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SITE NAME: NATIONAL GRID: GREENPOINT ENERGY CENTER

Address: 287 Maspeth Avenue, Brooklyn, New York, 11211

Tax Lot Parcel(s): Brooklyn, Block 2837, Lot 1

Latitude: 40.720500 - 40° 43' 5.30"

Longitude: 73.931800 - 73° 55' 51.24"

Regulatory Programs/Numbers/Codes: NYSDEC Codes 224052, V00631, 610000X6OG - Division of Air Resources ID, (NYSDEC)00157 - Compliance Data System ID, (USEPA)NYD986871077 - Facility Index Database System ID, (USEPA)NYD006978795 - Resource Conservation Recovery Act ID , (USEPA) Plant ID 110002337784, Spill No. 9009058, 9111530, 9211562, 9301329, 9305107, 9606233, 9714234, 0004653, 0104143, 0106270, 0202908, 0303442, 0310061, 0413650, 0506134, 0908424, 0908872, 1006581, and 1012824.

Analytical Data Status: Electronic Data Available Hardcopies Only No Data Available

1 SUMMARY OF CONSTITUENTS OF POTENTIAL CONCERN (COPCs) TRANSPORT PATHWAYS TO THE CREEK

The current understanding of the transport mechanisms of contaminants from the upland portions of the Greenpoint Energy Center (Site) to Newtown Creek is summarized in this section and Table 1.

Overland Transport: No specific evidence of overland transport was identified in the available site records. The pathway has not been evaluated for completeness but will be under investigation in the near future.

Bank Erosion: A relieving platform (bulkhead) adjacent to Newtown Creek extends along the eastern part of the Site. No specific evidence of bank erosion was identified in the available

site records. The pathway has not been evaluated for completeness but will be under investigation in the near future.

Groundwater: Groundwater at the site generally flows easterly to southeasterly toward Newtown Creek, with the exception of the northeast corner where, according to the Paulus, Sokolowski and Sartor Engineering (PS&S) company reports, it appears to flow southwest (PS&S, 2006). The pathway has not been evaluated for completeness but will be under investigation in the near future.

Overwater Activities: Historical aerial photographs indicate that barges docked along the Site bulkhead. Reviewed information did not specify other current or historical overwater activities. The pathway has not been evaluated for completeness but will be under investigation in the near future.

Stormwater/Wastewater Systems: Information available for review identifies the presence of a manhole and a storm sewer pipe leading to the bulkhead. Information is unavailable as to the current or former connections related to this manhole and pipe. The pathway has not been evaluated for completeness but will be under investigation in the near future.

Additional information indicates that the current stormwater collection system at the Site is directed to the major collector along Maspeth Avenue. Final sewer discharge points are not defined.

Air Releases: Information related to air releases was not identified in the available historical information reviewed.

2 PROJECT STATUS

A summary of investigation and remedial activities at the site is provided in the following table.

Activity		Date(s)/Comments
Phase 1 Environmental Site Assessment	<input type="checkbox"/>	NA
Site Characterization	<input checked="" type="checkbox"/>	2004-2005; Completed for Liquefaction Plant Area (northeast)
Remedial Investigation	<input checked="" type="checkbox"/>	2004-2007; Completed for Liquefaction Plant Area (northeast)
Remedy Selection	<input checked="" type="checkbox"/>	2005; Completed for Liquefaction Plant Area (northeast)

Activity		Date(s)/Comments
Remedial Design/Remedial Action Implementation	<input checked="" type="checkbox"/>	2005, 2006-2007; Completed for Liquefaction Plant Area (northeast)
Use Restrictions (Environmental Easements or Institutional Controls)	<input checked="" type="checkbox"/>	Outlined in Soil Management Plan, Greenpoint Energy Center, Northeast corner (June, 2006).
Construction Completion	<input checked="" type="checkbox"/>	2005, 2006-2007; Completed for Liquefaction Plant Area (northeast)
Site Closeout/No Further Action Determination	<input type="checkbox"/>	

- NYSDEC Site Code(s): NYSDEC Code 224052, V00631, 610000X6OG - Division of Air Resources ID, (NYSDEC)00157 - Compliance Data System ID, (USEPA)NYD986871077 - Facility Index Database System ID, (USEPA)NYD006978795 - Resource Conservation Recovery Act ID (USEPA), Spill No. 9009058, 9111530, 9211562, 9301329, 9305107, 9606233, 9714234, 0004653, 0104143, 0106270, 0202908, 0303442, 0310061, 0413650, 0506134, 0908424, 0908872, 1006581, and 1012824.
- NYSDEC Site Manager: Henry Willems

3 SITE OWNERSHIP HISTORY

- Respondent Member: Yes No

Owner*	Occupant	Type of Operation	Year
Peter Cooper and others	Peter Cooper Glue Factory, Located near Maspeth Ave. and Newtown Creek	Glue Factory Ref: www.rebresearch.com and http://brooklynology.brooklynpubliclibrary.org/post/2011/08/05/Peter-Coopers-Glue-Works.aspx 1888 and 1907 Sanborn Maps	1838 - 1915
Unknown	Demuth Glass Manufacturing Co., located between Lombardy and Division St. on Newtown Creek	Ornamental glass Ref: 1888 and 1907 Sanborn Maps	1888 - c 1907

Brooklyn Union Gas	Brooklyn Union Gas	Manufactured gas, LP air, oil gas and refinery air gas Ref: Sanborn Maps, Aerial Photos, Brown's Directory and NY Public Service Commission Reports	1927 - 1978
Brooklyn Union Gas	Brooklyn Union Gas	Substitute Natural Gas (SNG) Ref: Sanborn Maps, Aerial Photos, BUG Literature and NY Public Service Commission Reports	1973 - 1989
Brooklyn Union Gas KeySpan National Grid	Brooklyn Union Gas KeySpan National Grid	Liquefied Natural Gas (LNG) Ref: Sanborn Maps, Aerial Photos and NY Public Service Commission Reports	1968 - Present

* The ownership records prior to 1927 were not researched. The presence of two factories (glass and glue) is based on historic maps of the area. The Greenpoint Energy Center was not one contiguous parcel until after Brooklyn Union Gas purchased the land in various segments prior to 1927. Between 1915 and 1927 we believe the site was vacant.

4 PROPERTY DESCRIPTION

The Site is comprised of approximately 117 acres and is bounded on the south by Maspeth Avenue, on the west by Vandervoort and Porter Avenues, on the north by Division Place and Lombardy Street, and on the east by Newtown Creek (Plate 1). The area surrounding the Site is predominantly industrial and manufacturing, with some commercial, and residential buildings to the northwest. The Site is generally flat, with a ground surface between approximately elevation (El.) 10 and 20, except for the northwestern portion of the Site which rises to approximately El. 65. All elevations are in units of feet referenced to North American Vertical Datum of 1988 (NAVD88).

Most of the Site is unpaved having either a gravel surface or bare soil. The paved portion of the Site is mainly to the southeast around the Service, Stores and Transportation Buildings. Varick Avenue, which runs south to north across the center of the Site is an abandoned partially paved road. There is a paved road running between the Transportation Building and the LNG facility to the north. The secured area contains two LNG tanks, two long metal storage buildings and a control house with offices.

On the southwest corner of the Site there exists two large circular concrete foundations for the former waterless gas holder tanks. There are both occupied and unoccupied buildings scattered around the Site. The occupied buildings are mainly the LNG facility and in the southeast where National Grid has their transportation and service center. The unoccupied buildings are remnants of the former manufactured gas works along Varick Avenue and include the S&S building, the laboratory building and the compressor building. To the west is the Meter Operations building, owned by National Grid, and a Soil Recycling Center, operated by the National Grid, which has two storage sheds.

The Site is served by both wastewater and stormwater sewers. Information available for review indicates the presence of a manhole and a storm sewer pipe in the eastern part of the site leading to the bulkhead, however current and former connections to this pipe are not known. Additional information also indicates that the central and western portions of the site are served by stormwater and wastewater lines that lead to the major collector line in Maspeth Avenue. All other wastewater and stormwater discharges to sewers in the perimeter streets. Final sewer discharge points are not defined.

5 CURRENT SITE USE

The Site currently is divided internally into two major operational areas: the LNG facility occupying the general northern half of the Site, and gas transmission and operations support facilities in the southern half of the Site. The entire Site is fenced along its perimeter with the LNG facility fenced internally, separating it from the operations area. The Site operates 24-hours per day with full-time site-wide security.

6 SITE USE HISTORY

The parts of the Site have been used for industrial purposes throughout a history dating to at least 1838 and generally included the following operations.

<u>Approximate Timeframe</u>	<u>Operations</u>
1838 – c 1920	Glue factory
1870 - c 1920	Glass company

1927 - 1952	MGP water gas plant
1928 - 1952	Coke oven gas plant
1952	Water gas plant converted to Oil Gas; Coke ovens decommissioned
1968 - Present	LNG facility
1973 - 1989	SNG Plant

The Site was owned and operated by Brooklyn Union Gas (BUG, a predecessor company of National Grid) through most of the 20th century. Prior to the purchase of the property by BUG, the Site contained two other industries in the mid- to late 1800s. Peter Cooper, a major New York industrialist, built a glue factory on Maspeth Avenue near Newtown Creek in 1838. To the north of the glue factory was the Demuth Glass Manufacturing Company near Lombardy Street and Newtown Creek which started around 1870.

During the late 1880s, the shoreline of the Site was different than existed when the MGP facility was built in the 1925. Newtown Creek to the east consisted of two channels that wrapped around an island, named Mussel Island. By 1925 Mussel Island and the channel between the island and the mainland were filled and made a part of the Site when a bulkhead system (relieving platform) was constructed.

After 1950 with the introduction of natural gas and LNG, the use of coal and oil to manufacture gas was curtailed. By the late 1960s LNG was stored at the Site and in the mid 1970s a modern SNG plant was built. The SNG was used for base load conditions. It operated for approximately 15 years before it was shut down in 1989. The LNG facility still stands today and the Site is used as a major regional regulator station for the natural gas network.

7 CURRENT AND HISTORICAL AREAS OF CONCERN AND COPCs

▪ Uplands

The Site has not been formally delineated to identify Areas of Concern, nor has there been a site-wide Remedial Investigation (RI). As agreed upon in a meeting with the NYSDEC Project Manager on June 9, 2011, the RI at the Site will be accomplished in three phases addressing Areas of Interest in order of priority. Phase 1 of the Remedial Investigation at the Site is scheduled for Spring 2012 with focus on the bulkhead area adjacent to Newtown Creek.

▪ Overwater Activities

Since the MGP was first constructed in 1925-1927 there was a coal off-loading dock on Newtown Creek. Coal was shipped to the Site in coal packets (a form of coastal bulk freighter). In 1946, with the introduction of heavy oil as a feed stock, an oil and by-product transfer facility was built at the northern end of the pier line just south of Lombardy Street. The oil and by-product off-loading activities we believe stopped after the oil gas process ceased in the late 1950s.

▪ Spills

There have been 19 spills registered from January 1978 through April 2011 that are reported in the NYSDEC Spill Incident Database for the Site address: 287 Maspeth Avenue, Brooklyn, NY (NYSDEC, 2012). Most spills at the Site were either gasoline or diesel and the reported quantities varied from 1 to 200 gallons. Only one spill is reported to have affected ground water and none – surface water. All the spills reported for the Site are closed.

NYSDEC Spill No.	Spill Date	Close Date	Material Spilled	Amount Spilled	Resource Affected
9009058	11/16/1990	3/4/2003	Gasoline	Unknown	Groundwater
9111530	2/7/1992	11/22/1994	Unknown Petroleum	Unknown	Soil
9211562	1/7/1993	2/6/2007	Gasoline	Unknown	Soil
9301329	4/28/1993	12/23/2002	Diesel	100.00 Gal.	Soil
9305107	7/23/1993	3/28/2005	Gasoline	Unknown	Soil
9606233	8/14/1996	10/27/1997	Diesel	10.00 Gal.	Soil
9714234	3/24/1998	3/31/1998	Gasoline	5.0 Gal.	Soil
0004653	7/18/2000	2/24/2003	Diesel	Unknown	Soil
0104143	7/18/2001	2/13/2003	PAINT	Unknown	Soil
0106270	9/13/2001	2/6/2007	Diesel	200.00 Gal.	Soil
0202908	6/19/2002	3/13/2003	Hydrocarbons	1.00 Gal.	Soil
0303442	7/2/2003	7/9/2003	SLUDGE	Unknown	Soil
0310061	11/26/2003	12/17/2003	#2 Fuel Oil	2.00 Gal.	Soil
0413650	3/31/2005	4/4/2005	Material not identified	N/A	
0506134	8/18/2005	8/18/2005	Motor Oil	25.00 Gal.	Soil
0908424	10/27/2009	11/6/2009	Waste Oil/Used Oil	22.00 Gal.	Unknown
0908872	11/7/2009	12/9/2009	Unknown Hazardous material	Unknown	Unknown
1006581	9/17/2010	9/17/2010	Other	30.00 Gal.	Soil

1012824	3/24/2011	4/5/2011	Non-PCB Oil	3.00 Gal.	Unknown
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8 PHYSICAL SITE SETTING

Geology

The geology of the Site consists of approximately 200 feet of overburden underlain by bedrock. Site geology has been investigated to a limited extent as part of the LNG IRM pre-design program (discussed below) that included soil borings, groundwater sampling and testing, and groundwater elevation gauging.

Overburden has been observed to consist of, in order of increasing depth:

- Fill and recent sand deposits
- Drumlin or Moraine deposits (northwest corner of Site)
- Marsh deposits (along Newtown Creek and English Kills)
- Glacial outwash sands with discontinuous silt and till lenses
- Gardiner's Clay
- Deep sand.

The Site is generally flat, with a ground surface between approximately El. 10 and El. 20, except for the northwestern portion of the Site which rises to approximately El. 65. The observed thickness of the fill ranges from about 30 to 40 feet along Newtown Creek, and 10 to 15 feet inland. Native sand was observed beneath the fill in some locations. Marsh deposits consisting of peat, silt, and clay are located within the footprint of the former tidal marsh adjacent to Newtown Creek and English Kills.

Glacial outwash is present throughout the Site, with measured thicknesses of 50 to 70 feet. The glacial outwash was observed to consist of sand, silty sand, and gravel, with occasional gravel seams. The glacial outwash is underlain by the Gardiner's Clay, observed on Site to be comprised of silty sand and clay with thicknesses ranging from 5 to at least 15 feet. The Site is at the northern extent of the Gardiner's Clay as mapped by USGS (USGS, 1986), which may explain the minimal thickness and low clay content observed in some locations. The deep sand unit located beneath the Gardiner's Clay may be related to the Jameco Gravel aquifer; however, the northern extent of the Jameco Gravel as mapped by USGS is about a mile south of the Site. A historical investigation indicates the depth of bedrock at about 132 to 185 feet below the ground surface in the northern part of the Site. The regional USGS

bedrock surface map shows bedrock surface dipping downward from northwest to southeast at about 100 vertical feet per 1.5 miles.

Hydrogeology

Two regional aquifers are present in the area of the Site: the Upper Glacial Aquifer and the Jameco Aquifer. The Upper Glacial Aquifer is unconfined, and includes ground water within the fill, marsh deposits, and glacial outwash units. Ground water in the Upper Glacial Aquifer generally flows southwesterly toward New York Harbor, but locally converges toward the area of Newtown Creek [USGS, 1997]. The Jameco Gravel is a confined or semi-confined aquifer, generally located beneath the Gardiner's Clay. The Site is located about a mile north of the mapped extent of the Jameco Gravel; however, sand present beneath the Gardiner's Clay on Site may be connected to the Jameco Aquifer.

9 NATURE AND EXTENT (*CURRENT UNDERSTANDING OF ENVIRONMENTAL CONDITIONS*)

9.1 Soil and Groundwater

Limited soil and groundwater data are available for the Site and are presented in the historical investigation summaries below. The Site is scheduled to undergo a phased RI with initial focus on the bulkhead area to assess potential contaminant transport pathways into Newtown Creek. Phase 1 of the RI activities is scheduled for Spring of 2012, pending NYSDEC approval of the RI work plan.

- | | |
|--|--|
| ▪ Soil Investigations | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| ▪ Bank Samples | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| ▪ Groundwater Investigations | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| ▪ NAPL Presence (Historical & Current) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| ▪ Dissolved COPC Plumes | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A |
| ▪ Visual Seep Sample Data | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

Brooklyn Union Gas Naphtha Study Boring Results, Brooklyn Union Gas Company, February 1979

Starting in January 1979, BUG, at the request of the United States Coast Guard (USCG), drilled soil borings in the Tank Farm Area in the northwest part of the Site. These borings assisted the USCG in defining the extent of an underlying hydrocarbon deposit located in the

Greenpoint area of Brooklyn. The study was prompted by the USCG observation of large quantities of oil in Newtown Creek on September 2, 1978 and the fact that the BUG Site hosted oil and gas operations and was situated along Newtown Creek less than a half-mile away from the location of observed oil seepage at the foot of Meeker Street. Ultimately, as described below (Geraghty and Miller investigation), it was concluded that the observed oil seepage was unrelated to BUG and the Site.

A total of 17 borings were drilled at the Naphtha Tank Farm Area. The investigation targeted the depth interval at and slightly below the water table. When the water table was encountered, a well with a 10 foot screen was installed. The samples were examined by both BUG and the USCG. No contaminants were found in either the water or the soil samples taken from the available test points in the Naphtha Tank Farm Area.

Investigation of Underground Accumulation of Hydrocarbons along Newtown Creek, Brooklyn, New York. Geraghty and Miller, Inc., July 1979

The report summarizes the results of a study carried out by Geraghty and Miller on behalf of the USCG which investigated a large accumulation of hydrocarbons in the subsurface of Brooklyn, New York. The investigation began in September 1978 and continued until June 1979. The horizontal and vertical extent of the petroleum product was mapped through installation of test borings and collection of field measurements. The Site was one of the facilities under investigation. The other possible sources of hydrocarbon accumulation were thought to be oil terminals, and pipelines which are present throughout the area.

A total of six borings were installed around the tank farm in the northwest part of the property and one additional boring along Lombardy Street near the intersection of Stewart Avenue to a depth of up to 53 feet below the ground surface. According to the report, no traces of hydrocarbons were found in any of the soil or water samples collected from the wells installed at the boring locations. Based on these results, Geraghty and Miller concluded that the spill did not originate at the Site.

Ground-Water Contingency Plan for the Brooklyn Union Gas Company Petroleum Bulk Storage Facility, Roux Associates, 1990

Roux Associates was retained by BUG in June 1989 to install and sample five ground-water monitoring wells at the petroleum bulk storage facility in the northwest part of the Site. The purpose of the monitoring wells was to determine groundwater quality, to determine if any petroleum hydrocarbons were present near above-ground storage tanks, and to monitor for future leaks at the Site.

The five wells were initially sampled in July 1989 and then re-sampled during January 1990 and May 1990. During the July 1989 sampling event, the five wells were sampled for BTEX and petroleum products (i.e., gasoline, kerosene, and fuel oil). During the January sampling event, the five monitoring wells were sampled for BTEX, gasoline, kerosene, fuel oil, and lubrication oil. During the May sampling event, the five monitoring wells were sampled for BTEX and for polycyclic aromatic hydrocarbons (PAH). No above-mentioned constituents were detected during the three sampling events. No free product had been found in the five monitoring wells when measurements were taken by Roux Associates' personnel or during monitoring of the wells by BUG personnel.

Underground Storage Tank Closure Report, Lexicon Environmental Associates, 1993

In July 1993 Lexicon Environmental Associates observed the removal of two 550- and two 4,000-gallon tanks located at the southwest side of the Transportation Building (along Maspeth Avenue). The 550-gallon tanks were in service from 1959 to 1988 and were used for gasoline storage. The 4,000-gallon tanks were in service from 1977 to 1993 and were also used for gasoline storage.

The excavation outside of the concrete vaults exposed contaminated soils that exhibited an odor not characteristic of gasoline-contaminated soils. Five soil samples were collected following the tank removal from depths of between 3 and 45.5 feet below the ground surface. All five samples identified the presence of several VOCs in varying quantities. Naphthalene was identified at concentration of 20,000 µg/L in one of the soil samples.

A petroleum hydrocarbon analysis obtained from one of the tank pit soil samples did not match gasoline, fuel oil, or diesel fuel reference standard patterns. The peaks identified in the analysis were heavy molecular weight hydrocarbons.

Underground Storage Tank Groundwater Investigation, Fanning, Phillips & Molnar, 1993 to 1995

Fanning, Phillips & Molnar (FP&M) was retained by BUG to perform an underground storage tank (UST) groundwater investigation following the removal of four USTs located at the southwest side of the Transportation Building in July of 1993. The investigation findings noted:

- USTs tested tight, tank steel in excellent condition
- Regarding the condition of the 550-gallon tank concrete vaults: clean sand backfill, no gasoline contamination evident
- Regarding the condition of the concrete encasing of the 4,000-gallon tanks; no staining
- Soil samples exhibited naphthalene levels not indicative of gasoline.

The NYSDEC required BUG to install groundwater monitoring wells at the southwest UST area based on the levels of hydrocarbons present in soils. Four wells were installed following this request in 1993 and 1994. Free product was encountered in monitoring wells W-1 and W-2 one week after development. During drilling of monitoring wells W-3 and W-4, petroleum-contaminated soils were encountered at the water table. Free product was not detected in wells W-3 or W-4.

The closest previously-existing monitoring well to the tank excavation was GPW-7, located 365 feet west of the UST area. The drilling log for the well indicates that soil samples obtained from the vadose zone, water table, and the saturated zone exhibited a weathered gasoline odor and the cuttings had a slight sheen. The depth to water was approximately 7 feet below the ground surface. The groundwater sample at GPW-7 had measured 1,800,000 µg/l of benzene.

Investigation of Proposed UST Locations East of Transportation Building, Groundwater Technology, Inc., 1995

Groundwater Technology, Inc. (GTI) installed five geotechnical borings and a monitoring well at the request of BUG to support the replacement of the existing USTs at the east side of the Transportation building. Soil samples were collected during the boring installation at the 5-to 7- and 10- to 12-foot intervals. A monitoring well was completed to a depth of 20 feet and a groundwater sample was collected following the well installation.

The soils encountered in the boreholes and monitoring well consisted of fill deposits. The water table was located at approximately 11 feet below the ground surface. Soil samples indicated elevated concentrations of benzene, xylene, 1,2,4, trimethylbenzene, and naphthalene. The groundwater sample only had elevated benzene and none of the other abovementioned compounds.

Preliminary Evaluation of Maspeth Holder Demolition Impacts, Vanasse Hangen Brustlin, Inc., 2001.

At the request of KeySpan Energy (the owner of the Greenpoint Energy Center at the time) Vanasse Hangen Brustlin (VHB) performed a preliminary evaluation of KeySpan's analytical data collected prior, during, and after the demolition of the Maspeth Holders which were demolished by implosion on July 15, 2001. Surface samples were collected prior and after the demolition of Holders 1 and 2 from the depth interval 0 to 1.5 centimeters below the ground surface from 76 locations near the holders, including areas outside the Site. All soil samples were analyzed for lead addressing a concern of elevated lead concentrations that could have originated from paint chips flaking from the Maspeth Holders. Surface wipe samples were collected from a variety of hard surfaces and also analyzed for lead.

Lead concentrations in surface soils ranged from 1 mg/kg to 2,600 mg/kg. The highest lead concentration of 2,600 mg/kg registered in a surface soil sample collected outside the Site a few days before the Maspeth Holders implosion. The overall average lead concentration for surface soil samples collected pre-demolition was 339 mg/kg while the post-demolition overall average concentration was 322 mg/kg. VHB concluded, that based on analytical results, pre- and post-demolition lead concentrations in soil were not significantly different on a statistical basis.

Greenpoint Holder Soil Sampling Results, Miller Environmental Group, 2002.

A soil sampling program was carried out by Miller Environmental Group in November 2002 in the vicinity of the Maspeth Holder Station Holders 1 and 2. Soil samples were collected from 27 locations to a depth of 1 foot below the ground surface and analyzed by KeySpan Laboratory Services for lead. No formal report was found, but according to the available lab analytical reports, lead concentrations ranged from 35 mg/kg to 12,100 mg/kg. The sample with highest lead concentration was collected from the ground surface. No map of sampling locations was provided.

Preliminary Subsurface Investigation at the Greenpoint Operations Center, Miller Environmental Group, 2003.

Miller Environmental Group was retained by KeySpan Energy Corporation to perform a preliminary subsurface investigation at the Site in December 2002. Three borings and one temporary well were installed in the vicinity of LNG Tank 2 to a maximum depth of 13 feet below ground surface. Three soil and two groundwater samples were analyzed for Resource Conservation and Recovery Act (RCRA) metals, VOCs, SVOCs, cyanide, and diesel range compounds (DRO). Soil was also analyzed for petroleum products, and dielectric compounds. An Oil/NAPL sample was recovered and identified by the lab as a #6 fuel oil.

According to the Miller Environmental Group, the investigation indicated residual MGP waste at each sampling location both by field observations and analytical results.

Northeast Corner of the Greenpoint Energy Center (Liquefaction Plant), Paulus Sokolowski & Sartor Engineering, PC, 2004 to 2007.

Site investigation activities were conducted by the Paulus Sokolowski & Sartor (PS&S) Engineering Company from 2004 to 2007 at the request of National Grid in the area of the proposed LNG liquefaction facility in the northeast part of the Site. The investigation activities were to support a RI of the area, and an Interim Remedial Measure (IRM) design and implementation. Investigation activities included the installation of 58 soil borings, multiple test pits, soil vapor monitoring points, groundwater monitoring wells and the collection and laboratory analysis of soil, soil vapor and groundwater samples. Soil samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs), RCRA metals and cyanide. A summary of the observations based on the available PS&S reports is presented below:

- Within the investigation area underlying the proposed LNG liquefaction facility, areas of subsurface soil exhibiting tar fragments, saturation, staining or coating, were encountered primarily in the first 5 feet below the ground surface. Visual impacts were observed to a maximum depth of 18 feet.
- The highest VOCs and SVOCs concentrations were observed in the subsurface soil samples collected from 0 to 6 inches above the groundwater table. VOC and SVOC concentrations decrease below a depth of 5 feet.
- Naphthalene odors were observed to a maximum depth of 3 feet while fuel-like odors were observed to a maximum depth of 45 feet.

Subsequently, an IRM was implemented under the approval of the NYSDEC addressing the impacted soil prior to the construction of the liquefaction facility.

Pre-Design Investigation Program, GEI Consultants, 2009 to 2010

GEI conducted a pre-design investigation to assess the potential need for a bulkhead IRM in accordance with a NYSDEC-approved Pre-Design Investigation (PDI) Work Plan, Cutoff Wall Interim Remedial Measure dated January 9, 2009, and Supplemental Pre-Design Investigation Work Plan, Cutoff Wall Interim Remedial Measure dated April 8, 2010. The investigation is not complete, and will be continued in Phase 1 of the RI, pending approval of the workplan by the NYSDEC.

Ball Field Human Health Risk Assessment Program, GEI Consultants, June 2010

GEI conducted an assessment of human health risk in December 2010 for the Site baseball field located at the intersection of Maspeth and Vandervoort Avenues. The human health risk assessment was conducted in response to the results of the evaluation of soil samples collected adjacent to the ball field which identified the presence of chemicals of potential concern. Prior to the start of this assessment, the baseball field was used by National Grid employees for a summer baseball league. In addition, the baseball field had been leased by Saint Joseph's College for their women's softball team practices and home games during the fall and spring seasons.

GEI evaluated the potential exposure of receptor populations to surface soils and soils immediately beneath the baseball field. The receptor populations evaluated in this assessment included: child visitor, adult worker, and student player. To evaluate soil conditions, GEI collected 42 soil samples on June 25, 2010, from the 0- to 2-inch and 2- to 6-inch depth intervals in a grid across the baseball field. The samples were analyzed for SVOCs, PAHs, PCBs, and metals. Based on the evaluation of potential exposures to the human receptors at the baseball field, the cancer risk estimates for a child visitor, adult worker and student player at the baseball field are within the USEPA acceptable cancer risk range of 1×10^{-4} to 1×10^{-6} . However, to be conservative, National Grid subsequently suspended use of the ball field.

Soil Analytical Results

Analyte	Units	Minimum Soil Concentration	Maximum Soil Concentration
Surface (0 to 2 feet)			
Metals			
Arsenic	mg/kg	ND	36.5
Barium	mg/kg	3.9 B	411
Cadmium	mg/kg	ND	1.5
Chromium	mg/kg	2.5	41.2
Total Cyanide	mg/kg	ND	7.8
Lead	mg/kg	1.8	449
Mercury	mg/kg	ND	4.2
Selenium	mg/kg	ND	3.3
Silver	mg/kg	ND	2.8
SVOCs			

Phenol	mg/kg	ND	ND
2-Methylphenol	mg/kg	ND	ND
4-Methylphenol	mg/kg	ND	ND
Isophorone	mg/kg	ND	ND
2,4-Dimethylphenol	mg/kg	ND	ND
Naphthalene	mg/kg	ND	20 D
2-Methylnaphthalene	mg/kg	ND	7.8 D
2-Chloronaphthalene	mg/kg	ND	ND
Acenaphthylene	mg/kg	ND	9.5 D
Acenaphthene	mg/kg	ND	1.6
Dibenzofuran	mg/kg	ND	4.9
Diethylphthalate	mg/kg	ND	0.82
Fluorene	mg/kg	ND	11 D
4,6-Dinitro-2-methylphenol	mg/kg	ND	ND
N-Nitrosodiphenylamine	mg/kg	ND	0.36
Phenanthrene	mg/kg	ND	47 D
Anthracene	mg/kg	ND	13 D
Carbazole	mg/kg	ND	4.1
Di-n-butylphthalate	mg/kg	ND	0.14
Fluoranthene	mg/kg	ND	62 D
Pyrene	mg/kg	ND	75 D
Butyl benzyl phthalate	mg/kg	ND	0.55
Benzo(a)anthracene	mg/kg	ND	39 D
Chrysene	mg/kg	ND	42 D
Bis(2-ethylhexyl)phthalate	mg/kg	ND	0.96
Benzo(b)fluoranthene	mg/kg	ND	35 D
Benzo(k)fluoranthene	mg/kg	ND	18 D
Benzo(a)pyrene	mg/kg	ND	38 D
Indeno(1,2,3-cd)pyrene	mg/kg	ND	9.6 D
Dibenzo(a,h)anthracene	mg/kg	ND	4.2
Benzo(g,h,i)perylene	mg/kg	ND	3.9
VOCs			
Methylene Chloride	mg/kg	ND	0.016
Acetone	mg/kg	ND	0.023
Carbon Disulfide	mg/kg	ND	ND
2-Butanone	mg/kg	ND	ND
1,1,1-Trichloroethane	mg/kg	ND	ND
Benzene	mg/kg	ND	ND
Toluene	mg/kg	ND	ND

Ethylbenzene	mg/kg	ND	ND
Total Xylenes	mg/kg	ND	ND
Styrene	mg/kg	ND	ND
Trichloroethene	mg/kg	ND	ND
Tetrachloroethene	mg/kg	ND	ND
PCBs			
Aroclor 1016	mg/kg	ND	ND
Aroclor 1221	mg/kg	ND	ND
Aroclor 1232	mg/kg	ND	ND
Aroclor 1242	mg/kg	ND	0.29
Aroclor 1248	mg/kg	ND	ND
Aroclor 1254	mg/kg	ND	0.077
Aroclor 1260	mg/kg	ND	0.15
Subsurface (>2 feet)			
Metals			
Arsenic	mg/kg	ND	1720
Barium	mg/kg	14 B	280
Cadmium	mg/kg	ND	2.3
Chromium	mg/kg	1.9	34.4
Total Cyanide	mg/kg	ND	41
Lead	mg/kg	0.34	593
Mercury	mg/kg	ND	4
Selenium	mg/kg	ND	1.3
Silver	mg/kg	ND	1.2 B
SVOCs			
Phenol	mg/kg	ND	4.8
2-Methylphenol	mg/kg	ND	1.2
4-Methylphenol	mg/kg	ND	5.6
Isophorone	mg/kg	ND	ND
2,4-Dimethylphenol	mg/kg	ND	11
Naphthalene	mg/kg	ND	3700 D
2-Methylnaphthalene	mg/kg	ND	2400 D
2-Chloronaphthalene	mg/kg	ND	0.66
Acenaphthylene	mg/kg	ND	370
Acenaphthene	mg/kg	ND	650 D
Dibenzofuran	mg/kg	ND	280 D
Diethylphthalate	mg/kg	ND	0.71
Fluorene	mg/kg	ND	820 D

4,6-Dinitro-2-methylphenol	mg/kg	ND	ND
N-Nitrosodiphenylamine	mg/kg	ND	35
Phenanthrene	mg/kg	ND	2400
Anthracene	mg/kg	ND	540 D
Carbazole	mg/kg	ND	45
Di-n-butylphthalate	mg/kg	ND	0.48
Fluoranthene	mg/kg	ND	1100
Pyrene	mg/kg	ND	1300
Butyl benzyl phthalate	mg/kg	ND	0.45
Benzo(a)anthracene	mg/kg	ND	530
Chrysene	mg/kg	ND	590 D
Bis(2-ethylhexyl)phthalate	mg/kg	ND	0.88
Benzo(b)fluoranthene	mg/kg	ND	370 D
Benzo(k)fluoranthene	mg/kg	ND	230 D
Benzo(a)pyrene	mg/kg	ND	440
Indeno(1,2,3-cd)pyrene	mg/kg	ND	22
Dibenzo(a,h)anthracene	mg/kg	ND	1.3
Benzo(g,h,i)perylene	mg/kg	ND	18
VOCs			
Methylene Chloride	mg/kg	ND	0.016 B
Acetone	mg/kg	ND	0.03
Carbon Disulfide	mg/kg	ND	ND
2-Butanone	mg/kg	ND	ND
1,1,1-Trichloroethane	mg/kg	ND	0.81
Benzene	mg/kg	ND	13 E
Toluene	mg/kg	ND	19 D
Ethylbenzene	mg/kg	ND	16 D
Total Xylenes	mg/kg	ND	37 D
Styrene	mg/kg	ND	ND
Trichloroethene	mg/kg	ND	0.002 J
Tetrachloroethene	mg/kg	ND	0.22
PCBs			
Aroclor 1016	mg/kg	ND	ND
Aroclor 1221	mg/kg	ND	ND
Aroclor 1232	mg/kg	ND	ND
Aroclor 1242	mg/kg	ND	0.051
Aroclor 1248	mg/kg	ND	ND
Aroclor 1254	mg/kg	ND	ND

Aroclor 1260	mg/kg	ND	0.042
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Notes:

ND - Indicates Compound Was Not Detected At The Method Detection Limit.

D - Indicates Sample Was Diluted.

J - Indicates That Compound Was Detected At A Concentration Below The Method Detection Limit.

B - Indicates Compound Was Also Reported In Quality Assurance/Quality Control Blanks.

9.2 Surface Water

- Surface Water Investigation Yes No
- General or Individual Stormwater Permit (Current or Past) Yes No
- Do other non-stormwater wastes discharge to the system? Yes No
- Stormwater Data Yes No
- Catch Basin Solids Data Yes No
- Wastewater Permit Yes No
- Wastewater Data Yes No
- Surface Water Summary

No surface water investigations have been performed to-date.

9.3 Sediment

- Creek Sediment Data Yes No

9.4 Air

- Air Permit Yes No

Permit Type	Permit Number	Start Date	Frequency-Parameters
Title V Permit	2610100071	9/18/2007	Title V Permit requires submittal of Annual Compliance & Monitoring, Semi-Annual Monitoring, and Quarterly Monitoring Reports. In addition, Annual Fuel Use and Emission Statements must be submitted on an annual basis. The facility has a 12 month rolling NOx limit of 94,600 lb/yr. VOC emission limits (3.0 lb/gal.) apply to paint used at the Meter (gas meters) & Test facility.
NYCDEP Air Permit/Registrations	CA064992L	Start Date not Available	No monitoring or reporting requirements associated with these permits
Same as above	CA195391X	Same as above	No monitoring or reporting requirements associated with these permits

Same as above	CA195691H	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CA195791P	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CA233997P	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CA409386M	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CB250902N	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CB251002Z	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CB306400X	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	CB306600M	Same as above	No monitoring or reporting requirements associated with these permits
Same as above	GA003397X	Same as above	No monitoring or reporting requirements associated with these permits

▪ Air Data

Yes No

Report Date	Constituent	Result	Unit	Limit	Notes
15-Apr-11	Carbon Dioxide	398.07	Tons	N/A	Title V Permit 2-6101-00071
15-Apr-11	Carbon Monoxide	2.48	Tons	N/A	Title V Permit 2-6101-00071
15-Apr-11	Sulfur Dioxide	0.002	Tons	N/A	Title V Permit 2-6101-00071
15-Apr-11	Particulates	0.79	Tons	N/A	Title V Permit 2-6101-00071
15-Apr-11	Oxides of Nitrogen	3.68	Tons	47.3	Title V Permit 2-6101-00071
15-Apr-11	VOC	0.89	Tons	N/A	Title V Permit 2-6101-00071

▪ Air Summary

Greenpoint Energy Center operates under a Title V Permit that controls the emissions from six LNG vaporizers, two CNG RICE driven gas compressors, and three engine generators operated in association with the LNG facility.

10 REMEDIATION HISTORY (INTERIM REMEDIAL MEASURES AND OTHER CLEANUPS)

▪ Soil Cleanup

Soil cleanup activities implemented at the Site to date have been limited to the northeast corner of the Site, in accordance with requirements set forth in the Voluntary Cleanup Agreement with the NYSDEC, Site No. V006312.

Remedial Investigation activities were conducted in March 2004, November and December 2004, and January 2005 in the northeast corner of the Site, at the site of LNG plant. Following the RI, the IRM was implemented within the northeast corner of the Site in order to eliminate exposure pathways to Site soils with contaminant concentrations in excess of established cleanup standards and to remove grossly contaminated soils and other potential contaminated material that could serve as a potential source of contaminant soil gas. Implementation of IRM activities commenced with mobilization on April 15, 2005 and concluded with restoration activities on June 17, 2005. The completed IRM work effort included the following:

- Removal of approximately 9,900 tons of impacted soils that were classified as nonhazardous.
- Removal of approximately 408 tons of debris consisting primarily of demolished roadway asphalt and cement piping.
- Backfilling and compaction of excavation areas using certified clean course aggregate to pre-existing grades (i.e., environmental soil cap).
- Placement of a crushed stone cover consisting of 12 inches of ¾-inch stone located along the eastern portion of the remedial area.
- Re-construction of the pre-existing asphalt roadway using certified clean fill (i.e., road-base material) consisting of crushed ledge rock.
- Installation of a protective stone cover over the eastern extent of the existing soil berm using 7-inch-diameter riprap stone.

Subsequent to the completion of the June 2005 IRM, based on the proposed additional expansion of facilities in the northeast corner, Supplemental Site Investigation (SSI) activities were conducted in May 2006 and August 2007. The purpose of the May 2006 SSI was to characterize subsurface soil conditions within the planned construction excavation areas and to supplement previous investigations and complete the characterization of subsurface soils along the northern perimeter of expansion area.

Implementation of supplemental IRM (SIRM) activities commenced on July 13, 2006 and concluded with Site restoration/demobilization activities on December 4, 2007. The SIRM activities included, but were not limited to, the following:

- Excavation and disposal of approximately 7,114 tons of impacted soil and associated debris. SIRM excavation depths ranged from 3 to 10 feet below the ground surface.
- Backfilling and compaction of the excavation areas using non-impacted soils approved for re-use on Site in accordance with the NYSDEC approved 2006 Soil Management Plan, and/or imported certified clean fill to pre-existing grades.
- Restoring the soil berm located in the northeast corner (including the removal and off-site disposal of an existing asphalt emulsion cover and placement of a 7-inch riprap stone protective cover).
- Installing five 12-foot-diameter drywells.
- Conducting a SSI program.
- Performing ancillary excavations and construction activities to support the future site development.

The objective of the SIRM activities was to remove impacted soils to eliminate future potential direct contact and inhalation exposure pathways to workers performing subsurface construction activities associated with the expansion of the facility's operations within the northeast corner. To achieve this objective the SIRM excavation work included an allowance for the removal of up to an additional 1 foot of the suspected impacted material beyond the planned limits of the expansion facilities. Based upon completion of the activities described in the Final Site Investigation/Supplemental Interim Remedial Measure Completion Report (PS&S, 2009), the SIRM was successful in removing the identified impacted materials from the SIRM area.

- Groundwater Cleanup
None

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12 ATTACHMENTS

Figure 1. Site Location.

Plate 1. Greenpoint Historical Investigation Locations.

Table 1. Potential Areas of Concern and Transport Pathways Assessment – Greenpoint Energy Center Site

Table 1.
Potential Areas of Concern and Transport Pathways Assessment – Greenpoint Energy Center Site

Potential Areas of Concern	Media Impacted					COPCs													Potential Migration Pathway ¹						
						TPH			VOCs			SVOCs	PAHs	Phthalates	Phenolics	Metals	PCBs	Herbicides and Pesticides					Dioxins/Furans		
	Surface Soil	Subsurface Soil	Groundwater	Catch Basin Solids	River Sediment	Gasoline-Range	Diesel – Range	Heavier – Range	Petroleum Related (e.g., BTEX)	VOCs	Chlorinated VOCs								Overland Transport	Groundwater	Direct Discharge – Overwater	Direct Discharge – Storm/Wastewater		Discharge to Sewer/CSO	Bank Erosion
Description of Areas of Concern																									
Greenpoint Energy Center Liquefaction IRM area, IRM completed under NYSDEC code V00631	√	√	√	?	?	?	√	?	√	√	√	√	√	√	√	√	?	√	?	?	?	?	?	?	?
Greenpoint Energy Center – the rest of the Site, RI under NYSDEC code 224052	√	√	√	?	?	√	√	√	√	√	?	√	√	√	?	√	√	?	√	?	?	?	?	?	?

Notes:

√ - COPCs are/were present in Areas of Concern having a current or historical pathway that is determined to be complete or potentially complete

? - There is not enough information to determine if COPC is/was present in Area of Concern or if pathway is complete

-- - Current or historical pathway has been investigated and shown to be not present or incomplete

¹? – COPC detected in one or more media, but migration pathway not yet evaluated

COPCs – Constituents of Potential Concern

BTEX - Benzene, toluene, ethylbenzene, and xylenes

PAHs - Polycyclic aromatic hydrocarbons

SVOCs - Semi-volatile Organic Compounds

TPH - Total Petroleum Hydrocarbons

VOCs - Volatile Organic Compounds

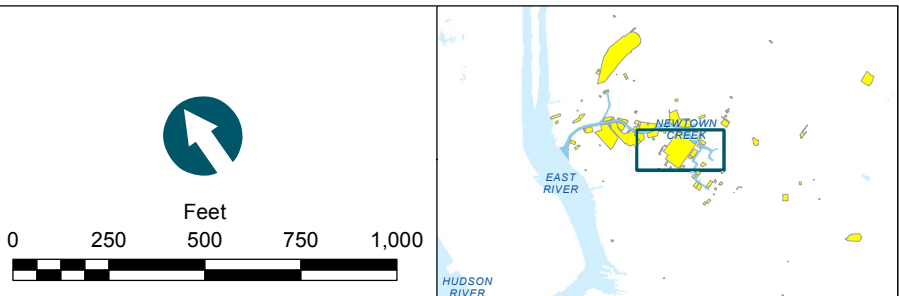


G:\Jobs\110782-01 NewtownCreek\Map\RI RemedialInvestigation\Historic Data Research\Site Features\Mapbook.mxd ckblinger 5/23/2012 4:57:52 PM

- | | |
|---|--|
| <ul style="list-style-type: none"> ● USEPA Sample Locations (Surface and Subsurface) Shoreline (NYC Dept. of Information Technology, 2006) USGS Nat'l Elev. Dataset 5-foot Contours Selected Site Property Boundary Neighboring Site Property Boundary | <p>Outfall Class</p> <ul style="list-style-type: none"> ● Direct Discharge ● General ● Highway Drain ● Major Stormwater Outfall ● SPDES ● Storm Drain |
|---|--|

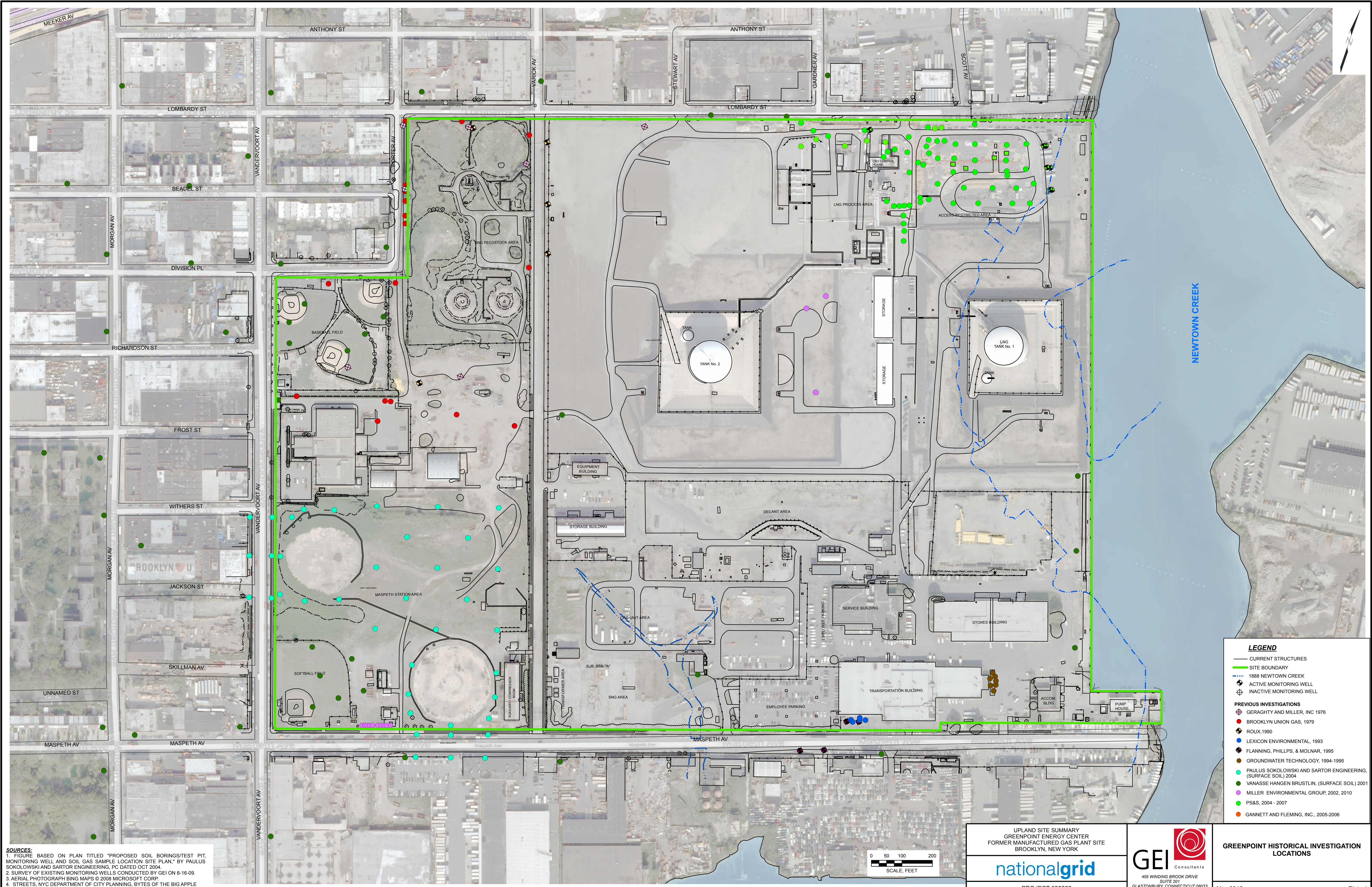
NOTES:

1. Outfall Labeling: BB: Bowery Bay; NC(B/Q): Newtown Creek, Brooklyn/Queens; ST: Stormwater.
2. Outfall locations are preliminary, compiled, estimated data based on New York City Department of Environmental Protection (NYCDEP) maps and tabulated data and other resources. Many outfall locations were taken from the New York City Shoreline Survey Program: Newtown Creek Water Pollution Control Plant Drainage Area, NYCDEP, March 31, 2003. Other locations were taken from an excerpt from a similar report from 2008 (the complete report was not included in files available for review). Finally, some outfall locations were inherited from previous Anchor QEA and Newtown Creek Project work. Latitudinal and longitudinal data provided in the 2003 and 2008 NYCDEP reports were rounded to the nearest second. This resulted in potential outfall location discrepancies of up to approximately 200 feet. All outfall locations are currently under field verification.
3. Aerial Photos: New York State Division of Homeland Security and Emergency Services, 2010.
4. Site Boundaries are based on New York City parcels data.
5. Coarse topographic contours are derived from U.S. Geological Survey 10-meter data.



DRAFT

Figure 1
 Site Vicinity Map
 Draft Upland Site Summary: Greenpoint Energy Center
 Newtown Creek RI/FS



SOURCES:
 1. FIGURE BASED ON PLAN TITLED "PROPOSED SOIL BORINGS/TEST PIT, MONITORING WELL AND SOIL GAS SAMPLE LOCATION SITE PLAN," BY PAULUS SOKOLOWSKI AND SARTOR ENGINEERING, PC DATED OCT 2004.
 2. SURVEY OF EXISTING MONITORING WELLS CONDUCTED BY GEI ON 6-16-09.
 3. AERIAL PHOTOGRAPH BING MAPS © 2008 MICROSOFT CORP.
 4. STREETS, NYC DEPARTMENT OF CITY PLANNING, BYTES OF THE BIG APPLE

LEGEND

- CURRENT STRUCTURES
- SITE BOUNDARY
- 1888 NEWTOWN CREEK
- ⊕ ACTIVE MONITORING WELL
- ⊖ INACTIVE MONITORING WELL

PREVIOUS INVESTIGATIONS

- ⊕ GERAGHTY AND MILLER, INC 1976
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UPLAND SITE SUMMARY
 GREENPOINT ENERGY CENTER
 FORMER MANUFACTURED GAS PLANT SITE
 BROOKLYN, NEW YORK

nationalgrid

PROJECT 093260

GEI
 Consultants

455 WINDING BROOK DRIVE
 SUITE 201
 GLASTONBURY, CONNECTICUT 06033

GREENPOINT HISTORICAL INVESTIGATION LOCATIONS

May 2012 Plate 1

