
**APPENDIX I:
CONTAMINATED MATERIALS SCREENING
REPORT**

CONTAMINATED MATERIALS SCREENING REPORT (November 2008)

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1.0 Introduction

This report presents the findings of a Contaminated Materials Screening Study prepared by The Louis Berger Group, Inc./Parsons Brinckerhoff Joint Venture (Berger/PB JV) for the properties located within a corridor approximately 500 feet to either side of the existing Goethals Bridge and approach roads (the Primary Study Area). The purpose of this Screening Study is to assess, at a preliminary level, each property's potential to impact specific components of the proposed action (e.g., location of ramps, piers, support structures, staging areas, etc.) or the proposed project's construction schedule. This Screening Study is the first step in an evaluation process to determine this potential and to characterize possible future steps (property acquisition, remediation, etc.).

This Screening Study was conducted in a manner consistent with the level of care and skill exercised by environmental professionals currently practicing under similar conditions, and was based on information made available to Berger/PB JV representatives. Such a review cannot be expected to reveal all hazardous materials or conditions that might be present within the Primary Study Area; the possibility exists that some hazardous materials or conditions might exist and not be detected because they are beyond the scope of this study. Additional information that was not made available at the time of this report's preparation may result in the modification of the information presented herein.

2.0 Methodology, Approach and Data Sources

The Screening Study evaluated a Primary Study Area approximately 500 feet to either side of the centerline of the existing Goethals Bridge and its approaches. For properties located within the Primary Study Area, the Berger/PB JV reviewed historical fire insurance maps, other historical mapping, historical aerial photographs, and regulatory agency databases. Data pertaining to remedial investigations, corrective action plans, and soil and groundwater sampling and analyses were also reviewed for specific properties. To validate or confirm the database information and to identify potential properties or areas of concern that may not have been identified in the database search, a visual inspection (windshield survey) of the Primary Study Area was conducted. It should be noted that the inspection was from public rights-of-way only, and focused primarily on inventorying current land use. The goal of this Screening Study is to assess the potential for the presence of contaminated materials, resulting from previous or existing uses, within the Primary Study Area.

2.1 Fire Insurance Maps

Fire insurance maps (Sanborn Maps) are useful for identifying historical land uses within the Primary Study Area and adjacent areas, as well as potential areas of environmental concern. They typically document land use, structural changes, street addresses, occupants, gas storage areas, raw material pilings, and types of products manufactured and/or stored on site. Sanborn Maps of the Primary Study Area and vicinity for the years 1889, 1903, 1922, 1937, 1950, 1963, 1977, 1986, and 1996 were reviewed.

2.2 Historical Aerial Photographs

Aerial photographs are also used, in conjunction with other historical information, to determine prior land usage. Aerial photographs from 1940, 1951, 1959, and 1970 were reviewed.

2.3 Regulatory Agency Database Review

The Berger/PB JV undertook a search of federal and state regulatory agency databases for listed sites. These included the following:

2.3.1 Federal Regulatory Agency Databases

Federal regulatory agency databases reviewed included the following:

- National Priorities List (NPL)
- Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) List
- Resource Conservation and Recovery Information System (RCRIS) List
- Toxic Chemical Release Inventory System (TRIS)

National Priorities List (NPL)

The U.S. Environmental Protection Agency's *NPL (or Superfund) List* is a federal listing of uncontrolled or abandoned hazardous waste sites. The list is created from the CERCLIS database (see below) and is primarily based upon a score that each site or facility receives from the USEPA's Hazardous Ranking System. After a site or facility has been identified as a CERCLIS site, the USEPA conducts an assessment of the property. The ranking score associated with the degree of contamination found is one of the determinations made as to whether the site is placed on the NPL. These sites are then prioritized for possible long-term remedial action and referred to the state for further action under state programs.

CERCLIS List

The *CERCLIS List* is a compilation of records from a nationwide database created to maintain and regulate those facilities or sites that the USEPA has investigated or will investigate for suspected or uncontrolled releases of hazardous substances, contaminants or pollutants as reported by states, municipalities, private companies and private citizens under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or the Superfund Program). Once a site is placed on the CERCLIS List, it may be subjected to several additional levels of evaluation to determine the severity of the contamination, from Discovery and Preliminary Assessment to Site Inspection, and possibly to the Hazardous Ranking System. Such a determination could ultimately place the site under consideration for inclusion on the NPL. Inclusion on the CERCLIS list does not confirm the presence of an environmental problem or a public health threat. Former CERCLIS sites that have been granted the status of No Further Remedial Action Planned (NFRAP) are also included in this database. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund Action or NPL consideration. This policy

change is part of the USEPA's Brownfields Redevelopment Program to help cities, states, private investors, and affected citizens to promote economic redevelopment of unproductive urban sites.

RCRIS - Generator/Transporter Facilities; Treatment, Storage, or Disposal (TSD) Facilities or Corrective Action Activity (CORRACTS) Facilities

The Resource Conservation and Recovery Act (RCRA) program identifies and tracks hazardous wastes from the point of generation to the point of disposal. RCRA requires that generators, transporters, treaters, storers, and disposers of hazardous waste provide information concerning their activities to state environmental agencies. The *Resource Conservation and Recovery Information System (RCRIS) database* is primarily used to track handler permit or closure status, compliance with federal and state regulations, and cleanup activities. The *RCRIS TSD database* tracks those facilities that treat, store and/or dispose of hazardous materials as defined by RCRA (referred to as TSD facilities). The *RCRIS CORRACTS database* identifies TSD facilities that have conducted, or are currently conducting, corrective action(s) as regulated under RCRA. The *RCRIS Generators/Transporters database* includes any operation that generates or transports hazardous waste and that must obtain a hazardous waste generator identification number or transporter permit.

Toxic Chemical Release Inventory System

The Toxic Chemical Release Inventory System (TRIS) is a federal database that identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

2.3.2 New Jersey Regulatory Agency Databases

- Known Contaminated Sites List (KCSL)
- Solid Waste Facilities Databases (SWF)
- Regulated Underground Storage Tank Contamination Report (LUST)
- Major Facilities List (MFS)

Known Contaminated Sites List

The *Known Contaminated Sites List (KCSL)* includes sites under the purview of the New Jersey Department of Environmental Protection's (NJDEP's) Site Remediation Program which have contamination present at levels greater than the applicable cleanup criteria for soil and/or groundwater standards. The list includes sites being remediated under all the various regulatory programs administered by the Site Remediation Program such as: the federal Superfund Program, RCRA, New Jersey's Industrial Site Recovery Act (ISRA), the state's Underground Storage of Hazardous Substances Act, the Spill Compensation and Control Act, the Solid Waste Management Act and the Water Pollution Control Act.

Solid Waste Facilities Databases

The state's solid waste databases are comprised of the *Landfill Location Database* and the *Transfer Station/Intermodal Container/Material Recovery Facility Database*, both of which are maintained by NJDEP.

Regulated Underground Storage Tank Contamination Report

New Jersey's *Regulated Underground Storage Tank Contamination Report* contains an inventory of reported leaking underground storage tank (LUST) incidents maintained by NJDEP.

Major Facilities List

New Jersey's *Major Facilities List* is an inventory maintained by NJDEP of all "major facilities" as defined by the New Jersey Spill Compensation and Control Act and therefore subject to the requirements of the Act. These facilities are defined as those located on one or more contiguous or adjacent properties owned or operated by the same entity, having a total combined storage capacity of 20,000 gallons or more of non-petroleum hazardous substances or 200,000 gallons or more of hazardous substances of all kinds.

2.3.3 New York Regulatory Agency Databases

- State Inactive Hazardous Waste Sites (SHWS)
- Solid Waste/Landfills Facilities Sites (SW/LF)
- New York State Leaking Underground Storage Tanks (LTANKS)
- Voluntary Cleanup Program (VCP)
- Registered Waste Tire Storage Facility List (SWTIRE)

State Inactive Hazardous Waste Sites

The New York State *Inactive Hazardous Waste Sites Database*, compiled by the New York State Department of Environmental Conservation (NYSDEC), maintains information regarding the investigation and cleanup of suspected hazardous waste sites.

Solid Waste/Landfills Facilities Sites

The *SW/LF Database* is a comprehensive listing of state-permitted/recorded solid waste facilities maintained by NYSDEC.

New York State Leaking Underground Storage Tanks (LTANKS)

NYSDEC's *Leaking Underground Storage Tanks* database contains records of reported leaking storage tank incidents reported from April 1, 1986 to the most recent update. They can be either leaking underground storage tanks or leaking aboveground storage tanks. The causes of the incidents are tank test failures, tank failures or tank overfills.

Voluntary Cleanup Program

New York's *Voluntary Cleanup Program* database is a database maintained by NYSDEC that identifies contaminated sites that are being remediated to levels allowing for the site's productive reuse using private, rather than public funds.

Registered Waste Tire Storage Facility List

The *Registered Waste Tire Storage Facility List* is a NYSDEC database that identifies registered waste tire storage facilities.

2.4 Review of Additional Data

Several additional reports and records were also reviewed. These included a *Remedial Investigation and Risk Assessment Report* prepared by Golder Associates (Golder, 1999) for the Borne Chemical Company property in Elizabeth; a *Corrective Action Plan* prepared for the former GATX property on Staten Island by Roux Associates (Roux, 1998); a program of soil and groundwater sampling and analysis undertaken by the Port Authority on Staten Island as part of preliminary design studies performed in 1993/1994 (Berger, 1994) and in 1995/1996 (Sverdrup, 1996); Limited Phase I Environmental Site Assessment – R.T. Baker & Son Machinery Dismantlers (Hatch Mott MacDonald, 2003); Limited Phase I Environmental Site Assessment – Saperstein Properties (Hatch Mott MacDonald, 2003), Limited Phase I Environmental Site Assessment – Bayway Metals (Hatch Mott MacDonald, 2003) and the Historic Fill Map of the Elizabeth Quadrangle along the western shoreline of the Arthur Kill in New Jersey prepared by the NJDEP (NJDEP, 2004). The NJDEP's online records were also reviewed at <http://www.state.nj.us/dep/gis/depsplash.htm> and the former Olympia Trails Bus Company was identified as a known contaminated site. Reports obtained through an OPRA request on the former Olympia Trails Bus Company property included a Site Investigation Report prepared by PMK Group (PMK 1998), a *Remedial Investigation Report* prepared by PMK Group (PMK 2001), a *Final Remedial Investigation Summary Report* prepared by Foster Wheeler Environmental Corporation (Foster 2002) and an *Addendum No. 1 to the Approved August 2005 Remedial Action Work Plan* prepared by Tetra Tech EC, Inc., (Tetra Tech, 2005).

2.5 Visual Inspection/Windshield Survey

The Primary Study Area was surveyed through visual inspection from the public rights-of-way through drive-by windshield surveys only.

3.0 Findings

3.1 Elizabeth

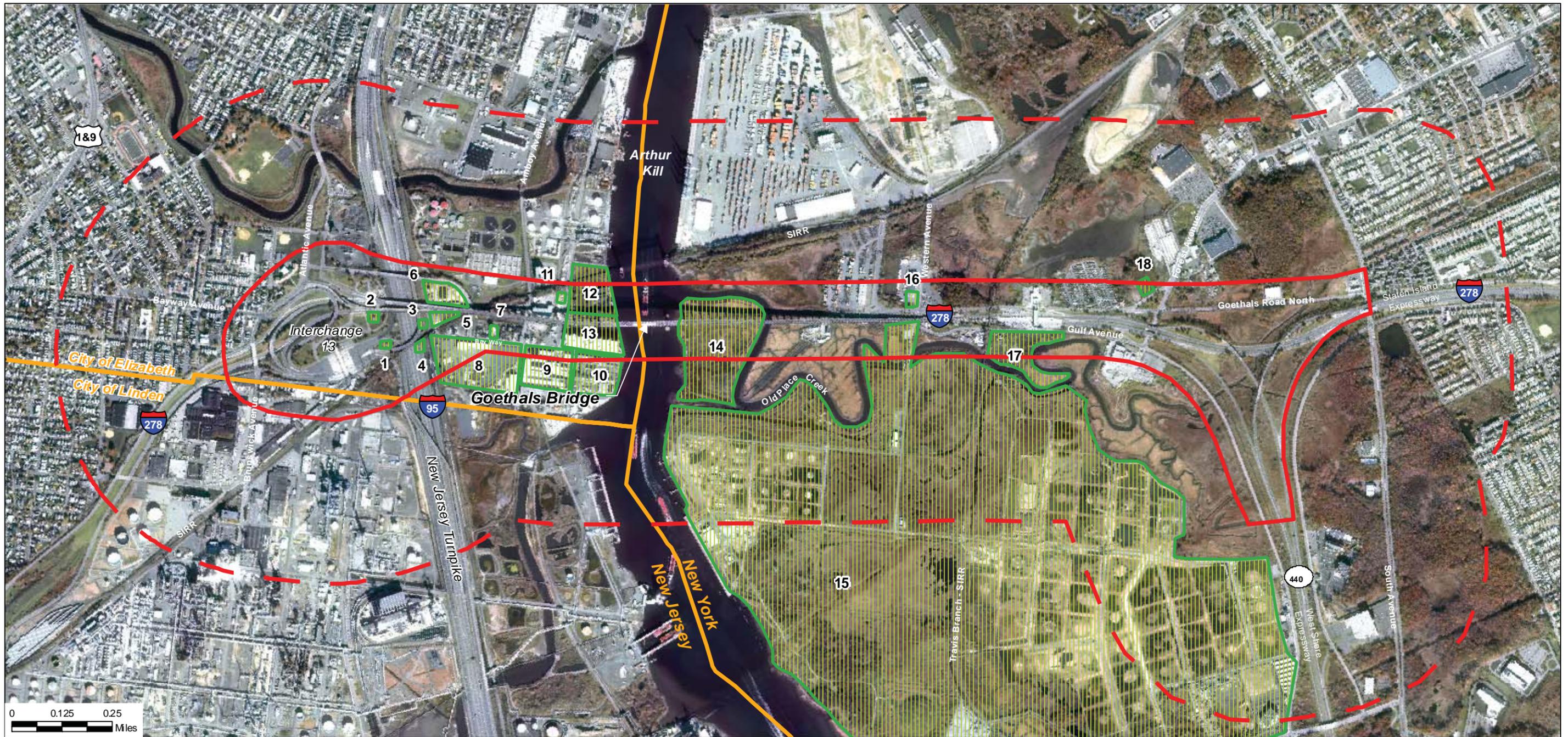
3.1.1 Fire Insurance Maps

Sanborn Fire Insurance maps for the city of Elizabeth from 1889, 1903, 1922, 1950 and 1963 were reviewed. The results are summarized in Table 1 and Figure 1 and are discussed below.

TABLE 1 SANBORN MAP REVIEW – ELIZABETH PORTION OF THE PRIMARY STUDY AREA

Year	Facility	Location
1889	Bowker Fertilizer Company	North of Bay Way, between S. Front Street and Arthur Kill
1903	Bowker Fertilizer Company	North of Bay Way, between S. Front Street and Arthur Kill
	Waclark Wire Company	South of Bay Way, between S. Front Street and Arthur Kill
	Standard Oil Company	West side of S. Front Street, north of Bay Way
1922	Bowker Chemical Company	670 S. Front Street
	Borne – Scrymser Company	S. Front Street, north of Bowker Chemical
	American Copper Products	South of Bay Way, between S. Front Street and Amboy Avenue
	Public Service Bayway Substation	127-133 Bay Way
	Bayway Smelting Corporation	South of Bay Way, between Amboy Avenue and the Elizabethport & Perth Amboy Branch RR
	Skinner Brothers Manufacturing Company	South of Bay Way, between Amboy Avenue and the Elizabethport & Perth Amboy Branch RR
	Elizabeth Foundry Company	South of Bay Way, between Amboy Avenue and the Elizabethport & Perth Amboy Branch RR
	Byron Heffernan & Company	North of Staten Island Railroad, east of Elizabethport & Perth Amboy Branch
	Atlantic Chemical Works	300 feet north of Bay Way, west of Elizabethport & Perth Amboy Branch
	Kaufman Scrap Iron & Metals Yard	South of Staten Island Railroad, west of Elizabethport & Perth Amboy Branch
1950	Borne – Scrymser Company	632 S. Front Street
	Phelps Dodge Copper Products	South of Bay Way, between S. Front Street and Rockefeller Street
	Reichhold Chemicals, Inc.	South of Bay Way, between Amboy Avenue and Rockefeller Street
	National Solvents	North of Staten Island Railroad, east of Elizabethport & Perth Amboy Branch
	New Jersey Metals Company	South of Bay Way, between Amboy Avenue and Rockefeller Street
	California Spray Chemical Corp.	South of Bay Way, between Amboy Avenue and Rockefeller Street
1963	Borne – Scrymser Company	632 S. Front Street
	Phelps Dodge Copper Products	South of Bay Way, between S. Front Street and Amboy Avenue
	Reichhold Chemicals, Inc.	South of Bay Way, between Amboy Avenue and Rockefeller Street
	Unnamed junkyard	South of Bay Way, west of New Jersey Turnpike
	Unnamed welding shop	Bay Way at Elizabeth Bridge Plaza
	Petroleum offices and lab	North of Bay Way at Merchant Street
	Unnamed gas station	Northeast quadrant of Bridge Approach and Trenton Avenue

Source: Sanborn Fire Insurance Maps



Legend

- Primary Study Area
 - Secondary Study Area
 - Historical Properties of Questionable Environmental Concern
- 1 - Junkyard
 - 2 - Welding Shop, Petroleum Lab
 - 3 - Atlantic Chemical Works
 - 4 - Kaufman Scrap Iron & Metals Yard
 - 5 - Byron Heffernan & Co., Later National Solvents
 - 6 - Former Olympic Trails Bus Co.
 - 7 - PSE&G Substation
 - 8 - Bayway Smelting Corp., Skinner Brothers Manufacturing Co., Elizabeth Foundry Co., Later Reichold Chemicals, Inc, NJ Metals Co., & California Spray Chemicals Corp
 - 9 - American Copper Products

- 10 - Waclark Wire Co.
- 11 - Standard Oil Co.
- 12 - Borne-Scrymser Co.
- 13 - Bowker Fertilizer Co.
- 14 - Shoreline Area
- 15 - Gulf Oil Corp. New York Terminal, Later GATX
- 16 - Motor Freight Station
- 17 - Saperstein Properties
- 18 - Automobile Salvage Yard

Goethals Bridge Replacement EIS

FIGURE 1
Historic Properties of Questionable Environmental Nature

Source: Basemapping: Port Authority of New York and New Jersey, 2002.

The Primary Study Area and its immediate vicinity have been subject to industrialization since the late 1800s. This industrial development included foundries, petroleum processing, fertilizer plants, copper works and creosote plants.

1889

According to the 1889 map, the facilities of the Bowker Fertilizer Company were located north of Bay Way, between South Front Street and the Arthur Kill. In addition to fertilizer and other agricultural chemicals, the Bowker Company manufactured sulphuric acid at the site. The company later evolved into the leading manufacturer of insecticides and fungicides in the country. In addition to the main building and several smaller sheds, two buildings labeled “Acid Storage” and “Burning Shed/Furnaces” were located on the property. Located across South Front Street to the west were meadows. Located south of Bay Way, between South Front Street and the Arthur Kill, was James Carroll’s brickyard.

1903

The Bowker Fertilizer Company was still depicted on the 1903 map; however the meadows previously located to the west were now developed with two stores of unknown occupancy, a tenement, and a building labeled “Standard Oil Company”. An oil tank was located next to the building. Located across Bay Way to the south, on the former brickyard site, were the facilities of the Waclark Wire Company, a manufacturer of copper wire. Located along Bay Way, west of South Front Street, were several flats and stores of unknown occupancy on both sides of the street.

1922

On the 1922 maps, the Bowker Fertilizer Company was labeled as the “Bowker Chemical Company – Manufacturers of Fertilizers and Heavy Chemicals”. The map also depicted two large fuel oil storage tanks on the property. Located adjacent to the north were the facilities of the Borne – Scrymser Company, Inc., manufacturer of lubricating oils. This complex, constructed in 1911, contained numerous above-ground storage tanks as well as several buildings labeled “bleachers”.

Located on the north side of Bay Way, between South Front Street and Amboy Avenue, were several dwellings and stores of unknown occupancy. The area behind the buildings to the north was vacant as far north as the Staten Island Railroad trestle. Located across Bay Way to the south, also between South Front Street and Amboy Avenue, were the facilities of the American Copper Products Corporation and the Bayway Terminal, a series of warehouses; as well as a network of railroad tracks.

Located on the block bound by Bay Way on the south, Krakow Street on the north, Amboy Avenue on the east and Burlington Avenue on the west, were numerous dwellings and stores of unknown occupancy fronting on each street. Located at 127-133 Bay Way was an electric substation. North of Krakow Street, to the Staten Island Railroad trestle, the land was primarily vacant with three isolated dwellings.

Located south of Bay Way, between Amboy Avenue and the Elizabethport and Perth Amboy Branch of the Central Railroad of New Jersey (today's Chemical Coast Secondary Line), were the facilities of the Bayway Smelting Corporation, Skinner Brothers Manufacturing Company (manufacturers of heating equipment), and the Elizabeth Foundry Company.

The area north of Bay Way and west of Burlington Avenue was undeveloped to the Elizabeth River and beyond (outside the Primary Study Area); with the exception of the Byron Heffernan & Company, manufacturers of coal tar and inorganic chemicals. This facility was located immediately north of the Staten Island Railroad trestle and immediately east of the Elizabethport and Perth Amboy Branch.

With two exceptions, the Primary Study Area west of the Elizabethport and Perth Amboy Branch was largely vacant with isolated residences. Located immediately west of the Elizabethport and Perth Amboy Branch and immediately south of the Staten Island Railroad trestle was the David Kaufman and Sons scrap iron and metals yard. Located approximately 300 feet north of Bay Way, immediately west of the Elizabethport and Perth Amboy Branch was the Atlantic Chemical Works, manufacturers of coal tar products.

1950

The existing Goethals Bridge (then known as the "Bridge to Staten Island") is depicted on the 1950 maps. The New Jersey approach to the bridge is located largely in the footprint of the former Richmond Street.

North of the existing bridge to the Staten Island Railroad trestle, the block between the Arthur Kill and South Front Street was still occupied by the Borne – Scrymser Company. To the west, across South Front Street, the block was undeveloped with the exception of some railroad tracks. Located west of this block, across Amboy Avenue, was an isolated dwelling. From this point west, to the Elizabethport and Perth Amboy Branch, the land was undeveloped.

South of the existing bridge to Bay Way, the Bowker Chemical Company had been replaced on the block between the Arthur Kill and South Front Street by the large warehouse that is presently located on the site, known as the Bayway Industrial Center. Notations on the map indicate the building was constructed in 1927. To the west, across South Front Street, the block was bisected by railroad tracks and contained several flats and stores of unknown occupancy. The block to the west, across Amboy Avenue, and bound by Krakow Street on the north, Bay Way on the south and Burlington Avenue on the west, was occupied by numerous dwellings and several stores of unknown occupancy. Located between Burlington Avenue and the Elizabethport and Perth Amboy Branch, north of Bay Way, were the facilities of National Solvents, on the former site of the Byron Heffernan & Company.

Located south of Bay Way, between the South Front Street and Amboy Avenue, were the works of the Phelps Dodge Copper Products Company. Located between Amboy Avenue and Rockefeller Street were additional Phelps Dodge facilities, including several structures labeled "steel gas tanks", as well as the Elizabeth Plant of the Reichhold Chemical Company (manufacturers of synthetic resins); the facilities of the New Jersey Metals Company and a plant operated by the California Spray Chemical Corporation, manufacturers of insecticides and

fungicides. The Reichhold plant, constructed in 1936, contained numerous above-ground storage tanks and chemical towers. The New Jersey Metals property contained several storage tanks (including several containing glycerin, alcohol and formaldehyde) and several “cooking kettle” buildings. The California Spray Chemical plant contained a structure labeled “Emulsion Building”. Located between Rockefeller Street and the Elizabethport and Perth Amboy Branch, south of Bay Way, were additional buildings, chemical tanks and a cooling tower belonging to Reichhold Chemical.

The Primary Study Area west of the Elizabethport and Perth Amboy Branch was largely vacant with isolated residences.

1963

North of Bay Way, on both sides of the existing Goethals Bridge between the Arthur Kill and Burlington Avenue, the 1963 map depicted conditions similar to those seen on the 1950 map. West of Burlington Avenue, the recently completed New Jersey Turnpike is now located immediately adjacent to the west to Elizabethport and Perth Amboy Branch. Bay Way ends at the railroad and Relocated Bay Way has been constructed to carry traffic over the Turnpike.

South of Bay Way, between the Arthur Kill and Rockefeller Street, conditions were similar to those depicted on the 1950 map with the exception that the Reichhold Chemical Company now occupied almost the entire area, having acquired the land and facilities previously owned by the New Jersey Metals Company and the California Spray Chemical Corporation. A small smelter operated by the Magnolia Metal Company is also present at 116-126 Bay Way.

West of the New Jersey Turnpike, the Primary Study Area was generally comprised of vacant land and residences, with several isolated junkyards located south of Bay Way. Located north of Bay Way, between the Turnpike and Elizabeth Bridge Plaza, was a facility labeled “Petroleum Off. & Lab” and a welding shop. A gas station was located in the northeast quadrant of the intersection of the bridge approach road and Trenton Avenue.

3.1.2 Historical Aerial Photographs

1940

The 1940 aerial photographs depict an array of industrial buildings and tanks located in the Primary Study Area, which is consistent with the 1922 and 1950 fire insurance maps.

1951

With the exception of the New Jersey Turnpike, which is depicted under construction, the 1951 aerial photograph depicts conditions generally similar to those in 1940, which are also consistent with the 1950 fire insurance maps.

1959

With the exception of the New Jersey Turnpike, which is depicted as being completed and operational, the 1959 aerial photograph depicts conditions generally similar to those in 1951, which are also consistent with the 1950 and 1963 fire insurance maps.

1970

The 1970 aerial photograph depicts conditions generally similar to those in 1959, which are also consistent with the 1963 fire insurance maps.

3.1.3 Regulatory Agency Database Review

3.1.3.1 Federal Regulatory Agency Databases

National Priorities List

No sites listed on the NPL are located in the Elizabeth portion of the Primary Study Area. However, the former Chemical Control Corporation property, a listed NPL site, is located on South Front Street, approximately 3,000 feet north of the existing bridge.

CERCLIS List

No sites listed on the CERCLIS List are located in the Elizabeth portion of the Primary Study Area. However, two NFRAP sites, the Borne Chemical Company property, located at 632 South Front Street, and the former Reichhold Chemical Company property, located at 726 Rockefeller Street, are located in the Primary Study Area. No additional information was reported by the database.

RCRIS - Generator/Transporter Facilities; Treatment, Storage, or Disposal (TSD) Facilities or Corrective Action Activity (CORRACTS) Facilities

There are eight RCRIS facilities located in the Elizabeth portion of the Primary Study Area. Table 2 identifies these facilities, their location, facility type and violation type, if any.

Toxic Chemical Release Inventory System

One site was identified in the Elizabeth portion of the Primary Study Area. The site, Phelps Dodge Specialty Copper, is located at 48-94 Bay Way, approximately 400 feet south of the existing bridge.

3.1.3.2 New Jersey Regulatory Agency Databases

Known Contaminated Sites List

Four sites listed on the KCSL are located in the Elizabeth portion of the Primary Study Area and are summarized in Table 3.

Solid Waste Facilities Databases

One solid waste facility was identified in the Elizabeth portion of the Primary Study Area. The site, the Waste Management of New Jersey Transfer Station, is located at 625-647 South Front Street. The existing bridge transects the property, with all waste handling activities located immediately north of the bridge and an office and parking located immediately south. The facility is currently allowed to accept and process 2,000 tons per day of solid waste and/or source separated recyclable materials. The facility is authorized to accept municipal waste (household, commercial and institutional), bulky waste, construction and demolition debris, vegetative waste, animal and food processing waste and dry industrial waste. All solid waste operations take place within a 29,000-square foot enclosed building.

TABLE 2 RCRIS FACILITIES – ELIZABETH PORTION OF THE PRIMARY STUDY AREA

Facility	Address	RCRIS Listing	Comments
Former Reichhold Chemical ¹	726 Rockefeller St.	TSD Facility	Violations exist.
Former Reichhold Chemical ¹	726 Rockefeller St.	CORRACTS	Assigned low priority.
Liberty Corcon JV	644 Amboy Avenue	Large-Quantity Generator	No violations reported.
Phelps Dodge Specialty Copper	48 – 94 Bay Way	Large-Quantity Generator	Ignitable hazardous wastes, corrosive hazardous wastes, cadmium, chromium, sludge from electroplating operations.
PSE&G Bayway Switching Station	Trenton and Bayway Avenues	Small-Quantity Generator	Not reported.
Former Reichhold Chemical ¹	726 Rockefeller St.	Small-Quantity Generator	Not reported.
Borne Chemical Company ²	632 South Front Street	Small-Quantity Generator	Not reported.
Waste Management of New Jersey	625-647 South Front Street	Small-Quantity Generator	Not reported.
Chevron USA	666 South Front Street	Small-Quantity Generator	Not reported.

Source: EDR, 2005.

Notes: 1 – Although Reichhold Chemical is still listed in the RCRA databases, the facility has been inactive since 1991.
2 – Although Borne Chemical is still listed in the RCRA databases, the facility has been inactive since 1984.

TABLE 3 KCSL SITES – ELIZABETH PORTION OF THE PRIMARY STUDY AREA

Facility	Address	Comments
BP Service Station No. 948	507 Bay Way	Active NJDEP case, with on-site source of contamination
Former Reichhold Chemical, Inc. ¹	726 Rockefeller Street	Active NJDEP case, with on-site source of contamination
Borne Chemical Company ²	632 South Front Street	Active NJDEP case, with on-site source of contamination
Former Olympia Trails Bus Company ³	200 Relocated Bayway Avenue	Active NJDEP case, with on-site source of contamination

Source: EDR, 2005 and NJDEP 2008 online records.

Notes: 1 – Reichhold Chemical, Inc. has been inactive since 1991.
 2 – Borne Chemical Co. has been inactive since 1984.
 3 – Former Olympic Trails Bus Company was discovered through review of NJDEP's online records and is inactive.

Regulated Underground Storage Tank Contamination Report

Two active LUST cases were identified in the Elizabeth portion of the Primary Study Area and are summarized in Table 4.

Major Facilities List

One facility listed on the Major Facilities List was identified in the Elizabeth portion of the Primary Study Area. The site, Reichhold Chemical, Inc., is located at 726 Rockefeller Street. Although it is still listed on the Major Facilities List, Reichhold ceased operations in 1991 and a decommissioning program was initiated. All on-site structures have been demolished except for a warehouse used to store drummed and bagged raw material and finished products.

TABLE 4 LEAKING UNDERGROUND STORAGE TANK SITES – ELIZABETH PORTION OF THE PRIMARY STUDY AREA

Facility	Address	Comments
Amoco Service Station No. 948	507 Bay Way	Active site with confirmed soil and groundwater contamination.
Exxon Service Station No. 3-6181	507 Bay Way	Active site with confirmed soil and groundwater contamination.

Source: EDR, 2005.

3.1.4 Review of Additional Data

3.1.4.1 Port Authority Soil and Groundwater Testing Program

From December 1993 through January 1994, the Port Authority collected soil and groundwater samples from boring locations south of the Goethals Bridge in Elizabeth and Staten Island as part of their preliminary design studies for a south parallel crossing. Supplemental sampling was performed from November 1995 through January 1996. Samples were analyzed for volatile and semi-volatile organic compounds, PCBs, pesticides, and metals. In Staten Island, soil samples from the area immediately adjacent to the Arthur Kill and from the R.T. Baker property were also analyzed for chlorinated dioxins and dibenzofurans.

The types of substances detected in the two testing programs are summarized below:

- Volatile organic compounds (VOCs) include aromatic compounds (such as benzene, toluene, ethylbenzene, xylene [BTEX] and methyl tertiary butyl ether [MTBE] which are found in petroleum products used in fuels, vehicle repair and metal works, as well as many other industries; and chlorinated compounds (such as trichloroethene and tetrachloroethene, common ingredients in solvents and cleansers) used in degreasing, dry cleaners, and other industrial facilities. Groundwater can become contaminated with VOCs and vapors can be released, especially during excavation activities. In addition, some VOCs can be flammable if the vapors are confined. Many chlorinated solvents contain known carcinogens, fetotoxins and neurotoxins.
- Semi-volatile organic compounds (SVOCs), depending on the specific compound, may contain either polynuclear aromatics (PNAs) or polycyclic aromatic hydrocarbons (PAHs), some of which are known carcinogens. SVOCs detected in the soil and groundwater samples were principally PAHs. PAHs are formed during the combustion of wood, coal, and oil and are found in coal tar and ash, in creosote, and in some petroleum products. Because of the way they are formed, PAHs are found throughout the environment.
- Pesticides detected in soil samples included 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE. DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) is a pesticide that was once widely used to control insects on agricultural crops and insects that carry diseases like malaria and typhus, but is now used in only a few countries to control malaria. After 1972, the use of DDT was no longer permitted in the United States except in cases of a public health emergency. Technical grade DDT may also contain DDE (1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene) and DDD (1,1-dichloro-2,2-bis(p-chlorophenyl)ethane) as contaminants. DDD was also used to kill pests, but to a far lesser extent than DDT. Both DDE and DDD are breakdown products of DDT.
- Polychlorinated biphenyls (PCBs) are a group of synthetic organic chemicals that can cause a number of different harmful effects. PCBs were used widely as dielectric fluid, coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in August 1977 because there was evidence that PCBs build up in the environment and may cause harmful effects. Consumer products that may contain PCBs include old fluorescent lighting fixtures, electrical devices or appliances containing PCB capacitors made before PCB use was stopped, old microscope oil, and old

hydraulic oil. There are no known natural sources of PCBs in the environment. PCBs were detected in soil and groundwater samples from the R.T. Baker site only.

- Metals are natural constituents of both soil and groundwater, but have also been widely used in many industrial activities, such as foundries, metal working facilities and printing facilities. Lead is a common component of paint on bridges and can be found in elevated concentrations in soil near roadways because of the historic use of leaded gasoline. A number of different metals were detected in the samples. Several metals, including lead, mercury, and arsenic, are known to cause adverse health effects.

During the 1993-1994 sampling program in Elizabeth, eight soil samples were collected from five boring locations while groundwater samples were collected from three monitoring wells. In the supplemental sampling program, ten soil samples were collected from five boring locations. All analytes were either not detected or were detected at concentrations below NJDEP cleanup levels. Elevated levels of total petroleum hydrocarbons (TPH) were detected at a location between South Front Street and Amboy Avenue, and at a location west of Burlington Avenue. Soil samples from the boring location between South Front Street and Amboy Avenue also contained elevated levels of PAHs.

Supplemental sampling was performed from November 1995 through January 1996. Samples were analyzed for volatile and semi-volatile organic compounds, polychlorinated biphenyls (PCBs), pesticides, and metals. Several of the sediment samples were also analyzed for dioxins. In the supplemental sampling program, ten soil samples were collected from five boring locations. All analytes were either not detected or were detected at concentrations below NJDEP cleanup levels. Elevated levels of total petroleum hydrocarbons (TPH) were detected at a location between South Front Street and Amboy Avenue, and at a location west of Burlington Avenue.

3.1.4.2 Historic Fill

Large areas of historic fill are depicted in Historic Fill Map of the Elizabeth Quadrangle along the western shoreline of the Arthur Kill in New Jersey (NJDEP, 2004). As mapped in the Primary Study Area, the historic fill extends at least 500 feet west of the Arthur Kill, in general between the shoreline and South Front Street. Historic fill is present at the Borne Chemical Co., Phelps Dodge Wire & Cable and the Bayway Industrial Center properties. The Phelps Dodge Wire & Cable property is located immediately adjacent to and south of the Borne Chemical Co. The Phelps Dodge Wire & Cable property is designated as Block 4 Lot 1470A and is not contiguous with the Phelps Dodge Specialty Copper property at 48 to 94 Bay Way in Elizabeth. The presence of historic fill was confirmed at the Borne Chemical Co. and the former Olympic Trails Bus Company property as a result of on-site subsurface investigations.

The mapped historic fill is non-indigenous material placed on a site in order to raise the topographic elevation of the site. The NJDEP makes no representation as to the composition of the fill or presence of contamination in the fill. However, given the long industrial history of the Elizabeth area and knowledge of the contaminated sites in the project area, the fill present along the shoreline is likely to be contaminated. The presence of contamination would need to be sampled in to confirm whether contamination is present. If contamination is identified, it would need to be addressed in accordance with procedures specified by the NJDEP for investigating

and remediating Historic Fill Material (Technical Requirements for Site Remediation N.J.A.C. 7:26E).

3.1.4.3 Borne Chemical Company Site

The Berger/PB JV reviewed a *Remedial Investigation and Risk Assessment Report* prepared by Golder Associates for the Borne Chemical Company property in Elizabeth. The report, dated September 1999, identified several issues with respect to the need for further evaluation of the site's environmental conditions. These issues are discussed below.

Separate Phase Liquid and VOC Impacted Areas

Separate phase liquid was identified in monitoring wells located in the (north) eastern corner of the site. The thickness was greatest adjacent to Clifton Street (former), which, according to the report, indicated a possible off-site source to the north. The site's boundary along the former Clifton Street is north of the Staten Island Railroad and is outside of the Primary Study Area. The report recommended further investigation of the source and extent of the separate phase liquid in this area of the site, as well as the off site location to the north.

The area of VOC impact was located in fill water within the former tank farm. The highest VOC concentrations were found at the sample site nearest to the former Clifton Street. The report recommended further investigation to assess the source and extent of VOC impacts.

Historic Fill

According to the Golder report the site consists entirely of manmade land and historic fill material is present. Elevated levels of VOCs, semivolatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), PCBs and metals are present in soils. SVOCs (primarily PAHs) are wide-spread throughout the site. VOCs exceedances are primarily found in the former tank farm area and are generally limited to the southern portion in the former tank farm. TPH exceedances are found throughout the site; however, the highest TPH concentrations are located in the interior of the site, southwest of the Staten Island Railroad right-of-way. There are a limited number of exceedances for PCBs, which are generally located in the center and southern portion of the site. Metal exceedances are generally concentrated in the former operations area on the southwestern lot.

Groundwater

Exceedances of the NJDEP groundwater quality standards VOC criteria were found for three compounds at relatively low concentrations in two wells, and for a more significant number of compounds and at higher concentrations in the tank farm area (see above). Metals exceedances, with the exception of sodium and nickel, are found widespread across the site. One nickel exceedance was found at a concentration of 102 ug/l, just above the groundwater quality standard of 100 ug/l. Sodium is found to consistently exceed the standard in one well, however this is believed to be due to saline intrusion from the Arthur Kill. The fact that the other constituents are generally widespread across the site and are found in both upgradient monitoring wells suggests a possible upgradient off-site source for these constituents (e.g., arsenic). The Borne site is downgradient to a number of industrial facilities, including an active solid waste

transfer station across South Front Street. Another nearby facility, a manufacturer of metal products, may be the potential source of iron and arsenic, both of which are found widespread in the fill water at the Borne site. However, no exceedances of the groundwater quality standards were found for SVOCs, PCBs, or TPH.

The risk assessment included in the report concluded that, for the exposure scenarios evaluated, adverse human health effects are not expected to exceed the carcinogenic and non- carcinogenic risk targets established by USEPA for the protection of human health.

The Borne Chemical Co. Site is part of the Elizabethport Brownfields Development Area (BDA) in Elizabeth. As a BDA, the NJDEP works with selected communities affected by multiple brownfields to design and implement remediation and reuse plans for these properties simultaneously. Based on Berger's April 9, 2008 phone discussion with the NJDEP Case Manager, Mr. Anthony Findley, the NJDEP has received a Remedial Action Workplan (RAW) to address soil contamination at the site.

Soil remediation at the site likely will be addressed through "hot spot" removal and capping. The most contaminated soils, "hot spots", will be excavated and disposed of offsite. Any remaining contaminated soils will be left in place, covered by an impermeable cap, and deed notice will be implemented for the site. According to Mr. Findley, a Remedial Action Workplan is required in the future for groundwater and separate phase product remediation. This RAW will need to include the removal of separate phase product from the water table.

Mr. Findley discussed the possible remediation alternatives for groundwater contamination which will probably be contained onsite through the installation of water-tight sheet piling enclosure which will be driven through the unconsolidated overburden material and into the top of bedrock. Once the separated phase product is removed, groundwater contamination (dissolved in the groundwater) will be monitoring through long-term groundwater water sampling of onsite monitoring wells. A pilot test is currently being conducted to evaluate separate phase product recovery methods at the site. Mr. Findley indicated that site redevelopment can proceed without an approved groundwater RAW and the developer has already received a NJDEP Waterfront Development Permit.

3.1.4.4 Port Authority ROW – Boat Slip Area

The Port Authority currently has a right-of-way (ROW) directly beneath the Goethals Bridge structure in an embayment within the Arthur Kill shoreline of Elizabeth. The ROW is located within part of the former Cory Warehouse Boat Slip which was formerly used to accommodate warehouse loading and unloading operations along the bulkheads. Depths within the boat slip range between two and eight feet below mean sea level. As part of the Port Authority's 1993-1994 sampling program, shallow sediment samples from the within the same basin which is contiguous with the Port Authority ROW. The sampling results indicate that organic contaminants are present in the sediments at concentrations above National Oceanic and Atmospheric Administration (NOAA) sediment quality standards and NJDEP sediment quality for purposes of assessing effects to aquatic biota. Elevated levels of PCBs, DDT and its derivatives, as well as PAHs were identified. Dioxins were also detected within the sediments. Based on the sediment results, it would be anticipated that the contaminants recognized in the boat slip area are likely to be present within the Port Authority's ROW.

3.1.4.5 Bayway Metals

Bayway Metals is located at 645 Amboy Avenue in Elizabeth. In 2003, the Port Authority conducted a limited Phase I Environmental Site Assessment (Hatch Mott MacDonald, 2003) at this property designated as Block 4, Lot 4. The findings of the assessment indicated that the site contained the following environmental concerns including an aboveground storage tank near the southwestern entrance to the property, an in-ground truck scale that potentially contains hydraulic oil, potential leaks and spills from heavy industrial equipment used on-site, and automobile salvaging and scrap metal reclamation operations were present.

3.1.4.6 Former Olympia Trails Bus Company

The Berger/PB JV reviewed several reports pertaining to the former Olympia Trails Bus Company property located at 200 Relocated Bayway Avenue in Elizabeth. The property had previously been operated by the Olympia Trails Bus Company as a bus depot and maintenance garage. The property is currently owned by the Port Authority, which is also directing the onsite cleanup and investigation activities. The reports and documents reviewed included a *Site Investigation Report* prepared by PMK Group in August 1998; a *Remedial Investigation Report* prepared by PMK Group in July 2001; a Final Remedial Investigation Summary Report prepared by Foster Wheeler Environmental Corporation in December 2002; as well as various letters to and from the NJDEP. These findings of the record review are discussed below.

Soil

Based on the record review, historic fill material is present across the site at depths ranging from 1 foot to greater than 9 feet. Elevated levels of VOCs, SVOCs, PAHs, TPH, PCBs and metals are present in soils. SVOCs (primarily PAHs) and metals are wide-spread throughout the site. VOCs in excess of NJDEP standards appear to be limited to a surface spill area in the northwestern portion of the site. TPH exceedances were detected in the vicinity of an oil-water separator. There was one exceedance for PCBs, which was detected in a floor drain sediment sample.

Groundwater

Groundwater is encountered approximately 5 to 13 feet below the ground surface. Exceedances of the NJDEP groundwater quality standards for VOCs, pesticides and metals were identified in the groundwater beneath the site. As reported by Foster Wheeler (2002), the VOCs in excess of the standards included benzene, trichloroethene; pesticides included aldrin and Endosulfan I; metal exceedances included arsenic, cadmium, chromium copper, iron, lead, nickel.

Remediation

Soil remediation at the site likely will be addressed through “hot spot” removal and capping. The most contaminated soils, “hot spots”, e.g., the surface spill area and the oil-water separator and disposed of offsite, will be excavated and disposed of off-site. Any remaining contaminated soils in excess of the standards will be left in place will be addressed by engineering and institutional controls. The institutional control will consist of a Deed Notice and the engineering

controls will consist of a 12-inch thick topsoil/fill cap. According to the NJDEP case manager, Mr. Gary Greulich indicated the Deed Notice area will be encompassed by fencing.

Mr. Greulich also discussed the status of field work associated with the RAW that was conducted during the week of November 10, 2008. The field activities included the following:

- Three diesel oil USTs were excavated and removed.
- Soil was excavated from a spill area where elevated TCE concentrations were previously identified. During the excavation activities, a crushed drum and a blue residue were discovered and removed.
- The presence of hydraulic lifts were investigated and only one lift was found and removed.
- The oil/water separator and contaminated soil was removed in an area where previous sampling results had indicated the presence of elevated TPH concentrations.
- The possible presence of dry wells were investigated; however, no dry wells were identified.

According to Mr. Greulich, post excavation samples were collected from excavations associated with the UST removals, the spill area, the hydraulic lift and the oil/water separator. He indicated that the results of the sampling and remediation activities will be summarized in a report to be submitted to the NJDEP in 2009 (personal communication 2008).

Groundwater remediation will likely be addressed through natural attenuation (natural degradation of contaminants through a combination of biological, physical and chemical processes). A Classification Exception Area (CEA) will need to be established with the NJDEP until the groundwater quality standards are achieved. A CEA already been requested for the site; however, the NJDEP (NJDEP, April 5, 2005) rejected the CEA until further delineation of on-site VOC contamination in the soils was conducted. A CEA may be established pending the results of the November 2008 remedial action activities.

3.1.5 Visual Inspection/Windshield Survey

Visual inspections of the Elizabeth portion of the Primary Study Area were conducted on numerous occasions during the preparation of this report. Although no direct evidence of contamination (stained soil, stressed vegetation, leaks, etc.) was observed; several properties, by virtue of their current use, have the potential for on-site contamination. These properties are summarized in Table 5 and depicted in Figure 2.

The Borne Chemical Co., Phelps Dodge Wire & Cable, Phelps Dodge Specialty Copper, former Byron Heffernan & Company/National Solvent, Waste Management and Bayway Metals properties are located adjacent to the existing bridge. There is located on 48 to 94 Bay Way, approximately 500 feet south of the existing bridge and the majority of the Phelps Dodge property lies outside the Primary Study Area.

TABLE 5 POTENTIALLY CONTAMINATED SITES BASED ON EXISTING USE – ELIZABETH PORTION OF THE PRIMARY STUDY AREA

Facility	Address	Comments
Borne Chemical Co.	632 S. Front Street	Abandoned industrial facility, poor housekeeping, and deferred maintenance observed.
Phelps Dodge Specialty Copper	48 – 94 Bay Way	Active industrial facility utilizing compounds such as copper, cadmium and chromium.
Bayway Metals	645 Amboy Avenue	Active junkyard, poor housekeeping and deferred maintenance observed.
Bayway Industrial Center (Former Bowker Chemical Co.)	625-647 South Front Street	Small-Quantity Generator, Active Generator/Transporter Facilities; Treatment, Storage, or Disposal (TSD) Facilities, historic fill material.
Port Authority ROW – Boat Slip Area	Not Applicable	ROW in area beneath bridge in area where sampling indicates that shallow sediments are likely to be contaminated with PAHs, PCBs, metals and pesticides.
Phelps Dodge Wire and Cable	Block 4 Lot 1470A	Undeveloped parcel adjacent to the Borne Chemical Col Site and potentially contains Historic Fill.
Waste Management of New Jersey	625-647 South Front Street	Small-Quantity Generator, Active Generator/Transporter Facilities; Treatment, Storage, or Disposal (TSD) Facilities, historic fill material.

The gas station at 507 Bayway in Elizabeth is also an area of potential contamination; however, it is not likely that this site will not affect the Project because it is so far removed from the anticipated construction area.

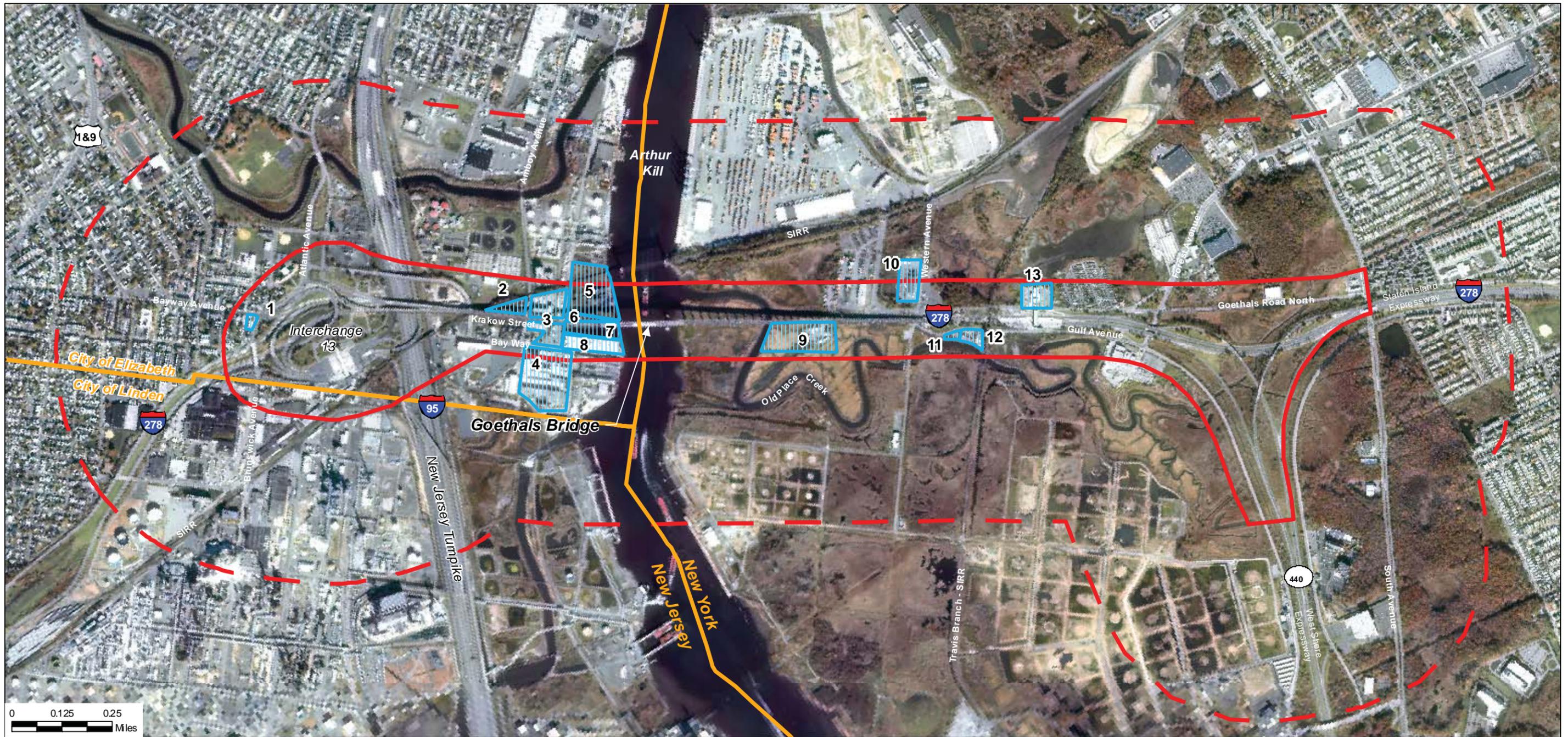
3.2 Staten Island

3.2.1 Fire Insurance Maps

Sanborn Fire Insurance maps for the Staten Island portion of the Primary Study Area from 1937, 1950, 1977, 1986, and 1996 were reviewed with the following results.

1937

According to the 1937 maps, the area north of the existing bridge and south of the railroad, between the Arthur Kill and Western Avenue was primarily undeveloped with several isolated dwellings along Western Avenue. This pattern of vacant land broken by isolated dwellings extended east to South Avenue and beyond.



Legend

- Primary Study Area
 - Secondary Study Area
 - Current Properties of Questionable Environmental Nature
- | | |
|---|---|
| <ul style="list-style-type: none"> 1 - Gas Station, 507 Bayway 2 - Bayway Metals 3 - Waste Management 4 - Phelps Dodge Speciality Copper 5 - Borne Chemical Company Site 6 - Phelps Dodge Wire and Cable 7 - Port Authority ROW - Boat Slip Area | <ul style="list-style-type: none"> 8 - Bayway Industrial Centers 9 - R.T. Baker & Son, Inc. 10 - Coca Cola Distribution 11 - Heavy Equipment Rentals 12 - Frank Liquori Plumber 13 - Goethals Administration/Maintenance Facility |
|---|---|

Goethals Bridge Replacement EIS

FIGURE 2

Current Properties of Questionable Environmental Nature

Source: Basemapping: Port Authority of New York and New Jersey, 2002.

Located approximately 500 feet south of the existing bridge, between the Arthur Kill and 6th Avenue (an unmapped street that was the extension of Western Avenue) was Gulf Oil Corporation's New York Refinery, which extended south beyond the Primary Study Area. The New York Refinery continued west of 6th Avenue for approximately 3,500 feet, after which the land was vacant. Although referred to in the maps as a refinery, there is no direct documentation of refinery operations at this site.

1950

The 1950 mapping depicted conditions similar to those in 1937 with the exception of the northeast corner of North Washington and Western Avenues, which was occupied by a Texas Eastern pipeline pressure station.

1977

The 1977 mapping depicted conditions similar to those in 1950 with the exception of the northwest corner of North Washington and Western Avenues, which was occupied by a motor freight station and the north side of the intersection of Goethals Road North and Forest Avenue, which was occupied by a golf range and an automobile salvage yard. An expanded Goethals Bridge toll plaza and administration building were also present.

1986

The 1986 mapping depicted conditions similar to those in 1977 with the exception of two large metal sheds present near the northwest corner of North Washington and Western Avenues; and the Goethals Mobile Home Park, located on Goethals Road North east of the toll plaza. Gulf Oil's New York Refinery was now labeled as the New York Terminal.

1996

The 1996 mapping depicted conditions similar to those in 1986 with the exception of a contractor's storage yard being located on Western Avenue north of the pipeline pressure station. In addition, substantial residential development was depicted just east of South Avenue both north and south of the Staten Island Expressway.

The results of the Sanborn map review are depicted in Figure 1 (historical properties) and summarized in Table 6.

**TABLE 6 SANBORN MAP REVIEW – STATEN ISLAND
PORTION OF THE PRIMARY STUDY AREA**

Year	Facility	Location
1937-1950	Gulf Oil Corp. New York Refinery	Approximately 500 feet south of existing bridge
1977	Gulf Oil Corp. New York Refinery	Approximately 500 feet south of existing bridge
	Motor Freight Station	Northwest corner of N. Washington and Western Avenues
	Automobile Salvage Yard	North side of the intersection of Goethals Road North and Forest Avenue
1986-1996	Gulf Oil Corp. New York Terminal	Approximately 500 feet south of existing bridge
	Motor Freight Station	Northwest corner of N. Washington and Western Avenues
	Automobile Salvage Yard	North side of the intersection of Goethals Road North and Forest Avenue

Source: Sanborn Fire Insurance Maps.

3.2.2 Historical Aerial Photographs

1940

The 1940 aerial photograph indicated that with the exception of the petroleum storage tanks associated with Gulf's New York Refinery and several isolated dwellings along Western Avenue, the Primary Study Area was primarily undeveloped. This finding is consistent with the 1937 fire insurance maps.

1951

The 1951 aerial photograph depicted conditions similar to those observed in the 1940 photograph, which is consistent with the 1950 fire insurance maps.

1959

The 1959 aerial photograph depicted conditions similar to those seen in the 1950 photograph.

1970

The 1970 aerial photograph did not contain coverage of Staten Island.

3.2.3 Regulatory Agency Database Review

3.2.3.1 Federal Regulatory Agency Databases

National Priorities List

There are no sites listed on the NPL located in the Staten Island portion of the Primary Study Area.

CERCLIS List

There are no sites listed on the CERCLIS List located in the Staten Island portion of the Primary Study Area. There is one NFRAP site however: The R.T. Baker & Son Machinery Dismantlers, 250 South Washington Avenue. No other information was reported by the database.

RCRIS - Generator/Transporter Facilities; Treatment, Storage, or Disposal (TSD) Facilities or Corrective Action Activity (CORRACTS) Facilities

There are five RCRIS facilities located in the Staten Island portion of the Primary Study Area, as noted in Table 7.

Toxic Chemical Release Inventory System

There are no TRIS sites located in the Staten Island portion of the Primary Study Area.

TABLE 7 RCRIS FACILITIES – STATEN ISLAND PORTION OF THE PRIMARY STUDY AREA

Facility	Address	RCRIS Listing	Comments
Howland Hook Marine Terminal	239 Western Avenue	Large-Quantity Generator	No violations reported.
Goethals Bridge Administration Building	2777 Goethals Road North	Large-Quantity Generator	No violations reported.
Eastern Environmental Services	2878 Gulf Avenue	Small-Quantity Generator	No violations reported.
Bayshore Environmental & Technical Services	2878 Gulf Avenue	Small-Quantity Generator	Not reported.
Keyspan Staten Island Service Center	200 Gulf Avenue	Small-Quantity Generator	Not reported.

Source: EDR, 2005.

3.2.3.2 New York Regulatory Agency Databases

State Inactive Hazardous Waste Sites

There is one site listed in NYSDEC's *Inactive Hazardous Waste Sites Database* located in the Primary Study Area. The site, the R.T. Baker & Son Machinery Dismantlers, is located at 250 South Washington Avenue. The site consists of approximately three acres of filled-in wetlands. Except for an access road to Washington Avenue, the site is bound entirely by marshland and tidal creeks.

In 1977, USEPA advised the site's owner/operator to stop salvaging transformers after it was discovered that this company was acquiring PCB oil-filled transformers, selling the PCB-contaminated oil to a waste oil company, and recovering the copper wire from the transformer core. Soil samples taken at the time confirmed extensive PCB contamination in the salvage area.

A Phase II Investigation in late 1985 identified the presence of PCBs (21.5 ppm) in a shallow groundwater well installed at the disposal location. PCBs were also found in downgradient bedrock well at 4.9 ppb. Sediments from a leachate seep near a wetland area about 190 feet west of the site were found to be contaminated with PCBs at 5.3 ppm. In addition, sediments within the wetland area were found to be contaminated with PCBs at 405 ppb.

Negotiations with the Port Authority were made to investigate and remediate the site as part of their 1994 Goethals Bridge Modernization Program. Under this program, the area south of the bridge was investigated and included two borings at the Baker site. Low levels of PCBs were found in the soils and groundwater. Another investigation followed in 1995-96 and involved several borings and groundwater wells. The highest concentration of PCBs (22 ppm) was detected in a sample collected from the top of the peat layer, 14 feet below the surface of the fill beneath the site. Peat contains high concentrations of organic material which binds PCBs tightly. The same sample also contained high levels of VOCs. Three other subsurface soil samples contained PCB levels over 10 ppm, and eight surface soil samples contained PCB levels over 1 ppm. No PCBs were found in the groundwater at that time. Elevated levels of metals were also present in the soil samples from the R.T. Baker site, notably copper, lead, and zinc. A work plan to investigate the on-site impacts of the PCBs was agreed upon with the Port Authority, but then the bridge project was put on hold.

Groundwater contaminants from the Baker site have the potential for entering the Arthur Kill by way of shallow groundwater as well as through Old Place Creek. The unsaturated soil at the site contains relatively high concentrations of PCBs and several metals. These contaminants have migrated into the shallow aquifer and onto the wetland surface, but may not have contaminated the deeper bedrock aquifer. Exposures to contaminated groundwater are not expected because Staten Island is served by public drinking water. The site has no public water or sanitary utilities. Unauthorized access is restricted by a chain-link fence and gate only at the entrance to the site. Trespassing is unlikely due to the site's isolated location. NYSDEC has classified the site as a *Significant Threat to the Public Health or Environment – Action Required*.

In 2003, the Port Authority conducted a limited Phase I Environmental Site Assessment (Hatch Mott MacDonald, 2003) at the R.T. Baker site. At the time of the Phase I inspection, conducted from the roadway, the site appeared to be operational, trash bins and abandoned vehicles were

observed onsite. Based on the field observations and previous sampling results, the Phase I confirmed that various areas of known and potential contamination are present.

The NYSDEC Superfund Program will be conducting future investigations and remediation activities at the R.T Baker site (personal communication September 29, 2008 with NYSDEC Acting Section Chief, Ms. Sally Dewes). According to Ms. Dewes, additional investigations are not likely to begin until sometime in 2009 and remediation at the site is not likely to commence until sometime between 2010 and 2013. Because the R.T. Baker site is frequently flooded, the NYSDEC is concerned about the potential migration of contaminated soils from the R.T. Baker site into the nearby wetlands and creek (personal communication April 8, 2008 with Mr. Chris Milack, former NYSDEC Case Manager). It is unlikely that the remediation of this site will be completed by the time the Goethals Bridge construction is underway. Future investigation and remediation activities at this site may impact the construction of the Goethals Bridge Project.

Solid Waste/Landfills Facilities Sites

There are no sites listed in the *SW/LF Database* located in the Staten Island portion of the Primary Study Area.

New York State Leaking Underground Storage Tanks (LTANKS)

There are three active LTANKS incidents located in the Staten Island portion of the Primary Study Area. These incidents are summarized in Table 8. An additional 10 incidents at the former GATX property are discussed in Section 3.2.4.2 below.

Voluntary Cleanup Program

There are no sites participating in New York's *Voluntary Cleanup Program* located in the Staten Island portion of the Primary Study Area.

Registered Waste Tire Storage Facility List

There are no sites listed in the *Registered Waste Tire Storage Facility List* located in the Staten Island portion of the Primary Study Area.

3.2.4 Review of Additional Data

3.2.4.1 Port Authority Soil and Groundwater Testing Program

In the Port Authority's 1993-1994 sampling program, 32 soil samples were collected from 17 boring locations, and groundwater samples were collected from 6 monitoring wells in Staten Island. In the Port Authority's supplemental 1995-1996 sampling program, 76 soil samples were collected from 22 boring locations, and groundwater samples were collected from 8 monitoring wells. The supplemental sampling program focused primarily on the R.T. Baker property, with 58 of the 76 soil samples analyzed coming from the Baker site. Samples were analyzed for VOCs, SVOCs, PCBs, pesticides, and/or metals. Some of the soil samples from the area immediately adjacent to the Arthur Kill and from the R.T. Baker property were also analyzed for chlorinated dioxins and dibenzofurans.

TABLE 8 LTANKS SITES – STATEN ISLAND PORTION OF THE PRIMARY STUDY AREA

Facility	Address	Comments
Goethals Bridge Administration Building	2777 Goethals Road N.	Case No. 8807196. Unknown amount of gasoline spilled as a result of a tank test failure on 11/30/88. Corrective action taken.
Goethals Bridge Administration Building	2777 Goethals Road N.	Case No. 9207817. Unknown amount of diesel fuel spilled as a result of a tank test failure on 10/6/92. Corrective action taken.
Goethals Bridge Administration Building	2777 Goethals Road N.	Case No. 9905414. Unknown amount of waste oil spilled into ground as a result of a malfunctioning oil-water separator on 8/4/99.

Source: EDR, 2005.

Elevated concentrations of contaminants were detected at many locations. The results of the sampling are as follows:

- Two soil samples from borings near the Arthur Kill shoreline contained elevated levels of pesticides. One sample contained 120 parts per million (ppm) of 4,4'-DDT and 71 ppm of 4,4'-DDD. The second sample contained 58 ppm of 4,4'-DDE. NYSDEC recommended soil cleanup objectives for these compounds are 2.9 ppm for 4,4'-DDD and 2.1 ppm for 4,4'-DDE and 4,4'-DDT. One or more samples from the same area contained elevated levels of TPH (14,200 ppm) and of metals, including arsenic (137 ppm), cadmium (6.3 ppm), chromium (230 ppm), copper (2,770 ppm), lead (1,760 ppm), mercury (26.7 ppm), nickel (105 ppm), vanadium (303 ppm), and zinc (603 ppm). NYSDEC recommends that soil cleanup objectives for metals be based on site background levels. General regional background levels used by NYSDEC are: arsenic, 3 to 12 ppm; cadmium, 0.1 to 1 ppm; chromium, 1.5 to 40 ppm; copper, 1 to 50 ppm; lead, 200 to 500 ppm; mercury, 0.001 to 0.2 ppm; nickel, 0.5 to 25 ppm; vanadium, 1 to 300 ppm; and zinc, 9 to 50 ppm.
- Soil samples from an area just south of where the existing bridge crosses Old Place Creek contained elevated levels of TPH (up to 6,370 ppm) and several metals, notably arsenic (up to 336 ppm).
- Elevated levels of PCBs exceeding NYSDEC clean-up levels (1 ppm for surface soil, and 10 ppm for subsurface soil) were detected at 9 of 19 boring locations and in 12 of 60 soil samples from the R.T. Baker site. The highest concentration of PCBs (8,900 ppm) was detected in a sample collected from the top of the peat layer, 14 feet below the surface of the fill on the site. Peat contains high concentrations of organic material which binds PCBs tightly. The same sample also contained high levels of 1,2,4-trichlorobenzene (1,400 ppm) and 1,4-dichlorobenzene (560 ppm). Three other subsurface soil samples contained PCB

levels over 10 ppm, and eight surface soil samples contained PCB levels over 1 ppm. The highest PCB concentration detected in surface soil was 22 ppm. No PCBs were detected in any of the eight monitoring wells samples in 1996. Elevated levels of metals were also present in the soil samples from the Baker site, notably copper (10,000 ppm), lead (4,100 ppm), and zinc (17,000 ppm).

- Soil and groundwater samples from the area along Gulf Avenue, east of Western Avenue, contained elevated levels of several VOCs, SVOCs and metals. Most of the soil samples from this area contained elevated levels of TPH (greater than 1,000 ppm). Ethylbenzene, xylene, and naphthalene; compounds found in gasoline and other petroleum products, were detected in both soil and groundwater samples from one location. Elevated levels of PAHs were also present.

3.2.4.2 Shoreline Area (Block 1895, Lots 1, 50 and 100)

The Shoreline Area along the Arthur Kill beneath the Goethals Bridge in Staten Island is owned by NYC Ports and Terminals. The 19.8-acre property consisting of undeveloped marshland is designated as Block 1895, Lots 1, 50 and 100 on the Staten Island tax map. Louis Berger & Associates, Inc. (Environmental Report – Staten Island Bridges Program Port Authority of New York and New Jersey, April, 1992) reported that there was a potential of soil and water contamination at this site due to the placement of dredge material fill from the Arthur Kill from the 1940s to 1950s. Subsequent soil and sediment sampling conducted by the Port Authority between 1993 and 1996 indicate that elevated concentrations of SVOCs, TPH and/or metals have been detected in the soils. Dioxin furan was also detected in some of the soils samples.

3.2.4.3 Former GATX Property

The Berger/PB JV reviewed a *Corrective Action Plan (CAP)* prepared by Roux Associates, Inc. for the former GATX property on Staten Island. Only the extreme northern portion of the 440-acre property is located within the Primary Study Area. Site closure activities, including a site-wide investigation and remediation program, are being undertaken pursuant to a Consent Order between GATX and NYSDEC dated March 31, 1998. The activities and areas of concern discussed below all took place south of Old Place Creek, outside of the Primary Study Area. They are discussed here however due to the site's proximity to the proposed project and because groundwater in the northern areas of the site generally flows to the north and northwest, toward the proposed project.

Commercial development of the property dates back to 1929. Gulf Oil Corporation operated the site as a petroleum storage and transfer facility from 1929 until 1999. Products historically stored at the site include light products (gasoline, aviation gasoline, fuel oils, jet fuels, etc.) as well as lubricating oils, naphtha distillate and crude oil. From GATX's acquisition of the property in 1989 until cessation of operations in 1999, storage at the site included only light products. Construction and demolition of site structures and tanks occurred intermittently throughout the period of operation, depending on particular needs at that time.

The site initially consisted of 54 aboveground storage tanks split between eastern and western tank fields, which were constructed between 1929 and 1930. The east tank field was expanded to include 26 additional aboveground storage tanks in two phases. The main operation at the site

included loading and unloading of petroleum products from ships to the onshore storage tanks via pipelines, and the transfer of product to petroleum transmission lines maintained by other companies through rights-of-way on the site. Product was also transferred to railroad cars via a railroad siding in the west tank field. This included packaged products such as lubricants loaded from on-site warehouses, as well as bulk products, which were transferred via two loading racks. Smaller quantities of product were transferred to tanker trucks at a few smaller loading racks located in the west tank field. In addition, some processing of products evidently occurred during Gulf ownership of the site. Although referred to in some historical maps as a refinery, there is no direct documentation of refinery operations at the site.

In 1971, ownership transferred from Gulf to the Texas Eastern Terminal Company (predecessor to Chevron, USA). Inwood Petroleum Corporation purchased the site from Chevron in July of 1987 and subsequently sold the facility in August of 1987 to Seneca Terminal Properties, Inc. (Predecessor to PetroPort Terminal Corporation). GATX acquired the property in 1989 from PetroPort.

When acquired by GATX, the site consisted of 78 aboveground storage tanks with storage capacities ranging from 7,000 to 130,000 barrels (bbls). Operations at the site during GATX ownership primarily focused on ship to shore and shore to ship transfer of petroleum products via an aboveground piping system. Product was also inbound and outbound from the tank fields via several petroleum transmission pipelines that pass through the site through rights-of-way maintained by other companies. Two small tanker truck loading racks were used in the west tank field. GATX conducted bulk storage operations at the site until the end of 1999, at which point all tanks were emptied of contents, cleaned, disconnected from incoming and outgoing lines.

The site historically consisted of upland areas, wetlands and tidal creeks connected to either Old Place Creek or the Arthur Kill. These areas were regraded and filled with sand and gravel during development of the site in 1929. The fill layer averages approximately five feet in thickness across the site, with the greatest thickness beneath roads and former building areas and the least thickness beneath the former tank areas. A layer of peat, one to five feet thick, underlies the fill across most, but not all, of the site. Beneath the fill and underlying peat (if present) lie intermittent layers of clay, silt, sand and gravel. The depth to bedrock beneath the site is approximately 30 to 50 feet below ground surface (bgs). Groundwater is present in the unconsolidated deposits beneath the site at depths ranging from zero to six feet bgs. The predominant groundwater flow direction is generally toward the northwest.

The soil and groundwater sampling conducted by the Port Authority 1993-1994 indicated that elevated pesticides were detected in the groundwater, in excess of the NYSDEC's guidelines, beneath an undeveloped portion of the former GATX facility adjacent to Interstate Route 287 (Port Authority's 1993-1994 sampling).

The development of the CAP, as well as previous investigations of the site, identified several Areas of Concern (AOCs) as summarized below.

Tank Field Related AOCs

Numerous tank leaks, failures and overfills have occurred at the site over the years. Since GATX acquired the site in 1989, these have included:

- July 1990 – Leak of 200 gallons of No. 2 fuel oil from Tank No. 45.
- March 1993 – Leak of an unknown quantity of jet fuel from Tank No. 1.
- May 1994 – One-inch diameter hole reported in the floor of Tank No. 90.
- March 1996 – Leak of 30 gallons of unreported petroleum product from Tank No. 15.
- August 1996 – Retention ponds identified within the bermed areas of five former No. 6 fuel oil tanks.
- August 1996 – Numerous areas of stained soil identified across the site.
- August 1997 – Several leaking valves, pumps and suction lines reported.
- September 1997 – Overfill of 6,000 gallons of No. 2 fuel oil at Tank No. 146.
- October 1997 – No. 2 fuel oil observed to be weeping from the side of Tank No. 60.
- October 1999 – Areas of free product observed on the ground in 15 separate locations.

Underground and Aboveground Piping Related AOCs

Numerous spills and releases related to aboveground and underground piping have occurred throughout the site.

Underground Storage Tank Related AOCs

A total of seven underground storage tanks (USTs) were known to have existed at the site. Their status and condition are unknown. In addition, on October 19, 1993, during the installation of new underground storage tanks, GATX observed free phase hydrocarbons on the groundwater.

Stormwater Management Related AOCs

The site's storm water management system included a network of catch basins, oil traps, lift stations, and sewer lines that collected storm water. Due to the layout of the storm water management system throughout the operational areas of the site, the system has historically received petroleum contact water resulting from historical operations and releases. Free product has been observed in many catch basins and other sewer structures. Due to the age of much of the sewer system, areas of free product on the groundwater table may have contributed to the observed free product in the sewer system.

As part of the storm water management system for the site, a series of five drainage canals were present bordering both the east and west tank fields. The canals were historically designed to convey storm water to the three oil/water separators. During GATX ownership of the site, a force main system was installed to convey storm water to the oil/water separators and reduce the reliance on the canal system. However, pumping of the canals still occurs today, but only conveying storm water from relatively localized areas around the canals through each respective canal. Due to historical releases reaching the storm water management system, the canals have been impacted. On several occasions, sediments within the canals were noted to exhibit visual indications of impact.

Storm water at the site is ultimately discharged to either the Arthur Kill or Old Place Creek via three New York State Pollutant Discharge Elimination System (SPDES) permitted outfalls. Immediately prior to discharge, all water is treated using concrete oil/water separators. Historically, storm water was treated using wooden oil/water separators located immediately adjacent to the active separators.

Landfilling and Landfarming Related AOCs

According to available historical records and aerial photographs, landfilling of demolition debris took place in the west tank field in an area north of Third Street in the northwestern most portion of the site.

Landfarming of petroleum-impacted soil and sediment was historically performed in up to ten areas across the site with the approval of the NYSDEC during the 1980s.

3.2.4.4 Saperstein Properties

The Saperstein Properties are located along the eastern terminus of the Proposed Project. In 2003, the Port Authority conducted a limited Phase I Environmental Site Assessment (Hatch Mott MacDonald, 2003) at these properties located at 2828 & 2826 Gulf Avenue in Staten Island and designated as Block 1855, Lots 9 and 27. At the time of the Phase I inspection the onsite house was unoccupied and the property was vacant and overgrown with vegetation. The findings of the investigation indicated that the site had been used a truck parts business and salvage yard. The environmental concerns identified at the site included the former salvage yard operations as well as a parts scale which may contain hydraulic oil. Leakage of petroleum products and other vehicular fluids are the environmental concern associated with the former operations and equipment.

3.2.5 Visual Inspection/Windshield Survey

Visual inspections of the properties within the Primary Study Area were conducted. Although no direct evidence of contamination (stained soil, stressed vegetation, leaks, etc.) was observed; many properties, by virtue of their current use, have the potential for on-site contamination. These properties are summarized in Table 9 and are depicted in Figure 2.

TABLE 9 POTENTIALLY CONTAMINATED SITES BASED ON EXISTING USE – STATEN ISLAND PORTION OF THE PRIMARY STUDY AREA

Facility	Address	Comments
R.T. Baker & Son, Inc.	250 Goethals Road North	Active junkyard, poor housekeeping and deferred maintenance observed.
Heavy Equipment Rentals	Gulf Avenue	Vacant lot with disturbed soils
Frank Liquori Plumbers	2173 Gulf Avenue	Plumbing contractor, poor housekeeping and deferred maintenance observed.
Coca-Cola distributor	Western Avenue and Goethals Road North	Underground Storage Tanks
Goethals Administration/Maintenance Facility	Goethals Road North	Underground Storage Tanks

4.0 Conclusions

The Primary Study Area is largely comprised of industrial land uses and vacant land. Many of the industrial uses have been in the area for a century or more and were in operation in an era when there were fewer environmental regulations, which may have led to soil and/or groundwater contamination from these operations over time.

Other factors along the project alignment influence the assessment of contaminated materials. For example, contamination typically migrates to an adjacent property via groundwater or soil gas. Proximity to the existing bridge and any proposed alignments is an important factor in determining potential for impact—the closer a given contaminated site is to a construction activity, the greater the potential that the site of concern might result in contamination reasonably close to a project route. Sites located hydraulically upgradient of the project route with respect to groundwater flow have a greater potential to affect the project site, because contaminants may travel toward the project site in the groundwater. Conversely, those sites located downgradient of the project route with respect to groundwater flow are less likely to have affected the project site. While the groundwater in the Primary Study Area generally flows toward the Arthur Kill, localized variations are possible. Similarly, movement of soil gases through the subsurface is difficult to predict because of both natural ecological conditions and manmade structures such as utility lines

Many contaminants that enter the ground bind to soil particles, and therefore are not likely to move far from the site where they originated. Others can dissolve in or travel with groundwater that passes beneath the source thereby traveling to, or finding a pathway to, other properties or receptors nearby. Generally, bedrock in the area does not have extensive fractures and fissures, but contaminated water can travel through bedrock pathways or in the overlying soil/fill material to other locations.

Because the proposed project could result in changes to short- and long-term groundwater flow patterns, especially if dewatering is required during construction, the screening conservatively assumed that any adjacent site might result in contamination along the proposed alignment.

Soil, soil gas, and groundwater can become contaminated as a result of past or current activities on nearby or adjacent properties. Many past and current industrial activities use, store, or generate contaminated materials that can be spilled, dumped, or buried nearby. Industrial activities can also result in contamination due to improper management of raw product and/or waste material.

Subsurface soil, soil gas and groundwater contamination can remain undetected for many years. Excavation, earthmoving, dewatering, and other construction activities can, however, expose the contaminants, providing a pathway of exposure and introducing potential risk to construction workers and others nearby if such contaminants are not properly managed. In this way, construction of the proposed project might encounter contaminated soil, soil gas, and/or groundwater.

Several properties located within the project corridor have the potential to impact the proposed project from a contaminated materials perspective. These properties are discussed below.

4.1 Elizabeth

4.1.1 Historical Land Use

As shown previously in Table 1 and Figure 1, or as identified through an examination of online NJDEP records, numerous properties in the Elizabeth portion of the project corridor have historical uses of a questionable environmental nature. Because of their proximity to the existing bridge (and potential alignment alternatives), four of these sites are discussed below.

Former Bowker Fertilizer/Chemical Company Site (Currently Bayway Industrial Center).

The 1950 Sanborn map indicated that the Bowker Chemical Company had been replaced on the block between the Arthur Kill and South Front Street by the large warehouse that is presently located on the site, known as the Bayway Industrial Center. The former Bowker Company had manufactured fertilizers, pesticides, insecticides and other agricultural chemicals, as well as sulphuric acid. Because the facility was in operation when there were few to no environmental regulations, it is possible that on-site operations have led to soil and/or groundwater contamination. In addition, this area where the facility is located is mapped as an area where historic fill may be present.

Borne Chemical Company. The Borne Chemical Company, located on S. Front Street directly north of the existing bridge, was a manufacturer and custom blender of petroleum products from 1874 until 1984. Significant soil and groundwater contamination is known to exist on the site. Under the terms of several Administrative Consent Orders and a Memorandum of Agreement with NJDEP, the site's potentially responsible parties have prepared a Remedial Investigation and Risk Assessment for the site (see Section 3.1.4.2). A Remedial Action Workplan for soil remediation was developed for soil remediation at the site. The Workplan which is under NJDEP review includes isolated "hot spots" removal with subsequent capping of the contaminated soils. Separate phase product will have to be removed from the water table and groundwater

contamination will likely be addressed by localized groundwater treatment system and/or long-term groundwater monitoring. According to NJDEP this is not a complex remediation. Soil remediation and capping at the Borne site should be remediated before the construction of any replacement bridge. Separate phase and groundwater remediation may still be proceeding during bridge construction, but should not impact project construction.

Former Byron Heffernan/National Solvents Site. This property is located in the area bound by the Staten Island Railroad to the south, the Chemical Coast Secondary Line to the west, Rockefeller Street to the east and Chelsea Street (a paper street located approximately 100 feet north of the existing bridge) to the north. This site is the former location of Byron Heffernan & Co. and subsequently National Solvents. Byron Heffernan manufactured coal tar products (e.g., creosote). The International Agency for Research on Cancer has determined that coal tar is carcinogenic to humans and that creosote is probably carcinogenic to humans. U.S. EPA has also determined that coal tar creosote is a probable human carcinogen. Because these facilities were in operation when there were few to no environmental regulations, it is possible that on-site operations have led to soil and/or groundwater contamination.

Former Olympic Trails Bus Company Site. This property is located at 200 Relocated Bayway Avenue and had previously been occupied by a bus depot and maintenance garage. The property is currently owned by the Port Authority and consists of a vacant lot with an access road and a sign structure. Soil and groundwater contamination, as well as historic fill, have been confirmed at the site. The NJDEP has approved an RAW and Addendum for the site. Soil remediation at the site will be addressed through “hot spot” removal and capping. The most contaminated soils, “hot spots”, will be excavated and disposed of off-site. Any remaining contaminated soils in excess of the standards will be left in place will be addressed by engineering and institutional controls. The institutional control will consist of a Deed Notice and the engineering controls will consist of a 12-inch thick topsoil/fill cap in an area enclosed by fencing. Groundwater contamination will be addressed through natural attenuation and the establishment of a CEA.

Remedial activities were conducted during the week of November 10, 2008 which included limited excavation of contaminated soils, as well as the removals of three USTs, an oil/water separator, and a hydraulic lift. The need to conduct additional investigation and remediation activities this site will be determined pending the findings of these remedial action activities. A report summarizing the results and findings will be submitted to the NJDEP in 2009. Future investigation and remediation activities at this site may impact the construction of the Goethals Bridge Project.

4.1.2 Regulated Sites

As discussed in Section 3.1.3, three properties in the Elizabeth portion of the Primary Study Area are known to be contaminated. Two of these, the gas station located at 507 Bay Way and the former Reichhold Chemical facility located at 726 Rockefeller Street, are located far enough away from the existing bridge that impacts to/from them are not likely. The third property, the Borne Chemical Company, is discussed in Sections 3.1.4.2 and 4.1.1.

4.1.3 Current Conditions

Several properties in the New Jersey portion of the Primary Study Area have current uses of a questionable environmental nature (Table 6 and Figure 1). Because of their proximity to the existing bridge (and potential alignment alternatives), seven of these sites are discussed below. The Borne Chemical site, an abandoned industrial facility with known soil, groundwater and separate phase liquid contamination, was discussed in Section 4.1.1 above.

- **Phelps Dodge Wire & Cable.** This property is an undeveloped site located immediately adjacent to the Borne Chemical Co. site. The Phelps Dodge Wire & Cable property is designated as Block 4 Lot 1470A and is not contiguous with the Phelps Dodge Specialty Copper property at 48 to 94 Bay Way in Elizabeth.
- **Phelps Dodge Specialty Copper.** This site is an active industrial facility located at 48-94 Bay Way utilizing numerous hazardous compounds. Properties of this type are of concern because typically they are locations of spills, many of which are unreported.
- **Port Authority ROW – Boat Slip Area.** The Port Authority currently has a right-of-way (ROW) directly beneath the Goethals Bridge structure in a portion of a boat basin which was formerly used to accommodate warehouse loading and unloading operations along the bulkheads. As part of the Port Authority's 1993-1994 sampling program, shallow sediment samples from the embayment immediately adjacent to and contiguous with the Port Authority ROW. Contaminants detected within the sediments on the adjacent property are suspected to be present within the Port Authority ROW. The suspected contaminants include SVOCs, PCBs, DDT and dioxins.
- **Bayway Metals.** An active junkyard located at 645 Amboy Avenue where poor housekeeping and deferred maintenance was observed. The types of operations at the site are of concern because of the machine used and the contamination resulting from processing the materials. Chemicals of concern associated with salvage yards include VOCs, SVOCs, PCBs and metals.
- **Waste Management Waste Management of New Jersey.** An active transfer station, located at 625-647 South Front Street. The facility is allowed to accept municipal waste (household, commercial and institutional), bulky waste, construction and demolition debris, vegetative waste, animal and food processing waste and dry industrial waste. Fluids and petroleum leaks, discharges or spills are anticipated from heavy equipment used for site operations. Other potential contaminants would be anticipated from the handling of materials associated with the onsite operations. Chemicals of concern associated with the transfer station would likely include VOCs, SVOCs, PCBs and metals.
- **Bayway Industrial Center.** A multi-business facility is located at 660 -720 South Front Street on property formerly occupied by Former Bowker Fertilizer/Chemical Company Site. The former Bowker Company had manufactured fertilizers, pesticides, insecticides and other agricultural chemicals, as well as sulfuric acid. This property is also in an area mapped as a historic fill. As part of the Port Authority's 1993-1994 sampling program, shallow sediment samples from the basin in the northern portion of the property

contiguous with the Port Authority ROW, discussed above. Contaminants identified within the sediments include SVOCs, PCBs, DDT and metals; dioxins were also detected in the sediments.

The gas station at 507 Bayway in Elizabeth is also an area of potential contamination; however, it is not likely that this site will not affect the Project because it is so far removed from the anticipated construction area.

4.2 Staten Island

4.2.1 Historical Land Use

Several properties in the Staten Island portion of the Primary Study Area have historical uses of a questionable environmental nature (Table 6 and Figure 1). Because of their proximity to the existing bridge (and potential alignment alternatives), three of these sites are discussed below.

- **Shoreline Area (Block 1895, Lots 1, 50 and 100).** The Shoreline Area along the Arthur Kill beneath the Goethals Bridge in Staten Island encompasses a 19.8-acre property consisting of undeveloped marshland that is designated as Block 1895, Lots 1, 50 and 100. This site has been used for the placement of dredge material fill from the Arthur Kill in the 1940s to 1950s. Subsequent soil and sediment sampling conducted by the Port Authority between 1993 and 1996 indicate that elevated concentrations of SVOCs, TPH and/or metals have been detected in the soils. Dioxin furan was also detected in some of the soils samples.
- **Former GATX Property.** This property, a former petroleum storage and transfer facility from 1929 until 1999, is discussed in detail in Section 3.2.4.2. Only the extreme northern portion of the 440-acre property is located within the Primary Study Area. The 1993-1994 Port Authority soil and groundwater sampling indicates that elevated pesticide concentrations are present in the groundwater in the portion of the site adjacent to Interstate I-278.
- **Saperstein Properties.** These two properties are located near the eastern terminus of the Proposed Project along Gulf Avenue. The properties had been used as part of a form truck parts and salvage yard business. The environmental concerns at these properties are petroleum discharges and other fluids from vehicles and equipment associated with the former parts and salvage yard operations.
- **Former Freight Station.** A motor freight station was located in the northwest corner of N. Washington and Western Avenues from at least 1977 through 1996. Properties of this type are of concern because typically they are locations of petroleum spills, many of which are unreported.
- **Former Automobile Salvage Yard.** An automobile salvage yard was located on the north side of the intersection of Goethals Road North and Forest Avenue. Chemicals of concern associated with salvage yards include SVOCs (motor oil, diesel fuel, and grease), VOCs (gasoline), metals, ethylene glycol (antifreeze) and PCBs.

4.2.2 Regulated Sites

As discussed in Section 3.2.3, two properties in the Staten Island portion of the Primary Study Area, the R.T. Baker & Son site and the Goethals Bridge Administration Building, are known to be contaminated.

4.2.3 Current Conditions

Several properties located in the Staten Island portion of the Primary Study Area have the potential for on-site contamination by virtue of their current use (Figure 2 and Table 9). These properties include the R.T. Baker & Son property, 250 South Washington Avenue (active junkyard, poor housekeeping, and deferred maintenance); Heavy Equipment Rentals, Gulf Avenue (vacant lot with disturbed soils); Frank Liquori Plumbers, 2173 Gulf Avenue (active plumbing contractor, poor housekeeping, and deferred maintenance); and the Coca-Cola Distributor, intersection of Western Avenue and Goethals Road North (USTs).

5.0 Recommendations

This screening report identified several sites with the potential to contain contaminated soils, groundwater or both. Further investigations should be conducted to confirm the presence of contaminants once an alternative is selected and project design has progressed to the point where areas to be disturbed are more specifically defined. If these investigations reveal the presence of contaminated materials, the measures discussed below should be implemented prior to and during construction. Standard remediation measures exist for all of the substances likely to be encountered. Therefore, by implementing such measures, adverse impacts would be avoided or mitigated.

The measures to be implemented include the following:

- Further investigations to be undertaken to better delineate the nature and extent of contamination in areas where the project might encounter it; and
- Remediation measures to be undertaken before or during construction to remove or contain contaminated materials.

These are described below.

5.1 Further Investigations

During the final design phase for the selected alternative, additional subsurface investigations should be undertaken in areas of concern described above to delineate the nature and extent of contamination. These investigations would generally include testing of soil and groundwater for a range of constituents. Borings would be advanced to the approximate depth of construction where excavation is required. Soil samples may be taken at a series of depths to determine the extent of any contamination. While the chemical analysis of the soil samples would vary depending upon the contaminant of concern, it would be expected that testing for metals, VOCs, SVOCs, PCBs, and pesticides would occur at most locations. In locations where contamination is identified either in the soil or groundwater, additional testing may be performed to further

delineate the extent of contamination. The sampling plan would be approved by NYSDEC or NJDEP as applicable prior to implementation.

5.2 Health and Safety Plan

Health and Safety Plans (HASPs) approved by NYSDEC or NJDEP, as applicable, would be developed for the various construction activities associated with the project to reduce the potential for worker or public contact with contamination found in either the soil or groundwater. These plans would address the potential exposure pathways and other safety concerns associated with a variety of construction activities. Each HASP would address both the known contamination issues (e.g., the need for air monitoring if excavating in known solvent contaminated soil) as well as contingency items (e.g., if unknown tanks or drums are encountered). The HASP would be developed in accordance with U.S. Occupational Health and Safety Administration (OSHA) regulations and guidelines.

The HASP would be the primary measure used to safeguard construction workers and nearby residents during construction. This document would describe in detail all air, soil, and water sampling and monitoring that would take place during construction, planned response to monitoring data, personal protective equipment (PPE) to be used by workers in various parts of the excavation, dust and vapor control measures and emergency procedures. These procedures would include requirements to notify appropriate regulatory agencies as well as procedures to quickly and safely address the various issues. The HASP would also generally include routine monitoring of both air and soil (in place and/or as spoils).

The provisions of the Health and Safety Plan would be mandatory for the contractors and subcontractors engaged in any construction activities that have the potential to expose their personnel to the existing soils or groundwater on the construction site. In addition, all on-site personnel would be required to follow all applicable local, state, and OSHA codes and regulations.

5.3 Measures During or Prior to Construction

A contaminated materials handling plan approved by NYSDEC and NJDEP would be developed to safely remove contaminated soils generally during, but potentially prior to, construction. This plan would include a HASP as well as procedures for stockpiling, testing, loading, transporting, and disposing of the material in accordance with all applicable regulations.

Potentially contaminated soils would be excavated and stockpiled until they could be tested and, if necessary, removed for off-site disposal at an appropriate facility. Although this is more costly than the disposal of non-contaminated soils, it is generally a rapid and relatively straightforward process. Depending on the quantities and locations of contaminated soils, other mitigation technologies may be used, such as soil vapor extraction for VOCs and capping for metal contamination. Capping would involve reusing soil on-site and covering it with at least 2 feet of clean soil or other appropriate material (e.g., asphalt paving). During construction, unusual conditions—such as odors or discoloration of the soil—that may indicate unexpected contamination would be checked for. Any contaminated materials encountered during construction would be handled, stored, and disposed of in accordance with all applicable federal, state, and local regulations.

5.4 Dewatering

In some areas, construction might require dewatering and contaminated groundwater may be encountered. If the groundwater exceeded the local sewer use limitations, the water would be treated (by readily available technologies) prior to its disposal to sewer systems. An appropriate testing program would be developed as part of the project's dewatering permit(s), which would be sought from the appropriate regulatory agencies. A similar situation exists if water is pumped directly to the Arthur Kill or Old Place Creek rather than to a sewer, though the limits and required permits differ. Treatment would be to the levels specified in local sewer ordinances for sewer discharges or applicable water quality regulations for discharges to waterbodies and wetlands.

5.5 Demolition of Structures

At locations where construction requires the demolition of structures, a comprehensive asbestos survey of each structure would be conducted, including the sampling of all suspect materials to determine the presence or absence of asbestos containing materials (ACMs). Based on the findings of the survey, ACMs would be removed in accordance with all local, state, and federal regulations.

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