

1.0 INTRODUCTION

KeySpan Corporation (KeySpan) entered into an Order on Consent (Index No. D1-0002-98-11) with the New York State Department of Environmental Conservation (NYSDEC) to conduct a Remedial Investigation (RI) at the Former Manufactured Gas Plant (MGP) site located in Bay Shore and Brightwaters, Suffolk County, New York. The initial field program was completed in the Fall of 2000 as documented in the report entitled, “Bay Shore/Brightwaters Former Manufactured Gas Plant Site Remedial Investigation Report,” dated April 2002 (herein referred to as the April 2002 RI Report). Based on the findings of the completed field program, additional sampling activities were recommended. As a result, a supplemental field investigation was subsequently completed in accordance with the scope of work presented in the Supplemental Field Investigation Work Plan for the Bay Shore/Brightwaters Former Manufactured Gas Plant Site, dated February 8, 2002. This Final Remedial Investigation Report presents the findings of the supplemental field program, which are built upon the understanding of the site gained through the completion of the initial field program. The Final RI Report includes:

- Background information related to the site;
- A summary of findings associated with the initial field program;
- Objectives of the supplemental field program;
- The geology and hydrogeology of the investigation area;
- The findings of the supplemental field program;
- A summary discussion as to the nature and extent of MGP-related chemical compounds and residuals based on all data collected as part of the initial field program and the supplemental field program; and
- A Qualitative Human Exposure Assessment (QHEA) and Fish and Wildlife Resources Impact Analysis (FWRIA) that has been updated to reflect the findings of the supplemental field program.

1.1 Supplemental Field Program Objectives

Based on KeySpan's assessment of the existing data as summarized in **Section 1.4** and discussions with the NYSDEC and Suffolk County Department of Health Services (SCDHS), it was determined that additional data was needed to further refine understanding of the nature and extent of MGP-related chemical compounds and residuals present in the subsurface environment and to develop a remedial strategy for the site and off-site areas. Therefore, a supplemental field program scope of work was developed. The objectives of the supplemental field program included:

- Further delineate the presence of BTEX and PAHs in subsurface soil and groundwater in suspected source areas;
- Define the vertical and areal extent of NAPL within suspected source areas;
- Provide additional data as to the potential mobility and recoverability of identified NAPL;
- Define the nature and extent of off-site NAPL downgradient of the Bay Shore Site;
- Obtain additional data needed to evaluate the potential applicability/effectiveness of various remedial technologies under a Remedial Action Plan (RAP);
- Provide additional data needed to design and implement an IRM to mitigate the migration of the Bay Shore Site groundwater plume to Lawrence Creek;
- Provide additional data needed to design and implement an IRM to address the presence of BTEX and PAHs within the area of Watchogue Creek (a/k/a Crum's Brook) located between Oak Street and Union Boulevard;
- Determine if the Brightwaters Yard groundwater plume is entering O-Co-Nee Pond and/or its headwaters;
- Determine whether unregistered private water supply wells exist downgradient of the Bay Shore Site and Brightwaters Yard and, if wells are identified, determine whether they are impacted by the groundwater plumes.
- Determine whether potential exposure pathways exist via infiltration of impacted groundwater into basements of private residences downgradient of the Bay Shore Site and Brightwaters Yard within the areas of the groundwater plumes.

1.2 Overview of Report Organization

The Final RI Report is organized as follows:

- **Executive Summary:** Summarizes and provides an overview of the findings of all the data collected as part of the initial field program completed in 2000 and the supplemental field program.
- **Section 1.0 - Introduction:** Presents background information and a description of the physical setting of the site and its surroundings. This section also provides a summary of the field program completed in 2000 and the specific objectives of the supplemental field program. Finally, this section also presents the “operable unit” concept used to manage on-going and future remedial actions associated with the site.
- **Section 2.0 - Field Investigation Program:** Provides an overview of the field activities associated with the supplemental field program. Additionally, it discusses data management and chemical data validation/usability.
- **Section 3.0 - Site Geology and Hydrogeology:** Presents a discussion of the geology and hydrogeology of the site and immediately surrounding areas based on geologic data collected as part of the initial and supplemental field programs. However, the discussion focuses on those aspects of site/area geology and hydrogeology that have been clarified based on the findings of the supplemental field program.
- **Section 4.0 - Findings:** This section provides a discussion of the chemical compounds and other MGP residuals identified in on-site and off-site areas based on the supplemental field program. Where appropriate, data from the initial field program as well as historical data has been used in conjunction with supplemental field program data to provide a better understanding as to the nature and extent of MGP-related chemical compounds and residuals associated with the site.
- **Section 5.0 - Conclusions:** Provides conclusions based on the findings of **Section 4.0** in conjunction with **Section 3.0** findings.
- **Section 6.0 - Conceptual Summary:** This section provides an overall summary of the chemical and physical data collected as part of the supplemental field program in addition to the initial field program. This section summarizes the nature and extent of MPG-related chemical compounds and residuals, the fate and transport of these chemicals and materials, and the identification of potential exposure pathways.
- **Section 7.0 - References:** Lists all documents and other sources of information utilized in the preparation of this report.

1.3 Site Description and History

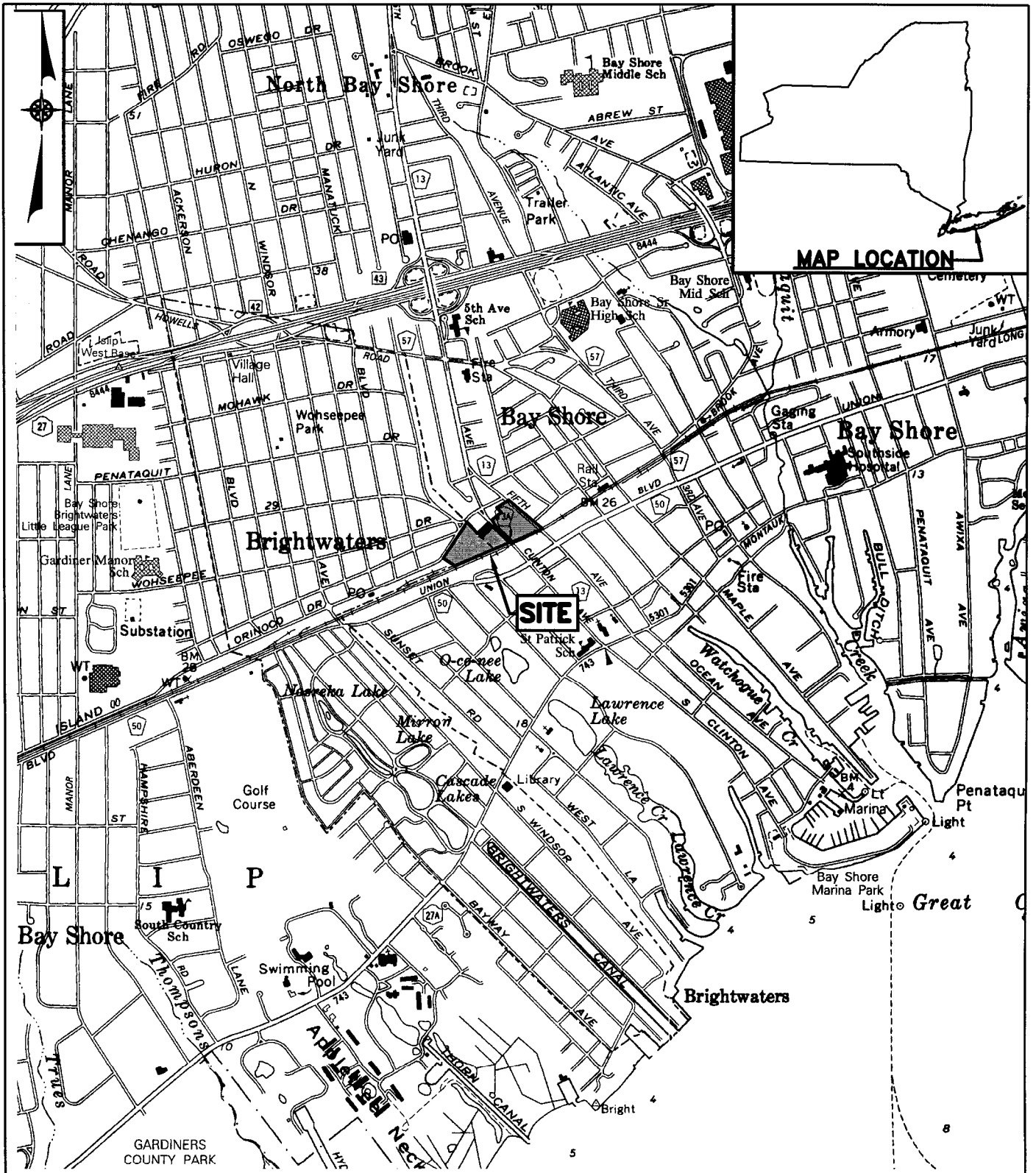
The Bay Shore/Brightwaters former MGP site is located in Bay Shore and the Incorporated Village of Brightwaters, located in the Town of Islip, Suffolk County, New York (see **Figure 1-1**). The site is approximately 10 acres in area and is bisected by Clinton Avenue. The Long Island Rail Road (LIRR) - Montauk Branch borders the site to the south, Fifth Avenue to the east, and Orinoco Drive to the north. A site map showing the site and surrounding areas, current structures, and other relevant site features is provided in **Figure 1-2**.

The area surrounding the Bay Shore/Brightwaters Former MGP site is typically suburban, with a variety of land uses including residential, commercial and light industrial. The site is bounded on the east, north, and west by residences and small commercial businesses, and to the south by the LIRR. Immediately south of the LIRR are a number of residences, as well as the adjacent KeySpan-owned parcel that was formerly used as a commercial lumber property. Properties further south are principally single-family residential homes; however, some commercial properties exist along Union Boulevard.

Operational History

The site opened as a gas plant in 1889 under the ownership of the Mutual Gas and Light Company. The Suffolk Gas and Electric Light Company owned and operated the site from 1889 to 1917. In 1918, the Long Island Lighting Company (LILCO) became the legal owner. Gas manufacturing reportedly occurred between 1889 and approximately 1973, when the plant was demolished. In 1918, LILCO began operating a carbureted water gas plant. Later in the life of the plant, it was converted to an oil-gas process. Manufacturing operations were conducted on the Bay Shore property, while the Brightwaters Yard property was used to support gas manufacturing and distribution operations. Additional details regarding the history of the site are provided in the April 2002 RI Report.

Since approximately the 1920s to the early 1970s, it is believed that the former Bay Shore MGP discharged storm water and treated process wastewater under a permit issued by the New



SOURCE: USGS BAY SHORE WEST QUADRANGLE, 1969



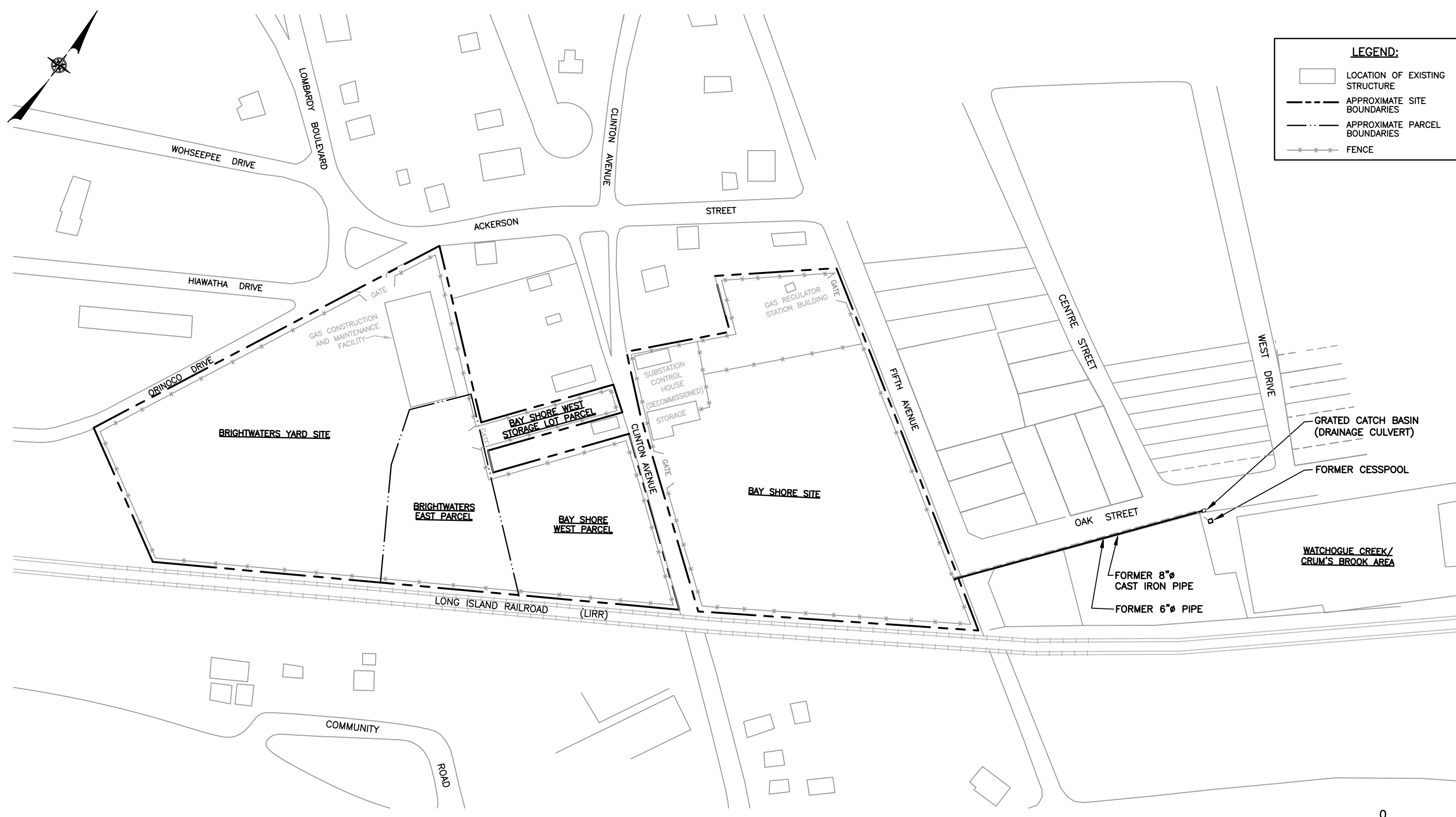
BAY SHORE/BRIGHTWATERS FORMER MGP SITE FINAL REMEDIAL INVESTIGATION
BAY SHORE, NEW YORK

SITE LOCATION MAP



Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 1-1



LEGEND:

	LOCATION OF EXISTING STRUCTURE
	APPROXIMATE SITE BOUNDARIES
	APPROXIMATE PARCEL BOUNDARIES
	FENCE

SOURCE: BASE MAP PREPARED FROM INTERPRETATION OF AERIAL PHOTOGRAPH DATED APRIL 4, 1994.



BAY SHORE/BRIGHTWATERS FORMER MGP SITE FINAL REMEDIAL INVESTIGATION
BAY SHORE, NEW YORK

SITE MAP

York State Department of Health to Watchogue Creek/Crum's Brook located approximately 600 feet southeast of the site. The wastewater from the former MGP discharged to a 6-inch diameter drain line located near the southeast corner of the site. The 6-inch diameter drain line crossed beneath Fifth Avenue (from west to east) running east along the south side of Oak Street and was conveyed to an adjacent Cesspool located approximately 410 feet east of the site. In addition, it appears that in approximately 1947 the 6-inch drain was replaced with an 8-inch diameter cast iron drain line which also crossed beneath Fifth Avenue from west to east along the south side of Oak Street. However, it is believed that this replacement line conveyed flows to a drainage culvert/catch basin along Oak Street adjacent to the original Cesspool. Additional details regarding the history of the Watchogue Creek/Crum's Brook area are provided in the April 2002 RI report.

Current Site Conditions

The site consists of several parcels, including the Bay Shore Site, Bay Shore West Parcel, Bay Shore West Storage Lot Parcel, Brightwaters East Parcel and the Brightwaters Yard Site. For the purpose of this Final RI Report, and consistent with previous reports, the parcels have been grouped into two general areas, as shown on **Figure 1-2**. The first area comprises the Bay Shore Site and Bay Shore West Parcel. The second area includes the Brightwaters Yard Site, Brightwaters East Parcel and the Bay Shore West Storage Lot Parcel. The Watchogue Creek/Crum's Brook area is also included on **Figure 1-2**.

The Bay Shore Site includes an active KeySpan gas regulator station, a decommissioned Long Island Power Authority (LIPA) electric substation and a storage building, all of which are located in the northern part of the site. The southern portion of the Bay Shore Site is vacant and generally covered with grass, small trees and other low vegetation. The Bay Shore West Parcel is currently vacant and was previously covered with relatively dense vegetation. The parcel was cleared of vegetation in February 2002 and most of the parcel is covered with dolostone/crushed stone. The parcel is used for storage of equipment and materials in support of utility operations. The Bay Shore West Storage Lot Parcel is utilized for the storage of equipment and materials used to support gas construction activities at the Brightwaters Yard Site. The Brightwaters Yard

Site and Brightwaters East Parcel extend into the Incorporated Village of Brightwaters and support an active KeySpan gas construction facility.

Physical Setting and Hydrogeology

Topography at the site is relatively flat, with the land surface sloping less than one percent southward, toward the Great South Bay. Site elevation ranges from roughly 20 to 24 feet above mean sea level (msl). Storm water within the site infiltrates to subsurface soil. In general, the storm water drainage systems in the Bay Shore/Brightwaters area in the vicinity of the site are designed to convey flows to local surface water bodies and, ultimately, the Great South Bay. There are no naturally occurring or manmade surface water bodies within the boundaries of the site. Two natural streams, and several artificially impounded lakes and ponds are located within a half mile of the site between the site and the Great South Bay. The surface water bodies nearest to the site include Watchogue Creek/Crum's Brook (north of Montauk Highway), Watchogue Creek (south of Montauk Highway), Lawrence Creek, Lawrence Lake and O-Co-Nee Pond.

Groundwater beneath the site ranges in depth from approximately 6 to 8 feet below ground surface (bgs) and generally flows in a southerly direction throughout the site. Horizontal groundwater velocities within the Upper Glacial aquifer at and downgradient of the site have been estimated to range from between 2.1 and 2.5 feet per day. On-site and downgradient monitoring well clusters indicate horizontal groundwater flow within the Upper Glacial aquifer. The only substantial vertical flow was observed at a well cluster located in close proximity to Lawrence Creek where a significant upward vertical gradient was observed, indicating an area of groundwater discharge.

Additional details regarding the physical setting and hydrogeology of the site are provided in the April 2002 RI Report.

1.4 Previous Site Investigations

Between 1979 and 2000, several environmental investigations were completed at and in the vicinity of the site. The results of these investigations indicate that chemical constituents were present in soil and groundwater on-site and were used to identify two separate groundwater plumes emanating from the site: one originating from the Bay Shore Site and one from the Brightwaters Yard Site. The results of the investigations also indicated that the sources of the plumes were associated with former MGP operations at the Bay Shore Site and Brightwaters Yard Site, respectively. The investigations determined that the chemical compounds detected in on-site soil and groundwater, as well as in off-site groundwater, were primarily benzene, toluene, ethylbenzene and xylene (BTEX) and polycyclic aromatic hydrocarbons (PAHs). Additional details regarding the previously completed investigations are presented in the April 2002 RI Report.

The following discussion presents a summary of findings related to the initial field program which are discussed in greater detail in the April 2002 RI Report.

Bay Shore Site and Bay Shore West Parcel

Surface soil within the Bay Shore Site is generally free of chemical constituents at elevated concentrations. However, elevated concentrations of BTEX and PAHs were detected in subsurface soil in the southern and central portions of the Bay Shore Site. The highest levels were found immediately downgradient of a former Naphthalene Scrubber and Oil Separation Tank. In general, BTEX and PAH concentrations in soil decrease rapidly with increasing depth. However, soil samples recovered from several borings within the southernmost portion of the Bay Shore Site exhibited naphthalene/hydrocarbon-like odors, staining, sheens and tar/oil droplets or blebs as deep as 62 feet bgs.

Surface soil on the Bay Shore West Parcel did not exhibit chemical constituents at elevated levels. In addition, subsurface soil within the majority of the site did not exhibit chemical constituents at elevated levels. However, BTEX compounds were detected in

subsurface soil within the vicinity of two former aboveground Oil Storage Tanks in the southeastern portion of the parcel.

Metal concentrations in subsurface soil within the Bay Shore Site and Bay Shore West Parcel were found to be at or below typical background concentrations. Of the samples analyzed, the only anomaly was lead, detected in the general area of the former industrial Cesspool located southwest of the Main Holder at a concentration of 1,210 mg/kg.

The vast majority of the subsurface soil samples collected within the Bay Shore Site and Bay Shore West Parcel were found to be either free of detectable levels of total cyanide or exhibited total cyanide concentrations below 1.0 mg/kg with a maximum total cyanide concentration of 9.3 mg/kg.

As with subsurface soil, groundwater beneath the Bay Shore Site contains levels of BTEX and PAHs with the highest concentrations generally observed beneath the southern half of the Bay Shore Site where the former gas works were located. The highest total BTEX concentration (65,400 micrograms per liter [ug/l]) and highest total PAH concentration (18,606 ug/l) were detected in shallow groundwater in this area. Separate-phase nonaqueous phase liquid (NAPL) was observed in one monitoring well located within the southern portion of the Bay Shore Site.

Brightwaters Yard Site, Brightwaters East Parcel and Bay Shore West Storage Lot Parcel

With the exception of subsurface soil in two areas of the site, surface and subsurface soil did not exhibit elevated levels of chemical constituents. Subsurface soil in the vicinity of the former underground storage tanks (USTs) located on the Brightwaters East Parcel adjacent to the Gas Construction and Maintenance Facility (GCMF) building, as well as in the vicinity of the former H-Fuel tank in the southwestern portion of the Brightwaters Yard Site exhibited elevated levels of BTEX and PAHs. Metals analysis indicated that the majority of RCRA metals in subsurface soil samples to be at or below typical background concentrations. Analytical results indicated total cyanide concentrations were below the Contract Required Detection Limit

(CRDL) of 1 mg/kg. Details concerning subsurface soil conditions are summarized later in this section as part of the descriptions of the Interim Remedial Measures (IRMs) associated with these areas.

Groundwater beneath the Brightwaters Yard Site, Brightwaters East Parcel and Bay Shore West Storage Lot Parcel did not exhibit elevated levels of BTEX and PAHs with the exception of groundwater in the vicinity and downgradient of the former H-fuel tank on the Brightwaters Yard Site and the former USTs on the Brightwaters East Parcel. Details concerning groundwater quality downgradient of the former H-fuel tank and former USTs are summarized later in this section as part of the descriptions of the IRMs associated with these areas.

Off-site Investigation – Bay Shore Site and Bay Shore West Parcel

Off-site subsurface soil samples collected at locations east of the Bay Shore Site along Fifth Avenue did not exhibit evidence of chemical constituents related to the former MGP.

The highest BTEX and PAH concentrations identified in off-site groundwater were observed in shallow monitoring wells located immediately downgradient of the Bay Shore Site. In general, BTEX and PAH concentrations decrease rapidly with increasing distance downgradient of the Bay Shore Site. The sources of BTEX and PAH compounds in off-site groundwater appear to be primarily located within the central and southern portions of the Bay Shore Site. The Bay Shore West Parcel appears to be a minor contributor of these compounds to off-site groundwater.

The BTEX/PAH plume associated with the Bay Shore Site appears to be migrating south to southeast from the site in the direction of natural groundwater flow. The width of plume is approximately 500 feet extending from the Bay Shore Site to the southeast corner of the Bay Shore West Parcel. The total length of the plume is estimated to be approximately 3,400 feet extending from the Bay Shore Site and Bay Shore West Parcel to the apparent discharge point at Lawrence Creek. Lawrence Creek is a tidally influenced surface water body located south of Montauk Highway. Although the plume discharges to Lawrence Creek, analysis of surface water

and sediment samples collected from the suspected discharge area indicated BTEX and PAHs to be at relatively low concentrations in surface water.

Impact to the underlying Magothy aquifer is not expected. While the Bay Shore Site groundwater plume immediately downgradient of the site appears to extend throughout the vertical extent of the Upper Glacial aquifer, the low permeable fine sands, silt and clay underlying this aquifer restrict the vertical migration of the plume. Also, limiting the downward migration is the transition from a predominantly horizontal flow regime to an “upward” or discharging flow regime in the Upper Glacial aquifer downgradient of the site.

A review of historical and current data suggests that natural processes, including dispersion, dilution and biodegradation, are actively reducing the areal distribution of the plume, as well as BTEX and PAH groundwater concentrations. It is anticipated that these processes will likely continue to attenuate the plume in the future. However, additional geochemical data will be required to evaluate these processes and to demonstrate the extent to which natural attenuation of the plume is occurring.

While the Bay Shore Site groundwater plume appears to be well defined, groundwater data and NYSDEC records documenting petroleum releases downgradient of the site suggests that there are other sources contributing BTEX and PAHs to groundwater. Additional details concerning these other sources of BTEX and PAHs are provided in the April 2002 RI Report.

Metals analysis of groundwater samples collected from monitoring wells located downgradient of the Bay Shore Site indicated that the majority of RCRA listed metals were generally within concentration ranges that would be considered typical of ambient groundwater quality for the Upper Glacial aquifer given the commercial and industrial land use within the area.

Total cyanide concentrations in the majority of groundwater samples collected from wells located downgradient of the Bay Shore Site were found to be below instrument detection limits or the CRDL of 20 ug/l. The maximum observed concentrations did not exceed 70 ug/l. Free

cyanide analysis was generally consistent with the total cyanide results with the majority of samples exhibiting free cyanide concentrations below the instrument detection limit or the CRDL of 20 ug/l. The maximum observed concentrations did not exceed 60 ug/l.

Watchogue Creek/Crum's Brook IRM/Investigation

The investigation activities associated with this IRM/Investigation were primarily conducted in two general areas, one being the former cesspool area and the other being the former pond area/headwaters of Watchogue Creek/Crum's Brook. The former Cesspool historically received storm water drainage and process wastewater from the former Bay Shore MGP site.

Former Cesspool Area

Surface soil samples collected in the vicinity of the former Cesspool did not exhibit chemical constituents at elevated levels. Subsurface soil samples collected from this area exhibited elevated levels of BTEX and PAHs. BTEX and PAH concentrations were observed in shallow subsurface soil within and immediately south of the cesspool area and PAH concentrations were observed in shallow subsurface soil at a location approximately 65 feet downgradient of the former Cesspool. RCRA metals analysis on subsurface soil samples indicated all targeted metals to be generally at or below typical background concentrations for soil in the eastern United States. Total cyanide analysis indicated the majority of soil samples to be free of detectable levels of total cyanide or exhibit cyanide at concentrations less than the CRDL of 1.0 mg/kg. Groundwater in the vicinity and downgradient of the former Cesspool exhibited detectable BTEX and PAHs.

Former Pond Area and Watchogue Creek/Crum's Brook Headwaters

Surface soil samples collected in the former pond area and headwaters of Watchogue Creek/Crum's Brook did not exhibit chemical constituents at elevated levels. Subsurface soil samples collected from this area exhibited elevated levels of BTEX and PAHs. Both BTEX and

PAH concentrations rapidly decrease with increasing depth. BTEX compounds and PAHs were detected at low concentrations in groundwater samples collected in the vicinity of the former pond area and headwaters of Watchogue Creek/Crum's Brook. Based on the results of the investigation, subsurface soil within the former pond area appears to be a minor contributor of BTEX and PAHs to groundwater. RCRA metals analysis indicated that the majority of targeted metals were within or below typical background concentrations for soil in the eastern United States. Total cyanide analysis indicated that the majority of soil samples did not exhibit detectable levels of total cyanide or exhibit total cyanide at concentrations below the CRDL.

Surface water samples collected from the former pond area and headwaters of Watchogue Creek/Crum's Brook between the LIRR and Union Boulevard and samples collected from within the main body of the creek between Union Boulevard and Mechanicsville Service Road did not exhibit detectable levels of BTEX compounds. Several PAHs were detected at trace levels in the surface water samples collected from the main body of the creek. Stream sediment samples collected from the main body of the creek exhibited detectable concentrations of BTEX, PAHs and metals. However, in general, the concentrations of the chemicals detected in surface water and sediment would be considered typical of surface water and sediment that receives storm water from suburban roadways and commercial and light industrial properties, such as those present in the areas surrounding the pond/headwaters areas of Watchogue Creek/Crum's Brook.

Brightwaters Yard UST Removal/Closure IRM/Investigation

This IRM/Investigation included the excavation, cleanout, removal and closure of four USTs at the Brightwaters Yard, as well as the investigation and delineation of chemical constituents in soil and groundwater. The investigation/delineation program identified BTEX and PAHs present in subsurface soil within and immediately adjacent to the UST excavation. BTEX and PAH concentrations, as well as physical evidence of hydrocarbons such as staining and odors, decreased significantly at depths greater than 10 feet bgs. The majority of subsurface soil samples within the study area exhibited metals within concentration ranges that would be considered typical for ambient soil. However, a number of samples characterized as fill material containing coal, ash and cinders, exhibited several metals at concentrations above typical

background levels. Total cyanide was generally not detected or was present at concentrations less than the CRDL of 1.0 mg/kg with few exceptions. Total cyanide concentrations detected above the CRDL ranged from 2.0 mg/kg to a maximum of 81.7 mg/kg.

Groundwater samples collected downgradient of the UST excavation exhibited detectable levels of BTEX and PAHs. The highest concentrations of total BTEX and PAHs were detected in shallow groundwater approximately 30 feet downgradient of the UST excavation. Based on the results of the investigation, these constituents do not appear to be migrating off the Brightwaters East Parcel at any appreciable levels.

Brightwaters Yard Groundwater Plume IRM/Investigation

The results of this IRM/Investigation confirmed and clarified the findings of previous investigations. Compounds present in the groundwater plume included BTEX and “light-end” PAHs, primarily naphthalene. The plume is generally confined to shallow groundwater from the top of the water table to approximately 15 feet below grade at all off-site well locations. BTEX and PAH concentrations in groundwater appear to fluctuate over time within the downgradient limits of the plume. This may be due to the combination of a number of factors including: the naturally occurring increases and decreases in the elevations of the groundwater table and the associated “smearing” of chemicals within the clay/silt unit, the overall dilution of the plume through dispersion, and the reduction of chemical mass through naturally occurring biological processes.

Metals analysis of groundwater samples collected from monitoring wells indicated that the majority of metals were found at concentrations that would be considered typical of ambient groundwater quality. Total cyanide analysis identified several groundwater samples in which total cyanide was detected at concentrations that were greater than the CRDL of 20 ug/l with a maximum concentration of 125 ug/l. Free cyanide analysis indicated that the majority of the samples were free of detectable levels of free cyanide. Samples that indicated concentrations of free cyanide did not exceed 140 ug/l.

Surface water samples collected from O-Co-Nee Pond did not contain BTEX and PAH compounds while sediment samples exhibited trace levels of BTEX compounds, as well as certain PAHs. Cyanide was either not detected or found at concentrations less than the CRDL.

Private Property Air Sampling Program

As part of this investigation, 26 indoor air samples and ambient (outdoor) air samples were collected at eight private properties in the vicinity of the site. The analytical results of these samples indicated that, in general, the compounds detected were those that are typically found in homes due to the storage and use of consumer household products associated with cleaning, home care, refinishing, hobbies and automotive products, as well as from the storage of heating fuel. Various BTEX compounds were detected in a number of samples and are commonly associated with MGP-related residuals, as well as contemporary household products and applications as noted above. However, naphthalene, a signature compound associated with MGP-related residuals, was not detected in any of the samples.

Qualitative Human Exposure Assessment Findings

Under current and future site use conditions, the potentially exposed populations (i.e., potential receptors) are those that might come into contact with site chemicals of potential concern (COPCs). These receptor populations and the potential exposure pathways associated with each population are summarized in the July 2002 qualitative human exposure assessment.

Under current site use conditions, the on-site trespasser population is assumed to have the potential to receive exposure to surface soil via the ingestion (oral), dermal and inhalation routes. On-site KeySpan workers are assumed to spend time both outdoors and indoors and, consequently, are assumed to be exposed to chemicals in surface soil (via ingestion, dermal contact and inhalation during outdoor activities), and also to COPCs in indoor air (via inhalation during indoor activities).

Adult nearby off-site utility workers are assumed to be exposed to surface and subsurface soil via the ingestion, dermal and inhalation routes, and to groundwater via the dermal and inhalation routes as a consequence of their work.

Off-site residents living near former pond area of Watchogue Creek are assumed to contact surface soil (via ingestion, dermal contact and inhalation) during everyday activities such as playing, gardening, etc. Exposure to off-site sediment and surface water in Lawrence Creek, Lawrence Lake and O-Co-Nee Pond also is possible for these off-site residents. In addition, persons residing near the Bay Shore and Brightwaters groundwater plumes may be exposed to chemicals originating from groundwater via inhalation of vapors in indoor air.

Trespassers to Watchogue Creek are assumed to contact chemicals in sediment via ingestion and dermal contact in the area between Union Boulevard to the north and Mechanicsville Service Road to the south.

Under future site use conditions, on-site construction workers are assumed to be subject to exposure to surface and subsurface soil via the ingestion, dermal and inhalation routes, and to groundwater via the dermal and inhalation routes as a consequence of their work (i.e., trenching, excavation and installing deep piles). Off-site construction worker exposures to chemicals in these media also are assumed to occur in the former Cesspool and former pond area of Watchogue Creek. Given the potential for commercial redevelopment of the site, commercial workers and site visitors may be exposed to site-related chemicals via inhalation of chemicals in indoor air. A future residential land use scenario for the site was not included in the exposure assessment because it is expected that future residential development will be prevented by the use of deed restrictions.

Fish and Wildlife Resources Impact Analysis Findings

Following the Appendix 1C Decision Key in NYSDEC's Fish and Wildlife Resources Impact Analysis (FWRIA) guidance, a FWRIA was deemed required. The analysis focuses on risks associated with site-related chemicals detected in soil, surface water, sediment and

groundwater. The site reconnaissance conducted as part of this analysis indicates that the site and surrounding area are poor quality environmental resources, due to the limited presence of vegetation. The site is partially covered with buildings, bluestone and asphalt. Wildlife species typically present are adapted to an urban setting. Due to the limited size of the vegetated areas, only a few individual animals will be present. In addition, virtually all wildlife species in the community are transient and present on the site or in the plume path areas for brief periods, reflecting the degree of urbanization. Thus, there is little opportunity for exposure to any of the chemicals of potential ecological concern.

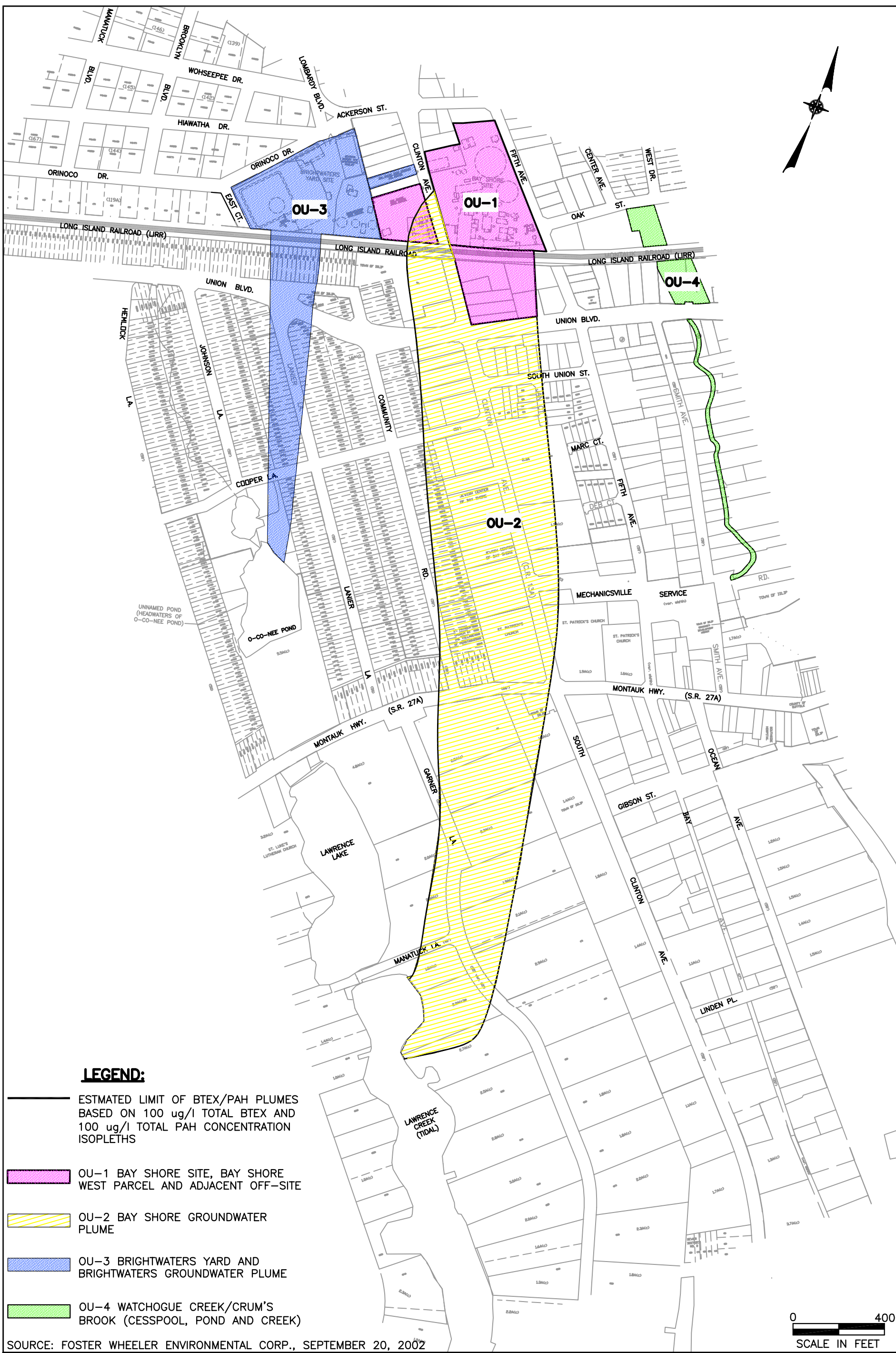
1.5 Operable Unit Designations

In an effort to more effectively manage the remediation of the Bay Shore/Brightwaters former MGP site, the site has been divided into four operable units (OUs), including:


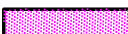



- *Operable Unit 1* - Bay Shore Site, Adjacent Off-site Areas north of Union Boulevard and Bay Shore West Parcel.
- *Operable Unit 2* - Bay Shore Site Groundwater Plume.
- *Operable Unit 3* - Brightwaters Yard and Groundwater Plume.
- *Operable Unit 4* - Watchogue Creek/Crum's Brook.

The geographic boundaries of each operable unit are provided on **Figure 1-3** and additional descriptive detail is provided below.

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LEGEND:

-  ESTIMATED LIMIT OF BTEX/PAH PLUMES BASED ON 100 ug/l TOTAL BTEX AND 100 ug/l TOTAL PAH CONCENTRATION ISOPLETHS
-  OU-1 BAY SHORE SITE, BAY SHORE WEST PARCEL AND ADJACENT OFF-SITE
-  OU-2 BAY SHORE GROUNDWATER PLUME
-  OU-3 BRIGHTWATERS YARD AND BRIGHTWATERS GROUNDWATER PLUME
-  OU-4 WATCHOGUE CREEK/CRUM'S BROOK (CESSPOOL, POND AND CREEK)

SOURCE: FOSTER WHEELER ENVIRONMENTAL CORP., SEPTEMBER 20, 2002

BAY SHORE/BRIGHTWATERS FORMER MGP SITE FINAL REMEDIAL INVESTIGATION
BAY SHORE, NEW YORK



OPERABLE UNIT DESIGNATIONS

FIGURE 1-3

Operable Unit 1 (OU-1 - Bay Shore MGP Site, Bay Shore West Parcel and Off-site Area South to Union Boulevard)

This operable unit addresses the Bay Shore Site, the Bay Shore West Parcel, and an off-site area south of the Bay Shore Site, extending to Union Boulevard. This area has been found to contain the source material associated with the Bay Shore Site groundwater plume.

Operable Unit 2 (OU-2 - Bay Shore MGP Groundwater Plume)

This operable unit addresses the dissolved phase groundwater plume emanating from Operable Unit 1 (OU-1) and the plume discharge area of Lawrence Creek.

Operable Unit 3 (OU-3 - Brightwaters Yard and Groundwater Plume)

This operable unit addresses the Bay Shore West Storage Lot Parcel, the Brightwaters Yard and its associated dissolved phase groundwater plume. This operable unit includes the plume discharge area of O-Co-Nee Pond.

Operable Unit 4 (OU-4 - Watchogue Creek/Crum's Brook)

This operable unit addresses off-site areas including a former Cesspool, former pond area, and the headwaters of Watchogue Creek (a.k.a. Crum's Brook), located approximately 400 feet east of the Bay Shore site. The former Cesspool historically received storm water drainage and process wastewater from the former Bay Shore MGP Site. The cesspool area is located immediately upgradient from a former pond that likely formed the headwaters of Watchogue Creek/Crum's Brook.