Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Former Clifton MGP Site

Operable Unit No. 2

Richmond County, New York

Site No. 2-43-023

December 2006

New York State Department of Environmental Conservation

GEORGE E. PATAKI, *Governor* DENISE M. SHEEHAN, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Former Clifton MGP Inactive Waste Disposal Site
Operable Unit No. 2 - 25 Willow Avenue Parcel
Richmond County, New York
Site No. 2-43-023

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Unit 2 of the Former Clifton MGP site, an inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for Operable Unit 2 of the Former Clifton MGP inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Former Clifton MGP site and the criteria identified for evaluation of alternatives, the NYSDEC has selected demolition of existing building, removal of former structures, excavation of contaminated soil, installation of vertical barrier walls and tar recovery wells. The components of the remedy are as follows:

- Demolition of the existing building on the site to allow for the excavation of the contamination located beneath the building.

- Removal of former MGP-related structures including their foundations which contain coal tar.

- Excavation of approximately 38,300 cubic yards of grossly contaminated soils, down to an approximate depth of ten (10) feet below ground surface (bgs).

- Backfill of the excavated areas with clean fill from an off-site location. Visually clean material from on-site building demolition may be used to backfill the lower portion of the excavated areas. The top two (2) feet will consist of clean soil capable of supporting vegetation.

- Installation of vertical cutoff walls in the subsurface to prevent off-site migration of DNAPL (coal tar) from the site.

- Installation of recovery wells to allow for collection, treatment and disposal of dense non-aqueous phase liquids (DNAPL) that remain at depth in the subsurface after the excavation work is complete.

- A site management plan and environmental easement.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

_____ _____

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for Operable Unit No. 2 of the Former Clifton MGP Site.

The site is currently separated into two parcels of land, 40 Willow Avenue and 25 Willow Avenue which are identified as Operable Units (OU)1 and 2, respectively, as shown on Figure 1. The property at 40 Willow Avenue is known as Operable Unit 1, where a remedy was selected in March, 2004. This document deals with the property at 25 Willow Avenue, which is identified as Operable Unit 2.

The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, the operation of a manufactured gas plant (MGP) at the Former Clifton MGP Site has resulted in the disposal of hazardous wastes, including coal tar containing benzene, toluene, ethylbenzene, xylene and polycyclic aromatic hydrocarbons. These wastes have contaminated the soils and groundwater at the site, and have resulted in:

- a significant threat to human health associated with potential exposure to contaminated soil and groundwater.
- a significant environmental threat associated with the impacts of MGP contaminants to groundwater.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy:

- Demolition of the existing building to allow for the excavation of the impacted materials located beneath the building.

- Installation of vertical cutoff walls in the subsurface to prevent off-site migration of NAPL from the site.
- Excavation, offsite treatment and disposal of approximately 38,300 cubic yards of contaminated soils, down to an approximate depth of ten (10) feet below ground surface (bgs).

- Removal of former MGP-related structures including foundations determined to contain coal tar to the extent practicable.

- Backfill of the excavated areas with clean soil materials from an off-site location. Visually clean material from on-site building demolition may be used to backfill the lower portion of the excavated areas. The top two (2) feet will consist of clean top soil.

- Installation of recovery wells to allow for collection, treatment and disposal of dense non-aqueous phase liquids (DNAPL) that may remain at depth in the subsurface after the excavation work is complete.

- A site management plan and environmental easement.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Former Clifton MGP site occupies two parcels at the intersection of Bay Street and Willow Avenue in the Clifton section of Staten Island, Richmond County, New York (see Figures 1 and 2).

Operable Unit (OU) No. 2, which is the subject of this document, consists of the 25 Willow Avenue parcel of the Former Clifton MGP Site. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The remaining operable unit, (OU-1) for this site is the 40 Willow Avenue parcel of the Former Clifton MGP Site. A Record of Decision was completed for this unit in March of 2004.

The OU-2 parcel is a 3.5-acre parcel bounded to the northeast by Bay Street; to the south by Willow Avenue, and to the northwest by a wooded embankment and an associated active railroad right-of-way (ROW). The OU-2 parcel is currently owned by Keyspan Corporation and is zoned for manufacturing. The surrounding area is characterized by a combination of urban residential, industrial and commercial uses.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The Former Clifton MGP was operated by the Richmond County Gas Light Co. from 1856 to 1901. The plant was then operated by the New York and Richmond Gas Company from 1901 until 1957. Brooklyn Union (now KeySpan) acquired the latter company in 1957, at which point MGP operations ceased.

Manufactured gas plants produced combustible gas by heating coal and petroleum products. The gas was cooled, purified, and then piped to homes and businesses in the surrounding area, where it was used for heating and cooking in much the same way that natural gas is used today. In addition, prior to the widespread availability and use of electricity, the manufactured gas was also used for lighting.

The 25 Willow Avenue parcel was the location of the main operational facility of the former MGP. The MGP consisted of a brick retort and water gas house where gas was manufactured, a purifying house, and other structures including a 75-foot-diameter relief holder. Tar and fuel oil storage tanks were also located on the site.

Over the years, by-products, such as coal tar generated from the MGP operations, have leaked or been released from the former relief holder and other structures resulting in the contamination of soil and groundwater.

3.2: Remedial History

Remedial activities at the site are being performed in accordance with a 1998 Administrative Order on Consent (Index No. D2-0001-98-04) (AOC).

In 1993, Brooklyn Union removed seven underground storage tanks from the 25 Willow Avenue parcel. These tanks had formerly contained gasoline, diesel fuel or waste oil.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. KeySpan Corporation, the present owner of the parcel has been identified as the PRP for this site.

The NYSDEC and KeySpan entered into a Consent Order on April 14, 1998. The Order obligates Keyspan to implement a full remedial program.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) was conducted to determine the nature and extent of contamination and to evaluate the alternatives for addressing threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted in several rounds of field work between February 1999 and December 2004. The field activities and findings of the investigation are described in the RI report. The following activities were conducted during the RI:

- Research of historical information

- Installation of over 100 borings and nine test pits to identify the location of former MGP structures, characterize the contamination surrounding these structures, and to define the extent to which this contamination has spread.

- Collection of 12 soil gas samples to evaluate the potential for contaminated soil vapors to enter the building at 25 Willow Avenue. This building is currently vacant and will be demolished as part of the proposed remedy.

- Collection of 67 discrete groundwater samples from 18 new and existing monitoring wells, collection of 114 subsurface soil samples and 10 surface soil samples; and

- A survey of public and private water supply wells in the area around the site;

To determine whether the soil and groundwater contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI report.

5.1.1: Site Geology and Hydrogeology

The remedial investigation identified four distinct stratigraphic units. These units are, in order of increasing depth:

1) Imported fill material made up of silt, sand and gravel mixed with slag, coal, brick, concrete, metal, ash, and clinkers. This unit ranges in thickness from a few inches to approximately nine feet;

2) Alluvial/marsh deposits beneath the layer of fill. This unit ranges up to 20 feet thick;

3) Glacial deposits beneath the alluvial deposits; and

4) A weathered bedrock layer known as saprolite. The top of the saprolite was encountered at depths of 114 to 123 feet.

Two aquifers are present beneath the site: a shallow, unconfined water table aquifer and a deep semi-confined aquifer. The water table elevations for the shallow unconfined aquifer range from about 4 feet to approximately 9 feet bgs. Groundwater flow in the shallow aquifer is controlled by the presence of a filled, former stream channel and a storm sewer that traverse the site.

The deep aquifer is located within the glacial deposits above the saprolite. The water in the deeper aquifer is under confining (artesian) pressure. Groundwater in this aquifer generally flows to the northeast and discharges to New York Harbor, located approximately 600 feet from the site.

5.1.2: Nature of Contamination

The principal waste product produced at MGPs was coal tar, which is an oily, dark colored liquid with a strong, objectionable odor. Coal tar is also referred to as a dense non-aqueous phase liquid or DNAPL since it is heavier than water and will sink through the groundwater until it reaches some material which it cannot penetrate. Unlike most materials labeled as "tar", this is not a viscous material. Rather, it has a physical consistency similar to motor oil, which enables it to move through the subsurface. The tar contains high levels of volatile and semi-volatile organic compounds (VOCs and SVOCs).

The principal coal tar VOCs are benzene, toluene, ethylbenzene, and xylenes. These compounds, collectively known as BTEX, are slightly soluble in water. Groundwater which comes into contact with tar or tar-contaminated soils will become contaminated with BTEX compounds. This contaminated groundwater can then move through the subsurface along with the ordinary groundwater flow.

The principal coal tar SVOCs are a group of compounds known as polycyclic aromatic hydrocarbons, commonly abbreviated as PAHs. PAH compounds are generally less soluble than BTEX, and are consequently less likely to dissolve in groundwater. This makes PAH compounds less mobile in the subsurface, so the highest levels of PAHs are normally found in close proximity to the tar from which they are derived.

Specific PAHs of concern in coal tar are the following:

acenaphthene
acenaphthylene
anthracene
benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(g,h,i)perylene
benzo(k)fluoranthene
dibenzo(a,h)anthracene
chrysene
fluoranthene
fluorene
indeno(1,2,3-cd) pyrene
2-methylnaphthalene
naphthalene
phenanthrene
pyrene

In this document, PAH concentrations are referred to as either total PAHs (TPAHs) or carcinogenic PAHs (cPAHs). The TPAH concentration is the sum of the concentrations of each (italicized and non-italicized) PAH listed above. The cPAH concentration is the sum of the concentrations of each italicized PAH listed above.

The contaminated materials were found primarily in the immediate area surrounding historic structures that handled tar. Some of the tar has moved away from these source areas through individual soil layers. Discrete intervals of tar impacted materials were observed at depth beneath Willow Avenue and Bay Street/Edgewater Street as depicted in Figures 8 and 9.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for water, and parts per million (ppm) for soil. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern in soil and groundwater and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Surface Soil

Surface soil is defined as the soil located from zero to two inches in depth. Very little surface soil is exposed in the OU2 area, since most of the site is paved or covered by a building. However, one small grassy area does exist, and surface soil samples were collected from this area. For comparison purposes, soil samples were also collected in the surrounding neighborhood to determine background surficial soil concentrations in areas not impacted by the MGP site

On site surface soils show TPAH concentrations ranging from 11 ppm to 92 ppm and cPAH concentrations from 5.9 to 54 ppm. BTEX concentrations range from non-detect to 0.8 ppm. Cyanide was not detected in any of the surface soil samples.

Contaminant concentrations were generally lower in the background areas. On site soils contained trace levels of BTEX and concentrations of TPAH ranging from 5.3 to 56 ppm. cPAH levels ranged from 3.1 to 30 ppm.

Isolated blobs of thick, weathered tar were found seeping through cracks in the parking lot pavement on the 25 Willow Avenue parcel. Although this tar was almost solidified on the surface of the pavement, the seeps provided a complete route of exposure to site contaminants. Keyspan covered the tar seeps with heavy steel plates in 2004 as an interim measure to prevent exposure.

Subsurface Soil

High levels of subsurface soil contamination are generally found in the immediate vicinity of former MGP structures that handled tar (see Figure 2). Tar-saturated soils are present within the walls of former Relief Holder No.1, and in the soils outside this structure, down to a depth of approximately 44 feet bgs. Soils within and around other former MGP structures including the tar separator, tar tanks, and tar wells were also found to be grossly contaminated by MGP tar. Isolated deposits of tar and tar stained soils were noted at off-site locations beneath the Edgewater Street right of way to a depth of approximately 24 feet bgs and beneath Willow Avenue to a depth of 25 feet bgs.

TPAH concentrations in subsurface soils range from non detect to a maximum of 96,090 ppm. BTEX concentrations range from non-detect to 6,100 ppm.

Based on the results of the remedial investigation, it does not appear that tar is currently moving into uncontaminated areas, either on site or off site. However, if the site is left in its current state, some fraction of the tar could move in the future in response to changes in land use such as construction activity or groundwater pumping.

Groundwater

Groundwater contamination was detected primarily in areas near grossly impacted soils and former tar handling structures. BTEX and TPAH levels in groundwater decrease rapidly with distance away from the former tar handling structures.

Shallow groundwater at the southwestern corner of the 25 Willow Avenue Parcel contains traces of BTEX and low levels of PAHs (4.6 ppb). BTEX with a concentration of 111 ppb and TPAH at 219 ppb was noted along the route of the former stream/storm sewer. No measurable amount of NAPL was observed in any of the shallow monitoring wells at the OU-2 parcel.

Measurable tar was observed in only one well (RW-18) on the OU-2 parcel. However, the groundwater sample from this well contained only 0.7 ppb BTEX and no detectable PAH. PAHs and total cyanide were not detected in either of the deep groundwater samples collected during the RI. Deep groundwater at the OU-2 parcel does not appear to be significantly contaminated by MGP by-products.

Off-site migration of groundwater contamination at this site is not considered significant. However, source materials in site soils impacting the site groundwater will be addressed during the remedial phase of the project to allow and enhance natural attenuation of the site groundwater over time.

Soil Vapor

Twelve (12) soil vapor samples were collected beneath the concrete floor slab of the existing building. The samples primarily contained concentrations of chlorinated VOC compounds including 1,1,1-trichloroethane ranging from non-detect to 25,000 micrograms per cubic meter

(mcg/m^3). Other compounds detected were 1,1-dichloroethane, 1,1-dichloroethene and tetrachloroethene at maximum concentrations of 5,400 mcg/m^3, 2,800 mcg/m^3 and 960 mcg/m^3 respectively. These compounds are typically not associated with the operation of the MGP and are likely associated with post-MGP operations. .

The building is currently unoccupied and will be demolished to allow implementation of the selected remedy. Consequently, no further investigation of soil vapor intrusion in this building is warranted.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS.

KeySpan conducted an Interim Remedial Measure (IRM) as a temporary measure in May of 2004 to eliminate potential exposures to tar which was found seeping through cracks in the pavement. As described in Section 5.1.3, the IRM included placement of steel plates over the tar seep in accordance with an NYSDEC-approved work plan.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 7 of the RI report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

There are no known completed exposure pathways at the site. However, potential exposure pathways are:

- Dermal contact with contaminated surface soil, subsurface soil or groundwater
- Incidental ingestion of contaminated soils or groundwater

- Inhalation of contaminated soil vapors

Surface and subsurface soils contain elevated levels of site-related contaminants. Most of the site is paved and enclosed by a locked chain-link fence, thus restricting access to contaminated surface and subsurface soils. Exposure to surface soil is not expected in the grass strip along Bay Street because of limited area of exposed surface soils. If contaminated soil is brought to the surface through excavation or other site activities, exposures could occur via inhalation of fugitive particulates, dermal contact or incidental ingestion.

No one is currently using the site groundwater for drinking or other uses and municipal water serves the area. Municipal water is obtained from reservoirs in upstate New York. Although unlikely, a well could be installed in the future. Depth to groundwater is four to nine feet, therefore incidental ingestion of and dermal contact with contaminated groundwater is possible during construction activities.

Soil vapor is contaminated with benzene, toluene, xylene and chlorinated VOCs. The on-site building is currently vacant and the selected remedy calls for its removal. Any future development will include an evaluation of soil vapor and the potential for exposures associated with soil vapor intrusion. If necessary, remedial or mitigation measures will be taken to minimize potential exposures.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors. The following environmental exposure pathways and ecological risks have been identified:

Analytical results from groundwater samples indicate that groundwater beneath the OU-2 portion of the site is impacted by contaminants resulting from the operation of the MGP. Although this groundwater impact has resulted in significant damage to the groundwater resource at the site, there is no evidence of impact to surface waters. New York Harbor is the nearest surface water body, approximately 600 feet northeast of the site, and the groundwater plume appears to attenuate before reaching it.

Contaminants present at OU-2 of the Clifton site do not pose a current or future risk to wildlife The site and the immediate surrounding areas are occupied by commercial facilities, buildings and paved parking lots and therefore provide minimal habitat to wildlife. Because of the urban nature of these surrounding areas, a wildlife population is not expected. Due to the transient nature of the use of the site by birds and other small animals, the frequency and duration of exposure is limited.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- direct contact with contaminated surface and subsurface soil at concentrations exceeding SCGs;
- ingestion of contaminated surface and subsurface soil at concentrations exceeding SCGs;
- migration of NAPL in the subsurface soil; and
- the source of contamination to the groundwater with a goal of reduction in the groundwater contamination over time.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the former Clifton MGP Site (OU-2) were identified, screened and evaluated in the FS report which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that will be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. The cost to implement all alternatives has been estimated using a discount rate of 5%, assuming a 30-year period of monitoring. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring will cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated soil and groundwater at the site. All alternatives with the exception of Alternative 1 (which calls for no action) share some common components, which are referred to as common elements. The common elements are: 1) institutional controls; 2) building demolition and; 3) NAPL recovery. The common elements are presented in details with each alternative as appropriate.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative will leave the site in its present condition and will not provide any additional protection to human health or the environment. Although this alternative does not require active remedial action, it will require cost for annual monitoring, operation and periodic site reviews. The periodic site review will be performed to assess any changes in the risk to human health and the environment posed by the site.

The cost to implement Alternative 1, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $389,000
Capital Cost: $0
Annual OM&M: $25,000

Alternative 2: Engineered Environmental Capping and Common Elements

Alternative 2 includes actions that will preclude direct contact with impacted materials underneath the site (See Figure 3). No removal of contaminated soils will be performed. The components of Alternative 2 will include the following:

- Demolition of the existing building to allow cap construction.

- Placement of an engineered cap to prevent contact with contaminated materials in the subsurface. The actual cap type and thickness will be determined during the remedial design phase of the project.

- Installation of recovery wells for passive collection of any NAPL that readily flows into recovery wells for removal and off-site disposal.

- Institutional controls to mitigate the threat of exposure to remaining contamination. These controls will include restrictions on future use of the land, maintenance of site access restrictions (e.g. fencing with lockable gates), a health and safety plan, public education and awareness programs, long-term monitoring, and periodic site reviews.

The cost to implement Alternative 2, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:
Present Worth: $10,329,000
Capital Cost: $5,285,000
Annual OM&M: $328,000

Alternative 3: Vertical Barrier Cutoff Walls and Common Elements

Alternative 3 includes actions which will use surface and subsurface containment to encapsulate source materials at OU-2 (see Figure 4). The components of this alternative will include the following:

- Installation of a subsurface containment system consisting of two vertical barrier cutoff walls keyed into the underlying confining layer located approximately 44 feet bgs. The type of walls to be utilized will be evaluated during the design phase of the project. The barrier walls will isolate MGP-byproducts and prevent horizontal off-site migration of site contamination.

- Demolition of the existing building to allow cap construction.

- Excavation of up to one foot of soil to allow for the installation of a soil cover or asphalt cap over approximately 3.5 acres of land to prevent exposure to contaminated soil and inhibit infiltration of precipitation into the subsurface.

- Installation of recovery wells for passive collection of any NAPL that readily flows into recovery wells for removal and off-site disposal.

- Institutional controls to mitigate the threat of exposure to remaining contamination. These will include restrictions on future use of the land, maintenance of site access restrictions (e.g. fencing with lockable gates), a health and safety plan, public education and awareness programs, long-term monitoring, and periodic site reviews.

The cost to implement Alternative 3, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $15,404,000
Capital Cost: $7,996,000
Annual OM&M: $482,000

Alternative 4: Excavation of soils up to 10 ft below ground surface, Removal of MGP-related Structures, and Common Elements.

This alternative will include actions for removal of source materials in subsurface soil and former MGP-related structures (see Figure 5). The components of Alternative 4 will include the following:

- Demolition of the existing building to allow removal of the impacted materials located beneath.

- Excavation, treatment and disposal of approximately 38,300 cubic yards of contaminated soil, to a depth of approximately 10 feet bgs. Some portions of the areas depicted for removal may not be sufficiently contaminated to warrant removal. The actual depth of soil removal will be based on observed field conditions with the concurrence of the NYSDEC on-site representative. The excavated area will be backfilled with clean soil imported from an off-site source. The clean soil cover will eliminate the need for the site to remain fenced.

Visually clean material from on-site building demolition may be used to backfill the lower portion of the excavated areas.

- Removal of former MGP-related structural foundations determined to contain MGP-byproducts to the extent practical.

- Installation of recovery wells for passive collection of any NAPL that readily flows into recovery wells for removal and off-site disposal.

- Institutional controls to mitigate the threat of exposure to remaining contamination. The components of these controls will include deed restrictions on future use of the land, maintenance of site access restrictions , a health and safety plan, public education and awareness programs, long-term monitoring and periodic site reviews.

The cost to implement Alternative 4, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $25,997,000
Capital Cost: $21,426,000
Annual OM&M: $298,000

Alternative 5: Excavation of soils up to 10 ft below ground surface, Removal of Former MGP-related Structures, Vertical Barrier Cutoff Walls and Common Elements.

This alternative will combine components of Alternative 3 and 4 with the exception of lockable gates and fencing. The excavation and associated backfill will allow a clean environment for the installation of subsurface features associated with any future development. The barrier walls will contain any remaining NAPL not removed by excavation and will prevent migration into off-site areas (see Figure 6). The components of this alternative are as follows:

- Demolition of the existing building to allow access to the impacted materials located beneath the building.

- Removal of former MGP-related structures determined to contain coal tar with the potential for future mobility, to the extent practicable.

- Excavation, off-site treatment and disposal of approximately 38,300 cubic yards of contaminated soils. The soils will be removed to a depth of approximately 10 feet bgs as depicted in Figure 6. Soil removal beyond 10 feet bgs may be necessary based on field observations. The actual depth of soil removal will be based on observed field conditions with the concurrence of the NYSDEC on-site representative. Materials warranting removal will be soil containing visible coal tar or separate phase materials. Some portions of the areas depicted for removal may not be sufficiently contaminated to warrant removal. A visible demarcation barrier will be installed at the bottom of the excavation for future determination of the extent of soil removal. The clean soil cover will eliminate the need for the site to remain fenced.

- Excavated areas will be backfilled with clean soil from off-site location. Visually clean material from on-site building demolition may be used to backfill the lower portion of the excavated areas. The top two (2) feet of the entire on-site parcel will be filled with clean top soil.

- Installation of subsurface containment consisting of two vertical barrier walls keyed into the underlying confining layer located approximately 44 feet bgs. The type of wall to be utilized will be evaluated during the design phase of the project. The barrier wall will isolate the remaining coal tar and prevent its off-site migration.

- Installation of recovery wells for passive collection of any NAPL that will readily flow into recovery wells, for removal and off-site disposal.

- Institutional controls to mitigate the threat of exposure to remaining contamination. The components will include restrictions on future use of the land, maintenance of site access restrictions, a health and safety plan, public education and awareness programs, long-term monitoring and periodic site reviews. Any future development will include an evaluation of soil vapor and the potential for exposures associated with soil vapor intrusion.

The cost to implement Alternative 5, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $31,471,000
Capital Cost: $26,427,000
Annual OM&M: $328,000

Alternative 6: Excavation of Source Materials to full depth, Removal of Former MGP-related Structures and Common Elements

This alternative will attempt to remove all contaminated materials from the Site through excavation to a depth of approximately 44 feet bgs (see Figure 7). The material to be removed will include former MGP-related structures and foundations. Collection of NAPL and secure fencing of the site will not be necessary under this alternative, since all source materials will be removed. The main components of this alternative are:

- Excavation, removal, treatment and disposal of approximately 179,000 cubic yards of soils. Soils will be removed to a depth corresponding with the vertical confining unit located at approximately 44 feet bgs.

- Backfilling the excavated areas with clean soil imported from off-site sources. The site will be restored to a pre-disturbance grade. Visually clean material from on-site building demolition may be used to backfill the lower portion of the excavated areas.

The cost to implement Alternative 6, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $70,635,000
Capital Cost: $69,753,000
Annual OM&M: $57,000

The Annual OM&M cost for this alternative will be cost associated with groundwater sampling and analysis, etc. to monitor the effectiveness of the alternative.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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

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

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

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

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

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

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

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability

of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectiveness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 2 at the end of the PRAP.

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

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised.

A number of persons expressed concern about the potential health effects that may be associated with the excavation and removal of the contaminated materials at the site. This concern will be addressed by implementing a stringent health and safety plan as well as the New York State Department of Health Community Air Monitoring Plan during the construction of the selected remedy. No other significant public comments were received.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the NYSDEC has selected Alternative 5 which calls for the excavation of soils up to 10 feet bgs, removal of former MGP-related structures and vertical barrier cutoff walls, and other measures, as the remedy for this site. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the RI and the evaluation of alternatives presented in the FS. The selected remedy, when fully implemented, will eliminate or mitigate all threats to public health and the environment presented by the contaminated materials present at the OU-2 portion of the site. The selected remedy will achieve the remedial action objectives (RAOs) and comply with environmental laws, regulations and other standards and criteria.

Alternative 1 does not include active remedial actions and thus will not provide protection to human health and the environment over what currently exists. In addition, this alternative will not comply with SCGs, since source material and MGP-related structures will remain in place and continue to pose a threat to both human health and the environment. This alternative was therefore, eliminated from further evaluation.

Alternatives 2,3,4,5 and 6 will all provide some level of protection to public health and the environment and were retained for consideration. Balancing criteria were used to choose between them.

Alternative 2, which calls for capping of the site, will prevent human exposure through direct contact or ingestion of the impacted materials. However, this alternative will not provide any removal or treatment with the exception of some minor excavation associated with the capping. Grossly contaminated material will remain in place, beneath the cap, under this alternative. This alternative will not prevent further migration of site contamination to off-site locations. Though this alternative will include passive NAPL recovery, the majority of site contamination will be left in place, resulting in further contamination of soil and groundwater.

Alternative 3 will build on Alternative 2 by including a subsurface vertical barrier wall keyed into a confining layer located at a depth of approximately 44 feet bgs. While this alternative will provide a higher level of protection of human health and the environment compared to Alternative 2, the former MGP-related structures containing MGP by-product will not be removed and will continue to act as sources of contamination to soil and groundwater. Alternative 3 is less desirable when compared to the selected alternative.

Alternative 4 will remove the contamination most likely to be contacted by humans during construction work, through excavation of up to 10ft of contaminated soil and removal of MGP-related structures. However, it will not prevent off-site migration of the remaining, deeper NAPL.

Alternative 6, which includes near-total removal of contaminated materials to their full depth of 44 feet, will provide a slightly greater amount of protection to human health and the environment than Alternative 5. Under this alternative, only very low levels of contaminated materials will remain following excavation. However, this alternative will create several short-term impacts during implementation. Performing excavation to a depth of 44 feet bgs will result in significant disruption to the community as a result of the need for massive dewatering, treatment and disposal of water. The four-fold increase in soil produced (approximately 179,000 cubic yards) will require roughly 9,000 tandem truck trips through the community to transport the contaminated material off site. Though this alternative will result in a reduction in the volume of contaminated source materials, it will result in greater short-term adverse impacts on nearby residents and commercial establishments during construction and will only provide minimal additional protection of human health and the environment over the selected remedy. The incremental cost of over $50 million and the significantly increased community disruption associated with this alternative over Alternative 5 are not justified by the marginal increase in protection. The proposed remedy is expected to allow natural attenuation of remaining contamination by removing the source of contamination.

Alternative 5 is being selected because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It will achieve the remediation goals for the site by removing most of the source of the site contamination and by preventing off-site migration of the remaining NAPL through the installation of NAPL recovery wells and vertical barrier walls.

Although Alternatives 2 and 3 will achieve the RAOs established for the OU-2 portion of the site, they will not provide the reduction in toxicity, mobility and volume of contaminated materials. Alternative 4 will also meet the RAOs but will not provide immediate reduction in mobility compared to Alternative 5. Alternative 6 will achieve the RAOs but the logistical and implementability issues associated with excavation do not warrant the additional period of disruptive

activities and the significant increase in capital cost (over $50 million) when compared to Alternative 5.

On the basis of the above evaluations, Alternative 5 offers the most balanced and cost effective remedy.

The estimated present worth cost to implement the remedy is $31,471,000. The cost to construct the remedy is estimated to be $26,427,000 and the estimated average annual operation, maintenance, and monitoring costs for 30 years is $328,000.

The elements of the selected remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. Demolition of the existing building and associated features located in the northeastern portion of the 25 Willow Avenue parcel to allow for the excavation of the impacted materials located beneath the building. All construction and demolition (C&D) debris will be handled and disposed of in accordance with applicable State and local regulations.

3. Installation of two vertical barrier cutoff walls to prevent the migration of NAPL from the site source areas to off-site locations. The walls will be installed in two areas of the site to cut off migration of contamination off the site, as shown on Figure 6. The type and configuration of the walls to be installed will be determined during the design of the selected remedy. The evaluation will take into account the constructibility and compatibility of the wall with subsurface site contamination. The barrier wall may also serve to support excavation.

4. Excavation of source materials to an approximate depth of ten (10) feet below ground surface (bgs) to remove approximately 38,000 cubic yards of contaminated soils. Material to be removed will include soil containing visible coal tar or separate phase materials. The approximate excavation boundaries are shown on Figure 6. Some portion of the areas depicted for removal may not be sufficiently contaminated to warrant removal. The actual extent of removal in these locations will be based on visual observations as the excavation proceeds, with the concurrence of the NYSDEC on-site representative. Dewatering of the excavation will be required for effective operations. Any water generated will be pre-treated prior to discharge to a permitted facility such as a publicly owned treatment works (POTW). Odor, noise and dust control measures will be implemented. A visible demarcation barrier will be installed at the bottom of the excavation to mark the extent of soil removal prior to backfilling the excavation.

5. Former MGP-related structures including foundations and associated grossly contaminated soil determined to contain coal tar with potential for future mobility will be removed to their full depth, to the extent practicable.

6. Excavated areas will be backfilled with clean soil from an off-site location. Visually clean material from onsite building demolition may be used to backfill the lower portion of the excavated areas. The top two (2) feet of the entire on-site parcel will be filled with clean top soil.

7. NAPL recovery wells will be installed to allow for the collection, treatment and disposal of mobile NAPL that may be present in the subsurface after shallow soils and MGP-related structures have been removed. Recovery/monitoring wells will be placed immediately upgradient and down gradient of the walls to ensure recovery of NAPL collecting behind the walls, as well as any significant NAPL that may be present immediately outside of the walls. The actual number and locations of wells, the screen intervals and method of recovery will be determined during the design of the selected remedy.

8. Since the remedy results in contamination above unrestricted levels remaining at the site, an institutional control in the form of an environmental easement will be required for the remedy. The environmental easement will:
   (a) restrict the use of the site to "commercial use";
   (b) restrict the use of groundwater at the site;
   (c) require the management of the site in accordance with the provisions of the site management plan, to be approved by the Department; and
   (d) require the property owner complete and submit to the NYSDEC a periodic certification.

9. A site management plan (SMP) will be developed and implemented. The SMP will identify the institutional controls and engineering controls (IC/ECs) required for the remedy and detail their implementation. The SMP for this remedy will include:
   (a) An IC/EC control plan to establish the controls and procedures necessary to; (i) manage remaining contaminated soils that may be excavated from the site during future activities, including procedures for soil characterization, handling, health and safety of workers and the community as well as, disposal/reuse in accordance with applicable NYSDEC regulations and procedures; (ii) evaluate the potential for vapor intrusion for any buildings developed on the site, including mitigation of any impacts identified; (iii) maintain use restrictions regarding site development or groundwater use identified in the environmental easement; and (iv) require the property owner to provide an institutional control/engineering control (IC/EC) certification on a periodic basis.
   (b) A monitoring plan to monitor the vertical barrier walls and NAPL recovery wells. The effectiveness of the cutoff walls will be determined from sampling results obtained from a periodic groundwater monitoring program; and
   (c) An operation and maintenance plan to provide the detailed procedures necessary to operate and maintain the remedy, including the NAPL recovery system. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the NYSDEC determines that continued operation is technically impracticable or not feasible.

10. Contaminated soil was encountered at the Edgewater Plaza parking lot at depths ranging from 6 to 21 feet below grade, the extent of this contamination and the need for remediation will be determined during the design phase of the this project.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- Repositories for documents pertaining to the site were established.
- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.
- A public meeting was held on February 9, 2006 to present and receive comments on the Proposed Remedial Action Plan (PRAP). An availability session was held on September 21, 2006 to give the public additional opportunity to ask questions about the site and provide comments on the PRAP.
- A responsiveness summary (Appendix A) was prepared to address the comments received during the PRAP public comment period.

TABLE 1

Nature and Extent of Contamination

Surface Soil	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semi Volatile Organic Compounds (SVOCs) cPAHs	Benzo(a)anthracene	0.38 - 9.4	0.224	10/10
	Benzo(a)pyrene	0.45 - 8.8	0.061	10/10
	Benzo(b)fluoranthene	0.52 - 8.2	1.1	5/10
	Benzo(k)flouranthene	0.85 - 10	1.1	8/10
	Chrysene	0.55 - 12	0.4	10/10
	Dibenzo(a,h)anthracene	0.046 - 1.6	0.014	9/10
	Indeno(1,2,3-cd)pyrene	0.072 - 4	3.2	1/10
Subsurface Soil	**Contaminants of Concern**	**Concentration Range Detected (ppm)[a]**	**SCG[b] (ppm)[a]**	**Frequency of Exceeding SCG**
Volatile Organic Compounds (VOCs)				
	Benzene	0.001 - 1,000	0.06	47/127
	Toluene	0.0004- 2,100	1.5	44/127
	Ethylbenzene	0.0005 - 1,500	5.5	40/127
	Xylenes (Total)	0.001- 1,800	1.2	73/127
Semi Volatile Organic Compounds (SVOCs) cPAHs	Benzo(a)anthracene	0.004- 1,700	0.224	71/128
	Benzo(a)pyrene	0.014 - 1,500	0.061	65/128
	Benzo(b)fluoranthene	0.013 - 590	1.1	64/128
	Benzo(k)flouranthene	0.022 - 890	1.1	64/128
	Chrysene	0.003 - 2,200	0.4	65/128
	Dibenzo(a,h)anthracene	0.033 - 2,600	0.014	33/128
	indeno(1,2,3-cd)pyrene	0.012 - 3,200	3.2	46/128

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	0.6 - 8,300	1	48/67
	Toluene	0.3 - 3,500	5	35/67
	Ethylbenzene	1 - 1,800	5	28/67
	Xylenes (Total)	1 - 2,000	5	42/67
Semivolatile Organic Compounds (SVOCs) cPAHs	Benzo(a)anthracene	0.2 - 6	0.002	0/24
	Benzo(a)pyrene	0.2 - 4	0.002	0/24
	Benzo(b)fluoranthene	0.2 - 3	ND	0/24
	Benzo(k)fluoranthene	0.3 - 4	0.002	0/24
	Indeno(1,2,3-cd)pyrene	0.1 - 4	0.002	1/24
	Chrysene	0.2 - 6	0.002	0/24
Sub Slab Soil Vapor	**Contaminants of Concern**	**Concentration Range Detected (mcg/m3)[a]**	**SCG[b] (mcg/m3)[a]**	**Frequency of Exceeding SCG**
VOCs	1,1,1-Trichloroethane	ND - 25,000	N/A	N/A
	1,1-Dichloroethane	ND - 5,400	N/A	N/A
	1,1-Dichloroethylene	ND - 2,800	N/A	N/A
	Tetrachloroethylene	ND - 960	N/A	N/A

[a] ppb = parts per billion, which is equivalent to micrograms per liter, mcg/L, in water;
ND = Non Detect;
N/A = Not Applicable
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
mcg/m^3 = micrograms per cubic meter
[b] SCG = standards, criteria, and guidance values;

Table 2

Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual OM&M	Total Present Worth
Alternative 1: No Action	$0	$25,000	$389,000
Alternative 2: Capping and Common Elements	$5,285,000	$328,000	$10,329,000
Alternative 3: Vertical Barrier Cutoff Walls and Common Elements.	$7,996,000	$482,000	$15,404,000
Alternative 4: Excavation to 10 ft bgs, Removal of Former MGP-related Structures and Common Elements	$21,426,000	$298,000	$25,997,000
Alternative 5: Excavation to 10 ft bgs, Removal of Former MGP-related Structures, Vertical Barrier Cuttoff Walls and Common Elements	$26,427,000	$328,000	$31,471,000
Alternative 6: Excavation to Full Depth of Contamination and Common Elements	$69,753,000	$57,000	$70,635,000

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Former Clifton MGP Site
Operable Unit No. 2
Staten Island, Richmond County, New York
Site No. 2-43-023

The Proposed Remedial Action Plan (PRAP) for the Former Clifton MGP site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on January 3, 2006. The PRAP outlined the remedial measure proposed for the contaminated soil and groundwater at the Former Clifton MGP site.

The release of the PRAP was announced by a notice to the public contact list in January 2006, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on February 9, 2006, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period was to have ended on February 22, 2006, however it was extended to March 10, 2006, at the request of the public. Also, an Availability Session was held on September 21, 2006 to give the public an additional opportunity to comment on the PRAP.

This responsiveness summary responds to all questions and comments raised during the public comment period and at the two meetings. The following are the comments received, with the NYSDEC's responses:

COMMENT 1: There is no information as to how the NYSDEC intends to seal the area during soil removal activities to prevent the particles from getting into the air.

RESPONSE 1: The NYSDEC typically requires the use of temporary enclosures when there are concerns about odors and dust generation during soil excavation activities. These enclosures can resemble large tents, which cover the active excavation areas and staging areas where contaminated soils are excavated, stockpiled, and loaded for shipment off site or may also be trench shrouds, where appropriate. Air inside the enclosure is maintained at a slightly lower pressure than the outside pressure, to ensure that odors and dust are drawn inwards into the enclosure, rather than escaping to the outside air. Odor and particulate control measures will be determined during design.

It is expected that KeySpan will install such a temporary enclosure unit equipped with an air handling system to process air from within the enclosure to remove contaminants before discharge to the atmosphere. Monitoring systems will be placed around the site as

part of a community air monitoring plan to ensure that air leaving the unit is free of contamination and meets the NYSDEC and NYSDOH air emission requirements.

Trucks transporting contaminated soils off site will be covered with tarps to control dust and, when necessary, may be covered with a layer of foam to suppress odors.

As noted above, all site remedial actions will be conducted under the terms of a community air monitoring plan (CAMP) approved by NYSDOH.

COMMENT 2: Although the NYSDEC documents indicate that the border is the train trestle, there is another parcel of land on Greenfield Avenue that is part of Operable Unit 2 and is probably equally contaminated, but that is not marked as part of your site.

RESPONSE 2: This area noted by the comment was investigated and found to be free of contamination. The parcel of land on Greenfield Avenue is identified in the final Remedial Investigation Report as the "Northwest Parcels." Several soil borings and groundwater monitoring wells were placed along Greenfield Avenue to assess the soil and groundwater conditions in the area. Site-related contamination was not observed at any of these locations.

COMMENT 3: Since the vapor intrusion under the slab of the building at 25 Willow Avenue was found to reach levels of 25,000 micrograms per cubic meter, given the contaminants can move through the surface, how can you deny the possibility of vapor intrusion in the homes?

RESPONSE 3: The physical settings of the 25 Willow building and the homes on Lynhurst Avenue are very different. The 25 Willow Avenue Building sits partially on top of the original MGP plant, with high levels of soil contamination found at relatively shallow depths beneath the building.

The homes on Lynhurst Avenue are not built on top of MGP structures. Although some MGP tar has been detected beneath these homes, it is located at a greater depth beneath the ground surface and has clean groundwater sitting on top of it. This layer of clean groundwater minimizes the generation of contaminated soil vapors which will be of concern for possible intrusion into the homes.

Several groundwater samples were collected between the MGP site (Operable Unit 1) and the homes on Lynhurst Avenue. Groundwater down to a depth of approximately 25 feet below the ground was clean with no MGP contaminants identified. In addition, soil vapor samples were also collected from the backyards of each of the homes on Lynhurst, with low levels of site-related contaminants detected. Soil vapor will also be evaluated after installation of the barrier wall in accordance with the Record of Decision for OU-1.

COMMENT 4: The PRAP refers to excavation and removal of "source materials" for off- site treatment and disposal. How are these materials defined? What material will be left behind?

RESPONSE 4: The ROD calls for the removal of the MGP structures that remain in the subsurface and their contents. At other MGP sites, we have often encountered soil heavily contaminated

with coal tar or MGP constituents immediately outside of and beneath these structures, and the ROD also requires removal of any heavily contaminated soils encountered to a depth of approximately ten feet below the ground surface. These highly concentrated materials are considered "source" materials, in the sense that they function as sources of both NAPL and dissolved groundwater contamination, which can move through the subsurface serving as source of contamination to other soil and groundwater.

The shape of the contaminated soil mass is often highly complex, so predicting exactly where these materials will be encountered before excavation begins is difficult. Decisions on which soils must be removed and which can remain are best made by trained personnel on the scene as the excavation work progresses. In most cases, visual identification of MGP tar contamination is quicker and reliable in the field. NYSDEC seeks to maintain an on-site presence during intrusive work so that these decisions can be made quickly and consistently. In making this professional judgement, NYSDEC staff apply the following definitions:

"Source area" or "source" means a portion of a site or area of concern at a site where the investigation has identified a discrete area of soil, sediment, surface water or groundwater containing contaminants in sufficient concentrations to migrate in that medium, or to release significant levels of contaminants to another environmental medium, which could result in a threat to public health or the environment. A source area typically includes, but is not limited to, a portion of a site where a substantial quantity of any of the following are present:
(1) Concentrated solid or semi-solid hazardous substances;
(2) Non-aqueous phase liquids; or
(3) Grossly contaminated media.
"Grossly contaminated media" means soil, sediment, surface water or groundwater which contains sources or substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, through strong odor, by elevated contaminant vapor levels or is otherwise readily detectable without laboratory analysis.

The description of the soil removal component of the remedy has been clarified in the final ROD to address this potential ambiguity.

The following statement was submitted in the form of a petition with 70 signatures

COMMENT 5: Digging up the contaminated soil is the most hazardous way to remediate the contamination. We have no confidence that there is an effective method which can be used by these agencies to contain the soil particles and keep them from getting into the air when undertaking the monumental task of removing 10 feet of topsoil from a 3.5 acre contaminated lot.

RESPONSE 5: Please see response to comment No. 1. Temporary containment structures have been used successfully at several MGP site cleanups in New York State and elsewhere.

APPENDIX B

Administrative Record

Administrative Record

Former Clifton MGP Site
Operable Unit No. 2
Site No. 2-43-023

1.Proposed Remedial Action Plan for the Former Clifton MGP site, Operable Unit No.2 dated January 2006.

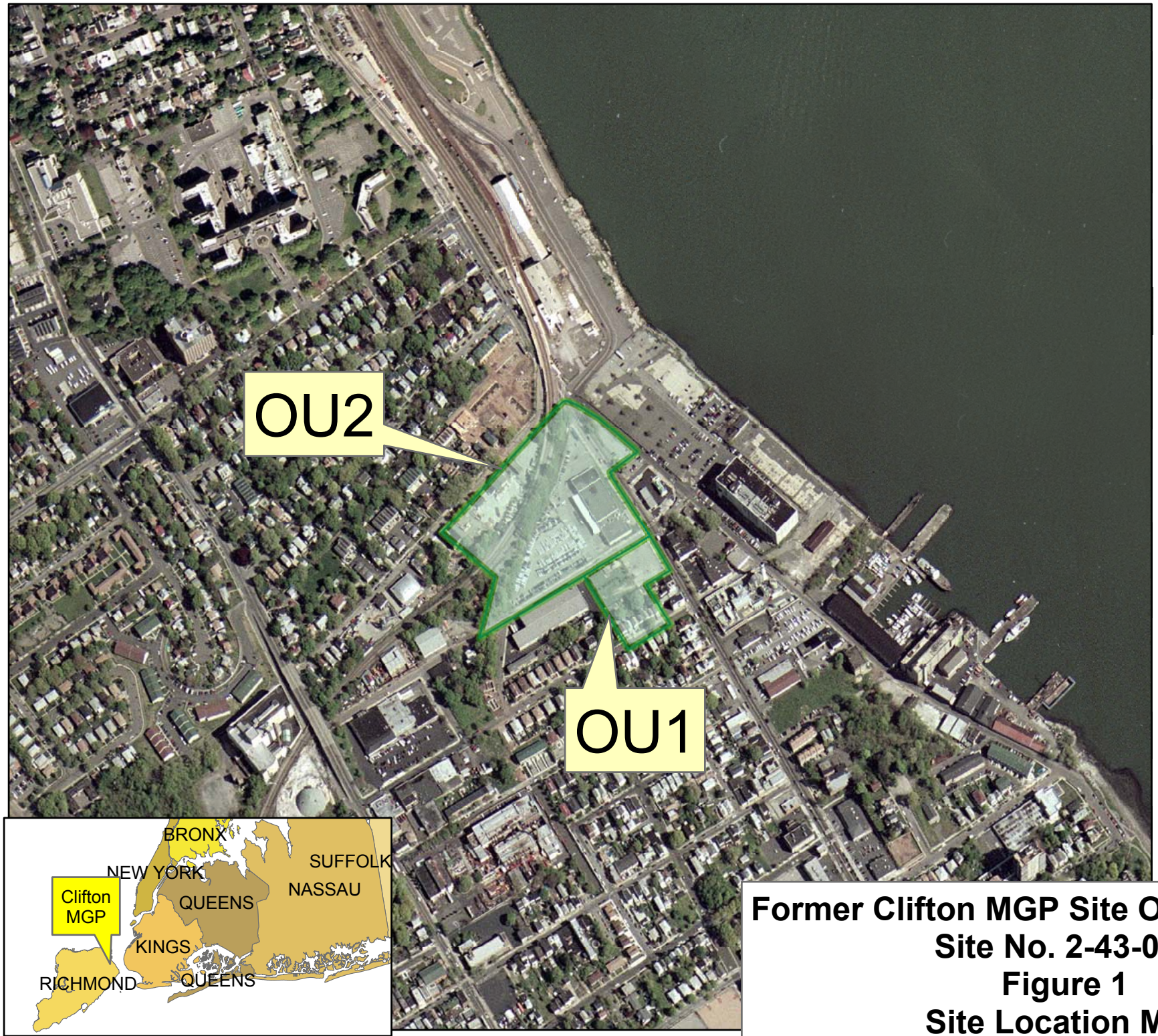
2.Order on Consent, Index No. D2-0001-98-04, between NYSDEC and KeySpan Corporation, executed on April 1998.

3.Final Remedial Investigation Report, Clifton Former MGP Site, Operable Unit 2, dated February 2006, prepared by GEI Consultants.

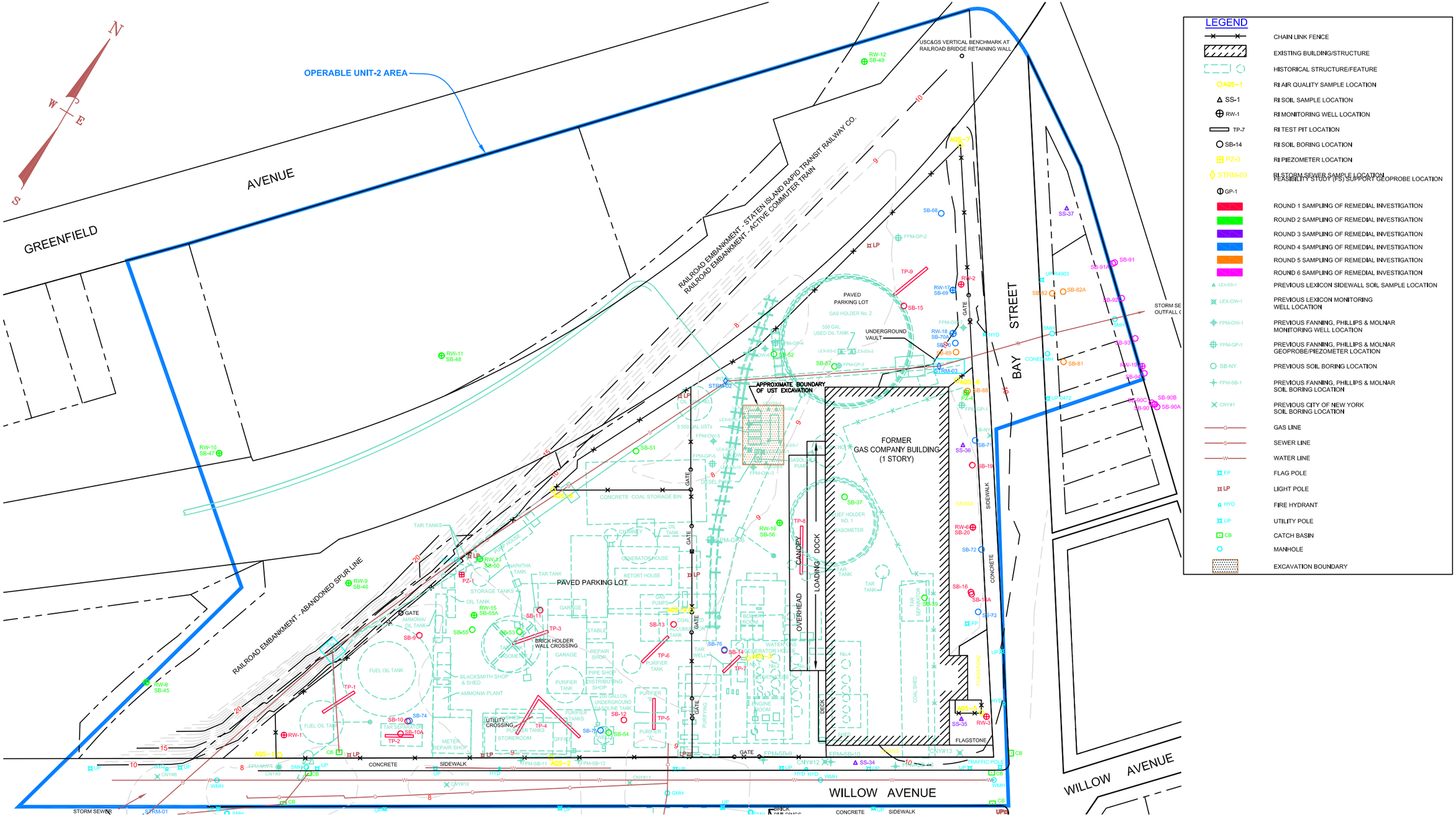
4.Final Feasibility Study Report for the Former Clifton Manufactured Gas Plant (MGP) Site, 25 Willow Avenue Parcel, Operable Unit 2, dated October 2006.

5.Fact Sheet, January 2006, Remedial Action Plan Proposed for the OU-2 Portion of the Former Clifton MGP Site.

6.Fact Sheet, Februay 2006, Comment Period Extended for the Remedial Action Plan Proposed for the OU-2 Portion of the Former Clifton MGP Site.



Former Clifton MGP Site Operable Unit 2
Site No. 2-43-023
Figure 1
Site Location Map



LEGEND

- CHAIN LINK FENCE
- EXISTING BUILDING/STRUCTURE
- HISTORICAL STRUCTURE/FEATURE
- AQS-1 — RI AIR QUALITY SAMPLE LOCATION
- SS-1 — RI SOIL SAMPLE LOCATION
- RW-1 — RI MONITORING WELL LOCATION
- TP-7 — RI TEST PIT LOCATION
- SB-14 — RI SOIL BORING LOCATION
- PZ-3 — RI PIEZOMETER LOCATION
- STRM-03 — RI STORM SEWER SAMPLE LOCATION
- GP-1 — FEASIBILITY STUDY (FS) SUPPORT GEOPROBE LOCATION
- ROUND 1 SAMPLING OF REMEDIAL INVESTIGATION
- ROUND 2 SAMPLING OF REMEDIAL INVESTIGATION
- ROUND 3 SAMPLING OF REMEDIAL INVESTIGATION
- ROUND 4 SAMPLING OF REMEDIAL INVESTIGATION
- ROUND 5 SAMPLING OF REMEDIAL INVESTIGATION
- ROUND 6 SAMPLING OF REMEDIAL INVESTIGATION
- LEX-SS-1 — PREVIOUS LEXICON SIDEWALL SOIL SAMPLE LOCATION
- LEX-OW-1 — PREVIOUS LEXICON MONITORING WELL LOCATION
- FPM-OW-1 — PREVIOUS FANNING, PHILLIPS & MOLNAR MONITORING WELL LOCATION
- FPM-GP-1 — PREVIOUS FANNING, PHILLIPS & MOLNAR GEOPROBE/PIEZOMETER LOCATION
- SB-NY — PREVIOUS SOIL BORING LOCATION
- FPM-SB-1 — PREVIOUS FANNING, PHILLIPS & MOLNAR SOIL BORING LOCATION
- CNY#1 — PREVIOUS CITY OF NEW YORK SOIL BORING LOCATION
- GAS LINE
- SEWER LINE
- WATER LINE
- FP — FLAG POLE
- LP — LIGHT POLE
- HYD — FIRE HYDRANT
- UP — UTILITY POLE
- CB — CATCH BASIN
- MANHOLE
- EXCAVATION BOUNDARY

SOURCES:

1. "FOLLOW-UP SOIL AND GROUNDWATER INVESTIGATION AT THE BROOKLYN UNION GAS COMPANY CLIFTON STATION FACILITY, 40 WILLOW AVENUE, STATEN ISLAND, NY" BY FANNING, PHILLIPS & MOLNAR, AUGUST 29, 1994.
2. "MAP OF PROPERTY, EXIST. BLDG & YARD CONNECTIONS, NEW YORK AND RICHMOND GAS COMPANY - 1921" BY FANNING, PHILLIPS & MOLNAR ENGINEERS, RONKONKOMA, NEW YORK. SCALE 1"=30'. DATED 2/8/94 - REVISED TO 2/13/98.
3. "TOPOGRAPHY AND SAMPLE LOCATIONS, #49 - #67 LYNHURST AVENUE" BY GEI CONSULTANTS, INC., COLCHESTER, CONNECTICUT FOR KEYSPAN ENERGY. SCALE 1"=10'. DATED 7/8/02.
4. "SITE PLAN, TOPOGRAPHY AND HISTORIC STRUCTURES WITHIN OPERABLE UNIT-1 (OU-1) AND OPERABLE UNIT-2 (OU-2)", PREPARED BY GEI CONSULTANTS, INC. AND DATED SEPTEMBER 2002.

SOURCE:

1. BASE MAP OF SITE PREPARED BY GEI CONSULTANTS, INC. TAKEN FROM PLAN ENTITLED, "SITE PLAN, TOPOGRAPHY AND HISTORIC STRUCTURES WITHIN OPERABLE UNIT-1 (OU-1) AND OPERABLE UNIT-2 (OU-2)," DATED SEPTEMBER 2002.

40 20 0 40 80

GRAPHIC SCALE IN FEET

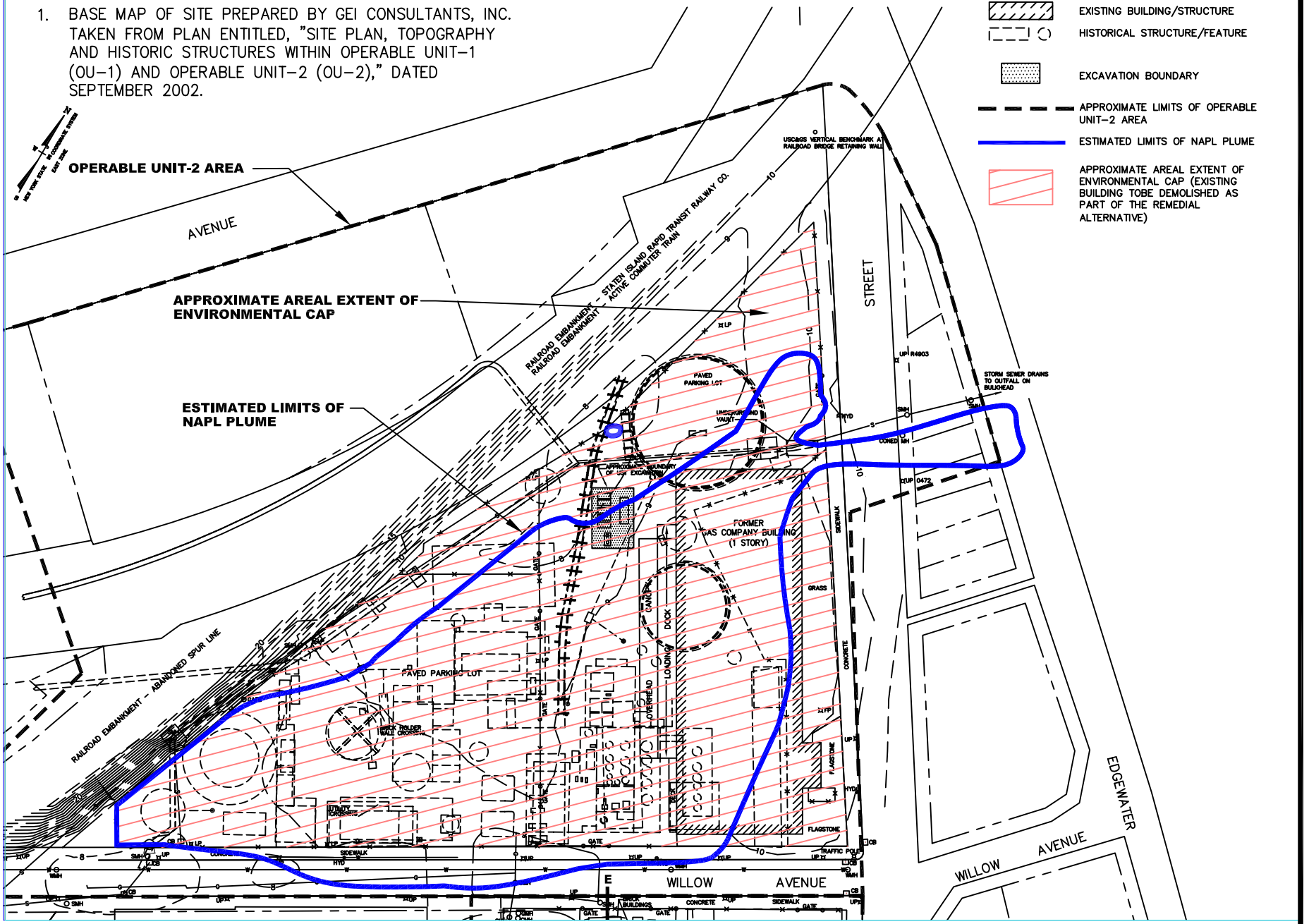
FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023

SITE LAYOUT MAP

FIGURE 2

SOURCE:

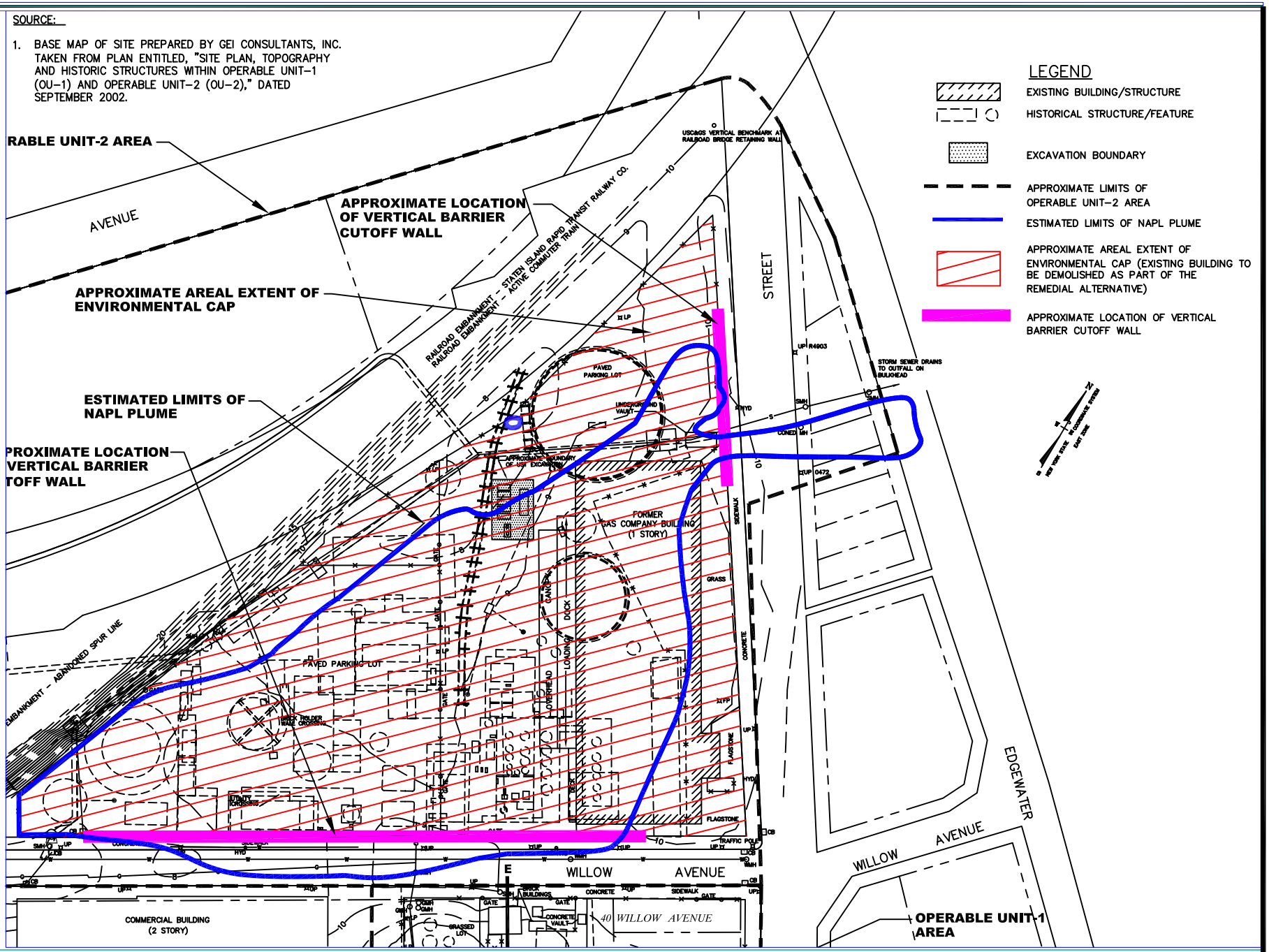
1. BASE MAP OF SITE PREPARED BY GEI CONSULTANTS, INC. TAKEN FROM PLAN ENTITLED, "SITE PLAN, TOPOGRAPHY AND HISTORIC STRUCTURES WITHIN OPERABLE UNIT–1 (OU–1) AND OPERABLE UNIT–2 (OU–2)," DATED SEPTEMBER 2002.



FORMER CLIFTON MGP SITE - OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023

ALTERNATIVE 2 - CAPPING

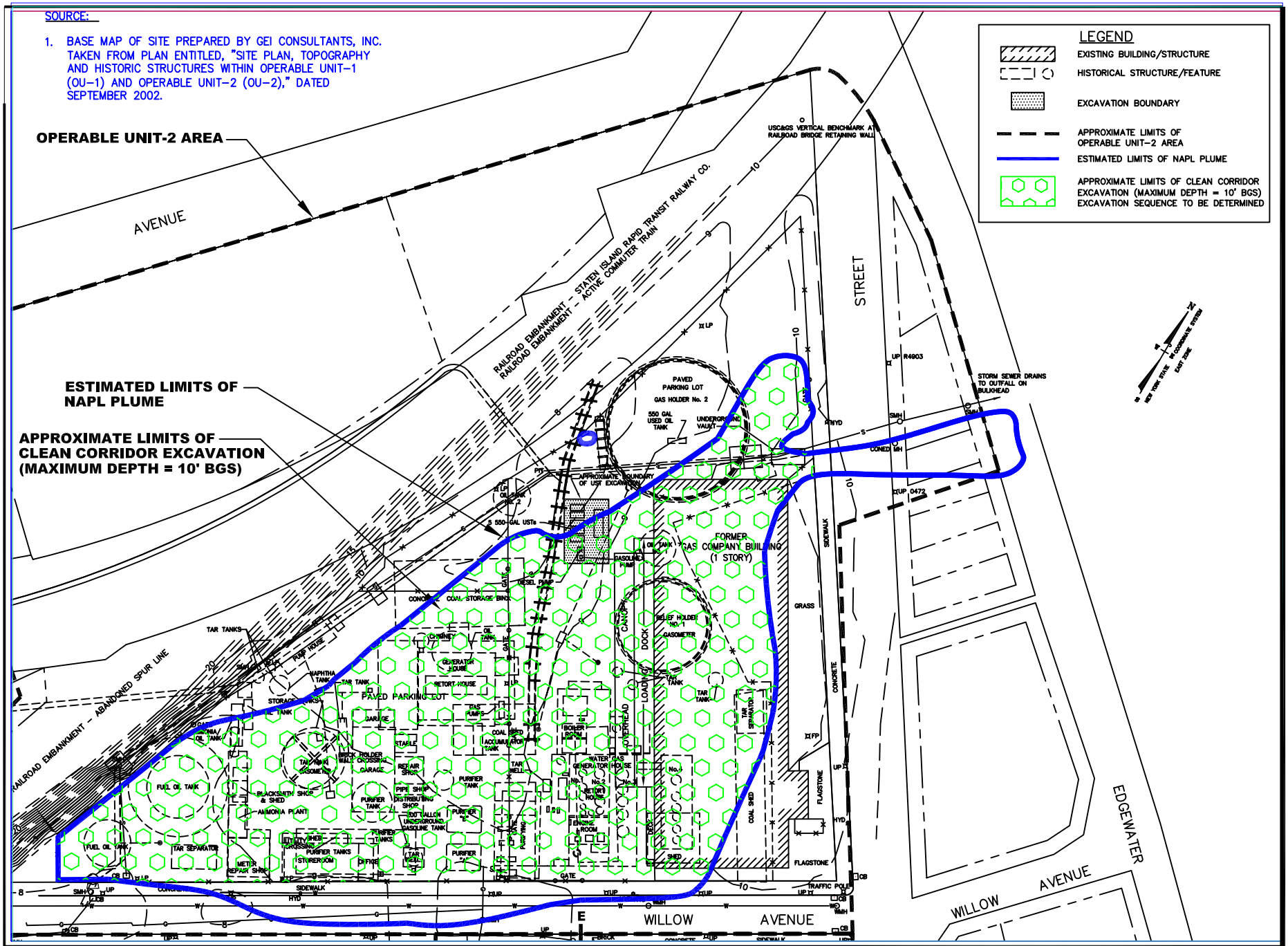
FIGURE 3

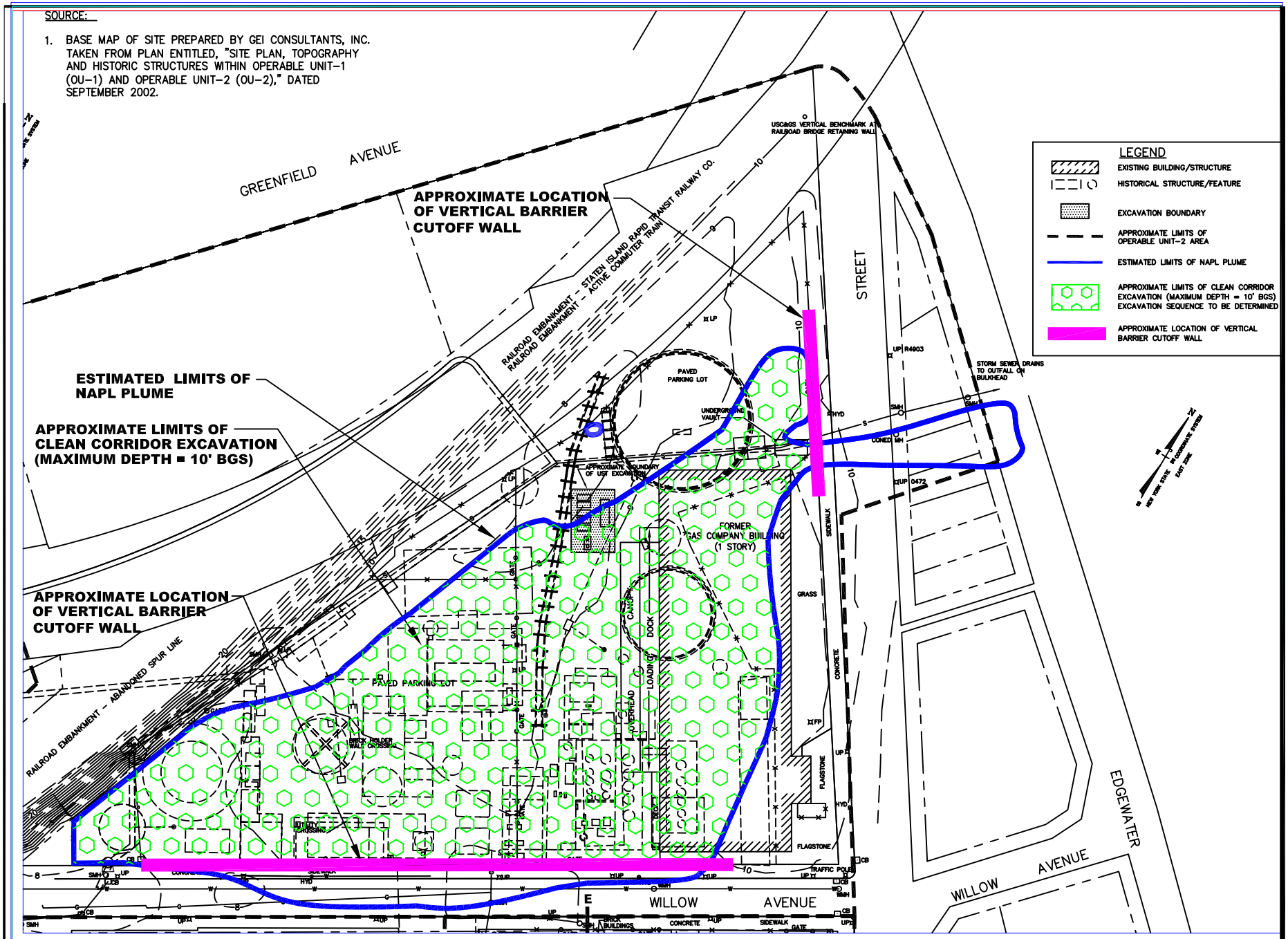


FORMER CLIFTON MGP SITE - OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023

ALTERNATIVE 2 - CAPPING

FIGURE 4

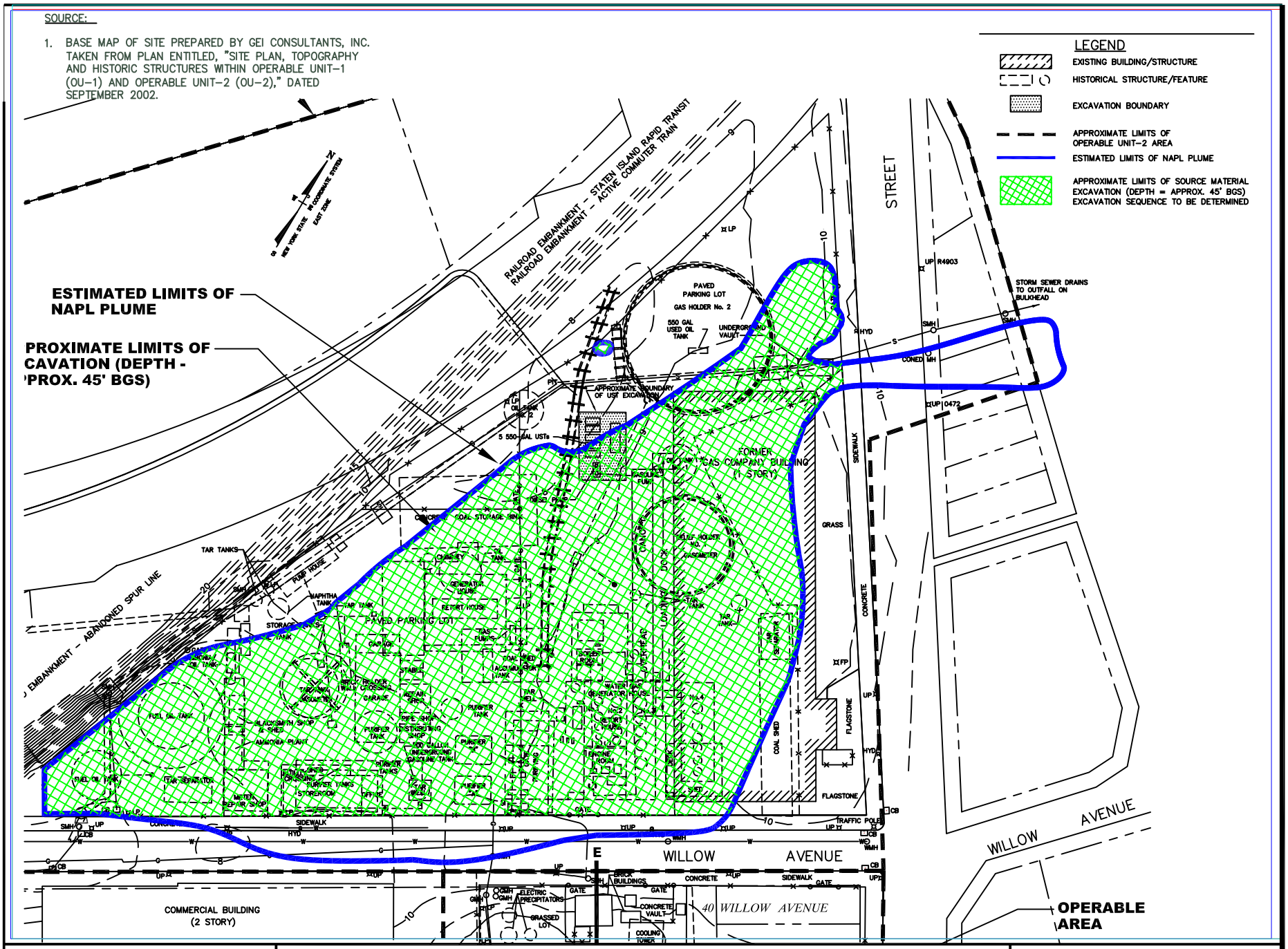

SOURCE:
1. BASE MAP OF SITE PREPARED BY GEI CONSULTANTS, INC. TAKEN FROM PLAN ENTITLED, "SITE PLAN, TOPOGRAPHY AND HISTORIC STRUCTURES WITHIN OPERABLE UNIT-1 (OU-1) AND OPERABLE UNIT-2 (OU-2)," DATED SEPTEMBER 2002.
OPERABLE UNIT-2 AREA
ESTIMATED LIMITS OF NAPL PLUME
APPROXIMATE LIMITS OF CLEAN CORRIDOR EXCAVATION (MAXIMUM DEPTH = 10' BGS)
LEGEND
EXISTING BUILDING/STRUCTURE
HISTORICAL STRUCTURE/FEATURE
EXCAVATION BOUNDARY
APPROXIMATE LIMITS OF OPERABLE UNIT-2 AREA
ESTIMATED LIMITS OF NAPL PLUME
APPROXIMATE LIMITS OF CLEAN CORRIDOR EXCAVATION (MAXIMUM DEPTH = 10' BGS) EXCAVATION SEQUENCE TO BE DETERMINED
AVENUE
STREET
RAILROAD EMBANKMENT - STATEN ISLAND RAPID TRANSIT RAILWAY CO.
RAILROAD EMBANKMENT - ACTIVE COMMUTER TRAIN
RAILROAD EMBANKMENT - ABANDONED SPUR LINE
PAVED PARKING LOT
GAS HOLDER No. 2
550 GAL USED OIL TANK
UNDERGROUND VAULT
STORM SEWER DRAINS TO OUTFALL ON BULKHEAD
APPROXIMATE BOUNDARY OF UST EXCAVATION
550-GAL USTs
FORMER GAS COMPANY BUILDING (1 STORY)
GRASS
SIDEWALK
CONCRETE
FLAGSTONE
TAR TANKS
PUMP HOUSE
GENERATOR HOUSE
RETORT HOUSE
STABLE
GARAGE
REPAIR SHOP
BLACKSMITH SHOP & SHED
AMMONIA PLANT
PURIFIER TANKS
PURIFIER
TAR SEPARATOR
METER REPAIR SHOP
BOILER ROOM
ENGINE ROOM
COAL SHED
WATER GAS GENERATOR HOUSE
RELIEF HOLDER No. 1
GASOMETER
TRAFFIC POLES
WILLOW AVENUE
EDGEWATER
FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023
ALTERNATIVE 4: 10 FT EXCAVATION, REMOVAL OF MGP STRUCTURES
FIGURE 5



FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023

ALTERNATIVE 5: 10 FT EXCAVATION, REMOVAL OF MGP STRUCTURES, VERTICAL CUTOFF WALLS

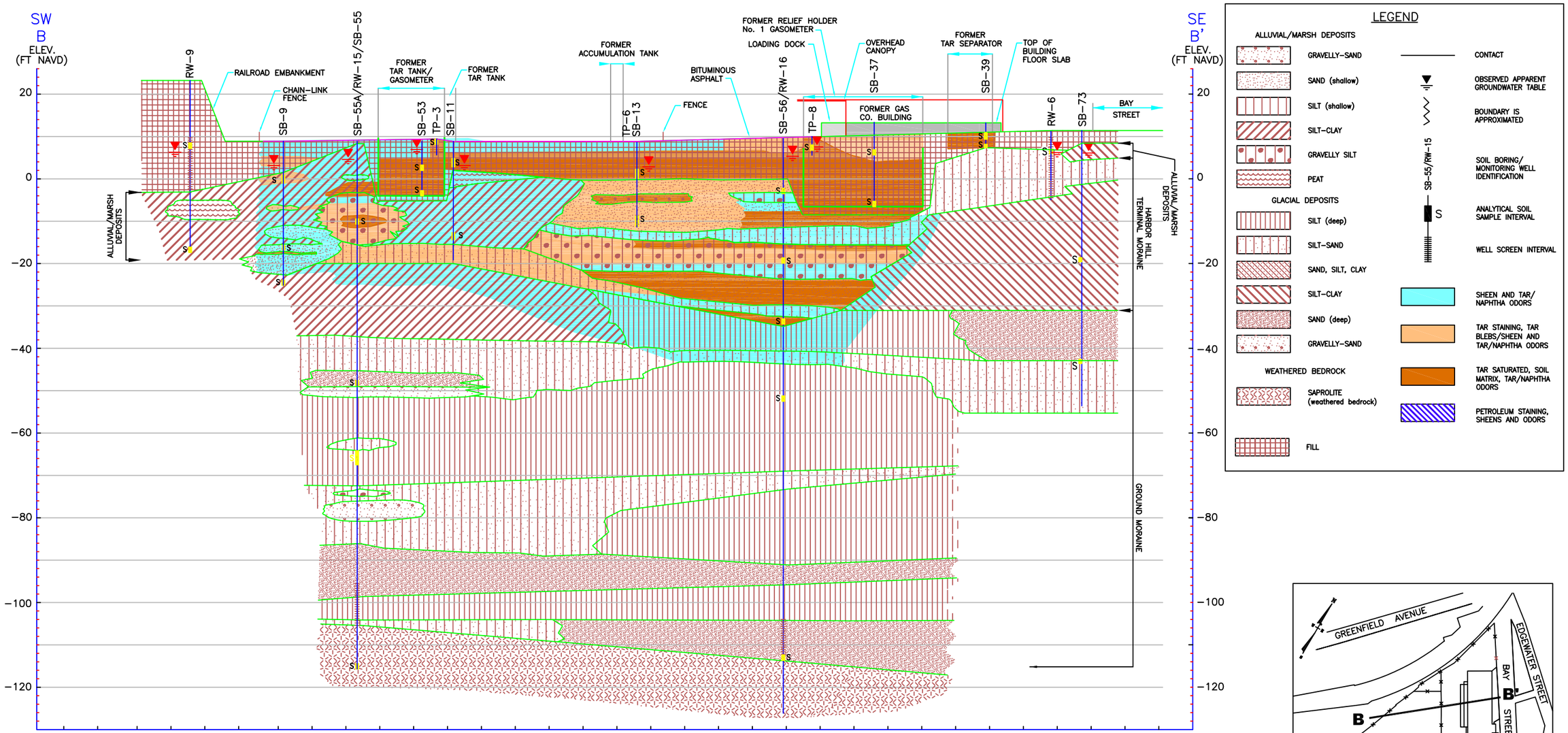
FIGURE 6



FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2-43-023

ALTERNATIVE 6: EXCAVATION TO FULL DEPTH

FIGURE 7



LEGEND

ALLUVIAL/MARSH DEPOSITS
- GRAVELLY−SAND
- SAND (shallow)
- SILT (shallow)
- SILT−CLAY
- GRAVELLY SILT
- PEAT

GLACIAL DEPOSITS
- SILT (deep)
- SILT−SAND
- SAND, SILT, CLAY
- SILT−CLAY
- SAND (deep)
- GRAVELLY−SAND

WEATHERED BEDROCK
- SAPROLITE (weathered bedrock)

- FILL
- CONTACT
- OBSERVED APPARENT GROUNDWATER TABLE
- BOUNDARY IS APPROXIMATED
- SB−55/RW−15 — SOIL BORING/ MONITORING WELL IDENTIFICATION
- S — ANALYTICAL SOIL SAMPLE INTERVAL
- WELL SCREEN INTERVAL
- SHEEN AND TAR/ NAPHTHA ODORS
- TAR STAINING, TAR BLEBS/SHEEN AND TAR/NAPHTHA ODORS
- TAR SATURATED, SOIL MATRIX, TAR/NAPHTHA ODORS
- PETROLEUM STAINING, SHEENS AND ODORS

TRANSECT LOCATION

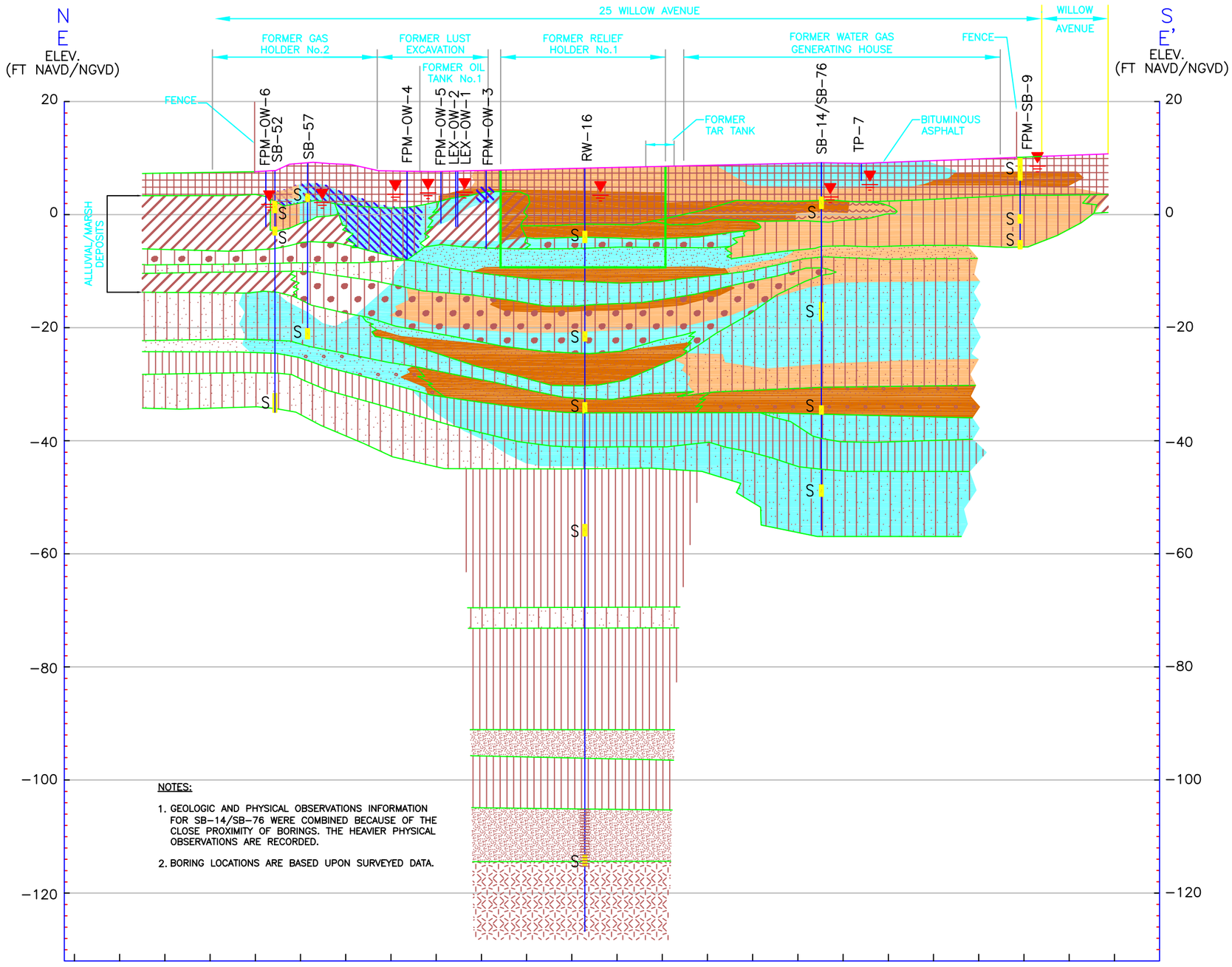
SOURCE:

1. BASE MAP OF SITE PREPARED BY GEI CONSULTANTS, INC. TAKEN FROM PLAN ENTITLED, "SITE PLAN, TOPOGRAPHY AND HISTORIC STRUCTURES WITHIN OPERABLE UNIT−1 (OU−1) AND OPERABLE UNIT−2 (OU−2)," DATED SEPTEMBER 2002.

FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
SITE NO. 2−43−023

CROSS SECTIONS

FIGURE 8



LEGEND

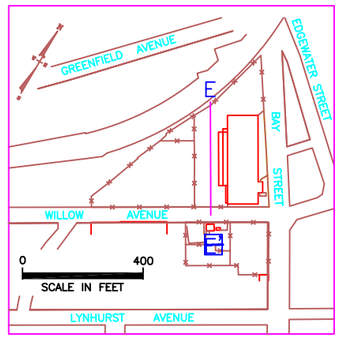
ALLUVIAL/MARSH DEPOSITS
- GRAVELLY-SAND
- SAND (shallow)
- SILT (shallow)
- SILT-CLAY
- GRAVELLY SILT
- PEAT

GLACIAL DEPOSITS
- SILT (deep)
- SILT-SAND
- SAND, SILT, CLAY
- SILT-CLAY
- SAND (deep)
- GRAVELLY-SAND

WEATHERED BEDROCK
- SAPROLITE (weathered bedrock)

FILL
- FILL

- CONTACT
- OBSERVED APPARENT GROUNDWATER TABLE
- BOUNDARY IS APPROXIMATED
- SOIL BORING/ MONITORING WELL IDENTIFICATION (SB-55/RW-15)
- ANALYTICAL SOIL SAMPLE INTERVAL (S)
- WELL SCREEN INTERVAL
- SHEEN AND TAR/ NAPHTHA ODORS
- TAR STAINING, TAR BLEBS/SHEEN AND TAR/NAPHTHA ODORS
- TAR SATURATED, SOIL MATRIX, TAR/NAPHTHA ODORS
- PETROLEUM STAINING, SHEENS AND ODORS



TRANSECT LOCATION

SOURCE:

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FORMER CLIFTON MGP SITE OPERABLE UNIT 2
STATEN ISLAND, RICHMOND COUNTY
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CROSS SECTIONS

FIGURE 9