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FINAL

Feasibility Study Report

Newark Former Manufactured Gas Plant Site

Newark, New York

Site No. 8-59-021

March 2013

Certification Statement

I, Jason Brien, P.E. certify that I am currently a NYS registered professional engineer and that this *Feasibility Study Report* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010a).

________________________________ Date 3/29/2013

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Site No. 8-59-021

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Introduction

This *Feasibility Study Report* (FS Report) presents an evaluation of remedial alternatives to address environmental impacts identified at the former manufactured gas plant (MGP) site (the site) located in the Village of Newark, New York (New York State Department of Environmental Conservation [NYSDEC] Site No. 8-59-021). This FS Report has been prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of NYSEG in accordance with an Order on Consent (Index Number D0-0002-9309) between NYSEG and the NYSDEC.

The purpose of this FS Report is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions
- Protective of public health and the environment
- Consistent with relevant sections of NYSDEC guidance, the National Contingency Plan (NCP), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The overall objective of this FS Report is to recommend a reliable remedy that achieves the site-specific remedial action objectives (RAOs) and best balance the NYSDEC evaluation criteria.

Background

The former MGP site is located on West Shore Boulevard in an urban area of the Village of Newark, New York. For the purposes of the Feasibility Study, the project area is defined as the former MGP property and surrounding properties where Remedial Investigations were conducted. The majority of the former MGP property is located on a parcel that is currently operated by a Quality Inn hotel (owned by Ten Masters Hotels, Inc.). The former MGP property also extends to the approximate northern boundary of what is now West Shore Boulevard. Additional properties that are considered part of the project area consist of a gravel and grass covered area (owned by Mr. Clement Whalen) north of West Shore Boulevard and a vacant grass-covered lot (owned by MJB Properties) located immediately west of the hotel property.

The MGP reportedly operated from circa 1900 into the 1920's (Atlantic Environmental Services [AES], 1991). The current property owner, Ten Masters Hotels, Inc., acquired the property sometime after 1974. During its peak operation, the MGP consisted of two gas holders (referred to as the eastern and western holders), a retort house, a purifier house, a coal shed, two tar wells and two "pressure tanks". The Newark MGP produced gas using the coal carbonization process and later the carbureted water gas process (AES, 1991). The tars produced by the coal carbonization process were generally viscous and contained higher concentrations of phenols and base nitrogen organics when compared to the tars generated from the later carbureted water gas process. Coal carbonization also produced cyanide in the gas, which was removed during gas purification and often appears in wastes such as lime and wood chips.

Based on a review of Sanborn Fire Insurance Maps for the period of 1885 through 1963 and historical aerial photographs, former MGP structures were removed by 1974. The hotel was constructed sometime between 1974 and 1985, and construction of West Shore Boulevard began in approximately 1985.

Nature and Extent of Impacts

For the purpose the Feasibility Study, MGP-related impacts were identified in the following primary areas:

- North of West Shore Boulevard
- Tar Well and Eastern Gas Holder
- Western Gas Holder

<u>North of West Shore Boulevard</u>

- Visual impacts observed in this area consisted of solidified tar-like material (TLM) at soil borings SB-23, SB-29, and SB-30 (at depths ranging from 0.5 to 5.4 feet below ground surface [bgs])

- Analytical results for near surface (i.e., collected from 0 to 2 feet bgs) and subsurface soil samples (i.e., greater than 2 feet bgs) collected from this area indicated the presence of polycyclic aromatic hydrocarbons (PAHs) at elevated concentrations from 0 to 9 feet bgs. These highest total PAH concentrations are attributed to the TLM observed at shallow depths in this area.

Tar Well and Eastern Gas Holder

- Visual impacts observed in this area consisted of solidified TLM at soil borings SB-6 and SB-7 at depths ranging from 5 to 7.5 feet bgs, and at soil boring SB-9 at a depth of approximately 15 feet bgs. Trace amounts of oil-like material (OLM) were also observed at soil borings SB-3 and SB-6 at depths of 18 and 15 feet bgs, respectively.

- Analytical results for subsurface soil samples SB-6 (7-7.3') and SB-9 (9-11') located within and immediately south of the northern tar well (respectively) indicated the presence of (benzene, toluene, ethylbenzene, and/or xylene) BTEX and PAH compounds at elevated concentrations.

- Benzene was detected in a groundwater sample collected from monitoring well MW-10-02 at a concentration slightly exceeding the NYSDEC Class GA Standard for benzene.

Although the northern tar well and eastern gas holder are considered one area, additional investigation activities (i.e., in support of a remedial design) may be conducted to confirm that impacted material observed is confined to the limits of tar well.

Western Gas Holder

- Visual impacts observed in this area consisted of a 0.2-foot interval of solidified TLM at soil boring SB-2 at a depth of 7.5 feet bgs.

- Benzene was detected in a groundwater sample collected from monitoring well MW-10-01 at a concentration only slightly exceeding the NYSDEC Class GA Standard.

None of the soil samples collected in the vicinity of the western gas holder contained BTEX or PAH compounds at concentrations exceeding 10 or 500 milligrams per kilogram (mg/kg), respectively.

Remedial Action Objectives

RAOs are developed to specify the constituents of concern (COCs) within the project area, and to assist in developing goals for cleanup of COCs in each medium that may require remediation. The RAOs presented in the following table have been developed based on the generic RAOs listed on NYSDEC's website (http://www.dec.ny.gov/regulations/67560.html).

Table ES.1 Remedial Action Objectives

RAOs for Soil
RAOs for Public Health Protection
1. Prevent, to the extent practicable, ingestion/direct contact with MGP-related COCs/NAPL.
2. Prevent, to the extent practicable, inhalation of or exposure to MGP-related COCs from impacted soil.
RAOs for Environmental Protection
3. Prevent, to the extent practicable, impacts to biota from ingestion/direct contact with MGP-related COCs/NAPL.
4. Address, to the extent practicable, MGP-related COCs/NAPL in soil that could result in impacts to groundwater.
RAOs for Groundwater
RAOs for Public Health Protection
1. Prevent, to the extent practicable, ingestion of groundwater containing MGP-related dissolved phase COCs at concentrations exceeding NYSDEC groundwater quality Standards or Guidance Values.
2. Prevent, to the extent practicable, contact with or inhalation of VOCs from groundwater containing MGP-related COCs at concentrations exceeding NYSDEC groundwater quality Standards or Guidance Values.
RAOs for Environmental Protection
3. Restore groundwater to pre-disposal/pre-release conditions, to the extent practicable.
4. Address the source of groundwater impacts to the extent practicable.

Notes:
NAPL = Non-aqueous phase liquid; identified as OLM and TLM.

Remedial Technology Screening and Development of Remedial Alternatives

The objectives of the technology screening are to:

- Identify general response actions (GRAs)
- Identify associated remedial technology types and technology process options
- Narrow the universe of process options to those that have had documented success at achieving similar RAOs at former MGP sites to identify options that are implementable and potentially effective at addressing impacts identified for the project area

Based on this screening, remedial technology types and technology process options were eliminated or retained and subsequently combined into potential remedial alternatives for further, more detailed evaluation. This approach is consistent with the screening and selection process provided in DER-10. Based on the results of the technology screening, the following potential remedial alternatives were developed:

- Alternative 1 – No Action
- Alternative 2 – Groundwater Monitoring and Institutional Controls
- Alternative 3 – Targeted Soil Removal
- Alternative 4 – Deep Soil Removal
- Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions

Detailed Evaluation of Alternatives

Following the development of the remedial alternatives, a detailed description of each alternative was prepared and each alternative was evaluated with respect to the following criteria presented in DER-10:

- Short-Term Impacts and Effectiveness
- Long-Term Effectiveness and Permanence
- Land Use
- Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment
- Implementability
- Compliance with SCGs
- Overall Protectiveness of the Public Health and the Environment
- Cost Effectiveness

Comparative Analysis of Alternatives

Following the detailed evaluation of each alternative, a comparative analysis of the alternatives was completed using the evaluation criteria. The comparative analysis identified the advantages and disadvantages of each alternative relative to each other and with respect to the evaluation criteria. The results of the comparative analysis were used as a basis for recommending the preferred remedy for achieving the RAOs.

Preferred Remedial Alternative

The results of the comparative analysis were used as the basis for recommending a remedial alternative for the project area: Alternative 4. The primary components of the preferred remedial alternative consist of the following:

- Conducting a pre-design investigation (PDI) to refine/verify the extent of soil removal
- Protecting, bypassing, or relocating subsurface utilities that transect soil removal areas
- Excavating an estimated 1,500 cubic-yards (cy) of surface material, subsurface soil, and former MGP structures (plus up to an estimated 4,600 cy of soil and former MGP structures associated with the eastern and western gas holders) to a depth up to 18 feet bgs to address soil located above and below the water table that contains visual MGP-related impacts and/or total PAHs at concentrations greater than 500 mg/kg. As indicated above, a PDI will be conducted to refine/verify soil removal limits, as well as assess whether the former holders require removal.
- Transporting an estimated 170 tons of surface material off-site for disposal as construction and demolition (C&D) debris (plus up to an estimated 660 tons associated with the eastern and western gas holder excavations)
- Transporting an estimated 2,200 tons of subsurface soil off-site for treatment/disposal via low-temperature thermal desorption (LTTD) (plus up to an estimated 6,300 tons associated with the eastern and western gas holder excavations)
- Transporting an estimated 28,000 gallons of construction-related water off-site for treatment/disposal (plus up to an estimated 135,000 gallons associated with the eastern and western gas holder excavations)

- Backfilling soil removal areas with a controlled low-strength material (CLSM) to reduce the potential for damage to nearby infrastructure and buildings

- Restoring disturbed surfaces, in kind, with asphalt pavement, concrete, or vegetated topsoil

- Establishing institutional controls for properties within the project area in the form of deed restrictions and/or environmental easements that would limit intrusive (i.e., subsurface) activities that could result in potential exposures to residual subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values; require compliance with a Site Management Plan (SMP); and prohibit the use of non-treated groundwater in the project area.

- Preparing an SMP to document the following:

    - The institutional controls that have been established and will be maintained for the project area

    - Known locations of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial use SCOs

    - Protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially residually impacted material encountered during these activities

    - Protocols and requirements for conducting annual groundwater monitoring

    - Protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities

Acronyms and Abbreviations

AES	Atlantic Environmental Services
ARCADIS	ARCADIS of New York, Inc.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
C&D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLSM	controlled low-strength material
COC	constituent of concern
cy	cubic-yard
DAR	Division of Air Resources
DNAPL	dense non-aqueous phase liquid
DPW	Department of Public Works (DPW)
DUS/HPO	dynamic underground stripping and hydrous pyrolysis/oxidation
ECL	Environmental Conservation Law
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
FWRIA	Fish and Wildlife Resource Impact Analysis
GHG	greenhouse gas
GRA	general response action
GRI	Gas Research Institute
HASP	health and safety plan
HHEA	Human Heath Exposure Assessment
ISCO	in-situ chemical oxidation
LDRs	land disposal regulations
LTTD	low-temperature thermal desorption
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid

NCP	National Contingency Plan
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OLM	oil-like material
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	pre-design investigation
POTW	Publicly Owned Treatment Works
PPE	personal protective equipment
PRB	permeable reactive barrier
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery
RI	Remedial Investigation
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objective
SMP	site management plan
SSI	Site Screening Investigation
SVOC	semi-volatile organic compound
TAGM	Technical and Administrative Guidance Memorandum
TLM	tar-like material
TCLP	Toxicity Characteristic Leaching Procedure
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
UTS	Universal Treatment Standard
UV	ultraviolet
VOC	volatile organic compound
µg/L	micrograms per liter

1. Introduction

This *Feasibility Study Report* (FS Report) presents an evaluation of remedial alternatives to address environmental impacts identified at the former manufactured gas plant (MGP) site (the site) located in the Village of Newark, New York (New York State Department of Environmental Conservation [NYSDEC] Site No. 8-59-021). This FS Report has been prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of NYSEG in accordance with an Order on Consent (Index Number D0-0002-9309) between NYSEG and the NYSDEC.

1.1 Regulatory Framework

This FS Report has been prepared to evaluate remedial alternatives to address identified environmental impacts in a manner consistent with the Order on Consent and with NYSDEC Division of Environmental Remediation (DER) *DER-10 Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010a).

This FS Report has also been prepared in consideration of applicable provisions of the New York State Environmental Conservation Law (ECL) and associated regulations, including Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375-6 (6 NYCRR Part 375-6).

1.2 Purpose

The purpose of this FS Report is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions
- Protective of public health and the environment
- Consistent with relevant sections of NYSDEC guidance, the National Contingency Plan (NCP), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The overall objective of this FS Report is to recommend a reliable remedy that achieves the site-specific remedial action objectives (RAOs) and best balance the NYSDEC evaluation criteria.

1.3 Report Organization

This FS Report is organized as described in the following table.

Table 1.1 Report Organization

Section	Purpose
Section 1 – Introduction	Provides background information relevant to the development of remedial alternatives evaluated in this FS Report.
Section 2 – Identification of Standards, Criteria, and Guidance	Identifies standards, criteria, and guidance (SCGs) that govern the development and selection of remedial alternatives.
Section 3 – Development of Remedial Action Objectives	Presents a summary of the risk assessment and develops site-specific RAOs that are protective of public health and the environment.
Section 4 – Technology Screening and Development of Remedial Alternatives	Presents the results of a screening process to identify potentially applicable remedial technologies and assembles remedial alternatives that have the potential to meet the RAOs.
Section 5 – Detailed Evaluation of Remedial Alternatives	Presents a detailed description and analysis of each potential remedial alternative using the evaluation criteria presented in the referenced guidance documents.
Section 6 – Comparative Analysis of Alternatives	Presents a comparative analysis of each remedial alternative using the evaluation criteria.
Section 7 – Preferred Remedial Alternative	Identifies the preferred remedial alternative for addressing the environmental concerns.
Section 8 – References	Provides a list of references utilized to prepare this FS Report.

1.4 Background Information

This section summarizes background information relevant to the development and evaluation of remedial alternatives, including location, physical setting, and history of the former MGP, as well as summary of the previously completed investigations.

1.4.1 Site Location and Physical Setting

The former MGP site is located on West Shore Boulevard in an urban area of the Village of Newark, New York (Figure 1). For the purposes of the Feasibility Study, the project area is defined as the former MGP property and surrounding properties that were investigated during the Remedial Investigation (RI). The limits of the former MGP property are shown on Figure 2. The majority of the former MGP property is located on a parcel that is currently operated by a Quality Inn hotel (owned by Ten Masters Hotels, Inc.). The former MGP property also extends to the approximate northern boundary of what is now West Shore Boulevard. Additional properties that are considered part of the project area consist of a gravel and grass-covered area (owned by Mr. Clement Whalen) north of West Shore Boulevard and a vacant grass-covered lot (owned by MJB Properties) located immediately west of the hotel property.

The New York State Barge Canal borders the hotel property to the south (i.e., approximately 250 feet south of the former MGP property). A small creek (Military Brook) was formerly located immediately south of the MGP property, but has since been backfilled. The creek was no longer present by 1924 based on a review of historical mapping.

1.4.2 Site History

The MGP reportedly operated from circa 1900 into the 1920’s (Atlantic Environmental Services [AES], 1991). Based on a review of available records, the MGP property ownership is as follows:

- 1899 to 1910 – Newark New York Gas & Light Fuel Company
- 1910 to 1911 – Wayne County Gas & Electric Company
- 1911 to 1916 – Central New York Gas & Electric Company
- 1916 to 1936 – Empire Gas & Electric Company
- 1936 to 1974 – New York State Electric & Gas Corporation
- 1974 – Sold to Newark Urban Renewal Agency, then to Edward Braverman and Edward Storto

The current property owner, Ten Masters Hotels, Inc., acquired the property sometime after 1974.

During its peak operation, the MGP consisted of two gas holders (referred to as the eastern and western holders), a retort house, a purifier house, a coal shed, two tar wells and two “pressure tanks”. The Newark MGP produced gas using the coal carbonization process and later the carbureted water gas process (AES, 1991). The tars produced by the coal carbonization process were generally viscous and contained higher concentrations of phenols and base nitrogen organics when compared to the tars generated from the later carbureted water gas process. Coal carbonization also produced cyanide in the gas, which was removed during gas purification and often appears in wastes such as lime and wood chips.

Based on a review of Sanborn Fire Insurance Maps for the period of 1885 through 1963 and historical aerial photographs, former MGP structures were removed by 1974. The hotel was constructed sometime between 1974 and 1985, and construction of West Shore Boulevard began in approximately 1985.

1.4.3 Summary of Investigations

The project area has been subject to several environmental investigations including the following:

- Early 1990’s – Unknown Investigation. Four wells (i.e., monitoring wells MW-1A through MW-4A) were observed on the hotel property by ARCADIS during a site visit in October 2009. The property owner suggested that these wells were installed in the early 1990’s, but documentation or records pertaining to the wells do not exist. NYSEG suspects that these wells were installed as part of a commercial property transfer or re-finance (i.e. a Phase I Environmental Site Assessment) and not driven by a regulatory requirement.

- 1991 – Site Screening Investigation (SSI). AES conducted an SSI that included a historical review, and surface soil, surface water and streambed sampling and analyses, and a sensitive habitat survey. The primary objectives of the SSI were to:

  - Determine if an imminent threat to human health and/or the environment existed.

  - Establish a rank for the site relative to NYSEG’s other MGP sites.

- 2008 – Soil Vapor Intrusion Evaluation conducted by ARCADIS. The soil vapor evaluation included sub-slab soil gas, indoor air and ambient air sampling. The primary objective of the soil vapor evaluation was to evaluate the potential presence or migration of MGP-related vapor phase compounds beneath or inside the hotel building.

- 2011 – Remedial Investigation conducted by ARCADIS. The Remedial Investigation consisted of soil and groundwater investigations (surface soil, near surface soil, subsurface soil and groundwater sampling) and a risk evaluation. The overall objectives of the Remedial Investigation were to:

  - Characterize the site by establishing the nature and extent of MGP-related impacts.

  - Evaluate the risk posed to human health and environment by the MGP-related impacts.

  - Provide the information needed for evaluating remedial actions to address MGP-related impacts.

- 2012 – Additional surface soil sampling conducted by ARCADIS at the request of the New York State Department of Health (NYSDOH). Surface soil samples collected in 2011 during the RI were collected from the 0- to 1-foot and 0- to 2-foot depth intervals. In late 2012, the NYSDOH indicated that the 2011 surface soil sampling intervals were not appropriate for evaluating human exposure via soil ingestion, inhalation, or dermal contact, and NYSDOH requested that additional surface samples be collected from the 0- to 2-inch depth interval.

The results of these investigations were collectively used to develop the current characterization as presented in Section 1.5.

1.5 Site Characterization

This section presents an overall characterization of the project area and a summary of the nature and extent of impacted media based on the results obtained during the investigation activities conducted to date (as described in Section 1.4.3). The characterization consists of a summary of geology and hydrogeology and the nature and extent of impacts.

1.5.1 Geology

Geology cross-sections are provided as Figures 3, 4 and 5. As shown on the figures the overburden strata, in descending order from the ground surface consists of fill and a till unit. The character of these strata is briefly described below:

- Fill – The fill unit comprises the uppermost geologic unit. The fill unit is present at the ground surface and is generally 10 to 25 feet thick at the west and east, respectively. This unit is comprised of reworked alluvial deposits (sands, gravels, silts) and anthropogenic materials (e.g., slag, coal, wood, metal, ash, concrete, brick and foundations from former MGP structures).

- Till Unit – This unit lies directly beneath the fill at approximately 11 to 25 feet below ground surface (bgs). This unit is at least 15 feet thick and is comprised of a dense mixture of sand and silt with varying amounts of clay and gravel. The dense nature of the till suggests that it is a lodgment till formed at the base of a glacier.

- Bedrock – Although bedrock was not encountered during the previous investigations, the bedrock in the Newark regions has been mapped as the Upper Silurian age (formed 410 million years ago) Camillus Shale (Rickard and Fisher 1970).

1.5.2 Hydrogeology

As described in the *Remedial Investigation Report* (RI Report) (ARCADIS, 2013), shallow groundwater flow is relatively complex and does not appear to flow in a uniform direction (see Figure 6). Groundwater appears to converge near the center of the hotel property and head to the northeast. There also appears to be a component of groundwater flow toward the south, in the immediate vicinity of the Barge Canal. The hydrogeology of the fill and till units is as follows:

- Fill – The majority of water moving through this unit is likely derived from upgradient sources to the south (Barge Canal) and west. Infiltrating precipitation also contributes a small fraction of groundwater in this unit. The hydraulic conductivity of the unit ranges between 0.3 and at least 168 feet per day (ft/day), with a geometric mean of 4.1 ft/day.

- Till Unit – The permeability of the till is low and thus, groundwater moves slowly in this unit compared to the overlying fill. The dense nature and fine-grained composition of the till suggests that the hydraulic conductivity of this unit is very low.

1.5.3 Nature and Extent of Impacts

Manufactured gas-production byproducts, typically dense non-aqueous phase liquid (DNAPL) (i.e., coal tar) and purifier waste, often account for the majority of the impacts at former MGP sites. Principal components of coal tar that are routinely analyzed for at MGP sites are benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, which are volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs), which are semi-volatile organic compounds (SVOCs). The principal chemical of concern associated with purifier waste is cyanide, and as such, total and free cyanide analyses are typically performed during investigations of MGP sites. Sporadic amounts of coal tar and elevated concentrations of BTEX and PAHs were observed in the soils and/or groundwater within the project area; however, deposits of purifier waste and elevated levels of total cyanide were not observed within the project area. The Remedial Investigation identified BTEX and PAH compounds as constituents of concern (COCs) because these compounds were detected in soil and/or groundwater at concentrations exceeding applicable SCGs. Total cyanide was not identified as a COC because it was not detected in any soil or groundwater samples above applicable SCGs. It should be noted that some metals were detected at levels exceeding applicable SCGs. However, the Remedial Investigation determined that the metals were either naturally occurring or related to the presence of abundant urban fill within the project area. As such, these metals were not considered COCs associated with the former MGP.

For the purpose the Feasibility Study, MGP-related impacts were identified in the following primary areas:

- North of West Shore Boulevard
- Tar Well and Eastern Gas Holder
- Western Gas Holder

Summaries of the MGP-related impacts identified in these areas are presented in the following subsections.

1.5.3.1 NAPL Distribution and Characterization

Non-aqueous phase liquids (NAPLs) in the project area generally consisted of oil-like material (OLM; which is considered DNAPL), tar-like material (TLM; which is also considered DNAPL), sheens, and staining. The distribution of the visual MGP-related impacts is shown on Figure 7 (as well as Figures 3, 4, and 5). NAPL-related impacts are generally distributed as follows:

- North of West Shore Boulevard – Visual impacts observed in this area consisted of solidified TLM at soil borings SB-23, SB-29, and SB-30 (at depths ranging from 0.5 to 5.4 feet below ground surface [bgs]).

- Tar Well and Eastern Gas Holder – Visual impacts observed within the northern tar well consisted of solidified TLM at soil borings SB-6 and SB-7 at depths ranging from 5 to 7.5 feet bgs, and south of the tar well at soil boring SB-9 at a depth of approximately 15 feet bgs. Trace amounts of OLM were also observed at soil borings SB-3 and SB-6 at depths of 18 and 15 feet bgs, respectively.

  Although the northern tar well and eastern gas holder are considered one area, additional investigation activities (i.e., in support of a remedial design) could be conducted to confirm that impacted material observed at soil borings SB-6 and SB-7 are confined to the limits of tar well structure.

- Western Gas Holder – Visual impacts observed in this area consisted of a 0.2-foot interval of solidified TLM at soil boring SB-2 at a depth of 7.5 feet bgs. This material is assumed to have been placed as part of backfilling activities in the western gas holder area and is not believed to be associated with the former western gas holder.

1.5.3.2 Soil Quality

The extent of soil containing concentrations of MGP-related COCs exceeding applicable soil cleanup objectives (SCOs) has a strong correlation to the observed TLM and OLM distribution within the project area. Surface and subsurface soil analytical results are summarized on Figures 8 and 9 and were compared to 6NYCRR Part 375-6 SCOs for commercial land use (commercial SCOs). Soil impacts are distributed primarily in the three areas identified above, as follows:

- North of West Shore Boulevard – Analytical results for surface and subsurface soil samples collected from this area indicated the presence of PAHs at elevated concentrations.

  - Surface soil samples collected in 2012 (i.e., collected from the 0- to 2-inch depth interval below vegetation) contained total PAHs at concentrations ranging from 9.3 to 350 mg/kg, with the greatest concentration observed at surface soil sampling location SS-13.

- Near surface (i.e., between 2-inches and 2-feet bgs) soil samples SB-23 (0.6-0.9') and SB-29 (0-2') contained total PAHs at concentrations of 68,000 milligrams per kilogram (mg/kg) and 44,000 mg/kg, respectively. These elevated total PAH concentrations are attributed to the TLM observed at shallow depths at these locations (as described in Section 1.5.3.1).

- Subsurface soil (i.e., greater than 2 feet bgs) sample SB-23 (7-9') contained total PAHs at a concentration of 520 mg/kg.

• Tar Well and Eastern Gas Holder – Analytical results for subsurface soil samples SB-6 (7-7.3') and SB-9 (9-11') located within and immediately south of the northern tar well (respectively) indicated the presence of BTEX and PAH compounds at elevated concentrations.

  - Soil sample SB-6 (7-7.3') contained total BTEX and total PAHs at concentrations of 120 and 8,200 mg/kg, respectively.

  - Soil sample SB-9 (9-11') contained total PAHs at a concentration of 2,800 mg/kg.

• Western Gas Holder – None of the soil samples collected in the vicinity of the western gas holder contained BTEX or PAH compounds at concentrations exceeding 10 or 500 mg/kg, respectively.

Additionally, PAHs were detected at concentrations ranging from 2.3 to 120 mg/kg in near surface soil samples collected west (samples SS-03 through SS-05) and northwest (SS-07 through SS-10) of the hotel property. These concentrations exceed the commercial SCOs. However, based on the visual characterization of the soil in this area, the Remedial Investigation concluded that these PAHs are likely associated with the presence of urban fill observed throughout the project area.

1.5.3.3 Groundwater Quality

The distribution of groundwater samples with concentrations exceeding NYSDEC's *Division of Water, TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (NYSDEC, reissued June 1998 and addended April 2000 and June 2004) is as follows (Figure 10):

• North of West Shore Boulevard – None of the groundwater samples collected in this area contained BTEX or PAH compounds at concentrations exceeding NYSDEC Class GA Standard for benzene.

- Tar Well and Eastern Gas Holder – Benzene was detected in a groundwater sample collected from monitoring well MW-10-02 at a concentration of 2.1 micrograms per liter (µg/L), which slightly exceeds the NYSDEC Class GA Standard for benzene (i.e., 1 µg/L).

- Western Gas Holder – Benzene was detected in a groundwater sample collected from monitoring well MW-10-01 at a concentration of 1.1 µg/L, which only slightly exceeds the NYSDEC Class GA standard of 1 µg/L.

Additionally, trace levels of total cyanide were detected in groundwater samples from three monitoring wells with the highest concentration detected in the sample collected from MW-3A at 0.034 µg/L. This concentration is much lower than the Class GA Standard of 200 µg/L for total cyanide. Therefore, cyanide is not considered to be a constituent of concern in groundwater. Polychlorinated biphenyls (PCBs) were not detected in groundwater sampled from any of the wells.

1.5.3.4 Soil Vapor Quality

A soil vapor evaluation was conducted in the Quality Inn hotel in April 2008 to evaluate the potential presence or migration of MGP-related vapor phase compounds beneath or inside the hotel building. Sampling results were submitted to the NYSDEC on July 8, 2008. A copy of that report is provided on the attached CD. As detailed in the July 8, 2008 report, the soil vapor investigation involved the collection of six subslab soil gas samples, seven indoor air samples, and one outside (ambient) air sample. The work was conducted in general conformance with procedures outlined in the New York State Department of Health (NYSDOH) document *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, October 2006, Final (Guidance). Samples were analyzed by a New York State ELAP-certified laboratory for VOCs by USEPA Method TO-15 plus N-Alkanes and selected tentatively identified compounds. Subslab and coupled indoor air samples were collected from various locations within the building with two sample sets placed in close proximity to the reported locations of the former gas holders. Results of the evaluation showed numerous VOCs to be present in ambient air, indoor air and subslab soil vapor samples. In general, ambient air concentrations of VOCs were similar to indoor air concentrations, thus suggesting a background source. In most, but not all cases, when VOCs were detected in both indoor air and subslab soil vapor samples, the indoor air concentrations tended to be similar to or lower than the subslab concentration for the same VOC.

Analytical results were compared with Matrices 1 and 2 from the NYSDOH Guidance, which specifies seven chlorinated solvents to be evaluated. Of the seven solvents, trichloroethene (TCE) and tetrachloroethene (PCE) were detected at concentrations meeting action levels as specified in their respective Matrices. It may be worth noting that trace concentrations of PCE were subsequently detected in one near-surface soil sample collected west of the site (SS-04[0-1 ft bgs]).

The concentration of TCE in the indoor air sample IA-6 of 0.25 µg/m^3 juxtaposed with the subslab concentration of 6.1 µg/m^3 falls within the “Monitor” category of Matrix 1. Indoor air concentrations of 0.41 µg/m^3, 0.41 µg/m^3 and 0.70 µg/m^3 at indoor air sampling points IA-1, IA-2, and IA-3, respectively fall within the “Take reasonable and practical actions to identify source(s) and reduce exposures” category. It should be noted that TCE was detected at a concentration of 0.47 µg/m^3 in the ambient (outdoor) air sample, suggesting a possible background source for the indoor air TCE detections. Interior building renovations were in progress during the sampling event and several solvent-containing products (such as PVC cement) were observed during the product inventory; however, specific solvent compounds were not identified.

PCE was detected at a concentration of 150 µg/m^3 in subslab sample SS-5, which falls within the “Monitor” category of Matrix 2. PCE was not detected in indoor air or ambient air samples.

Since TCE and PCE are not generally associated with MGP sites, the presence of these compounds are not related to the former MGP. Cracks or utility penetrations through the concrete floor could create a route for migration of these compounds into the indoor air.

Benzene, toluene, ethylbenzene and xylenes were detected in indoor air, subslab and ambient air samples. There is currently no regulatory database to which subslab concentrations of petroleum compounds can be compared.

Indoor and ambient concentrations of petroleum compounds were compared to the USEPA 2001 Building Assessment & Survey Evaluation (BASE) database Table C2. The results are summarized and compared to the 90th percentile BASE data in Table 10. Concentrations of petroleum compounds in ambient (outdoor) air did not exceed the BASE data 90th percentile. Toluene was the only petroleum compound to exceed its associated 90th percentile value at indoor air samples IA-1 through IA-4.

2. Identification of Standards, Criteria, and Guidance

This FS Report was prepared in general conformance with the applicable guidance, criteria and considerations set forth in the DER-10 and 6 NYCRR Part 375 Environmental Remediation Programs. This section presents the SCGs that have been identified for the project area.

2.1 Definition of Standards, Criteria, and Guidance

"Standards and criteria" are cleanup standards, standards of control and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance.

"Guidance" is non-promulgated criteria, advisories and/or guidance that are not legal requirements and do not have the same status as "standards and criteria;" however, remedial programs should be designed with consideration given to guidance documents that, based on professional judgment, are determined to be applicable to the project (6 NYCRR 375-1.8[f][2][ii]).

Standards, criteria and guidance will be applied so that the selected remedy will conform to standards and criteria that are generally applicable, consistently applied and officially promulgated; and that are either directly applicable, or that are not directly applicable but relevant and appropriate, unless good cause (as defined in 6 NYCRR 375-1.8 [f][2][i]) exists why conformity should be dispensed with.

2.2 Types of Standards, Criteria, and Guidance

Potential SCGs considered in this FS Report were categorized in the following classifications:

- *Chemical-Specific SCGs* – These SCGs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values for each COC. These values establish the acceptable amount or concentration of chemical constituents that may be found in, or discharged to, the ambient environment.

- *Action-Specific SCGs* – These SCGs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste management and remediation.

- *Location-Specific SCGs* – These SCGs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in specific locations.

2.3 Standards, Criteria, and Guidance

The SCGs identified for the evaluation of remedial alternatives are presented in the following subsections. These SCGs have been identified as potentially applicable; their actual applicability will be determined during the evaluation of a particular remedy, and further described during development of the remedial design (i.e., after the final remedy has been selected). Each potential remedy will comply with the identified SCGs, or indicate why compliance with an SCG cannot or will not be obtained.

2.3.1 Chemical-Specific SCGs

The potential chemical-specific SCGs for the project area are summarized in Table 1. Chemical-specific SCGs are the criteria that typically drive the remedial efforts at former MGP sites because they are most directly associated with addressing potential human exposures. The primary chemical-specific SCGs that exist for impacted soil and groundwater at the project area are briefly summarized below.

The SCOs presented in 6 NYCRR Part 375-6 are chemical-specific SCGs that are relevant and appropriate to the project area. Specifically, the SCOs for the protection of human health, assuming a future commercial use (commercial use SCOs) and future industrial use (industrial use SCOs) are applicable for surface soils and subsurface soils, respectively. Additionally, CP-51 *Soil Cleanup Guidance* (NYSDEC, 2010b) allows for a subsurface soil total PAH SCO of 500 mg/kg at non-residential sites (i.e., commercial and industrial use sites).

Chemical-specific SCGs that potentially apply to the waste materials generated during remedial activities are the Resource Conservation and Recovery Act (RCRA) and New York State regulations regarding identifying and listing hazardous wastes outlined in 40 Code of Federal Regulations (CFR) 261 and 6 NYCRR Part 371, respectively. Included in these regulations are the regulated levels for the Toxicity Characteristic Leaching Procedure (TCLP) constituents. The TCLP constituent levels are a set of numerical criteria at which solid waste is considered a hazardous waste by the characteristic of toxicity. In addition, the hazardous characteristics of ignitability, reactivity and corrosivity may also apply, depending upon the results of waste characterization analyses.

Groundwater within the project area is classified as Class GA and, as such, the NYSDEC TOGS 1.1.1 Class GA Standards and Guidance Values are potentially applicable. These standards identify acceptable levels of constituents in groundwater based on potable use.

2.3.2 Action-Specific SCGs

Potential action-specific SCGs are summarized in Table 2. Action-specific SCGs include general health and safety requirements, and general requirements regarding handling and disposal of waste materials (including transportation and disposal, permitting, manifesting, disposal and treatment facilities), discharge of water generated during implementation of remedial alternatives, and air monitoring requirements (including permitting requirements for on-site treatment systems). Action-specific criteria will be identified for the selected remedy in the remedial design work plan; compliance with these criteria will be required. Several action-specific SCGs that may be applicable are briefly summarized below.

The NYSDEC Division of Air Resources (DAR) policy document *DAR-1: Guidelines for the Control of Toxic Ambient Air Contaminants* (formerly issued as Air Guide 1) (NSYDEC, 1997), incorporates applicable federal and New York State regulations and requirements pertaining to air emissions, which may be applicable for soil or groundwater alternatives that result in certain air emissions. Community air monitoring may be required in accordance with the NYSDOH Generic Community Air Monitoring Plan. New York Air Quality Standards provides requirements for air emissions (6 NYCRR Parts 257). Emissions from remedial activities will meet the air quality standards based on the air quality class set forth in the New York State Air Quality Classification System (6 NYCRR Part 256) and the permit requirements in New York Permits and Certificates (6 NYCRR Part 201).

One set of potential action-specific SCGs consists of the land disposal regulations (LDRs), which regulate land disposal of hazardous wastes. LDRs are applicable to alternatives involving the disposal of hazardous waste (if any). Because MGP wastes resulted from historical operations that ended before the passage of RCRA, material containing MGP-related impacts is only considered a hazardous waste in New York

State if it is removed (generated) and it exhibits a characteristic of a hazardous waste. However, if the impacted material only exhibits the hazardous characteristic of toxicity for benzene (D018), it is conditionally exempt from the hazardous waste management requirements (6 NYCRR Parts 370-374 and 376) when destined for thermal treatment, in accordance with the requirements set forth in NYSDEC's TAGM HWR-4061, *Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants* (DER-4) (NYSDEC, 2002). If MGP-related hazardous wastes are destined for land disposal in New York State, the state hazardous waste regulations apply, including LDRs and alternative LDR treatment standards for hazardous waste soil.

The NYSDEC will no longer allow amendment of soil at MGP sites with lime kiln dust/ quick lime containing greater than 50% calcium and/or magnesium oxide (Ca/MgO) due to vapor issues associated with free oxides. Guidance issued in the form of a letter from the NYSDEC to the New York State utility companies, dated May 20, 2008, indicated that lime kiln dust/quick lime will not be permitted for use during future remedial activities.

The United States Department of Transportation (USDOT) and New York State rules for the transport of hazardous materials are provided in 49 CFR Parts 107 and 171.1 through 172.558 and 6 NYCRR 372.3, respectively. These rules include procedures for packaging, labeling, manifesting and transporting hazardous materials and are potentially applicable to the transport of hazardous materials under any remedial alternative. New York State requirements for waste transporter permits are included in 6 NYCRR Part 364, along with standards for collection, transport and delivery of regulated wastes within New York State. Contractors transporting waste materials off-site during the selected remedial alternative must be properly permitted.

Remedial alternatives conducted within the project area must comply with applicable requirements outlined under the Occupational Safety and Health Administration (OSHA). General industry standards are outlined under OSHA (29 CFR 1910) that specify time-weighted average concentrations for worker exposure to various compounds and training requirements for workers involved with hazardous waste operations. The types of safety equipment and procedures to be followed during remediation are specified under 29 CFR 1926, and record keeping and reporting-related regulations are outlined under 29 CFR 1904.

In addition to OSHA requirements, the RCRA (40 CFR 264) preparedness and prevention procedures, contingency plan and emergency procedures are potentially relevant and appropriate to those remedial alternatives that include generation, treatment or storage of hazardous wastes.

2.3.3 Location-Specific SCGs

Potential location-specific SCGs are summarized in Table 3. Examples of potential location-specific SCGs include regulations and federal acts concerning activities conducted in floodplains, wetlands and historical areas, and activities affecting navigable waters and endangered/threatened or rare species.

Based on the Federal Emergency Management Agency (FEMA) National Flood Insurance Program Map Number 3608940005C, dated July 15, 1988, the project area is located outside the limits of a 500-year floodplain.

Location-specific SCGs also include local requirements, such as local building permit conditions for permanent or semi-permanent facilities constructed during the remedial activities (if any), Village of Newark Department of Public Works (DPW) street work permits, and influent/pre-treatment requirements for discharging water to the Publicly Owned Treatment Works (POTW).

3. Development of Remedial Action Objectives

This section presents the RAOs for impacted media. These RAOs represent medium-specific goals that are protective of public health and the environment that have been developed through consideration of the results of the investigation activities and with reference to potential SCGs, as well as current and foreseeable future anticipated uses of the project area. RAOs are developed to specify the COCs, and to assist in developing goals for cleanup of COCs in each medium that may require remediation.

3.1 Risk Assessment Summary

A risk evaluation was conducted as part of the Remedial Investigation to evaluate potential human and environment exposure pathways to MGP-related impacts. Potential wildlife exposure pathways were evaluated by conducting a Fish and Wildlife Resource Impact Analysis (FWRIA). Potential human exposure pathways were evaluated through a Human Heath Exposure Assessment (HHEA).

As presented in the RI Report, all of the following must be present for an exposure pathway to be complete:

- Contaminant source
- Contaminant release and transport mechanisms
- Point of exposure
- Route of exposure
- Receptor populations

The following conclusions were reached based on the FWRIA and HHEA:

- Surface Soil – PAHs were detected in surface soil samples (i.e., collected from the 0- to 2-inch bgs) at concentrations greater than 6NYCRR Part 375-6 commercial SCOs north of West Shore Boulevard. Surface soils have been identified as a potentially complete exposure pathway for commercial workers, maintenance workers, and recreational users/trespassers. As indicated above, PAHs detected in surface soil samples SS-03 through SS-05 and SS-07 through SS-10 are likely associated with the presence of urban fill throughout the project area and are not likely a result of the former MGP operations based on the lack of visual impacts in this area.

- Near-Surface Soil – PAHs were detected in near-surface soil samples (i.e., between 2-inches and 2-feet bgs) at concentrations greater than 6NYCRR Part

375-6 commercial and ecological SCOs. Based on current and anticipated future land use, intrusive workers (e.g., utility and construction workers) may be exposed to near-surface soils (0 to 2 feet bgs) during intrusive activities such as utility maintenance and/or repair or future site development. Based on the urban environment and general lack of natural habitats, the project area and surrounding areas provided limited value to local wildlife.

- Subsurface Soil – Subsurface soil contains elevated concentrations of PAH compounds, as well as visual indications of TLM and OLM. Subsurface soils do not represent a complete exposure pathway for commercial workers, maintenance workers, or recreational users/trespassers because these receptors would not be involved in intrusive activities. The potential for human exposure to MGP-related impacts in subsurface soil is limited to construction or utility workers who may engage in future intrusive activities. Construction/utility workers could potentially be exposed to airborne VOCs and dust during intrusive work (i.e. excavation activities). However, inhalation of vapors during intrusive activities is not considered a significant exposure pathway.

- Groundwater – Benzene was detected at concentrations only slightly exceeding TOGS 1.1.1 Class GA Standards and Guidance Values. Additionally, the water table is located approximately 10 to 15 feet bgs and groundwater is not used for potable purposes. Similar to subsurface soils, commercial workers, maintenance workers, or recreational users/trespassers do not conduct intrusive activities and therefore, would not be exposed to groundwater containing MGP-related impacts. Construction/utility workers could potentially be exposed to groundwater during intrusive activities. However, it is expected that intrusive activities would generally take place above the water table and exposure to potentially impacted groundwater is not considered a significant exposure pathway.

3.2 Remedial Action Objectives

RAOs are developed to specify the COCs, and to assist in developing goals for cleanup of COCs in each medium that may require remediation. The RAOs presented in the following table have been developed based on the generic RAOs listed on NYSDEC's website (http://www.dec.ny.gov/regulations/67560.html).

Table 3.1 Remedial Action Objectives

RAOs for Soil
RAOs for Public Health Protection
1. Prevent, to the extent practicable, ingestion/direct contact with MGP-related COCs/NAPL.
2. Prevent, to the extent practicable, inhalation of or exposure to MGP-related COCs from impacted soil.
RAOs for Environmental Protection
3. Prevent, to the extent practicable, impacts to biota from ingestion/direct contact with MGP-related COCs/NAPL.
4. Address, to the extent practicable, MGP-related COCs/NAPL in soil that could result in impacts to groundwater.
RAOs for Groundwater
RAOs for Public Health Protection
1. Prevent, to the extent practicable, ingestion of groundwater containing MGP-related dissolved phase COCs at concentrations exceeding NYSDEC groundwater quality standards or guidance values.
2. Prevent, to the extent practicable, contact with or inhalation of VOCs from groundwater containing MGP-related COCs at concentrations exceeding NYSDEC groundwater quality standards or guidance values.
RAOs for Environmental Protection
3. Restore groundwater to pre-disposal/pre-release conditions, to the extent practicable.
4. Address the source of groundwater impacts to the extent practicable.

Note:
NAPL = Non-aqueous phase liquid; identified as OLM and TLM.

Potential remedial alternatives are evaluated (in Section 5) based on their ability to meet the RAOs and be protective of human health and the environment.

4. Technology Screening and Development of Remedial Alternatives

The objective of the technology screening conducted as a part of this FS Report is to present general response actions (GRAs) and associated remedial technology types and technology process options that have documented success at achieving similar RAOs at MGP sites, and to identify options that are implementable and potentially effective at addressing site-specific concerns. Based on this screening, remedial technology types and technology process options were eliminated or retained and subsequently combined into potential remedial alternatives for more detailed evaluation. This approach is also consistent with the screening and selection process provided in DER-10.

This section identifies potential remedial alternatives to address impacted media. As an initial step, GRAs potentially capable of addressing impacted media were identified. GRAs are medium-specific and may include various non-technology specific actions such as treatment, containment, institutional controls, and excavation. Based on the GRAs, potential remedial technology types and process options were identified and screened to determine the technology types and associated technology process options that were the most appropriate. Technology types/process options that were retained through the screening were used to develop potential remedial alternatives. Detailed evaluations of these assembled remedial alternatives are presented in Section 5.

According to DER-10, the term “technology type” refers to a general category of technologies appropriate to the site-specific conditions and impacts, such as chemical treatment, immobilization, biodegradation, capping. The term “technology process option” refers to a specific process within a technology type. For each GRA identified, a number of technology types and associated technology process options were identified. In accordance with DER-10, each remedial technology type and associated technology process options are briefly described and screened, on a medium-specific basis, to identify those that are technically implementable and potentially effective given site-specific conditions. This approach was used to determine if a particular remedial technology type and technology process option is applicable given site-specific conditions for remediation of the impacted media.

4.1 Identification of Remedial Technologies

Remedial technology types that are potentially applicable for addressing the impacted media that were identified through a variety of sources, including vendor information, engineering experience, and review of available literature that included the following documents:

- *Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010a)
- *Presumptive/Proven Remedial Technologies for New York States Remedial Programs* (DER-15) (NYSDEC, 2007)
- “Management of Manufactured Gas Plant Sites” (Gas Research Institute [GRI], 1996)
- *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA, 1988)

Section 4.3(a)(3)(iv) of DER-10 indicates that GRAs should be established such that they give preference to presumptive remedies. Although each former MGP site offers its own unique site characteristics, the evaluation of remedial technology types and process options that are applicable to MGP-related impacts, or have been implemented at other MGP sites, is well documented. Therefore, this collective knowledge and experience, and regulatory acceptance of previous feasibility studies performed on MGP sites with similar impacts, were used to reduce the universe of potentially applicable process options to those with documented success in achieving similar RAOs.

4.2 General Response Actions

Based on the RAOs identified in Section 3, the following GRAs have been established for soil and groundwater:

- No Action
- Institutional Controls
- In-Situ Containment/Control
- In-Situ Treatment
- Removal
- Ex-Situ On-Site Treatment/Disposal
- Off-Site Treatment/Disposal

4.3 Remedial Technology Screening Criteria

Potentially applicable remedial technology types and technology process options were identified for each of the GRAs, and were screened on a medium-specific basis to retain the technology types and process options that could be implemented and would potentially be effective at achieving the site-specific RAOs. Screening was conducted to identify potential technology types and technology process options to address impacted soil and groundwater.

Technology process options were evaluated relative to other technology process options of the same remedial technology type using the following criteria:

- *Implementability* – This criterion evaluates the ability to construct and reliably operate the technology process option, as well as the availability of specific equipment and technical specialists to design, install, and operate and maintain the remedy.

- *Effectiveness* – This criterion is focused on the process option's ability to meet the site-specific RAOs, either as single technology or when used in combination with other technologies.

4.4 Remedial Technology Screening

The objective of this Feasibility Study is to briefly present GRAs and associated technology types; however, quickly focus on the remedial technology types and associated process options that have documented success at achieving similar RAOs at former MGP sites. The identified remedial technologies for addressing impacted soil and groundwater are presented in the following subsections and in Tables 4 and 5, respectively.

4.4.1 Soil

This section describes the basis for retaining representative soil remedial technology types and technology process options through the technology screening.

<u>No Action</u>

As required by DER-10, the "No Action" technology has been included and retained through the screening evaluation. No action would be completed to address impacted soil. The "No Action" alternative is readily implementable and was retained to serve as a baseline against which other alternatives will be compared.

Institutional Controls

The remedial technology types identified under this GRA consist of non-intrusive controls focused on minimizing potential exposure to impacted media. The remedial technology type screened under this GRA consists of institutional controls. Technology process options screened under this remedial technology type include deed restrictions, environmental land use restrictions, enforcement and permit controls, and informational devices. Institutional controls would be utilized to limit permissible future uses of the project area, as well as establish health and safety requirements to be followed during subsurface activities that could result in construction worker exposure to impacted soil.

Institutional controls will not achieve the soil RAOs as a stand-alone process, as these measures would not treat, contain or remove impacted soil. However, this process option was retained because institutional controls can be implemented in conjunction with other remedial technologies to reduce the potential for exposure to impacted soil.

In-Situ Containment/Control

Remedial technology types associated with this GRA consist of measures to address the impacted media by reducing mobility and/or the potential for exposure without removal or treatment. The remedial technology type evaluated under this GRA consists of capping. Technology process options screened under this remedial technology type include: soil cap, asphalt/concrete cap, and multimedia cap.

None of the capping technology process options were retained for further evaluation. While each of these technology process options is readily implementable, construction of a cap would not provide any significant reduction to potential future exposures to impacts and would not achieve a majority of the site-specific RAOs.

In-Situ Treatment

Remedial technology types associated with this GRA consist of those that treat or stabilize impacted soil in-situ (i.e., without removal). These technologies would actively address MGP-related COCs in soil to achieve the RAOs. The remedial technology types evaluated under this GRA consist of immobilization, extraction/in-situ stripping, chemical treatment, biological treatment, and thermal treatment. Technology process options screened under these remedial technology types include:

- solidification/stabilization (immobilization)
- dynamic underground stripping and hydrous pyrolysis/oxidation (DUS/HPO) (extraction/in-situ stripping)
- chemical oxidation and surfactant/co-solvent flushing (chemical treatment)
- biodegradation, enhanced biodegradation, and biosparging (biological treatment)
- in-situ thermal desorption and electrical resistance heating (thermal treatment)

Solidification/stabilization is an effective means to reduce the mobility of MGP-related COCs, eliminate free liquids, and reduce the hydraulic conductivity of NAPL-impacted soil. However, the presence of buildings and subsurface structures (i.e., former MGP structures and existing utilities) could limit the implementability of solidification/ stabilization of soil. Therefore, solidification/stabilization was not retained for further evaluation.

Based on the results of the screening, DUS/HPO, chemical oxidation, surfactant/co-solvent flushing, biodegradation, enhanced biodegradation, and biosparging were not retained for further evaluation due to general ineffectiveness at addressing NAPL-impacted soil. Additionally, each of these processes would require long-term operation and monitoring due to the nature of impacts.

Specific concerns related to DUS/HPO include the potential for the uncontrolled migration of NAPL that could limit the effectiveness of the technology process option. DUS/HPO is typically more effective for addressing chlorinated solvents.

Pilot studies conducted at other former MGP sites have shown that in-situ chemical oxidation (ISCO) (including surfactant/co-solvent flushing) is only partially effective in the treatment of NAPL-impacted soil. ISCO has been shown to be effective at treating the dissolved phase impacts associated with the NAPL, but does not effectively treat soil containing NAPL. Multiple applications with large quantities of highly reactive oxidants would be required due to the nature of impacts. Based on the ineffectiveness in addressing impacted soil, oxidant would need to be administrated over the long-term.

In-situ thermal treatment technologies were not retained as these technologies may not be effective at addressing NAPL and numerous implementability concerns associated with the utilities present within and near West Shore Boulevard.

Removal

Remedial technology types associated with this GRA consist of measures to recover impacted soil/NAPL from the ground. The remedial technology types evaluated under this GRA consist of excavation and NAPL removal. Technology process options screened under these remedial technology types include:

- excavation
- active removal, passive removal, and hot water/steam injection (NAPL Removal)

Excavation is a proven technology to address impacted material and would achieve several RAOs. When combined with proper handling of the excavated material, this technology process would be effective at minimizing potential future exposures. Excavation could be implemented (i.e., equipment and contractors needed to complete soil removal are readily available).

None of the NAPL removal-related processes options were retained through the technology screening because mobile NAPL has not been observed within the project area.

Ex-Situ On-Site Treatment and/or Disposal

Remedial technology types associated with this GRA consist of measures to treat impacted soil on-site after soil has been excavated or otherwise removed from the ground. The remedial technology types evaluated under this GRA consist of on-site ex-situ immobilization, extraction, thermal destruction, chemical treatment, and disposal. Technology process options screened under these remedial technology types include:

- solidification/stabilization (immobilization)
- low-temperature thermal desorption (LTTD) (extraction)
- incineration (thermal destruction)
- chemical oxidation and soil washing (chemical treatment)
- solid waste landfill and RCRA landfill (disposal)

Due to the current and anticipated future uses of the project area (i.e., commercial use in an urban setting), none of the ex-situ on-site treatment and/or disposal technology types and associated technology process options are considered practicable, technically implementable, or administratively feasible given lack of available space, public acceptance, and potential for exposures during on-site treatment/disposal. None of these process options were retained for further evaluation.

Off-Site Treatment and/or Disposal

Remedial technology types associated with this GRA consist of measures to treat/dispose of impacted soil at off-site locations after soil has been removed from the ground. The remedial technology types evaluated for this GRA consist of recycle/reuse, extraction, thermal destruction, and off-site disposal. Technology process options screened under these remedial technology types include:

- asphalt batching, brick/concrete manufacturer, and fuel blending/co-burn in utility boiler (recycle/reuse)
- LTTD (extraction)
- incineration (thermal destruction)
- solid waste landfill and RCRA landfill (off-site disposal)

LTTD and off-site disposal at a solid waste landfill were retained for further evaluation. Disposal at an off-site solid waste landfill would be reserved for material that is not suitable for on-site reuse as subsurface fill and that is not appropriate for treatment via LTTD (e.g., concrete, debris). While each of these process options were retained, the final off-site treatment or disposal of waste materials will be evaluated as part of the remedial design for the selected remedy. This will allow for an evaluation of the costs associated with these potential off-site treatment/disposal processes, which can fluctuate significantly based on season, market conditions, and treatment/disposal facility capacity. In addition, multiple off-site treatment technologies could be utilized to treat or dispose of media with different concentrations of COCs. However, for the purpose of preparing this FS Report, LTTD and solid waste landfill are assumed as the off-site treatment/disposal technology process options for hazardous (D018) and non-hazardous materials (respectively) that may be generated during remedial construction.

The asphalt concrete batch plant, brick/concrete manufacturer and co-burn in utility boiler technology processes are not considered implementable. The number of facilities capable of implementing these process and demand for raw materials are limited. Incineration and RCRA landfill technology processes were not retained through the technology screening. The relative cost for incineration is high and although incineration would be an effective means for treating soil containing MGP-related impacts, LTTD is equally effective for treating impacted soil at a lower cost. Disposal at a RCRA landfill was not retained as material that is characteristically hazardous would still require pre-treatment to meet New York State Universal Treatment Standards (UTSs)/LDRs prior to disposal.

4.4.2 Groundwater

This section describes the basis for retaining representative groundwater remedial technology types and technology process options through the technology screening.

No Action

As required by DER-10, the “No Action” technology has been included and retained through the screening evaluation. No action would be completed to address impacted groundwater. The “No Action” alternative is readily implementable and was retained to serve as a baseline against which other alternatives will be compared.

Institutional Controls

Remedial technology types associated with this GRA generally consist of non-intrusive administrative controls used to reduce the potential for contact with, or use of groundwater. The remedial technology type screened under this GRA consisted of institutional controls. Technology process options for institutional controls include deed restrictions, groundwater use restrictions, enforcement and permit controls, and informational devices. This technology process is considered implementable and therefore, was retained for further evaluation. Because institutional controls would not treat, contain or remove any COCs in groundwater, institutional controls alone would not achieve the RAOs. However, institutional controls would work toward meeting the RAOs of preventing potential human exposures to groundwater containing COCs. Institutional controls could enhance the effectiveness of other technology types/technology process options when included as part of a remedial alternative.

In-Situ Containment/Control

Remedial technology types associated with this GRA involve addressing impacted groundwater without removal or treatment. The remedial technology type evaluated under this GRA consisted of containment. Technology process options screened under this remedial technology type consisted of sheet pile walls and slurry walls. Based on the presence of subsurface utilities, the implementability of a continuous barrier would be limited and containment options would not be effective at preventing groundwater flow to and from areas containing MGP-related impacts. Additionally, containment process options would not address potential exposures to future utility/construction workers. Therefore, none of the containment process options were retained.

In-Situ Treatment

Remedial technology types associated with this GRA involve addressing impacted groundwater without removal. Remedial technology types evaluated under this GRA consist of biological treatment, chemical treatment and extraction. Technology process options screened under these remedial technology types included:

- Groundwater monitoring, enhanced biodegradation, and biosparging (biological treatment)
- Chemical oxidation and permeable reactive barrier (PRB) (chemical treatment)
- DUS/HPO (Extraction)

Although groundwater monitoring alone, without source removal, will likely not achieve groundwater RAOs, this technology process was retained as a measure to monitor and document groundwater conditions over time based on implementability. However, enhanced biodegradation and biosparging were not retained because these technologies would not be an effective means for addressing impacted groundwater, based on the relatively low concentrations of dissolved phase impacts identified to date (could be addressed through source removal [e.g., excavation]).

Based on the presence of subsurface utilities, the implementability of a continuous barrier would be limited; consequently, PRB would not be effective at preventing groundwater flow to and from areas containing MGP-related impacts.

Chemical oxidation and DUS/HPO were not retained as these processes would not be a cost effective means for achieving the RAOs and could result in NAPL and/or dissolved plume migration, respectively.

Removal

Remedial technology types associated with this GRA consider removal of groundwater containing MGP-related impacts for treatment and/or disposal. The remedial technology type evaluated under this GRA consisted of hydraulic control. Technology process options screened under this remedial technology type included vertical extraction wells and horizontal extraction wells.

In general, hydraulic control, by means of vertical or horizontal extraction wells would generate water that would require treatment over long periods of time. Equipment and tools necessary to install and operate vertical extraction wells are readily available. However, the project area has limited space to construct and operate pump and treat equipment. Installation of horizontal extraction wells includes use of specialized drilling equipment that requires a large amount of space, and subsurface site conditions (e.g., multiple obstructions, subsurface utilities, etc.) are not suitable for the installation of horizontal wells. Additionally, long-term pump-and-treat alternatives would not be an effective means to address dissolved phase impacts. Therefore, vertical and horizontal extractions wells were not retained for further evaluation.

<u>Ex-Situ On-Site Treatment</u>

Remedial technology types associated with this GRA consider the on-site treatment of extracted impacted groundwater. The remedial technology types evaluated under this GRA consisted of chemical treatment and physical treatment. Technology process options screened under these remedial technology types included:

- ultraviolet (UV) oxidation and chemical oxidation (chemical treatment)
- carbon adsorption, filtration, air stripping, precipitation/coagulation/flocculation, and oil/water separation (physical treatment)

As indicated above, no groundwater extraction technology process options were retained through the technology screening. Therefore, ex-situ on-site treatment technology process options will not be required. Additionally, similar to the ex-situ on-site soil treatment technologies, due to the current and anticipated future uses of the project area (i.e., commercial use in an urban setting), none of the ex-situ on-site groundwater treatment technology process options are considered practicable given the potential for long-term exposures as a result of the construction and operation of an on-site water treatment system. Note, although not retained, ex-situ on-site treatment technology process options may be used in support of other remedial technology processes (i.e., treatment of groundwater removed during excavation activities).

Off-Site Treatment/Disposal

Remedial technology types associated with this GRA consider the off-site treatment/disposal of extracted groundwater. The remedial technology type evaluated under this GRA consisted of groundwater disposal. Technology process options screened under this technology type consisted of: discharge to a local POTW, discharge to surface water, and discharge to a privately-owned and commercially operated treatment facility.

As indicated above, groundwater extraction processes are not considered effective or readily implementable and therefore, were not retained. Potential remedial alternatives will not require an ongoing discharge/disposal of treated/untreated groundwater removed from the subsurface. Similar to ex-situ on-site treatment technology process options, although not retained, off-site treatment disposal technology process options may be used in support of other remedial technology processes (i.e., disposal of groundwater removed during excavation activities).

4.5 Summary of Retained Technologies

As indicated previously, results of the remedial technology screening process for soil and groundwater are presented in Tables 4 and 5, respectively. Remedial technologies retained for soil and groundwater are summarized in the following tables.

Table 4.1 Retained Soil Technologies

GRA	Technology Type	Technology Process Option
No Action	No Action	No Action
Institutional Controls	Institutional Controls	Deed Restrictions, Environmental Land Use Restrictions, Enforcement and Permit Controls, Informational Devices
Removal	Excavation	Excavation
Off-Site Treatment and/or Disposal	Extraction Disposal	LTTD Solid waste landfill

Table 4.2 Retained Groundwater Technologies

GRA	Technology Type	Technology Process Option
No Action	No Action	No Action
Institutional Controls	Institutional controls	Deed Restrictions, Groundwater Use Restrictions, Enforcement and Permit Controls, Informational Devices
In-Situ Treatment	Biological Treatment	Groundwater monitoring

4.6 Assembly of Remedial Alternatives

Retained remedial technology types and technology process options were combined into remedial alternatives that have the potential to achieve or work toward achieving site-specific RAOs. DER-10 requires an evaluation of the following alternatives:

- The "No-Action" alternative
- An alternative that would restore the site to pre-disposal conditions

Additional alternatives were developed based on:

- Current, intended and reasonably anticipated future use of the project area
- Removal of source areas of contamination

These remedial considerations require varying levels of remediation but provide protection of public health and the environment by preventing or minimizing exposure to the COCs through the use of institutional controls; removing COCs to the extent possible thereby minimizing the need for long-term management; and treating COCs, but vary in the degree of treatment employed and long-term management needed.

Remedial alternatives that have been assembled and developed for addressing the impacted media are presented below. Technical descriptions and detailed evaluations of the remedial alternatives are presented in Section 5.

4.6.1 Alternative 1 – No Action

The "No Action" alternative was retained for evaluation as required by DER-10. Under this alternative, no remedial activities would be completed to address MGP-related impacts to soil and/or groundwater. The "No Action" alternative serves as the baseline for comparison of the overall effectiveness of the other remedial alternatives.

4.6.2 Alternative 2 – Groundwater Monitoring and Institutional Controls

Under this alternative, annual groundwater monitoring would be conducted to document the extent of dissolved phase impacts and the potential trends in COC concentrations. Additionally, institutional controls (i.e., deed restrictions or environmental easements) would be established to limit the future development and use of the project area and groundwater, as well as limit the permissible invasive (i.e., subsurface) activities. As NYSEG does not own the properties containing MGP-related impacts, implementation of institutional controls would require coordination between NYSDEC and the property owners (i.e., hotel owner, Village of Newark, and business owner for the property north of West Shore Boulevard). In support of this alternative, a Site Management Plan (SMP) would be prepared to document the long-term groundwater monitoring requirements and handling and management protocols for potential future excavation activities that may be conducted in the project area.

4.6.3 Alternative 3 – Targeted Soil Removal

Alternative 3 would include the removal of soil located above the water table that contains visual MGP-related impacts or total PAHs at concentrations greater than 500 mg/kg. The area north of West Shore Boulevard would be excavated to a maximum depth of 9 feet bgs to address hardened TLM and elevated concentrations of total PAHs in near surface and subsurface soil, and consequently, surface soil containing elevated concentrations of total PAHs in this area would also be addressed. The former tar well area would be excavated (including the tar well structure) to a maximum depth of 11 feet bgs to address TLM and elevated concentration of PAHs. Alternative 3 would include the same groundwater monitoring, institutional controls, and SMP components as Alternative 2.

4.6.4 Alternative 4 – Deep Soil Removal

Alternative 4 would include the removal of soil containing visual MGP-related impacts or total PAHs at concentrations greater than 500 mg/kg. In addition to soil removal that would be conducted under Alternative 3 (i.e., soil containing MGP-related impacts located above the water table), Alternative 4 would also include excavations to address TLM and OLM observed below and south of the tar well (i.e., at depths of 15 feet bgs), as well as potential removal of the eastern gas holder and soil below the holder(where OLM was observed at depths of 18 feet bgs) and a portion of the western holder (where a 0.2-foot interval of solidified TLM at a depth of 7.5 feet bgs). A pre-design investigation would be conducted to refine/verify the soil removal limits and assess whether the former holders require removal. Alternative 4 would also include the same groundwater monitoring, institutional control, and SMP components as Alternatives 2 and 3.

4.6.5 Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions

Alternative 5 would include the removal activities to address soil containing MGP-related COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs. In addition to the soil that would be removed under Alternative 4, Alternative 5 would include the removal of soil containing COCs at concentrations greater than unrestricted use SCOs east of the eastern gas holder, additional soil north of West Shore Boulevard, and soil below the hotel within the former MGP footprint (assuming hotel demolition and removal). Following excavation and backfilling activities, groundwater monitoring would be conducted for a short duration (e.g., up to two years) to confirm that groundwater standards and guidance values are achieved. Alternative 5 would not include long-term groundwater monitoring or institutional controls components.

5. Detailed Evaluation of Alternatives

This section presents detailed descriptions of the remedial alternatives developed to address impacts identified to date. Each of the retained remedial alternatives is evaluated with respect to the criteria presented in DER-10. The results of the detailed evaluation of the remedial alternatives are used to aid in the recommendation of a preferred remedial alternative for addressing impacted media.

5.1 Description of Evaluation Criteria

Consistent with DER-10, the detailed evaluation of remedial alternatives presented in this section consists of an evaluation of each assembled alternative (presented in Section 4.6) against the following criteria:

- Short-Term Impacts and Effectiveness
- Long-Term Effectiveness and Permanence
- Land Use
- Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment
- Implementability
- Compliance with SCGs
- Overall Protectiveness of the Public Health and the Environment
- Cost Effectiveness

Descriptions of the evaluation criteria are presented in the following sections. Additional criteria, including community acceptance, will be addressed following submittal of this FS Report.

Per DER-10, sustainability and green remediation will also be considered in the remedial evaluation with the goal of minimizing ancillary environmental impacts such as greenhouse gas emissions (GHGs) during the implementation of remedial programs. The evaluation will consider the alternative’s ability to reduce energy use; reduce greenhouse gas and other emissions; maximize reuse of land and recycling of materials; and preserve, enhance, or create natural habitats, etc. Sustainability and green remediation will be discussed under the short-term impacts and effectiveness criterion.

5.1.1 Short-Term Impacts and Effectiveness

The short-term impacts and effectiveness criterion is used to evaluate the remedial alternative relative to its potential effect on public health and the environment during construction and/or implementation of the alternative. The evaluation of each alternative with respect to its short-term impacts and effectiveness will consider the following:

- Potential short-term adverse impacts and nuisances to which the public and environment may be exposed during implementation of the alternative.

- Potential impacts to workers during implementation of the remedial actions and the effectiveness and reliability of protective measures.

- Amount of time required to implement the remedy and the time until the remedial objectives are achieved.

- The sustainability and use of green remediation practices utilized during implementation of the remedy.

5.1.2 Long-Term Effectiveness and Permanence

The evaluation of each remedial alternative relative to its long-term effectiveness and permanence is made by considering the risks that may remain following completion of the remedial alternative. The following factors will be assessed in the evaluation of the alternative's long-term effectiveness and permanence:

- Potential impacts to human receptors, ecological receptors, and the environment from untreated waste or treatment residuals remaining at the completion of the remedial alternative.

- The adequacy and reliability of institutional and/or engineering controls (if any) that will be used to manage treatment residuals or remaining untreated impacted media.

5.1.3 Land Use

This criterion evaluates the current and intended future land use of the project area relative to the cleanup objectives of the remedial alternative when unrestricted use cleanup levels would not be achieved. This evaluation considers local zoning laws, proximity to residential property, accessibility to infrastructure, and proximity to natural resources including groundwater drinking supplies.

5.1.4 Reduction of Toxicity, Mobility or Volume of Contamination through Treatment

This evaluation criterion addresses the degree to which the remedial alternative will permanently reduce the toxicity, mobility, or volume of the constituents present in the media through treatment.

5.1.5 Implementability

This criterion addresses the technical and administrative feasibility of implementing the remedial alternative, including the availability of the various services and materials required for implementation. The following factors will be considered during the implementability evaluation:

- *Technical Feasibility* – This factor considers the remedial alternative's constructability, as well as the ability to monitor the effectiveness of the remedial alternative.

- *Administrative Feasibility* – This factor refers to the availability of necessary personnel and material along with potential difficulties in obtaining approvals for long-term operation of treatment systems, access agreements for construction, and acquiring necessary approvals and permits for remedial construction.

5.1.6 Compliance with SCGs

This criterion evaluates the remedial alternative’s ability to comply with SCGs that were identified in Section 2. Compliance with the following items is considered during evaluation of the remedial alternative:

- Chemical-specific SCGs
- Action-specific SCGs
- Location-specific SCGs

Potentially applicable chemical-, action-, and location-specific SCGs are presented in Tables 1, 2 and 3, respectively.

5.1.7 Overall Protectiveness of the Public Health and the Environment

This criterion evaluates whether the remedial alternative provides adequate protection of public health and the environment based on the following:

- How the alternative would eliminate, reduce, or control (through removal, treatment, containment, other engineering controls, or institutional controls) any existing or potential human exposures or environmental impacts that have been identified.
- The ability of the remedial alternative to meet the site-specific RAOs.
- A combination of the above-listed criteria including: long-term effectiveness and permanence; short-term impacts and effectiveness; and compliance with SCGs.

5.1.8 Cost Effectiveness

This criterion evaluates the overall cost of the alternative relative to the effectiveness of the alternative (i.e., cost compared to long-term effectiveness and permanence, short-term impacts and effectiveness, and reduction of toxicity, mobility, and volume through treatment).

The estimated total cost to implement the remedial alternative is based on a present worth analysis of the sum of the direct capital costs (i.e., materials, equipment, and labor), indirect capital costs (i.e., engineering, licenses/permits, and contingency allowances), and operation and maintenance (O&M) costs. O&M costs may include future site management, operating labor, energy, chemicals, and sampling and analysis. These costs will be estimated with an anticipated accuracy between -30% to +50%. A 20% contingency factor is included to cover unforeseen costs incurred during implementation of the remedial alternative. Present-worth costs are calculated for alternatives expected to last more than 2 years. A 4% discount (i.e., interest) rate is used to determine the present-worth factor.

5.2 Detailed Evaluation Remedial Alternatives

This subsection presents the detailed analysis of each of the alternatives previously identified in Section 4.

- Alternative 1 – No Action
- Alternative 2 – Groundwater Monitoring and Institutional Controls

- Alternative 3 – Targeted Soil Removal
- Alternative 4 – Deep Soil Removal
- Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions

Each alternative is evaluated against the evaluation criteria described above (as indicated, public acceptance will be evaluated following submittal of this FS Report).

5.2.1 Alternative 1 – No Action

The “No Action” alternative was retained for evaluation as required by DER-10. The “No Action” alternative serves as the baseline for comparison of the overall effectiveness of the other remedial alternatives. The “No Action” alternative would not involve implementation of any remedial activities to address MGP-related impacts. The project area would be allowed to remain in its current condition and no effort would be made to change or monitor the current project area conditions.

<u>Short-Term Impacts and Effectiveness – Alternative 1</u>

No remedial actions would be implemented to address impacted environmental media. Therefore, there would be no short-term environmental impacts, nor risks associated with remedial activities would be posed to the community.

<u>Long-Term Effectiveness and Permanence – Alternative 1</u>

Under the “No Action” alternative, the COCs in media or the potential for on-going releases and/or migration of impacts would not be addressed. As a result, this alternative is not considered effective on a long-term basis.

<u>Land Use – Alternative 1</u>

The current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the area surrounding the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

No remedial actions would be completed under this alternative and the project area would remain in its current condition. The “No Action” alternative would not alter the anticipated future intended use of the project area.

<u>Reduction of Toxicity, Mobility or Volume of Contamination through Treatment – Alternative 1</u>

Under the “No Action” alternative, environmental media would not be treated (other than by natural processes), recycled, or destroyed. Therefore, the toxicity, mobility, and volume of environmental media containing MGP-related impacts would not be reduced.

<u>Implementability – Alternative 1</u>

The “No Action” alternative does not require implementation of any remedial activities, and therefore is technically and administratively implementable.

<u>Compliance with SCGs – Alternative 1</u>

- *Chemical-Specific SCGs* – Because removal or treatment is not included as part of this alternative, the chemical-specific SCGs would not be met by this alternative.

- *Action-Specific SCGs* – This alternative does not involve implementation of any remedial activities; therefore, the action-specific SCGs are not applicable.

- *Location-Specific SCGs* – Because no remedial activities would be conducted under this alternative, the location-specific SCGs are not applicable.

<u>Overall Protectiveness of the Public Health and the Environment – Alternative 1</u>

The “No Action” alternative does not address the toxicity, mobility, or volume of impacted environmental media and is not effective on a long-term basis for eliminating potential migration or potential exposure to impacts. Therefore, the “No Action” alternative would not be protective of human health and the environment and would not meet the RAOs.

<u>Cost Effectiveness – Alternative 1</u>

The “No Action” alternative does not involve implementation of any active remedial activities or monitoring conditions; therefore, there are no costs associated with this alternative.

5.2.2 Alternative 2 – Groundwater Monitoring and Institutional Controls

The major components of Alternative 2 consist of the following:

- Conducting long-term groundwater monitoring
- Establishing institutional controls
- Developing a site management plan

This alternative would address the potential for exposure to subsurface soil and groundwater containing MGP-related impacts through the implementation of institutional controls. Soil and groundwater containing MGP-related impacts would remain and would not be directly addressed by this remedial alternative. This alternative also includes long-term groundwater monitoring to document the extent of dissolved phase impacts and potential trends in COC concentrations.

As indicated in Section 1, groundwater within the project area contains benzene at concentrations slightly greater than NYSDEC Class GA Standards at two locations. Although there are no current users of groundwater or exposures to impacted groundwater, this alternative would include conducting annual groundwater monitoring to document potential changes in groundwater conditions. Annual groundwater monitoring activities would consist of collecting groundwater samples from the existing groundwater monitoring well network. The specific wells to be sampled would be determined during the remedial design for this alternative. Groundwater samples would be submitted for laboratory analysis for BTEX and PAHs. Analytical results would be used to document the extent of dissolved phase impacts and potential trends in COC concentrations. The results of the groundwater monitoring would be presented to NYSDEC in an annual report. Based on the results of the monitoring activities, NYSEG may request to modify the quantity of wells sampled or the frequency of sampling events. However, for the purpose of developing a cost estimate for this alternative, it has been assumed that annual groundwater monitoring activities would be conducted for 30 years.

Alternative 2 would also include establishing institutional controls on the project area in the form of deed restrictions and/or environmental easements to control intrusive (i.e., subsurface) activities that could result in potential exposures to subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values. Additionally, the institutional controls would require compliance with the SMP (described below) that would be prepared as part of this alternative. Although potable water is provided by a municipal supply, the institutional controls would also prohibit the use of non-treated groundwater from the project area. An annual report would be submitted to NYSDEC to document that institutional controls are maintained and remain effective.

As indicated above, this alternative would include preparation of an SMP that would document the following:

- The institutional controls that have been established and will be maintained for the project area
- Known locations of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial use SCOs
- Protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially impacted material encountered during these activities
- Protocols and requirements for conducting annual groundwater monitoring
- Protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities

<u>Short-Term Impacts and Effectiveness – Alternative 2</u>

As no remedial construction activities would be implemented under this alternative, short-term environmental impacts and risks be posed to the community would be limited. Potential exposures to field personnel conducting groundwater monitoring would be reduced through the use of proper training and personal protective equipment (PPE), as specified in a site-specific health and safety plan (HASP) that would be developed as part of the remedial design for this alternative. Potential risks to the community could occur during groundwater monitoring activities via exposure to purged groundwater and groundwater samples. Potential exposures to the community would be reduced by following appropriate procedures and protocols that would be described in the SMP.

Although this alternative does not employ green remediation practices, implementation of this alternative would utilize minimal non-renewable resources and is not anticipated to negatively impact the environment (i.e., consume non-renewable resources and energy). The relative carbon footprint of Alternative 2 (compared to the other alternatives) is considered minimal. The greatest contribution to greenhouse gases would occur as a result of traveling to and from the project area to conduct groundwater activities. Groundwater monitoring would be conducted over an assumed 30-year period.

Long-Term Effectiveness and Permanence – Alternative 2

Under Alternative 2, soil and groundwater containing MGP-related COCs would not actively be addressed. Surface soil and near surface soil north of West Shore Boulevard contains elevated concentrations of total PAHs and the potential for exposure to this material would remain. A majority of the surface cover within the remaining portions of the project area consists of asphalt pavement and concrete sidewalks, which provide a physical barrier to subsurface impacts. Based on the current and foreseeable future use of the project area, employees of local businesses do not conduct activities that would potentially result in exposure to subsurface soil and groundwater containing MGP-related COCs. If subsurface activities (e.g., installation of new utilities) were to be conducted at the site, work activities (including handling potentially impacted material) would be conducted in accordance with the procedures described in the SMP to reduce the potential for exposures to impacted media.

Alternative 2 would include the establishment of institutional controls and development of a long-term groundwater monitoring program. Institutional controls would prohibit potable uses of groundwater in the project area. Annual verification of the institutional controls would be completed to document that the controls are maintained and remain effective. Periodic groundwater monitoring would be conducted to document the extent of dissolved phase impacts and potential trends in COC concentrations. Potential exposures to field personnel and the community during long-term groundwater monitoring activities would be reduced by following appropriate procedures and protocols that would be established in the SMP.

Land Use – Alternative 2

The current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

Alternative 2 would not affect the current or anticipated future land use at the project area. Institutional controls would be placed on the properties within the project area and groundwater monitoring would be conducted for an assumed 30 years. In the event that properties within the project area are sold, future owners/operators would be required to comply with the SMP and institutional controls established based on the continued presence of soil and groundwater containing MGP-related COCs.

Reduction of Toxicity, Mobility or Volume of Contamination through Treatment – Alternative 2

Alternative 2 does not include direct treatment or containment of impacted soil and groundwater media. Although the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene, Alternative 2 includes periodic groundwater monitoring to document the extent and potential long-term reduction (i.e., toxicity and volume) of dissolved phase groundwater impacts.

Implementability – Alternative 2

This remedial alternative would be both technically and administratively implementable. From a technical implementability aspect, equipment and personnel qualified to conduct groundwater monitoring activities are readily available. Administratively, institutional controls would be established for the properties within the project area (i.e., not owned by NYSEG), which would require coordination with state agencies (i.e., NYSDEC and NYSDOH) and the property owners. Access agreements would be required, as existing groundwater monitoring wells are located on properties not owned by NYSEG.

Compliance with SCGs – Alternative 2

- *Chemical-Specific SCGs* – Chemical-specific SCGs are presented in Table 1. Potentially applicable chemical-specific SCGs for soil include 6 NYCRR Part 375-6 soil cleanup objectives (i.e., commercial and industrial use for surface and subsurface soil, respectively) and 40 CFR Part 261 and 6 NYCRR Part 371 regulations for the identification of hazardous materials. Potentially applicable chemical-specific SCGs for groundwater include NYSDEC Class GA Standards and Guidance Values.

Alternative 2 would not address soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial SCOs. Surface soil containing elevated concentrations of total PAHs and subsurface soil containing MGP-related impacts would remain in place. Waste materials generated during periodic groundwater sampling activities would be managed and characterized in accordance with 40 CFR 261 and 6 NYCRR Part 371 to determine off-site treatment/disposal requirements. NYS LDRs would apply to any materials that are characterized as a hazardous waste.

As indicated in Section 1, the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. Alternative 2 does not address MGP-related impacts located below the water table. Therefore, if this alternative could achieve groundwater SCGs, the SCGs would be achieved over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts).

- *Action-Specific SCGs* – Action-specific SCGs are presented in Table 2. Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Groundwater monitoring activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.

  Waste materials generated during groundwater monitoring activities could be subject to USDOT requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a NYSDEC-approved work plan and using licensed waste transporters and permitted disposal facilities.

- *Location-Specific SCGs* – Location-specific SCGs are presented in Table 3. As Alternative 2 does not include remedial construction activities, location-specific SCGs are not applicable.

Overall Protectiveness of the Public Health and the Environment – Alternative 2

Alternative 2 would mitigate the potential for long-term exposures to impacted subsurface soil and groundwater by monitoring groundwater and implementing institutional controls. This alternative would not utilize containment, treatment, or removal to address surface soil, subsurface soil or groundwater containing MGP-related COCs at concentrations greater than applicable standards and guidance values. Surface and subsurface soil and groundwater containing MGP-related COCs would remain and would not be directly addressed.

This alternative would prevent exposures (i.e., direct contact, ingestion, and inhalation) to MGP-related impacts in subsurface soil and groundwater (soil RAOs #1 and #2 and groundwater RAOs #1 and #2) solely through the implementation of institutional controls. However, exposures to human receptors (i.e., commercial workers, maintenance workers, and recreational users/trespassers) and biota receptors (soil RAO #3) from surface soil containing elevated concentrations of total PAHs (located north of West Shore Boulevard) would remain. Additionally, potentially complete exposure pathways (i.e., exposures to future construction/utility workers) would remain under this alternative and the reduction of potential exposures would only occur by adhering to the institutional controls and the procedures to be presented in the SMP.

Although the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene, Alternative 2 does not address soil containing MGP-related impacts below the water table and therefore, does not address potential sources of groundwater impacts (soil RAO #4 and groundwater RAO #4). Groundwater could potentially be restored to pre-disposal/pre-release conditions (groundwater RAO #3) over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts).

<u>Cost Effectiveness – Alternative 2</u>

The estimated costs associated with Alternative 2 are presented in Table 6. The total estimated 30-year present worth cost for this alternative is approximately $700,000. The estimated capital cost, for preparing an SMP and establishing institutional controls, is $100,000. The estimated 30-year present worth cost of O&M activities associated with this alternative is approximately $600,000.

5.2.3 Alternative 3 – Targeted Soil Removal

The major components of Alternative 3 consist of the following:

- Removing soil containing MGP-related COCs/NAPL above the water table
- Conducting long-term groundwater monitoring
- Establishing institutional controls
- Preparing an SMP

Alternative 3 would include the removal of soil located above the water table that contains visual MGP-related impacts or total PAHs at concentrations greater than 500 mg/kg. This alternative would include removal of former MGP structures and visually impacted material (i.e., greater than staining, sheens, and blebs) immediately surrounding the structures, laterally, to the extent practicable. Excavation activities would not be conducted under existing buildings.

Alternative 3 would include the excavation of approximately 1,200 cubic-yards (cy) of soil. Anticipated soil removal limits are shown on Figure 11. The area north of West Shore Boulevard would be excavated to depths ranging from 3 to 9 feet bgs to address hardened TLM and elevated concentrations of total PAHs (i.e., at soil boring locations SB -23, SB-30, and SB-32) in near surface and subsurface soil. Consequently, surface soil containing elevated concentrations of total PAHs would also be removed north of West Shore Boulevard (i.e., where visual MGP-related impacts have been identified in near surface and subsurface soil). The former tar well area would be excavated (including the tar well structure) to a maximum depth of 11 feet bgs address TLM and elevated concentration of BTEX and PAHs (i.e., at soil boring locations SB-3, SB-6, and SB-7). PDI activities would be conducted to refine/verify the extent of soil removal (i.e., within the tar well area) and to further asses the presence of former MGP structure and soil containing MGP-related impacts in the vicinity of the western gas holder area. Note that soil removal volumes and costs associated with this alternative do not include soil excavation activities in the vicinity of the western gas holder because the only potential MGP-related impact observed near this holder was a discrete piece of hardened tar at 7.5 feet bgs.

Based on the anticipated excavation limits of this alternative, subsurface utilities (i.e., electrical service, water lines, storm water drains, and telecommunication lines) would be protected and/or relocated during excavation activities. Additionally, lane closures (or closure of the entire roadway) would be required to conduct excavation activities within West Shore Boulevard and access to portions of the hotel parking lot would be restricted. Excavation activities would be conducted using conventional construction equipment such as backhoes, excavators, front-end loaders, dump trucks, etc. Based on the proposed extent/depth of excavation activities, excavation support systems (assumed to consist of pre-fabricated support systems [e.g., slide rail]) would be required. The final excavation support plan would be developed as part of a remedial design of this alternative. For the purpose of developing this alternative, it has been assumed that excavated material from 0 to 1 foot below grade within and south of West Shore Boulevard would be transported off-site for disposal as construction and demolition (C&D) debris. Remaining excavated material would be transported off-site for treatment/disposal via LTTD. Further off-site treatment/disposal options, including disposal of soil as a non-hazardous waste at a solid waste landfill or potential reuse of excavated material, would be assessed during the remedial design of this alternative.

Prior to backfilling the excavation areas, a demarcation layer (e.g., geotextile fabric) would be placed within excavation bottoms. Based on the proximity of the excavation areas to buildings, roadways, and subsurface utilities, it has been assumed that excavation areas would be backfilled with controlled low-strength material (CLSM) (e.g., flowable fill). CSLM is a self-compacting material and therefore, the need to compact backfill is significantly reduced (if not eliminated), thereby minimizing the potential for damage to adjacent buildings and infrastructure. Disturbed surfaces would be restored, in kind, with asphalt pavement, concrete, or vegetated topsoil.

Alternative 3 would include the same groundwater monitoring, institutional control, and SMP components previously described under Alternative 2.

Short-Term Impacts and Effectiveness – Alternative 3

Implementation of this alternative could result in short-term exposure of the surrounding community and site workers to site-related COCs as a result of excavation, material handling, and off-site transportation activities. Potential exposure mechanisms would include ingestion and dermal contact with NAPL and impacted soil and inhalation of volatile organic vapors or dust containing COCs during remedial construction. Potential exposure of remedial workers would be reduced through the use of appropriately trained field personnel and PPE, as specified in a site-specific HASP that would be developed as part of the remedial design.

Additional worker safety concerns include working with and around large construction equipment, noise generated from operating construction equipment, and increased vehicle traffic associated with transportation of excavated material from the project area and delivery of fill materials. These concerns would be reduced by using engineering controls and appropriate health and safety practices. Off-site transportation of excavated material and importation of clean fill materials would result in approximately 120 tractor trailer truck round trips (assuming 35 tons per dump truck). Transportation activities would be managed to reduce en-route risks to the community. Based on the anticipated excavation limits, portions of West Shore Boulevard and the hotel parking lot would be closed during remedial construction activities. Traffic control measures (e.g., flagmen, temporary barriers, and signs) would be used to direct vehicle traffic around excavation areas. Routine hotel operations may be disrupted during remedial construction activities.

Potential risks to the community could occur during groundwater monitoring activities via exposure to purged groundwater, groundwater samples, and/or NAPL. Potential exposures to the community would be reduced by following appropriate procedures and protocols that would be described in the SMP.

Alternative 3 does not employ green remediation practices and the relative carbon footprint (as compared to the other alternatives) is considered moderate. The greatest contribution to greenhouse gases would occur as a result of equipment operation during soil excavation, backfilling, and transportation activities, as well as LTTD treatment of excavated soil.

Soil excavation and backfilling activities could be completed in approximately 3 months and periodic groundwater monitoring would be conducted over an assumed 30-year period.

Long-Term Effectiveness and Permanence – Alternative 3

Alternative 3 would address MGP-related impacts to a depth of approximately 11 feet bgs (approximate depth to groundwater). Removal of this material would reduce the potential need to implement the protocols described in the SMP and reduce the potential for exposures to media containing MGP-related COCs (i.e., exposures to commercial workers, maintenance workers, and recreational users/trespassers would be eliminated). Alternative 3 would facilitate the completion of future subsurface utility work in areas that no longer contain MGP-related impacts (utility work would not likely be conducted at depths greater than 11 feet bgs), thereby minimizing the potential for future exposures to construction/ utility workers. Exposures to remaining impacts located below the water table (i.e., at depths greater than 11 feet bgs) would be addressed through the protocols and requirements that would be presented in the SMP. Based on the current and foreseeable future use of the project area, employees of local businesses do not conduct activities that would potentially result in exposure to subsurface soil and groundwater containing MGP-related COCs.

Alternative 3 would include the establishment of institutional controls and development of a long-term groundwater monitoring program. Institutional controls would prohibit potable uses of groundwater in the project area. Annual verification of the institutional controls would be completed to document that the controls are maintained and remain effective. Annual groundwater monitoring would be conducted to document the extent of dissolved phase impacts and potential trends in COC concentrations. Potential exposures to field personnel and the community during long-term groundwater monitoring activities would be reduced by following appropriate procedures and protocols that would be established in the SMP.

Land Use – Alternative 3

The current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

Alternative 3 would not affect the current or anticipated future land use at the project area. MGP-related impacts at depths up to 11 feet bgs would be removed. Institutional controls would be placed on the properties within the project area and groundwater monitoring would be conducted for an assumed 30 years. In the event that properties within the project area are sold, future owners/operators would be required to comply with the SMP and institutional controls established based on the continued presence of soil and groundwater containing MGP-related COCs at concentrations greater than applicable standards.

Reduction of Toxicity, Mobility or Volume of Contamination through Treatment – Alternative 3

Alternative 3 would include the excavation of approximately 1,200 cy of material to address near surface soil and subsurface soil (above the water table) containing elevated concentrations of total PAHs and visually impacted material. This removal would also address surface soil containing elevated concentrations of total PAHs in the vicinity of near surface soil containing visual MGP-related impacts. Excavated material would be permanently transported off-site for treatment via LTTD.

Although Alternative 3 would address surface soil containing elevated concentrations of total PAHs (in the vicinity near surface soil containing visual MGP-related impacts) and shallow sources of TLM (i.e., the former tar well and shallow soils), this alternative does not address soil containing MGP-related impacts located below the water table.

Although the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene, Alternative 3 includes annual groundwater monitoring to document the extent and potential long-term reduction (i.e., toxicity and volume) of dissolved phase groundwater impacts.

Implementability – Alternative 3

Alternative 3 would be both technically and administratively implementable. Removal and off-site disposal of surface and subsurface soil located above the water table that contains MGP-related impacts (and former MGP structures) is technically feasible. Remedial contractors capable of performing the excavation activities are readily available. Potential implementation challenges associated with this alternative include conducting excavation activities within public roadways and immediately adjacent to existing structures (e.g., the hotel south of West Shore Boulevard and the private business north of West Shore Boulevard) and excavating in areas where subsurface utilities are present (i.e., water, sewer, telecommunication). Soil loading conditions from the roadway and buildings would be evaluated as part of the remedial design. Potential options to temporarily bypass or reroute the subsurface utilities located within the anticipated excavation limits would also be evaluated during the remedial design. Temporary lane (or roadway) closures would have to be implemented to conduct excavation activities within West Shore Boulevard and portions of the hotel parking lot would be closed during excavation activities. Logistically, as NYSEG does not own property in the project area, limited space is available for equipment and material staging. Remedial construction activities would have to be coordinated with the property owners to reduce impacts to daily operations of the businesses within the project area.

Administratively, institutional controls would be established for the properties within the project area (i.e., not owned by NYSEG), which would require coordination with state agencies (i.e., NYSDEC and NYSDOH) and the property owners. Access agreements would be required to conduct excavation activities on property not owned by NYSEG. Access agreements would also be required to conduct groundwater monitoring activities on properties not owned by NYSEG.

Compliance with SCGs – Alternative 3

- *Chemical-Specific SCGs* – Chemical-specific SCGs are presented in Table 1. Potentially applicable chemical-specific SCGs for soil include 6 NYCRR Part 375-6 soil cleanup objectives (i.e., commercial and industrial use for surface and subsurface soil, respectively) and 40 CFR Part 261 and 6 NYCRR Part 371 regulations for the identification of hazardous materials. Additionally, CP-51 *Soil Cleanup Guidance* (NYSDEC, 2010b) provides a total PAH SCO of 500 mg/kg for subsurface soil at non-residential sites. Potentially applicable chemical-specific SCGs for groundwater include NYSDEC Class GA Standards and Guidance Values.

Alternative 3 would include the excavation of surface soil containing elevated concentrations of total PAHs north of West Shore Boulevard (i.e., where visual MGP-related impacts have been identified in near surface and subsurface soil) and subsurface soil containing visually impacted material and total PAH concentrations greater than 500 mg/kg (located above the water table). Excavated material and process residuals would be managed and characterized in accordance with 40 CFR 261 and 6 NYCRR Part 371 regulations to determine off-site treatment/disposal requirements. NYS LDRs would apply to any materials that are characterized as a hazardous waste.

As indicated in Section 1, the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. Alternative 3 does not address MGP-related impacts located below the water table. Therefore, if this alternative could achieve groundwater SCGs, the SCGs would be achieved over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts).

- *Action-Specific SCGs* – Action-specific SCGs are presented in Table 2. Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Work activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.

  Excavated soil would be subject to USDOT requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a NYSDEC-approved work plan and using licensed waste transporters and permitted disposal facilities. Per DER-4 (NYSDEC, 2002), excavated material from a former MGP site that is characteristically hazardous for benzene only (D018) is conditionally exempt from hazardous waste management requirements when destined for thermal treatment (e.g., LTTD). All excavated material would be disposed of in accordance with applicable NYS LDRs.

- *Location-Specific SCGs* – Location-specific SCGs are presented in Table 3. Potentially applicable location-specific SCGs generally include local building codes and construction permits. Remedial activities would be conducted in accordance with Village of Newark building/construction codes and ordinances.

<u>Overall Protectiveness of the Public Health and the Environment – Alternative 3</u>

Alternative 3 would address soil located above the water table that contains visual MGP-related impacts and/or total PAHs at concentrations greater than 500 mg/kg. Therefore, Alternative 3 would also address the surface soil north of West Shore Boulevard (i.e., above near surface soil containing visual MGP-related impacts) that contains elevated concentrations of total PAHs (i.e., that would be encountered by commercial workers, maintenance workers, and trespassers) and the impacted subsurface material most likely to be encountered by future subsurface utility/construction workers. Exposures to remaining impacts located below the water table (i.e., at depths greater than 11 feet bgs) would be addressed through the protocols and requirements that would be presented in the SMP. Additionally, annual groundwater monitoring would be conducted to document the extent of dissolved phase groundwater impacts.

This alternative would prevent human and biota exposures (i.e., direct contact, ingestion, and inhalation) to MGP-related impacts in soil (soil RAOs #1, #2, and #3) through the removal of MGP-related impacts (and former MGP structures) above the water table. Although unlikely, if future activities conducted within the project area included work below the water table, the reduction of potential exposures would occur by adhering to the institutional controls and the procedures set forth in the SMP that would be established/prepared as part this alternative (soil RAOs #1 and #2 and groundwater RAOs #1 and #2).

Although the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene, Alternative 3 does not address soil containing MGP-related impacts below the water table and therefore, does not address potential sources of groundwater impacts (soil RAO #4 and groundwater RAO #4). Groundwater could potentially be restored to pre-disposal/pre-release conditions (groundwater RAO #3) over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts).

Cost Effectiveness – Alternative 3

The estimated costs associated with Alternative 2 are presented in Table 6. The total estimated 30-year present worth cost for this alternative is approximately $1,800,000. The estimated capital cost, for conducting soil removal and backfilling activities, is $1,200,000. The estimated 30-year present worth cost of O&M activities associated with this alternative is approximately $600,000.

5.2.4 Alternative 4 – Deep Soil Removal

The major components of Alternative 4 consist of the following:

- Removing soil containing MGP-related impacts
- Conducting long-term groundwater monitoring
- Establishing institutional controls
- Preparing a SMP

Alternative 4 would include the removal of soil located above and below the water table that contains visual MGP-related impacts or total PAHs at concentrations greater than 500 mg/kg. This alternative would include removal of former MGP structures and visually impacted material (i.e., greater than staining, sheens, and blebs) immediately surrounding the structures, to the extent practicable. Excavation activities would not be conducted under existing buildings.

Alternative 4 would include the excavation of approximately 1,500 cy of soil. Potential soil removal limits are shown on Figure 13. In addition to the soil removal that would be conducted under Alternative 3 (i.e., soil containing MGP-related impacts located above the water table), Alternative 4 would also include soil removal to address TLM and OLM observed below and south of the tar well (i.e., at depths of 15 feet bgs at soil boring locations SB-6 and SB-9), as well as removal of the eastern gas holder and OLM observed below the eastern gas holder (i.e., at depths up to 18 feet bgs at soil boring location SB-3). PDI activities would be conducted to refine/verify the extent of soil removal (i.e., within the tar well area and near the eastern and western gas holders) and to further asses the presence/integrity of the former MGP structures (and determine if the former holders require removal).

Note that for the purpose of developing a cost estimate, Alternative 4 has been developed assuming soil in the vicinity of the eastern and western gas holders would be removed (i.e., an additional 4,600 cy of material, 6,100 cy total for Alternative 4).

Costs associated with soil and holder removal activities are included under the "Gas Holder Removal Contingency" line item presented in Table 8. Alternative 4 has been developed assuming that the hotel would remain in place.

Similar to Alternative 3, based on the anticipated excavation limits of this alternative, subsurface utilities (i.e., electrical service, water lines, storm water drains, and telecommunication lines) would be protected and/or relocated during excavation activities. Additionally, lane closures (or closure of the entire roadway) would be required to conduct excavation activities within West Shore Boulevard and access to portions of the hotel parking lot would be restricted. Excavation activities would be conducted using conventional construction equipment such as backhoes, excavators, front-end loaders, dump trucks, etc. Based on the proposed extent/depth of excavation activities, excavation support systems (assumed to consist of pre-fabricated support systems [e.g., slide rail]) would be required. The final excavation support plan would be developed as part of a remedial design of this alternative. For the purpose of developing this alternative, it has been assumed that excavated material from 0 to 1 foot below grade within and south of West Shore Boulevard would be transported off-site for disposal as C&D debris. Remaining excavated material would be transported off-site for treatment/disposal via LTTD. Further off-site treatment/disposal options, including disposal of soil as a non-hazardous waste at a solid waste landfill or potential reuse of excavated material, would be assessed during the remedial design of this alternative.

As Alternative 4 includes excavation activities below the water table in select areas, groundwater would be removed from the excavation areas. For the purpose of developing this alternative, it has been assumed that water generated during remedial construction activities would be temporarily stored on-site in frac tanks and subsequently transported off-site for disposal. The need for a temporary water treatment system would be evaluated as part of the remedial design of this alternative.

Consistent with Alternative 3, prior to backfilling the excavation areas, a demarcation layer (e.g., geotextile fabric) would be placed within excavation bottoms. Based on the proximity of the excavation areas to buildings, roadways, and subsurface utilities, it has been assumed that excavation areas would be backfilled with CLSM (e.g., flowable fill). Disturbed surfaces would be restored, in kind, with asphalt pavement, concrete, or vegetated topsoil.

Alternative 4 would include the same groundwater monitoring, institutional control, and SMP components previously described under Alternatives 2 and 3.

Short-Term Impacts and Effectiveness – Alternative 4

Implementation of this alternative could result in short-term exposure of the surrounding community and site workers to site-related COCs as a result of excavation, material handling, and off-site transportation activities. Potential exposure mechanisms would include ingestion and dermal contact with NAPL, impacted soil, and/or groundwater and inhalation of volatile organic vapors or dust containing COCs during remedial construction. Potential exposure of remedial workers would be reduced through the use of appropriately trained field personnel and PPE, as specified in a site-specific HASP that would be developed as part of the remedial design.

Additional worker safety concerns include working with and around large construction equipment, noise generated from operating construction equipment, and increased vehicle traffic associated with transportation of excavated material from the project area and delivery of fill materials. These concerns would be reduced by using engineering controls and appropriate health and safety practices. Off-site transportation of excavated material and importation of clean fill materials would result in approximately 600 tractor trailer truck round trips (assuming 6,100 cy of excavation and backfilling, 35 tons per dump truck and 5,000 gallons per tank truck). Transportation activities would be managed to reduce en-route risks to the community. Based on the anticipated excavation limits, portions of West Shore Boulevard and the hotel parking lot would be closed during remedial construction activities. Traffic control measures (e.g., flagmen, temporary barriers, and signs) would be used to direct vehicle traffic around excavation areas. Routine hotel operations may be disrupted during remedial construction activities.

Potential risks to the community could occur during groundwater monitoring activities via exposure to purged groundwater, groundwater samples, and/or NAPL. Potential exposures to the community would be reduced by following appropriate procedures and protocols that would be described in the SMP.

Alternative 4 does not employ green remediation practices and the relative carbon footprint (as compared to the other alternatives) is considered moderate to significant. The greatest contribution to greenhouse gases would occur as a result of equipment operation during soil excavation, backfilling, and transportation activities, as well as LTTD treatment of excavated soil.

Soil excavation and backfilling activities could be completed in approximately 7 months (assuming 6,100 cy of excavation and backfilling) and periodic groundwater monitoring would be conducted over an assumed 30-year period.

Long-Term Effectiveness and Permanence – Alternative 4

Alternative 4 would address MGP-related impacts at depths up to approximately 18 feet bgs. Removal of a majority of soil containing MGP-related impacts would significantly reduce the potential need to implement the protocols described in the SMP and reduce the potential for exposures (i.e., to commercial workers, maintenance workers, trespassers, utility/construction workers) to media containing MGP-related COCs. Similar to the excavation activities conducted under Alternative 3, Alternative 4 would facilitate the completion of future subsurface utility work in areas that no longer contain MGP-related material, thereby significantly reducing the potential for future exposures to construction/utility workers. Exposures to residual media containing COCs at concentrations greater than regulatory criteria (i.e., 6 NYCRR Part 375-6 commercial use SCOs and NYSDEC Class GA Standards and Guidance Values) would be addressed through the protocols and requirements that would be presented in the SMP. Based on the current and foreseeable future use of the project area, employees of local businesses do not conduct activities that would potentially result in exposure to subsurface soil and groundwater containing MGP-related COCs.

Alternative 4 would include the establishment of institutional controls and development of a long-term groundwater monitoring program. Institutional controls would prohibit potable uses of groundwater in the project area. Annual verification of the institutional controls would be completed to document that the controls are maintained and remain effective. Annual groundwater monitoring would be conducted to document the extent of dissolved phase impacts and potential trends in COC concentrations. Potential exposures to field personnel and the community during long-term monitoring activities would be reduced by following appropriate procedures and protocols that would be established in the SMP.

Land Use – Alternative 4

The current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

Alternative 4 would not affect the current or anticipated future land use at the project area. MGP-related impacts at depths up to 18 feet bgs would be removed. Institutional controls would be placed on the properties within the project area and groundwater monitoring would be conducted for an assumed 30 years. In the event that properties within the project area are sold, future owners/operators would be required to comply with the SMP and institutional controls established based on the presence of soil and groundwater containing residual MGP-related COCs at concentrations greater than applicable standards.

Reduction of Toxicity, Mobility or Volume of Contamination through Treatment – Alternative 4

Alternative 4 would include the excavation of approximately 1,500 cy of material to address near surface soil and subsurface soil (above and below the water table) containing elevated concentrations of total PAHs and visually impacted material (plus up to an additional 4,600 cy of material associated with the eastern and western gas holder excavations. This removal would also address surface soil containing elevated concentrations of total PAHs in the vicinity of near surface soil containing visual MGP-related impacts. Excavated material would be permanently transported off-site for treatment via LTTD. Alternative 4 would address surface soil containing elevated concentrations of total PAHs, sources of NAPL (i.e., the former tar well and eastern gas holder), and a vast majority of soil containing MGP-related impacts.

Although the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene, Alternative 4 includes annual groundwater monitoring to document the extent and potential long-term reduction (i.e., toxicity and volume) of dissolved phase groundwater impacts.

Implementability – Alternative 4

Alternative 4 would be both technically and administratively implementable. Removal and off-site disposal of surface soil and subsurface soil located above and below the water table that contains MGP-related impacts (and former MGP structures) is technically feasible. Remedial contractors capable of performing the excavation activities are readily available. Potential implementation challenges associated with this alternative include conducting excavation activities within public roadways and immediately adjacent to existing structures (e.g., the hotel south of West Shore Boulevard and the private business north of West Shore Boulevard) and excavating in areas where subsurface utilities are present (i.e., water, sewer, telecommunication). Soil loading conditions from the roadway and buildings would be evaluated as part of the remedial design. Potential options to temporarily bypass or reroute the subsurface utilities located within the anticipated excavation limits would also be evaluated during the remedial design. Temporary lane or roadway closures would have to be implemented to conduct excavation activities within West Shore Boulevard and portions of the hotel parking lot would be closed during excavation activities. Logistically, as NYSEG does not own property in the project area, limited space is available for equipment and material staging. A laydown area for holding tanks would be required in support of excavation dewatering activities (as soil removal activities would be conducted below the water table). Remedial construction activities would have to be coordinated with the property owners to reduce impacts to daily operations of the businesses within the project area.

Administratively, institutional controls would be established for the properties within the project area (i.e., not owned by NYSEG), which would require coordination with state agencies (i.e., NYSDEC and NYSDOH) and the property owners. Access agreements would be required to conduct excavation activities on property not owned by NYSEG. Access agreements would also be required to conduct groundwater monitoring activities on properties not owned by NYSEG.

<u>Compliance with SCGs – Alternative 4</u>

- *Chemical-Specific SCGs* – Chemical-specific SCGs are presented in Table 1. Potentially applicable chemical-specific SCGs for soil include 6 NYCRR Part 375-6 soil cleanup objectives (i.e., commercial and industrial use for surface and subsurface soil, respectively) and 40 CFR Part 261 and 6 NYCRR Part 371 regulations for the identification of hazardous materials. Additionally, CP-51 *Soil Cleanup Guidance* (NYSDEC, 2010b) provides a total PAH SCO of 500 mg/kg for subsurface soil at non-residential sites. Potentially applicable chemical-specific SCGs for groundwater include NYSDEC Class GA Standards and Guidance Values.

  Alternative 4 would include the excavation surface soil containing elevated concentrations of total PAHs north of West Shore Boulevard (i.e., where visual MGP-related impacts have been identified in near surface and subsurface soil) and subsurface soil containing visually impacted material and total PAH concentrations greater than 500 mg/kg (located above and below the water table). Excavated material and process residuals would be managed and characterized in accordance with 40 CFR 261 and 6 NYCRR Part 371 regulations to determine off-site treatment/disposal requirements. NYS LDRs would apply to any materials that are characterized as a hazardous waste.

As indicated in Section 1, the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. As Alternative 4 would address a majority of soil containing MGP-related impacts, this alternative would likely achieve groundwater SCGs.

- *Action-Specific SCGs* – Action-specific SCGs are presented in Table 2. Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Work activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.

  Excavated soil would be subject to USDOT requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a NYSDEC-approved work plan and using licensed waste transporters and permitted disposal facilities. Per DER-4 (NYSDEC, 2002), excavated material from a former MGP site that is characteristically hazardous for benzene only (D018) is conditionally exempt from hazardous waste management requirements when destined for thermal treatment (e.g., LTTD). All excavated material would be disposed of in accordance with applicable NYS LDRs.

- *Location-Specific SCGs* – Location-specific SCGs are presented in Table 3. Potentially applicable location-specific SCGs generally include local building codes and construction permits. Remedial activities would be conducted in accordance with Village of Newark building/construction codes and ordinances.

<u>Overall Protectiveness of the Public Health and the Environment – Alternative 4</u>

Alternative 4 would address soil located above and below the water table that contains visual MGP-related impacts and/or total PAHs at concentrations greater than 500 mg/kg. Therefore, Alternative 4 would also address the surface soil north of West

Shore Boulevard (i.e., above near surface soil containing visual MGP-related impacts) that contains elevated concentrations of total PAHs (i.e., that would be encountered by commercial workers, maintenance workers, and trespassers) and the subsurface material most likely to be encountered by future subsurface utility/construction workers. The potential for long-term exposures to impacted subsurface soil and groundwater would be significantly reduced through the implementation of Alternative 4. Exposures to residual media containing COCs at concentrations greater than regulatory criteria (i.e., 6 NYCRR Part 375-6 commercial use SCOs and NYSDEC Class GA Standards and Guidance Values) would be addressed through the protocols and requirements that would be presented in the SMP. Additionally, annual groundwater monitoring would be conducted to document the extent of dissolved phase groundwater impacts.

This alternative would prevent human and biota exposures (i.e., direct contact, ingestion, and inhalation) to MGP-related impacts in soil (soil RAOs #1, #2, and #3) through the removal of MGP-related impacts (and former MGP structures) above and below the water table. The reduction of potential exposures to residual soil and groundwater impacts would occur by adhering to the institutional controls and the procedures set forth in the SMP that would be established/prepared as part this alternative (soil RAOs #1 and #2 and groundwater RAOs #1 and #2).

The extent of dissolved phase impacts is currently limited to slightly elevated concentrations of benzene. As Alternative 4 would address a majority of soil containing MGP-related impacts, potential sources of groundwater impacts would addressed (soil RAO #4 and groundwater RAO #4). Groundwater would likely be restored to pre-disposal/pre-release conditions (groundwater RAO #3) as impacted groundwater would be removed from excavation areas (in support of soil removal activities) and residual dissolved phase impacts would naturally attenuate (in the absence of additional source material).

<u>Cost Effectiveness – Alternative 4</u>

The estimated costs associated with Alternative 4 are presented in Table 8. The total estimated 30-year present worth cost for this alternative is approximately $5,000,000 (assuming removal of the eastern and western gas holders and soil in the immediate vicinity of these structures). The estimated capital cost, for conducting soil removal and backfilling activities, is $4,400.000. The estimated 30-year present worth cost of O&M activities associated with this alternative is approximately $600,000.

5.2.5 Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions

The major components of Alternative 5 would consist of the following:

- Demolition and removal of the hotel
- Removing soil containing MGP-related COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs
- Conducting short-term groundwater monitoring

Alternative 5 would include the removal activities to address soil containing MGP-related COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs. This alternative would include purchase of the hotel property and demolition of the hotel to facilitate removal of former MGP structures and soil. Alternative 5 would include the excavation of approximately 14,500 cy of soil. Anticipated soil removal limits are shown on Figure 14. In addition to the soil that would be removed under Alternative 4, Alternative 5 would include the removal of soil containing COCs at concentrations greater than unrestricted use SCOs east of the eastern gas holder and north of West Shore Boulevard. Additionally, for the purpose of developing a cost, soil removal limits are assumed to include soil below the hotel within the footprint of the former MGP. PDI activities would be conducted to refine/verify the extent of soil removal.

Similar to Alternatives 3 and 4, based on the anticipated excavation limits of this alternative, subsurface utilities (i.e., electrical service, water lines, storm water drains, and telecommunication lines) would be protected and/or relocated during excavation activities. Additionally, lane closures or closure of the entire roadway would be required to conduct excavation activities within West Shore Boulevard. Excavation activities would be conducted using conventional construction equipment such as backhoes, excavators, front-end loaders, dump trucks, etc. Based on the proposed extent/depth of excavation activities, excavation support systems (assumed to consist of pre-fabricated support systems [e.g., slide rail]) will be required. The final excavation support plan would be developed as part of a remedial design of this alternative. For the purpose of developing this alternative, it has been assumed that excavated material from 0 to 1 foot below grade within and south of West Shore Boulevard would be transported off-site for disposal as C&D debris. Remaining excavated material would be transported off-site for treatment/disposal via LTTD. Further off-site treatment/disposal options, including disposal of soil as a non-hazardous waste at a solid waste landfill or potential reuse of excavated material, would be assessed during the remedial design of this alternative.

As Alternative 5 includes excavation activities below the water table in select areas, groundwater would be removed from the excavation areas. For the purpose of developing this alternative, it has been assumed that water generated during remedial construction activities would be temporarily stored on-site in frac tanks and subsequently transported off-site for disposal. The need for a temporary water treatment system would be evaluated as part of the remedial design of this alternative.

Following excavation and backfilling activities, groundwater monitoring would be conducted for a short duration (e.g., up to two years) to confirm that groundwater standards and guidance values are achieved. Because a vast majority (if not all) of MGP-related impacts would be removed from the project area, elevated dissolved phase concentrations of benzene that could potentially remain in groundwater downgradient from the excavation areas would be expected to naturally attenuate. Therefore, Alternative 5 would not include long-term groundwater monitoring or institutional controls components.

Short-Term Impacts and Effectiveness – Alternative 5

Implementation of this alternative could result in short-term exposure of the surrounding community and site workers to site-related COCs as a result of excavation, material handling, and off-site transportation activities. Potential exposure mechanisms would include ingestion and dermal contact with NAPL, impacted soil, and/or groundwater and inhalation of volatile organic vapors or dust containing COCs during remedial construction. Potential exposure of remedial workers would be reduced through the use of appropriately trained field personnel and PPE, as specified in a site-specific HASP that would be developed as part of the remedial design.

Additional worker safety concerns include working with and around large construction equipment, noise generated from operating construction equipment, and increased vehicle traffic associated with transportation of excavated material from the project area and delivery of fill materials. These concerns would be reduced by using engineering controls and appropriate health and safety practices. Off-site transportation of excavated material and importation of clean fill materials would result in approximately 1,300 tractor trailer truck round trips (assuming 35 tons per dump truck and 5,000 gallons per tank truck). Transportation activities would be managed to reduce en-route risks to the community. Based on the anticipated excavation limits, portions of West

Shore Boulevard would be closed during remedial construction activities. Traffic control measures (e.g., flagmen, temporary barriers, and signs) would be used to direct vehicle traffic around excavation areas. As indicated above, Alternative 5 has been developed assuming the hotel would be demolished and removed.

Potential risks to the community could occur during short-term periodic groundwater monitoring activities via exposure to purged groundwater and groundwater samples. Potential exposures to the community would be reduced by following appropriate procedures and protocols that would be described in the SMP.

Alternative 5 does not employ green remediation practices and the relative carbon footprint (as compared to the other alternatives) is considered significant. The greatest contribution to greenhouse gases would occur as a result of equipment operation during soil excavation, backfilling, and transportation activities, as well as LTTD treatment of excavated soil.

Soil excavation and backfilling activities could be completed in approximately 13 months and periodic groundwater monitoring would be conducted over an assumed 2-year period.

Long-Term Effectiveness and Permanence – Alternative 5

Under Alternative 5, soil containing MGP-related COCs at concentrations greater than unrestricted use SCOs would be excavated and transported off-site for treatment and/or disposal. Based on the soil removal limits of Alternative 5, the potential for future long-term impacts from and exposures to MGP-related COCs in soil and groundwater would be eliminated through the implementation of this alternative. Short-term groundwater monitoring would be conducted to confirm that groundwater standards and guidance values are achieved. Long-term groundwater monitoring, development of an SMP, establishment of institutional controls would not be required to reduce the potential for long-term exposures as a vast majority (if not all) of impacts would be removed from the project area under this alternative.

Land Use – Alternative 5

The current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

Based on the anticipated soil removal limits, Alternative 5 would include the demolition and removal of the hotel; thereby affecting the current land use at the project area. However, Alternative 5 would not affect the anticipated future land use at the project area. Soil containing MGP-related COCs at concentrations greater than unrestricted use SCOs would be removed. There would be no limitations to the potential future use of the project area. Dissolved phase concentrations of COCs in groundwater beyond excavation limits (if any) would be expected to naturally attenuate over a relatively short time period.

Reduction of Toxicity, Mobility or Volume of Contamination through Treatment – Alternative 5

Alternative 5 would include the excavation of approximately 14,500 cy of material to address soil containing MGP-related COCs at concentrations greater than unrestricted use SCOs. Excavated material would be permanently transported off-site for treatment via LTTD. Alternative 5 would address surface soil containing elevated concentrations of total PAHs above near surface soil containing visual MGP-related impacts, sources of NAPL (i.e., the former tar well and eastern gas holder), and a vast majority of soil containing MGP-related impacts.

The extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. Residual dissolved phase concentrations of benzene (if any) would be expected to naturally attenuate. Alternative 5 includes short-term (e.g., up to two years) periodic groundwater monitoring to document the likely reduction (i.e., toxicity and volume) of residual dissolved phase groundwater impacts.

Implementability – Alternative 5

Alternative 5 would be both technically and administratively implementable. Removal and off-site disposal of surface soil and subsurface soil located above and below the water table that contains MGP-related impacts (and former MGP structures) is technically feasible. Remedial contractors capable of performing the excavation activities are readily available. Potential implementation challenges associated with this alternative include conducting excavation activities within public roadways and immediately adjacent to existing structures (e.g., the private business north of West

Shore Boulevard) and excavating in areas where subsurface utilities are present (i.e., water, sewer, telecommunication). Soil loading conditions from the roadway and buildings would be evaluated as part of the remedial design. Potential options to temporarily bypass or reroute the subsurface utilities located within the anticipated excavation limits would also be evaluated during the remedial design. Temporary lane or roadway closures would have to be implemented to conduct excavation activities within West Shore Boulevard. Logistically, as NYSEG does not own property in the project area, limited space is available for equipment and material staging. A laydown area for holding tanks would be required in support of excavation dewatering activities (as soil removal activities would be conducted below the water table). Remedial construction activities would have to be coordinated with the property owners to reduce impacts to daily operations of the businesses within the project area.

Administratively, NYSEG would likely be required to purchase the hotel property and access agreements would be required to conduct excavation activities on property north of West Shore Boulevard. Access agreements would also be required to conduct short-term groundwater monitoring activities on properties not owned by NYSEG.

<u>Compliance with SCGs – Alternative 5</u>

- *Chemical-Specific SCGs* – Chemical-specific SCGs are presented in Table 1. Potentially applicable chemical-specific SCGs for soil include 6 NYCRR Part 375-6 soil cleanup objectives (i.e., commercial and industrial use for surface and subsurface soil, respectively) and 40 CFR Part 261 and 6 NYCRR Part 371 regulations for the identification of hazardous materials. Potentially applicable chemical-specific SCGs for groundwater include NYSDEC Class GA Standards and Guidance Values.

  Alternative 5 would address soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs (i.e. more stringent that commercial and industrial use SCOs), which includes soil containing MGP-related impacts (i.e., visually impacted soil and soil containing elevated concentrations of total PAHs). Excavated material and process residuals would be managed and characterized in accordance with 40 CFR 261 and 6 NYCRR Part 371 regulations to determine off-site treatment/disposal requirements. NYS LDRs would apply to any materials that are characterized as a hazardous waste.

  As indicated in Section 1, the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. As Alternative 5 would address soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs, this alternative would likely achieve groundwater SCGs.

- *Action-Specific SCGs* – Action-specific SCGs are presented in Table 2. Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Work activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.

  Excavated soil would be subject to USDOT requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a NYSDEC-approved remedial design and using licensed waste transporters and permitted disposal facilities. Per DER-4 (NYSDEC, 2002), excavated material from a former MGP site that is characteristically hazardous for benzene only (D018) is conditionally exempt from hazardous waste management requirements when destined for thermal treatment (e.g., LTTD). All excavated material would be disposed of in accordance with applicable NYS LDRs.

- *Location-Specific SCGs* – Location-specific SCGs are presented in Table 3. Potentially applicable location-specific SCGs generally include local building codes and construction permits. Remedial activities would be conducted in accordance with Village of Newark building/construction codes and ordinances.

<u>Overall Protectiveness of the Public Health and the Environment – Alternative 5</u>

Alternative 5 would address soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial SCOs. Therefore, Alternative 5 would also address the surface soil north of West Shore Boulevard (i.e., above near surface soil containing visual MGP-related impacts) that contains elevated concentrations of total PAHs (i.e., that would be encountered by commercial workers, maintenance workers, and trespassers) and the subsurface material most likely to be encountered by future subsurface utility/construction workers. Through excavation of soil in the project area, Alternative 5 would eliminate the potential for long-term exposures to impacted surface soil, subsurface soil, and groundwater.

This alternative would eliminate human and biota exposures (i.e., direct contact, ingestion, and inhalation) to MGP-related impacts in soil (soil RAOs #1, #2, and #3) through the removal of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs (and former MGP structures) above and below the water table.

The extent of dissolved phase impacts is currently limited to slightly elevated concentrations of benzene. As Alternative 5 would address a vast majority of (if not all) soil containing MGP-related impacts, potential sources of groundwater impacts would addressed (soil RAO #4 and groundwater RAO #4). Groundwater would likely be restored to pre-disposal/pre-release conditions (groundwater RAO #3) as impacted groundwater would be removed from excavation areas (in support of soil removal activities) and residual dissolved phase impacts (if any) would naturally attenuate, thereby eliminating exposures to impacted groundwater (groundwater RAOs #1 and #2).

<u>Cost Effectiveness – Alternative 5</u>

The estimated costs associated with Alternative 5 are presented in Table 9. The total estimated 2-year present worth cost for this alternative is approximately $12,000,000. The estimated capital cost, for purchased the hotel property, demolishing the hotel, and conducting soil removal and backfilling activities, is $11,950,000. The estimated 2-year present worth cost of O&M activities associated with this alternative is approximately $50,000.

6. Comparative Analysis of Alternatives

This section presents the comparative analysis of each remedial alternative using the evaluation criteria identified in Section 5. The comparative analysis identifies the advantages and disadvantages of each alternative relative to each other and with respect to the evaluation criteria.

6.1 Comparative Analysis

The alternatives evaluated in Section 5 consist of the following:

- Alternative 1 – No Action
- Alternative 2 – Groundwater Monitoring and Institutional Controls
- Alternative 3 – Targeted Soil Removal
- Alternative 4 – Deep Soil Removal
- Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions

The comparative analysis of these alternatives is presented in the following subsections.

6.1.1 Short-Term Impacts and Effectiveness

Alternative 1 would not include any active remediation and subsequently would not present potential short-term impacts to remedial workers, the public, or the environment. As Alternative 2 does not include any intrusive activities, Alternative 2 would pose minimal potential short-term risks and potential disturbances to remedial workers and the surrounding community.

Alternatives 3, 4, and 5 each include intrusive activities to address soil containing MGP-related impacts. Under Alternative 3, surface soil, near surface soil, and subsurface soil above the water table containing MGP-related impacts would be removed and Alternative 4 would include the excavation of surface soil, near surface soil, and subsurface soil (above and below the water table) containing MGP-related impacts. Alternative 5 would include the excavation of soil containing MGP-related COCs at concentrations greater than unrestricted use SCOs. Each of these alternatives would pose potential short-term risks to remedial workers and the public from potential exposure to impacted soil, groundwater (Alternatives 4 and 5 only), and NAPL during soil excavation, off-site transportation of excavated material, and backfilling. Additionally, the excavation activities conducted under these alternatives would pose short-term risks from the operation of construction equipment and generation of noise and dust.

As each of the remedial alternatives includes excavation (and backfilling) of a subsequently larger quantity of soil, each successive alternative would cause greater disruption to the surrounding community. Nuisances to the surrounding community would include noise from the operation of construction equipment and an increase in local truck traffic from off-site transportation of excavated materials and the importation of fill materials. Estimated duration of remedial construction activities for each of the alternatives and number of truck trips required for each alternative are presented below.

- Alternative 1 – no time required and no truck trips
- Alternative 2 – no time required and no truck trips
- Alternative 3 – 2 months and 120 truck trips
- Alternative 4 – 7 months and 600 truck trips
- Alternative 5 – 13 months and 1,300 truck trips

Potential exposures during implementation of these alternatives would be mitigated, to the extent practicable, by using appropriate PPE, air and work space monitoring, implementation of dust control and noise mitigation measures (as appropriate and if necessary based on monitoring results), and proper planning and training of remedial workers.

Based on the anticipated excavation limits, portions of West Shore Boulevard and the hotel parking lot would be closed during remedial construction activities. Traffic control measures (e.g., flagmen, temporary barriers, and signs) would be used to direct vehicle traffic around excavation areas. Routine hotel operations may be disrupted during the remedial construction activities associated with Alternatives 3 and 4. Demolition and removal of the hotel would be required to facilitate excavation activities under Alternative 5.

Alternative 1 would have no carbon footprint and Alternative 2 would have a minimal carbon footprint. Based on the extent of the excavation activities, Alternatives 3, 4 and 5 have sequentially increasing carbon footprints (i.e., moderate, moderate to significant, and significant). Alternative 5 has the greatest carbon footprint compared to the other alternatives. The greatest contribution to greenhouse gases would occur as a result of equipment operation during excavation, backfilling, and transportation activities, as well as LTTD treatment of excavated material.

As each successive alternative (i.e., Alternatives 3, 4, and 5) includes the excavation of a greater quantity of soil, the potential for short-term impacts to the public and remedial workers inherently increases. Compared to the other remedial alternatives, Alternative 5 would be the most disruptive to the project area and surrounding community, has the greatest potential for exposures to remedial workers and the public, would require the longest time to implement, and has the greatest carbon footprint. Therefore, Alternative 5 has the lowest level of short-term effectiveness (i.e., the greatest potential for exposure and community disruption during implementation).

6.1.2 Long-Term Effectiveness and Permanence

Although routine activities conducted within the project area do not include intrusive activities that could result in exposure to soil and groundwater containing MGP-related impacts, surface soil north of West Shore Boulevard contains elevated concentrations of total PAHs (above near surface soil containing visual MGP-related impacts) and subsurface soil throughout the project area contains elevated concentrations of total PAHs and visually impacted material at depths ranging from 5 to 18 feet bgs. The extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene at select locations.

Alternative 1 would not include the implementation of any remedial activities and therefore, would not address potential long-term exposures to or impacts from media that contain MGP-related impacts. Alternatives 2, 3, and 4 each include periodic groundwater monitoring to document the extent and concentrations of dissolved phase impacts (i.e., to confirm that concentrations of dissolved phase COCs are stable or potentially decreasing through natural attenuation). Additionally, Alternatives 2, 3, and 4 each include the establishment of institutional controls and development of an SMP to limit the potential for future exposures to MGP-related impacts in subsurface soil and groundwater (that would remain following remedial construction activities). Alternative 2 would rely solely on the institutional controls and the SMP to mitigate future exposures.

Alternative 3 would address subsurface soil (including former MGP structures) above the water table and surface soil above near surface soil containing visual MGP-related impacts. Removal of this material would reduce the potential need to implement the protocols described in the SMP and reduce the potential for exposures to media containing MGP-related COCs. This would facilitate the completion of future subsurface utility work in areas that no longer contain MGP-related impacts (utility work would not likely be conducted at depths greater than 11 feet bgs), thereby minimizing the potential for future exposures to construction/utility workers. Alternative 4 would address MGP-related impacts to a depth of approximately 18 feet bgs. Removal of a majority of soil containing MGP-related impacts would significantly reduce the potential need to implement the protocols described in the SMP and reduce the potential for exposures to media containing MGP-related COCs.

Alternative 5 would have the greatest degree of long-term effectiveness based on the removal of a vast majority of (if not all) soil and groundwater containing MGP-related impacts. However, Alternative 4 is also considered effective on long-term basis. Under Alternative 4, following removal of subsurface soil containing MGP-related impacts (and surface soil and near surface soil containing visual MGP-related impacts), exposures to media containing residual concentrations of COCs (i.e., greater than 6 NYCRR Part 375-6 commercial use SCOs and NYSDEC Class GA Standards and Guidance Values) would be addressed through the protocols and requirements that would be presented in the SMP. As indicated above, future subsurface utility work would be conducted in areas that no longer contain MGP-related impacts (or former MGP structures).

As Alternatives 2 and 3 do not address material below the water table, dissolved phase COC concentrations would likely not be reduced under these alternatives. Alternatives 4 and 5 would address soil containing MGP-related impacts (including visually impacted material) below the water table. Because the visually impacted material below the water table serves as a source of dissolved phase impacts, dissolved phase COC concentrations would likely be reduced following the completion of remedial construction activities. Alternatives 4 and 5 would likely restore groundwater quality. Under Alternative 5, a vast majority of MGP-related impacts (if not all) would be removed, through the removal of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs.

Although Alternative 5 would have the highest degree of long-term effectiveness and permanence, Alternative 4 is considered equally effective as Alternative 5 as Alternative 4 includes the removal of a vast majority (if not all) NAPL (i.e., OLM and TLM) and based on the limited potential for future exposures to soil and groundwater containing MGP-related impacts following implementation of Alternative 4.

6.1.3 Land Use

As indicated in Section 5, the current zoning for the project area is listed as commercial (i.e., general business [B-2]). Areas immediately surrounding the project area are zoned for commercial, industrial and residential (i.e., general business [B-2], light industrial [I-1], and residence [R-1 and R-2], respectively). The current and foreseeable future use of the project area is commercial. The majority of the project area will continue to be used by the hotel for accommodation services and as a parking lot. In addition, the other properties located within the project area are anticipated to be used for commercial purposes.

Based on the removal of the hotel, only Alternative 5 would have an impact on the current use of the project area. Implementation of Alternatives 1 through 5 is not anticipated to alter the anticipated future use of the project area. Under Alternatives 3, 4, and 5, future subsurface utility work would be completed in areas that no longer contain MGP-related impacts and the project area would be restored following the completion of remedial construction activities. As part of Alternatives 2, 3, and 4, institutional controls would be placed on the properties within the project area and groundwater monitoring would be conducted for an assumed 30 years. In the event that properties within the project area are sold, future owners/operators would be required to comply with the SMP and institutional controls established based on the continued presence of soil and groundwater containing MGP-related COCs.

6.1.4 Reduction of Toxicity, Mobility or Volume of Contamination through Treatment

Alternative 1 would not actively treat, remove, recycle, or destroy impacted media and therefore, is considered the least effective for this criterion. Alternatives 2, 3, and 4 each include annual groundwater monitoring to document the extent of dissolved phase impacts and potential trends in dissolved phase COC concentrations.

Through excavation, Alternatives 3, 4, and 5 would each address surface soil containing elevated concentrations of total PAHs (located above near surface soil containing visual MGP-related impacts), as well as near surface soil containing visual MGP-related impacts. Alternative 3 would also include excavation of soil containing MGP-related impacts located above the water table (i.e., at depths up to 11 feet bgs) while Alternative 4 would include the excavation of soil containing MGP-related impacts above and below the water table (i.e., at depths up to 18 feet bgs). Alternative 5 would include the excavation of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs. Alternatives 3, 4, and 5 would include the excavation of approximately 1,200 cy, up to 6,100 cy (including 4,600 cy of material associated with the eastern and western gas holder excavations), and 14,500 cy of material, respectively. Under each alternative, excavated material would be permanently transported off-site for treatment via LTTD.

As indicated in Section 1, the extent of dissolved phase impacts is currently limited to slightly elevated concentrations of benzene. To document the extent of dissolved phase impacts, Alternatives 2, 3, and 4 include long-term groundwater monitoring and Alternative 5 includes short-term groundwater monitoring. Alternatives 2 and 3 do not include excavation activities below the water table and therefore, reduction of dissolved impacts under these alternatives could only occur through potential long-term reduction (i.e., via natural attenuation). Under Alternatives 4 and 5, through the removal of a majority of subsurface soil containing MGP-related impacts (as well as removing impacted groundwater from excavation areas), residual concentrations of dissolved phase impacts would be expected to be reduced following the completion of the remedial construction activities.

Although Alternative 5 would remove a greater volume of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs, Alternatives 4 and 5 are considered equally effective at reducing the toxicity, mobility, and volume of MGP-related impacts as Alternative 4 includes the removal of a vast majority (if not all) NAPL (i.e., OLM and TLM). The additional 8,400 cy of material that would be removed under Alternative 5 (compared to Alternative 4) would not contain potentially mobile NAPL (if any NAPL at all) and is considered residual material that does not serve as a source of dissolved phase impacts.

6.1.5 Implementability

No remedial activities would be conducted as part of Alternative 1 and therefore, Alternative 1 is considered the most implementable. Alternatives 2, 3, and 4 would include long-term groundwater monitoring, preparation of an SMP, and implementation of institutional controls on properties within the project area. From a technical implementability standpoint, these activities do not require highly specialized equipment or personnel and could be easily implemented. Administratively, establishing institutional controls and conducting groundwater monitoring on properties not owned by NYSEG would require coordination with state agencies (i.e., NYSDEC and NYSDOH) and the property owners.

Alternatives 3, 4, and 5 each include the excavation of subsurface soil and therefore, have similar implementation challenges. Remedial contractors capable of performing the excavation activities are readily available. Potential implementation challenges are associated with conducting excavation activities within public roadways and immediately adjacent to existing structures (e.g., the hotel south of West Shore Boulevard and the private business north of West Shore Boulevard) and excavating in areas where subsurface utilities are present (i.e., water, sewer, telecommunication). Soil loading conditions from the roadway and buildings would be evaluated. Potential options to temporarily bypass or reroute the subsurface utilities located within the anticipated excavation limits would be evaluated during the remedial design. Temporary lane (or roadway) closures would have to be implemented to conduct excavation activities within West Shore Boulevard and portions of the hotel parking lot would be closed during excavation activities. Additionally, the hotel would have to be demolished and removed to facilitate soil excavation activities under Alternative 5.

Logistically, as NYSEG does not own property in the project area, limited space is available for equipment and material staging. Under Alternatives 4 and 5, a laydown area for holding tanks would be required in support of excavation dewatering activities (as soil removal activities would be conducted below the water table). Remedial construction activities would have to be coordinated with the property owners to reduce impacts to daily operations of the businesses within the project area. Administratively, access agreements would be required to conduct excavation activities on property not owned by NYSEG. Under Alternative 5, NYSEG would likely be required to purchase the hotel property prior demolition and removal of the building.

6.1.6 Compliance with SCGs

- *Chemical-Specific SCGs* – Chemical-specific SCGs are presented in Table 1. Potentially applicable chemical-specific SCGs for soil include 6 NYCRR Part 375-6 soil cleanup objectives (i.e., commercial and industrial use for surface and subsurface soil, respectively) and 40 CFR Part 261 and 6 NYCRR Part 371 regulations for the identification of hazardous materials. Additionally, CP-51 *Soil Cleanup Guidance* (NYSDEC, 2010b) provides a total PAH SCO of 500 mg/kg for subsurface soil at non-residential sites. Potentially applicable chemical-specific SCGs for groundwater include NYSDEC Class GA Standards and Guidance Values.

  Alternatives 1 and 2 do not include intrusive remedial construction activities and therefore, would not achieve chemical-specific SCGs for soil. Alternative 3 would address soil above the water table that contains visual impacts and/or total PAH at concentrations greater than 500 mg/kg. Alternative 4 would address soil above and below the water table that contains visual impacts and/or total PAH at concentrations greater than 500 mg/kg. Alternative 5 would address soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial and industrial use SCOs (i.e., through the removal of soil containing COCs at concentrations greater than unrestricted use SCOs). Under each alternative, excavated material and process residuals would be managed and characterized in accordance with 40 CFR 261 and 6 NYCRR Part 371 regulations to determine off-site treatment/disposal requirements. NYS LDRs would apply to any materials that are characterized as a hazardous waste.

As indicated in Section 1, the extent of dissolved phase impacts is limited to slightly elevated concentrations of benzene. Alternatives 1, 2, and 3 do not address soil containing MGP-related impacts below the water table. Therefore, if these alternatives could achieve groundwater SCGs, the SCGs would be achieved over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts). As Alternative 4 would address a majority of soil containing MGP-related impacts (including all NAPL) and Alternative 5 would address a vast majority (if not all) soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 unrestricted use SCOs, either of these alternatives would likely achieve the groundwater SCGs.

- *Action-Specific SCGs* – Action-specific SCGs are presented in Table 2. Potentially applicable action-specific SCGs include health and safety requirements and regulations associated with handling impacted media. Work activities would be conducted in accordance with OSHA requirements that specify general industry standards, safety equipment and procedures, and record keeping and reporting regulations. Compliance with these action-specific SCGs would be accomplished by following a site-specific HASP.

  Under Alternatives 2, 3, 4, and 5, excavated soil and process residuals would be subject to USDOT requirements for packaging, labeling, manifesting, and transporting hazardous or regulated materials. Compliance with these requirements would be achieved by following a NYSDEC-approved remedial design and using licensed waste transporters and permitted disposal facilities. Per DER-4 (NYSDEC, 2002), excavated material from a former MGP site that is characteristically hazardous for benzene only (D018) is conditionally exempt from hazardous waste management requirements when destined for thermal treatment (e.g., LTTD). All excavated material would be disposed of in accordance with applicable NYS LDRs.

- *Location-Specific SCGs* – Location-specific SCGs are presented in Table 3. Potentially applicable location-specific SCGs generally include local building codes and construction permits. Remedial activities conducted under any of the alternatives would be conducted in accordance with Village of Newark building/construction codes and ordinances.

6.1.7 Overall Protectiveness of the Public Health and the Environment

As Alternative 1 does not include any active remedial measures or administrative controls, Alternative 1 is not considered protective of public health and the environment. Alternatives 2, 3, 4, and 5 would prevent exposures (i.e., direct contact, ingestion, and inhalation) of MGP-related impacts in soil and groundwater (soil RAOs #1 and #2 and groundwater RAOs #1 and #2). Alternative 2 would solely rely on the implementation of institutional controls and procedures set forth in an SMP, while Alternatives 3, 4, and 5 would utilize a combination of varying amounts of excavation, institutional controls, and an SMP to prevent human and biota exposures to MGP-related impacts in soil (soil RAOs #1, #2, and #3). Alternatives 3, 4, and 5 would address the subsurface and near-surface material most likely to be encountered by future subsurface utility/construction workers (i.e., soil above the water table), as well as the surface soil north of West Shore Boulevard (located above near surface soil containing visual MGP-related impacts) that contains elevated concentrations of total PAHs (i.e., that could be encountered by commercial workers, maintenance workers, and trespassers). Although each of these alternatives is considered protective of human health and the environment, Alternative 5 would solely rely on excavation to mitigate potential exposures to impacted media. Alternatives 3 and 4 would partially rely on institutional controls and an SMP; Alternative 3 would only address soil (and former MGP structures) containing MGP-related impacts above the water table and Alternative 4 would address soil containing MGP-related impacts (and former MGP structures) above and below the water table (but not all soil containing COCs at concentrations greater than unrestricted use SCOs).

Although the extent of dissolved phase impacts is currently limited to slightly elevated concentrations of benzene, Alternatives 1, 2, and 3 do not address soil containing MGP-related impacts below the water table. Therefore, these alternatives would not address potential sources of groundwater impacts (soil RAO #4 and groundwater RAO #4) and groundwater would only be restored to pre-disposal/pre-release conditions (groundwater RAO #3) over a prolonged period of time (i.e., through natural attenuation of dissolved phase impacts). Alternatives 4 and 5 would address a majority (if not all) soil containing MGP-related impacts, which serve as a source of dissolved phase impacts (soil RAO #4 and groundwater RAO #4). Additionally, Alternatives 4 and 5 would likely restore groundwater to pre-disposal/pre-release conditions (groundwater RAO #3), as impacted groundwater would be removed from the excavation areas (in support of soil removal activities) and residual dissolved phase impacts (if any) would naturally attenuate.

6.1.8 Cost Effectiveness

The following table summarizes the estimated costs associated with implementing each of the remedial alternatives.

Table 6.1 Estimated Costs

Alternative	Estimated Capital Cost	Estimated Present Worth Cost of O&M	Total Estimated Cost
Alternative 1 – No Action	$0	$0	$0
Alternative 2 – Groundwater Monitoring and Institutional Controls	$100,000	$600,000[1]	$700,000
Alternative 3 – Targeted Soil Removal	$1,200,000	$600,000[1]	$1,800,000
Alternative 4 – Deep Soil Removal	$4,400,000	$600,000[1]	$5,000,000
Alternative 5 – Soil Removal to Achieve Pre-Disposal Conditions	$11,950,000	$50,000[2]	$12,000,000

Notes:
1. Estimated present worth of O&M cost is over an assumed 30-year period.
2. Estimated present worth of O&M cost is over an assumed 2-year period.

The capital cost to implement Alternative 5 is greater relative to the other alternatives (i.e., nearly two and half times more than Alternative 4). Alternative 5 includes the removal of more than two times the volume (14,500 cy) of soil removed under Alternative 4 (6,100 cy). Although the high cost for Alternative 5 corresponds to the greatest removal volume, Alternative 5 corresponds to the greatest disruption to the surrounding community and has greatest potential for exposures and community disruption during implementation of the alternative. Therefore, Alternative 5 is considered the least cost effective compared to the short-term effectiveness; reduction of toxicity, mobility, and volume; and long-term effectiveness.

The capital cost to implement Alternative 4 is more than double the capital cost to implement Alternative 3. However, Alternative 4 would address soil containing MGP-related impacts (including a vast majority, if not all NAPL) above and below the water table (i.e., at depths up to 18 feet bgs), compared to Alternative 3 (which only addresses soil to depths up to 11 feet bgs). As Alternative 4 would address a majority of soil containing MGP-related impacts, Alternative 4 would rely less upon institutional controls and an SMP to prevent potential future exposures to construction/utility workers and the source of dissolved phase impacts would be addressed. Alternative 4 would include annual groundwater monitoring confirm the anticipated natural attenuation of residual dissolved impacts following soil excavation activities. Therefore, Alternative 4 is considered the most cost effective.

6.2 Comparative Analysis Summary

The following table provides a summary of the remedial alternatives' abilities to meet the RAOs, as well as the volume of visually impacted material addressed, relative short-term impacts, and estimated cost for each alternative.

Table 6.2 Comparative Analysis Summary

Criteria	Alternative No.				
	1	**2**	**3**	**4**	**5**
Overall Protection (RAOs)					
Soil RAO 1	No	Yes	Yes	Yes	Yes
Soil RAO 2	No	Yes	Yes	Yes	Yes
Soil RAO 3	No	No	Yes	Yes	Yes
Soil RAO 4	No	No	No	Yes	Yes
Groundwater RAO 1	No	Yes	Yes	Yes	Yes
Groundwater RAO 2	No	Yes	Yes	Yes	Yes
Groundwater RAO 3	No	No	No	Yes	Yes
Groundwater RAO 4	No	No	No	Yes	Yes
Reduction of Toxicity, Mobility, and Volume					
Soil Removal Volume	0 cy	0 cy	1,200 cy	6,100 cy	14,500 cy
Short Term Impacts					
Length of Disruption	None	None	3 months	7 months	13 months
Carbon Footprint	None	Minimal	Moderate	Moderate / Significant	Significant
Cost					
Total Cost	$0	$700,000	$1,800,000	$5,000,000	$12,000,000

7. Preferred Remedial Alternative

The results of the comparative analysis (presented in Section 6) were used as a basis for identifying a preferred remedial alternative for the project area. The components of the preferred remedial alternative, as well as the rationale for selecting the preferred remedial alternative, are presented in the following subsections.

7.1 Summary of Preferred Remedial Alternative

Based on the comparative analysis of the remedial alternatives presented in Section 6, Alternative 4 is the preferred remedial alternative. This alternative would cost-effectively achieve the best balance of the NYSDEC evaluation criteria. The preferred remedial alternative reduces the potential for future exposure to surface soil, subsurface soil, and groundwater containing MGP-related impacts.

The primary components of the preferred remedial alternative consist of the following:

- Conducting a PDI to refine/verify the extent of soil removal
- Protecting, bypassing, or relocating subsurface utilities that transect soil removal areas
- Excavating an estimated 1,500 cy of surface material, subsurface soil, and former MGP structures (plus up to an estimated 4,600 cy of soil and former MGP structures associated with the eastern and western gas holders) to a depth up to 18 feet bgs to address soil located above and below the water table that contains visual MGP-related impacts and/or total PAHs at concentrations greater than 500 mg/kg. As indicated above, a PDI will be conducted to refine/verify soil removal limits, as well as assess whether the former holders require removal.
- Transporting an estimated 170 tons of surface material off-site for disposal as C&D debris (plus up to an estimated 660 tons associated with the eastern and western gas holder excavations)
- Transporting an estimated 2,200 tons of subsurface soil off-site for treatment/ disposal via LTTD (plus up to an estimated 6,300 tons associated with the eastern and western gas holder excavations)
- Transporting an estimated 28,000 gallons of construction-related water off-site for treatment/disposal (plus up to an estimated 135,000 gallons associated with the eastern and western gas holder excavations)

- Backfilling soil removal areas with a CLSM to reduce the potential for damage to nearby infrastructure and buildings
- Restoring disturbed surfaces, in kind, with asphalt pavement, concrete, or vegetated topsoil
- Establishing institutional controls for properties within the project area in the form of deed restrictions and/or environmental easements that would limit intrusive (i.e., subsurface) activities that could result in potential exposures to residual subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values; require compliance with the SMP; and prohibit the use of non-treated groundwater in the project area.
- Preparing an SMP to document the following:
  - The institutional controls that have been established and will be maintained for the project area
  - Known locations of soil containing COCs at concentrations greater than 6 NYCRR Part 375-6 commercial use SCOs
  - Protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially residually impacted material encountered during these activities
  - Protocols and requirements for conducting annual groundwater monitoring
  - Protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities

7.2 Rationale for the Selection of the Preferred Remedial Alternative

Excavation is the primary component of the preferred alternative. Excavation is a proven technology for addressing soil that contains MGP-related impacts, has been successfully implemented at other MGP sites, and is considered technically and administratively implementable. Remedial contractors capable of performing excavation activities are readily available. Potential implementation challenges are associated with conducting excavation activities within public roadways and immediately adjacent to existing structures (e.g., the hotel south of West Shore Boulevard and the private business north of West Shore Boulevard) and excavating in areas where subsurface utilities are present (i.e., water, sewer, telecommunication). Soil loading conditions from the roadway and buildings would be evaluated. Potential options to temporarily bypass or reroute the subsurface utilities located within the anticipated excavation limits would be evaluated as part of a PDI conducted during the remedial design. Temporary lane (or roadway) closures would have to be implemented to conduct excavation activities within West Shore Boulevard and portions of the hotel parking lot would be closed during excavation activities.

Logistically, as NYSEG does not own property in the project area, limited space is available for equipment and material staging. A laydown area for holding tanks would be required in support of excavation dewatering activities (as soil removal activities would be conducted below the water table). Remedial construction activities would have to be coordinated with the property owners to reduce impacts to daily operations of the businesses within the project area. Administratively, access agreements would be required to conduct excavation activities on property not owned by NYSEG.

The preferred alternative also includes groundwater monitoring, institutional controls, and an SMP. Administratively, institutional controls would be established for the properties within the project area (i.e., not owned by NYSEG), which would require coordination with state agencies (i.e., NYSDEC and NYSDOH) and the property owners. Access agreements would also be required to conduct groundwater monitoring activities on properties not owned by NYSEG.

Alternative 4 would prevent human and biota exposures (i.e., direct contact, ingestion, and inhalation) to MGP-related impacts in soil (soil RAOs #1, #2, and #3) through the removal of MGP-related impacts (and former MGP structures) above and below the water table. The reduction of potential exposures to residual soil and groundwater impacts would occur by adhering to the institutional controls and the procedures set forth in the SMP that would be established/prepared as part of this alternative (soil RAOs #1 and #2 and groundwater RAOs #1 and #2).

The extent of dissolved phase impacts is currently limited to slightly elevated concentrations of benzene. As Alternative 4 would address a majority of soil containing MGP-related impacts (including a vast majority, if not all, NAPL), potential sources of groundwater impacts would be addressed (soil RAO #4 and groundwater RAO #4). Groundwater would likely be restored to pre-disposal/pre-release conditions (groundwater RAO #3) as impacted groundwater would be removed from excavation areas (in support of soil removal activities) and residual dissolved phase impacts would naturally attenuate.

Alternative 4 is considered equally effective, compared to Alternative 5, when considering long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; and overall protectiveness of the public health and the environment. Implementation of Alternative 5 would provide minimal added benefits related to these criteria and is not justified by the additional cost and disruption to the community. In contrast to Alternative 5, Alternative 4 can achieve the site-specific RAOs with a shorter remedial construction time, less impact to the surrounding community, and at less cost.

7.3 Estimated Cost for Preferred Remedial Alternative

The total estimated cost associated with implementation of the preferred remedial alternative is summarized in the following table.

Table 7.1 – Cost Estimate for the Preferred Remedial Alternative

Alternative	Estimated Capital Cost	Estimated Present Worth of O&M Cost[1]	Total Estimated Cost
Alternative 4 – Deep Soil Removal	$4,400,000	$600,000	$5,000,000

Notes:
1. Estimated present worth of O&M cost is over an assumed 30-year period.

8. References

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Tables

Table 1
Summary of Chemical-Specific SCGs

Feasibility Study Report
NYSEG - Newark Former MGP Site - Newark, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
National Primary Drinking Water Standards	40 CFR Part 141	S	Establishes maximum contaminant levels (MCLs) which are health-based standards for public water supply systems.	These standards are potentially applicable if an action involves future use of ground water as a public supply source.
RCRA-Regulated Levels for Toxic Characteristics Leaching Procedure (TCLP) Constituents	40 CFR Part 261	S	These regulations specify the TCLP constituent levels for identification of hazardous wastes that exhibit the characteristic of toxicity.	Excavated materials may be sampled and analyzed for TCLP constituents prior to disposal to determine if the materials are hazardous based on the characteristic of toxicity.
Universal Treatment Standards/Land Disposal Restrictions (UTS/LDRs)	40 CFR Part 268	S	Identifies hazardous wastes for which land disposal is restricted and provides a set of numerical constituent concentration criteria at which hazardous waste is restricted from land disposal (without treatment).	Applicable if waste is determined to be hazardous and for remedial alternatives involving off-site land disposal.
New York State				
NYSDEC Guidance on Remedial Program Soil Cleanup Objectives	6 NYCRR Part 375	G	Provides an outline for the development and execution of the soil remedial programs. Includes soil cleanup objective tables.	These guidance values are to be considered, as appropriate, in evaluating soil quality.
Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	S	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 371-376.	Applicable for determining if materials generated during implementation of remedial activities are hazardous wastes. These regulations do not set cleanup standards, but are considered when developing remedial alternatives.
Soil Cleanup Guidance	CP-51	G	Provides the framework and policies for the selection of soil cleanup levels.	Guidance would be used to develop site-specific soil cleanup objectives (SCOs).
NYSDEC Ambient Water Quality Standards and Guidance Values	Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1	G	Provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in the NYSDEC programs.	These standards are to be considered in evaluating groundwater and surface water quality.
New York State Surface Water and Groundwater Quality Standards	6 NYCRR Parts 700-705	S	Establishes quality standards for surface water and groundwater.	Potentially applicable for assessing water quality at the site during remedial activities.

Table 2
Summary of Action-Specific SCGs

Feasibility Study Report
NYSEG - Newark Former MGP Site - Newark, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
Occupational Safety and Health Act (OSHA) - General Industry Standards	29 CFR Part 1910	S	These regulations specify the 8-hour time-weighted average concentration for worker exposure to various compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below required concentrations. Appropriate training requirements will be met for remedial workers.
OSHA - Safety and Health Standards	29 CFR Part 1926	S	These regulations specify the type of safety equipment and procedures to be followed during site remediation.	Appropriate safety equipment will be on-site and appropriate procedures will be followed during remedial activities.
OSHA - Record-keeping, Reporting and Related Regulations	29 CFR Part 1904	S	These regulations outline record-keeping and reporting requirements for an employer under OSHA.	These regulations apply to the company(s) contracted to install, operate and maintain remedial actions at hazardous waste sites.
RCRA - Preparedness and Prevention	40 CFR Part 264.30 - 264.31	S	These regulations outline requirements for safety equipment and spill control when treating, handling and/or storing hazardous wastes.	Safety and communication equipment will be installed at the site as necessary. Local authorities will be familiarized with the site.
RCRA - Contingency Plan and Emergency Procedures	40 CFR Part 264.50 - 264.56	S	Provides requirements for outlining emergency procedures to be used following explosions, fires, etc. when storing hazardous wastes.	Emergency and contingency plans will be developed and implemented during remedial design. Copies of the plan will be kept on-site.
90 Day Accumulation Rule for Hazardous Waste	40 CFR Part 262.34	S	Allows generators of hazardous waste to store and treat hazardous waste at the generation site for up to 90 days in tanks, containers and containment buildings without having to obtain a RCRA hazardous waste permit.	Potentially applicable to remedial alternatives that involve the storing or treating of hazardous materials on-site.
Land Disposal Facility Notice in Deed	40 CFR Parts 264 and 265 Sections 116-119(b)(1)	S	Establishes provisions for a deed notation for closed hazardous waste disposal units, to prevent land disturbance by future owners.	The regulations are potentially applicable because closed areas may be similar to closed RCRA units.
RCRA - General Standards	40 CFR Part 264.111	S	General performance standards requiring minimization of need for further maintenance and control; minimization or elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products. Also requires decontamination or disposal of contaminated equipment, structures and soils.	Decontamination actions and facilities will be constructed for remedial activities and disassembled after completion.
Standards Applicable to Transporters of Applicable Hazardous Waste - RCRA Section 3003	40 CFR Parts 170-179, 262, and 263	S	Establishes the responsibility of off-site transporters of hazardous waste in the handling, transportation and management of the waste. Requires manifesting, recordkeeping and immediate action in the event of a discharge.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
United States Department of Transportation (USDOT) Rules for Transportation of Hazardous Materials	49 CFR Parts 107 and 171.1 - 172.558	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous materials.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
Clean Air Act-National Ambient Air Quality Standards	40 CFR Part 60	S	Establishes ambient air quality standards for protection of public health.	Remedial operations will be performed in a manner that minimizes the production of benzene and particulate matter.
USEPA-Administered Permit Program: The Hazardous Waste Permit Program	RCRA Section 3005; 40 CFR Part 270.124	S	Covers the basic permitting, application, monitoring and reporting requirements for off-site hazardous waste management facilities.	Any off-site facility accepting hazardous waste from the site must be properly permitted. Implementation of the site remedy will include consideration of these requirements.
Land Disposal Restrictions	40 CFR Part 368	S	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes Universal Treatment Standards (UTSs) to which hazardous waste must be treated prior to land disposal.	Excavated materials that display the characteristic of hazardous waste or that are decharacterized after generation must be treated to 90% constituent concentration reduction capped at 10 times the UTS.
RCRA Subtitle C	40 U.S.C. Section 6901 et seq.; 40 CFR Part 268	S	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes UTSs to which hazardous wastes must be treated prior to land disposal.	Potentially applicable to remedial activities that include the dredging and disposal waste material from the site.

Table 2
Summary of Action-Specific SCGs

Feasibility Study Report
NYSEG - Newark Former MGP Site - Newark, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
New York State				
NYSDEC's Monitoring Well Decommissioning Guidelines	NPL Site Monitoring Well Decommissioning dated May 1995	G	This guidance presents procedure for abandonment of monitoring wells at remediation sites.	This guidance is applicable for soil or groundwater alternatives that require the decommissioning of monitoring wells onsite.
Guidelines for the Control of Toxic Ambient Air Contaminants	DAR-1 (Air Guide 1)	G	Provides guidance for the control of toxic ambient air contaminants in New York State and outlines the procedures for evaluating sources of air pollution.	This guidance may be applicable for soil or groundwater alternatives that results in certain air emissions.
New York Permits and Certificates	6 NYCRR Part 201	G	Provides instructions and regulations for obtaining a permit to operate air emission source.	Permits are not required for remedial actions taken at hazardous waste sites; however, documentation for relevant and appropriate permit conditions would be provided to NYSDEC prior to and during implementation of this alternative.
New York State Air Quality Classification System	6 NYCRR Part 256	G	Outlines the air quality classifications for different land uses and population densities.	Air quality classification system will be referenced during the treatment process design.
New York Air Quality Standards	6 NYCRR Part 257	G	Provides air quality standards for different chemicals (including those found at the site), particles, and processes.	Emissions from the treatment process will meet the air quality standards.
Discharges to Public Waters	New York State Environmental Conservation Law, Section 71-3503	S	Provides that a person who deposits gas tar, or the refuse of a gas house or gas factory, or offal, refuse, or any other noxious, offensive, or poisonous substances into any public waters, or into any sewer or stream running or entering into such public waters, is guilty of a misdemeanor.	During the remedial activities, MGP-impacted materials will not be deposited into public waters or sewers.
New York Hazardous Waste Management System - General	6 NYCRR Part 370	S	Provides definitions of terms and general instructions for the Part 370 series of hazardous waste management.	Hazardous waste is to be managed according to this regulation.
Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	S	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 371-376.	Applicable for determining if solid waste generated during implementation of remedial activities are hazardous wastes. These regulations do not set cleanup standards, but are considered when developing remedial alternatives.
Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	6 NYCRR Part 372	S	Provides guidelines relating to the use of the manifest system and its recordkeeping requirements. It applies to generators, transporters and facilities in New York State.	This regulation will be applicable to any company(s) contracted to do treatment work at the site or to transport or manage hazardous material generated at the site.
New York Regulations for Transportation of Hazardous Waste	6 NYCRR Part 372.3 a-d	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous waste.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
Waste Transporter Permits	6 NYCRR Part 364	S	Governs the collection, transport and delivery of regulated waste within New York State.	Properly permitted haulers will be used if any waste materials are transported off-site.
NYSDEC Technical and Administrative Guidance Memorandums (TAGMs)	NYSDEC TAGMs	G	TAGMs are NYSDEC guidance that are to be considered during the remedial process.	Appropriate TAGMs will be considered during the remedial process.
New York Regulations for Hazardous Waste Management Facilities	6 NYCRR Part 373.1.1 - 373.1.8	S	Provides requirements and procedures for obtaining a permit to operate a hazardous waste treatment, storage and disposal facility. Also lists contents and conditions of permits.	Any off-site facility accepting waste from the site must be properly permitted.
Land Disposal of a Hazardous Waste	6 NYCRR Part 376	S	Restricts land disposal of hazardous wastes that exceed specific criteria.	New York defers to USEPA for UTS/LDR regulations.
NYSDEC Guidance on the Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants	TAGM 4061 (DER-4)	G	Outlines the criteria for conditionally excluding coal tar waste and impacted soils from former MGPs which exhibit the hazardous characteristic of toxicity for benzene (D018) from the hazardous waste requirements of 6 NYCRR Parts 370 - 374 and 376 when destined for thermal treatment.	This guidance will be used as appropriate in the management of MGP-impacted soil and coal tar waste generated during the remedial activities.
National Pollutant Discharge Elimination System (NPDES) Program Requirements, Administered Under New York State Pollution Discharge Elimination System (SPDES)	40 CFR Parts 122 Subpart B, 125, 301, 303, and 307 (Administered under 6 NYCRR 750-758)	S	Establishes permitting requirements for point source discharges; regulates discharge of water into navigable waters including the quantity and quality of discharge.	Removal activities may involve treatment/disposal of water. If so, water generated at the site will be managed in accordance with NYSDEC SPDES permit requirements.

Table 3
Summary of Location-Specific SCGs

Feasibility Study Report
NYSEG - Newark Former MGP Site - Newark, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
Historical and Archaeological Data Preservation Act	16 USC 469a-1	S	Provides for the preservation of historical and archaeological data that might otherwise be lost as the result of alteration of the terrain.	The National Register of Historic Places website indicated two records present for historical sites in the immediate vicinity of the MGP site (i.e., US Post Office and Washington Avenue Soldier's Monument and Triangle).
National Historic and Historical Preservation Act	16 USC 470; 36 CFR Part 65; 36 CFR Part 800	S	Requirements for the preservation of historic properties.	The National Register of Historic Places website indicated two historic sites are present within 0.5 miles of the MGP site (i.e., US Post Office and Jackson-Perkings House).
Hazardous Waste Facility Located on a Floodplain	40 CFR Part 264.18(b)	S	Requirements for a treatment, storage and disposal (TSD) facility built within a 100-year floodplain.	Hazardous waste TSD activities (if any) will be designed to comply with applicable requirements cited in this regulation.
Endangered Species Act	16 USC 1531 et seq.; 50 CFR Part 200; 50 CFR Part 402	S	Requires federal agencies to confirm that the continued existence of any endangered or threatened species and their habitat will not be jeopardized by a site action.	During the threatened/endangered species evaluation, three species (i.e., bog turtle, Indiana bat, bald eagle) were identified on the USFWS list of Threatened, Endangered, Sensitive Species. In addition, one plant species (i.e., prairie fringed orchid) was identify by the NHP as sensitive species in the vicinity of the site
New York State				
New York State Freshwater Wetlands Act	ECL Article 24 and 71; 6 NYCRR Parts 662-665	S	Activities in wetlands areas must be conducted to preserve and protect wetlands.	Does not appear to be applicable as the site is located in a wetlands area.
New York State Parks, Recreation, and Historic Preservation Law	New York Executive Law Article 14	S	Requirements for the preservation of historic properties.	The National Register of Historic Places register would be consulted to determine the presence of historical sites in the immediate vicinity of the MGP site.
Endangered & Threatened Species of Fish and Wildlife	6 NYCRR Part 182	S	Identifies endangered and threatened species of fish and wildlife in New York.	The shellbark hickory, twin-leaf, marsh valerian are candidates on the List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State.
Local				
Local Building Permits	N/A	S	Local authorities may require a building permit for any permanent or semi-permanent structure, such as an on-site water treatment system building or a retaining wall.	Substantive provisions are potentially applicable to remedial activities that require construction of permanent or semi-permanent structures.
Local Street Work Permits	N/A	S	Local authorities will require a permits for conducting work within and closing local roadways.	Street work permits will be required to conduct remedial activities within public roadways.

Table 4
Remedial Technology Screening Evaluation for Soil

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
No Action	No Action	No Further Action	Alternative would not include any remedial action. A 'No Action' alternative serves as a baseline for comparison of the overall effectiveness of other remedial alternatives. Consideration of a 'No Action' alternative is required by the NYSDEC DER-10.	Implementable.	Would not achieve the RAOs for soil in an acceptable time frame.	Yes
Institutional Controls	Institutional Controls	Deed Restrictions, Environmental Land Use Restrictions, Enforcement and Permit Controls, Informational Devices	Institutional controls would include legal and/or administrative controls that mitigate the potential for exposure to impacted soils and/or jeopardize the integrity of a remedy. Examples of potential institutional controls include establishing land use restrictions, health and safety requirements for subsurface activities.	Implementable.	When properly implemented and followed, this technology could reduce potential human exposures, and may be effective when combined with other technology processes. Would help to reduce human exposure to impacted soil. May not achieve RAOs for environmental protection.	Yes
In-Situ Containment/ Control	Capping	Soil Cap	Placing and compacting soil/gravel material over impacted soil to provide a physical barrier to human and biota exposure to impacted soil at the site.	Implementable. Equipment and materials necessary to construct the cap are readily available.	Although construction of a cap is readily implementable, the presence of a surface cap would not achieve a majority of the site-specific RAOs.	No
		Asphalt/Concrete Cap	Application of a layer of asphalt or concrete over impacted soils.			No
		Multi-Media Cap	Application of a combination of clay/soils and synthetic membrane(s) over impacted soil.			No
In-Situ Treatment	Immobilization	Solidification/ Stabilization	Addition of material to the impacted soil that limits the solubility and mobility of NAPL and COCs in soil and groundwater. Involves treating soil to produce a stable material with low leachability that physically and chemically locks NAPL and COCs in the solidified matrix.	Potentially implementable. Solidification/stabilization materials are readily available. The presence of existing buildings and subsurface structures would limit implementability.	Overall effectiveness of this process would need to be evaluated during a bench-scale treatability study. Assuming an effective stabilization mix could be developed, this technology would effectively address each of the RAOs for soil. However, based on the extent and depth of MGP-related impacts, and the likely presence of subsurface structures present in the project area, significant pre-ISS excavation would be required to remove the structures and the limited quantity of impacted material at depths below the structures does not warrant ISS treatment.	No
	Extraction/In-Situ Stripping	Dynamic Underground Stripping and Hydrous Pyrolysis/Oxidation (DUS/HPO)	Steam is injected into the subsurface to mobilize contaminants and NAPLs. The mobilized contaminants are captured and constituents are recondensed, collected, and treated. In addition, HPO can degrade contaminants in subsurface heated zones. In most cases, this technology requires long-term operation and maintenance of on-site injection, collection and/or treatment systems.	Technically implementable. This option would require a pilot scale study to determine effectiveness. Process may result in uncontrolled NAPL migration. Not a preferred technology process due to risks and potential technical implementability issues.	Could potentially promote NAPL mobilization. Focused on saturated zone, not effective for soil/NAPL above the water table. Alone, this technology would not effectively address the RAO of preventing direct exposure to impacted soil.	No
	Chemical Treatment	Chemical Oxidation	Oxidizing agents are added to oxidize and reduce the mass of organic constituents in-situ chemical oxidation involves the introduction of chemicals such as ozone, hydrogen peroxide, magnesium peroxide, sodium persulfate or potassium permanganate. A pilot study would be required to evaluate/determine oxidant application requirements. May not effectively oxidize NAPL.	Implementable. Equipment and materials necessary to inject/apply oxidizing agents are readily available. May require special provisions for storage of process chemicals.	Would require multiple treatments of chemicals to reduce COCs. Would not be effective at treating NAPL and NAPL-containing soil.	No
		Surfactant/Cosolvent Flushing	A surfactant or cosolvent solution is delivered and extracted by a network of injection and extraction wells to flush the NAPL source area. Reduction of the NAPL mass occurs by increasing the dissolution of the NAPL or selected constituents or by increasing the NAPL mobility with reduction of the interfacial tension between the NAPL and groundwater and/or reduction of the NAPL viscosity. A bench scale and treatability study would be required to determine surfactant/cosolvent solution.	Implementable. Equipment and materials necessary to inject/apply oxidizing agents are readily available. May require special provisions for storage of process chemicals.	Overall effectiveness of this process would need to be evaluated during a bench and field-scale pilot test to determine the site-specific design. Would not be effective at treating all NAPL and NAPL-containing soil.	No

See Note on Page 3.

Table 4
Remedial Technology Screening Evaluation for Soil

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
In-Situ Treatment (Cont.)	Biological Treatment	Biodegradation	Natural biological and physical processes that, under favorable conditions, act without human intervention to reduce the mass, volume, concentration, toxicity, and/or mobility of COCs. This process relies on long-term monitoring to demonstrate the reduction of impacts.	Implementable.	Less effective for PAHs; not effective for NAPLs; would not achieve RAOs in an acceptable time frame.	No
		Enhanced Biodegradation	Addition of amendments (e.g., oxygen, nutrients) and controls to the subsurface to enhance indigenous microbial populations to improve the rate of natural degradation.	Implementable.	May not achieve RAOs for soil. Not effective for NAPLs.	No
		Biosparging	Air/oxygen injection wells are installed within the impacted regions to enhance biodegradation of constituents by increasing oxygen availability. Low-flow injection technology may be incorporated. This technology requires long-term monitoring.	Implementable.	May not achieve RAOs for soil. Not effective for NAPLs.	No
	Thermal Treatment	In-Situ Thermal Desorption	Heat is injected into the subsurface via vacuum wells and heat transfer is completed via thermal conduction. COCs are destroyed via oxidation, pyrolysis, boiling, and volatilization. Vapor/water is recovered and treated.	Potentially implementable. Numerous concerns related to conducting thermal treatment in close proximity to public buildings, roadways, and subsurface utilities.	May not achieve RAOs for soil. Not effective for NAPLs and SVOCs. Likely not effective at addressing sporadic hardened tar observed at the site.	No
		Electrical Resistance Heating	Electrical current is applied to the subsurface via network of probes installed through standard drilling techniques. Electrical resistance is used to transfer heat via thermal conduction. COCs are destroyed via oxidation, boiling, and volatilization Vapor/water is recovered and treated.			No
Removal	Excavation	Excavation	Physical removal of impacted soil. Typical excavation equipment would include excavators, backhoes, loaders, and/or dozers. Extraction wells and pumps or other methods may be used to obtain hydraulic control to facilitate use of typical excavation equipment to physically remove soil.	Implementable. Equipment capable of excavating the soil is readily available.	Would achieve RAOs. Proven process for effectively removing impacted soil.	Yes
	NAPL Removal	Active Removal	Process by which automated pumps are utilized to remove DNAPL from recovery wells.	Technically implementable.	NAPL does not appear to migrating, therefore, would not achieve RAOs.	No
		Passive Removal	NAPL is passively collected in vertical wells and periodically removed (i.e., via bottom-loading bailers, manually operated pumps, etc.).	Technically implementable.		No
		Hot Water/Steam Injection	Process involves the injection of hot water and/or steam to heat groundwater and decrease the viscosity of DNAPL to facilitate mobilization and removal. Used in conjunction with one (or more) of the above recovery technologies.	Technically feasible.	This process may facilitate uncontrolled migration of NAPL. Would not meet the RAOs as a stand-alone technology.	No
Ex-Situ On-Site Treatment and/or Disposal	Immobilization	Solidification/ Stabilization	Addition of material to excavated soil that limits the solubility or mobility of the constituents present. Involves treating soil to produce a stable material with low leachability, that physically and chemically locks the constituents within the solidified matrix.	Technically implementable. Limitations of space and public proximity concerns limits the implementability of this technology. Pilot study would be needed to verify implementability.	May achieve RAOs. Proven process for effectively reducing mobility and toxicity of NAPL and organic and inorganic constituents.	No
	Extraction	Low-Temperature Thermal Desorption	Process by which soils containing organics with boiling point temperatures less than 800^{0} Fahrenheit are excavated, conditioned, and heated; the organic compounds are desorbed from the soils into an induced airflow. The resulting gas is treated either by condensation and filtration or by thermal destruction. Treated soils are returned to the subsurface. Treatment is conducted in a thermal treatment unit that is mobilized or constructed on-site.	Not considered implementable due to close proximity of public areas.	Proven process for effectively removing organic constituents from excavated soil. The efficiency of the system and rate of removal of organic constituents would require evaluation during bench-scale and/or pilot-scale testing.	No

See Note on Page 3.

Table 4
Remedial Technology Screening Evaluation for Soil

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
Ex-Situ On-Site Treatment and/or Disposal (Cont.)	Thermal Destruction	Incineration	Use of a mobile incineration unit installed on-site for high temperature thermal destruction of the organic compounds present in the media. Soils are excavated and conditioned prior to incineration. Treated soils are returned to the subsurface.	Not considered implementable due to close proximity of public areas.	Proven process for effectively addressing organic constituents. The efficiency of the system and rate of removal of organic constituents would need to be verified during bench-scale and/or pilot-scale testing.	No
	Chemical Treatment	Chemical Oxidation	Addition of oxidizing agents to degrade organic constituents to less-toxic by-products.	Implementable. Equipment and materials necessary to apply oxidizing agents are available. Large amounts of oxidizing agents may be required. May require special provisions for storage of process chemicals.	Not known to be effective for NAPL.	No
	On-Site Disposal	RCRA Landfill	Construction of a landfill that would meet RCRA requirements.	Not considered implementable due to close proximity of public areas.	This technology process would be effective at meeting the RAOs for soil. Excavated material would be contained in an appropriately constructed soil management cell. Long-term effectiveness requires ongoing maintenance and monitoring.	No
		Solid Waste Landfill	Construction of a landfill that would meet NYSDEC solid waste requirements.			No
Off-Site Treatment and/or Disposal	Recycle/ Reuse	Asphalt Concrete Batch Plant	Soil is used as a raw material in asphalt concrete paving mixtures. The impacted soil is transported to an off-site asphalt concrete facility and can replace part of the aggregate and asphalt concrete fraction. The hot-mix process melts asphalt concrete prior to mixing with aggregate. During the cold-mix process, aggregate is mixed at ambient temperature with an asphalt concrete/water emulsion. Organics and inorganics are bound in the asphalt concrete. Some organics may volatilize in the hot-mix.	Permitted facilities and demand are limited.	Effective for treating organics and inorganics through volatilization and/or encapsulation. Thermal pretreatment may be required to prevent leaching. Limited number of projects to support comparison of effectiveness.	No
		Brick/Concrete Manufacture	Soil is used as a raw material in manufacture of bricks or concrete. Heating in ovens during manufacture volatilizes organics and some inorganics. Other inorganics are bound in the product.	The site does not have the adequate space necessary to conduct the amount of screening of the material required to be performed prior to being utilized in brick/concrete manufacture.	Effective for treating organics and inorganics through volatilization and/or vitrification. A bench-scale/pilot study may be necessary to determine effectiveness.	No
		Co-Burn in Utility Boiler	Soil is blended with feed coal to fire a utility boiler used to generate steam. Organics are destroyed.	Permitted facilities available for burning MGP soils are limited.	Effective for treating organic constituents. Soil would be blended with coal prior to burning. Overall effectiveness of this process would need to be evaluated during a trial burn.	No
	Extraction	Low-Temperature Thermal Desorption	Process by which soils containing organics with boiling point temperatures less than 800° Fahrenheit are heated and the organic compounds are desorbed from the soils into an induced airflow. The resulting gas is treated either by condensation and filtration or by thermal destruction. Would be used on materials that are determined to be characteristically hazardous based on TCLP analysis.	Implementable. Treatment facilities are available.	Effective means for treatment of materials that are characteristically hazardous due to the presence of organic compounds (i.e., benzene).	Yes
	Thermal Destruction	Incineration	Soils are incinerated off-site for high temperature thermal destruction of the organic compounds present in the media. Soils are excavated and conditioned prior to incineration.	Not implementable. Not a cost effective means for treating impacted soil. Limited number of treatment facilities. LTTD is a more appropriate technology process for thermally treating MGP-impacted media.	Proven process for effectively addressing organic constituents. The efficiency and effectiveness of the system and rate of removal of organic constituents would need to be verified during bench-scale and/or pilot-scale testing.	No
	Off-Site Disposal	Solid Waste Landfill	Disposal of non-hazardous soil and C&D debris in an existing permitted non-hazardous landfill.	Implementable.	Proven process that, in conjunction with excavation, can effectively achieve the RAOs.	Yes
		RCRA Landfill	Disposal of impacted soil in an existing RCRA permitted landfill facility.	Hazardous materials would not meet New York State LDRs.	Proven process that, in conjunction with excavation, can effectively achieve the RAOs.	No

Note:

1. Shading indicates that technology process has not been retained for development of a remedial alternative.

Table 5
Remedial Technology Screening Evaluation for Groundwater

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
No Action	No Action	No Further Action	Alternative would not include any remedial action. A 'No Action' alternative serves as a baseline for comparison of the overall effectiveness of other remedial alternatives. Consideration of a 'No Action' alternative is required by the NYSDEC DER-10.	Implementable.	Would not achieve the RAOs for groundwater in an acceptable time frame.	Yes
Institutional Controls	Institutional Controls	Deed Restrictions, Groundwater Use Restriction, Enforcement and Permit Controls, Informational Devices	Institutional controls would include legal and/or administrative controls that mitigate the potential for exposure to impacted materials and/or jeopardize the integrity of a remedy. Examples of potential institutional controls include establishing land use restrictions, health and safety requirements for subsurface activities, and restrictions on groundwater use and/or extraction.	Implementable.	May be effective for reducing the potential for human exposure. This option would not meet the RAO for restoring groundwater, to the extent practicable, the quality of groundwater. This option may be effective when combined with other process options.	Yes
In-Situ Containment/ Control	Containment	Sheet Pile	Steel sheet piles are driven into the subsurface to contain impacted soils, groundwater, and NAPLs. The sheet pile wall is typically keyed into a confining unit and could be permeable or impermeable to groundwater flow.	Presence of existing buildings and subsurface utilities would prevent installation of a continuous barrier, limiting the implementability of this alternative. Hydraulic effects on-site groundwater would have to be evaluated. Equipment and materials required to install slurry walls are readily available.	Could further reduce mobility of NAPL and dissolved phase COCs in groundwater. In order to control dissolved phase migration, would require areas to be completely surrounded. Effectiveness could be limited based on the presence of subsurface utilities (which may prevent construction of a complete barrier). Additionally, containment would address potential exposures to future construction/utility workers.	No
		Slurry Walls/Jet Grout Wall	Involves excavating a trench and adding a slurry (e.g., soil/cement-bentonite mixture) to control migration of groundwater and NAPL from an area. Slurry walls are typically keyed into a low permeability unit (e.g., an underlying silt/clay layer).			No
In-Situ Treatment	Biological Treatment	Groundwater Monitoring	Natural biological, chemical, and physical processes that under favorable conditions, act without human intervention to reduce the mass, volume, concentration, toxicity, and mobility of chemical constituents. Long-term monitoring is required to demonstrate the reduction of COCs.	Easily implemented. Would require monitoring to demonstrate reduction of COCs.	May be effective if NAPL and impacted soil is addressed.	Yes
		Enhanced Biodegradation	Addition of amendments (e.g., nutrients, oxygen) to the subsurface to enhance indigenous microbial populations to improve the rate of natural biodegradation of constituents.	Would be difficult to sufficiently oxygenate the soil using amendments due to the thickness of the saturated zone and depth of impacts.	May not be effective if the subsurface conditions cannot be made and maintained aerobic. Would not be effective at restoring groundwater to pre-release/pre-disposal conditions unless MGP source materials are addressed (i.e., through containment, excavation, or stabilization). May not be required based on low concentrations of dissolved phase impacts.	No
		Biosparging	Air/oxygen injection wells are installed within the dissolved plume to enhance biodegradation of constituents by increasing oxygen availability. Low-flow injection technology may be incorporated. This technology requires long-term operation, monitoring, and maintenance of air/oxygen delivery system.	Implementable. Equipment for installing wells and injecting air/oxygen is readily available.	Could be effective at addressing dissolved-phase impacts in combination with source material mass reduction. May not be required based on low concentrations of dissolved phase impacts.	No
	Chemical Treatment	Chemical Oxidation	Oxidizing agents are added to oxidize and reduce the mass of organic constituents. In-situ chemical oxidation involves the introduction of chemicals such as ozone, hydrogen peroxide, magnesium peroxide, sodium persulfate, or potassium permanganate. Large amounts of oxidizing agents are needed to oxidize NAPL.	Implementable. Equipment and materials necessary to inject/apply oxidizing agents are readily available. May require special provisions for storage of process chemicals.	Assuming removal of source materials, this technology could meet the RAOs for groundwater. However, may not be a cost effective means to achieve the RAOs. May not be required based on low concentrations of dissolved phase impacts.	No
		Permeable Reactive Barrier (PRB)	PRBs are installed in or downgradient from the flow path of a contaminant plume. The contaminants in the plume react with the media inside the barrier to either break the compound down into harmless products or immobilize contaminants by precipitation or sorption.	Presence of existing buildings and subsurface utilities would prevent installation of a continuous barrier, limiting the implementability of this alternative.	Groundwater conditions may potentially encourage biological growth and fouling of PRB. Could be effective when combined with source removal. May not be required based on low concentrations of dissolved phase impacts.	No

See Note on Page 3.

Table 5
Remedial Technology Screening Evaluation for Groundwater

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
In-Situ Treatment (Cont.)	Extraction	Dynamic Underground Stripping and Hydrous Pyrolysis/Oxidation (DUS/HPO)	Steam is injected into the subsurface to mobilize contaminants and NAPLs. The mobilized contaminants are captured and constituents are recondensed, collected and treated. In addition, HPO can degrade contaminants in subsurface heated zones. In most cases, this technology requires long-term operation and maintenance of on-site injection, collection, and/or treatment systems.	Technically implementable. This option would require a pilot scale study to determine effectiveness. Process may result in uncontrolled NAPL migration. Not a preferred technology process due to risks and potential technical implementability issues.	This option would require a pilot scale study to determine effectiveness. Process may result in NAPL and/or dissolved plume migration. Not certain in the ability of this alternative to meet the RAOs.	No
Removal	Hydraulic Control	Vertical Extraction Wells	Vertical wells are installed and utilized to recover groundwater for treatment/disposal and containment/migration control. Typically requires extensive design/testing to determine required hydraulic gradients and feasibility of achieving those gradients.	Equipment and tools necessary to install and operate vertical extraction wells are readily available. Would require operation for an extended period of time.	Would not meet RAOs as a stand alone technology. Would likely be used in conjunction with an ex-situ treatment system (i.e., pump and treat). Pumping would be required over a prolonged period of time.	No
		Horizontal Extraction Wells	Horizontal wells are utilized to replace conventional well clusters in soil and containment/migration control.	Requires specialized horizontal drilling equipment. Not implementable.	Proven process for effectively extracting groundwater. Not likely to meet RAOs in an acceptable amount of time.	No
Ex-Situ/On-Site Treatment	Chemical Treatment	Ultra-violet (UV) Oxidation	Oxidation by subjecting groundwater to UV light and ozone. If complete mineralization is achieved, the final products of oxidation are carbon dioxide, water, and salts.	Potentially implementable. Limited space for a full-scale treatment system. Not typically used in MGP-impacted groundwater treatment train. Not effective on NAPL.	Proven process for effectively treating organic compounds. Use of this process may effectively achieve the RAOs. A bench-scale treatability study may be required to evaluate the efficiency of this process and to make project-specific adjustments to the process.	No
		Chemical Oxidation	Addition of oxidizing agents to degrade organic constituents to less-toxic byproducts.	Potentially implementable. Limited space for a full-scale treatment system. Not effective on NAPL.	A bench-scale treatability study may be required to evaluate the efficiency of this process and to make project-specific adjustments to the process. Large amounts of oxidizing agents are needed to oxidize NAPL.	No
	Physical Treatment	Carbon Adsorption	Process by which organic constituents are adsorbed to the carbon as groundwater is passed through carbon units.	Limited space for a full-scale treatment system. Potentially implementable. May be used as part of a temporary water treatment system in support of excavation dewatering activities. However, permanent on-site treatment technologies are not required because groundwater removal technologies have not been retained.	Effective at removing organic constituents. Use of this treatment process may effectively achieve the RAOs when combined with groundwater extraction.	No
		Filtration	Extraction of groundwater and treatment using filtration. Process in which the groundwater is passed through a granular media in order to removed suspended solids by interception, straining, flocculation, and sedimentation activity within the filter.		Effective pre-treatment process to reduce suspended solids. Use of this process along with other processes (i.e., that address organic constituents) could effectively achieve the RAOs.	No
		Air Stripping	A process in which VOCs are removed through volatilization by increasing the contact between the groundwater and air.		This technology process would be effective at removing VOCs from water. Process would potentially be used as part of a temporary treatment train to treat groundwater removed from excavation areas. Has potential to be used as part of a treatment system to meet the RAOs.	No
		Precipitation/ Coagulation/ Flocculation	Process which precipitates dissolved constituents into insoluble solids and improves settling characteristics through the addition of amendments to water to facilitate subsequent removal from the liquid phase by sedimentation/filtration.		Process which transforms dissolved constituents into insoluble solids by adding coagulating agents to facilitate subsequent removal from the liquid phase by sedimentation/filtration. Has potential to be used as part of a treatment system to meet the RAOs.	No
		Oil/Water Separation	Process by which insoluble oils are separated from water via physical separation technologies, including gravity separation, baffled vessels, etc.		Effective at separating insoluble oil from groundwater. This process could be used as part of the groundwater treatment train if needed to address separate-phase liquids. Has potential to be used as part of a treatment system to meet the RAOs.	No

See Note on Page 3.

Table 5
Remedial Technology Screening Evaluation for Groundwater

NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

General Response Action	Remedial Technology Type	Technology Process Option	Description	Implementability	Effectiveness	Retained?
Off-Site Treatment and/or Disposal	Groundwater Discharge	Discharge to a local Publicly-Owned Treatment Works (POTW)	Treated or untreated water is discharged to a sanitary sewer and treated at a local POTW facility.	Implementable. Equipment and materials necessary to extract, pretreat (if necessary), and discharge the water to the sewer system are readily available. Discharges to the sewer will require a POTW-issued discharge permit.	Proven process for effectively disposing of groundwater. Typically requires the least amount of pretreatment because the discharged water will be subjected to additional treatment at the POTW. May be used in support of excavation dewatering activities. However, permanent off-site treatment/disposal technologies are not required because groundwater removal technologies have not been retained.	No
		Discharge to Surface Water via Storm Sewer	Treated or untreated water is discharged to surface water, provided that the water quality and quantity meet the allowable discharge requirements for surface waters (NYSDEC SPDES compliance).	Discharges to surface water must meet substantive requirements of a SPDES permit. Cleanup objectives and sampling requirements may be restrictive.	This technology process would effectively dispose of groundwater. Impacted groundwater would require treatment to achieve water quality discharge limits. Helps in the management of treated water, but does not directly lend to achieving the RAOs for groundwater. May be used in support of excavation dewatering activities. However, permanent off-site treatment/disposal technologies are not required because groundwater removal technologies have not been retained.	No
		Discharge to a privately-owned treatment/ disposal facility.	Treated or untreated water is collected and transported to a privately-owned treatment facility.	Equipment and materials to pretreat the water at the site are readily available on a commercial basis. Facilities capable of transporting and disposing of the groundwater are available. Treatment may be required prior to discharge.	Proven process for effectively disposing of groundwater. Typically requires the least amount of pretreatment because the discharged water will be subjected to additional treatment at the disposal facility. May be used in support of excavation dewatering activities. However, permanent off-site treatment/disposal technologies are not required because groundwater removal technologies have not been retained.	No

Note:
1. Shading indicates that technology process has not been retained for development of a remedial alternative.

Table 6
Cost Estimate for Alternative 2 - Groundwater Monitoring and Institutional Controls

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Capital Costs					
1	Site Management Plan	1	LS	$30,000	$30,000
2	Institutional Controls	1	LS	$50,000	$50,000
				Subtotal Capital Cost	$80,000
				Contingency (20%)	$16,000
				Total Capital Cost	$96,000
Operation and Maintenance Costs					
3	Annual Verification of Institutional Controls	1	LS	$5,000	$5,000
4	Annual Groundwater Sampling	1	EVENT	$5,000	$5,000
5	Laboratory Analysis of Groundwater Samples	10	EACH	$250	$2,500
6	Waste Disposal	2	DRUM	$700	$1,400
7	Annual Summary Report	1	LS	$15,000	$15,000
				Subtotal O&M Cost	$28,900
				Contingency (20%)	$5,780
				Total Annual O&M Cost	$34,680
8	30-Year Total Present Worth Cost of O&M				$599,688
				Total Estimated Cost:	**$695,688**
				Rounded To:	**$700,000**

General Notes:

1. Cost estimate is based on ARCADIS of New York's (ARCADIS') past experience and vendor estimates using 2013 dollars.

2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. ARCADIS is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.

3. All costs assume construction field work to be conducted by non-unionized labor.

Assumptions:

1. Site management plan cost estimate includes labor necessary to prepare a site management plan to document: the institutional controls that have been established and will be maintained for the project area; known locations of soil containing COCs at concentrations greater than 6NYCRR Part 375-6 commercial use SCOs; protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially impacted material encountered during these activities; protocols and requirements for conducting annual groundwater monitoring; protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities.

2. Institutional controls cost estimate includes legal expenses to institute environmental easements and/or deed restrictions. Institutional controls would: limit intrusive (i.e., subsurface) activities that could result in potential exposures to remaining subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values; require compliance with the SMP; and prohibit the use of non-treated groundwater in the project area.

3. Annual verification of institutional controls cost estimate includes administrative costs for confirming institutional controls to minimize the potential for human exposure to project area soil and groundwater are present. Annual costs associated with institutional controls include verifying the status of institutional controls and preparing/submitting notification to the NYSDEC to demonstrate that the institutional controls are being maintained and remain effective.

Table 6
Cost Estimate for Alternative 2 - Groundwater Monitoring and Institutional Controls

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

4. Annual groundwater sampling cost estimate includes labor, equipment, and materials necessary to conduct annual groundwater sampling activities. Cost estimate assumes groundwater samples will be collected from up to 8 groundwater monitoring wells using low-flow sampling procedures. Cost estimate assumes two workers will require 2 days to complete the sampling activities. Estimate includes costs for labor, field vehicle, and equipment rental.

5. Laboratory analysis of groundwater samples cost estimate includes the analysis of groundwater samples for BTEX and PAHs. Estimate assumes laboratory analysis of groundwater samples from up to 8 groundwater monitoring wells and up to 2 QA/QC samples per sampling event.

6. Waste disposal cost estimate includes off-site disposal of drummed PPE, disposable sampling equipment, and purge water generated/collected during annual groundwater monitoring activities.

7. Annual summary report cost estimate includes labor necessary to prepare an annual report summarizing annual groundwater monitoring activities and results. Annual report to be submitted to NYSDEC.

8. Present worth is estimated based on a 4% beginning-of-year discount rate. It is assumed that "year zero" is 2013.

Table 7
Cost Estimate for Alternative 3 - Targeted Soil Removal

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Capital Costs					
1	Pre-Design Investigation	1	LS	$75,000	$75,000
2	Mobilization/Demobilization	1	LS	$50,000	$50,000
3	Utility Markout, Protection, Bypass and Relocation	1	LS	$100,000	$100,000
4	Decontamination Pad	1	LS	$6,000	$6,000
5	Shallow Soil Removal	120	CY	$25	$3,000
6	Soil Excavation and Handling	1,100	CY	$125	$137,500
7	Community Air Monitoring and Vapor/Odor Control	7	WEEK	$5,000	$35,000
8	Traffic Control	7	WEEK	$5,000	$35,000
9	Demarcation Layer	460	SY	$5	$2,300
10	Controlled Low-Strength Material	970	CY	$100	$97,000
11	Backfill	80	CY	$25	$2,000
12	Surface Restoration	7,400	SF	$8	$59,200
13	Solid Waste Characterization	4	EACH	$1,200	$4,800
14	Solid Waste Transportation and Disposal - C&D Debris	170	TON	$100	$17,000
15	Solid Waste Transportation and Disposal - LTTD	1,700	TON	$85	$144,500
16	Site Management Plan	1	LS	$30,000	$30,000
17	Institutional Controls	1	LS	$50,000	$50,000
	Subtotal Capital Cost				$848,300
18	Administration & Engineering (15%)				$79,770
	Construction Management (15%)				$79,770
	Contingency (20%)				$169,660
	Total Capital Cost				$1,177,500
Operation and Maintenance Costs					
19	Annual Verification of Institutional Controls	1	LS	$5,000	$5,000
20	Annual Groundwater Sampling	1	EVENT	$5,000	$5,000
21	Laboratory Analysis of Groundwater Samples	10	EACH	$250	$2,500
22	Waste Disposal	2	DRUM	$700	$1,400
23	Annual Summary Report	1	LS	$15,000	$15,000
	Subtotal O&M Cost				$28,900
	Contingency (20%)				$5,780
	Total Annual O&M Cost				$34,680
24	30-Year Total Present Worth Cost of O&M				$599,688
	Total Estimated Cost:				**$1,777,188**
	Rounded To:				**$1,800,000**

General Notes:

1. Cost estimate is based on ARCADIS of New York's (ARCADIS') past experience and vendor estimates using 2013 dollars.

2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. ARCADIS is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.

3. All costs assume construction field work to be conducted by non-unionized labor.

Table 7
Cost Estimate for Alternative 3 - Targeted Soil Removal

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Assumptions:

1. Pre-design investigation cost estimate includes labor and equipment necessary to conduct pre-design investigation (PDI) activities in support of the remedial design of this alternative. PDI activities may include, but are not limited to, completion of soil borings and test pits to refine excavation limits and the collection and chemical/geotechnical analysis of soil samples.

2. Mobilization/demobilization cost estimate includes mobilization and demobilization of labor, equipment, and materials necessary to conduct the remedial construction activities associated with this alternative.

3. Utility markout, protection, bypass and relocation cost estimate includes labor, equipment, and materials necessary to temporarily bypass or relocate subsurface utilities within anticipated excavation limits. Utilities anticipated to affected by remedial construction activities include, but are not limited to: electric lines north of West Shore Boulevard; and storm sewers, water lines, and telecommunication lines within and south of West Shore Boulevard.

4. Decontamination pad cost estimate includes labor, equipment, and materials necessary to construct and remove a 50-foot by 20-foot decontamination pad and appurtenances. The decontamination pad would consist of a 12-inch gravel fill layer bermed and sloped to a sump and covered with a 40-mil HDPE liner and a 6-inch layer of gravel.

5. Shallow soil removal cost estimate includes labor, equipment, and materials necessary to remove shallow soil containing MGP-related impacts north of West Shore Boulevard. Cost estimate assumes excavation activities would be completed to depths up to 3 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume.

6. Soil excavation and handling includes labor, equipment, and materials necessary to excavate soil containing MGP-related impacts above the water table. Cost estimate assumes excavation activities would be completed to depths up to 11 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume. Estimate includes costs for rental of pre-fabricated excavation support systems (e.g., slide rail) to facilitate excavation activities. Final excavation support systems to be evaluated as part of the remedial design.

7. Community air monitoring and vapor/odor control cost estimate includes labor, equipment, and materials necessary to monitor vapor/odor emission during intrusive site activities and applying vapor/odor suppressing foam to open excavations.

8. Traffic control cost estimate includes labor, equipment, and materials necessary to establish lane closures/restrictions during remedial construction activities. Estimate includes costs for two flagmen and signage to direct traffic around excavation areas within West Shore Boulevard.

9. Demarcation layer cost estimate includes labor, equipment, and materials necessary to place a woven, light-weight, non-biodegradable, high-visibility demarcation layer within soil excavation area footprints.

10. Controlled low-strength material (CLSM) cost estimate includes labor, equipment, and materials necessary to purchase and place CSLM within subsurface soil excavations areas to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume.

11. Backfill cost estimate includes labor, equipment, and materials necessary to import, place, grade and compact imported fill (e.g., general fill) in shallow soil removal areas north of West Shore Boulevard to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume. Cost estimate assumes 95% compaction based on standard proctor testing and includes survey verification and compaction testing.

12. Surface restoration cost estimate includes labor, equipment, and material necessary restore surfaces disturbed during remedial activities in kind. Final surface restorations include 6-inch layer of sub-base and up to 6 inches of asphalt pavement, concrete sidewalk, or vegetated topsoil. Estimate based on an assumed area of twice the excavation foot print.

13. Solid waste characterization cost estimate includes the analysis of soil samples (including, but not limited to, PCBs, VOCs, SVOCs, and RCRA Metals). Costs assumes that waste characterization samples would be collected at a frequency of one sample per every 500 tons of material destined for off-site treatment/disposal.

14. Solid waste transportation and disposal - C&D debris cost estimate includes labor, equipment, and materials necessary to transport and dispose of surface material (e.g., pavement, concrete, gravel sub-base) excavated from areas within and south of West Shore Boulevard as construction and demolition debris. Costs assume excavated surface material would be transported off-site disposal as C&D debris at an assumed density of 2 tons per cubic-yard. Cost estimate includes disposal fee; transportation fuel surcharge; and environmental, transportation, and spotting fees. Cost estimate assumes that no material will be recycled or reused.

15. Solid waste transportation and disposal - LTTD cost estimate includes labor, equipment, and materials necessary to transport and treat excavated soil at a thermal treatment facility. Cost assumes excavated soil will be treated/disposed of via LTTD at an estimated density of 1.5 tons per cubic-yard. Cost estimate includes treatment fee, transportation fuel surcharge, and spotting fees. Cost estimate assumes thermally treated soil does not require subsequent treatment or disposal.

16. Site management plan cost estimate includes labor necessary to prepare a site management plan to document: the institutional controls that have been established and will be maintained for the project area; known locations of soil containing COCs at concentrations greater than 6NYCRR Part 375-6 commercial use SCOs; protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially impacted material encountered during these activities; protocols and requirements for conducting annual groundwater monitoring; protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities.

17. Institutional controls cost estimate includes legal expenses to institute environmental easements and/or deed restrictions. Institutional controls would: limit intrusive (i.e., subsurface) activities that could result in potential exposures to remaining subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values; require compliance with the SMP; and prohibit the use of non-treated groundwater in the project area.

18. Administration and engineering and construction management costs are based on an assumed 15% of the total capital costs, not including costs for the pre-design investigation, off-site transportation and treatment/disposal of excavated material, preparation of a site management plan, and establishment of institutional controls.

19. Annual verification of institutional controls cost estimate includes administrative costs for confirming institutional controls to minimize the potential for human exposure to project area soil and groundwater are present. Annual costs associated with institutional controls include verifying the status of institutional controls and preparing/submitting notification to the NYSDEC to demonstrate that the institutional controls are being maintained and remain effective.

20. Annual groundwater sampling cost estimate includes labor, equipment, and materials necessary to conduct annual groundwater sampling activities. Cost estimate assumes groundwater samples will be collected from up to 8 groundwater monitoring wells using low-flow sampling procedures. Cost estimate assumes two workers will require 2 days to complete the sampling activities. Estimate includes costs for labor, field vehicle, and equipment rental.

21. Laboratory analysis of groundwater samples cost estimate includes the analysis of groundwater samples for BTEX and PAHs. Estimate assumes laboratory analysis of groundwater samples from up to 8 groundwater monitoring wells and up to 2 QA/QC samples per sampling event.

22. Waste disposal cost estimate includes off-site disposal of drummed PPE, disposable sampling equipment, and purge water generated/collected during annual groundwater monitoring activities.

23. Annual summary report cost estimate includes labor necessary to prepare an annual report summarizing annual groundwater monitoring activities and results. Annual report to be submitted to NYSDEC.

24. Present worth is estimated based on a 4% beginning-of-year discount rate. It is assumed that "year zero" is 2013.

Table 8
Cost Estimate for Alternative 4 - Deep Soil Removal

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Capital Costs					
1	Pre-Design Investigation	1	LS	$75,000	$75,000
2	Mobilization/Demobilization	1	LS	$75,000	$75,000
3	Utility Markout, Protection, Bypass and Relocation	1	LS	$100,000	$100,000
4	Decontamination Pad	1	LS	$6,000	$6,000
5	Shallow Soil Removal	120	CY	$25	$3,000
6	Soil Excavation and Handling	1,400	CY	$125	$175,000
7	On-Site Water Handling/Management	15	WEEK	$2,500	$37,500
8	Community Air Monitoring and Vapor/Odor Control	17	WEEK	$5,000	$85,000
9	Traffic Control	17	WEEK	$5,000	$85,000
10	Demarcation Layer	460	SY	$5	$2,300
11	Controlled Low-Strength Material	1,300	CY	$100	$130,000
12	Backfill	80	CY	$25	$2,000
13	Surface Restoration	7,400	SF	$8	$59,200
14	Liquid Waste Characterization	1	EACH	$1,200	$1,200
15	Liquid Waste Transportation and Disposal	28,000	GAL	$1.00	$28,000
16	Solid Waste Characterization	5	EACH	$1,200	$6,000
17	Solid Waste Transportation and Disposal - C&D Debris	170	TON	$100	$17,000
18	Solid Waste Transportation and Disposal - LTTD	2,200	TON	$85	$187,000
19	Site Management Plan	1	LS	$30,000	$30,000
20	Institutional Controls	1	LS	$50,000	$50,000
				Subtotal Capital Cost	$1,154,200
21				Administration & Engineering (15%)	$119,280
				Construction Management (15%)	$119,280
				Contingency (20%)	$230,840
22	Gas Holder Removal Contingency	1	LS	$2,740,000	$2,740,000
				Total Capital Cost	$4,363,600
Operation and Maintenance Costs					
23	Annual Verification of Institutional Controls	1	LS	$5,000	$5,000
24	Annual Groundwater Sampling	1	EVENT	$5,000	$5,000
25	Laboratory Analysis of Groundwater Samples	10	EACH	$250	$2,500
26	Waste Disposal	2	DRUM	$700	$1,400
27	Annual Summary Report	1	LS	$15,000	$15,000
				Subtotal O&M Cost	$28,900
				Contingency (20%)	$5,780
				Total Annual O&M Cost	$34,680
28				30-Year Total Present Worth Cost of O&M	$599,688
				Total Estimated Cost:	**$4,963,288**
				Rounded To:	**$5,000,000**

General Notes:

1. Cost estimate is based on ARCADIS of New York's (ARCADIS') past experience and vendor estimates using 2013 dollars.

2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. ARCADIS is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.

3. All costs assume construction field work to be conducted by non-unionized labor.

Table 8
Cost Estimate for Alternative 4 - Deep Soil Removal

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Assumptions:

1. Pre-design investigation cost estimate includes labor and equipment necessary to conduct pre-design investigation (PDI) activities in support of the remedial design of this alternative. PDI activities may include, but are not limited to, completion of soil borings and test pits to refine excavation limits and the collection and chemical/geotechnical analysis of soil samples.

2. Mobilization/demobilization cost estimate includes mobilization and demobilization of labor, equipment, and materials necessary to conduct the remedial construction activities associated with this alternative.

3. Utility markout, protection, bypass and relocation cost estimate includes labor, equipment, and materials necessary to temporarily bypass or relocate subsurface utilities within anticipated excavation limits. Utilities anticipated to affected by remedial construction activities include, but are not limited to: electric lines north of West Shore Boulevard; and storm sewers, water lines, and telecommunication lines within and south of West Shore Boulevard.

4. Decontamination pad cost estimate includes labor, equipment, and materials necessary to construct and remove a 50-foot by 20-foot decontamination pad and appurtenances. The decontamination pad would consist of a 12-inch gravel fill layer bermed and sloped to a sump and covered with a 40-mil HDPE liner and a 6-inch layer of gravel.

5. Shallow soil removal cost estimate includes labor, equipment, and materials necessary to remove shallow soil containing MGP-related impacts north of West Shore Boulevard. Cost estimate assumes excavation activities would be completed to depths up to 3 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume.

6. Soil excavation and handling includes labor, equipment, and materials necessary to excavate soil containing MGP-related impacts above and below the water table. Cost estimate assumes excavation activities would be completed to depths up to 15 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume. Estimate includes costs for rental of pre-fabricated excavation support systems (e.g., slide rail) to facilitate excavation activities. Final excavation support systems to be evaluated as part of the remedial design.

7. On-site water handling/management cost estimate includes labor, equipment, and material necessary to remove and containerize groundwater from excavation areas. Cost estimate includes the rental of up to two 20,000 gallon holding tanks and associated pumps and piping.

8. Community air monitoring and vapor/odor control cost estimate includes labor, equipment, and materials necessary to monitor vapor/odor emission during intrusive site activities and applying vapor/odor suppressing foam to open excavations.

9. Traffic control cost estimate includes labor, equipment, and materials necessary to establish lane closures/restrictions during remedial construction activities. Estimate includes costs for two flagmen and signage to direct traffic around excavation areas within West Shore Boulevard.

10. Demarcation layer cost estimate includes labor, equipment, and materials necessary to place a woven, light-weight, non-biodegradable, high-visibility demarcation layer within soil excavation area footprints.

11. Controlled low-strength material (CLSM) cost estimate includes labor, equipment, and materials necessary to purchase and place CSLM within subsurface soil excavations areas to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume.

12. Backfill cost estimate includes labor, equipment, and materials necessary to import, place, grade and compact imported fill (e.g., general fill) in shallow soil removal areas north of West Shore Boulevard to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume. Cost estimate assumes 95% compaction based on standard proctor testing and includes survey verification and compaction testing.

13. Surface restoration cost estimate includes labor, equipment, and material necessary restore surfaces disturbed during remedial activities in kind. Final surface restorations include 6-inch layer of sub-base and up to 6 inches of asphalt pavement, concrete sidewalk, or vegetated topsoil. Estimate based on an assumed area of twice the excavation foot print.

14. Liquid waste characterization cost estimate includes the analysis (including, but not limited to, PCBs, VOCs, SVOCs, and RCRA Metals) of water containerized during remedial construction. Cost estimate assumes one sample collected and analyzed per every 50,000 gallons water requiring transportation and off-site disposal.

15. Liquid waste transportation and disposal cost estimate includes fees associated transporting and disposing of water collected during remedial construction activities. Volume estimate includes decontamination water and groundwater removed from excavation areas only. Volume estimate based on one saturated pore volume of the excavation areas and one total volume of the saturated portion of the excavation areas. Cost estimate assumes water would be removed from on-site holding tanks and transported for off-site disposal via 5,000-gallon tanker trucks. Cost estimate includes disposal fee; transportation fuel surcharge; and environmental, transportation, and spotting fees.

16. Solid waste characterization cost estimate includes the analysis of soil samples (including, but not limited to, PCBs, VOCs, SVOCs, and RCRA Metals). Costs assumes that waste characterization samples would be collected at a frequency of one sample per every 500 tons of material destined for off-site treatment/disposal.

17. Solid waste transportation and disposal - C&D debris cost estimate includes labor, equipment, and materials necessary to transport and dispose of surface material (e.g., pavement, concrete, gravel sub-base) excavated from areas within and south of West Shore Boulevard as construction and demolition debris. Costs assume excavated surface material would be transported off-site disposal as C&D debris at an assumed density of 2 tons per cubic-yard. Cost estimate includes disposal fee; transportation fuel surcharge; and environmental, transportation, and spotting fees. Cost estimate assumes that no material will be recycled or reused.

18. Solid waste transportation and disposal - LTTD cost estimate includes labor, equipment, and materials necessary to transport and treat excavated soil at a thermal treatment facility. Cost assumes excavated soil will be treated/disposed of via LTTD at an estimated density of 1.5 tons per cubic-yard. Cost estimate includes treatment fee, transportation fuel surcharge, and spotting fees. Cost estimate assumes thermally treated soil does not require subsequent treatment or disposal.

19. Site management plan cost estimate includes labor necessary to prepare a site management plan to document: the institutional controls that have been established and will be maintained for the project area; known locations of soil containing COCs at concentrations greater than 6NYCRR Part 375-6 commercial use SCOs; protocols (including health and safety requirements) for conducting invasive (i.e., subsurface) activities and managing potentially impacted material encountered during these activities; protocols and requirements for conducting annual groundwater monitoring; protocols for addressing significant changes in COC concentrations in groundwater based on the results of the annual monitoring activities.

20. Institutional controls cost estimate includes legal expenses to institute environmental easements and/or deed restrictions. Institutional controls would: limit intrusive (i.e., subsurface) activities that could result in potential exposures to remaining subsurface soil and groundwater containing MGP-related impacts at concentrations greater than applicable standards and guidance values; require compliance with the SMP; and prohibit the use of non-treated groundwater in the project area.

21. Administration and engineering and construction management costs are based on an assumed 15% of the total capital costs, not including costs for the pre-design investigation, off-site transportation and treatment/disposal of excavated material, preparation of a site management plan, and establishment of institutional controls.

Table 8
Cost Estimate for Alternative 4 - Deep Soil Removal

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

22. Gas holder removal contingency cost estimate includes labor, equipment, and materials necessary to conduct excavation activities associated with removal of both the eastern gas holder and the western gas holder. Estimate includes costs for excavation support system, excavation and backfilling of approximately 4,600 cy of material, water management, and material disposal. Estimate does not include costs for removing the existing hotel. Final excavation limits would be determined based on the results of the PDI. Final excavation support systems to be evaluated as part of the remedial design.

23. Annual verification of institutional controls cost estimate includes administrative costs for confirming institutional controls to minimize the potential for human exposure to project area soil and groundwater are present. Annual costs associated with institutional controls include verifying the status of institutional controls and preparing/submitting notification to the NYSDEC to demonstrate that the institutional controls are being maintained and remain effective.

24. Annual groundwater sampling cost estimate includes labor, equipment, and materials necessary to conduct annual groundwater sampling activities. Cost estimate assumes groundwater samples will be collected from up to 8 groundwater monitoring wells using low-flow sampling procedures. Cost estimate assumes two workers will require 2 days to complete the sampling activities. Estimate includes costs for labor, field vehicle, and equipment rental.

25. Laboratory analysis of groundwater samples cost estimate includes the analysis of groundwater samples for BTEX and PAHs. Estimate assumes laboratory analysis of groundwater samples from up to 8 groundwater monitoring wells and up to 2 QA/QC samples per sampling event.

26. Waste disposal cost estimate includes off-site disposal of drummed PPE, disposable sampling equipment, and purge water generated/collected during annual groundwater monitoring activities.

27. Annual summary report cost estimate includes labor necessary to prepare an annual report summarizing annual groundwater monitoring activities and results. Annual report to be submitted to NYSDEC.

28. Present worth is estimated based on a 4% beginning-of-year discount rate. It is assumed that "year zero" is 2013.

Table 9
Cost Estimate for Alternative 5 - Soil Removal to Achieve Pre-Disposal Conditions

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Item #	Description	Estimated Quantity	Unit	Unit Price	Estimated Cost
Capital Costs					
1	Pre-Design Investigation	1	LS	$75,000	$75,000
2	Purchase of Property	1	LS	$1,879,400	$1,879,400
3	Building Demolition and Disposal	1	LS	$1,240,000	$1,240,000
4	Mobilization/Demobilization	1	LS	$150,000	$150,000
5	Utility Markout, Protection, Bypass and Relocation	1	LS	$100,000	$100,000
6	Decontamination Pad	1	LS	$6,000	$6,000
7	Shallow Soil Removal	170	CY	$25	$4,250
8	Soil Excavation and Handling	14,300	CY	$125	$1,787,500
9	On-Site Water Handling/Management	47	WEEK	$2,500	$117,500
10	Community Air Monitoring and Vapor/Odor Control	51	WEEK	$5,000	$255,000
11	Traffic Control	51	WEEK	$5,000	$255,000
12	Demarcation Layer	1,600	SY	$5	$8,000
13	Controlled Low-Strength Material	150	CY	$100	$15,000
14	Backfill	13,200	CY	$25	$330,000
15	Surface Restoration	51,400	SF	$8	$411,200
16	Liquid Waste Characterization	11	EACH	$1,200	$13,200
17	Liquid Waste Transportation and Disposal	502,000	GAL	$1.00	$502,000
18	Solid Waste Characterization	44	EACH	$1,200	$52,800
19	Solid Waste Transportation and Disposal - C&D Debris	830	TON	$100	$83,000
20	Solid Waste Transportation and Disposal - LTTD	21,100	TON	$85	$1,793,500
21	Sale of Property	1	LS	-$142,400	-$142,400
				Subtotal Capital Cost	$8,935,950
22				Administration & Engineering (15%)	$601,118
				Construction Management (15%)	$601,118
				Contingency (20%)	$1,787,190
				Total Capital Cost	$11,925,375
Operation and Maintenance Costs					
23	Annual Groundwater Sampling	1	EVENT	$5,000	$5,000
24	Laboratory Analysis of Groundwater Samples	10	EACH	$250	$2,500
25	Waste Disposal	2	DRUM	$700	$1,400
26	Annual Summary Report	1	LS	$15,000	$15,000
				Subtotal O&M Cost	$23,900
				Contingency (20%)	$4,780
				Total Annual O&M Cost	$28,680
27				2-Year Total Present Worth Cost of O&M	$54,093
				Total Estimated Cost:	**$11,979,468**
				Rounded To:	**$12,000,000**

<u>**General Notes**</u>:

1. Cost estimate is based on ARCADIS of New York's (ARCADIS') past experience and vendor estimates using 2013 dollars.

2. This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost. Utilization of this cost estimate information beyond the stated purpose is not recommended. ARCADIS is not licensed to provide financial or legal consulting services; as such; this cost estimate information is not intended to be utilized for complying with financial reporting requirements associated with liability services.

3. All costs assume construction field work to be conducted by non-unionized labor.

Table 9
Cost Estimate for Alternative 5 - Soil Removal to Achieve Pre-Disposal Conditions

Feasibility Study Report
NYSEG - Newark Former Manufactured Gas Plant Site - Newark, New York

Assumptions:

1. Pre-design investigation cost estimate includes labor and equipment necessary to conduct pre-design investigation (PDI) activities in support of the remedial design of this alternative. PDI activities may include, but are not limited to, completion of soil borings and test pits to refine excavation limits and the collection and chemical/geotechnical analysis of soil samples.

2. Purchase of property cost estimate includes potential purchase of hotel property to facilitate building demolition and soil removal activities. Estimate based on Wayne County Real Property Assessment Data (accessed January 17, 2013).

3. Building demolition and disposal cost estimate includes labor, equipment, and material necessary to remove the existing hotel to facilitate soil excavation activities. Estimate includes an assumed cost of $25 per square-foot for building material characterization sampling, building demolition, and building material disposal (estimated 49,600 square-feet).

4. Mobilization/demobilization cost estimate includes mobilization and demobilization of labor, equipment, and materials necessary to conduct the remedial construction activities associated with this alternative.

5. Utility markout, protection, bypass and relocation cost estimate includes labor, equipment, and materials necessary to temporarily bypass or relocate subsurface utilities within anticipated excavation limits. Utilities anticipated to affected by remedial construction activities include, but are not limited to: electric lines north of West Shore Boulevard; and storm sewers, water lines, and telecommunication lines within and south of West Shore Boulevard.

6. Decontamination pad cost estimate includes labor, equipment, and materials necessary to construct and remove a 50-foot by 20-foot decontamination pad and appurtenances. The decontamination pad would consist of a 12-inch gravel fill layer bermed and sloped to a sump and covered with a 40-mil HDPE liner and a 6-inch layer of gravel.

7. Shallow soil removal cost estimate includes labor, equipment, and materials necessary to remove shallow soil containing MGP-related impacts north of West Shore Boulevard. Cost estimate assumes excavation activities would be completed to depths up to 3 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume.

8. Soil excavation and handling includes labor, equipment, and materials necessary to excavate soil containing MGP-related impacts above and below the water table. Cost estimate assumes excavation activities would be completed to depths up to 18 feet below grade using conventional construction equipment. Cost estimate is based on in-place soil volume of ideas as identified as containing MGP-related impacts. Estimate assumes that only soil within the limits of the former MGP requires removal below the hotel. Estimate includes costs for rental of pre-fabricated excavation support systems (e.g., slide rail) to facilitate excavation activities. Final excavation support systems to be evaluated as part of the remedial design.

9. On-site water handling/management cost estimate includes labor, equipment, and material necessary to remove and containerize groundwater from excavation areas. Cost estimate includes the rental of up to two 20,000 gallon holding tanks and all pumps and piping.

10. Community air monitoring and vapor/odor control cost estimate includes labor, equipment, and materials necessary to monitor vapor/odor emission during intrusive site activities and applying vapor/odor suppressing foam to open excavations.

11. Traffic control cost estimate includes labor, equipment, and materials necessary to establish lane closures/restrictions during remedial construction activities. Estimate includes costs for two flagmen and signage to direct traffic around excavation areas within West Shore Boulevard.

12. Demarcation layer cost estimate includes labor, equipment, and materials necessary to place a woven, light-weight, non-biodegradable, high-visibility demarcation layer within soil excavation area footprints.

13. Controlled low-strength material (CLSM) cost estimate includes labor, equipment, and materials necessary to purchase and place CSLM within subsurface soil excavations areas north of West Shore Boulevard to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume.

14. Backfill cost estimate includes labor, equipment, and materials necessary to import, place, grade and compact imported fill (e.g., general fill) to within 12 inches of the surrounding grade. Cost estimate is based on in-place soil volume (not including areas backfilled with CLSM). Cost estimate assumes 95% compaction based on standard proctor testing and includes survey verification and compaction testing.

15. Surface restoration cost estimate includes labor, equipment, and material necessary restore surfaces disturbed during remedial activities in kind. Final surface restorations include 6-inch layer of sub-base and up to 6 inches of asphalt pavement, concrete sidewalk, or vegetated topsoil. Estimate based on an assumed area of twice the excavation foot print.

16. Liquid waste characterization cost estimate includes the analysis (including, but not limited to, PCBs, VOCs, SVOCs, and RCRA Metals) of water containerized during remedial construction. Cost estimate assumes one sample collected and analyzed per every 50,000 gallons water requiring transportation and off-site disposal.

17. Liquid waste transportation and disposal cost estimate includes fees associated transporting and disposing of water collected during remedial construction activities. Volume estimate includes decontamination water and groundwater removed from excavation areas only. Volume estimate based on one saturated pore volume of the excavation areas and one total volume of the saturated portion of the excavation areas. Cost estimate assumes water would be removed from on-site holding tanks and transported for off-site disposal via 5,000-gallon tanker trucks. Cost estimate includes disposal fee; transportation fuel surcharge; and environmental, transportation, and spotting fees.

18. Solid waste characterization cost estimate includes the analysis of soil samples (including, but not limited to, PCBs, VOCs, SVOCs, and RCRA Metals). Costs assumes that waste characterization samples would be collected at a frequency of one sample per every 500 tons of material destined for off-site treatment/disposal.

19. Solid waste transportation and disposal - C&D debris cost estimate includes labor, equipment, and materials necessary to transport and dispose of surface material (e.g., pavement, concrete, gravel sub-base) excavated from areas within and south of West Shore Boulevard as construction and demolition debris. Costs assume excavated surface material would be transported off-site disposal as C&D debris at an assumed density of 2 tons per cubic-yard. Cost estimate includes disposal fee; transportation fuel surcharge; and environmental, transportation, and spotting fees. Cost estimate assumes that no material will be recycled or reused.

20. Solid waste transportation and disposal - LTTD cost estimate includes labor, equipment, and materials necessary to transport and treat excavated soil at a thermal treatment facility. Cost assumes excavated soil will be treated/disposed of via LTTD at an estimated density of 1.5 tons per cubic-yard. Cost estimate includes treatment fee, transportation fuel surcharge, and spotting fees. Cost estimate assumes thermally treated soil does not require subsequent treatment or disposal.

21. Sale of property cost estimate includes sale of former hotel property following remedial construction. Estimate assumes property is sold at a price equivalent to the land value only (based on Wayne County Real Property Assessment Data, accessed January 17, 2013).

22. Administration and engineering and construction management costs are based on an assumed 15% of the total capital costs, not including costs for the pre-design investigation and off-site transportation and treatment/disposal of excavated material.

23. Annual groundwater sampling cost estimate includes labor, equipment, and materials necessary to conduct annual groundwater sampling activities. Cost estimate assumes groundwater samples will be collected from up to 8 groundwater monitoring wells using low-flow sampling procedures. Cost estimate assumes two workers will require 2 days to complete the sampling activities. Estimate includes costs for labor, field vehicle, and equipment rental.

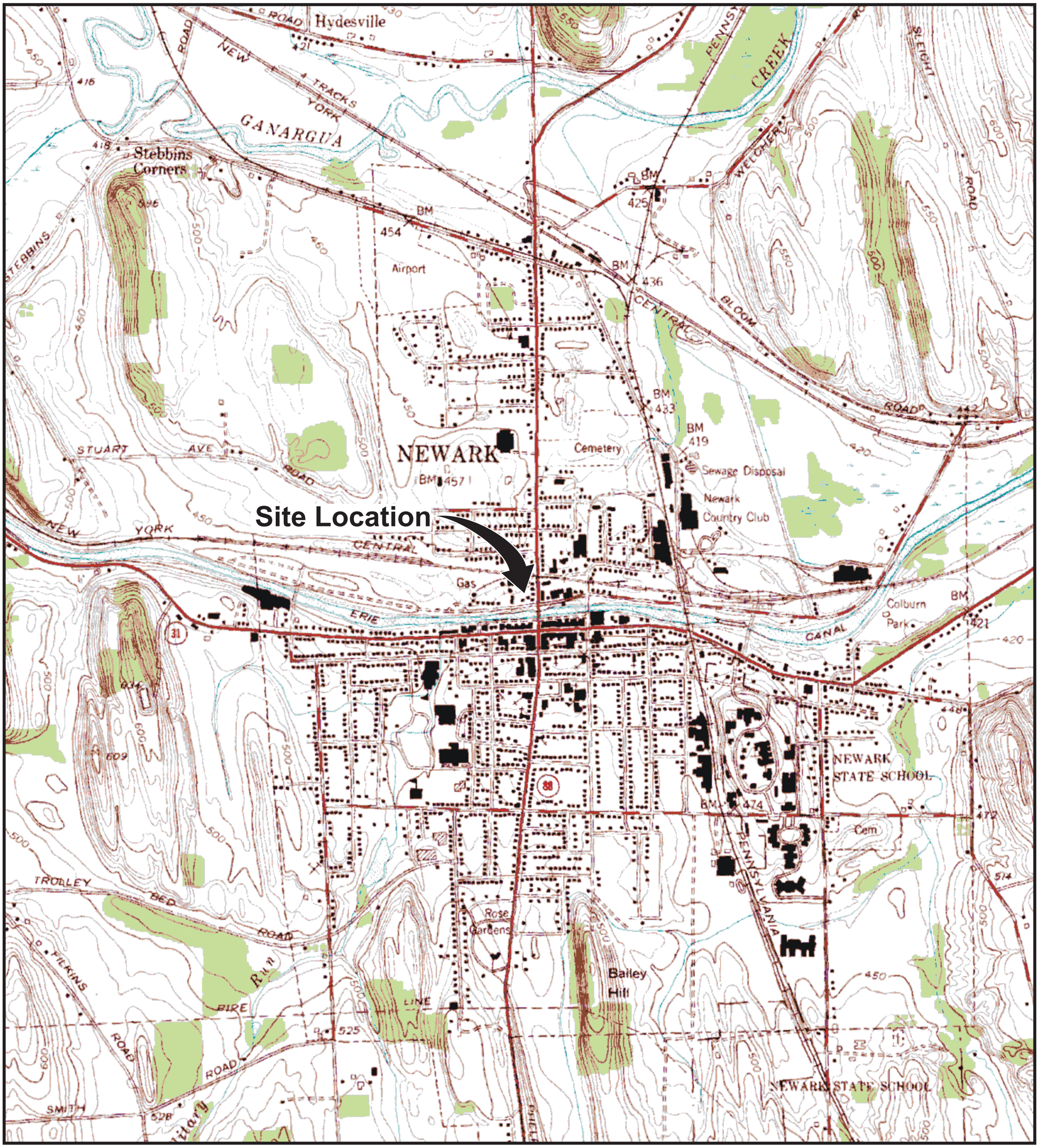
24. Laboratory analysis of groundwater samples cost estimate includes the analysis of groundwater samples for BTEX and PAHs. Estimate assumes laboratory analysis of groundwater samples from up to 8 groundwater monitoring wells and up to 2 QA/QC samples per sampling event.

25. Waste disposal cost estimate includes off-site disposal of drummed PPE, disposable sampling equipment, and purge water generated/collected during annual groundwater monitoring activities.

26. Annual summary report cost estimate includes labor necessary to prepare an annual report summarizing annual groundwater monitoring activities and results. Annual report to be submitted to NYSDEC.

27. Present worth is estimated based on a 4% beginning-of-year discount rate. It is assumed that "year zero" is 2013.

Figures



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., NEWARK, NY, 1952, PHOTOREVISED 1952.

2000' 0 2000'

Approximate Scale: 1" = 2000'

Area Location

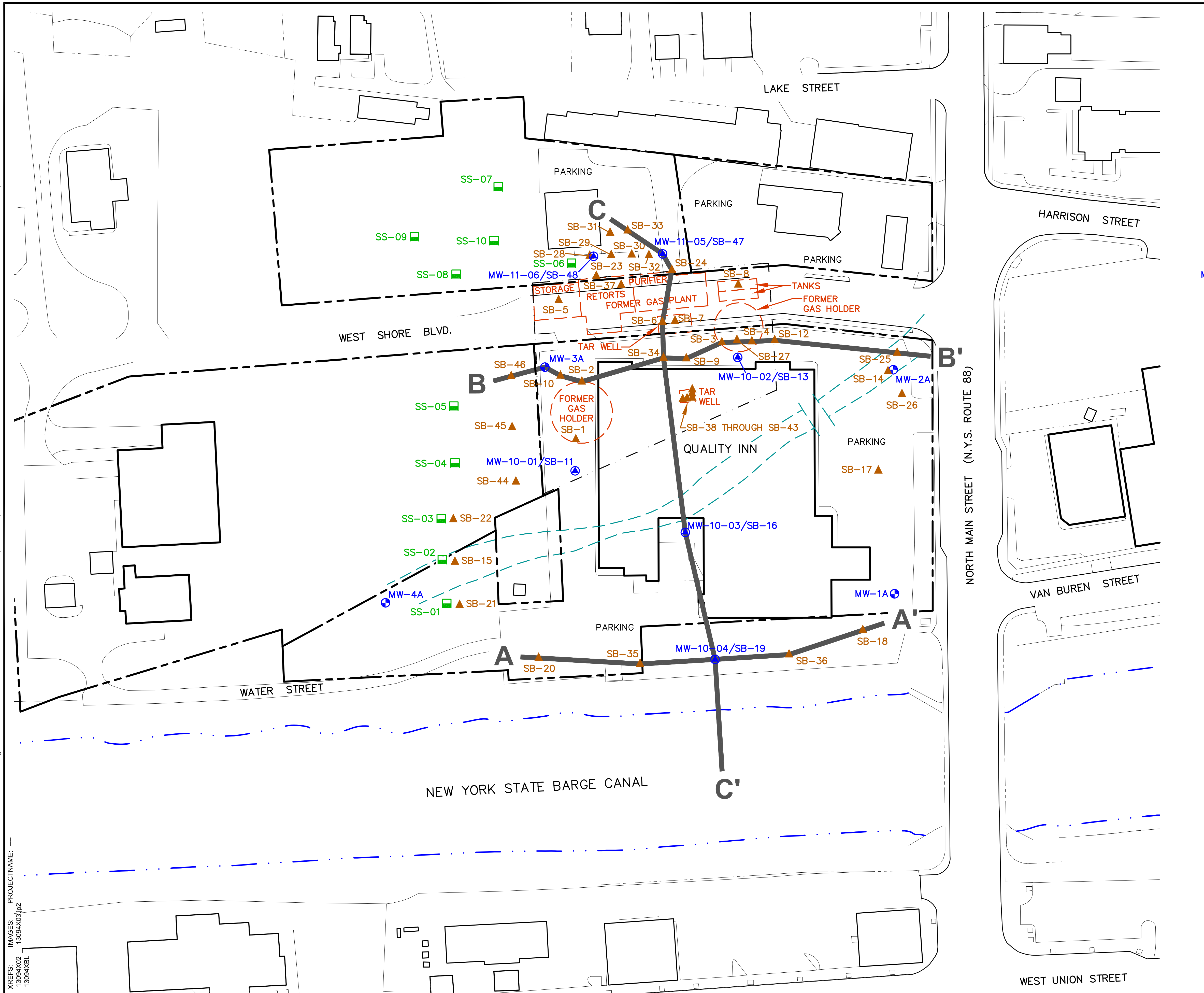
NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

SITE LOCATION MAP

ARCADIS

FIGURE
1

08/24/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0013094/0003/00009/CDR/13094N01.CDR



LEGEND:

- SB-46 ▲ SOIL BORING
- MW-11-06/SB-48 MONITORING WELL/SOIL BORING
- MW-1A MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
- SS-01 SURFACE SOIL SAMPLE
- A—A' LINE OF CROSS SECTION
- PROPERTY LINE
- FORMER MGP STRUCTURES
- APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
- APPROXIMATE FORMER MGP BOUNDARY

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
2. AERIAL DOWNLOADED FROM NYS GIS CLEARINGHOUSE, DATED 2010. COORDINATES ARE STATE PLANE NAD 83.
3. FORMER MGP SITE FEATURES FROM DWG FILE PROVIDED BY NYSEG TITLED "NEWARK FORMER MGP SITE VILLAGE OF NEWARK TOWN OF ARCADIA WAYNE COUNTY, NEW YORK", REVISED 12/18/02, AT A SCALE OF 1"=40'. FORMER MGP SITE FEATURE LOCATIONS ARE APPROXIMATE.
4. SAMPLING LOCATIONS AND QUALITY INN BUILDING BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, REVISED 11/3/11, @ A SCALE OF 1" = 40'. COORDINATES ARE NEW YORK STATE PLANE CENTRAL ZONE.
5. SURFACE SOIL SAMPLE LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND ARE APPROXIMATE.

0 100' 200'

GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

SITE MAP

ARCADIS

FIGURE
2

CITY: SYRACUSE, N.Y. DIV/GROUP: ENVCAD-141 DB: R. ALLEN, R. BASSETT PM/TM: S. POWLIN TR: A. KORIK LYR: ON=*;OFF=REF (FRZ) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 10/31/2012 9:35 AM BY: BASSETT, RICHARD
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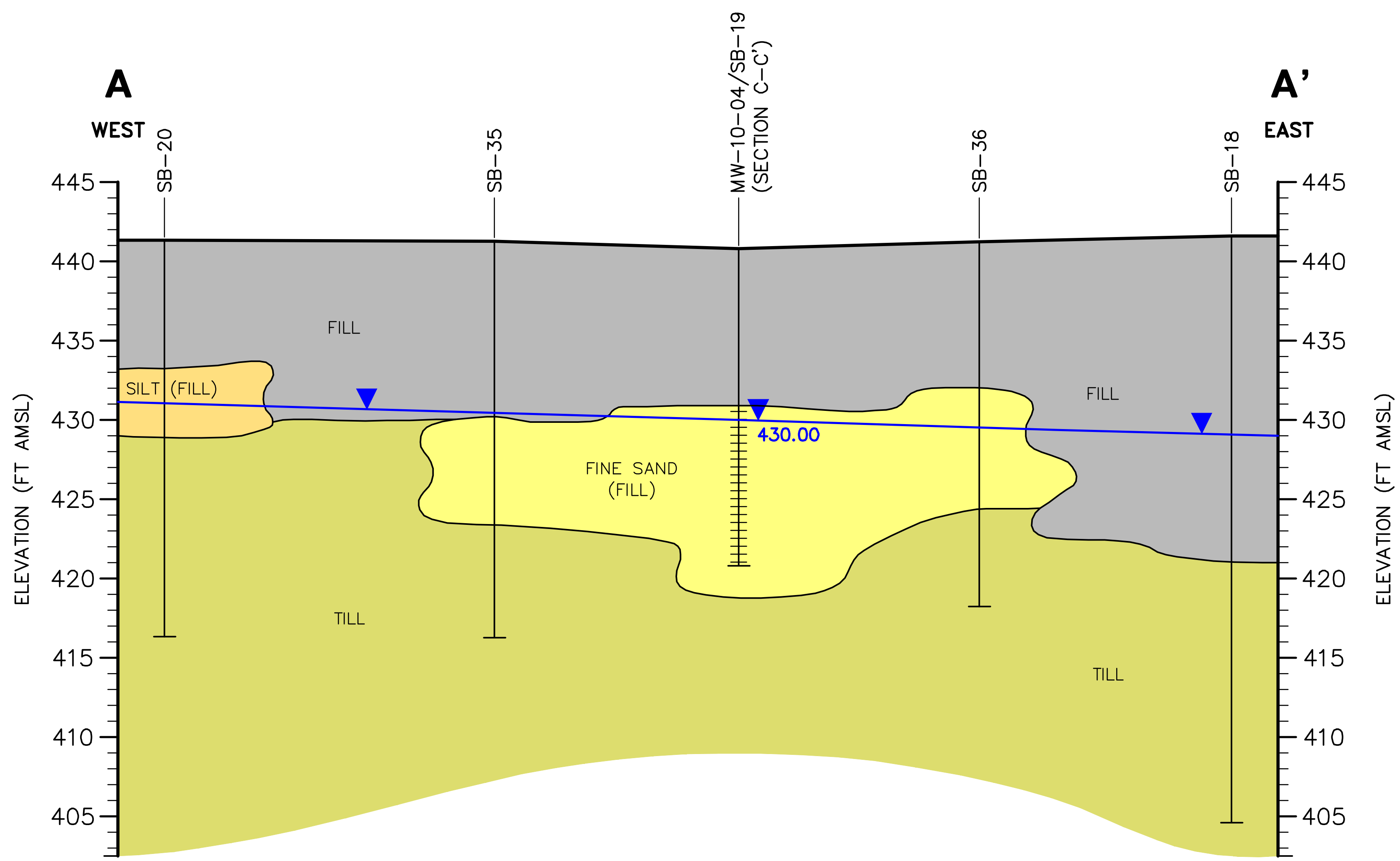


LEGEND:

SB-18 WELL OR BORING ID

GROUND SURFACE

WATER TABLE (11/30/11)

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

SCREEN

BOTTOM OF BORING

FILL

SILT

FINE SAND

TILL

NOTE:

ELEVATIONS ARE REFERENCED TO NAVD 1988.

VERTICAL EXAGGERATION = 5X

0 10' 20'

VERTICAL SCALE

0 50' 100'

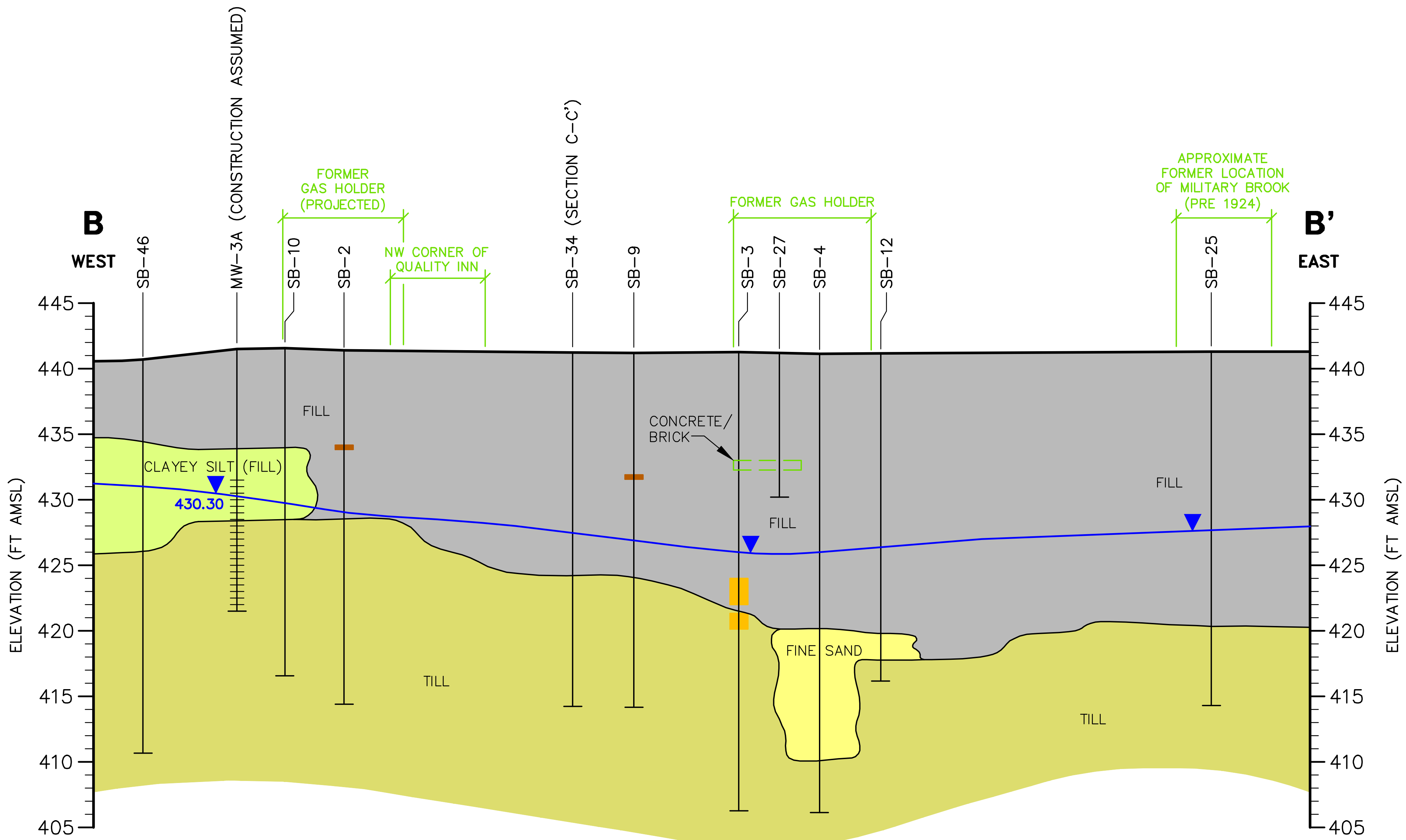
HORIZONTAL SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

GEOLOGIC CROSS SECTION A-A'

ARCADIS

FIGURE
3



LEGEND:

MW-3A WELL OR BORING ID

GROUND SURFACE

WATER TABLE (11/30/11)

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

SCREEN

BOTTOM OF BORING

FILL

FINE SAND

CLAYEY SILT

TILL

TAR-LIKE MATERIAL

TRACE OIL-LIKE MATERIAL

NOTES:

1. ELEVATIONS ARE REFERENCED TO NAVD 1988.
2. SCREENED INTERVAL AT MW-3A IS UNKNOWN. THE 10 FOOT SCREEN LENGTH IS AN ASSUMPTION.

VERTICAL EXAGGERATION = 5X

0 10' 20'

VERTICAL SCALE

0 50' 100'

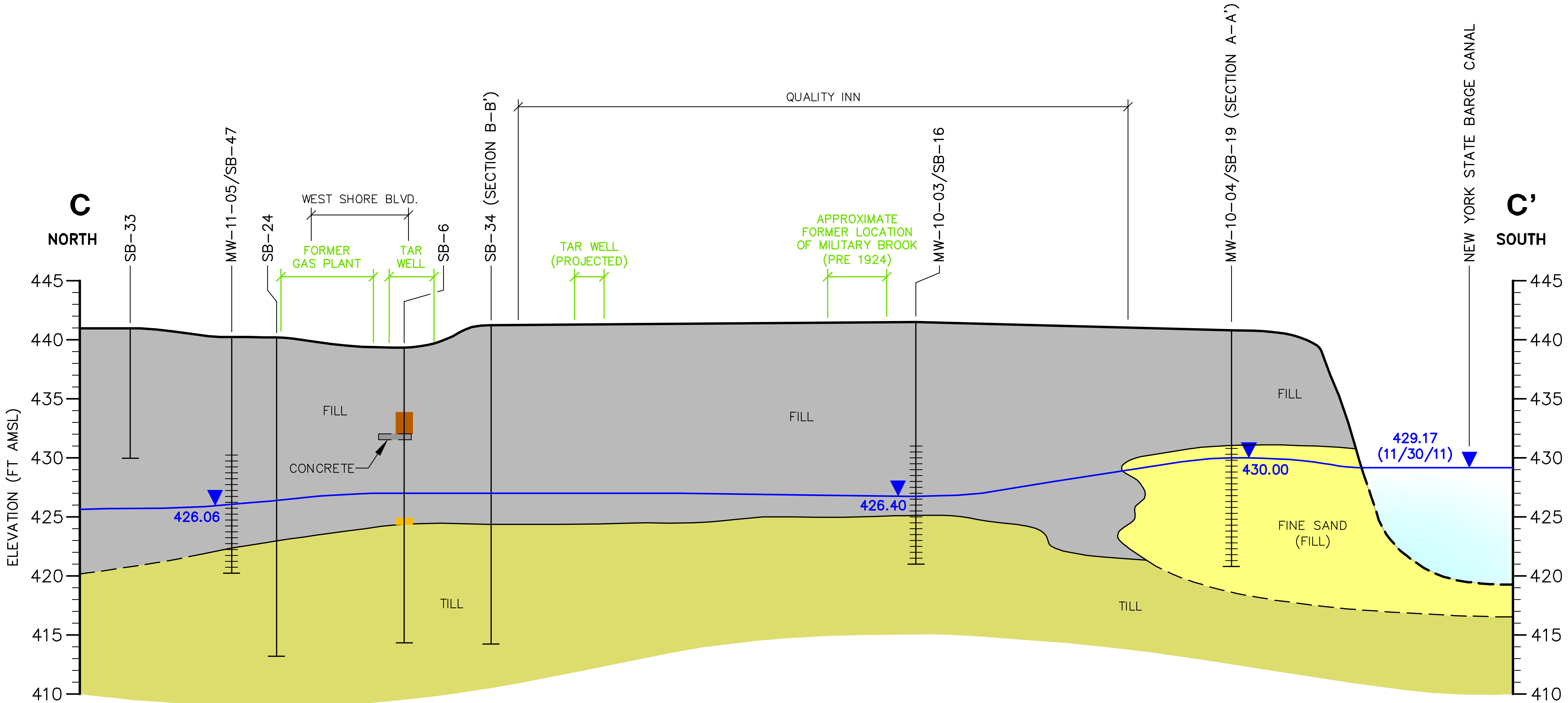
HORIZONTAL SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

GEOLOGIC CROSS SECTION B-B'

ARCADIS

FIGURE
4



LEGEND:

SB-24 WELL OR BORING ID

GROUND SURFACE

WATER TABLE (11/30/11)

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

SCREEN

BOTTOM OF BORING

FILL

FINE SAND

TILL

TAR-LIKE MATERIAL

TRACE OIL-LIKE MATERIAL

NOTE:

ELEVATIONS ARE REFERENCED TO NAVD 1988.

VERTICAL EXAGGERATION = 5X

0 10' 20'

VERTICAL SCALE

0 50' 100'

HORIZONTAL SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021

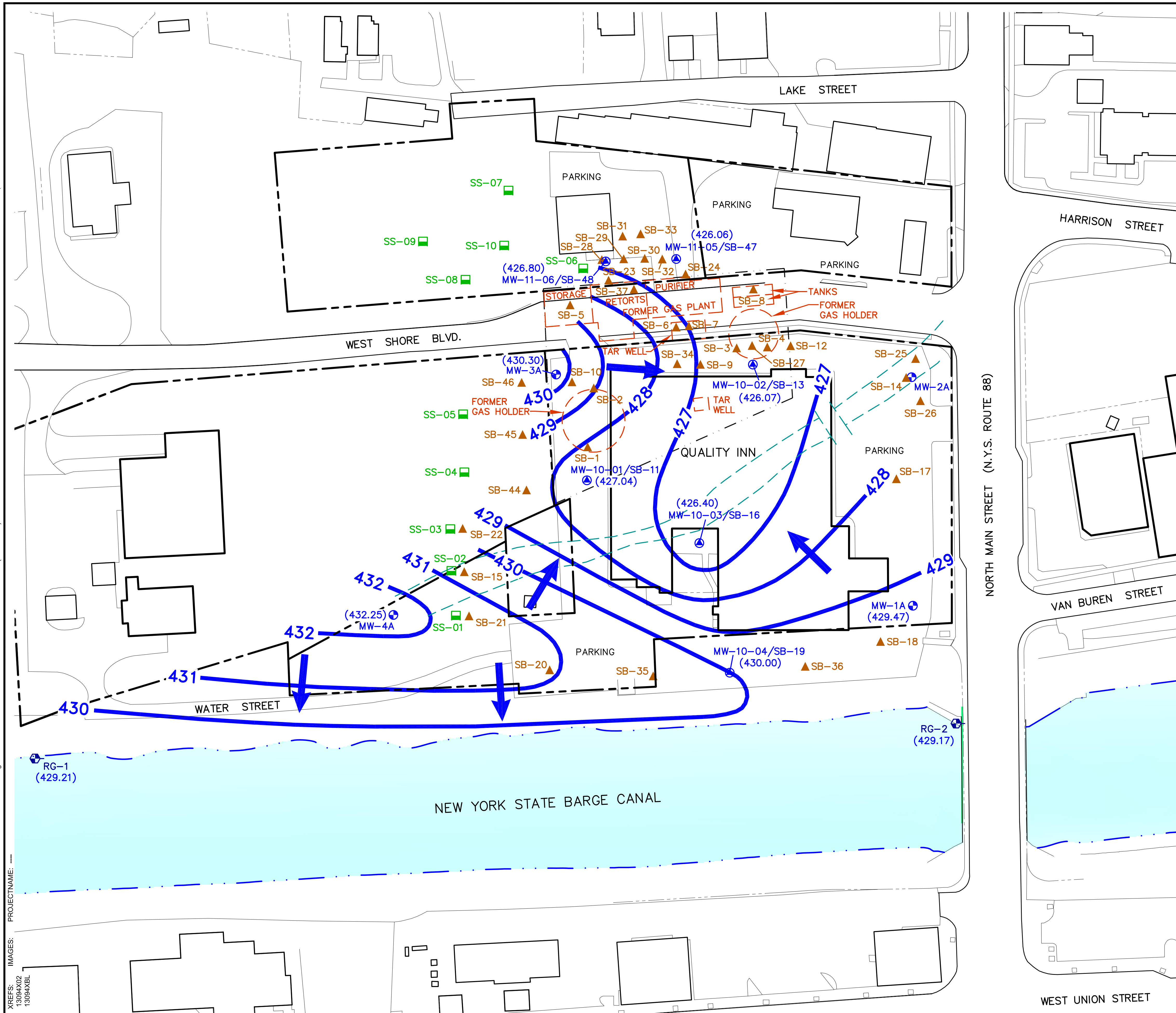
FEASIBILITY STUDY

GEOLOGIC CROSS SECTION C-C'

ARCADIS

FIGURE

5



LEGEND:

(426.07) WATER TABLE ELEVATION

429 WATER TABLE CONTOUR

INFERRED GROUNDWATER FLOW DIRECTION

SB-46 SOIL BORING

MW-11-06/SB-48 MONITORING WELL/SOIL BORING

RG-1 RIVER GAUGE

MW-1A MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S

SS-01 SURFACE SOIL SAMPLE

PROPERTY LINE

FORMER MGP STRUCTURES

APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)

APPROXIMATE FORMER MGP BOUNDARY

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
2. AERIAL DOWNLOADED FROM NYS GIS CLEARINGHOUSE, DATED 2005. COORDINATES ARE STATE PLANE NAD 83.
3. FORMER MGP SITE FEATURES FROM DWG FILE PROVIDED BY NYSEG TITLED "NEWARK FORMER MGP SITE VILLAGE OF NEWARK TOWN OF ARCADIA WAYNE COUNTY, NEW YORK", REVISED 12/18/02, AT A SCALE OF 1"=40'. FORMER MGP SITE FEATURE LOCATIONS ARE APPROXIMATE.
4. SAMPLING LOCATIONS AND QUALITY INN BUILDING BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, REVISED 11/3/11, @ A SCALE OF 1" = 40'. COORDINATES ARE NEW YORK STATE PLANE CENTRAL ZONE.
5. SURFACE SOIL SAMPLE LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND ARE APPROXIMATE.

0 100' 200'

GRAPHIC SCALE

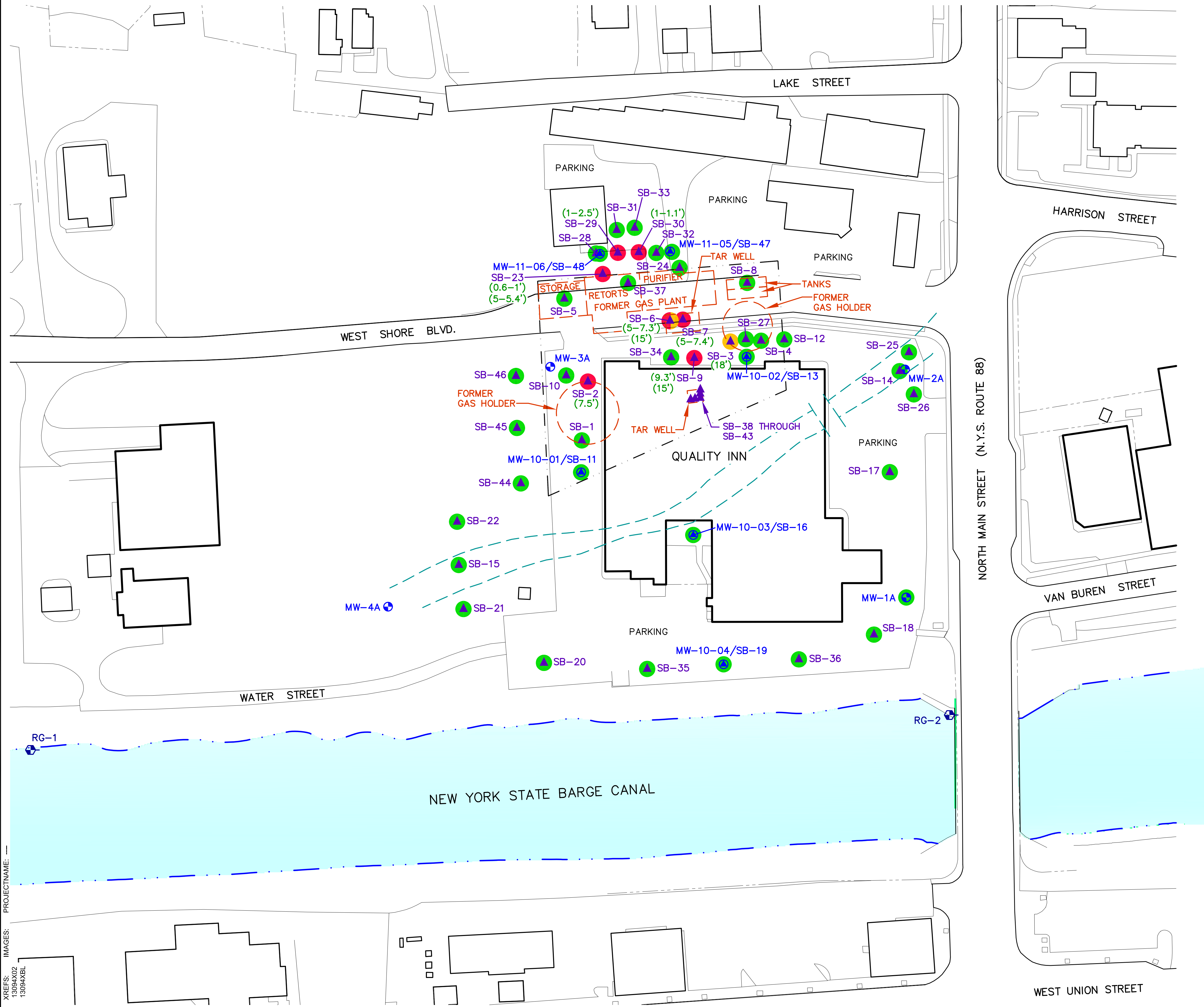
NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021

FEASIBILITY STUDY

WATER TABLE CONTOURS - 11/30/11

ARCADIS

FIGURE
6



LEGEND:

- SB-20 — SOIL BORING
- MW-10-02/SB-13 — MONITORING WELL/SOIL BORING
- RG-1 — RIVER GAUGE
- MW-1A — MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
- FORMER MGP STRUCTURES
- APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
- APPROXIMATE FORMER MGP BOUNDARY
- SB-29 — SOIL BORING WITH TAR-LIKE MATERIAL
- SB-3 — SOIL BORING WITH TRACE OIL-LIKE MATERIAL
- SB-44 — SOIL BORING WITH NO OBSERVED IMPACTS
- (1-2.5') — DEPTH OF OBSERVED IMPACT

NOTES:

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0 100' 200'

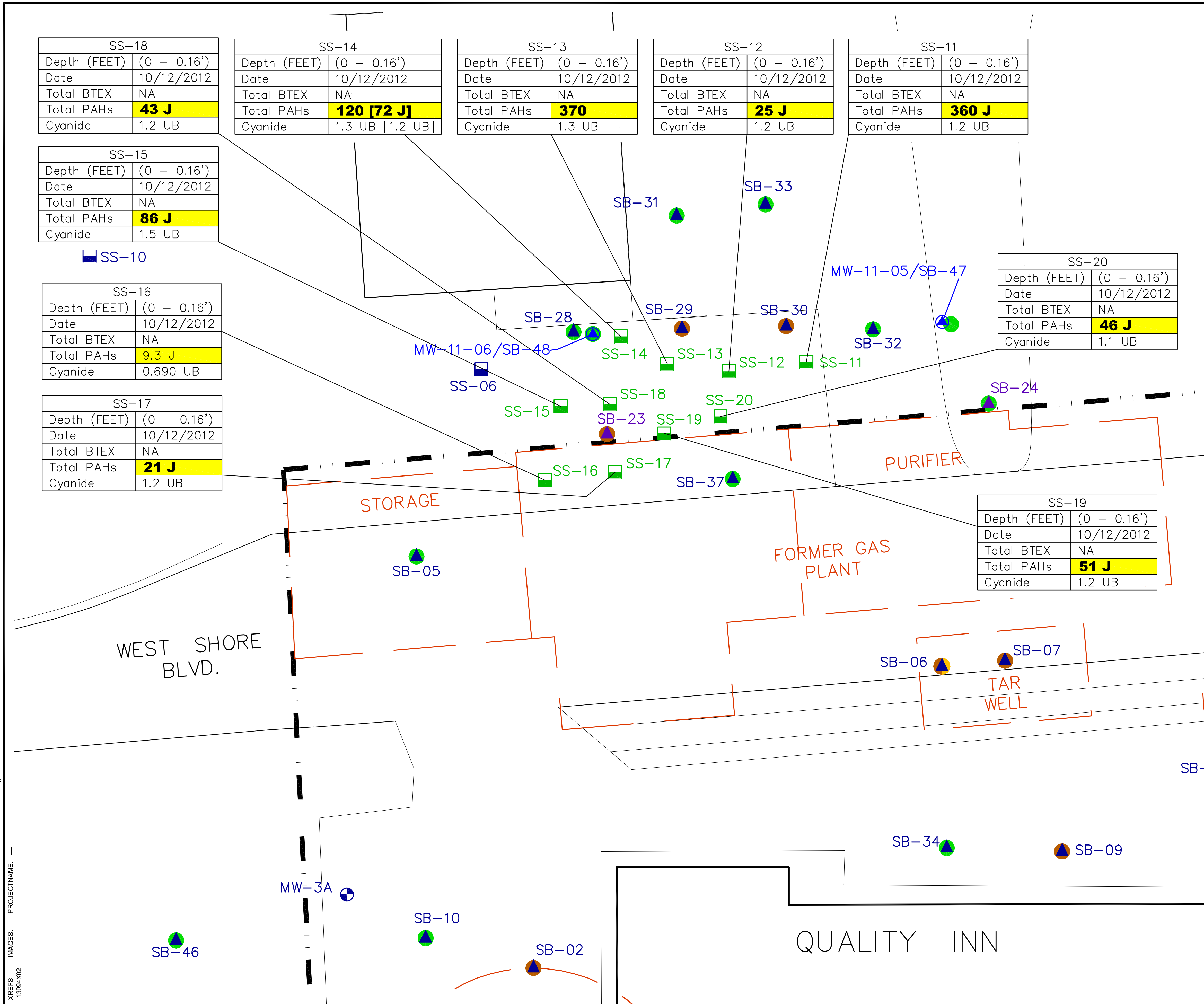
GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

BORINGS WITH VISUAL IMPACTS

ARCADIS

FIGURE
7



LEGEND:

MW-1A	MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
SB-20	SOIL BORING
SS-01	SURFACE SOIL SAMPLE
W-10-02/SB-13	MONITORING WELL/SOIL BORING
RG-1	RIVER GAUGE
	FORMER MGP STRUCTURES
	APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
	APPROXIMATE FORMER MGP BOUNDARY
	SOIL BORING WITH TAR-LIKE MATERIAL
	SOIL BORING WITH TRACE OIL-LIKE MATERIAL
	SOIL BORING WITH NO OBSERVED IMPACTS
J	INDICATES AN ESTIMATED VALUE
NA	INDICATES THAT NO ANALYSES WERE PERFORMED FOR THIS ANALYTE (OR GROUP) IN THE SAMPLE
U	THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
B	INDICATES AN ESTIMATED VALUE BETWEEN THE INSTRUMENT DETECTION LIMIT AND THE REPORTING LIMIT
[ ]	RESULTS IN BRACKETS ARE FOR DUPLICATE SAMPLES
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
PAHs	POLYCYCLIC AROMATIC HYDROCARBONS

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5. RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg) OR PARTS PER MILLION.
6. SURFACE SOIL SAMPLE LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND ARE APPROXIMATE.

0 20' 40'
GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 85-9-021
FEASIBILITY STUDY

SURFACE SOIL ANALYTICAL RESULTS

ARCADIS

FIGURE
8

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: R. ALLEN, R. BASSETT, P. LISTER PM/TM: S. POWLIN TR: J. GOLUBSKI LYR:ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0013094\0002\00008\DWG\13094C03.dwg LAYOUT: 8 SAVED: 12/28/2012 9:57 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 12/28/2012 9:57 AM BY: BASSETT, RICHARD
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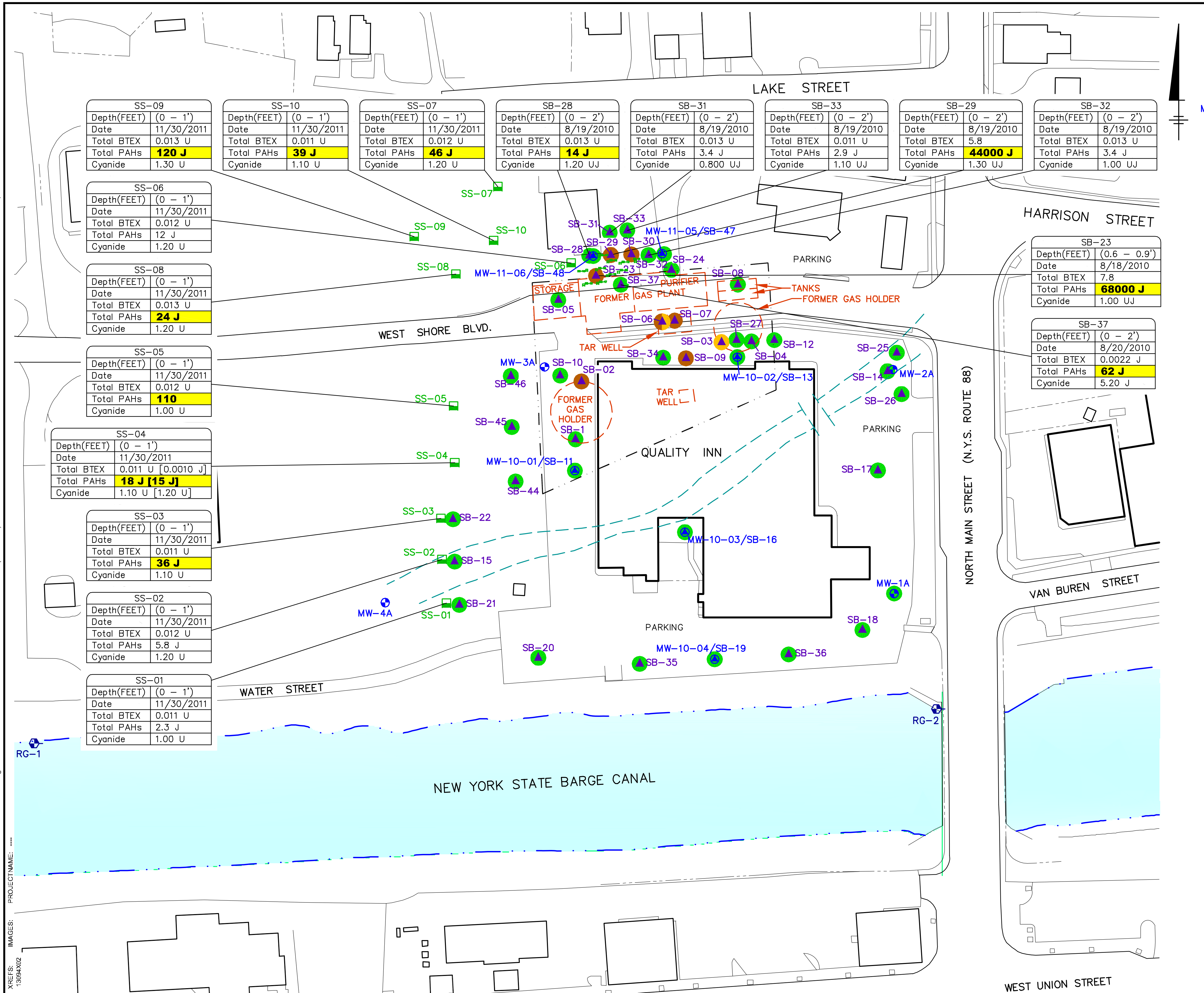

LEGEND:

MW-1A	MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
SB-20	SOIL BORING
SS-01	SURFACE SOIL SAMPLE
MW-10-02/SB-13	MONITORING WELL/SOIL BORING
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	FORMER MGP STRUCTURES
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5. RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg) OR PARTS PER MILLION.
6. NEAR SURFACE SOIL SAMPLE LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND ARE APPROXIMATE.

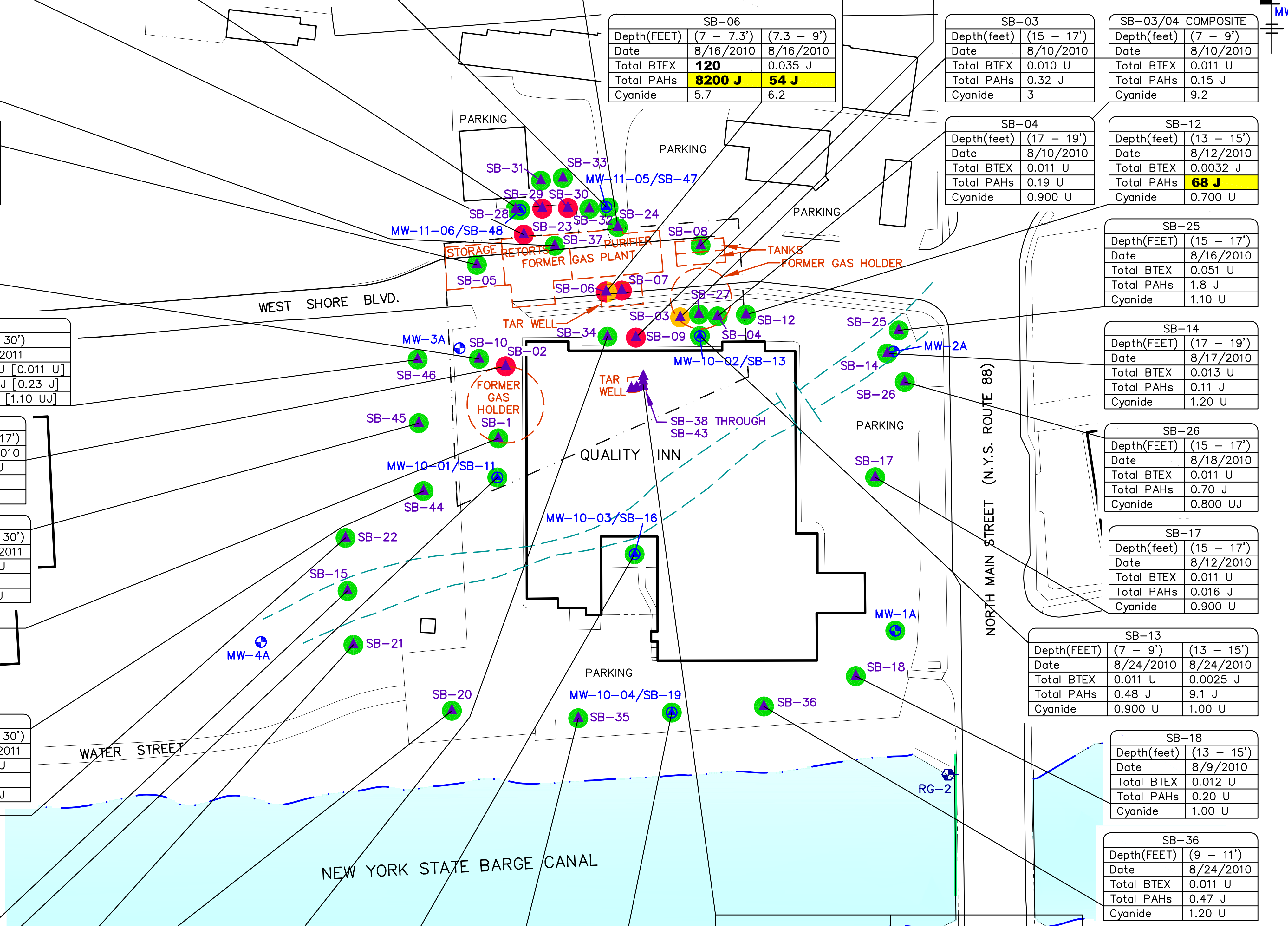
0 100' 200'
GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 85-9-021
FEASIBILITY STUDY

NEAR SURFACE SOIL ANALYTICAL RESULTS

ARCADIS

FIGURE
9



SB-23		
Depth(FEET)	(7 – 9')	(13 – 15')
Date	8/18/2010	8/18/2010
Total BTEX	0.0094 J	0.0033 J
Total PAHs	**520 J**	**78 J**
Cyanide	1.00 UJ	0.800 UJ

SB-48		
Depth(Feet)	(10 – 12')	(18 – 20')
Date	9/22/2011	9/22/2011
Total BTEX	0.012 U	0.011 U
Total PAHs	0.47 J	0.19 U
Cyanide	1.20 UJ	1.10 UJ

SB-47		
Depth(Feet)	(10 – 12')	(18 – 20')
Date	9/21/2011	9/21/2011
Total BTEX	0.011 U	0.011 U
Total PAHs	1.0 J	0.19 U
Cyanide	0.960 UJ	1.00 UJ

SB-24		
Depth(FEET)	(5 – 7')	(15 – 17')
Date	8/18/2010	8/18/2010
Total BTEX	0.015 U	0.018 U
Total PAHs	**35 J**	2.7 J
Cyanide	16.9 J	1.10 UJ

SB-08	
Depth(FEET)	(13 – 15')
Date	8/17/2010
Total BTEX	0.011 U
Total PAHs	0.94 J
Cyanide	0.900 U

SB-09		
Depth(feet)	(9 – 11')	(17 – 19')
Date	8/11/2010	8/11/2010
Total BTEX	0.011 J	0.013 U [0.012 U]
Total PAHs	**2800**	2.5 J [4.4 J]
Cyanide	3.5	1.30 U [1.10 U]

SB-37	
Depth(FEET)	(13 – 15')
Date	8/23/2010
Total BTEX	0.011 U
Total PAHs	1.2 J
Cyanide	0.800 U

SB-06		
Depth(FEET)	(7 – 7.3')	(7.3 – 9')
Date	8/16/2010	8/16/2010
Total BTEX	**120**	0.035 J
Total PAHs	**8200 J**	**54 J**
Cyanide	5.7	6.2

SB-03	
Depth(feet)	(15 – 17')
Date	8/10/2010
Total BTEX	0.010 U
Total PAHs	0.32 J
Cyanide	3

SB-03/04 COMPOSITE	
Depth(feet)	(7 – 9')
Date	8/10/2010
Total BTEX	0.011 U
Total PAHs	0.15 J
Cyanide	9.2

SB-05	
Depth(FEET)	(11 – 13')
Date	8/17/2010
Total BTEX	0.011 U [0.011 U]
Total PAHs	0.25 J [0.078 J]
Cyanide	1.10 U [1.00 U]

SB-04	
Depth(feet)	(17 – 19')
Date	8/10/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	0.900 U

SB-12	
Depth(FEET)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0032 J
Total PAHs	**68 J**
Cyanide	0.700 U

SB-10	
Depth(feet)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0026 J
Total PAHs	0.19 U
Cyanide	1.00 U

SB-25	
Depth(FEET)	(15 – 17')
Date	8/16/2010
Total BTEX	0.051 U
Total PAHs	1.8 J
Cyanide	1.10 U

SB-46		
Depth(Feet)	(8 – 10')	(28 – 30')
Date	9/20/2011	9/20/2011
Total BTEX	0.0019 J	0.011 U [0.011 U]
Total PAHs	1.7 J	0.037 J [0.23 J]
Cyanide	1.00 UJ	2.20 J [1.10 UJ]

SB-14	
Depth(FEET)	(17 – 19')
Date	8/17/2010
Total BTEX	0.013 U
Total PAHs	0.11 J
Cyanide	1.20 U

SB-02		
Depth(feet)	(7 – 9')	(15 – 17')
Date	8/11/2010	8/11/2010
Total BTEX	0.013 U	0.012 U
Total PAHs	**52 J**	0.54 J
Cyanide	9.1	1.30 U

SB-26	
Depth(FEET)	(15 – 17')
Date	8/18/2010
Total BTEX	0.011 U
Total PAHs	0.70 J
Cyanide	0.800 UJ

SB-45		
Depth(Feet)	(8 – 10')	(28 – 30')
Date	9/20/2011	9/20/2011
Total BTEX	0.0025 J	0.012 U
Total PAHs	0.12 J	0.20 U
Cyanide	1.10 UJ	1.10 UJ

SB-17	
Depth(feet)	(15 – 17')
Date	8/12/2010
Total BTEX	0.011 U
Total PAHs	0.016 J
Cyanide	0.900 U

SB-01	
Depth(feet)	(15 – 17')
Date	8/12/2010
Total BTEX	0.0021 J
Total PAHs	0.14 J
Cyanide	0.800 U

SB-13		
Depth(FEET)	(7 – 9')	(13 – 15')
Date	8/24/2010	8/24/2010
Total BTEX	0.011 U	0.0025 J
Total PAHs	0.48 J	9.1 J
Cyanide	0.900 U	1.00 U

SB-44		
Depth(Feet)	(10 – 12')	(28 – 30')
Date	9/19/2011	9/19/2011
Total BTEX	0.0022 J	0.012 U
Total PAHs	0.13 J	0.20 U
Cyanide	1.00 UJ	1.20 UJ

SB-18	
Depth(feet)	(13 – 15')
Date	8/9/2010
Total BTEX	0.012 U
Total PAHs	0.20 U
Cyanide	1.00 U

SB-22	
Depth(FEET)	(15 – 17')
Date	8/19/2010
Total BTEX	0.011 U
Total PAHs	0.17 J
Cyanide	1.00 UJ

SB-36	
Depth(FEET)	(9 – 11')
Date	8/24/2010
Total BTEX	0.011 U
Total PAHs	0.47 J
Cyanide	1.20 U

SB-15	
Depth(FEET)	(15 – 17')
Date	8/20/2010
Total BTEX	0.010 U
Total PAHs	0.091 J
Cyanide	1.00 UJ

SB-21	
Depth(FEET)	(11 – 13')
Date	8/20/2010
Total BTEX	0.011 U
Total PAHs	0.074 J
Cyanide	1.10 UJ

SB-34		
Depth(FEET)	(9 – 11')	(17 – 19')
Date	8/23/2010	8/23/2010
Total BTEX	0.012 U	0.011 U
Total PAHs	3.7 J	0.19 U
Cyanide	4.4	1.00 U

SB-35	
Depth(FEET)	(9 – 11')
Date	8/23/2010
Total BTEX	0.011 U [0.011 U]
Total PAHs	0.19 U [0.19 U]
Cyanide	0.900 U [1.10 U]

SB-38	
Depth(FEET)	(3 – 4')
Date	10/28/2010
Total BTEX	0.0040 U
Total PAHs	0.49 J
Cyanide	0.800 U

SB-40	
Depth(FEET)	(2 – 3.8')
Date	10/29/2010
Total BTEX	0.011 U
Total PAHs	0.036 J
Cyanide	0.800 U

SB-42	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.010 U [0.011 U]
Total PAHs	0.18 J [0.39 J]
Cyanide	1.00 U [0.600 J]

SB-11	
Depth(FEET)	(17 – 19')
Date	8/25/2010
Total BTEX	0.011 U
Total PAHs	0.20 U
Cyanide	0.800 U

SB-20	
Depth(feet)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0034 J
Total PAHs	0.18 U
Cyanide	1.10 U

SB-16	
Depth(FEET)	(15 – 17')
Date	8/26/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	1.00 U

SB-19	
Depth(FEET)	(9 – 11')
Date	8/25/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	1.00 U

SB-39	
Depth(FEET)	(3 – 3.6')
Date	10/28/2010
Total BTEX	0.011 U
Total PAHs	0.10 J
Cyanide	1.00 U

SB-41	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.010 U
Total PAHs	0.18 U
Cyanide	1.00 U

SB-43	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.011 U
Total PAHs	0.080 J
Cyanide	1.00 U

LEGEND:

- MW-1A — MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
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SITE NO. 8-59-021
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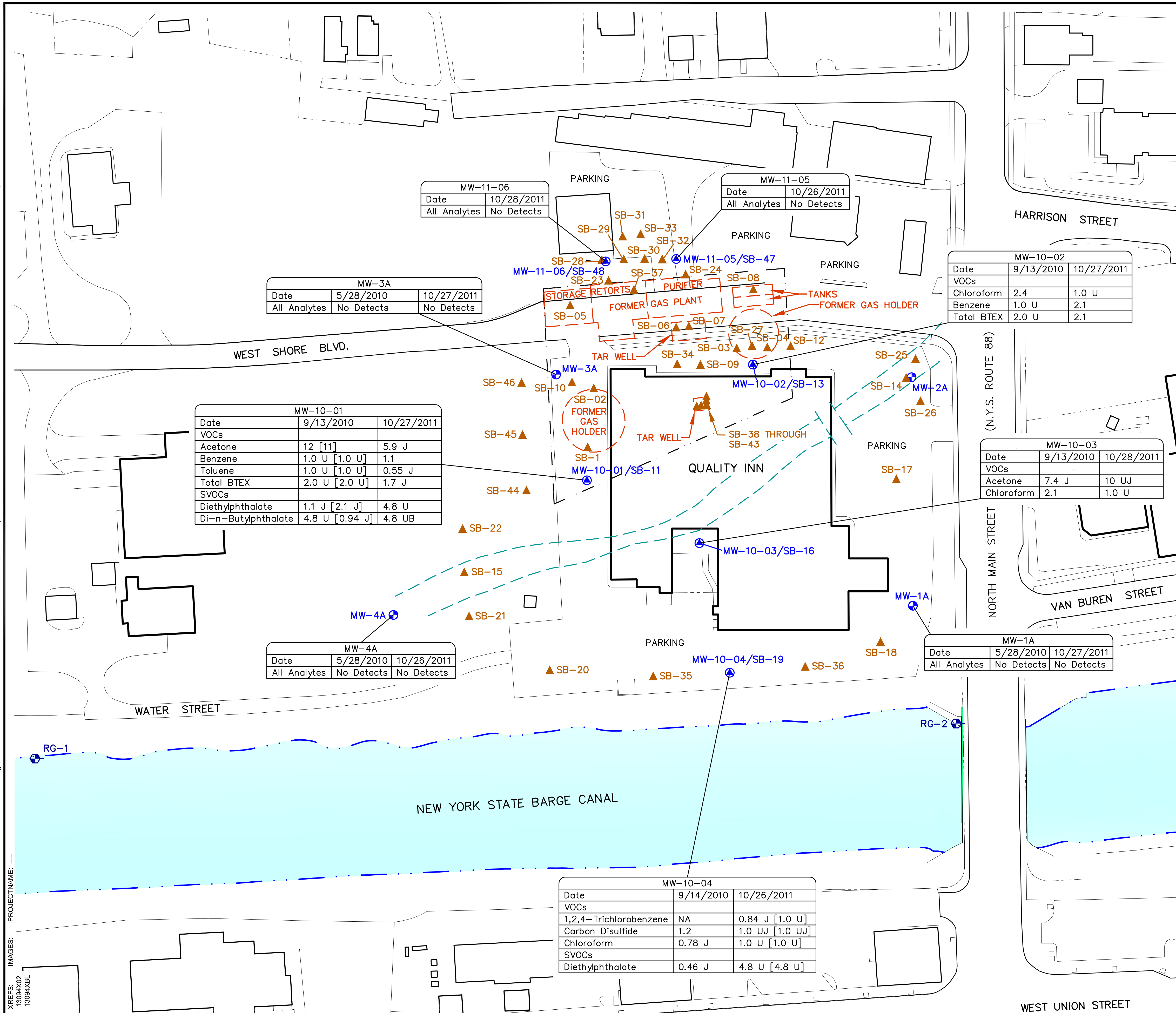
SUBSURFACE SOIL ANALYTICAL RESULTS

ARCADIS

FIGURE
10

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: R. ALLEN R. BASSETT PM/TM: S. POWLIN TR: G. MILES LYR:ON=*;OFF=*REF* PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 12/27/2012 6:20 PM BY: BASSETT, RICHARD
LAYOUT: 10 SAVED: 12/27/2012 6:20 PM ACADVER: 18.1S (LMS TECH)
PROJECTNAME: ---- IMAGES: XREFS: 13094X02 13094XBL



MW-11-06	
Date	10/28/2011
All Analytes	No Detects

MW-11-05	
Date	10/26/2011
All Analytes	No Detects

MW-3A		
Date	5/28/2010	10/27/2011
All Analytes	No Detects	No Detects

MW-10-02		
Date	9/13/2010	10/27/2011
VOCs		
Chloroform	2.4	1.0 U
Benzene	1.0 U	2.1
Total BTEX	2.0 U	2.1

MW-10-01		
Date	9/13/2010	10/27/2011
VOCs		
Acetone	12 [11]	5.9 J
Benzene	1.0 U [1.0 U]	1.1
Toluene	1.0 U [1.0 U]	0.55 J
Total BTEX	2.0 U [2.0 U]	1.7 J
SVOCs		
Diethylphthalate	1.1 J [2.1 J]	4.8 U
Di-n-Butylphthalate	4.8 U [0.94 J]	4.8 UB

MW-10-03		
Date	9/13/2010	10/28/2011
VOCs		
Acetone	7.4 J	10 UJ
Chloroform	2.1	1.0 U

MW-4A		
Date	5/28/2010	10/26/2011
All Analytes	No Detects	No Detects

MW-1A		
Date	5/28/2010	10/27/2011
All Analytes	No Detects	No Detects

MW-10-04		
Date	9/14/2010	10/26/2011
VOCs		
1,2,4-Trichlorobenzene	NA	0.84 J [1.0 U]
Carbon Disulfide	1.2	1.0 UJ [1.0 UJ]
Chloroform	0.78 J	1.0 U [1.0 U]
SVOCs		
Diethylphthalate	0.46 J	4.8 U [4.8 U]

LEGEND:

MW-1A	MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
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	APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
	APPROXIMATE FORMER MGP BOUNDARY
B	THE ANALYTE WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK
J	INDICATES AN ESTIMATED VALUE
U	THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
[ ]	RESULTS IN BRACKETS ARE FOR DUPLICATE SAMPLES
VOCs	VOLATILE ORGANIC COMPOUNDS
SVOCs	SEMI-VOLATILE ORGANIC COMPOUNDS

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
2. AERIAL DOWNLOADED FROM NYS GIS CLEARINGHOUSE, DATED 2005. COORDINATES ARE STATE PLANE NAD 83.
3. FORMER MGP SITE FEATURES FROM DWG FILE PROVIDED BY NYSEG TITLED "NEWARK FORMER MGP SITE VILLAGE OF NEWARK TOWN OF ARCADIA WAYNE COUNTY, NEW YORK", REVISED 12/18/02, AT A SCALE OF 1"=40'. FORMER MGP SITE FEATURE LOCATIONS ARE APPROXIMATE.
4. SAMPLING LOCATIONS BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, @ A SCALE OF 1" = 40'.
5. RESULTS REPORTED IN MICROGRAMS PER LITER ($\mu g/L$) OR PARTS PER BILLION.

0 100' 200'

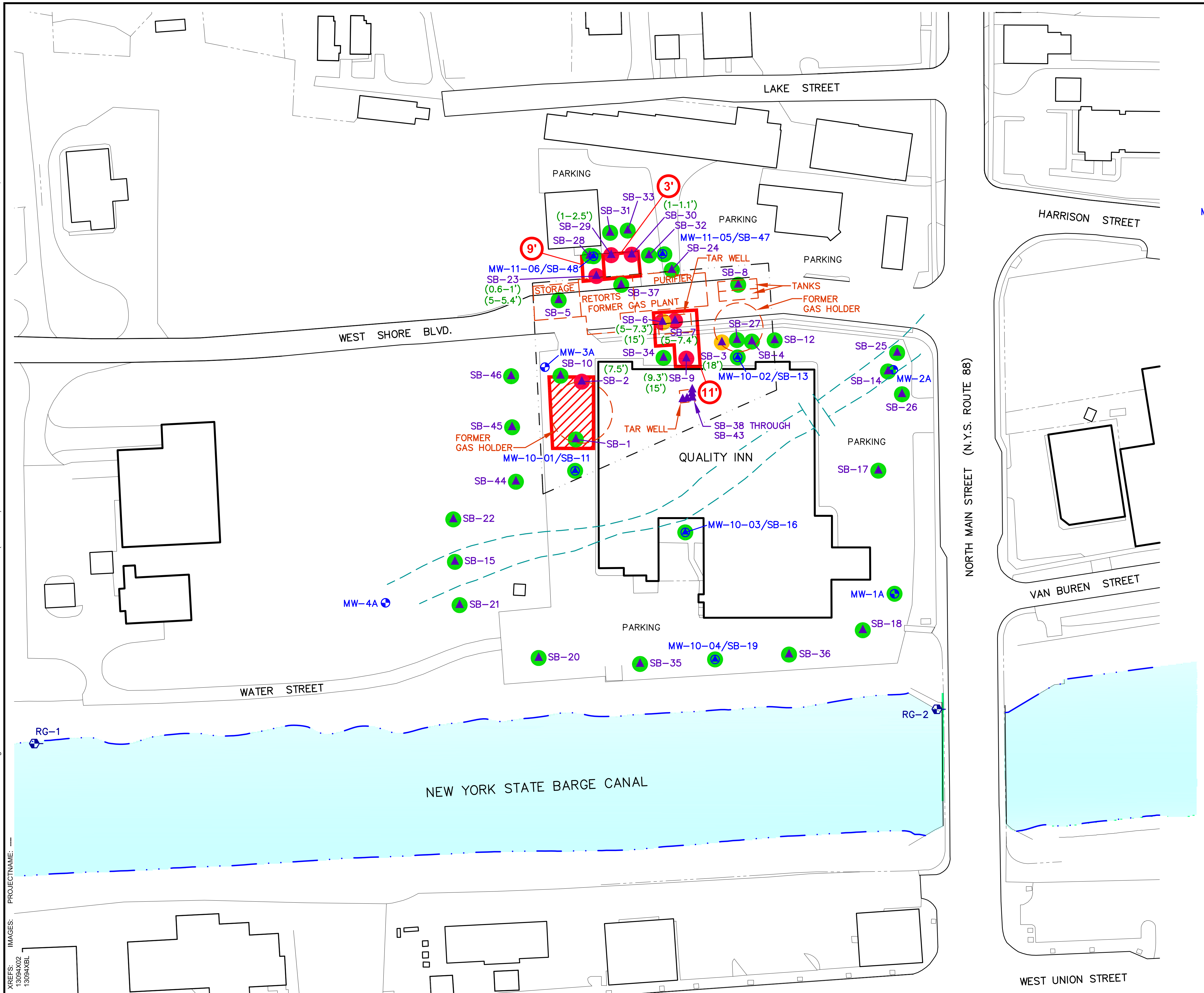
GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

DETECTED VOCs AND SVOCs IN GROUNDWATER

ARCADIS

FIGURE
11



LEGEND:

SB-20	SOIL BORING
MW-10-02/SB-13	MONITORING WELL/SOIL BORING
RG-1	RIVER GAUGE
MW-1A	MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
	FORMER MGP STRUCTURES
	APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
	APPROXIMATE FORMER MGP BOUNDARY
SB-29	SOIL BORING WITH TAR-LIKE MATERIAL
SB-3	SOIL BORING WITH TRACE OIL-LIKE MATERIAL
SB-44	SOIL BORING WITH NO OBSERVED IMPACTS
(1-2.5')	DEPTH OF OBSERVED IMPACT
	PROPOSED HORIZONTAL LIMITS OF REMOVAL
9'	PROPOSED DEPTH OF REMOVAL
	AREA REQUIRING FURTHER INVESTIGATION

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
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4. SAMPLING LOCATIONS AND QUALITY INN BUILDING BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, @ A SCALE OF 1" = 40'.

0 100' 200'
GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEATURIBILITY STUDY

ALTERNATIVE 3
TARGETED SOIL REMOVAL

ARCADIS

FIGURE
12

CITY: SYRACUSE NY DIV/GROUP: ENV/IM-DV DB:R.ALLEN, R. BASSETT LD:(Opt) PIC:(Opt) PM:S. POWLIN TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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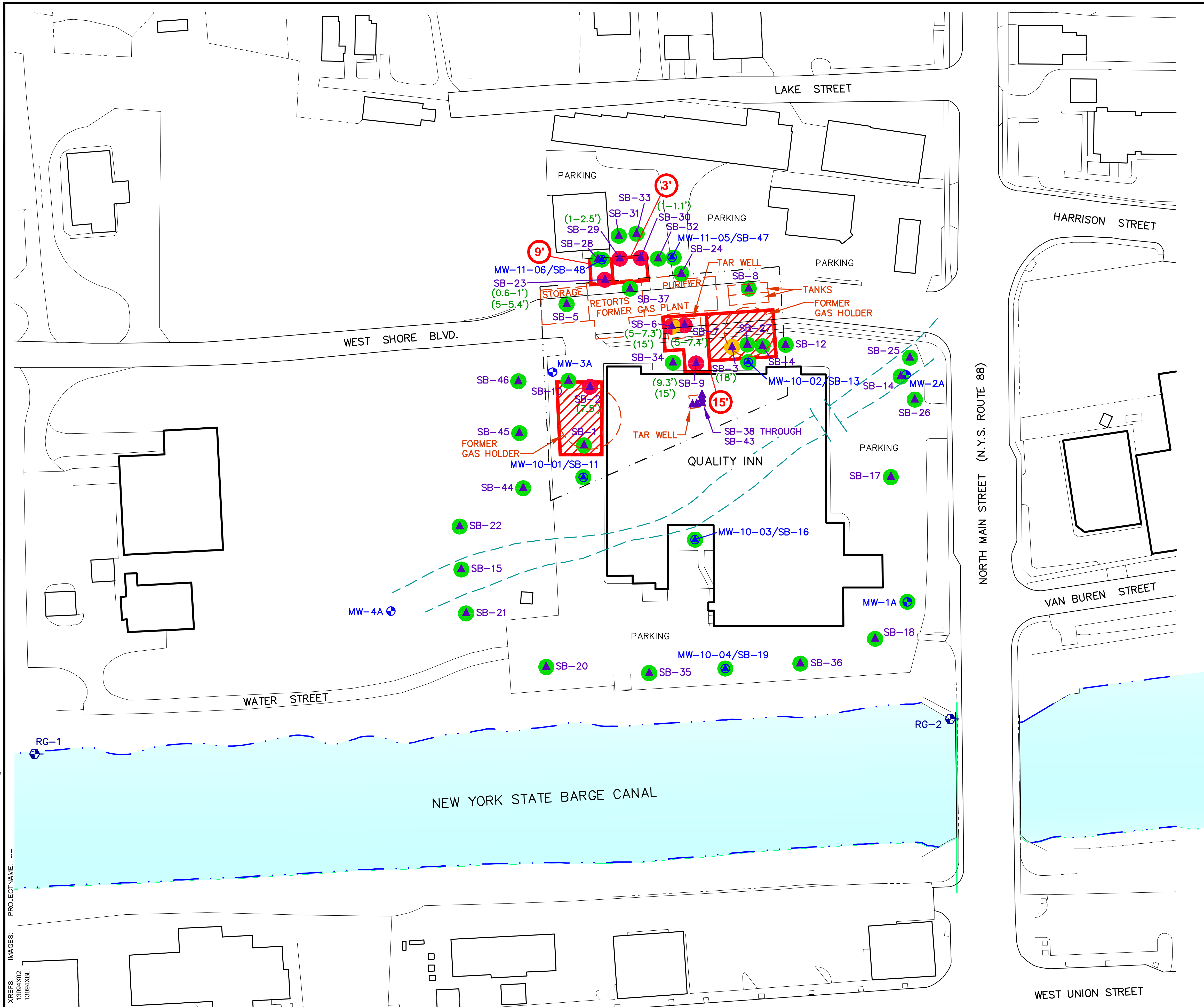

LEGEND:

- SB-20 SOIL BORING
- MW-10-02/SB-13 MONITORING WELL/SOIL BORING
- RG-1 RIVER GAUGE
- MW-1A MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S
- FORMER MGP STRUCTURES
- APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)
- APPROXIMATE FORMER MGP BOUNDARY
- SB-29 SOIL BORING WITH TAR-LIKE MATERIAL
- SB-3 SOIL BORING WITH TRACE OIL-LIKE MATERIAL
- SB-44 SOIL BORING WITH NO OBSERVED IMPACTS
- (1-2.5') DEPTH OF OBSERVED IMPACT
- PROPOSED HORIZONTAL LIMITS OF REMOVAL
- 9' PROPOSED DEPTH OF REMOVAL
- AREA REQUIRING FURTHER INVESTIGATION

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
2. AERIAL DOWNLOADED FROM NYS GIS CLEARINGHOUSE, DATED 2005. COORDINATES ARE STATE PLANE NAD 83.
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4. SAMPLING LOCATIONS AND QUALITY INN BUILDING BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, @ A SCALE OF 1" = 40'.

0 100' 200'

GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

ALTERNATIVE 4
DEEP SOIL REMOVAL

ARCADIS

FIGURE
13

SB-23		
Depth(FEET)	(7 – 9')	(13 – 15')
Date	8/18/2010	8/18/2010
Total BTEX	0.0094 J	0.0033 J
Total PAHs	**520 J**	**78 J**
Cyanide	1.00 UJ	0.800 UJ

SB-48		
Depth(Feet)	(10 – 12')	(18 – 20')
Date	9/22/2011	9/22/2011
Total BTEX	0.012 U	0.011 U
Total PAHs	0.47 J	0.19 U
Cyanide	1.20 UJ	1.10 UJ

SB-47		
Depth(Feet)	(10 – 12')	(18 – 20')
Date	9/21/2011	9/21/2011
Total BTEX	0.011 U	0.011 U
Total PAHs	1.0 J	0.19 U
Cyanide	0.960 UJ	1.00 UJ

SB-24		
Depth(FEET)	(5 – 7')	(15 – 17')
Date	8/18/2010	8/18/2010
Total BTEX	0.015 U	0.018 U
Total PAHs	**35 J**	2.7 J
Cyanide	16.9 J	1.10 UJ

SB-08	
Depth(FEET)	(13 – 15')
Date	8/17/2010
Total BTEX	0.011 U
Total PAHs	0.94 J
Cyanide	0.900 U

SB-09		
Depth(feet)	(9 – 11')	(17 – 19')
Date	8/11/2010	8/11/2010
Total BTEX	0.011 J	0.013 U [0.012 U]
Total PAHs	**2800**	2.5 J [4.4 J]
Cyanide	3.5	1.30 U [1.10 U]

SB-37	
Depth(FEET)	(13 – 15')
Date	8/23/2010
Total BTEX	0.011 U
Total PAHs	1.2 J
Cyanide	0.800 U

SB-06		
Depth(FEET)	(7 – 7.3')	(7.3 – 9')
Date	8/16/2010	8/16/2010
Total BTEX	**120**	0.035 J
Total PAHs	**8200 J**	**54 J**
Cyanide	5.7	6.2

SB-03	
Depth(feet)	(15 – 17')
Date	8/10/2010
Total BTEX	0.010 U
Total PAHs	0.32 J
Cyanide	3

SB-03/04 COMPOSITE	
Depth(feet)	(7 – 9')
Date	8/10/2010
Total BTEX	0.011 U
Total PAHs	0.15 J
Cyanide	9.2

SB-05	
Depth(FEET)	(11 – 13')
Date	8/17/2010
Total BTEX	0.011 U [0.011 U]
Total PAHs	0.25 J [0.078 J]
Cyanide	1.10 U [1.00 U]

SB-04	
Depth(feet)	(17 – 19')
Date	8/10/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	0.900 U

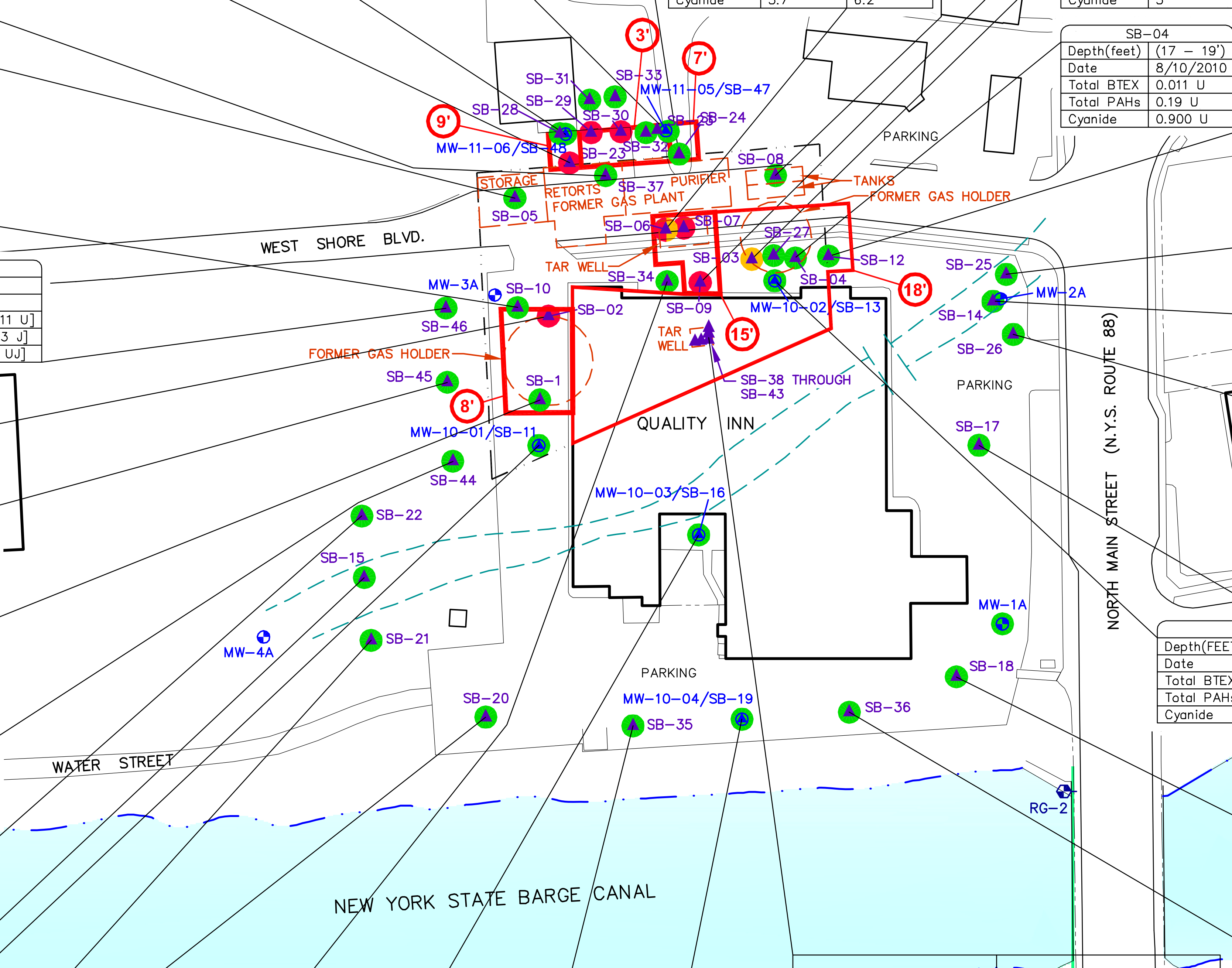
SB-12	
Depth(feet)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0032 J
Total PAHs	**68 J**
Cyanide	0.700 U

SB-10	
Depth(feet)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0026 J
Total PAHs	0.19 U
Cyanide	1.00 U

SB-25	
Depth(FEET)	(15 – 17')
Date	8/16/2010
Total BTEX	0.051 U
Total PAHs	1.8 J
Cyanide	1.10 U

SB-46		
Depth(Feet)	(8 – 10')	(28 – 30')
Date	9/20/2011	9/20/2011
Total BTEX	0.0019 J	0.011 U [0.011 U]
Total PAHs	1.7 J	0.037 J [0.23 J]
Cyanide	1.00 UJ	2.20 J [1.10 UJ]

SB-14	
Depth(FEET)	(17 – 19')
Date	8/17/2010
Total BTEX	0.013 U
Total PAHs	0.11 J
Cyanide	1.20 U



SB-02		
Depth(feet)	(7 – 9')	(15 – 17')
Date	8/11/2010	8/11/2010
Total BTEX	0.013 U	0.012 U
Total PAHs	**52 J**	0.54 J
Cyanide	9.1	1.30 U

SB-26	
Depth(FEET)	(15 – 17')
Date	8/18/2010
Total BTEX	0.011 U
Total PAHs	0.70 J
Cyanide	0.800 UJ

SB-45		
Depth(feet)	(8 – 10')	(28 – 30')
Date	9/20/2011	9/20/2011
Total BTEX	0.0025 J	0.012 U
Total PAHs	0.12 J	0.20 U
Cyanide	1.10 UJ	1.10 UJ

SB-17	
Depth(feet)	(15 – 17')
Date	8/12/2010
Total BTEX	0.011 U
Total PAHs	0.016 J
Cyanide	0.900 U

SB-01	
Depth(feet)	(15 – 17')
Date	8/12/2010
Total BTEX	0.0021 J
Total PAHs	0.14 J
Cyanide	0.800 U

SB-13		
Depth(FEET)	(7 – 9')	(13 – 15')
Date	8/24/2010	8/24/2010
Total BTEX	0.011 U	0.0025 J
Total PAHs	0.48 J	9.1 J
Cyanide	0.900 U	1.00 U

SB-44		
Depth(Feet)	(10 – 12')	(28 – 30')
Date	9/19/2011	9/19/2011
Total BTEX	0.0022 J	0.012 U
Total PAHs	0.13 J	0.20 U
Cyanide	1.00 UJ	1.20 UJ

SB-18	
Depth(feet)	(13 – 15')
Date	8/9/2010
Total BTEX	0.012 U
Total PAHs	0.20 U
Cyanide	1.00 U

SB-22	
Depth(FEET)	(15 – 17')
Date	8/19/2010
Total BTEX	0.011 U
Total PAHs	0.17 J
Cyanide	1.00 UJ

SB-36	
Depth(FEET)	(9 – 11')
Date	8/24/2010
Total BTEX	0.011 U
Total PAHs	0.47 J
Cyanide	1.20 U

SB-15	
Depth(FEET)	(15 – 17')
Date	8/20/2010
Total BTEX	0.010 U
Total PAHs	0.091 J
Cyanide	1.00 UJ

SB-21	
Depth(FEET)	(11 – 13')
Date	8/20/2010
Total BTEX	0.011 U
Total PAHs	0.074 J
Cyanide	1.10 UJ

SB-34		
Depth(FEET)	(9 – 11')	(17 – 19')
Date	8/23/2010	8/23/2010
Total BTEX	0.012 U	0.011 U
Total PAHs	3.7 J	0.19 U
Cyanide	4.4	1.00 U

SB-35	
Depth(FEET)	(9 – 11')
Date	8/23/2010
Total BTEX	0.011 U [0.011 U]
Total PAHs	0.19 U [0.19 U]
Cyanide	0.900 U [1.10 U]

SB-38	
Depth(FEET)	(3 – 4')
Date	10/28/2010
Total BTEX	0.0040 U
Total PAHs	0.49 J
Cyanide	0.800 U

SB-40	
Depth(FEET)	(2 – 3.8')
Date	10/28/2010
Total BTEX	0.011 U
Total PAHs	0.036 J
Cyanide	0.800 U

SB-42	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.010 U [0.011 U]
Total PAHs	0.18 J [0.39 J]
Cyanide	1.00 U [0.600 J]

SB-11	
Depth(FEET)	(17 – 19')
Date	8/25/2010
Total BTEX	0.011 U
Total PAHs	0.20 U
Cyanide	0.800 U

SB-20	
Depth(feet)	(13 – 15')
Date	8/12/2010
Total BTEX	0.0034 J
Total PAHs	0.18 U
Cyanide	1.10 U

SB-16	
Depth(FEET)	(15 – 17')
Date	8/26/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	1.00 U

SB-19	
Depth(FEET)	(9 – 11')
Date	8/25/2010
Total BTEX	0.011 U
Total PAHs	0.19 U
Cyanide	1.00 U

SB-39	
Depth(FEET)	(3 – 3.6')
Date	10/28/2010
Total BTEX	0.011 U
Total PAHs	0.10 J
Cyanide	1.00 U

SB-41	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.010 U
Total PAHs	0.18 U
Cyanide	1.00 U

SB-43	
Depth(FEET)	(2 – 4.3')
Date	10/29/2010
Total BTEX	0.011 U
Total PAHs	0.080 J
Cyanide	1.00 U

LEGEND:

MW-1A MONITORING WELL WITH "A" DESIGNATION INSTALLED IN EARLY 1990'S

SB-20 SOIL BORING

MW-10-02/SB-13 MONITORING WELL/SOIL BORING

RG-1 RIVER GAUGE

FORMER MGP STRUCTURES

APPROXIMATE FORMER LOCATION OF MILITARY BROOK (PRE 1924)

APPROXIMATE FORMER MGP BOUNDARY

SOIL BORING WITH TAR-LIKE MATERIAL

SOIL BORING WITH TRACE OIL-LIKE MATERIAL

SOIL BORING WITH NO OBSERVED IMPACTS

J INDICATES AN ESTIMATED VALUE

NA INDICATES THAT NO ANALYSES WERE PERFORMED FOR THIS ANALYTE (OR GROUP) IN THE SAMPLE

U THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.

[ ] RESULTS IN BRACKETS ARE FOR DUPLICATE SAMPLES

BTEX BENZENE, TOLUENE, ETHYLBENZENE, XYLENES

PAHs POLYCYCLIC AROMATIC HYDROCARBONS

PROPOSED HORIZONTAL LIMITS OF REMOVAL

9' PROPOSED DEPTH OF REMOVAL

NOTES:

1. BASE MAP PREPARED FROM DWG FILE PROVIDED BY NYSEG TITLED "LOCATION MAP NEWARK MGP SITE VILLAGE OF NEWARK WAYNE COUNTY, NEW YORK", REVISED 6/03/99, AT A SCALE OF 1"=200'.
2. FORMER MGP SITE FEATURES FROM DWG FILE PROVIDED BY NYSEG TITLED "NEWARK FORMER MGP SITE VILLAGE OF NEWARK TOWN OF ARCADIA WAYNE COUNTY, NEW YORK", REVISED 12/18/02, AT A SCALE OF 1"=40'. FORMER MGP SITE FEATURE LOCATIONS ARE APPROXIMATE.
3. SAMPLING LOCATIONS BASED ON A SURVEY DRAWING BY FISHER ASSOCIATES TITLED "MONITORING WELL LOCATION MAP", DATED 09/21/10, @ A SCALE OF 1" = 40'.
4. SHADING INDICATES THAT ONE OR MORE TOTAL BTEX OR TOTAL PAH CONSTITUENT COMPOUNDS WERE DETECTED AT A CONCENTRATION ABOVE THE NYSDEC RESTRICTED USE INDUSTRIAL SCO. BOLD FONT INDICATES THAT ONE OR MORE TOTAL BTEX OR TOTAL PAH CONSTITUENT COMPOUNDS WERE DETECTED AT A CONCENTRATION ABOVE THE NYSDEC RESTRICTED USE RESIDENTIAL SCO.
5. RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg) OR PARTS PER MILLION.

0 100' 200'

GRAPHIC SCALE

NYSEG
NEWARK FORMER MANUFACTURED GAS PLANT SITE
SITE NO. 8-59-021
FEASIBILITY STUDY

ALTERNATIVE 5
REMOVAL TO ACHIEVE PRE-DISPOSAL CONDITIONS

ARCADIS

FIGURE
14

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