In-City Water Supply Resiliency

Draft Scope of Work
Draft Environmental Impact Statement

CEQR No. 15DEP029U

Prepared by	New York City Department of Environmental Protection
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May 2017

In-City Water Supply Resiliency Project

DEIS

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List of Acronyms

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BEPA	Bureau of Environmental Planning and Analysis
CadnaA	Noise modeling software
CAL3QHCR	EPA Air Dispersion Model
CEA	Critical Environmental Areas
CEQR	City Environmental Quality Review
cfs	Cubic Feet per Second
DCP	Department of City Planning
DEIS	Draft Environmental Impact Statement
DEP	Department of Environmental Protection
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FEIS	Final Environmental Impact Statement
GAC	Granular Activated Carbon
GHG	Greenhouse Gas
IGWMC	International Groundwater Modeling Center
LPC	Landmarks Preservation Commission
MCL	Maximum Contaminant Level
mgd	million gallons per day
NAAQS	National Ambient Air Quality Standards
NWIS	National Water Information System
NYC	New York City
NYCDOHMH	New York City Department of Health and Mental Hygiene
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
PCE	Passenger Car Equivalents
RCNY	Rules of the City of New York
ROW	Right-of-Way
SEQRA	State Environmental Quality Review Act
SERP	State Environmental Review Process
SHPO	State Historic Preservation Office
SPDES	State Pollutant Discharge Elimination System

TIMS	NYCDOT Traffic Information Management System
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
VPC	Vapor Phase Carbon

1.0 INTRODUCTION

The vast and complex New York City (City) water supply system (**Figure 1**) was originally developed through the visionary planning of City planners and engineers who understood the importance of delivering an abundant and reliable supply of clean drinking water to the City. The system was designed in the early 1800s, and has been able to expand, adapt, and modernize to keep pace with a growing population because City leaders have continued to follow the precedent set by their predecessors. Today, the New York City Department of Environmental Protection (DEP) is responsible for supplying clean drinking water to over eight million City residents and approximately one million upstate customers in sufficient quantity to meet present water demand, as well as for maintaining the water supply system to meet future water demand. Recognizing the need to protect the long-term viability and overall resilience of the water supply system, the City continues to make systematic and sustained investments in the critical infrastructure that provides water to approximately nine million people each day. These investments include work on redundancy measures for use in the event of necessary repairs and/or emergencies.

DEP is proposing the In-City Water Supply Resiliency Project to meet the City's water supply needs and serve as a supplement to DEP's upstate surface water supplies. The subject of this Draft Scope of Work is the proposed Queens Groundwater project, also referred to as the In-City Water Supply Resiliency Project (the "Proposed Project"). The Jamaica Water Supply Company operated a group of wells that served communities in southeastern Queens and portions of Nassau County from 1887 to 1996. In 1996, DEP acquired the Queens portion of this system. The Queens Groundwater system is comprised of 44 well stations, which house a total of 68 water supply wells. These wells collectively have a permitted capacity of up to a five-year running average of 22,568 million gallons per year or 62 million gallons per day (mgd) with a 24,807 million gallon maximum in any one year or 68 mgd. DEP has owned, maintained, and operated the groundwater supply system since its acquisition and has retained the system in order to have a supplemental supply to the City's upstate surface water system in times of upstate drought and unforeseen system outages or emergencies.

This EIS will support DEP's application to the New York State Department of Environmental Conservation (NYSDEC) to renew the Water Supply/Water Withdrawal permit for the groundwater system, which expires on December 31, 2017. The Proposed Project is the upgrade of DEP's groundwater wells to include the necessary treatment required for the operation of the existing groundwater supply system in the event there is an exigent need to supply the full 68 mgd permitted capacity in response to emergency water supply shortage and upstate drought conditions. Permanent or mobile temporary treatment facilities will be evaluated for the 68 wells at 44 stations (or sites) that are addressed within the current NYSDEC Water Supply Permit (**Figure 2**).

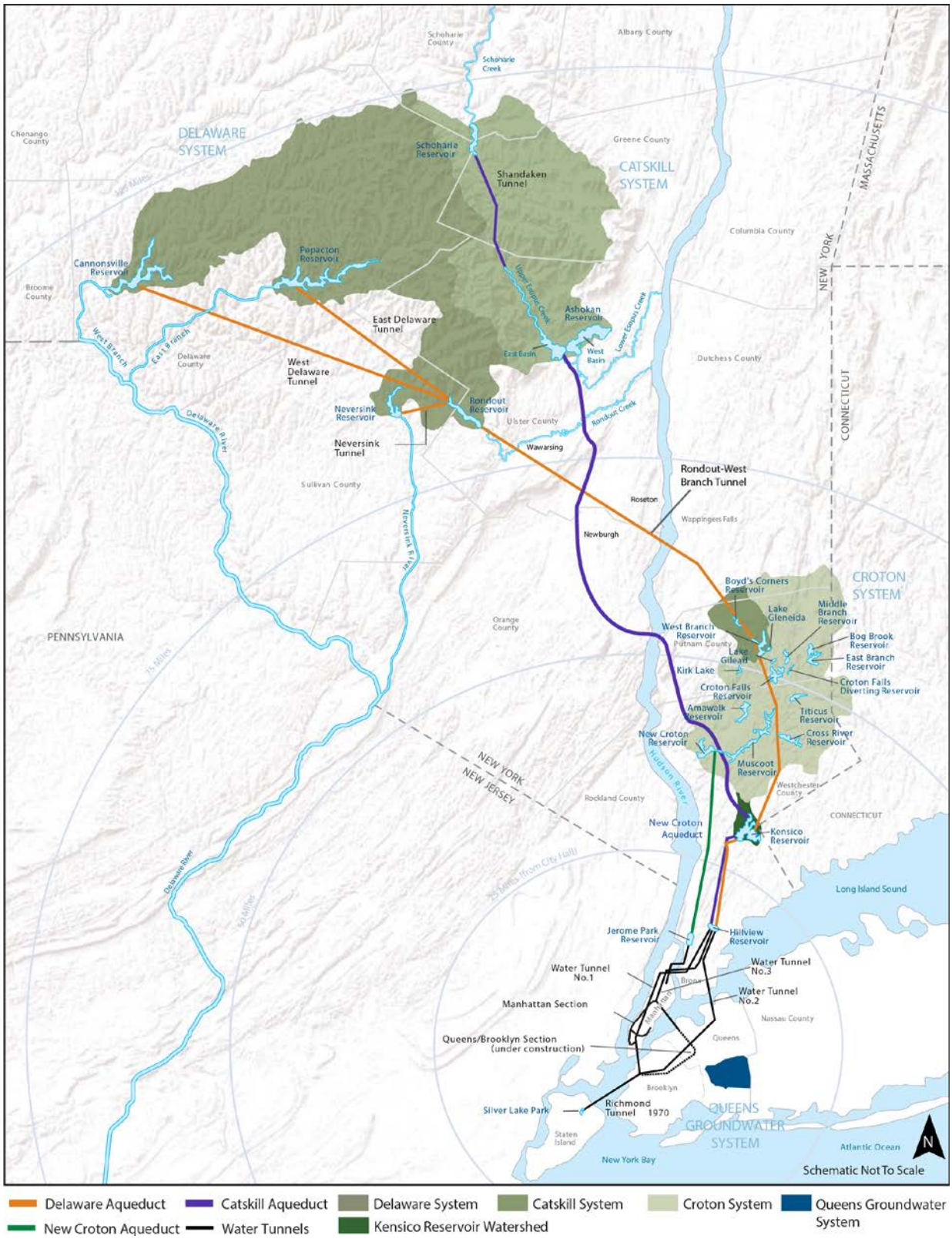

Figure 1: Water Supply System Map

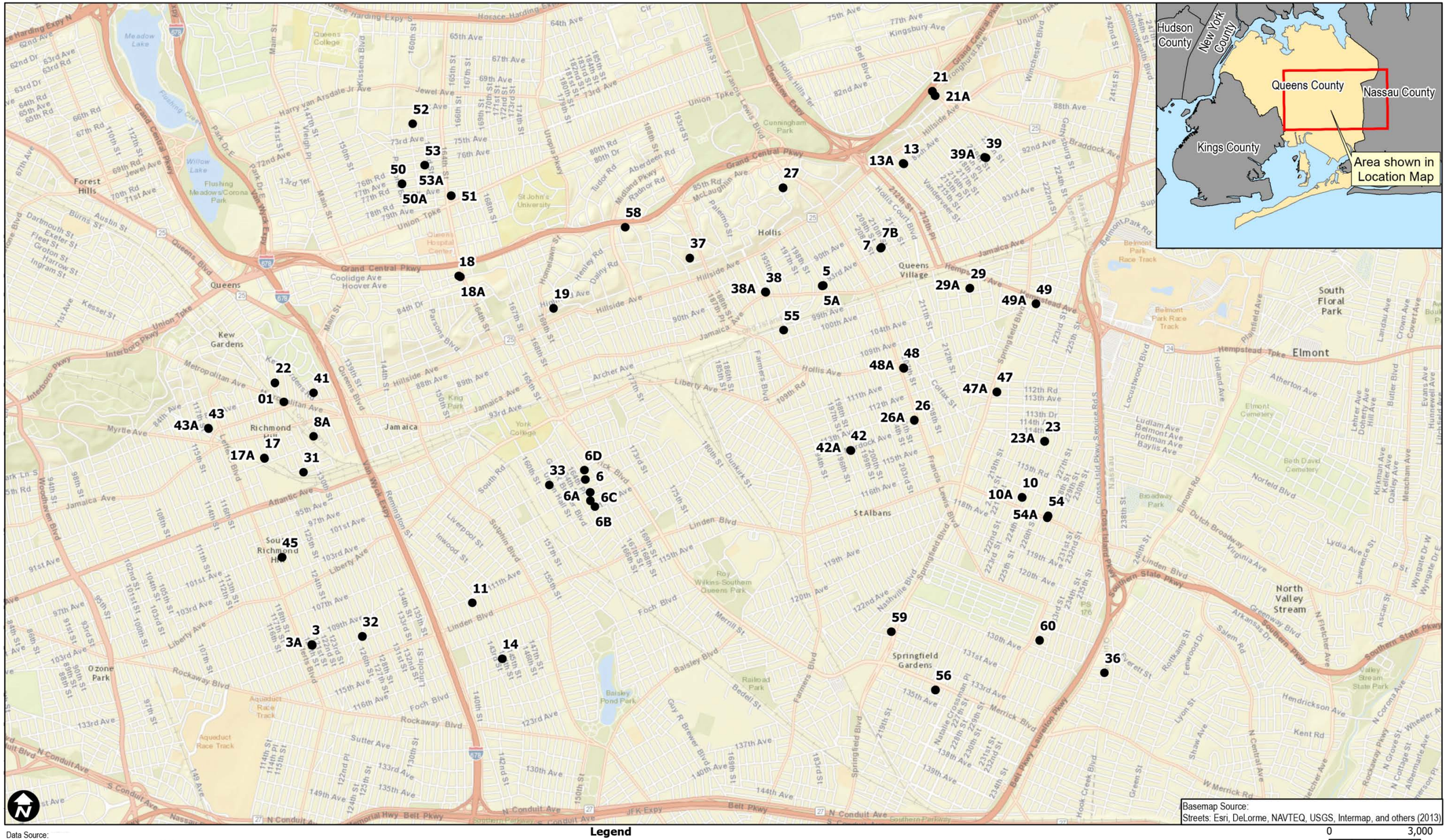

Figure 2: DEP Inventory of Groundwater Infrastructure in Southeast Queens

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1.1 ORGANIZATION OF THE DRAFT SCOPE

This Draft Scope includes the following discussions:

- **Section 1.2, Purpose and Need for the Proposed Project -** This section describes the need for the Proposed Project.
- **Section 1.3, In-City Water Supply Resiliency Project Description -** This section describes the main components of the Proposed Project and the locations.
- **Section 1.4, Project Schedule and Phasing -** This section describes the anticipated schedule for the Proposed Project.
- **Section 1.5, Project Approvals and Coordination -** This section discusses the anticipated permits and approvals that would be required for the Proposed Project as well as necessary interagency and public outreach and coordination.
- **Section 1.6, Analytical Framework for Environmental Impact Statement -** This section outlines the analytical framework for the draft environmental impact statement (DEIS).
- **Section 1.7, Organization and Scope of the Environmental Impact Statement -** This section presents the organization of the DEIS and outlines the scope of the analyses to be performed, as well as their methodologies.

1.2 PURPOSE AND NEED FOR THE PROPOSED PROJECT

DEP is responsible for ensuring the safe and reliable delivery of drinking water to consumers in sufficient quantity to meet all present and future water demands. The purpose of the In-City Water Supply Resiliency Project is to rehabilitate and modernize DEP's groundwater system to ensure its viability for meeting DEP's water supply needs as a supplement to upstate surface water supplies in the event of necessary repairs and/or an emergency. Rehabilitating the Queens Groundwater system would improve the resiliency of the City's overall water supply system by making a portion of the groundwater system immediately accessible in an emergency, and the entire groundwater system available within a short period of time during a water supply shortage due to drought conditions or infrastructure outages.

DEP originally acquired the Queens Groundwater system in 1996 and has maintained and operated it as a supplemental supply to the City's upstate surface water system. DEP has maintained applicable permits to operate the system since acquiring the system in 1996 and is seeking to renew its Water Supply/Water Withdrawal Permit (DEC Permit #2-6399-00005/00001) which expires on December 31, 2017, to maintain the existing permitted capacity. No modifications to the existing Water Supply/Water Withdrawal Permit would be requested and the currently permitted capacities would remain the same as provided within the existing permit. The Proposed Project would enable operation of the full permitted capacity of the groundwater well system in southeastern Queens, New York. As such, the DEIS will include the evaluation of

necessary upgrades to support permanent or temporary on-site treatment system improvements at all well stations for potable water supply to support the use of these stations in the event of an emergency.

The Proposed Project is consistent with the *One New York: the Plan for a Strong and Just City (OneNYC)* initiative to protect the City's water supply and maintain reliability and resiliency of the system.

1.3 IN-CITY WATER SUPPLY RESILIENCY PROJECT DESCRIPTION

DEP has owned, maintained, and operated a groundwater supply system in southeastern Queens since 1996 (Queens Groundwater system). This system was formerly owned and operated by the Jamaica Water Supply Company and had been in operation since before the beginning of the 20th century. At its peak, the Jamaica Water Supply Company produced a maximum of over 100 mgd of groundwater.

The currently permitted Queens Groundwater system is comprised of 44 well stations, which house a total of 68 water supply wells (some stations include a single well; others include multiple wells). DEP holds and maintains a Water Supply Permit from the NYSDEC that was effective January 1, 2007 and will require renewal by December 31, 2017. The permit allows DEP to withdraw up to 22,568 million gallons per year (62 mgd) based upon a five-year running average, with a 24,807 million gallon per year maximum for any single year (68 mgd).[1] All stations are located within an approximately 20 square-mile area in the southeastern section of Queens, near the border with Nassau County. The stations are generally bounded by I-495 (Long Island Expressway) to the north, Route 27 (Sunrise Highway) to the south, Lefferts Boulevard to the west, and the Belt/Cross Island Parkways to the east (see **Figure 2** and **Table 1.3-1**). The production from any of the Queens wells in the future would be capable of reaching the Hillview Reservoir for distribution anywhere within the City where there would be demand. Ongoing and planned upgrades for existing water mains in Queens as part of the City's continuous maintenance program and independent of the Proposed Project will make this infrastructure even more robust.

Table 1.3-1: Well Station Sites Comprising the Proposed Project

Well Number	Station	Address (Queens, NY)	Block	Lot	Zoning	Aquifer
1	1	127-01 Metropolitan Ave.	9249	65	R6	Upper Glacial
3	3	109-31 120th St.	11601	54	R4	Upper Glacial
3A	3	109-31 120th St.	11601	54	R4	Upper Glacial
5	5	93-02 199th St.	10473	19	R4	Magothy
5A	5	93-02 199th St.	10473	19	R4	Magothy
6	6	166-44 108th Ave.	10173	48	R4-1	Upper Glacial
6A	6	164-44 109th Ave.	10183	53	R3A	Upper Glacial
6B	6	164-27 110th Ave.	10185	125	R3A	Upper Glacial

[1] All groundwater flows have been rounded to the nearest whole number mgd.

Table 1.3-1: Well Station Sites Comprising the Proposed Project

Well Number	Station	Address (Queens, NY)	Block	Lot	Zoning	Aquifer
6C	6	164-11 109th Dr.	10184	112	R3A	Lloyd
6D	6	166-44 108th Ave.	10173	48	R4-1	Upper Glacial
7	7	91-01 209th St./91-01 91st Ave./ 209-02 91st Ave.	10560	1	R2	Magothy
7B	7	91-01 209th St./91-01 91st Ave./ 209-02 91st Ave.	10560	1	R2	Magothy
8A	8	131-02 88th Ave.	9338	45	M1-1	Lloyd
10	10	116-32 224th St.	11324	48	R3-1	Upper Glacial
10A	10	116-32 224th St.	11324	48	R3-1	Magothy
11	11	111-12 143rd St.	11958	6	R3A	Jameco
13	13	214-01 89th Ave.	10672	1	R2	Magothy
13A	13	214-01 89th Ave.	10672	1	R2	Magothy
14	14	116-16 144th St.	12002	11	R3A	Jameco/ Magothy
17	17	87-73 123rd St.	9332	47	R5	Lloyd
17A	17	87-73 123rd St.	9332	47	R5	Jameco
18	18	84-02 164th St./84-06 164th St.	9792	73	R4B	Magothy
18A	18	84-02 164th St./84-06th 164 St.	9792	73	R4B	Lloyd
19	19	Highland Ave.	9843	15	R5	Upper Glacial
21	21	85-44 Springfield Blvd.	10693	35	R3-2	Magothy
21A	21	85-44 Springfield Blvd.	10693	35	R3-2	Magothy
22	22	84-76 127th St.	9248	42	R4-1	Upper Glacial
23	23	114-56 224th St.	11267	15	R2A	Upper Glacial
23A	23	114-56 224th St.	11267	15	R2A	Magothy
26	26	113-30 Francis Lewis Blvd.	11001	1	R4B	Upper Glacial
26A	26	113-30 Francis Lewis Blvd.	11001	1	R4B	Magothy
27	27	86-83 Dunton St.	10538	107	R1-2	Upper Glacial
29	29	216-15 102nd Ave.	11091	1	R3-2	Upper Glacial
29A	29	216-15 102nd Ave.	11091	1	R3-2	Magothy
31	31	127-15 92nd Ave.	9356	35	M1-1	Upper Glacial
32	32	109-50 127th St./126-15 111th Ave.	11607	33	R3-2	Upper Glacial
33	33	160-25 108th Ave.	10139	32	R4	Upper Glacial
36	36	Hook Creek Blvd.	12890	2	R2	Magothy
37	37	87-74 Chevy Chase St.	9962	89	R1-2	Upper Glacial
38	38	90-35 193rd St.	10458	25	R5	Upper Glacial
38A	38	90-35 193rd St.	10458	25	R5	Magothy
39	39	90-42 Springfield Blvd.	10718	26	R2	Upper Glacial
39A	39	90-42 Springfield Blvd.	10718	26	R2	Magothy
41	41	87th Ave.	9621	42	R4-1	Upper Glacial
42	42	197-14 Murdock Ave.	11014	6	R4-1	Upper Glacial
42A	42	197-14 Murdock Ave.	11014	6	R4-1	Magothy
43	43	85-34 118th St.	9260	21	R6B	Upper Glacial
43A	43	85-34 118th St.	9260	21	R6B	Magothy

Table 1.3-1: Well Station Sites Comprising the Proposed Project

Well Number	Station	Address (Queens, NY)	Block	Lot	Zoning	Aquifer
45	45	101-19 120th St.	9488	68	R4A	Upper Glacial
47	47	217-14 112th Rd.	11214	11	R3-2	Upper Glacial
47A	47	217-14 112th Rd.	11214	11	R3-2	Magothy
48	48	109-81 Francis Lewis Blvd.	10947	14	R3-2	Upper Glacial
48A	48	109-81 Francis Lewis Blvd.	10947	14	R3-2	Magothy
49	49	103-15 219th St.	11154	18	R3-2	Upper Glacial
49A	49	103-15 219th St.	11154	18	R3-2	Magothy
50	50	77-09 Parsons Blvd.	6827	30	R3-2	Magothy
50A	50	77-09 Parsons Blvd.	6827	30	R3-2	Magothy
51	51	78-23 164th St.	6972	37	R3-2	Magothy
52	52	71-52 161st St.	6799	81	R6	Magothy
53	53	160-25 76th Rd.	6836	4	R3-2	Magothy
53A	53	160-25 76th Rd.	6836	4	R3-2	Magothy
54	54	227-25 Linden Blvd.	11328	1	R2A	Upper Glacial
54A	54	227-25 Linden Blvd.	11328	1	R2A	Magothy
55	55	194-10 99th Ave.	10841	10	R3-2	Magothy
56	56	134-15 222nd St.	13102	1	R3A	Magothy
58	58	180-40 Grand Central Parkway	9949	60	R1-2	Magothy
59	59	132-06 Springfield Blvd.	12728	41	R2	Magothy
60	60	231-19 128th Dr.	12869	54	R2A	Magothy

The sources of water for these wells are the aquifers beneath the Queens section of Long Island.[2] There are four main aquifers in the Brooklyn Queens Aquifer: the Upper Glacial and Jameco, which are the shallowest; the Magothy, which is the middle layer; and the Lloyd, which is the deepest (see **Figure 3**). Formed approximately 60 million years ago, the aquifers are generally separated by layers of clay, and groundwater moves through the aquifer systems under the influence of pressure and gravity. Water for the Queens Groundwater wells is largely extracted from the Magothy aquifer, though some wells extract from the Upper Glacial, Jameco, and Lloyd aquifers (see **Figure 3** and **Table 1.3-1**).

No new wells would be installed as part of the Proposed Project, nor would DEP seek to increase the capacity of the existing wells. The purpose of the Proposed Project is to provide necessary treatment and infrastructure upgrades for the wells in order to support the withdrawal of high quality potable water during a water supply shortage or drought emergency within the City's upstate surface water system. Well stations will be assessed for one of two alternative scenarios. The first scenario would provide for the potential construction of temporary pad or trailer-based facilities at all stations. The second scenario would involve the installation of permanent treatment upgrades at selected stations, including the replacement of mechanical equipment (e.g., pumps) and the construction of buildings for new treatment facilities to provide a supply of groundwater for rapid response. Once the upgrades to provide permanent and/or temporary

[2] An aquifer is a natural underground layer of porous, water-bearing materials (sand, gravel) generally capable of yielding a large supply of water.

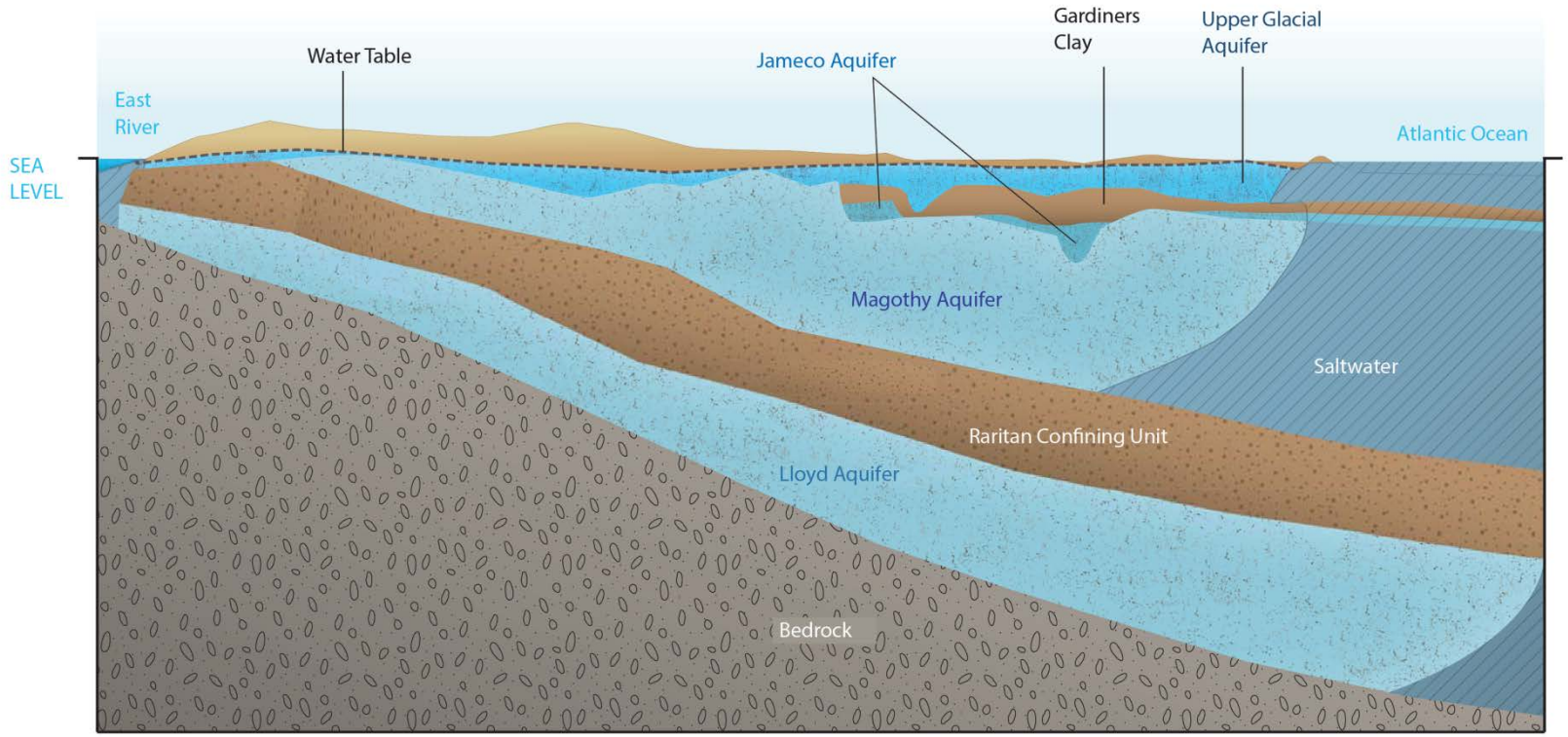

Figure 3: Queens Aquifers

treatment are complete, the wells would provide more robust resiliency to the water supply in the event of a water supply shortage such as droughts, repairs, and/or emergencies.

The DEIS will identify potential impacts associated with a range of alternative operating scenarios. If significant adverse impacts are identified, the DEIS would also include mitigation measures as described in **Section 1.7.6**.

Finished water quality at all stations would meet or exceed all applicable New York State Department of Health (NYSDOH) and New York City Department of Health and Mental Hygiene (NYCDOHMH) water quality standards and would be of a quality consistent or comparable with water from DEP's upstate surface water system. Based on the raw water quality of the groundwater system in addition to existing and expected future drinking water regulations, the following types of treatment are currently anticipated: (1) iron and manganese removal; (2) volatile organic compounds (VOC) removal; (3) perchlorate removal; (4) nitrate removal; and (5) chemical treatment (i.e., chlorine, fluoride, orthophosphate, and pH adjustment). These constituents are commonly found in urban aquifers and can be effectively treated and removed by the standard treatment methods described in greater detail below. Likewise, the chemical treatments noted are also routinely utilized in the maintenance and operation of groundwater and surface water systems throughout the United States.

For all water quality constituents of concern, DEP conducted a screening evaluation of possible treatment options, comparing them in terms of their capacity to achieve water quality goals, operation and maintenance needs, ease of use, cost, and other factors. The types of treatment that would be included in the designs are described below:

- *Iron and Manganese Treatment.* Groundwater in the aquifers underlying the southeastern section of Queens generally includes naturally occurring levels of iron and/or manganese, which would require treatment. Higher levels of iron and manganese in water usually result in discolored water, leading to potential discoloration in laundry and plumbing fixtures, and can affect the taste of beverages, such as coffee or tea. Applicable technologies for iron and/or manganese treatment would include pH adjustment (if necessary), followed by a combination of oxidation and filtration, as needed.

- *VOC Removal.* Some of the wells in the Queens Groundwater system have elevated concentrations of VOCs. The selected technologies to treat these VOCs are Granular Activated Carbon (GAC) and air stripping. GAC is effective at removing a wide range of organic contaminants, has been identified as a best available technology for VOC removal, and can be used alone or in conjunction with air stripping. In GAC treatment, the untreated water is passed through large vessels of GAC media, usually comprised of organic materials with high carbon content (coconut shells, coal, etc.). GAC treats the water by adhering the contaminants onto the GAC media through a process called adsorption.[3] As the GAC pores become filled with organic compounds, removal rates

[3] Adsorption is a process by which molecules or particles are bound to a surface; this is different from absorption, which involves the filling of pores in a solid. Activated carbon is an effective adsorbent because it provides substantial surface area relative to its weight and volume.

decline. Therefore, the GAC must be replaced at regular intervals depending on influent contaminant concentrations, GAC type, and contact time. DEP currently has several GAC treatment systems in place.

In air stripping, VOCs are transferred from the water into the air inside an air stripping tower. In these systems, water is sprayed into the top of a tower that is packed with media, as air is simultaneously blown up from the bottom of the tower. As the air makes contact with the water, the VOCs are transferred from the liquid to the gaseous phase. A sump at the bottom of the tower collects the treated water. Once in the vapor phase (off-gas), the VOCs need to be captured and treated to prevent their release into the atmosphere to comply with applicable air emissions requirements. The air stripping technology referred to as vapor phase carbon (VPC) was selected for this project. A VPC unit passes the off-gas stream through vessels containing activated carbon that adsorbs the VOCs.

VOC treatment technology is effective at removing a wide range of organic chemicals and has been installed for wellhead treatment at several DEP groundwater stations and throughout the region for similar applications. Additionally, these units typically produce few wastes and require minimal operator attention.

- *Perchlorate Removal*. A small number of wells in the Queens Groundwater system contain levels of perchlorate that will require treatment. Perchlorate is an anion that has been introduced to the environment as a contaminant in both ground and surface water from various chemical and industrial processes. Perchlorate is persistent and long lasting, and once it is introduced into the environment, it migrates freely with water flow and does not easily reduce to a less oxidative state. Options for perchlorate treatment include ion exchange.

  Ion exchange is a cost-effective solution for removing perchlorate and is the most commonly used treatment process for perchlorate removal in potable water treatment applications. The selected perchlorate removal process is a continuous process; as the water to be treated passes through the exchange material which is placed in a packed bed, perchlorate is removed from the water in exchange for chloride, similar to that for nitrate removal. Since the typical ion exchange media used with perchlorate is single pass and regenerated off-site, residual streams are limited to spent resin and sample streams. Additionally, capital costs, operation, and maintenance costs, and footprint are reasonable. In general, ion exchange is cost effective compared to other removal technologies. Single pass ion exchange is a proven technology and can be reliably operated to meet finished water quality goals.

- *Nitrate Removal*. Several wells in the Queens Groundwater system contain levels of nitrate that will require treatment. The sources of this contaminant include past on-site sewage disposal systems, application of fertilizers, and agricultural processes. Options considered for nitrate treatment include ion exchange.

  Ion exchange is a cost-effective solution for removing nitrate and is the most common method used for nitrate removal in potable water treatment applications (including Long

Island supply wells). Ion exchange resin is typically installed in two or more vessels. Nitrate is removed as contaminated groundwater flows through the resin-filled vessel and exchanges with chloride for adsorption sites on the resin. Resin regeneration is conducted by taking a vessel offline for regeneration with a brine solution while a second vessel is operated for nitrate adsorption. For groundwater systems such as the Queens Groundwater system, two or more stationary vessels would typically be installed. Ion exchange is a proven technology and can be reliably operated to meet finished water quality goals.

- *Chemical Treatment.* Finished water goals for chemical treatment would be established to meet all applicable regulatory requirements. These goals would be established for chlorine residual, fluoride, orthophosphate, and pH. Residual chlorine levels would be established to maintain adequate levels of chlorine, in order to ensure water remains safely disinfected as it travels through the distribution system. DEP would also add fluoride to the groundwater entering its distribution system for dental protection, in accordance with New York City's Health Code and guidance from NYSDOH and NYCDOHMH. Lastly, finished water goals would be based on the optimal water quality parameters established by NYSDOH for corrosion control treatment (such as the addition of orthophosphate) and compliance with the U.S. Environmental Protection Agency's (EPA) Lead and Copper Rule.

1.4 PROJECT SCHEDULE AND PHASING

For the purposes of the DEIS analyses, it will be conservatively assumed that activities for the In-City Water Supply Resiliency Project would begin in 2019, and that construction at all well station sites would take place concurrently, with peak construction periods to be identified in the DEIS. Permanent and temporary treatment improvements to the Queens Groundwater stations are anticipated to be completed in 2021. For the assessment of the potential impact of the operation of the Queens Groundwater system upon groundwater resources, the analysis period was assumed to be the 10-year duration of a renewed permit (2018-2028) based upon the current pumping limits allowed by the current permit.

1.5 PROJECT APPROVALS AND COORDINATION

The Proposed Project would require permits and approvals from the following State and local agencies listed below.

- NYS Department of Environmental Conservation
- NYS Department of Transportation
- NYS Department of Health
- NYC Office of the Mayor
- NYC Department of Health and Mental Hygiene

- NYC Department of City Planning
- NYC Department of Transportation

1.6 ANALYTICAL FRAMEWORK FOR ENVIRONMENTAL IMPACT STATEMENT

As the lead agency, DEP is required to examine the environmental effects of a proposed action and, to the maximum extent practicable, avoid or mitigate potentially significant adverse environmental impacts, consistent with social, economic, and other essential considerations. This environmental review is being prepared in accordance with the New York State Environmental Quality Review Act (SEQRA) and the City of New York's CEQR process. Any proposed action funded, approved, or directly undertaken by a New York State or local agency must comply with the provisions of SEQRA and its implementing regulations (6 NYCRR Part 617). As a consequence, the In-City Water Supply Resiliency Project is subject to review under SEQRA. In addition, since the In-City Water Supply Resiliency Project is being undertaken by a New York City agency, it is also subject to review under CEQR requirements, as set forth in 62 RCNY Chapter 5 and Executive Order 91 of 1977, CEQR regulations, and CEQR amendments, as well as the State Environmental Review Process (SERP), as required by the State Revolving Loan Fund Program. The City's *CEQR Technical Manual* provides guidelines for conducting environmental reviews performed under CEQR.

The DEIS will describe the analytical framework that will be used to assess the potential for impacts associated with all components of the Proposed Project. It will define the assessment conditions, build year (construction and operation), impact assessment categories, and impact thresholds as follows:

- **Existing Conditions.** In the DEIS, existing conditions will be described in order to establish a baseline against which future conditions can be projected. In general, existing conditions will be evaluated for the study areas most likely to be affected by the Proposed Project.

- **No Build Conditions.** Using existing conditions as a baseline, conditions known to occur or expected to occur in the future, regardless of the Proposed Project, are then evaluated for the Proposed Project's analysis year(s). This is the "No Build" or "Future without the Proposed Project" and is the baseline condition against which the effects of the Proposed Project are measured.

- **Analysis Year(s).** The analysis year refers to a particular future year for which a DEIS analyzes a proposed project's likely effects on its environmental setting. There could be a number of analysis years depending on the technical areas being examined. For example, if the project would result in substantial construction, there could be separate interim analysis years for the traffic and air quality analyses since the peak year for traffic may differ from the peak year for potential air pollutant emissions. Construction related to the In-City Water Supply Resiliency Project is expected to start in 2019 and permanent or temporary treatment improvements to the Queens Groundwater stations are assumed to

be completed in 2021. For the assessment of the potential impact of the operation of the Queens Groundwater system upon groundwater resources, the analysis period was assumed to be the 10-year duration of a renewed permit (2018-2028) based upon the current pumping limits allowed by the permit. An analysis of proposed operations will be conducted for a range of pumping scenarios as summarized below based upon the 10-year duration of the permit:

- Scenario A – Groundwater pumping at the currently permitted 5-year running average of 62[4] mgd for the entire permit period (10 years).

- Scenario B – Groundwater pumping at current single year permitted maximum (68 mgd) for Year 1; followed by 4 years (Years 2 through 5) of pumping at 60 mgd in order to comply with the 5-year running average of 62 mgd under the current permit; with Years 6 through 10 also at 60 mgd.

- Scenario C – Groundwater pumping at current single year permitted maximum (68 mgd) for Year 1; followed by 4 years (Years 2 through 5) of pumping at 60 mgd in order to comply with the 5-year running average of 62 mgd under the current permit; Year 6 at 68 mgd and Years 7 through 10 also at 60 mgd.

- Scenario D – Groundwater pumping at current single year permitted maximum (68 mgd) for Years 1 through 4; followed by Year 5 pumping at 37 mgd in order to comply with the 5-year running average of 62 mgd; Years 6 through 9 at 68 mgd and Year 10 at 37 mgd.

- Scenario E – Groundwater pumping for 10 years at 33 mgd.

In addition as there may be the potential for noticeable changes to the closer western Nassau County wells, two additional scenarios would be evaluated. For the scenario (i.e., from Scenarios A through E above) determined to have the most significant potential effect, an assessment with similar pumping rates and durations to the identified worst-case scenario would be completed for operation of all of the westernmost Queens supply wells, and then for all of the easternmost wells. The evaluation of these additional scenarios would provide a further understanding of potential impacts of the Proposed Project upon the westernmost Nassau County wells.

1.7 ORGANIZATION AND SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

As discussed above, since the sponsor of the Proposed Project is DEP, a New York City agency, it is subject to CEQR in addition to SEQRA. The City of New York's *CEQR Technical Manual* provides suggested methodologies for conducting environmental assessments performed under CEQR.

[4] All groundwater flows have been rounded to the nearest whole number mgd.

The methodologies in the *CEQR Technical Manual* provide a structured approach to addressing the potential for significant adverse impacts, and this Draft Scope of Work follows its suggested analytical approaches. These methodologies are considered to be appropriate technical analysis methods and guidelines for environmental impact assessment of discretionary actions in New York City. However, since the Proposed Project has the potential to affect locations outside New York City, locally and/or State-accepted DEIS methodologies will be applied in cases where New York City methodologies are less stringent or not applicable.

The remainder of this Draft Scope of Work describes the analysis methodologies that will be used in the DEIS to assess the potential environmental effects of the Proposed Project.

- **Sections 1.7.1** and **1.7.2** outline the Executive Summary and Project Description to be included in the DEIS.
- **Section 1.7.3** describes the methodologies that will be used to analyze the potential impacts of the Proposed Project.
- **Section 1.7.4** describes how the Proposed Project's cumulative effects will be assessed.
- **Section 1.7.5** describes how alternatives to the Proposed Project will be addressed.
- **Sections 1.7.6**, **1.7.7**, and **1.7.8** describe how the DEIS will identify any required mitigation measures, as well as disclose any unavoidable adverse impacts, and irreversible and irretrievable commitment of resources.
- **Section 1.7.9** describes how appendices will be included as part of the DEIS.
- **Section 1.7.10** describes how a glossary of acronyms will be included as part of the DEIS.

1.7.1 EXECUTIVE SUMMARY

The DEIS will include an Executive Summary providing the reader with a clear understanding of the information found in the main body of the DEIS. A synopsis of all potential significant adverse impacts from the construction and operation of the Proposed Project, along with proposed mitigation measures for such impacts, will be summarized in this chapter. Specifically, the Executive Summary will include:

- A brief description of the Proposed Project, including background leading to its development and anticipated analysis year(s).
- A list of involved and interested agencies, and required approvals/permits.
- A concise list of any anticipated significant adverse impacts and proposed mitigation measures.
- A description of the alternatives to the Proposed Project considered in the DEIS.

1.7.2 CHAPTER 1: PROJECT DESCRIPTION

This chapter of the DEIS will describe the Proposed Project and provide the public and decision-makers with the context within which to evaluate the Proposed Project and its alternatives.

The Project Description chapter will contain an overview of the In-City Water Supply Resiliency Project, including a description of the various well station locations, a list of all actions and approvals associated with the Proposed Project, identification of the applicant, and a discussion of the regional setting for the Proposed Project. It will also incorporate a statement of purpose and need for the Proposed Project.

This section will provide charts, graphics, maps, site plans, and renderings, as well as other supporting documents, as appropriate. Tax lots, land ownership, and existing uses of all parcels of land comprising the well station sites will be identified. The Proposed Project will be described, including approximate dimensions of project components. An overview of the Proposed Project's construction schedule and phasing will also be provided, and locations where construction may occur (including construction staging areas) will be identified.

1.7.3 CHAPTER 2: PROBABLE IMPACTS OF THE PROPOSED PROJECT

1.7.3.1 Overview

As described above, the Proposed Project involves the rehabilitation and modernization of DEP's existing groundwater system to ensure its viability for meeting DEP's water supply needs as a supplement to DEP's upstate surface water supplies in the event of necessary repairs and/or an emergency. This portion of the DEIS will provide a detailed assessment of potential impacts related to the Proposed Project.

At a minimum, a screening level assessment will be provided in the DEIS for all relevant environmental impact assessment categories for which more detailed assessments are not required. Using the methodology described below, applicable environmental impact assessment categories (e.g., land use, transportation, etc.) will be evaluated for each station in the Proposed Project. In some cases, specific assessment categories may be evaluated cumulatively with respect to both construction and operation. The proposed analysis approach for all relevant environmental impact categories is summarized in **Table 1.7-1**.

Table 1.7-1: Summary of Analyses of Proposed Project Components to be Included in the DEIS

Assessment Categories Requiring Preliminary and/or Detailed Analysis	Station-Specific Assessment	Project-Wide Assessment
Land Use, Zoning, and Public Policy	✓	-
Socioeconomic Conditions	-	✓
Community Facilities and Services	-	-
Open Space and Recreation	-	-
Critical Environmental Areas	-	-

Table 1.7-1: Summary of Analyses of Proposed Project Components to be Included in the DEIS

Assessment Categories Requiring Preliminary and/or Detailed Analysis	Station-Specific Assessment	Project-Wide Assessment
Shadows	-	-
Historic and Cultural Resources	-	-
Urban Design and Visual Resources	✓	-
Natural Resources and Water Resources	✓	✓
Hazardous Materials	✓	✓
Water and Sewer Infrastructure	✓ (Wastewater and Stormwater)	✓ (Water Supply)
Solid Waste and Sanitation Services	-	-
Energy	✓	✓
Transportation	-	✓
Air Quality	-	-
Greenhouse Gas Emissions and Climate Change	-	✓
Noise	✓ (Stationary Source)	-
Neighborhood Character	✓	✓
Public Health	-	✓
Environmental Justice	-	✓
Growth Inducement	-	✓
Construction	✓	✓

The level and type of treatment at each site will vary based upon what may be required to meet applicable federal, State, and local drinking water requirements, and will be determined during implementation of the Proposed Project. Therefore, a conceptual facility design(s) ("representative site or station") will be developed to allow for an evaluation of the various treatment levels that may be required at each well site that may be part of a permanent upgrade. This design(s) will be based upon volumetric facility requirements (e.g., cubic feet of treatment facility per mgd of well capacity) with maximum building heights and floor areas established based upon this. Each station will be assessed for potential impacts associated with the largest conceptual design that may be suitable for a specific site. Where the largest facilities may result in potential impacts, the DEIS will explore limiting the facility to a smaller size as a mitigating alternative. In addition, a trailer-mounted or pad-based facility design to provide temporary treatment will be developed and assessed for each well site.

It is noted that the baseline condition under CEQR must consider "the conditions relevant to a 'reasonable worst-case' analysis of the effects of the project." For example, when determining the baseline condition for water supply conditions, the reasonable worst-case analysis would be during a water supply shortage condition when the City would be drawing the maximum permitted volume of water under its permit. However, because the City has reduced the utilization of the Queens wells in recent years, the baseline condition will be developed in the

following manner. The calibration period for the existing groundwater model (see **Section 1.7.3.10** for additional information on the model) of the Long Island aquifers will be extended to include pumping, streamflow, rainfall recharge, return flow, and piezometric head data through 2015. Once the model has been extended in time and the calibration verified, it will be run to represent future baseline conditions without the Queens supply well pumping. The baseline simulation will incorporate averages for recent pumping and aquifer recharge and is intended to approximate what is most likely to occur over the course of a future, 10-year period (2018-2028), coincident with the proposed duration of the permit renewal. The model will then be used to assess changes due to the Proposed Project under a range of operating scenarios (see **Section 1.6**).

1.7.3.2 Chapter 2.1: Land Use, Zoning, and Public Policy

Activities associated with construction and operation of the Proposed Project would occur at multiple stations throughout Queens. An assessment of the potential for construction and operation of the Proposed Project to affect land use, zoning, or public policy within an area of approximately 400 feet from the boundary of each station proposed for rehabilitation (study area) will be included in the DEIS.

More specifically, the land use analysis will describe existing land uses within each study area. Land use information will be compiled and mapped from published data, and supplemented with existing field surveys and aerial photography, as available. The land use analysis will also provide a baseline for other analyses such as transportation and neighborhood character. The zoning analysis will describe existing zoning regulations that apply to the study area, including information on allowed uses, building bulk, and setbacks required within the zoning districts. The potential for the Proposed Project to impact existing and planned land uses and zoning on or near the sites will be assessed. Any pending zoning actions that may affect land use patterns in the study areas will also be identified. Lastly, the public policy analysis will outline and evaluate potential compliance with public policies that may apply to each site and its study area, including any adopted or proposed neighborhood or community plans.

1.7.3.3 Chapter 2.2: Socioeconomic Conditions

The socioeconomic assessment in the DEIS will provide a screening level analysis of the Proposed Project against applicable CEQR guidelines to describe and document existing socioeconomic conditions and trends that could potentially be affected by the project and result in significant impacts due to (1) direct residential displacement; (2) direct business displacement; (3) indirect residential displacement; (4) indirect business displacement; and (5) adverse effects on a specific industry.

1.7.3.4 Chapter 2.3: Community Facilities and Services

There may be changes to community services associated with the Proposed Project (e.g., police associated with traffic control during construction or equipment deliveries). A screening level assessment of community facilities and services will initially identify the local community facilities within the study areas and service providers that would service these study areas; and if

required, an analysis will describe any expected uses of those community facilities and services; and describe the potential for impacts from the Proposed Project on these.

1.7.3.5 Chapter 2.4: Open Space and Recreation

A screening level assessment will be prepared to determine whether construction or operation of the Proposed Project has the potential to adversely affect open space and recreation, thereby warranting further analysis. Specifically, an inventory of existing open space and recreational resources within the study areas will be conducted utilizing existing information and data sources to determine if any resources would potentially be displaced or are located in close enough proximity to the Proposed Project to warrant an analysis of potential impacts. Results of the open space and recreation screening assessment and analysis and an assessment of conditions in the future without the Proposed Project, if required, will be presented in the DEIS.

1.7.3.6 Chapter 2.5: Critical Environmental Areas

There is one Critical Environmental Area (CEA) located in the vicinity of one station site: the Jamaica Bay CEA. This CEA is located approximately ¼-mile from Station 36. The potential for construction and operation of the Proposed Project to affect or be affected by the environmental characteristics of this CEA will be assessed in the DEIS.

1.7.3.7 Chapter 2.6: Shadows

An assessment of shadows from operation of the proposed facilities will be included in this section of the DEIS if it is determined that any facility would cast shadows on any sunlight-sensitive resources. If a proposed component could cast new shadows or substantially increase existing shadows on a publicly-accessible open space or park, historic landscape or resource (if the resource's significance depends on sunlight), or important natural feature, shadow studies would be performed to illustrate the times and extent of the potential impact.

If the results of the screening assessment indicate that sunlight-sensitive resources fall within an area that would be shaded by the Proposed Project, a detailed shadow analysis will be undertaken to determine the extent and duration of the incremental shadows resulting from the Proposed Project in accordance with the *CEQR Technical Manual*. If required, the detailed analysis will include three-dimensional computer modeling to determine the extent and duration of new incremental shadows that would fall on a sunlight-sensitive resource as a result of the Proposed Project. As applicable, a discussion and comparison of shadows anticipated in the future without the Proposed Project would be provided, if appropriate.

1.7.3.8 Chapter 2.7: Historic and Cultural Resources

This section of the DEIS will include an assessment of the potential for impacts to historical and cultural resources that could occur as a direct or indirect result of construction and operation of the proposed facilities. This analysis will include identification of archaeological and architectural resources that could be affected by the Proposed Project, and will include consultations with and/or a review of databases maintained by the State Historic Preservation Office (SHPO) and the New York City Landmarks Preservation Commission (LPC). The

analysis will also utilize existing Phase 1A literature reviews already prepared for some of the sites, where readily available.

If any resources of potential historic and/or archaeological significance are identified, the DEIS will include a description of measures that would be incorporated into the Proposed Project, as required, to further investigate the identified sites and study areas, by way of additional documentary research and/or field surveys as needed, upon implementation of a permanent well station site. These additional investigations may include preparation of a Phase I Archaeological Survey consisting of a Phase IA Literature Review and Sensitivity Assessment, a Phase IB Archaeological Field Reconnaissance Survey, or Phase III Investigations. Impacts on any historic or cultural resources that are expected in the future without the Proposed Project actions as a result of other expected development projects will be qualitatively discussed.

For the temporary pad-based facilities, the installation of concrete pads to support the location of the portable treatment facilities will also be evaluated for potential historic and/or archaeological impacts.

1.7.3.9 Chapter 2.8: Urban Design and Visual Resources

This section of the DEIS will assess the potential for impacts on urban design and visual resources from construction and operation of the proposed facilities, as the Proposed Project would result in construction of new structures or rehabilitation of existing structures that may alter existing view corridors. A screening level analysis will be included in the DEIS to determine whether a visual assessment pursuant to CEQR criteria is warranted at those sites where new permanent structures associated with the Proposed Project would be built. The assessment will include a characterization of existing public view corridors in the study area, and the potential for impacts to these as a result of physical alterations beyond those allowed by existing zoning or that increase the built floor area beyond what would be allowed "as-of-right". The study area for the assessment of visual resources will be consistent with that used for land use, zoning, and public policy, but may also include view corridors that extend beyond that study area based on the locations that are publicly accessible. In addition, the incremental changes to views that are deemed to have aesthetic value will be characterized in the DEIS both in a narrative format and through the use of images depicting conditions in the future with and without the Proposed Project. This will be completed using available images depicting conditions in the future with and without the new structures, as warranted.

A qualitative assessment of the potential for impacts from nighttime lighting in connection with the Proposed Project will also be undertaken in this section. The analysis will consider local applicable codes, the most recent edition of the Illuminating Engineering Society Handbook, and the most recent edition of the American National Practice for Roadway Lighting (RP-8) approved by the American National Standards Institute (ANSI) to evaluate whether nighttime lighting has the potential to affect nearby sensitive land uses.

1.7.3.10 Chapter 2.9: Natural Resources and Water Resources

A screening level analysis will be conducted to determine whether a more detailed natural resources analysis is warranted for a specific species or habitat at a particular station associated

with the Proposed Project. The screening level analysis will include a combination of desktop analyses, agency consultations, and information acquired from site surveys, where available. The desktop analyses and agency consultations will be used to identify existing natural resources within the study areas in proximity to the well and well station sites that could be affected by construction and operation of the Proposed Project.

The potential for increased stormwater runoff from the proposed work at stations will also be assessed.

Water resources including groundwater aquifers, lakes, streams, and wetlands within the study area (Kings, Queens, Nassau, and western Suffolk counties) will be identified and generally described. The Queens supply wells pump from varying vertical horizons, spanning several different aquifers. Each of the aquifers extend through Queens, Nassau, and Suffolk counties, so extraction (i.e., groundwater pumping) from any well in one of the counties on Long Island could lower piezometric heads (i.e., groundwater elevations) or reduce groundwater-fed baseflow in a neighboring county. A description of each major aquifer in the study area will be provided and an assessment of the potential for impacts to them from operation of the Queens Groundwater system will be presented in the DEIS. The assessment will consider impacts from the operation of the Proposed Project on the aquifers and will evaluate potential effects due to groundwater withdrawals over a range of operating scenarios (see **Section 1.6**).

The New York City groundwater model will be the primary tool used to evaluate potential changes resulting from each operating scenario. This three-dimensional numerical groundwater model was developed in 2005 by the City and has been calibrated to long term transient conditions, reviewed by the U.S. Geological Survey (USGS) and utilized to evaluate the availability of groundwater in Brooklyn and Queens for supplemental public water supply. The groundwater model currently simulates historical transient groundwater flow patterns in Brooklyn, Queens, Nassau County and the western portion of Suffolk County using data for a period of more than 100 years and the hydrogeologic framework developed by USGS and others. Among the datasets that have been used in the development and calibration of the model include, but are not limited to, Brooklyn, Queens, Nassau and Suffolk county public supply pumping data, Metropolitan Transit Authority dewatering pumping data, piezometric head data (USGS, NWIS), streamflow data (USGS, NWIS), chloride concentration data (USGS), rainfall data, and NYSDEC contaminant source data. The model simulates the movement of fresh and salt water, the discharge of groundwater baseflow to surface streams, and the water balance inputs (recharge) and outputs (pumping) over that time period. The model utilizes DYNSYSTEM, which has been applied to over 200 groundwater modeling studies in the United States, including a number of Long Island studies within Nassau and Suffolk County. DYNSYSTEM has been reviewed and tested by the International Groundwater Modeling Center (IGWMC) (van der Heijde 1985, 2000) and has been extensively tested and documented.

The calibrated groundwater model is an idealized representation of how the Long Island aquifers transmitted water historically in response to applied stresses. For example, as water supply withdrawals have increased, piezometric heads have dropped, and, at some locations, the salt water interface has moved inland. The robust data records kept on Long Island over the course of the 20th century allowed for the inclusion of over 100 years of data in the calibration period. The inclusion of, and calibration to, significant instances of historical changes in piezometric head

and salt water interface positions validates the model as a tool that can be used with confidence to understand the impacts of potential future individual and cumulative stresses on the aquifer system.

Model results will be used to quantify potential changes in piezometric head and water table elevations, hydraulic zones of contribution (i.e., the region that contributes the groundwater extracted for a well or series of wells) to existing supply wells, groundwater-fed stream baseflows, and salt water interface locations associated with the groundwater withdrawals under the Proposed Project scenarios. Results from each scenario will be compared to baseline conditions without Queens supply pumping, as well as pre-development conditions with no Long Island supply pumping in place.

To develop the baseline conditions, the existing groundwater model calibration period will be extended through 2015. Once the model has been extended in time and the calibration verified, the baseline simulation conditions will be determined from recent pumping and aquifer recharge with the intent to approximate future aquifer conditions.

The model will be used to assess the net change in piezometric heads at water supply wells for baseline conditions and with the Proposed Project scenario. Seasonal and longer term variability in piezometric head elevations is normal and anticipated by Long Island water suppliers. As a result, well pump intakes are typically set to be a minimum of 20 feet below the water table elevation encountered during normal pumping operations. This allows temporary and anticipated variations in pumping levels to have minimal impact on the operation of a well. For the purposes of this DEIS, and in order to be conservative, water table elevation changes associated with Proposed Project scenario pumping that exceed 10 feet at Nassau and western Suffolk County supply wells will be reviewed further. Proposed Project scenario water table elevation changes of less than 10 feet will be assumed to have minimal impact on supply well operations. Simulated water table elevation changes (relative to baseline conditions) will be tabulated for all Nassau and western Suffolk County supply wells. The table will also include (based on available data) the screen elevation, pump intake elevation, and the difference in water table elevation between the modeled baseline and pre-development conditions for each supply well.

The surface expression of groundwater can be viewed as stream baseflow. Historically, these expressions are measured at stream gauging stations located in the southern portions of Long Island. These streamflow gauges act as calibration points for the groundwater model and are therefore good indicators of potential future impacts of proposed pumping. Proposed Project scenario changes in simulated groundwater-fed stream baseflow relative to baseline conditions will be quantified and tabulated for Nassau and western Suffolk County streams, creeks, and rivers. Potential impacts to streams will be further reviewed when simulated peak Proposed Project scenario baseflow changes by more than 1.0 cubic foot per second (cfs), relative to baseline conditions. This threshold for further evaluation is conservative given the seasonal variation encountered in the streams and the recording accuracy of the stream gauging stations, which is approximately 1.0 to 4.0 cfs based on the Valley Stream at Valley Stream, New York gauging station (USGS 01311500). As historical simulations have indicated that Nassau County public water supply pumping and implementation of sewering activities have been the primary driver for streamflow reductions over the past half century, the table will include the difference between baseline and pre-development conditions for each waterbody assessed. Where the

1.0 cfs threshold is exceeded, the DEIS will qualitatively describe the potential impacts to natural resources (e.g., wetlands, aquatic biota) and potential measures that may be implemented to limit adverse effects.

Potential changes in salt water intrusion due to the Proposed Project will also be evaluated by comparing the locations of the modeled salt water interfaces for each scenario to the baseline condition interface location. Areas that show accelerated inland movement will be compared to the hydraulic zones of capture for supply wells as a measure of potential impact to drinking water quality. As baseline condition pumping is not sustainable in some areas of Long Island, the simulated salt water interface is expected to move inland over the course of the baseline conditions simulation. For this reason, these baseline results will be compared to pre-development conditions as well.

1.7.3.11 Chapter 2.10: Hazardous Materials

There would be ground disturbance associated with the Proposed Project. The evaluation of current environmental conditions will use the results of Phase 1 Environmental Site Assessments (ESAs) and Phase II ESAs previously prepared for the well station sites. Applicable information from these Phase I and Phase II ESAs, as appropriate, will be summarized in the DEIS. The DEIS will include a description of measures that would be incorporated into the Proposed Project—such as compliance with existing regulatory requirements (e.g., for asbestos and lead paint), implementation of subsurface testing (if warranted) prior to construction to determine the need for special handling of excavated materials, and a summary of protocols to be implemented during construction of the proposed stations to limit public and construction workers' exposure to potential contaminants.

The stations will also require use and on-site storage of water treatment chemicals. An assessment of any potential impacts associated with these will also be included in the DEIS.

In addition, the DEIS will also identify and assess the potential impacts to known groundwater contamination plumes that currently impact or have the potential to impact water supply wells within Nassau and western Suffolk County. Screening criteria utilized to identify wells that have potential head changes greater than 10 feet will also be used to screen wells that have a potential to impact known contaminant plumes. Wells that demonstrate the potential for greater than 10 feet of change will have capture zones developed, as 10 feet represents 50 percent of the conservative factor built into well designs and as greater than 10 feet of change would create differential gradients that could move contaminant plumes. These capture zones would be representative of these gradient changes. Capture zones for the baseline and proposed scenarios will be reviewed and qualitatively described to determine if the change in capture zone has the potential to change local groundwater flow. If a potential exists to move local groundwater flow a review of known contamination plumes within the baseline or Proposed Project scenario will be performed. Known and significant contaminant plumes that have been delineated by federal, State, and county agencies would be evaluated. From this review a qualitative assessment will be made on potential changes to known contaminant plumes.

1.7.3.12 Chapter 2.11: Water and Sewer Infrastructure

A water and sewer infrastructure assessment will be conducted to determine if construction and operation of the Proposed Project has the potential to cause any significant adverse impacts to water supply and sewer infrastructure in New York City or surrounding communities in Nassau County and western Suffolk County.

Discharges during construction and operational activities associated with the Proposed Project would be directed to a stormwater and/or sewer system, or trucked and hauled for permitted discharge off-site, as applicable. The potential effects of these wastewater discharges to existing or proposed City infrastructure (e.g., sewer and/or wastewater treatment plant capacity) will be evaluated as part of the DEIS. In addition, analyses required to support potential modification of existing or acquisition of new SPDES permit to support the ongoing operation of the Queens Groundwater system would also be completed, as necessary. An assessment and review of anticipated significant projects, including anticipated future capital programs by the City related to water and sewer infrastructure, in the future without the Proposed Project will be completed as necessary.

In addition, an assessment of the potential impacts of the Proposed Project upon water supply will also be conducted including an evaluation of potential impacts to existing Nassau and western Suffolk County water suppliers as well as New York City customers. This assessment will use groundwater modeling to assess potential changes that may affect the availability of water supply resources. The DEIS will evaluate the net change in heads (i.e., groundwater pumping elevation) at water supply wells measured as the difference between the Proposed Project minus the baseline condition. As a general design rule in the Long Island region, pump settings are typically set to be a minimum of 20 feet below the pumping water level. This is to accommodate temporary variations in pumping levels to have minimal impact on well operation. In order to conservatively assess potential impacts due to the Proposed Project, head changes greater than 10 feet at supply wells within Nassau and western Suffolk counties will be identified and these will be reviewed further to more fully quantify potential impacts.

1.7.3.13 Chapter 2.12: Solid Waste and Sanitation Services

Operation of the Proposed Project is not expected to materially increase solid waste production or change the way solid waste is currently handled. Construction of the Proposed Project would necessitate the disposal of construction debris and excavated materials. This section of the DEIS will include an estimate of the amount of construction debris and excavated material, and describe the disposal methods for these materials. Solid wastes from the treatment process would consist of spent GAC both for liquid and vapor phase treatments. Spent GAC is typically removed from site to be reactivated and reused.

1.7.3.14 Chapter 2.13: Energy

The total amount of energy use for the Proposed Project will be estimated to determine whether operation of the proposed facilities has the potential to adversely affect energy supply in the project area (i.e., Queens), thereby warranting further analysis. Specifically, a review of existing

energy supply sources will be conducted within the project area, and the need for any additional infrastructure in the form of electric or gas utilities will be evaluated.

The projected annual energy consumption for the Proposed Project will be calculated and presented in the DEIS, along with an assessment of the potential for the Proposed Project to significantly impact energy supply.

The DEIS will also evaluate the potential for neighboring water suppliers in Nassau County and western Suffolk County to experience an increase in energy usage as a result of the Proposed Project. Pumping of the Queens Groundwater system may result in a lowering of the water table in the vicinity of the Nassau and western Suffolk County supply wells. Impacts to the water table will be evaluated under a range of pumping scenarios using a groundwater model and compared with the existing pump depth settings for Nassau and western Suffolk County wells to quantity any significant changes in energy demand. Supply wells that may experience a head change will be evaluated in more detail to assess the potential for a significant change in energy usage.

1.7.3.15 Chapter 2.14: Transportation

Well station operations after the rehabilitation is complete would require an average of less than one employee vehicle per day (i.e., less than one vehicle trip each direction per day) and on many days there would be no employees traveling to or from the site. There may be additional vehicles accessing a site to deliver supplies (e.g., chemical delivery vehicles) or for routine maintenance, but these trips would also be relatively infrequent. Therefore, in accordance with the *CEQR Technical Manual*, a detailed traffic study would not be warranted for the well station operations because the trip generation would be well below the 50 peak hour passenger car equivalent (PCE) threshold for analysis.

Analysis of potential construction-related transportation impacts is discussed in **Section 1.7.3.23** below.

1.7.3.16 Chapter 2.15: Air Quality

Finished water at all stations would be treated to meet or exceed all applicable NYSDOH and NYCDOHMH water quality standards. Based on the raw water quality of the groundwater system and existing and expected future drinking water regulations, the following types of treatment are currently anticipated: (1) iron and manganese removal; (2) VOC removal; (3) perchlorate removal; (4) nitrate removal; and (5) chemical treatment (i.e., chlorine, fluoride, orthophosphate and pH adjustment). The selected technologies to address VOC removal would be GAC and air stripping. It is expected that several of the wells may be equipped with air stripping technology.

An operational stationary air discussion will be included within the DEIS specific to the treatment technologies that are proposed and the potential for air emissions from these. The majority of these treatment technologies would not result in air emissions. For the removal of VOCs from groundwater, the Proposed Project will incorporate applicable and appropriate control measures to address potential air emissions that would meet all federal, State, and local air emissions requirements. As an example, treatment for VOC removal will involve the use of GAC which will not generate air emissions or air stripping which will use VPC to remove VOCs

prior to any air emissions release. As a result, a detailed stationary air quality analysis for operations is not anticipated.

Likewise, the Proposed Project would not involve the addition of any new emission sources related to heat and hot water systems and would not have any permanent on-site emergency generators; rather, the sites would be equipped with hook-ups for temporary emergency generators to be brought on-site as necessary.

In addition, operation of the Proposed Project is not expected to significantly alter traffic conditions; the maximum hourly incremental traffic generated by the project is not expected to exceed the *CEQR Technical Manual* carbon monoxide (CO) screening threshold of 170 peak hour trips at nearby intersections in the study area, or the particulate matter (PM2.5) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. As such, an assessment of operational mobile source air quality emissions is not anticipated to be warranted.

1.7.3.17 Chapter 2.16: Greenhouse Gas Emissions and Climate Change

Given the importance of global climate change impacts and SEQRA and CEQR's mandate to address adverse environmental impacts, the DEIS will include a discussion of energy use or greenhouse gas (GHG) emissions A qualitative assessment of the minimal expected operational GHG emissions and the program's consistency with City policy to reduce GHG emissions is appropriate. The qualitative GHG assessment will explain that there will be no on-site equipment using fossil fuels at permanent well sites and that temporary well sites will have generators that would be brought to these sites and operated solely in an emergency condition. In addition, delivery/material vehicles that would be traveling to/from the sites during operations would be minimal resulting in minimal GHG emissions from fossil fuels used for the delivery/material vehicles.

1.7.3.18 Chapter 2.17: Noise

Operation of the Proposed Project would result in additional sources of stationary noise emissions from pumps or other equipment operating at the sites. For the stationary source noise analysis, a screening assessment will be performed based on a representative facility design to assess the potential for noise impacts. The maximum emissions for the most noise-intensive conceptual treatment scenario that would be considered at the closest site boundaries and at the nearest noise-sensitive receptors will be utilized in the screening of each station to determine if more site-specific assessment is required. If there is the potential for impacts from the screening level analysis, a detailed stationary source analysis will be performed. The detailed stationary noise operational noise analysis would be performed using a spreadsheet model or CadnaA, an acoustical three-dimensional noise modeling software, to determine the total noise level that would be emitted at the property boundary and nearest noise-sensitive receptors due to on-site operation activities. If predicted noise levels are not in compliance with the *CEQR Technical Manual* impact thresholds:

- Maximum allowable cumulative noise levels for new or replacement equipment would be established for incorporation into the project design and specifications; and

- Measures that could be implemented as part of the Proposed Project to reduce noise levels and achieve compliance with requirements will be evaluated.

In addition, operation of the Proposed Project is not expected to significantly alter traffic conditions. The maximum hourly incremental traffic generated by the project is not expected to exceed the *CEQR Technical Manual* screening threshold of doubling of the noise PCEs in the future without the Proposed Project condition. As such an assessment of operational mobile source noise emissions is not warranted.

1.7.3.19 Chapter 2.18: Neighborhood Character

A screening level analysis of the potential for construction and operation of the Proposed Project to affect neighborhood character will be included in the DEIS. The neighborhood character assessment will be conducted as follows:

- Based on planned development projects in the vicinity of the proposed station sites, public policy initiatives, and planned public improvements, anticipated changes in the character of the area in the future without the Proposed Project will be summarized.

- The predominant factors that contribute to defining the character of the neighborhood surrounding the well sites will be described. The Proposed Project's effect on neighborhood character will be assessed using the analyses of potential impacts for various technical areas—i.e., urban design and visual resources, historic resources, socioeconomic conditions, traffic and noise.

1.7.3.20 Chapter 2.19: Public Health

According to the guidelines included in the *CEQR Technical Manual*, a public health assessment may be warranted if an unmitigated significant adverse impact is identified in other CEQR analysis areas, such as air quality, drinking water quantity and quality, hazardous materials, or noise. Although such an impact is not expected for the Proposed Project, if one is identified, a public health assessment will be prepared and presented in the DEIS.

1.7.3.21 Chapter 2.20: Environmental Justice

An assessment of the potential for the Proposed Project to disproportionately affect minority or low-income populations will be included in the DEIS. Following NYSDEC guidance CP-29, the environmental justice analysis will consist of the following steps:

- Define a study area to include all census block groups substantially within ¼ mile of each site, or the area where any potential significant adverse impacts resulting from the Proposed Project could occur—including locations outside of New York City—should they be identified in the DEIS;
- Determine whether low-income or minority communities (potential environmental justice areas) are present in the study area. Following NYSDEC's methodology, to identify significant minority and low-income populations within the study area, demographic information will be obtained from the U.S. Census Bureau's Census 2010. Demographic

data such as total population, race, and ethnicity, and poverty status will be compiled at the census block group level for each census block group in the environmental justice study area. In addition, data will be compiled for Queens and for New York City as a whole to allow for a comparison of study area characteristics to a larger reference area;

- If low-income or minority communities are present, in accordance with the environmental justice policy, identify potential environmental justice minority or low-income areas (environmental study area) that include: (1) minority, having a minority population equal to or greater than 51.1 percent in an urban area and 33.8 percent in a rural area of the total population; or (2) low-income, having a low-income population equal to or greater than 23.59 percent of the total population; and
- Identify any potential significant adverse environmental impacts that could occur within the above-identified study area as a result of the Proposed Project.

1.7.3.22 Chapter 2.21: Growth Inducement

This chapter will discuss whether there is the potential for growth inducing impacts to occur as a result of the Proposed Project. The analysis will focus on whether the Proposed Project would introduce or greatly expand infrastructure capacity and whether that would, in turn, trigger additional development. In addition, this chapter will assess whether the potential impacts to water quantity or quality at surrounding water supply systems would have the potential to impede growth in adjacent municipalities.

1.7.3.23 Chapter 2.22: Construction

This chapter of the DEIS will include a description of the construction activities and equipment associated with the Proposed Project. The construction build year for the Proposed Project would be 2019, with all improvements to the well stations (permanent and temporary) completed by 2021. The description of construction activities and equipment will include mobilization, site preparation, construction, and demobilization, as appropriate, as well the types of equipment that will be present on-site to carry out these activities.

Traffic and Transportation

The construction transportation assessment presented in the DEIS will consider the increase in vehicle trips from construction workers and construction vehicles and equipment to and from each station, in addition to the potential for temporary sidewalk, lane, or street closures that could temporarily affect parking or pedestrians movement near a site. New York City Department of Transportation (NYCDOT) requires trucks to travel on designated truck routes. It is assumed that construction vehicles would proceed to the sites from the closest truck route. In addition, the construction transportation assessment will consider the extent and duration of any street, roadway, or sidewalk closure; any potential for impacts on the availability of parking; and any loss in other transportation services during construction of the Proposed Project.

The DEIS will include a screening level assessment that will consider any losses in lanes, sidewalks, and off-street parking near the well stations, as well as effects on other transportation services (i.e., transit and pedestrian circulation) during the construction periods, if applicable;

and identify the project-related construction worker and truck trips at each well station. Construction worker parking and truck delivery staging will also be addressed. Based on the trip generation projections for activities associated with peak construction periods for the Proposed Project, an assessment of potential transportation impacts during construction on a project-wide or cumulative basis will be provided. The construction transportation assessment will take into account several factors, including: trip distribution; departure/arrival patterns; and anticipated vehicular trips during construction for the proposed action and/or treatment alternatives that are proposed for the well stations. Representative facilities based upon volumetric treatment requirements (e.g., cubic feet of treatment facility per mgd of well capacity) will be used to estimate the construction trip generation rates for the permanent upgrade to wells as part of the Proposed Project. Construction duration at any specific station is anticipated to be less than two years.

Level 1 (Trip Generation) and Level 2 (Trip Assignment) screening assessments will be conducted as described above to determine if the analysis thresholds in the *CEQR Technical Manual* would be exceeded. If the screening level analysis identifies an exceedance of the *CEQR Technical Manual* quantified transportation analyses thresholds (50 or more vehicle trips and/or 200 or more transit/pedestrian trips during a given peak hour at an intersection), a detailed transportation analysis will be conducted. In addition, construction is expected to occur in a similar time frame for the majority of the sites; therefore, the aggregation of trips from different sites could exceed the screening threshold at major intersections along the route to multiple sites. Furthermore, if substantive road closures/traffic detours are required during construction, a detailed construction transportation analysis would also be conducted. In the detailed construction transportation analysis, existing traffic data will be utilized, where available (NYCDOT Traffic Information Management System [TIMS] database and past studies), to establish existing traffic service levels at key intersections where the routes to/from multiple sites may overlap or cross (i.e., inbound divergence points and outbound convergence points). The estimated peak hour trips associated with construction of the Proposed Project during peak construction will then be overlaid onto the future baseline traffic network and compared to the impact criteria outlined in the *CEQR Technical Manual*, in order to determine the potential for significant adverse traffic impacts. If any significant adverse impacts are predicted, mitigation measures will be developed.

Air Quality

A screening level assessment of emissions from construction equipment, worker and delivery vehicles, as well as fugitive dust emissions will be performed. For on-site construction sources, the screening assessment will review the projected activity and equipment at the well stations in the context of construction intensity, duration, and location of emissions relative to nearby sensitive locations; and will identify any project-specific control measures that could be implemented to reduce the effects of construction on air emissions. Potential cumulative effects from on-site construction at well stations in immediate proximity to each other will also be qualitatively discussed. For off-site construction sources, a site-wide mobile screening assessment will be performed to confirm that the *CEQR Technical Manual* mobile source screening thresholds would not be exceeded.

If the screening level analysis identifies the potential for significant adverse impacts from on-site construction activities and/or exceeds the mobile source screening thresholds based on anticipated equipment, duration, and proximity to receptors, a detailed analysis of air quality during construction will be performed, where required. For on-site construction sources, where required, an air dispersion modeling analysis of on-site construction activities will be conducted using the EPA NONROAD Emission Model and EPA AERMOD dispersion model to determine the potential for significant adverse air quality impacts In addition, if required, a mobile source analysis at representative intersection(s) would be conducted using the EPA mobile source emissions model MOVES, and the dispersion model CAL3QHC/CAL3QHCR.

The potential for significant adverse impacts will be determined by comparing model-predicted total concentrations to the National Ambient Air Quality Standards (NAAQS), or by comparing the predicted increase in concentrations to applicable CEQR *de minimis* criteria, as appropriate. The air quality analysis will also include a discussion of strategies that could be employed to reduce project-related air pollutant emissions associated with construction activities.

Noise

A screening level assessment of noise emissions that would be generated by the Proposed Project's construction activity will be performed. The assessment will review the projected activity and equipment at well stations in the context of construction intensity, duration, and location of emissions relative to nearby sensitive receptors; and will identify any project-specific control measures that could be implemented to reduce construction-related noise. Potential cumulative effects from on-site construction at well stations in immediate proximity to each other will also be qualitatively discussed. Measures for compliance with DEP Rules for Citywide Construction Noise Mitigation and the New York City Noise Control Code will be qualitatively discussed. For off-site construction sources, a mobile source screening assessment will be performed to confirm that the construction of the Proposed Project would not result in a doubling of existing noise PCEs, and therefore the *CEQR Technical Manual* mobile source screening threshold would not be exceeded.

If any locations are predicted to experience more than a doubling of noise PCEs, which would translate to a 3 dB(A) increase in noise levels, a detailed noise analysis will be conducted.

If the screening level assessment identifies the potential for significant adverse impacts from on-site construction activities and/or exceedance of the mobile source screening thresholds, a detailed analysis of noise during construction will be performed, where required. Potential noise impacts due to construction-related stationary and mobile sources will be examined and existing noise levels will be determined. One representative reasonable worst-case time period (i.e., day) during the construction peak period will be selected for analysis. During the representative reasonable worst-case time period, noise levels due to construction activities at the selected station will be predicted for representative nearby sensitive receptors. For on-site construction sources, where required, an analysis of on-site construction activities will be conducted using a spreadsheet model or CadnaA, an acoustical three-dimensional noise modeling software, to determine the potential for significant adverse noise impacts. In addition, if required, a mobile source analysis at representative major convergence roadways adjacent to noise-sensitive receptors would be conducted using the Federal Highway Administration Traffic Noise Model

(TNM). Based on the results of the construction noise analysis, if necessary, the feasibility, practicability, and effectiveness of implementing measures to mitigate significant construction noise impacts will be examined.

1.7.4 CHAPTER 3: CUMULATIVE EFFECTS

Cumulative impacts are two or more individual effects on the environment that, when taken together, compound or increase each other. The DEIS will evaluate the potential cumulative impacts from construction and operation of the Proposed Project.

1.7.5 CHAPTER 4: ALTERNATIVES

The purpose of an alternatives analysis is to identify and examine reasonable and practicable options to a proposed project that avoid or reduce project-related significant adverse impacts and still achieve the stated goals and objectives of the project. The DEIS alternatives analysis will include an assessment of a No Action Alternative, in which the Proposed Project is not undertaken, as well as the following:

- Alternate layouts of permanent facilities
- Alternate sites for permanent facilities
- Alternative treatment technologies

1.7.6 CHAPTER 5: MITIGATION

If any potential for significant adverse impacts resulting from construction and operation of the Proposed Project are identified in the analysis areas discussed above, practicable measures that could avoid or mitigate those impacts will be identified in this chapter of the DEIS.

1.7.7 CHAPTER 6: UNAVOIDABLE ADVERSE IMPACTS

If any unavoidable adverse impacts are expected to result from the Proposed Project, they will be disclosed and discussed in this section of the DEIS.

1.7.8 CHAPTER 7: IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This section of the DEIS will disclose any irretrievable commitment of resources that the Proposed Project may require.

1.7.9 APPENDICES

Appendices to the DEIS will be provided as needed.

1.7.10 GLOSSARY OF ACRONYMS

The DEIS will include a glossary of acronyms.