Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Operable Unit 2 - Coney Island Creek

Former Brooklyn Borough Gas Works Site

Coney Island, Kings County, New York

Site No. 2-24-026

March 2002

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* Erin M. Crotty, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Former Brooklyn Borough Gas Works Site
Operable Unit 2 - Coney Island Creek
Site No. 2-24-026

Statement of Purpose and Basis

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

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Former Brooklyn Borough Gas Works Site Operable Unit 2 and consideration of public 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 release 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 the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Former Brooklyn Borough Gas Works Site Operable Unit (OU) 2 and the criteria identified for evaluation of alternatives, the NYSDEC has selected removal of the upper level of sediments in the study area of the Creek and replacement with clean sediment quality material. The components of the remedy are as follows:

- The top three feet of contaminated sediments across the entire length and width of the OU 2 reach of the Creek adjacent to the site will be excavated and dewatered for off-site treatment/disposal or placement under the cap system, as provided for by the ROD for OU 1. An estimated 34,000 cubic yards of impacted sediment will be removed;

- The areas excavated will be capped with up to three feet of sediment-quality material, such as sand and/or silty-sand material. The cap will include a filter fabric or geotextile between any residual contaminated sediment and clean materials placed;

- Restoration of the Coney Island Creek bank along the OU1 site to remove contaminated materials and to provide a 50-foot wide ecological buffer zone, consistent with the requirements already established in the OU 1 ROD; and

- A long term monitoring program will be implemented to assure the effectiveness of the proposed remedy including the three foot cap system. As part of the monitoring, Keyspan will collect both sediment and surface water samples for laboratory analysis, perform a bathymetric survey and conduct modeling.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being 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

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

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FORMER BROOKLYN BOROUGH GAS WORKS SITE
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March 2002

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 a remedy to address the significant threats to human health and the environment created by the presence of hazardous waste at the study area of the Coney Island Creek (see Figure 2) referred to as Operable Unit (OU) 2 of the former Brooklyn Borough Gas Works Site. The Study area of the Coney Island Creek is a portion of the Creek adjacent to the former Brooklyn Borough Gas Works which is a class 2 inactive hazardous waste disposal site. Contamination at the former Brooklyn Borough Gas Works site (designated Operable Unit 1) was addressed by a Record of Decision (ROD) issued by NYSDEC in March 2001, which will require remediation of the site as detailed in the ROD

As more fully described in Sections 3 and 4 of this document, the operation of a manufactured gas plant (MGP) at the former Brooklyn Borough Gas Works Site resulted in the Creek contamination by a number of hazardous wastes including coal tar, benzene, toluene, ethylbenzene, xylene, polycyclic aromatic hydrocarbons, and non-aqueous phase liquid. These contaminants from the former were released or have migrated from the site into Coney Island Creek, resulting in surface water and sediment contamination above standards, criteria, and guidance values (SCGs). These operations have resulted in the following significant threats to the public health and the environment:

- Adverse acute or chronic effect to fish, shellfish, crustacea and other wildlife; and

- Potential human exposures to site-related contaminants through contact with contaminated surface water and sediments and/or the consumption of contaminated fish from the creek.

To restore Coney Island Creek to predisposal conditions to the extent feasible and authorized by law, but at a minimum to eliminate or mitigate significant threats to the human health and the environment caused by site-related contaminants in the Creek, and to prevent potential future exposures to the public, the NYSDEC has selected the following remedy for OU 2 of the Brooklyn Borough Gas Works Site:

- The top three feet of contaminated sediments across the entire length and width of the OU 2 reach of the Creek adjacent to the site will be excavated and dewatered for off-site treatment/disposal or placement under the cap system, as provided for by the ROD for OU 1. An estimated 34,000 cubic yards of impacted sediment will be removed;

- The areas excavated will be capped with up to three feet of sediment-quality material, such as sand and/or silty-sand material. The cap will include a filter fabric or geotextile between any residual contaminated sediment and clean materials placed;

- Restoration of the Coney Island Creek bank along the OU1 site to remove contaminated materials and to provide a 50-foot wide ecological buffer zone, consistent with the requirements already established in the OU 1 ROD; and

- A long term monitoring program will be implemented to assure the effectiveness of the proposed remedy including the three foot cap system. As part of the monitoring, Keyspan will collect both sediment and surface water samples for laboratory analysis, perform a bathymetric survey and conduct modeling.

The selected remedy, discussed in detail in Section 8 of this document, is intended to attain the remediation goals selected for this operable unit in Section 6, in conformance with applicable SCGs and with 6 NYCRR Part 375.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Former Brooklyn Borough Gas Works site, is a Class 2 site on the New York State Registry of Inactive Hazardous Waste Disposal Sites. The site is located in the Borough of Brooklyn, Kings County, New York (see Figure 1), in Coney Island. The site is bordered to the north by Shore Parkway, to the west by the New York Metropolitan Transit Authority (MTA) rail lines and to the south and east by Coney Island Creek. Coney Island Creek, which is the focus of this PRAP originates from the City of New York storm sewer near Shell Road, just east of the former MGP site. The Creek, which receives most of its water from the City of New York's combined storm sewer discharge flows into Gravesend Bay which in turn empties into New York Harbor and the Atlantic Ocean. The Creek is a brackish tidal creek and the existing site shoreline consists of fill materials, riprap and deteriorated wooden or concrete bulkheads. The shoreline is generally a steep-slope, with only sparse vegetative cover.

The former MGP site is approximately 16.4 acres in size. While Coney Island Creek is approximately 1.6 miles long, the stretch of the Creek of concern for this PRAP is about a third of a mile long starting at the Creek point of origin. The area surrounding the site is a relatively flat, densely populated commercial/residential neighborhood.

An operable unit (OU) represents a portion of a site that, for technical or administrative reasons, a remedy can be addressed separately to eliminate or mitigate a release, a threat of release, or an exposure pathway resulting from site contamination. Operable Unit 2, which is the subject of this PRAP, consists of the investigation and restoration of Coney Island Creek, which is adjacent to the former MGP parcel. Operable Unit 1 of this site, the former MGP parcel, was addressed by a ROD

issued in March 2001. The OU 1 remedy called for excavation and removal of approximately 22,000 cubic yards of coal tar from source areas, installation of a cap system and provision of subsurface barrier walls to prevent continuing discharge of contaminants to the Coney Island Creek.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

An MGP, was a facility where gas for lighting and cooking was produced for distribution to homes, businesses and industries, similar to natural gas today. At an MGP, a gas was produced as a result of the heating of coal (coal gas) and/or from a combination of coal gas, oil and water called the "carbureted water-gas" process. The Brooklyn Borough Gas Works began construction of the first gas generator at this site in 1908.

Release of by-products, such as coal tar, generated from MGP operations, has resulted in the contamination of soil, groundwater and surface water, through a combination of leaks from storage facilities including gas holders and from direct discharge into Coney Island Creek.

In 1951, the Brooklyn Borough Gas Works transformed its gas delivery operations to a natural gas-based system. Between 1952 and 1959, the Brooklyn Borough Gas Company operated the MGP for the purpose of maintaining gas supplies during periods of high customer demand. By 1966, the facility had been decommissioned while the remaining gas storage facility was completely demolished in 1981.

3.2: Remedial History

In 1994, Brooklyn Union Gas Company, a successor of the original operator, undertook the following remedial action at the site to mitigate the effect of MGP-related contaminants on public health and the environment: 1) installation of on-site non aqueous phase liquid (NAPL) recovery wells; 2) installation of booms in Coney Island Creek to control the spread of NAPL reaching Creek from the former MGP parcel; and 3) installation of a light non aqueous phase liquid (LNAPL) skimmer and collection system.

In compliance with its obligations under a NYSDEC Consent Order, Index No. D2-001-94-12 issued in May 1995, the Brooklyn Union Gas Company (a subsidiary of KeySpan Energy) performed supplemental remedial investigations in 1996 and 1997 to characterize the nature and extent of contamination resulting from manufactured gas operations. In 1997, additional remedial measures were conducted at the site as discussed in Section 4.2 below.

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present in the Coney Island Creek and to evaluate alternatives to address the significant threat to human health and the environment posed by the presence of hazardous waste, KeySpan Energy, the parent company of the Brooklyn Union Gas Company, has

recently completed a Remedial Investigation/Feasibility Study of the upper reach of the Coney Island Creek.

4.1: Summary of the Remedial Investigation

The purpose of the Remedial Investigation (RI) was to define the nature and extent of any contamination resulting from previous activities at the MGP site.

The RI included the following activities:

- Placement of borings in the bottom of the Creek to define the extent of contamination;
- Sampling and analysis of the sediment and surface water to determine the nature and distribution of contamination; and
- Assessment of habitat including fish and benthic community survey.

The field investigation was conducted in the fall of 1999 and a report entitled "Investigation, Risk Assessment, and Engineering Evaluation to Restore the Upper Reach of Coney Island Creek", dated October 2001, has been prepared. This report which is available to the public at the document repositories mentioned previously describes the field activities performed, the findings of the remedial investigation, the results of a risk assessment and an engineering evaluation of possible Coney Island Creek restoration alternatives.

To determine whether the Creek's surface water or sediment contain contamination related to former MGP operations at levels of concern, the analytical data were compared to environmental SCGs. Sediment SCGs are based on the NYSDEC Technical Guidance for Screening Contaminated Sediments, while surface water SCGs are based on the New York State Codes, Rules and Regulations, Title 6, Chapter X, Parts 700-705.

Based on the remedial investigation results, in comparison to the SCGs and potential human and environmental exposure routes, certain areas of Coney Island Creek require remediation. More complete information can be found in the October 2001 "Investigation, Risk Assessment and Engineering Evaluation Report".

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

4.1.1 Site Geology and Hydrogeology

Coney Island Creek is approximately 1.6 miles long, emerging from a culvert under Shell Road just east of the site. The Creek is a small tidal creek which flows in a southwesterly direction, then turns and flows in a northwesterly direction to Gravesend Bay which empties into lower New York Bay and, ultimately the Atlantic Ocean.

The shoreline of the Creek has been heavily impacted by development, and is characterized by bulkheads, riprap and debris along most of its length out to Gravesend Bay. Debris from dumping includes shopping carts and vehicle tires. In addition, wooden pilings are exposed in the channel at low tide, particularly near the head of the Creek.

The primary freshwater inflows to the Creek are one combined sewer overflow and six storm water outfalls, all of which discharge into the Creek adjacent to the study area (see Figure 2). Results from the Creek study indicated that the combined sewer overflow, stormwater discharges and dry weather sanitary discharges from the City of New York have significantly impacted the surface water and sediment quality of the Creek.

The upper sediment in Coney Island Creek is a very soft, wet, black organic silt with natural organics and debris. Underlying this unit is a layer of silt or clay with fine sand.

4.1.2 Nature of Contamination

As described in the October 2001 "Investigation, Risk Assessment and Engineering Evaluation Report", many sediment and surface water samples were collected from Coney Island Creek to characterize the nature and extent of contamination. The nature of the contamination found in the upper reach of the Coney Island Creek is summarized in Table 1.

The main categories of contaminants which exceed their SCGs are volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and inorganic compounds.

Specific volatile organic compounds of concern in sediment and surface water are benzene, toluene, ethylbenzene and xylenes. In this document, these compounds are referred to collectively as total BTEX and "total BTEX concentrations" is the sum of the concentrations of benzene, toluene, ethylbenzene and xylenes.

Specific PAHs of concern in sediment 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 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.

As reported in Section 4.1.3, a dense oily liquid that does not readily dissolve in water is found over a significant areal extent of the Creek sediments. Material such as this is referred to as non-aqueous phase liquid (NAPL). NAPL which is emanating from the OU1 site near the former gas holders to the Creek was found to saturate the unconsolidated deposits in the Creek sediment and in some cases exist in scattered, discontinuous globules. The presence of this NAPL is contributing to concentrations of BTEX and PAHs in the sediment and surface water of the Creek.

4.1.3 Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in sediment and surface water, and compares the data with the SCGs for the site. In this section of the PRAP, contaminants in surficial sediments and subsurface sediments are discussed separately. The following subsections summarize the media that were investigated and the findings of the investigation.

Sediments

Surface Sediments: Surface sediments, defined as the uppermost four inches of sediments in Coney Island Creek, are contaminated with various chemical constituents related to the gas manufacturing processes that took place at the site. The highest concentration of MGP-related contaminants including NAPL, was detected at a location south-southwest of the former MGP, near the former gas holders at the site. These areas where grossly NAPL-impacted materials are observed are considered source areas. BTEX compounds were detected in 11 of 30 surface sediment samples, with benzene, toluene, ethylbenzene and xylenes concentrations ranging between 0.0023 and 13 ppm. Individual PAHs were detected at concentrations ranging from 0.13 to 72 ppm in 29 of the 30 samples collected. The maximum concentrations of TPAHs and cPAHs detected in the surface sediment were 120 and 8 ppm respectively.

Twenty-three metals were detected in the surface sediment samples. The highest concentrations of metals, including lead at a concentration of over 2,000 ppm, were detected at sampling locations adjacent to the combined sewer overflow and storm water outfalls and are probably not MGP-related.

Subsurface Sediments: Subsurface sediments are defined as the sediments between 4 inches and 6 to 10 feet below the sediment surface. Individual BTEX constituents were detected in 34 of the 66 subsurface sediments samples collected with concentrations ranging from 0.0006 to 300 ppm, and a maximum total BTEX of 364 ppm. Individual PAHs were detected, at concentrations ranging from 0.036 to 200 ppm, in 74 of 99 samples. The maximum concentration of TPAH detected in the subsurface sediment was 819 ppm. Elevated concentration of PAHs were detected at depth of 6 to 10 feet below the sediment surface in the source areas adjacent to the southwest portion of the former MGP site.

Metals, including arsenic and lead at concentrations ranging from 61 to 3,300 ppm respectively were detected in subsurface sediments.

The results from the remedial investigation indicate that concentrations of metal contaminants tend to decrease with depth and that elevated metal concentrations are generally not in the same sampling

locations and/or depth intervals as total BTEX or total PAH concentrations, which are associated with areas impacted by the MGP. This pattern of distribution for metal contaminations is likely attributable to the presence of the combined sewer overflow and storm water outfalls.

Surface Water

Results from the laboratory analysis of 26 surface water samples indicate total BTEX concentrations ranging up to 6 ppb in the Creek. Concentrations of BTEX compounds were greatest in the northeast portion of Coney Island Creek, at stormwater outfall locations. Sheens are generally observed in the source areas where boom seeps are located adjacent to the former MGP gas holders. No SVOCs, pesticides, or polychlorinated biphenyls (PCBs) were detected in any of the surface water samples.

Sixteen metals were detected, including lead and manganese, with the highest concentration of metal contaminants occurring at stormwater outfall locations and are probably not MGP-related.

4.2 Interim Remedial Measures:

An Interim Remedial Measure (IRM) is implemented at a site when a source of contamination or an exposure pathways can be effectively addressed before completion of the RI/FS.

As mentioned in Section 3.2, the Brooklyn Union Gas Company instituted an IRM in November 1994, to mitigate the release of LNAPL from the MGP site into Coney Island Creek. The IRM included:

- Installation of two on-site NAPL recovery wells;
- Installation of a hard boom and end connections in Coney Island Creek; and
- Installation of LNAPL skimmer and oil collection systems.

The hard boom has been effective at controlling the spread of LNAPL on the surface water. However, the effectiveness of the skimmer and oil collection systems have been somewhat questionable.

The Brooklyn Union Gas Company also implemented an on-site IRM in October 1997 to remove high concentrations of lead from the top 1 foot of surface soil from approximately 4 acres on the western portion of the site, next to the former gas holders.

4.3 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 health risks can be found in Section 6 of the "Investigation, Risk Assessment, and Engineering Evaluation Report" dated October 2001.

An exposure pathway is a manner by which an individual may come into contact with a contaminant. The five elements of an exposure pathway are: 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure;

and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Exposure pathways which are known to, or which may exist, relative to the contamination in Coney Island Creek, include the following:

- Dermal contact with contaminated surface water and/or sediment in the creek by on-site construction workers and by children or adults trespassing along the Creek; and

- Ingestion of contaminated fish from the Creek as a result of recreational fishing although no measurements of chemical concentrations in fish tissue were taken during the remedial investigation.

4.4 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures and ecological risks which may be presented by the site. Section 5 of the October 2001"Investigation, Risk Assessment, and Engineering Evaluation Report" presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources.

Analytical results from surface water and sediment samples obtained from Coney Island Creek indicate that the Creek has been, and continues to be, impacted by contamination resulting from the operation of the former MGP. Wildlife including benthic organisms near and within Coney Island Creek may have contact with, or ingestion of, PAHs and other contaminants while foraging, nesting, or engaging in other activities in the Creek and in the adjacent upland areas.

SECTION 5: ENFORCEMENT STATUS

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

On May 12, 1995, the NYSDEC and KeySpan Energy entered into a Consent Order, Index No. D2-001-94-12. The Order obligates the responsible party, KeySpan Energy, to implement the remedy selected by the NYSDEC, as described in a Record of Decision.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR 375-1.10. The overall remedial goal is to restore the site to pre-disposal conditions, to the extent feasible and authorized by law, with the minimum remedial objective being to eliminate or mitigate, through the proper application of scientific and engineering principles, all significant threats to the public health and to the environment presented by the hazardous waste disposed at the site.

The goals selected for OU 2 of this site are:

- Eliminate, to the extent practicable, human exposures to MGP-related contaminants present in the Coney Island Creek surface water and sediment;

- Prevent or eliminate, to the extent practicable, exposure of fish and wildlife to levels of MGP-related contaminants in the Coney Island Creek surface water and sediments; and

- Prevent or eliminate, to the extent practicable, human exposure of MGP-related contaminants through the consumption of contaminated fish.

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 laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for OU 2 of the former Brooklyn Borough Gas Works site were identified, screened and evaluated in the report entitled "Investigation, Risk Assessment, and Engineering Evaluation to Restore the Upper Reach of Coney Island Creek", dated October 2001.

The Creek source area, as defined in this PRAP, is the southwest portion of the OU 2 area of the Coney Island Creek that is adjacent to the location of the former gas holders on the MGP site (see Figure 2). The contamination in the Creek source area likely originates from the former gas holders, which are defined as a separate source area under the OU 1 ROD. The area around the former gas holders is considered a source area for Creek contamination due to the continued discharges of NAPL from seeps into Coney Island Creek. Once the NAPL enters the Creek's sediment, it continues to migrate, acting as a secondary source of PAH contamination to surrounding sediments. The source area in Coney Island Creek is the location where hard booms were installed to control the spread of NAPL to the sediments and/ or sheens in the Coney Island Creek surface water.

In the development of the remedial alternatives for the Coney Island Creek, the practicality and cost effectiveness of the removal of various amounts and areas of sediment, particularly the depth of the contaminated sediments to be addressed, were considered. Also taken in account was the manner in which the contamination occurred, as a result of coal tar/NAPL and contaminated groundwater seeping into the Creek, resulting in surficial deposition and subsequent migration and resuspension of contaminants within the sediments. In identifying alternatives to be evaluated, a conservative approach was employed to ensure the protection of human health and the environment and to provide a suitable environment for the benthic organisms that reside in the Coney Island Creek. Therefore, it was determined that the removal of the upper three feet of contaminated sediment, followed by the placement of a cap of three feet of clean "sediment quality" material, will be used as a standard for evaluation to 1) protect human health and the environment, 2) provide sufficient unimpacted depth for a benthic organism habitat and 3) isolate and prevent remaining residual contamination from recontaminating the clean cap materials and/or reaching the Coney Island Creek surface water.

Completion of construction of the proposed remedy will eliminate or mitigate significant threats to human health and the environment caused by the presence of MGP-related and non-MGP related waste in Coney Island Creek. However, the proposed remedy will not eliminate the possibility of recontamination of Creek sediments and surface water caused by combined sewer overflows and storm sewer outfalls from the City of New York. Addressing such recontamination is not the responsibility of KeySpan. Completion of the remedy required by the OU-1 ROD will eliminate recontamination of Coney Island Creek sediment and surface water by MGP-related contamination coming from the site.

A summary of the detailed analysis follows. As presented below, the "time to implement" reflects only the time required to implement and alternative, and does not include the time required to design the remedy, procure contracts for design and construction, or to negotiate with responsible parties for implementation of the remedy.

7.1: Description of Remedial Alternatives

The potential remedies for OU 2 are intended to address the surface water and sediment contamination at Coney Island Creek.

The cost to implement all alternatives has been estimated using a discount rate of 3.5%, assuming a 30-year period for surface water and sediment monitoring.

Alternative 1: No Action with Monitoring

The "no action" alternative is evaluated as a procedural requirement and as a basis for comparison. Under this alternative, no active measures would be instituted to remediate the Creek. This alternative would leave the Creek in its present condition and would not provide any additional protection to human health or the environment. The Creek would be monitored yearly to evaluate sediment and surface water contaminant levels.

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:	$1,184,450
Capital Cost:	None
Annual O&M:	$ 64,400
Time to Implement	1 months - 3 months

Alternative 2: Active Environmental Restoration to Enhance Natural Recovery

Alternative 2 includes actions targeted at improving the ecological conditions, water quality and aesthetics in the Creek and along the shoreline. Creek bank restoration and the planting of species of vegetation to enhance aquatic and terrestrial habitat would be included in this alternative. The components of Alternative 2 would be as follows:

- Creek bank stabilization to prevent erosion using bioengineering techniques;

- Restoration of the Coney Island Creek bank to remove contaminated materials and provide a 50-foot wide ecological buffer zone; and

- Long-Term monitoring of Coney Island Creek to determine the trends of contaminant levels in surface water and sediment.

The cost to implement Alternative 2 has been estimated as follows:

Present Worth:	$4,266,450
Capital Cost:	$3,082,000
Annual O&M:	$ 64,400

Time to Implement 6 months - 8 months

Alternative 3: Removal and Capping of Source Areas

Alternative 3 would include removal of targeted MGP-related source area materials where continuing or past discharge of contaminants to the Creek have taken place (see Figure 3). The OU 1 remedy would eliminate this discharge of contaminants to the Creek. This alternative would also include capping of the removed areas. In addition to the provisions for active environmental restoration described in Alternative 2, Alternative 3 would also include the following actions:

- Removal of the upper three feet of sediments from the source areas of the Creek, identified on Figure 3, which are the location of continuing, or past, discharge of contaminants from the site. This would involve the excavation and off-site treatment/disposal of approximately 15,300 cubic yards of sediment;

- Restoration of the creek bed by capping the areas of excavation with three feet of sediment-quality material, such as clean sand and/or silty material to the original contours; and

- Long-term monitoring of Coney Island Creek to determine the trends of contaminant levels in surface water and restored sediment.

The cost to implement Alternative 3 has been estimated as follows:

Present Worth:	$7,070,450
Capital Cost:	$5,886,000
Annual O&M:	$ 64,400

Time to Implement 8 months - 12 months

Alternative 4: Removal of the Upper Level of Sediments in the Study Area

Alternative 4 would include the removal of a larger quantity of contaminated sediments than Alternative 3. Under Alternative 4, the upper three feet of sediments in both MGP-source and non MGP-source areas across the entire length and width of the Creek in the Study area would be removed, and the dredged areas would be capped using clean sand and/or silty material. The area which would be removed under Alternative 4 is shown on Figure 4.

The proposal to remove the upper three feet of contaminated sediment followed by placement of a cap of three feet of clean "sediment quality" material is based on the need to; 1) protect human health and the environment, 2) provide sufficient unimpacted depth for benthic organism habitat and 3) isolate and prevent remaining residual contamination from recontaminating the clean cap materials and/or reaching the Coney Island Creek surface water.

In addition to the natural recovery, active environmental restoration and source area removal described in Alternative 3, Alternative 4 would also include the following actions:

- Removal and replacement with clean materials of the top three feet of sediments containing grossly contaminated materials across the entire length and width of the Creek adjacent to the site as shown on Figure 4. This would involve the excavation and off-site treatment/disposal or placement under OU 1 cap of approximately 34,000 cubic yards of sediment containing MGP and non-MGP related contamination. If additional mobile NAPL materials are observed at the bottom of the excavation, the excavation would continue to remove sediments to the extent practicable to prevent or limit the ability of the material to recontaminate the three feet of cap material;

- Restoration of the creek bed by capping the removed areas with clean sand and sandy silt or equivalent materials to the original contour line. A fabric would be placed to separate the clean fill from the remaining contaminated sediments; and

- Long-term monitoring of Coney Island Creek to determine the effects of the remedy on contaminant levels in surface water and sediment.

The cost to implement Alternative 4 has been estimated as follows:

Present Worth:	$10,129,950
Capital Cost:	$ 8,945,500
Annual O&M:	$ 64,400
Time to Implement	10 months - 14 months

7.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste disposal sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative

analysis is included in the October 2001 "Investigation, Risk Assessment and Engineering Evaluation Report.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy would meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1 (No Action) would not bring the Creek into compliance with SCGs for surface water and sediment. The No Action alternative would not address residual concentrations of contaminants in excess of SCGs. Alternative 2 would not achieve compliance with applicable chemical-specific SCGs for both surface water and sediment within the Creek, as contaminant concentrations in both media would continue to persist above SCGs. Alternatives 3 also would not bring the site into compliance with all applicable chemical specific standards. While the impacted sediments in source areas would be removed, other areas in the Creek adjacent to the site would continue to have concentrations in excess of applicable SCGs. Alternative 4 would achieve compliance with applicable SCGs in the first three feet of sediments as the top three feet of impacted sediments would be removed along the entire length and width of the Creek adjacent to the site. The areas of removal would be capped with clean materials.

2. 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.

Alternative 1 would not provide any protection of human health and the environment. Contaminants carried by surface water may present an off-site exposure concern. Fish and birds would continue to be exposed to contaminants in the Creek. Alternative 2, similar to Alternative 1, would not provide any additional protection of human health and the environment. Residual contaminants would be left in place and would continue to present a source of exposure to humans and the environment. Alternative 3 would not provide complete protection to human health and the environment, as only the portions of the contaminated Creek sediments that are in the source areas would be removed. Capping of sediments in the source areas would minimize exposure pathways to contaminants in these source areas only. Other areas of the Creek adjacent to the site with levels of contaminants above SCGs would continue to serve as exposure points to humans and the environment. Alternative 4 would provide the greatest level of protection to human health and the environment since it would remove contaminated sediments from the upper three feet of the Creek bed in the study area and cap residual contaminated sediments to preclude both exposure to benthic organisms, wildlife and humans, and migration of contaminants to the surface water.

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.

Alternative 1 would not result in additional short-term impacts to construction workers, the community and/or the environment since there would be no actions proposed under this alternative. Alternative 2 would have some short term impacts for the on-site workers, but would have little impact on the community and the environment. Site access to limit trespassers would be controlled

by the use of security guards and fencing. Workers would be required to comply with all safety standards and regulations to prevent or minimize exposure to contaminants. Personal protective equipment would be used as appropriate. Construction measures to control erosion would be necessary during Creek bank restoration to limit impacts to the environment. Alternatives 3 and 4 would have significantly greater short-term impacts than implementation of Alternatives 1 and 2, due to the higher level of intrusive activities required. The use of active sediment control measures, such as use of a cofferdam across the Creek would prevent downstream release of suspended sediments due to removal activities. Air monitoring and other controls would mitigate any negative impacts to the nearby residents. The placement of suitable cap materials in the excavated areas would stabilize the Creek bed and prevent future erosion, resulting in minimal or no impacts to the environment. The wet nature of the removed sediment would essentially alleviate concerns regarding dust and volatile air emissions.

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 controls intended to limit the risk; and 3) the reliability of those controls.

Alternative 1 would not provide any long-term effectiveness and permanence as there would be no active remediation associated with this alternative. Exposure to human health and the environment would continue. Alternative 2, while including some restoration activities, would not provide effective nor permanent treatment/disposal of the contaminated sediments. Impacted sediments in the Creek bed would be left in-place and would continue to pose a potential for exposure. Creek bank stabilization is, however, expected to provide a permanent feature that would provide streambanks protection and erosion control. Slopes constructed in the ecological zone would be expected to be stable with little maintenance. Alternative 3 would provide more long-term effectiveness and permanence than Alternatives 1 or 2, by removing source area impacted sediments. However, sediments outside the MGP-related source areas with contamination in excess of SCGs would continue to pose unacceptable exposures to humans and the environment. Alternative 4 would provide the greatest level of effectiveness and permanence of all the alternatives. Impacted sediments from the upper reach of the creek adjacent to the site would be removed to a depth of three feet for treatment/disposal. The areas of removal would be capped with clean materials, ensuring that residual contaminants remaining in-place would not migrate to surface water or result in unacceptable exposures to human health or the environment.

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.

Alternative 1 would not incorporate any action to reduce the toxicity, mobility or volume of contamination. Alternative 2 would provide minimal reduction of toxicity, mobility or volume due to limited amount of impacted materials that would be excavated from the ecological zone for consolidation and management. After soil is removed, the area would be backfilled/capped with three feet of clean soil. Alternative 3 would provide significant levels of reduction of toxicity, mobility and volume as approximately 15,300 cubic yards of the most contaminated sediment would be removed for off-site treatment or disposal. Alternative 4 would provide the highest reduction

in toxicity, mobility and volume of impacted materials. Approximately 34,000 cubic yards of impacted sediments would be removed, dewatered, stabilized and either disposed off-site or consolidated under the OU 1 cap, if appropriate.

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

Alternative 1 would be the most implementable since there are no active remedial activities involved. Alternatives 2, 3 and 4 would each be easily implemented but would require an increased level of remedial activities compared to Alternative 1. The technologies that would be required to accomplish the restoration activities under these alternatives are readily available and reliable. The necessary materials to achieve the aesthetic enhancement proposed under Alternative 2 would be readily available and they would be easy to implement. The proposed cofferdam construction in the Creek necessary under Alternatives 3 and 4 has been accomplished at other projects and is a standard construction practice. Special considerations would be required during design to address the potential for groundwater impacts on the dewatered creek bed area so that equipment can effectively be operated during removal and capping activities. Permit requirements under Alternatives 3 and 4 would be easy to meet as it would only be necessary to comply with substantive technical requirements of applicable state permits pursuant to the negotiated consent order between KeySpan and the NYSDEC. However, work in the Coney Island Creek, and disturbance of tidal wetlands as part of Alternatives 3 and 4, would trigger the United States Army Corps of Engineers' (USACE) permit requirements.

Coordination among several agencies including the NYSDEC, NYSDOH, USACE, U.S. Coast Guard and the Mass Transit Authority would be required at various phases of the activities under Alternatives 2, 3 and 4.

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

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included in Appendix A presents the public comments received and the Department's response to the concerns raised. In general the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

Based upon the results of the RI/FS for the site, including the evaluation presented in Section 7, the NYSDEC has selected Alternative 4, Removal of the Upper Level of Sediments in the Study Area.

The selected remedy for Operable Unit 2- Coney Island Creek, will eliminate or mitigate, through the proper application of scientific and engineering principles, the significant threats to human health and the environment caused by the presence of hazardous waste in Coney Island Creek. The remedy will essentially eliminate the potential exposure of residual contaminants to humans and the environment.

This selection is based upon the evaluation of the four alternatives developed for this site, which demonstrates the advantages discussed below that Alternative 4 will have over the other evaluated plans in meeting the remedial action objectives.

Alternatives 1 and 2 would fail to meet remediation goals, as no active remedial measures would be taken to address MGP related contaminants in the Creek sediments. Both alternatives would rely solely on natural attenuations of the contaminants as a means of restoration of the Coney Island Creek sediments. Therefore, Alternatives 1 and 2 have been eliminated from further evaluation as neither of them would meet the Creek restoration objectives.

Alternative 3 would focus on the restoration of both the ecological zone of the Creek bank and the MGP-related sources areas in the western portion of the Creek adjacent to the site. Alternative 3 would remove the grossly contaminated sediments from locations considered source areas within the Creek and cap the areas with clean materials. This alternative would not, however, address sediment contamination above SCGs in the other areas of the Creek adjacent to the site, thereby leaving behind a continuing source of contamination to the Creek surface water, with potential impacts to human health and the environment. Similar to Alternatives 1 and 2, Alternative 3 would not meet the Coney Island Creek restoration goals and therefore has been eliminated from further considerations.

Alternative 4 will comply with SCGs by removing the first three feet of contaminated sediments across the entire length and width of the Creek adjacent to the site, where MGP contaminants have been identified in the upper three feet of the Creek sediments. Under Alternative 4, the areas of excavation will be capped with a three feet of clean materials to eliminate potential migration of residual contamination to the Creek surface water. The capping of the Creek bed with clean materials will also improve habitat for fish and wildlife and promote recolonization of the benthic community within the area. Alternative 4, although more expensive than Alternatives 1, 2 and 3 will provide the greatest protection of human health and the environment. Alternative 4 will meet all remedial goals established for the Coney Island Creek and will enhance the ecological , aesthetic and recreational values currently provided by the Coney Island Creek. Alternative 4, when implemented, will control potential future exposures of human and ecological receptors, including fish and wildlife to contaminants of potential concern. Alternative 4, compared to the other alternatives will remove the most significant contaminant sources and most of the contaminant mass for treatment and/or disposal. Residual contaminants left behind in the environment will be capped in-place to prevent further migration. Alternative 4, while more expensive, has clear advantages over the other alternatives in terms of meeting remedial objectives and is therefore the recommended alternative to restore the Coney Island Creek.

The estimated present worth cost to implement the selected remedy is $10,129,950. The cost to construct the remedy is estimated to be $8,945,500 and the estimated average annual operation and maintenance cost is $64,400 with a 30 year present worth cost of $1,184,450.

The elements of the selected remedy are as follows:

1. A remedial design program will be developed to verify the components of the conceptual design and to provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

2. The top three feet of contaminated sediments across the entire length and width of the OU 2 reach of the Creek adjacent to the site will be excavated and dewatered for off-site treatment/disposal or placement under the cap system, as provided for by the ROD for OU 1. If additional mobile NAPL materials are observed at the bottom of the excavation, the sediment excavation will continue to the extent practicable to prevent or limit the ability of the material to recontaminate the proposed three feet of capping material. An estimated 34,000 cubic yards of impacted sediment will be removed as shown on Figure 4. In addition, the remedial design will evaluate the use of a sediment trap at the upstream (Shell Road culverts) and downstream (MTA rail bridge) to determine if a sediment trap could be designed and constructed which would be effective in limiting the recontamination of the capped area by upstream and downstream sources.

3. The areas excavated will be capped with up to three feet of sediment-quality material, such as sand and/or silty-sand material. The cap will include a filter fabric or geotextile between any residual contaminated sediment and clean materials placed. The final thickness and materials making up the sediment cap will be determined during the Remedial Design phase, based on the requirement to effectively isolate contamination and provide an adequate bioturbation zone.

4. Contaminated materials will be removed to restore the Creek bank and provide a 50-foot wide ecological buffer zone. The 50-foot ecological buffer zone to be established along the Creek bank, will recontour the Coney Island Creek bank adjacent to the site with slopes of 3:1 or 4:1. The bank will be planted with appropriate plant species to balance goals of restoring aquatic and terrestrial habitat with aesthetic considerations and will support plant life, create habitat for selected bird species and promote additional beneficial uses of the transition zone from the Creek to the upland portion of the site. If the rip rap, retaining walls or bulkheads which will remain along the Creek bank are determined to have been impacted by MGP related contaminants, they will be cleaned.

5. A long term monitoring program will be implemented to assure the effectiveness of the proposed remedy including the three foot cap system. As part of the monitoring, Keyspan will collect both sediment and surface water samples for laboratory analysis, perform a bathymetric survey and conduct modeling.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken in an effort 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:

- A repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.
- In March 2001 the Record of Decision was issued selecting a remedy for Operable Unit 1 in accordance with the required community participation process.
- In January 2002 the Proposed Remedial Action Plan (PRAP) was released for public comment and a fact sheet was sent to the site mailing list summarizing the PRAP, identifying the public comment period and providing the date of a public meeting to present the PRAP.
- On February 19, 2002 the NYSDEC held a public meeting to solicit public comment on the PRAP.
- The NYSDEC attended a Community Board 13 Environmental And Sanitation Committee meeting on March 11, 2002 to provide information and respond to addition questions from the community board.
- In March 2002 a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.

TABLE 1
Nature and Extent of Contamination

SURFACE WATER Contaminant of Concern		Concentration Range Detected (ppb[a])	SCG[b] (ppb)	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	0.5 to 2	6	0 of 27
	Ethylbenzene	0.6 to 2.4	4.5	0 of 27
	Toluene	0.6 to 5.8	92	0 of 27
	Xylenes, total	0.5 to 5.9	19	0 of 27

SEDIMENT Contaminant of Concern		Concentration Range Detected (ppm[a])	SCG (ppm)	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Acetone	0.063 to 0.78	N[c]	N/A[d]
	Benzene	0.0023 to 24	0.6[e]	24 of 98
	Toluene	0.0006 to 0.32	45[e]	12 of 98
	Ethylbenzene	0.0023 to 300	6.4[e]	25 of 98
	Xylenes, total	0.0018 to 40	27[e]	39 of 98
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)	Chrysene	0.053 to 63	384	69 of 99
	Dibenzo[a,h]anthracene	0.036 to 2.4	63.4	12 of 93
	Indeno[1,2,3-cd]pyrene	0.063 to 5.9	0.7[e]	44 of 97
	Benzo[b]fluoranthene	0.062 to 26	0.7[e]	67 of 99
	Benzo[a]pyrene	0.046 to 32	430	68 of 99
	Benzo[a]anthracene	0.052 to 48	261	68 of 99
	Benzo[k]fluoranthene	0.043 to 81	0.7[e]	74 of 99
Inorganic Compounds	Arsenic	0.8 to 61.5	8.2	68 of 101
	Manganese	26.6 to 1,430	N	N/A
	Nickel	5.6 to 254	20.9	85 of 101
	Lead	1.2 to 3,340	46.7	82 of 101
	Zinc	6.9 to 3,770	150	69 of 101

[a]ppb = parts per billion, which is equivalent to micrograms per liter, µg/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil

[b]SCG = standards, criteria, and guidance values;
Surface water SCGs are based on the New York State Codes, Rules, and Regulations, Title 6, Chapter X, Parts 700-705; Sediment SCGs are based on the NYSDEC Technical Guidance for Screening Contaminated Sediments

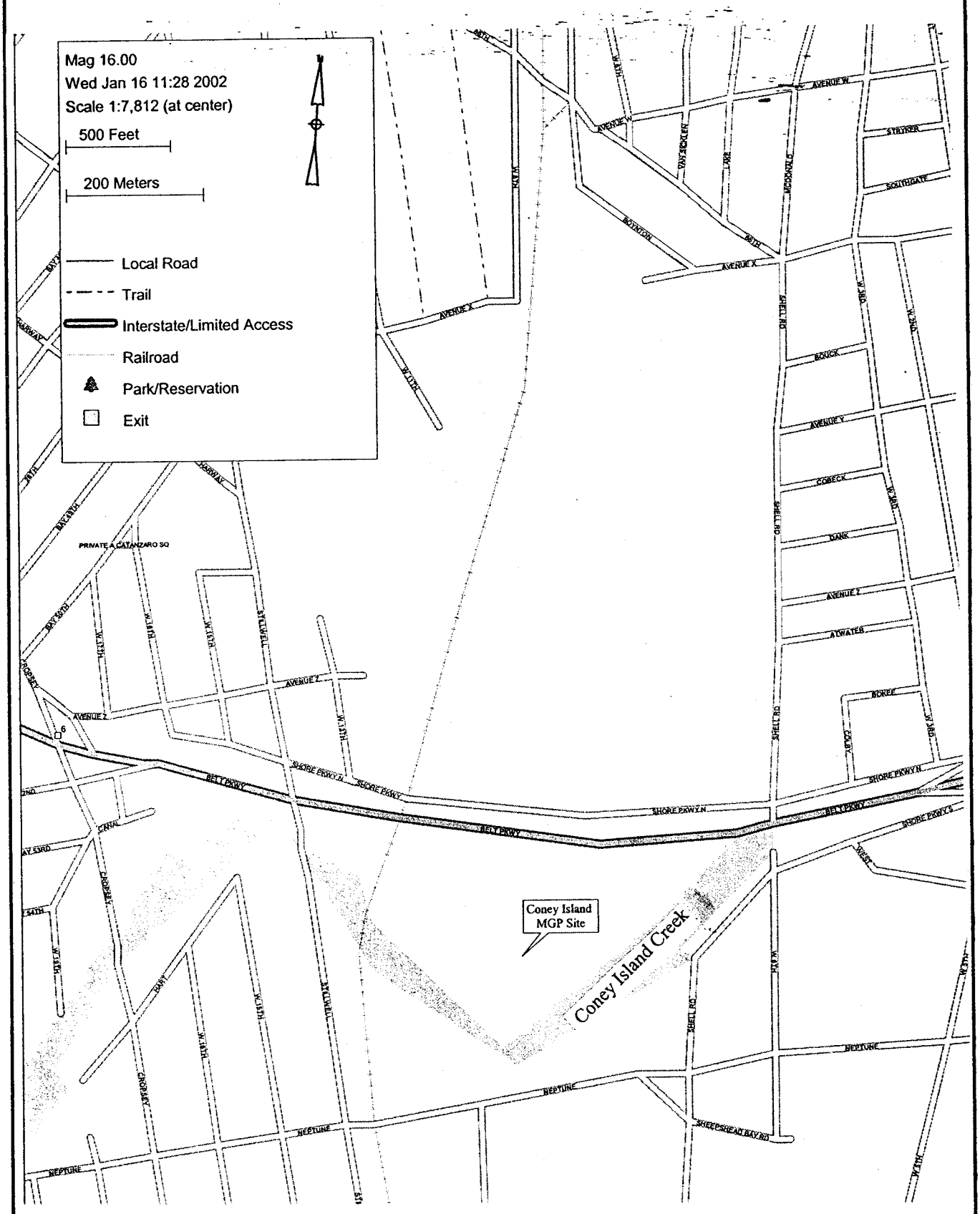
[c]N = none

[d]N/A = not applicable

[e]micrograms per gram, µg/g, organic carbon

Table 2
Remedial Alternative Costs

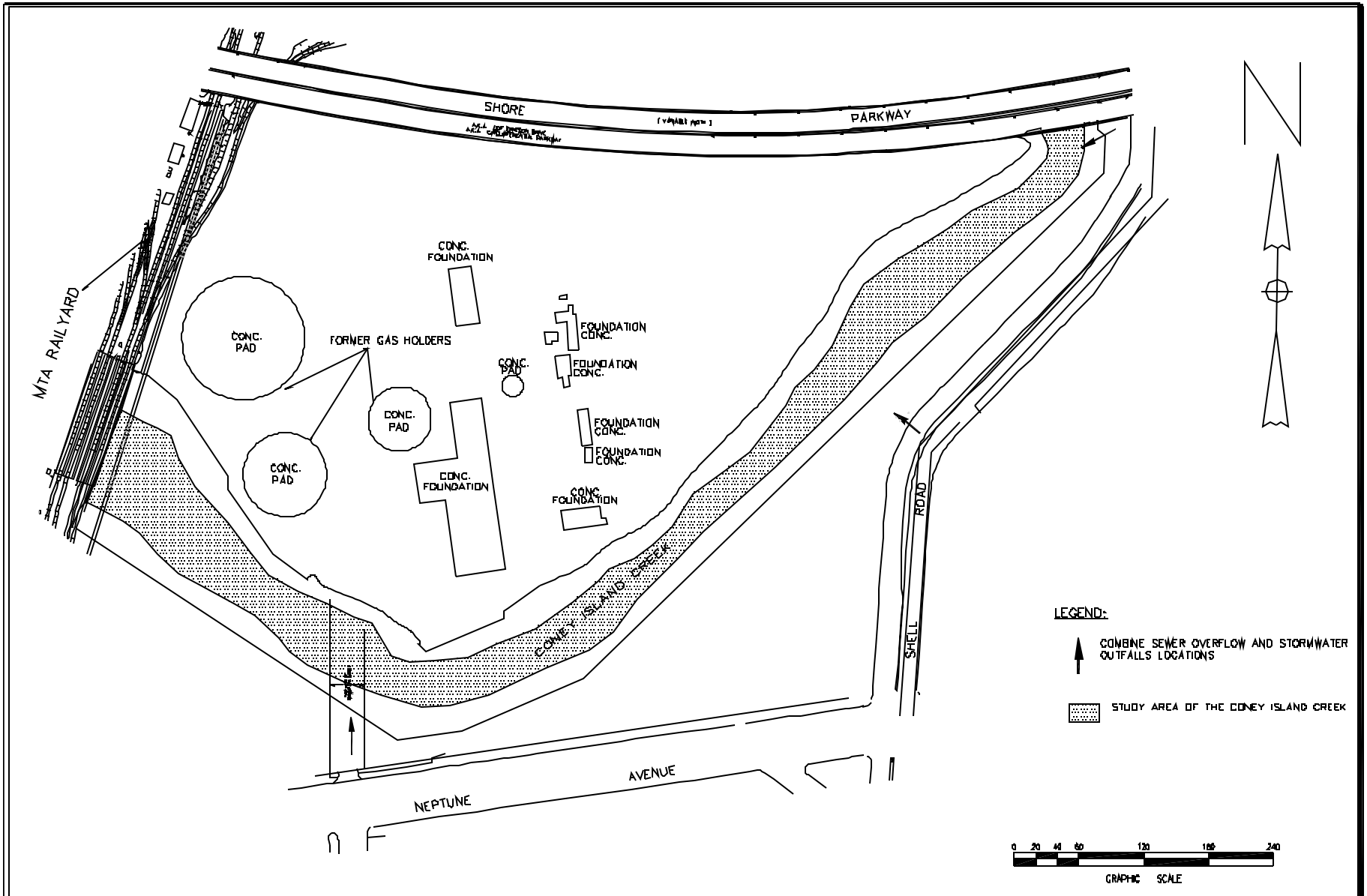
Remedial Alternative	Capital Cost	Annual O&M Cost	Total Present Worth
Alternative 1: No Action	$0	$64,400	$1,184,450
Alternative 2: Active Environmental Restoration to Enhance Natural Recovery	$3,082,000	$64,400	$4,266,450
Alternative 3: Removal of Source Areas and Capping.	$5,886,000	$64,400	$7,070,450
Alternative 4: Removal of Upper Level Sediments Exceeding SCGs.	$8,945,500	$64,400	$10,129,950



FORMER BROOKLYN BOROUGH GAS WORKS SITE
CONEY ISLAND, KINGS COUNTY, NEW YORK, SITE NO. 2-24-026

SITE LOCATION MAP

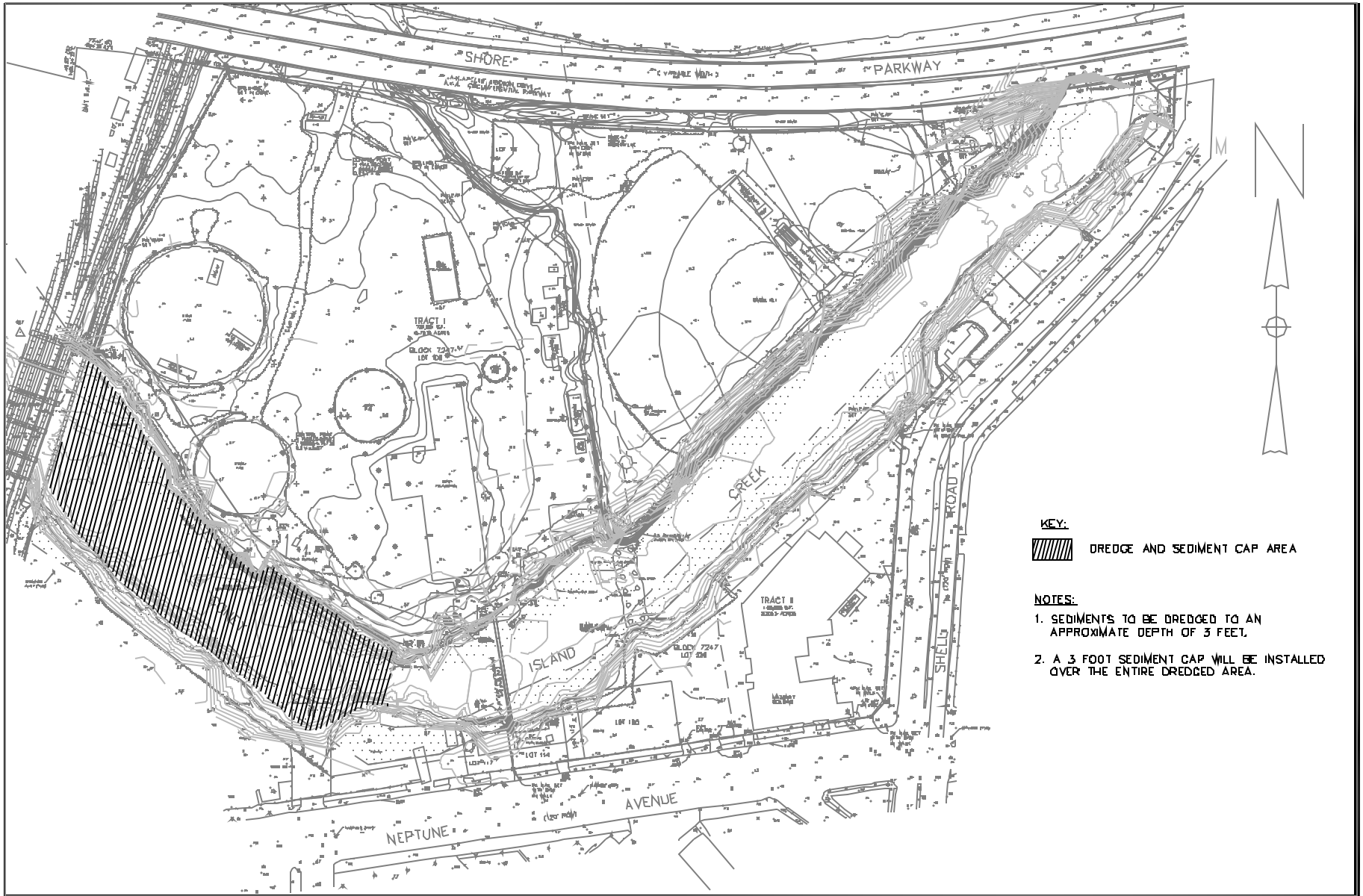
FIGURE 1



FORMER BROOKLYN BOROUGH GAS WORKS SITE
CONEY ISLAND, KINGS COUNTY, NEW YORK

SITE PLAN

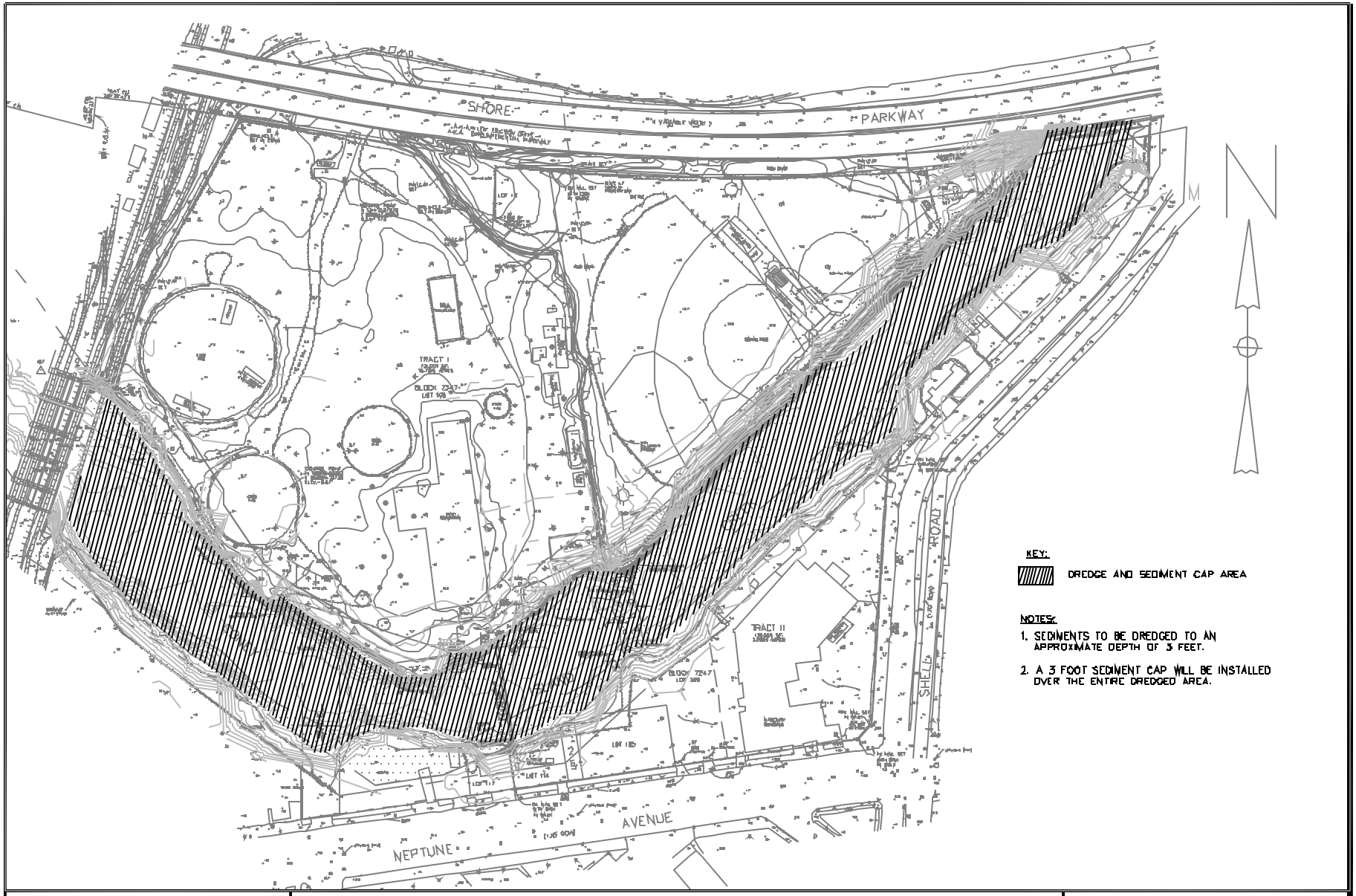
FIGURE 2



FORMER BROOKLYN BOROUGH GAS WORKS SITE
CONEY ISLAND, KINGS COUNTY, NEW YORK

ALTERNATIVE 3, SEDIMENT SOURCE AREA REMOVAL

FIGURE 3



FORMER BROOKLYN BOROUGH GAS WORKS SITE
CONEY ISLAND, KINGS COUNTY, NEW YORK

ALTERNATIVE 4, SEDIMENT REMOVAL AREA

FIGURE 4

APPENDIX A

RESPONSIVENESS SUMMARY

FORMER BROOKLYN BOROUGH GAS WORKS SITE
Operable Unit 2 - Coney Island Creek
Kings County, New York
Site No. 2-24-026

The Proposed Remedial Action Plan (PRAP) for the Former Brooklyn Borough Gas Works Site, Operable Unit 2 (OU 2) - Coney Island Creek Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on January 24, 2002. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and sediment at the Coney Island Creek operable unit 2 of the Site. The preferred remedy requires removal of the upper three feet of impacted sediments exhibiting contaminant concentrations across the entire length and width of the upper reach of the Creek study area and backfilling with up to three feet of clean sand and silty sand or equivalent clean material as a cap.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A PRAP public meeting was held on February 19, 2002, which included a presentation of the Remedial Investigation (RI) and the Interim Remedial Measure (IRM) undertaken at the site, as well as a discussion of the proposed remedy. This meeting, as well as a March 11 meeting with the Community Board 13 Environmental and Sanitation Committee, 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. Written comments were also received from Community Board 13, Assemblywoman Adele Cohen and Mr. Frank Pane.

The original public comment period for the PRAP was scheduled to end on March 19, 2002. However, the public comment period was extended to March 22, 2002 to allow Brooklyn Community Board 13 to submit formal comments. This Responsiveness Summary responds to all questions and comments raised at the two public meetings and to the written comments received.

The following are the comments received at the public meetings, with the NYSDEC's responses:

Comment 1: How is the material going to be disposed of?

Response 1: The disposal of the material will depend on the quality of the sediment and whether the construction of the upland portion of the project will be conducted concurrently with the Creek remedial work, as is currently the plan. The material will either be disposed under the cap of OU-1, if the quality and structural characteristics of the sediment are determined suitable, or sent off-site for treatment and/or disposal.

Comment 2: There are some plans including the use of the Creek for running a ferry boat. If this happens won't it result in scouring beyond the proposed depth of excavation?

Response 2: The remedy did not anticipate using the Creek for this kind of activity, considering the current tidal conditions which leave the Creek dry at times and the constraints of the low overhead clearance of the MTA railroad and Stillwell Avenue bridges. However, should this scenario occur at some future date, or another proposal surface which may require deepening of the Creek, the remedy would have to be revisited.

Comment 3: Is the dredging going to be in the area around the combined sewer overflow or the whole Creek?

Response 3: The proposed remedy will remove sediments across the entire length and width of the Creek from the culverts at Shell Road down to the MTA railroad bridge.

Comment 4: Isn't the NAPL or coal tar cancerous?

Response 4: Coal tar and/or NAPL contain different groups of compounds. One such group is polycyclic aromatic hydrocarbons (PAHs). The United States Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens. These PAHs are identified in Section 4.1.2 and are referenced as carcinogenic PAHs (cPAHs) in this ROD. Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer). In addition to the PAHs, coal tar and/or NAPL also contain benzene, which the DHHS has determined to be a known human carcinogen.

Although cPAHs and benzene are found in coal tar and/or NAPL, it is important to keep in mind that a chemical can cause health effects only when there is an exposure to the chemical (i.e., if there are no exposures, there are no health effects). As discussed in Section 4.3, there are some situations in which humans may come into contact with site-related contaminants, but generally the public is not being exposed to chemicals associated with the site.

Comment 5: Regarding the length of time taking to clean up the Creek, KeySpan reached an agreement with the NYSDEC in 1995 to perform remedial investigations and remedial measures to clean the site.

Response 5: Since 1995 a series of remedial investigations and interim remedial measures have taken place. This proposal to address the contamination in the Creek is being made as a result of the remedial investigations conducted at the site.

Comment 6: The Creek is 1.6 miles long and your report indicates contamination down to a depth of 10 feet and you are only proposing to remove three feet of sediment. Why not remove the entire ten feet of contaminated sediment?

Response 6: The highest concentrations of contaminants were found in the upper level of sediments. The upper sediment is also more mobile because of the nature of contaminants and the tidal action of the Creek. Clean material will be used to cap the remaining contaminated sediments in place, isolating them from the environment and effectively mitigating the environmental and human exposures. The proposed remedy will be protective of human health and the environment.

Comment 7: The Creek will have no water at certain time in a day. How deep can you remove sediment to ensure that the Creek will flush itself out properly?

Response 7: The proposal calls for the removal of the upper three feet of sediment and capping the remaining sediment with a geotextile and up to three feet of sand/sediment. One consideration during design will be how to optimize the capping system in order to enhance the flow of water to this stretch of the Creek. Since 24 inches of sediment is the minimum considered necessary to support benthic organisms, if the remaining one foot of cap included to provide for stabilization can be reduced, it may be possible to increase the depth of water remaining at low tide. The design will evaluate if this layer can be reduced by six inches.

Comment 8: Why not remove four feet of material and replace it with three feet of material?

Response 8: Since the proposed remedy will only address a portion of the Creek and not the entire length, removal of an additional foot of material beyond the proposed depth of removal and replacing it with less material will not improve the current flow condition of the Creek beyond a limited area. While some improvement may be possible and beneficial, a significant increase in depth will have little additional benefit.

Comment 9: As a representative of the community and sitting here watching your presentation, what I'm leaving here with is a very uncomfortable feeling that I can't go out and tell the people what you are proposing because there is too much uncertainty.

Response 9: We can assure you that, a minimum of three feet of grossly impacted material will be removed from the study area of the Creek. The final thickness of the cap material will be designed to enhance the current water flow conditions of the Creek, based on modeling. However, a minimum of two and one-half feet of cap materials will be placed at the Creek bed.

Comment 10: What is the zone of effective bioturbation? The contaminants are very complex molecules that do partition very easily into any living cell and bio-accumulate into a microscopic food chain.

Response 10: Bioturbation refers to the physical and biological activities that occur at or near the sediment surface which cause the sediment to become mixed. Burrowing and boring by organisms in this way, can increase the compaction of the sediment and usually destroys any laminations or bedding. Most benthic organisms tend to exist within the first six inches to twelve inches of sediment. This proposed remedy will provide sufficient unimpacted depth for benthic habitat. In general, PAHs and BETX are not bioaccumulative compounds. Benzene has little documented impact and PAH impact on benthic organisms is to decrease the viability of the organism as concentrations of PAHs increase.

Comment 11: How do you make KeySpan pay for this clean up?

Response 11: KeySpan is obligated under the 1995 Consent Order with the NYSDEC to clean up the MGP site and any areas impacted by MGP operations, which includes the Creek. KeySpan has complied with the order to date and has paid all the costs associated with this project. The State has no reason to believe they will not continue to work cooperatively to implement the remedies selected for this site.

Comment 12: You have defended the proposed remedy very nicely. My question is what happens when the work starts and you discover the problem to be more extensive than earlier thought, what happens then, does the taxpayer start footing the bill?

Response 12: If during remedial activities field conditions are encountered which drastically differ from what has been anticipated, it may be necessary to stop and reconsider the appropriate remedy to address the problem. The selected remedy will remove materials that are considered to be mobile and which have the potential to most severely impact human health and the environment. KeySpan is the primary responsible party for the site and will pay all costs necessary to address the Creek contamination. It is not anticipated that the taxpayer will be required to pay the cost of cleaning up the Creek.

Comment 13: Who will perform the ongoing monitoring and for how long?

Response 13: KeySpan will perform the monitoring. For purposes of cost estimation, a period of thirty years is used, however monitoring will occur as long as necessary. Monitoring data will be reviewed by the NYSDEC to determine the continued effectiveness of the remedy.

Comment 14: What happens when the property is sold?

Response 14: KeySpan will continue to be the responsible party to address site contamination, regardless of whether the property is transferred. However, KeySpan may chose to enter an agreement with a third party, for the third party to assume KeySpan responsibility under the

NYSDEC Consent Order. The third party would then have to enter into an order with the NYSDEC to assure that the terms of the original order are adhered to.

Comment 15: Where will the material be disposed of? Is it going to be disposed in a water body?

Response 15: Please see Response 1. The disposal of this material into a water body will not be considered.

Comment 16: How do you determine where the bed of the Creek will end up, I assume it will be by the Creek mean high water from side to side?

Response 16: The Creek bed and the width of sediment removal will be determined based on the north and south end of the existing bulkheads.

Comment 17: Do you have any information that this material may have migrated south into the other properties on the other side of the Creek?

Response 17: Borings were installed at several locations on the south side of Coney Island Creek as part of the remedial investigation. There is no indication that contaminants have moved beyond the Creek boundaries into the adjacent properties to the south of the Creek.

Comment 18: The community would want quarterly meetings to update it of the project progress.

Response 18: The NYSDEC will work with the Community Board to provide information on the project to the community through written communications, in the form of fact sheets sent to the site mailing list as well as updates of activities to be provided at Community Board meetings. The NYSDEC will also attend Board meetings, at appropriate project milestones to brief the Board on the progress of the design and construction of both the OU1 and OU2 remedies.

Comment 19: Since 1994 there's been an epidemic of death from different types of cancer down by Coney Island near the project. Why is it taking so long to try to clean up the Creek?

Response 19: Anyone with concerns about cancers near the Brooklyn Borough Gas Works site, and other inactive hazardous waste sites, can call the toll-free telephone number for the New York State Department of Health (NYSDOH) Center for Environmental Health (1-800-458-1158) to discuss their specific concerns. The NYSDOH frequently responds to questions and concerns about cancer. Many inquiries result from a need for information about cancer, including its frequency, risk factors, relationship to age, and latency. [Latency refers to the length of time between exposure to a cancer-causing (carcinogenic) agent and the diagnosis of cancer. The latency period for adult cancers is estimated to range from 10 to 30 or more years.] It is often reassuring when information and educational materials are provided about cancer.

Unfortunately, cancer is a very common disease. One in two men and one in three women will be diagnosed with cancer at some time during their life. In New York State, nearly one in four deaths is due to cancer. Eventually, cancer occurs in three out of every four families. Cancer is not one

disease, but a group of diseases. There are more than 100 different types of cancer, each with different risk factors. Tumors originating in different organs are considered to be different diseases because of variation in cause, type of abnormal cells, course of the disease, prognosis and treatment. Cancers develop in people of all ages, but most often in the middle-aged and the elderly. The number of cancer cases has risen dramatically over the past 40 years, but much of this increase is a reflection of the increase in the population, especially in older age groups. Prostate, lung and colorectal cancers are the most common types diagnosed among adult males. Breast, lung and colorectal cancers are the most common among adult females.

When an unusual pattern of cancer cases potentially related to a common environmental factor is suspected, the NYSDOH is able to evaluate Cancer Registry data for small geographical areas using information on residential addresses at the time of the cancer diagnoses. There are a number of factors NYSDOH researchers look for when evaluating whether cancer patterns in a given area may be unusual. These include the following: (1) several cases of the same or similar types of cancer in a small geographic area; (2) several cases of the same or similar types of cancer diagnosed in a short time-frame; (3) unusual numbers of a relatively rare cancer or cancers; or (4) a large number of cases of a cancer occurring in an unusual age group for that type of cancer. The issue of latency is also evaluated in order to assess the possibility of a cause and effect relationship between cancer cases and environmental factors.

Regarding the length of time taken to try to clean the Creek, the Department, prior to the adoption of Toxicity Characteristics Leaching Procedure in 1995 did not have the legal authority to address the type of contamination found at the former MGP site. However, in 1995 the Department was able to lis the site on the Registry of Inactive Hazardous Waste Disposal Sites and KeySpan entered into a consent order requiring investigation and remediation of the site. Since then, several phases of remedial site investigations have been performed in order to define the nature and extent of site contamination including the Coney Island Creek. These investigations are necessary to understand the problem and then select a balanced and cost effective remedy which will be protective of human health and the environment.

Comment 20: You have two large clean up jobs, the land and the Creek. Does one happen before the other, and when do you anticipate the clean up will start?

Response 20: The land-based work will most likely start first as this will cut off the migration pathway of contaminants to the Creek. The two projects will probably have some degree of overlap. The design of the upland remedy is scheduled for completion in October of 2002. Barring any unforseen circumstances, we anticipate that construction of the upland remedy will begin in the spring of 2003.

Comment 21: Will the rocks along the Creek bank be cleaned?

Response 21: The rocks along the Creek bank, determined to have been impacted by site contamination, will be cleaned.

Comment 22: It would make more sense to install a sediment trap at the railroad bridge to prevent recontamination of the proposed clean cap.

Response 22: This idea will be evaluated at during the design phase to ascertain the feasibility of this additional protective measure.

Comment 23: Oysters should be put into the Creek to help clean up the Creek water.

Response 23: Putting oysters in the Creek may have some limited beneficial impact on water quality, due to their ability to filter contaminants from the water, however, putting oysters in the Creek may also increase recreational harvesting of oysters in the Creek. Currently, recreational or commercial harvesting of any oysters, clams and mussels from Coney Island Creek is banned due to high levels of coliform bacteria in local waters. Generally, high concentrations of coliform bacteria indicate the presence of bacteria and viruses which may cause adverse health effects in water and specific shellfish. It is likely that any beneficial impacts on surface water quality will not be significant enough to justify increasing the potential for public exposures to harmful bacteria and viruses through the ingestion of oysters as a result of recreational activities. In addition, our Fish, Wildlife and Marine Resources group has taken a look at the proposal and determined that placing oysters in the Creek will not provide any additional benefit since oysters will not address sediment impact which is the major source of contamination to the Creek surface water.

Comment 24: Why is the clean up not beyond the railroad?

Response 24: While elevated levels of PAHs were detected at locations beyond the proposed area of clean up during remedial investigations, mobile material including coal tar were not detected. PAHs are not particular to MGP operations and could, and do likely, result from other contributing sources along the Creek such as the auto salvage yards, parking lots and automobile repair facilities which line the Creek bank in this area. In addition, storm water and other unknown discharge pipes exist throughout the area, which also represent contaminant sources.

Comment 25: Is the parcel of land adjacent the site on Stillwell Avenue part of the site?

Response 25: The NYSDEC has no evidence that this adjacent property was part of the MGP site.

Comment 26: Why is 873 Neptune Ave used as the site address? And what is the site west boundary?

Response 26: The 873 Neptune Avene address is being used as a legal postal address only for the purpose of the Registry listing of this Class 2 site and is not the street address of the site. The site boundary is properly defined and identified in the site description and figures included in the PRAP and ROD. The site is bordered to the west by the New York Metropolitan Transit Authority rail lines. The description in the ROD has been modified to delete the address and clarify the rail lines themselves as the west boundary.

A letter dated February 22, 2002 was received from Mr. Chuck Reichenthal, District Manager, Brooklyn Community Board 13, which included the following comments:

Comment 27: More information is needed about the semi permeable liner. Maintaining the integrity of the liner is essential for the success of the project. Has a liner been successfully used elsewhere? How is the liner installed? How will the integrity of the liner be monitored once the sand cap is in place.

Response 27: The remedy calls for the use of a geotextile fabric, as opposed to a semi-permeable liner. A liner implies a solid material intended to prevent or restrict the flow of water through it, while a fabric is designed to allow water to percolate through. The intent of the proposed geotextile fabric is to stabilize the surface of the sediments, with residual contamination, which will remain in place in the Creek and be capped with the clean sediment quality material. This fabric will also serve as a demarcation layer between the soil cap and sediments. In the future should the Creek be dredged to deepen it for boat traffic, the fabric will aid in identifying these sediments. A similar cap is part of the remedy selected for the Utica Harbor MGP site in Utica, NY being addressed by Niagara Mohawk, and similar capping alternatives are being developed for a number of other MGP sites where sediments have been impacted across the State.

The liner installation technique will depend on whether the Creek sediments are removed by dewatering the area or are dredged, however the concept is similar. For this installation, the flow of water through the fabric is desirable to assure the fabric will remain where placed and will not float or be moved. The liner will be placed over the remaining sediment and the sand/silt material placed over it. As detailed in the Feasibility Study, periodic monitoring of soil and sediments cap will be undertaken to ensure that the cap integrity is maintained.

Comment 28: What will happen when the cap consolidates overtime? Will KeySpan be responsible for providing additional sand?

Response 28: The cap will be designed and the manner of placement specified to minimize consolidation. However, KeySpan will be required to provide routine monitoring and maintenance of the selected remedy. If it is determined in the future that the cap has consolidated or another condition occurs which indicates that the remedy is no longer considered to be protective of human health and the environment, KeySpan will be responsible to enhance the remedy or implement an alternate remedial technology to meet the remedial action goals established for the site.

Comment 29: We need assurances that materials containing volatile organic compounds will only be handled within enclosed areas with proper (i.e. negative pressure) ventilation. Otherwise, chemical odors will permeate the surrounding area.

Response 29: We do not anticipate the sediment removal operations would result in significant odor or airborne contaminants because the sediment will be wet. However, once the sediment is dewatered, the potential for odor or airborne contaminants increases. To mitigate this effect, temporary enclosures will be used for any sediment dewatering or processing to control any potential release of MGP constituent air emissions and/or odors. The temporary enclosure will be designed

to maintain negative pressure within the enclosure. The ventilation system will provide clean air from the outside to displace contaminated air which would be pulled under vacuum to a vapor treatment system prior to discharge.

Comment 30: There is a possibility that materials dredged from Coney Island Creek will be placed on the adjacent shoreline of the BUG site and eventually capped with a plastic liner. Will material used in this fashion be amended and/or processed to immobilize contaminants?

Response 30: Whether the dredged sediments will be taken to upland area of the site area and incorporated under the site cap or sent off-site to a permitted facility will depend in large part on whether the remedies for the upland area and the Creek will be performed concurrently or separately. If the dredged materials are to be placed in the upland area, it will be placed under the cap. The dredged material will need to be dewatered and may also need to be stabilized with additives, for proper handling and placement.

Comment 31: We need assurances that confined aquatic disposal sites, geotextile bags and new shore confined disposal will not be used.

Response 31: The dredged material will either be incorporated into the upland remedial program as described in the March 2001 Record of Decision for OU-1 or transported off-site to a permitted facility for treatment and/or disposal. Use of any of the forms of disposal identified are not being considered by this proposal, nor would they be deemed appropriate in the future for contaminated material from this site.

Comment 32: Although this site does not provide quality habitat, it is still visited by many species of birds, especially during migration. What steps will be taken to minimize impact to wildlife especially during nesting and migration?

Response 32: While some disruption of the Creek will occur during the sediment removal, every consideration will be given to minimize impacts to habitats during construction of the proposed remedy. The proposed remedy, will however provide a greatly enhanced environment for fish, wildlife and benthic organisms when completed. As detailed in the PRAP, the remedy will establish a 50-foot ecological buffer zone to improve habitat. The zone will support plant life, create habitat for selected bird species and promote additional beneficial uses of the transitional zone from the Creek to the upland portion of the site and the clean sediments will greatly improve the benthic organisms environment.

Comment 33: At dredging sites in other areas, independent observers have reported that hoist restrictions have been ignored. Who is responsible for supervision at this site? Will supervisors be present at all times that work is in progress?

Response 33: The NYSDEC will provide oversight of the remedial work during all critical points of the project, (of which dredging would be one of the most critical) to ensure compliance with the design documents. KeySpan representatives will be expected to supervise the contractors involved

with remedial construction, as well, and will be held responsible for assuring the contractors actions are compliant with the design documents.

Comment 34: Will dredge be dewatered on site? Will that water be discharged to local sanitary lines, treated at an on site facility or just discharged back into the Creek?

Response 34: The degree of dewatering of the excavated sediments and volume of water to be treated will depend on the characteristic of the sediments and the type of removal proposed. Should the material be dewatered on site, a water treatment system may be necessary to treat the water generated. Consistent with the selected remedy for the upland portion of the former MGP site, the treated water will either be discharged into the Creek or sent to the local Public Owned Treatment Works. In any case the NYSDEC discharge limits, as required by the State Pollution Discharge Elimination System (SPDES), will be met.

A letter was received at the February 19, 2002 public meeting from Mr. Frank J Pane of Stillwell Avenue, Brooklyn, N.Y., which discussed his knowledge of the Creek past history and the Creek's past recreational services to the community. Mr. Panes' letter has been included in the Administrative Record (Appendix B) of this ROD.

A letter dated March 21, 2002 was received from Mr. Chuck Reichenthal, District Manager, Brooklyn Community Board 13, which included the following:

Comment 35: During the Board's monthly meeting of March 20, 2002, it passed a motion in support of the selected remedy with YEA votes of 23 and NAY votes of 2.

Response 35: The Department appreciates the Community Boards support of the remedy.

Comment 36: The Board expects that there will be a continued and regularly scheduled, ongoing communication with the State DEC on the Coney Island Creek Work.

Response 36: As stated in response 18, the Department will work diligently with the Community Board to keep it informed of the project developments through written communications and attendance at Board meetings.

A letter dated March 20, 2002 was received from Assemblywoman Adele Cohen, representing the 48th District, which included the following comments:

Comment 37: In 1984 Brooklyn Union Gas, now known as Keyspan, was ordered to cleanup the site that they occupied at the northwest corner of Neptune Avenue and West 8th Street, a property that borders on Coney Island Creek. This is property that they had polluted with toxic waste. It is almost 20 years later and Keyspan has not yet begun to cleanup the Creek.

Response 37: With the selection of this remedy, cleanup of the Creek is about to begin.

Comment 38: Although I have been told that the cleanup will begin shortly I am concerned that DEC has approved Keyspan's use of a plastic liner, whose durability has not been tested, on the Creek bottom.

Response 38: A plastic liner is not a part of the selected remedy. See RESPONSE 27.

Comment 39: Of equal concern to me is that 30 years from now, those of us with the institutional memory relating to the terms and conditions of this cleanup will no longer be here. I seriously question the long range effects of Keyspan being responsible to monitor the site rather than the State.

Response 39: As identified in RESPONSE 13, KeySpan is obligated by the consent order to remediate this site, which includes the operation and maintenance of the remedy. KeySPan will be responsible for preparing an Operation, Maintenance and Monitoring (OM&M) Plan at the conclusion of construction which will outline all required tasks necessary for the continued OM&M of the site. Keyspan will remain responsible for undertaking any necessary operation, monitoring and/or maintenance called for by this plan under the oversight and direction of the DEC for as long as necessary to assure protection of public health and the environment.

Comment 40: It is vital that DEC serve as the monitoring agent of the Creek. New York State must take the responsibility to insure the residents of this community that the Creek poses no threat to their health and well being.

Response 40: See RESPONSE 33 and 39.

APPENDIX B

Administrative Record

1. Work Plan for Investigations, Risk Assessments, and Engineering Evaluations to Restore Coney Island Creek for the Former Brooklyn Borough Gas Works Site. Prepared by: *Vanasse Hangen Brustlin, Inc. and Foster Wheeler Environmental Corporation*, October 1999.

1. Final Report, Investigations, Risk Assessments, and Engineering Evaluations to Restore the Upper Reach of Coney Island Creek in conjunction with Former Brooklyn Borough Gas Works Site. Prepared by: *Vanasse Hangen Brustlin, Inc. and Foster Wheeler Environmental Corporation*, October 2001.

2. Record of Decision, Former Brooklyn Borough Gas Works Site, Operable Unit 1 - Plant Site, Prepared by the Division of Environmental Remediation, New York State Department of Environmental Conservation, March 2002.

3. Proposed Remedial Action Plan, Former Brooklyn Borough Gas Works Site, Operable Unit 2 - Coney Island Creek. Prepared by the Division of Environmental Remediation, New York State Department of Environmental Conservation.

4. Comment letter on the PRAP from Mr. Frank J. Pane, Stillwell Ave, Brooklyn, NY, submitted February 19, 2002.

5. Comment memo on the PRAP from Mr. Chuck Reichenthal, District Manager, Brooklyn Community Board 13, dated February 22, 2002.

6. A letter dated March 21, 2002 was received from Mr. Chuck Reichenthal, District Manager, Brooklyn Community Board 13, which stated the Community Board's support for the selected remedy.

7. Comments on the PRAP were received from Assemblywoman Adele Cohen, representing the 48th District, dated March 20, 2002.