Kosciuszko Bridge Project

GROUNDWATER ASSESSMENT REPORT

Performed for the New York State Department of Transportation
In Support of the
Draft Environmental Impact Statement
For the Kosciuszko Bridge Project

Kings County and Queens County, NY

June 2006

New York State
Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

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A. INTRODUCTION

The New York State Department of Transportation (NYSDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Draft Environmental Impact Statement (DEIS) that will consider five different build alternatives to improve the Kosciuszko Bridge, which crosses Newtown Creek between Brooklyn and Queens. The project will focus on a 1.1-mile segment of the Brooklyn-Queens Expressway from Morgan Avenue in Brooklyn to the Long Island Expressway interchange in Queens. (Please refer to attached Project Location Map [Figure 1] and Project Limits Map [Figure 2].)

A.1. Project Alternatives

The DEIS will include a detailed analysis of six alternatives – the No Build Alternative and five Build Alternatives. These alternatives would either replace or rehabilitate the existing Kosciuszko Bridge, encompassing the 1.1-mile section of the Brooklyn Queens Expressway (BQE) between Morgan Avenue in Brooklyn and the Long Island Expressway interchange in Queens.

A brief description of the alternatives is included for reference.

No Build Alternative: The No Build Alternative makes no physical or operational improvements to the Kosciuszko Bridge, but continues NYSDOT's existing maintenance program.

RA-5 Rehabilitation with New Parallel Bridge on Eastbound Side: Alternative RA-5 rehabilitates the existing bridge and constructs a new parallel bridge on the eastbound side.

RA-6 Rehabilitation with New Parallel Bridge on Westbound Side: Alternative RA-6 rehabilitates the existing bridge and constructs a new parallel bridge on the westbound side.

BR-2 Bridge Replacement with Permanent Eastbound Bridge and Temporary Westbound Bridge: Alternative BR-2 replaces the existing bridge by building new parallel bridges on both sides of the existing bridge – one temporary, one permanent. Additional new bridge construction would be performed after demolition of the existing bridge.

BR-3 Bridge Replacement with Permanent Bridges on Both Eastbound and Westbound Sides: Alternative BR-3 replaces the existing bridge by building new permanent, parallel bridges on both sides of the existing bridge. Additional new bridge construction would be performed after demolition of the existing bridge.

BR-5 Bridge Replacement with Permanent Bridge on Eastbound Side: Alternative BR-5 replaces the existing bridge by building a new permanent, parallel bridge on the eastbound side of the existing bridge. Additional new bridge construction would be performed after demolition of the existing bridge.

Throughout this section, the BQE is on a viaduct well above grade.

A.2. Purpose of this Groundwater Assessment Report

Executive Order 12372 stipulates that a Federal Sole Source Aquifer (SSA) review by the U.S. Environmental Protection Agency (USEPA) is required for certain types of federally funded

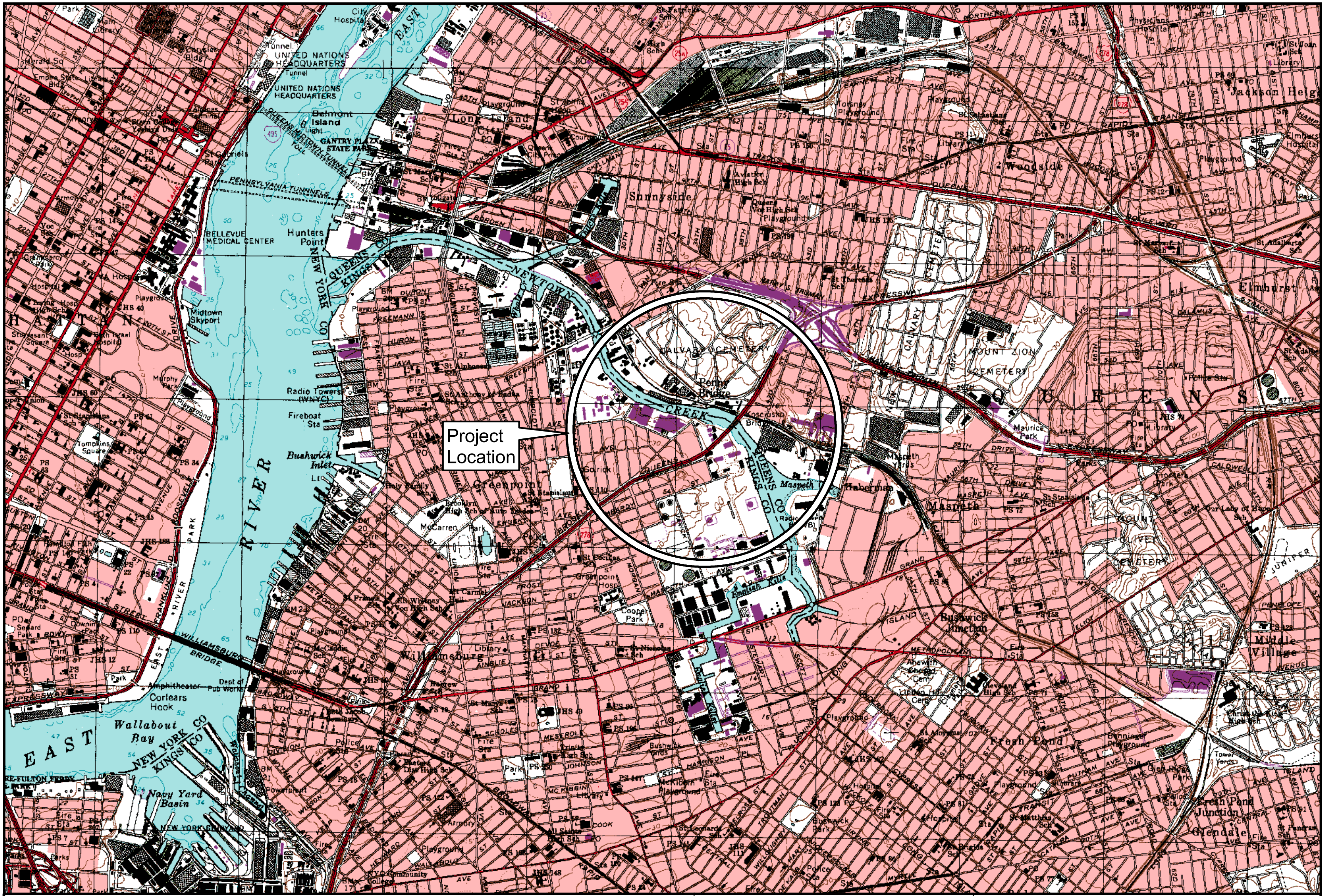

Figure 1
Kosciuszko Bridge Project Location

Source:
USGS Quad Name: Brooklyn NY

0 1,500 3,000
Feet
1 inch equals 3,000 feet

KOSCIUSZKO BRIDGE PROJECT

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Figure 2
Kosciuszko Bridge Project Limits

KOSCIUSZKO BRIDGE PROJECT

New York State Department of Transportation projects in SSA areas, including those that will add through-traffic lanes. The findings in this Groundwater Assessment Report will also be included in the DEIS. The data regarding the aquifers underlying the project were obtained from previous studies such as the ongoing New York City Department of Environmental Protection (NYCDEP) Brooklyn-Queens Aquifer Study, USEPA's Brooklyn-Queens Aquifer System Support Document, data from borings and samples obtained from adjacent remediation projects, and interviews with NYCDEP, New York State Department of Environmental Conservation (NYSDEC), USEPA, and U.S. Geological Survey (USGS) staff. The data suggest that although contaminated soils and groundwater will likely be encountered during construction, the project will not adversely affect the designated sole source aquifer. This report provides the rationale for that conclusion.

The following sections summarize the physical properties of the aquifer, the properties of potential contaminants, and the project area land uses. The information is presented in the order provided in the NYSDOT Environmental Procedures Manual.[1]

B. PHYSICAL PROPERTIES OF THE AQUIFER

B.1. Overview

The Long Island aquifer system underlies all of Nassau, Suffolk, Kings, and Queens Counties. In 1975, the USEPA designated the portion of the Long Island aquifer underlying Nassau and Suffolk Counties as a sole source aquifer. On June 18, 1979, the Jamaica Water Supply Company (JWSC) petitioned the USEPA Administrator to declare the portion of the Long Island aquifer located in Kings and Queens Counties as a sole source aquifer under the provisions of Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523). At the time, JWSC supplied water from sixty-five (65) wells located in or near the water supply franchise area to approximately 650,000 people in the southern portion of Queens County. At the time, about 80 percent of the water used by the Jamaica Water Supply Company was derived from groundwater in that area. In 1983 the Brooklyn-Queens Aquifer System, defined as the area under Kings and Queens Counties, was designated a sole source aquifer.

The Brooklyn-Queens Aquifer System is composed of four overlapping aquifers (from shallow to deep, the Upper Glacial, Jameco, Magothy, and Lloyd Aquifers) separated vertically by confining layers. A review of a hydro-geological map series published by USGS[2] indicates that, underlying a surface layer of fill, the Upper Glacial Aquifer extends down to approximately 90 to 100 feet below National Geodetic Vertical Datum of 1929 (NGVD29). An excerpt from that mapping is provided in Figure 3. Directly below the Upper Glacial Aquifer is an approximately 50-foot thick layer of the Raritan Confining Unit (‘Raritan Clay’). Bedrock underlies the Raritan Clay, at an elevation of approximately 140 feet below NGVD29. The Jameco, Magothy, and Lloyd Aquifers are absent in the project area. Borings taken just west of the project area in Brooklyn indicate that the Upper Glacial Aquifer is composed of materials categorized as sand in this area, and a thin (5-foot) layer of clay is intermittently present at the bottom of the surface fill layer.

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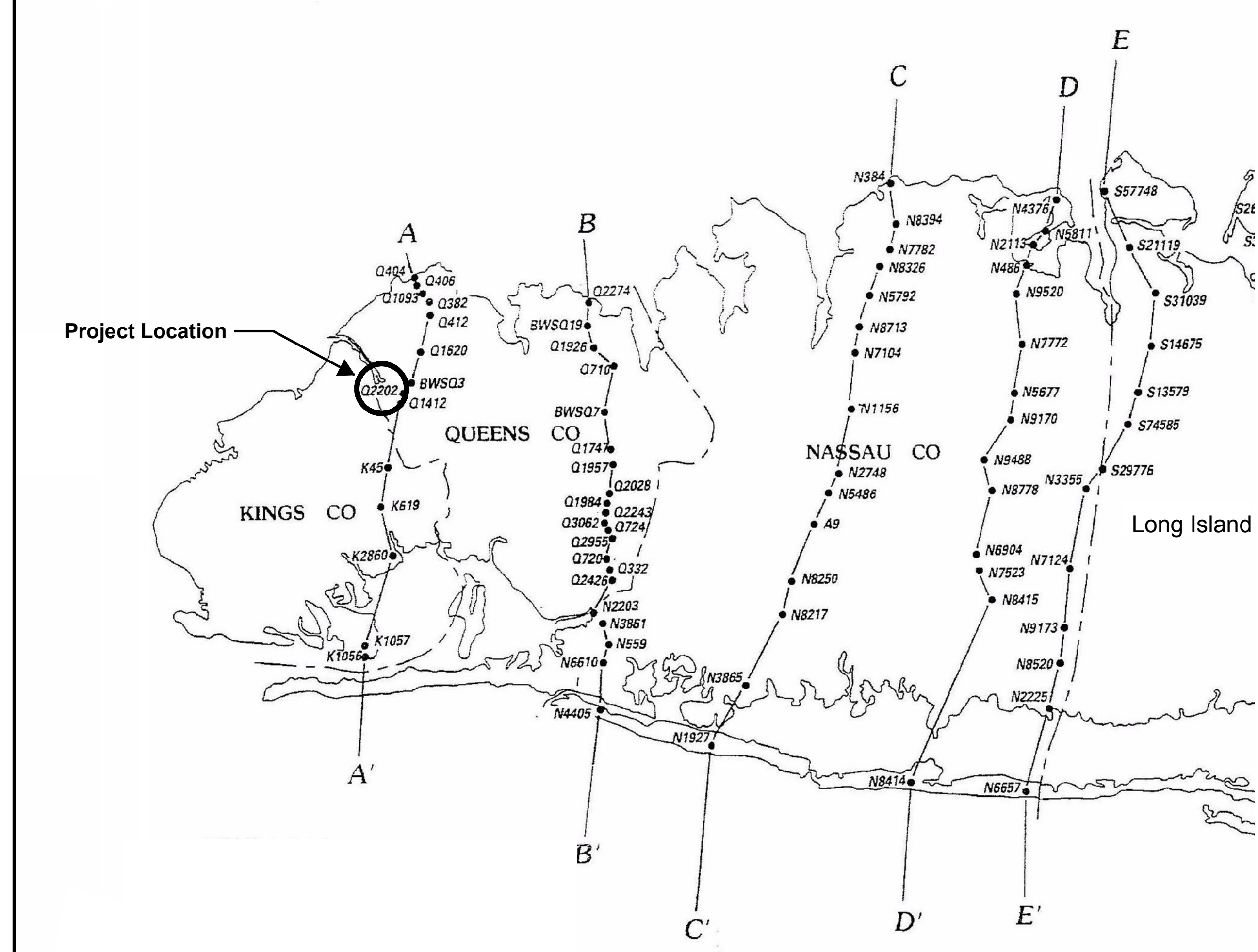
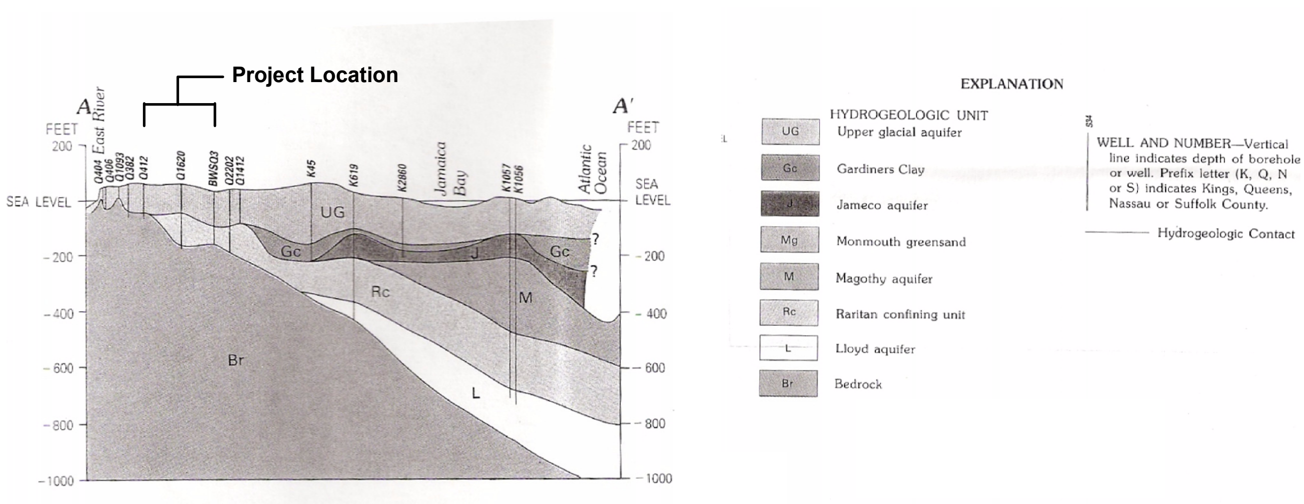
[1] NYSDOT Environmental Procedures Manual, Chapter 4.4 Attachment 4.4.b, Groundwater Assessment Reports for USEPA Designated Sole Source Aquifers.

[2] Smolensky, D.A., Buston, H.T., and Shernoff, P.K., 1989, Hydrologic framework of Long Island, New York: U.S. Geological Survey Hydrologic Investigations Atlas, HA-709, scale 1:50,000, 3 sheets.





Source: Hydrologic Framework of Long Island, USGS, 1989

Figure 3
Subsurface Cross-Section

0 5 10
Miles

KOSCIUSZKO BRIDGE PROJECT

New York State Department of Transportation

B.2. Physical Properties of the Aquifer Overburden

The Upper Glacial Aquifer is found essentially at the surface throughout the project area, covered by only a thin (5 to 30 feet) layer of fill.[3] Fill is highly variable in depth and composition. A thin (5-foot) layer of clay is intermittently present at the bottom of the surface fill layer.

B.3. Soil Depth of Aquifer Overburden

Variable, approximately 5 to 30 feet thick.

B.4. Infiltration Rate of Aquifer Overburden

Variable, since fill is not uniform.

B.5. Hydraulic Conductivity of the Aquifer

The Upper Glacial Aquifer has an average horizontal hydraulic conductivity of 270 ft/d.

B.6. Permeability of Aquifer Material

The till that comprised most of the Upper Glacial Aquifer is poorly permeable. However, borings local to the project area indicate that the Upper Glacial Aquifer is composed of materials categorized as sand in this area, suggesting a higher permeability locally.

B.7. Identification of Solution Channels and Fracture Zones

None known.

B.8. Depth of Impervious Layer

The Upper Glacial Aquifer is interrupted by discontinuous layers of clay in the project area, at varying depths and thicknesses. These clay deposits do not form an effective confining layer because they are discontinuous.

C. HYDROLOGICAL PROPERTIES OF THE AQUIFER

C.1. Average Annual Rainfall

The average annual precipitation in the project area is approximately 44 inches.[4]

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[3] Source: borings taken as part of the Peerless Importers Remedial Investigation, Greenpoint, Brooklyn, New York, provided by NYSDEC.

[4] Source: New York Annual Precipitation Map, USDA-NRCS National Cartography and Geospatial Center (http://www.ncgc.nrcs.usda.gov/products/datasets/climate/data/precipitation-state/ny.html).

C.2. Depth to Aquifer

The Upper Glacial Aquifer is essentially at the surface, with a thin (5-foot to 30-foot) overburden of fill material.

C.3. Volume of Aquifer

The Upper Glacial Aquifer extends beyond the study area and includes all of Long Island.

C.4. Yield of Aquifer

The location and shape of the Upper Glacial Aquifer make it prone to localized depression and saltwater intrusion. The USGS found that groundwater withdrawals in Kings County peaked in the 1920s to early 1940s to a maximum of 75 million gallons per day, resulting in significant cones of depression well below sea level.[5] Public-supply pumping ceased in 1947 and by the 1960s, the groundwater had returned to positive-head conditions (above sea level), with ongoing industrial pumping rates at a long-term stable rate of approximately 10 million gallons per day. Much more water is pumped from the aquifer east of the study area in central and eastern Long Island. Approximately 20% of the groundwater used by Long Island's 3 million residents is drawn from the Upper Glacial aquifer.

C.5. Depth to Seasonal High Water Table

Water-table elevations for March 1997 were mapped by USGS based on 59 observation wells in Kings and Queens Counties. The data show that in the project vicinity the groundwater altitude relative to sea level ranged from zero (0) feet at Newtown Creek to elevation 10 feet at the project limits furthest from the creek.[6] This corresponds to a depth of zero (0) feet below the ground surface at Newtown Creek where the water is at the surface, to 50 feet below the ground surface at the north end of the project where the ground elevation is 60 feet above sea level.

C.6. Direction of Groundwater Movement

The groundwater in the project area flows generally towards Newtown Creek and the East River.[7] Groundwater flow mapped in studies associated with treatment of groundwater/soils contamination adjacent to the project in Brooklyn confirms that groundwater flows generally towards Newtown Creek.[8]

C.7. Characteristics of Losing Stream[9]

There are no losing streams in the project area.

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[5] Effects of Ground-water Development and Ground-water Storage – Sustainability of Groundwater Resources (Circular 1186) (http://pubs.usgs.gov/circ/circ1186/html/gw_storage.html).

[6] Water-Table Altitude in Kings and Queens Counties, New York, in March 1997 (http://ny.usgs.gov).

[7] R. Lawrence, EPA Region 2, pers. comm. 4/29/05.

[8] Initial Site Characterization Report for the Former Paragon Oil (October 2004) – Figure 3-4.

[9] Definition of losing stream: A stream whose water seeps into an aquifer. The flow decreases as one moves downstream.

D. CHEMICAL PROPERTIES AND QUANTITIES OF POTENTIAL CONTAMINANTS

D.1. Toxicity of Potential Contaminants

There are two sources of contaminants that could potentially enter the aquifer at the project area: pre-existing contaminants in the groundwater in and adjacent to the project site, and project-related pollutants from construction and operation. Figure 4 depicts the location of several potentially contaminated sites which are listed and described in the Contaminated Materials Assessment section (Section IV.B.3.i) of the DEIS. From the graphic it is evident that potentially contaminated sites exist within or close to the majority of the project area. Some contaminants, like petroleum products, may have been released during surface spills or from leaking petroleum storage tanks. Others, such as polycyclic aromatic hydrocarbons (PAHs), metals, and/or polychlorinated biphenyls (PCBs), may have resulted from manufacturing operations and former coal storage.

Some of the larger potentially contaminated sites (i.e., Newtown Creek (Figure 4 Site 22), the former Phelps Dodge Refining Site (Figure 4 Site 24, 26 & 28), and a large oil plume in Brooklyn (Figure 4 as shown)) were previously investigated and the results of those studies were reviewed for the DEIS.

Newtown Creek. Newtown Creek sediments were found to contain various contaminants at potential hazardous waste levels, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, PCBs, and various PAHs.

Phelps Dodge Refining Site. The former Phelps Dodge Refining Site (a.k.a. "Laurel Hill Site") is listed as a NY State Inactive Hazardous Waste Site and a USEPA CERCLIS Site. A portion of the Phelps Dodge site lies within the Kosciuszko Bridge project limits in Queens abutting the east side of the existing BQE from Newtown Creek northward to 55th Avenue. Historic copper smelting and refining operations conducted at the Phelps Dodge site since the early 1900s resulted in contamination of underlying soils and groundwater with heavy metals, PCBs, and petroleum related compounds. Remedial activities completed in 2005 under NYSDEC oversight included removal and off-site disposal of hazardous PCB and metal contaminated soils, physical containment of lesser contaminated soils by capping, and containment/treatment of contaminated groundwater. Soil and groundwater data was reviewed for areas of the Phelps Dodge Site that overlap the limits of the Kosciuszko Bridge project area. Soil samples from these areas contained elevated levels of metals (primarily lead, copper, and arsenic), PAHs, and PCBs at isolated locations.[10]

Brooklyn Oil Plume. A free-phase groundwater petroleum plume is known to exist approaching the limits of the study area in Brooklyn near Van Dam and Varick Streets due to the release of approximately 17 million gallons of petroleum at the ExxonMobil Greenpoint Terminal that was first discovered in the late 1970s. A groundwater monitoring report that was

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[10] However, prior testing did not detect any contaminants in the soil of these areas at hazardous waste levels. As a result, NYSDEC did not require excavation and removal of these soils. Groundwater data indicated the presence of dissolved metals (primarily arsenic, iron, magnesium, sodium, and zinc) at concentrations above NYSDEC Class GA Groundwater Values, but below NYCDEP Sewer Discharge Limits. Slight exceedences of Class GA values were noted for VOCs and SVOCs at isolated locations. No free-phase petroleum product was reportedly observed in the monitoring wells located in the vicinity of the study area.

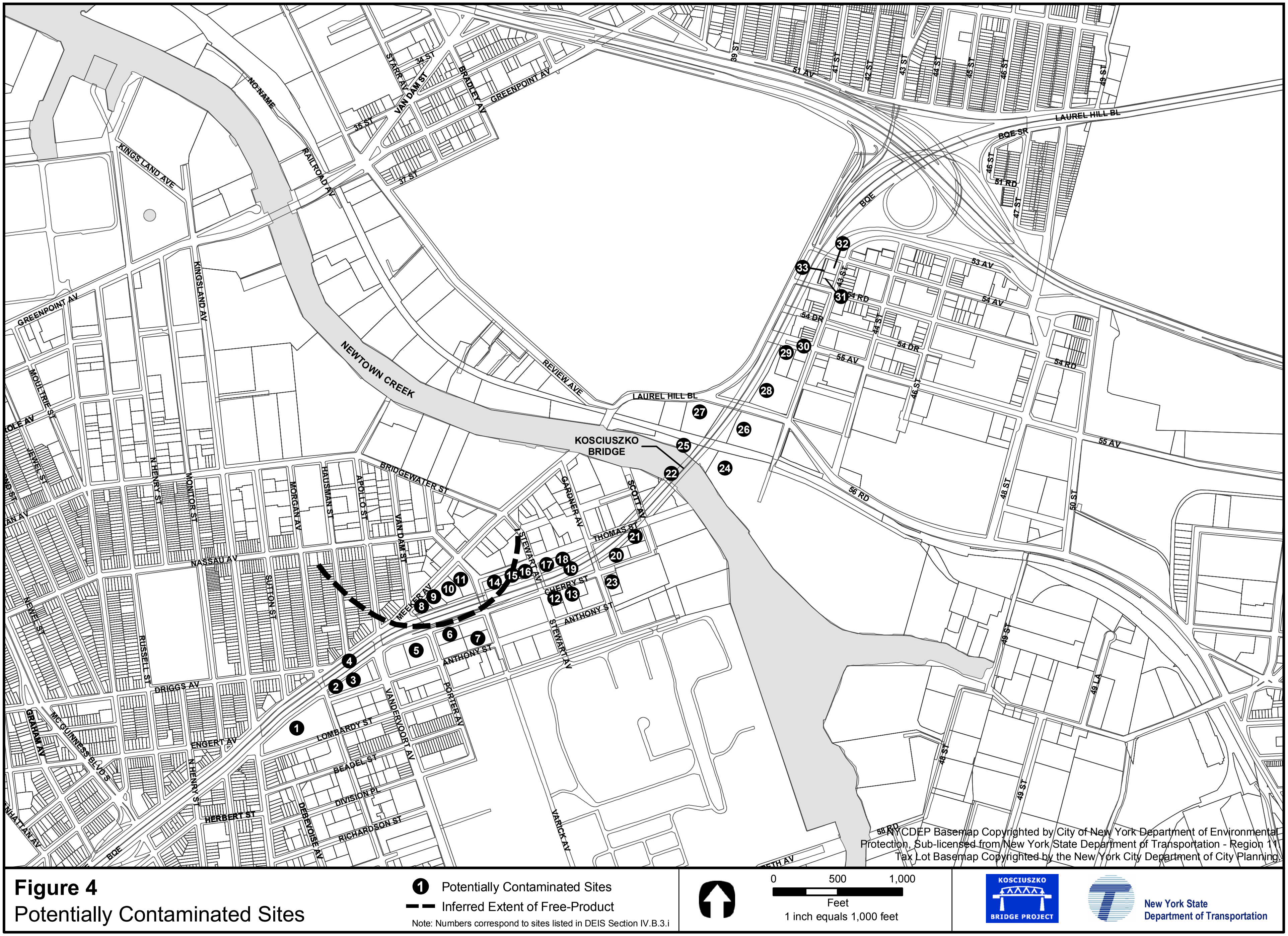

Figure 4
Potentially Contaminated Sites

prepared on behalf of ExxonMobil Corporation includes data collected on February 28, 2005 includes a free-product occurrence map which depicts free-product approaching the limits of the study area near Van Dam and Varick Streets at thicknesses ranging from non-existent to approximately 1 foot.

Soil and groundwater samples were collected for laboratory analysis from the study area in September 2005 to better define the conditions in areas of suspected contamination. The limits of the free-phase petroleum plume appear to extend beneath the BQE in the vicinity of Van Dam and Varick Streets. The edge of the plume does not appear to extend to the southeast beyond Cherry Street; however it does appear to exist within the limits of the project site between Varick and Van Dam Streets at thicknesses ranging from a sheen directly east of the BQE structure to up to one foot in thickness just west of the BQE.

Construction-related potential contaminants would include fuel and oil spills from construction equipment.

Relative to the operations phase (long-term), typical highway storm water runoff pollutants include particulates, Nitrogen, Phosphorus, Lead, Zinc, Iron, Copper, Cadmium, Chromium, Nickel, Manganese, Cyanide, Sodium, Calcium, Chloride, Sulphates, and petroleum.[11]

(Measures to address handling of existing and potential contaminants are discussed in Section D.3, below.)

D.2. Volume of Potential Contaminants

The volume of potential pollutants from construction activities would be on the order of several gallons (i.e., a fuel oil leak) and the volume of potential pollutants from roadway runoff during the operations phase (long term) would be a much larger volume of diluted pollutants, typical of urban runoff.

D.3. Handling of Potential Contaminants

The construction staging plan will take into account areas of potential contamination, and will provide for proper treatment and handling of materials from those areas. Clean soils and groundwater will be segregated from contaminated materials to ensure efficient treatment of contaminated materials and to ensure that the project will not spread the contamination to ‘clean’ materials.

Excavation dewatering fluids generated during construction in some areas of the project would likely require treatment prior to discharge to a sanitary sewer or Newtown Creek. Treatment processes could include particle settling, oil/water separation to remove free product, and/or carbon filtration to remove dissolved organic compounds. It is also possible that prolonged dewatering could cause migration of additional contaminants towards the extraction point from the surrounding aquifer. However, the goal during construction would be to avoid impacting the existing contaminated groundwater. If during design it is determined that the project would cause a draw-down or otherwise affect the adjacent contaminated groundwater, NYSDOT would contact USEPA for further discussions. The type of treatment selected is determined by

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[11] FHWA, Stormwater Best Management Practices in an Ultra-Urban Setting (http://www.fhwa.dot.gov/environment/ultraurb/uubmp2.htm).

the contaminants present in the groundwater. Both NYSDEC and NYCDEP permits require that contaminated sediments suspended in groundwater be removed prior to discharge. This would be achieved through the use of settling tanks. Flocculent can be injected into the tanks to cause suspended sediments to settle out of the water. The sediments would be analyzed to determine what, if any, contaminants are present, and, depending on the type and concentrations of contaminants, a disposal option would be selected as described in the DEIS.

Deep operations along the BQE in the vicinity of Varick Street and Van Dam Street in Brooklyn could encounter the free-phase petroleum plume that exists on the groundwater table in this area at depths ranging from approximately 40 to 50 feet below grade. Most of the construction for the project would be very shallow, but the pier footings would likely be pile-supported, particularly the taller piers nearest to Newtown Creek. If engineering considerations call for deep placement of foundation structures/piles in this area, the piles could penetrate the petroleum layer. However, as described in section B.8, available geologic cross sections for this area do not reveal the presence of a distinct hydrologic confining layer, suggesting that placement of columns that impact the product layer would not cause cross contamination of a lower hydrologic unit.

The deepest piles would extend an estimated 80 feet below Mean High Water (MHW) to achieve the necessary resistance. It is estimated that the piles would therefore be entirely within the Upper Glacial Aquifer, and would not be likely to extend into the underlying Raritan Clay. Even if the piles would extend into the Raritan clay layer the piles would not threaten any underlying aquifer layers because in the project area there are no aquifers underlying the Raritan clay. Borings would be taken during the design phase of the project. If those borings indicate that the piers would penetrate the Raritan clay in any location where an underlying aquifer is present, NYSDOT would contact USEPA for further discussions.

D.4. Spill Contingency Plan

Similar to other major construction projects in an urban area, the Kosciuszko Bridge Project would exercise care during construction to control the risks that could be associated with the mobilization of contaminants in soil, groundwater, building materials, or equipment. In particular, it would be necessary to prevent or control exposure to hazardous conditions associated with the free-product plume in Brooklyn and Newtown Creek sediment.

To mitigate potential health concerns, a pre-construction analysis of each area of proposed excavation would be undertaken prior to construction. This pre-construction analysis would include a review of existing sampling results and, if necessary, may include additional sampling and testing of soil and groundwater. The objective of these analyses would be to identify, to the extent possible, the environmental issues likely to be encountered in each area of excavation.

In addition, all work for the Kosciuszko Bridge would be conducted under the provisions of a Health and Safety Plan (HASP) to protect both workers and the general public who may be near the project site during the construction phase. Contaminated materials encountered during construction would be handled, stored, transported, and disposed of in accordance with applicable federal, state, and local regulations and in compliance with the site-specific HASP. At a minimum, all on-site project personnel would be required to follow all applicable local, state, and OSHA construction codes and regulations, including:

- U.S. EPA, Identification and Listing of Hazardous Waste (40 CFR Part 261);

- U.S. EPA, Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262);
- U.S. EPA, Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263);
- U.S. EPA, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CRF Part 264);
- U.S. EPA, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 265);
- U.S. EPA, Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (40 CFR Part 266);
- U.S. EPA, Land Disposal Restrictions (40 CFR Part 268);
- New York State Solid and Hazardous Waste Regulations (6 NYCRR Part 360) for remediation of soils that have elevated levels of metals as well as residual asbestos on the site;
- Procedures in Petroleum Cleanup and Removal (6 NYCRR Part 613 and 6 NYCRR Part 611) for removal of any storage tanks;
- Spill Technology and Remediation Series (STARS) Memo #1 for removal and disposal of petroleum contaminated soil; and
- Technical and Operations Guidance Series (TOGs) for removal of petroleum contaminated groundwater.

Soil and groundwater management plans would be developed before the start of construction activities. During construction, any unusual conditions that may indicate unexpected contamination, such as odors or discoloration of the soil, would be evaluated to ensure that the impacted materials are properly handled. Contaminated materials encountered during construction would be handled, stored, and disposed of in accordance with all applicable federal, state, and local regulations and in compliance with the soil and groundwater management plans.

The groundwater management plan would provide a description of the methods used to collect, store, and dispose of contaminated groundwater and petroleum product that could be generated during the chosen action. The groundwater management plan would also identify the requirements of permits, which must be obtained from NYCDEP and/or NYSDEC to discharge the water to either the city's sewers or surface waters, respectively. Prior to obtaining NYCDEP or NYSDEC discharge permits, groundwater would be sampled and analyzed to characterize its physical and chemical properties. Depending on the results of the analyses, the type of treatment prior to discharge, if required, would be determined.

Prior to implementing any treatment system or discharge of groundwater, samples would be collected and analyzed, a treatment system would be designed, and the information would be included in the NYSDEC or NYCDEP permit applications. Approval from the responsible regulatory agency, in the form of a permit, would be obtained prior to construction activities. Depending on the quantity of water to be discharged, the permits require sampling on a regular basis to confirm that the treatment is effective. Discharging activities would be performed in accordance with the terms and conditions specified by the permit, including the discharge rate, the sampling frequency, and the duration.

A Spill Contingency Plan would be developed for the project during the design and permitting stages. The contractor would adhere to construction best management practices in accordance with NYSDOT specifications to minimize the risk of groundwater contamination.

E. LAND USE OF PROJECT AREA

E.1. Existing Land Use and Condition of the Project Site

The project area is highly urbanized. Industrial, transportation, commercial and residential land uses dominate the area. A large cemetery is located adjacent to the project in Queens.

E.2. Planned Land Use of the Project Site

One important characteristic of land use that affects groundwater is whether the land cover is pervious (allows water to percolate into the soil) or impervious (sheds water). ‘Soft’ surfaces such as open undeveloped areas and vegetated areas are considered pervious, and ‘hard’ surfaces such as pavement, gravel parking lots, and buildings, are considered impervious. The project would increase the amount of impervious area because it would increase the paved area by widening the roadway. However, much of the area that would be displaced by the wider roadway is already impervious. For example, if an extra lane is added that displaces an existing parking lot, there would be no increase in the impervious area. Table 1 provides estimated changes to the amount of pervious landcover for each of the alternatives.

TABLE 1: IMPERVIOUS SURFACE AREA

	No Build	RA-5	RA-6	BR-2	BR-3	BR-5
Total Paved Area of BQE within Project Limits (Acres)	15.6	24.2	21.8	25.8	25.8	27.7
Increase in Paved Area of BQE relative to Existing Conditions (Acres (%))	0 (0%)	8.6 (55%)	6.2 (39%)	10.2 (65%)	10.2 (65%)	12.1 (77%)
Increase in Impervious Surface Area Relative to Existing Conditions (Acres)	0.0	1.9	0.8	2.1	2.1	2.1

Within the project limits the existing BQE roadway occupies approximately 15.6 acres of impervious (paved) area. The five build alternatives would increase the paved BQE roadway area to a varying degree, ranging from 21.8 acres for Alternative RA-6 (a 39% increase) to 27.7 acres for Alternative BR-5 (a 77% increase). Most of the additional BQE roadway area would displace areas that are already impervious. Alternative BR-5 for example, would increase the paved BQE roadway area by 12.1 acres, but only 2.1 acres of that increase would displace land cover that is now pervious. The balance would displace land cover that is already impervious (such as local roads, parking lots and buildings).

If the estimates provided in Table 1 change by more than 10% during the design phase, NYSDOT will contact USEPA for further discussion.

E.3. Pre- and Post-Project Storm Water Runoff

The project will be constructed using best management practices that would prevent contamination of the groundwater. Storm water from the south end of the project would be conveyed to an existing storm-sewer system. The remainder (majority) of the storm water runoff, from the central and northern portions of the project, would be conveyed to Newtown Creek after passing through storm water management measures. Specific stormwater handling measures have not yet been selected pending additional coordination with NYSDEC relative to surface water quality. This project would be constructed in conformance with GP-0201, and the NYSDEC Draft (January 2004) Standards and Specifications for Erosion and Sediment Control. Permanent stormwater controls would be designed per the NYSDEC Stormwater Design Manual. NYSDOT believes that, should full compliance with the Stormwater Design Manual be unfeasible, NYSDEC's Interim Strategy (April 2004) for Redevelopment Projects may apply. Stormwater treatment measures being considered include settling tanks, sand filters, stormwater quality basins and polishing ponds. However, siting of large surface measures such as ponds and basins may not be feasible because of a high groundwater table, relatively flat grades, and space constraints from existing infrastructure such as the rail line.

In contrast, there are no storm water runoff treatment measures in the existing roadway storm water system. The majority of the storm water runoff is directed to scuppers that discharge directly to the ground, resulting in overland flow towards Newtown Creek.

If compliance with the NYSDEC Stormwater Design Manual is not feasible, NYSDOT will notify USEPA for further discussion.

E.4. Characteristics of Aquifer Recharge Area

The Brooklyn-Queens Aquifer system is located within New York City, a highly urbanized area.

E.5. Pre- and Post-Project Topography of Project Site, Including Cut and Fill Limits

The topography of the project site will be altered primarily by the widening of the existing BQE roadway.

E.6. Proximity of Public and Private Well-Heads Within 200 Meters

There are no public wells within 200 m of the project. There is one mapped well on record at the NYC Department of Health that is within 200 m of the project, at 497 Scott Avenue in Brooklyn (approx. 90 meters from the project). However, the permit for that well expired in 1981, the well is not used for drinking water (no individual private wells in New York City are legally used for drinking water), and the well is at or near the Brooklyn oil plume. There are several public water supply wells in southeastern Queens formerly owned by the Jamaica Water Supply Company. Of the 68 wells in the former JWSC array, only four are currently in operation. Of those four, one well (#32) draws from the Upper Glacial Aquifer, and the remaining three wells (#5, 23A, and 50A) draw from the underlying Magothy Aquifer.[12] All are located on the far side of the 'glacial spine' which is the hydrological divide between north-flowing and south-flowing runoff on Long Island. The nearest public water supply well is located

[12] Pers. Com. C. Chakrabarti NYSDEC May 2, 2005.

at 108th Street at Hillside Avenue, in Southeastern Queens, approximately 6 miles from the Project site.[13]

E.7. Characteristics of Surface Water Features of Project Site

Newtown Creek is the dominant surface water feature in the project area. It is a highly channelized tidal waterway that outlets to the East River. It has poor water quality resulting from industrial activity and poor circulation.

E.8. Surface Drainage Patterns

Storm water runoff in the extreme southern portion of the project is conveyed to the municipal storm sewer system. The majority of the project area lacks storm sewers, so runoff flows overland into Newtown Creek. At the extreme north end of the project (the interchange with the Long Island Expressway), runoff is conveyed in storm sewers to Newtown Creek. The proposed project would similarly utilize the storm sewer system at the south end, and north end, but the runoff in the central part of the project would be collected and conveyed in a closed system with appropriate storm water management measures to pre-treat the water before it reaches Newtown Creek. Overland flow would be eliminated.

E.9. Provisions for Stockpiling, Storage, and Use of Various Construction Chemicals, Pesticides, or Fertilizers

A Spill Contingency Plan would be developed prior to construction to minimize the chances of a spill entering groundwater or surface waters.

F. CONCLUSION

Considering the information provided above, the proposed project is not likely to negatively impact the Brooklyn-Queens Sole Source Aquifer.

[13] Pers. Com. W. Yulinski NYC DEP September 6, 2005.