NYC Environmental Protection

Delaware Aqueduct Rondout-West Branch Tunnel Repair Program DEIS

Draft Scope of Work

CEQR No. 10DEP042U

Prepared by New York City Department of Environmental Protection

Commissioner **Caswell Holloway**

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List of Acronyms

AMR	Automatic Meter Readers
ATR	automatic traffic recorder
ANSI	American National Standards Institute
AUV	Autonomous Underwater Vehicle
CEQR	New York City Environmental Quality Review
CO	carbon monoxide
dB	decibel
dBA	A-weighted decibel
DEP	New York City Department of Environmental Protection
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
GIS	Geographical Information System
gpd	gallons per day
HCM	Highway Capacity Manual
L_{eq}	Equivalent sound level
LOS	levels of service
LWRP	Local Waterfront Revitalization Program
mgd	million gallons per day
NAAQS	National Ambient Air Quality Standards
NHL	National Historic Landmark
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NWI	National Wetland Inventory
NYSDEC	New York State Department of State
NYSDOH	New York State Department of Health

NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NWI	National Wetlands Inventory
O_3	ozone
PCEs	passenger car equivalents
$PM_{2.5}/PM_{10}$	particulate matter
RWBT	Rondout-West Branch Tunnel
SEQRA	New York State Environmental Quality Review Act
S/NR	New York State/National Registers
SO_2	sulfur dioxide
SPDES	State Pollutant Discharge Elimination System
SRF	New York State Revolving Fund Program
TBM	tunnel boring machine
THC	total hydrocarbons
TMCs	turning movement counts
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Services
v/c ratio	volume-to-capacity ratio ✶

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A. INTRODUCTION

The New York City Department of Environmental Protection (DEP) is proposing the Delaware Aqueduct Rondout-West Branch Tunnel Repair program (proposed program) to address the known leaks in the Rondout-West Branch Tunnel (RWBT), an approximately 45-mile section of the Delaware Aqueduct that conveys approximately 50 percent of the drinking water for New York City and is the primary source of water for residents and businesses of the Towns of Newburgh and Marlborough (see **Figure 1**).

DEP plans to address the leaks in the RWBT by undertaking the proposed program, which would consist of two main efforts:

- Project 1—Shaft and Bypass Tunnel Construction;
- Project 2—RWBT repair and water supply system improvements. Project 2 would consist of two sub-projects:
  - Project 2A—Identification and Implementation of Additional Water Augmentation Projects to Support the Bypass Tunnel Connection, referred to below as Water Supply System Augmentation and Improvement.
  - Project 2B—Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

Upon completion of Projects 1 and 2, the bypass tunnel would be in operation, and water would flow through the RWBT and the newly-constructed bypass tunnel.

DEP will undertake a two-part approach to the Environmental Impact Statement (EIS). As detailed later in this Draft Scope, the first EIS will provide a detailed analysis of the proposed program's Shaft and Bypass Tunnel Construction project (Project 1). Since the designs of the Water Supply System Augmentation and Improvement sub-project (Project 2A) and Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing sub-project (Project 2B) will not be available for several years, the first EIS will assess to the extent possible a mostly qualitative analysis of all of Project 2. When such design information is available, DEP will undertake a second EIS that will provide further details and will quantitatively assess the potential impacts from Project 2 of the proposed program in detail.

Specifically, DEP plans to construct a new tunnel segment to bypass a leaking section of the existing tunnel; this new tunnel segment would be the *bypass tunnel*. It would be constructed between a site to be located west of the Hudson River in the Town of

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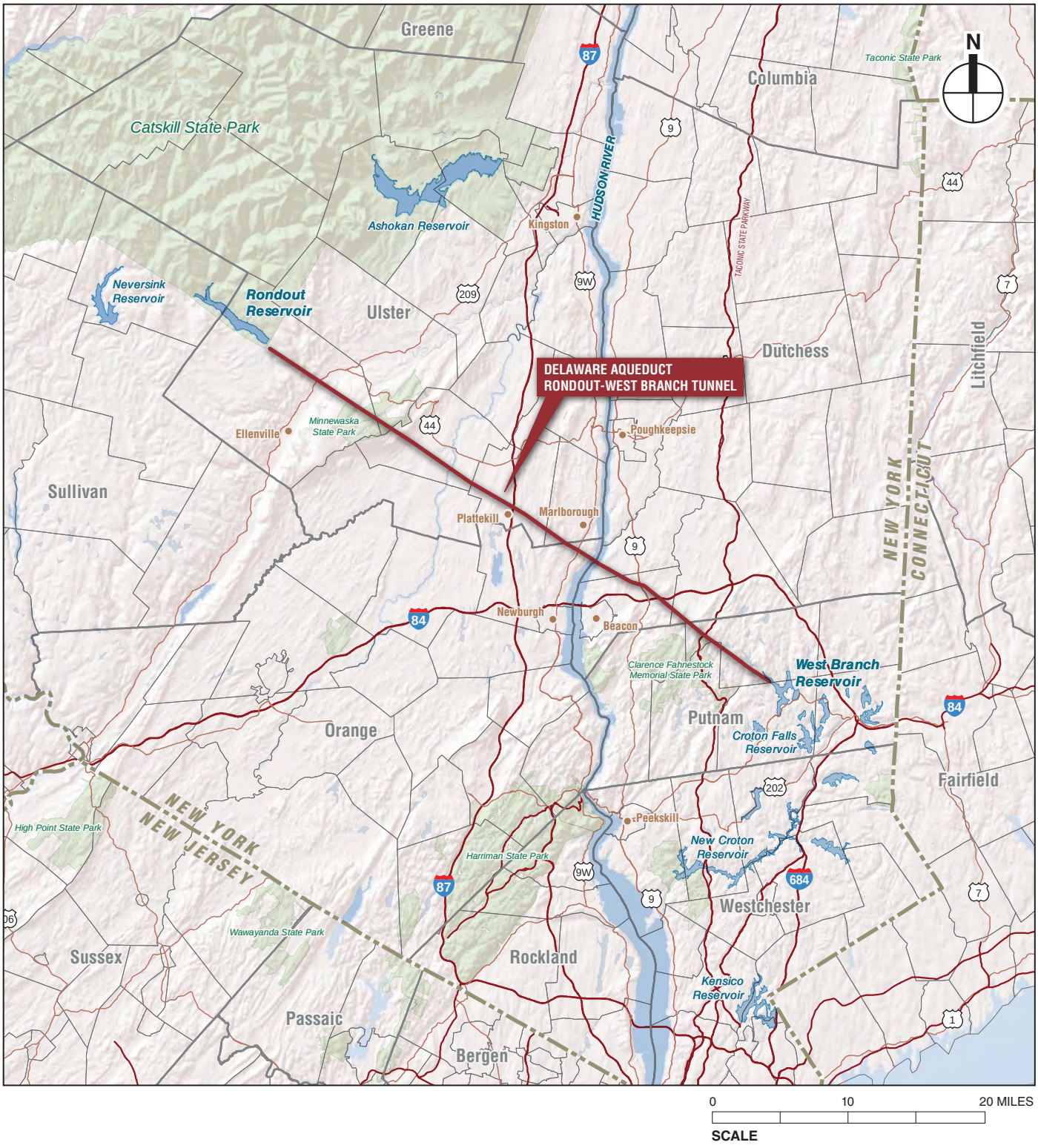

Figure 1

Project Location

Newburgh, Orange County (called the *west connection site* in this Draft Scope) and a site east of the river on DEP's Shaft 6 property located in the Town of Wappinger, Dutchess County (called the *east connection site*). This Draft Scope refers to Project 1 as Shaft and Bypass Tunnel Construction.

The Delaware Aqueduct is critical to the New York City water supply. Shutting down the Delaware Aqueduct during the Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing sub-project (Project 2B) would require DEP to first implement the Water Supply System Augmentation and Improvement sub-project (Project 2A), which would comprise a number of additional projects to supplement DEP's water supply sources, and to ready the water supply system for the effects of the shutdown period.

After Project 2A is implemented, DEP would shut down the Delaware Aqueduct and connect the bypass tunnel to the existing tunnel in Project 2B. During the connection period, inspections and repairs from within the remainder of the Rondout-West Branch Tunnel would be made in areas outside the bypassed section, including known leaking sections in the Town of Wawarsing. After the repairs are complete and the bypass tunnel is connected to the RWBT, water would flow through the RWBT and the newly-constructed bypass tunnel.

Because the proposed program is located in the State of New York and is an action to be undertaken by an agency of the City of New York, it is subject to environmental review pursuant to the New York State Environmental Quality Review Act (SEQRA) and the City of New York's City Environmental Quality Review (CEQR) process. Development of the proposed program may potentially result in significant adverse environmental impacts, requiring that an Environmental Impact Statement (EIS) be prepared. Scoping is the first step in the EIS preparation and provides an early opportunity for the public and other agencies to be involved in the EIS process. It is intended to determine the range of issues and considerations to be evaluated in the EIS.

This Draft Scope includes the following discussions:

- **Section B, Background and Planning**. This section describes the New York City water supply system, the current condition of the RWBT, and the efforts undertaken by DEP to monitor and characterize the conditions in the tunnel, to determine the amount and areas of leakage, and to prepare for the repair of the tunnel.
- **Section C, Purpose and Need for the Proposed Program**. This section describes the need for the proposed program.
- **Section D, Rondout-West Branch Bypass Tunnel Repair Program—Program Description**. This section describes the main components of the proposed program and their proposed locations.
- **Section E, Program Schedule and Phasing**. This section describes the anticipated schedule for the proposed program.

- **Section F, Program Approvals and Coordination**. This section discusses the anticipated permits and approvals that would be required for the proposed program and the additional coordination efforts that would be required.
- **Section G, Analytical Framework**. This section describes how the proposed program and method for analysis will be defined, and is used in the technical analysis areas of the Draft Scope (detailed in Section H).
- **Section H, Organization and Scope of the Environmental Impact Statement**. This section lays out the organization of the EIS that will be prepared and presents the methodologies and scope of work for that EIS.

B. BACKGROUND AND PLANNING

This section provides an overview of the New York City water supply system and explains the current state of the RWBT. It also describes efforts undertaken by DEP to monitor and characterize the conditions in the tunnel, to determine the amount and areas of leakage, and to prepare for the repair of the tunnel.

B.1 NEW YORK CITY WATER SUPPLY SYSTEM

B.1.1 OVERVIEW

DEP operates and maintains the New York City water supply system and is responsible for providing drinking water to more than 8 million customers in New York City as well as approximately 1 million upstate customers. The entire system consists of 19 reservoirs and three controlled lakes with a total storage capacity of approximately 580 billion gallons. The average total system demand is approximately 1.1 billion gallons of water a day.

New York City receives its drinking water from surface water from three upland reservoir systems: the Croton, Catskill, and Delaware systems (see **Figure 2**). Together, these watersheds encompass a 1,968-square-mile area and all or parts of eight counties in New York and a small portion of western Fairfield County in Connecticut. From these upland storage reservoirs, water flows by gravity to New York City through three aqueducts—New Croton Aqueduct, Catskill Aqueduct, and the Delaware Aqueduct (including the RWBT)—and four tunnels—City Tunnel Nos. 1, 2, and 3, and the Richmond Tunnel.

B.1.2 DELAWARE SYSTEM

Constructed between 1936 and 1964, the Delaware system extends as far as 125 miles northwest of Manhattan. With a total storage capacity of 326 billion gallons, the Delaware system provides approximately 50 percent of New York City's drinking water on an annual average basis. This drinking water is conveyed to New York City through a series of reservoirs connected by tunnels, as described below.

The 1,010-square-mile Delaware watershed is the system's westernmost watershed, consisting of four reservoirs: Cannonsville, Pepacton, Neversink, and Rondout. Three of

Schematic Not To Scale

Figure 2
Water Supply System

these reservoirs (Cannonsville, Pepacton, and the Neversink) collect water from the region surrounding the branches of the Delaware River. These reservoirs feed the water eastward to the West Delaware, East Delaware, and the Neversink Tunnels and then to the Rondout Reservoir, where the Delaware Aqueduct begins (see Figure 2).

At the Rondout Reservoir, the water is conveyed approximately 45 miles via the RWBT portion of the Delaware Aqueduct to the West Branch Reservoir, located east of the Hudson River in Putnam County (see **Figure 3**). The RWBT is 13.5 feet in diameter, lined with concrete, and varies in depth from 300 to 2,300 feet below ground (crossing the Hudson River at nearly 600 feet beneath the water surface). The tunnel is a deep rock, pressurized aqueduct that has been in nearly continuous service since it was brought online in 1944. It can convey up to approximately 900 million gallons per day (mgd) of water and delivers an average of 600 mgd on an annual basis. All water from the Delaware system flows through the RWBT.

Two municipalities are supplied water from the RWBT. The Town of Newburgh, Orange County, draws water from two primary sources: Chadwick Lake and the Delaware Aqueduct. The Town of Marlborough, Ulster County, receives water from the Delaware Aqueduct via the Town of Newburgh.

Finally, from the West Branch Reservoir, the Delaware Aqueduct proceeds south to Kensico Reservoir and then to Hillview Reservoir. From Hillview Reservoir, water is conveyed to New York City by City Water Tunnels Nos. 1, 2, and 3.

B.1.3 CATSKILL SYSTEM

The Catskill system includes the Schoharie Reservoir, Shandaken Tunnel, and Ashokan Reservoir. Schoharie Reservoir delivers up to 615 mgd to the Catskill system via the Shandaken Tunnel, which releases into Esopus Creek. Downstream of the Shandaken Tunnel outflow, Esopus Creek flows into the West Basin of Ashokan Reservoir. Water from Ashokan Reservoir is conveyed via the Catskill Aqueduct to Kensico Reservoir, where it typically mixes with water from the Delaware system before being disinfected, fluoridated, and conveyed to Hillview Reservoir. The upper Catskill Aqueduct spans from Ashokan to Kensico Reservoirs, and the lower Catskill Aqueduct spans from Kensico to Hillview Reservoirs. The Catskill system provides an average of approximately 40 percent of New York City's average daily demand.

B.1.4 CROTON SYSTEM

The Croton system is the oldest and smallest of the New York City's three reservoir systems. The Croton watershed is a series of interconnected reservoirs and lakes in northern Westchester and Putnam Counties. The Jerome Reservoir, a distribution reservoir, is located at the downstream end of the Croton system and is the point where Croton water enters the city's water distribution network. The Croton system provides an average of approximately 10 percent of the city's average daily demand. During droughts, it can provide up to 30 percent of in-city consumption.

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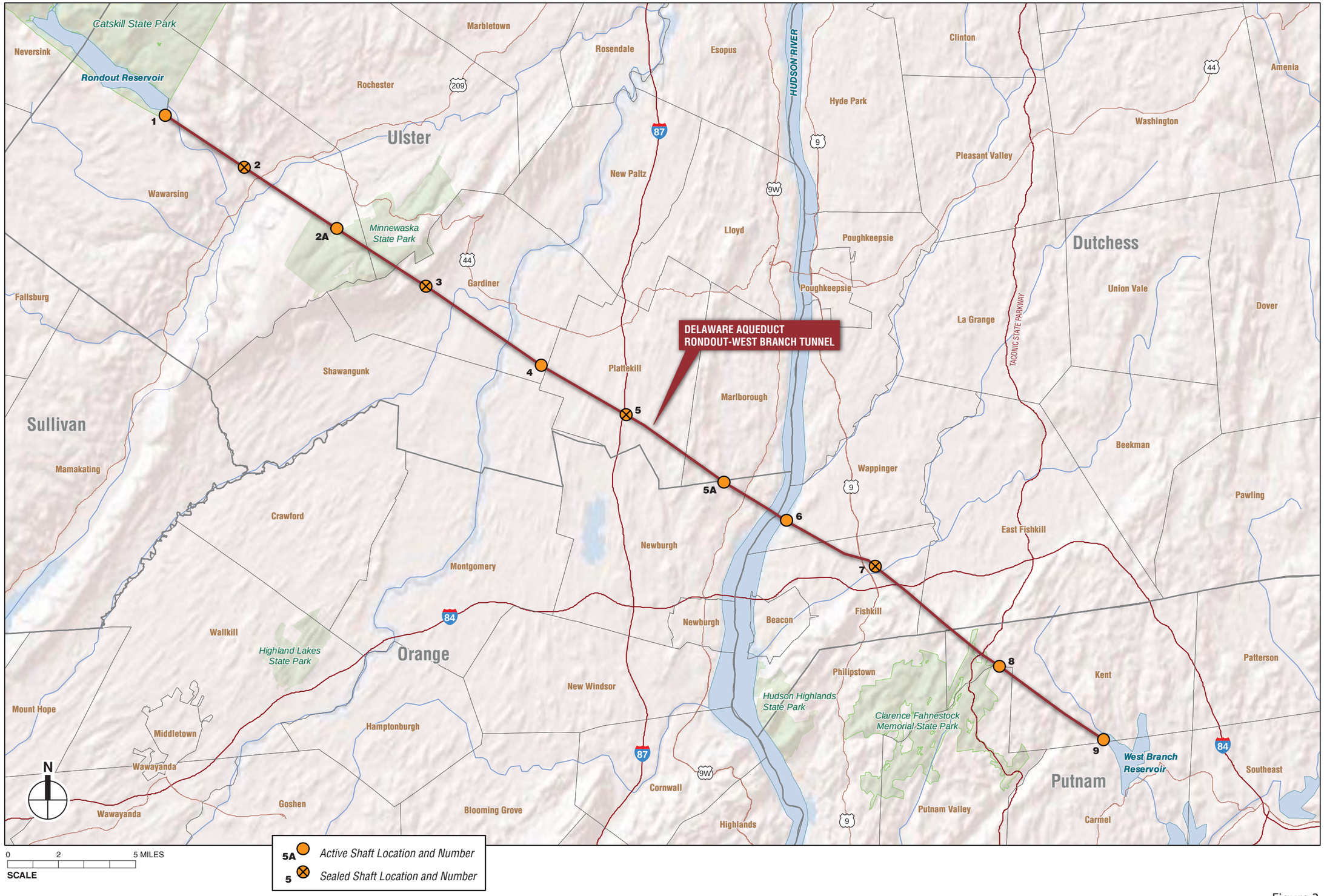

Figure 3

Rondout-West Branch Tunnel

B.2 EXISTING RWBT CONSTRUCTION AND GEOLOGY

During the construction of the RWBT, in zones where the rock was weak or disintegrated, heavy reinforcement and steel interlinings were installed in the tunnel to guard against rupture and excessive leakage and potential collapse. The heavily reinforced and steel-lined sections of the tunnel are known as the *Roseton and Wawarsing crossings* (see **Figures 4 and 5**). The Roseton crossing lies just to the west of the Hudson River and includes two sections totaling about 1,030 feet in length where special construction techniques were required. Both sections have a heavily reinforced concrete outer lining, a circular steel plate interlining, and the typical concrete tunnel lining forming the waterway. In addition to the interlining, large quantities of grout were required to seal the tunnel. The Wawarsing crossing is a section of tunnel approximately 600 feet long with multiple contact zones between various rock types. Similar construction techniques to those employed for the Roseton crossing were also used in Wawarsing.

Eleven shafts were excavated along the tunnel route to provide access and/or ventilation during construction (see Figure 3). The shafts are located along the tunnel, as follows:

- Shafts 1, 2, and 2A—Town of Wawarsing in Ulster County.
- Shafts 3 and 4—Town of Gardiner in Ulster County.
- Shaft 5—Town of Plattekill in Ulster County.
- Shaft 5A—Town of Newburgh in Orange County.
- Shaft 6—Town of Wappinger in Dutchess County.
- Shaft 7—Town of Fishkill in Dutchess County
- Shaft 8—Town of Putnam Valley in Putnam County.
- Shaft 9—Town of Kent in Putnam County.

B.3 OVERVIEW AND CONDITION OF THE RWBT

The last unwatering and physical inspection of the RWBT occurred in 1957-1958. DEP regularly conducts ongoing monitoring of the RWBT and, since the 1990s, has been investigating the Roseton and Wawarsing crossings in particular. These two sections of the RWBT appear to be leaking a total of between 10 and 35 mgd of water from the aqueduct, depending on the amount of water the aqueduct is carrying.

DEP's monitoring efforts have been continuous and varied and have included visual inspections of the tunnel using an autonomous inspection device and tunnel leakage investigations to determine the amount and specific location of the leaks. These monitoring efforts serve as a baseline by which to assess any changes in the tunnel condition and to determine priorities for tunnel repair.

Testing and monitoring efforts have included using dye, backflow, and hydrostatic tests, and hourly flow monitors. In 2003 and 2009, DEP launched an Autonomous Underwater Vehicle (AUV)—a self-propelled submarine-shaped vehicle—to conduct a detailed

2 *Shaft Site and Number*

0 1000 2500 FEET
SCALE

Figure 4

Delaware Aqueduct Rondout-West Branch Tunnel Repair Program

Approximate Area of Wawarsing Crossing: Aerial View

5A *Shaft Site and Number*

0 1000 2500 FEET
SCALE

Figure 5

Delaware Aqueduct Rondout-West Branch Tunnel Repair Program

Approximate Area of Roseton Crossing: Aerial View

survey of the entire approximately 45-mile length of tunnel from the Rondout to the West Branch Reservoirs. The AUV took 360-degree photographs every 8 feet, while also gathering sonar, velocity, and pressure data to assist in determining the location, size, and characteristics of the cracks in the tunnel lining.

Monitoring to date has shown that the leakage rate is stable and has not increased, and that the areas of leakage are correlated with the tunnel's surrounding geology; specifically, DEP's years of comprehensive inspections, testing, and study indicate that cracking and leakage are occurring in the aqueduct where it passes through limestone, a rock more susceptible to wear and tear than the sandstone, shale, gneiss and granite that form the vast majority of the tunnel.

DEP is currently undertaking or planning several projects to learn more about the RWBT's condition and leakage, including continued monitoring of the surface expressions of the leakage at the Roseton and Wawarsing crossings; hydraulic monitoring; visual inspections of the tunnel interior; and engineering risk assessments of the tunnel's structural integrity.

B.4 PLANNING FOR THE REPAIR OF THE RWBT

As discussed above, all water from the Delaware system flows through the RWBT, providing approximately 50 percent of New York City's drinking water on an annual average basis. Because the tunnel is such a critical component of DEP's water supply system, and because it has been known to be leaking, DEP has undertaken a multitude of planning and design efforts in preparation for the repair of the RWBT as part of both its emergency and long-term planning. As part of these efforts, DEP has identified a number of improvements to the RWBT that would facilitate emergency or planned repair work. Some of these improvements have already been constructed or are under construction, others are planned, and others are being evaluated. Some of these improvements would occur along the length of the RWBT, and others would occur at other locations within the water supply system. These projects include:

- Tunnel and shaft rehabilitation of Shaft 6 that will improve DEP's capability to unwater the tunnel. Completion of tunnel unwatering system is expected in 2013.
- Flow metering, instrumentation, and control improvements that allow DEP to continue to investigate the condition of the tunnel.
- In addition to the construction projects along the RWBT, DEP is already investing in other projects to modernize and improve the reliability of its water supply system. A number of these projects would also aid in the planning of Project 2B, the connection of the bypass tunnel and the inspection of the RWBT, including Wawarsing:
  - Croton Filtration Plant, Bronx, NY. This effort, which is being undertaken to ensure reliability of the Croton system, is under construction and expected to be completed in 2012.
  - Croton Falls, NY, Pumping Station Plant Improvements (Shaft 11). This effort, which is to increase pumping capacity, is expected to be complete in 2014.

- Cross River, NY, Pumping Station (Shaft 13). This effort, which is to increase pumping capacity, is expected to be finished in 2012.

C. PURPOSE AND NEED FOR THE PROPOSED PROGRAM

DEP is responsible for ensuring the safe and reliable transmission of drinking water from the watershed to consumers in sufficient quantity to meet all present and future water demands. As described above, the RWBT is a critical component of DEP's Delaware water supply system and is currently leaking between 10 and 35 mgd in two critical areas in the vicinity of the Wawarsing and Roseton crossings. DEP has an ongoing program to evaluate the condition of the tunnel's structural integrity, especially with respect to changes in the tunnel liner or leakage characteristics to determine whether there is an increased risk of further cracking or tunnel collapse. Construction of the bypass tunnel would minimize the time that the RWBT is taken out of service, thereby reducing risks, supporting inspections of other tunnel segments, and providing greater flexibility to inspect and repair the RWBT itself. This project is also consistent with the water network initiatives detailed in the Mayor's Office of Long Term Planning and Sustainability's *PlaNYC: A Greener, Greater New York*, by enabling DEP to continue to reliably deliver drinking water to upstate and New York City consumers.

D. RONDOUT-WEST BRANCH TUNNEL REPAIR PROGRAM—PROGRAM DESCRIPTION

As described above in Section B, "Background and Planning," DEP has conducted and is continuing to conduct studies to determine the specific locations of the RWBT problem areas. Concurrently, DEP is also undertaking preliminary planning and design of the proposed bypass tunnel construction and connection.

This section describes the proposed program, which would consist of two main efforts:

- Project 1—Shaft and Bypass Tunnel Construction;
- Project 2—RWBT repair and water supply improvements. Project 2 would consist of two sub-projects:
  - Project 2A— Water Supply System Augmentation and Improvement.
  - Project 2B— Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

Project 1 would begin with construction of shafts at the east and west connection sites, which would start in 2013 and be complete in 2016. Construction of the bypass tunnel itself would begin in 2015 and be complete in 2019. When the new bypass tunnel is complete and Project 2A has been implemented, Project 2B would commence. In this sub-project, the RWBT would be taken out of service and excavation would begin to connect the new bypass tunnel to the existing tunnel. It is anticipated that 6 to 15 months would be needed to complete the bypass connection and to undertake the RWBT inspection and repair, including within the Town of Wawarsing. Upon completion of

Projects 1 and 2, the bypass tunnel would be in operation, and water would flow through the RWBT and the newly-constructed bypass tunnel.

Project 1 and Project 2B of the proposed program would include construction within Orange, Ulster, Dutchess, and Putnam Counties, NY (see **Figure 1**). Project 2A would occur at various locations within the water supply system, within and in the vicinity of New York City, and may include work in Nassau County and eastern New Jersey.

The planning, design, and implementation of the proposed program would ensure reliable service of the RWBT to satisfy water supply needs to users of the New York City water supply system into the future. More detail on the proposed program, including Projects 1 and 2 and its sub-projects, is presented below.

D.1 PROJECT 1: SHAFT AND BYPASS TUNNEL CONSTRUCTION

Project 1 would consist of construction of the bypass tunnel around the highest leakage section of the RWBT. The new tunnel to be constructed is referred to as the *Rondout-West Branch Bypass Tunnel* or *bypass tunnel*.

At this time, the exact route of the bypass tunnel has not been determined, but it would likely be constructed within 1 mile of the existing RWBT, between a site to be acquired west of the Hudson River—referred to as the *west connection site*—and Shaft 6 (east of the Hudson River)—referred to as the *east connection site* (see **Figure 6**). The tunnel would be sized to accommodate the full Delaware Aqueduct capacity (i.e., approximately 900 mgd). The tunnel would be located approximately 600 feet below the Hudson River water surface, and approximately parallel to the north and at the same depth as the existing RWBT.

Construction for the bypass tunnel would occur underground, with construction staging and support activities at both the west and east connection sites. DEP has examined the potential use of properties already under DEP jurisdiction for the west and east connection sites; however, DEP has limited properties in the project area, and, therefore, some acquisition of property would be needed. Acquisition of any properties needed for use to support the project would undergo a separate environmental review; the EIS will identify specific sites that have been or would be acquired and would evaluate any potential environmental effects from the use of the sites. In addition, the EIS will include an evaluation of the potential environmental effects of alternative sites that were initially considered and later rejected (see Section H.8, “Alternatives”).

DEP is still evaluating various options to construct the bypass tunnel. At the current time, it is anticipated that the bypass tunnel would be constructed using a tunnel boring machine (TBM). For tunnel construction, it is anticipated that two shafts would be required—one each at the west and east connection sites. These shafts would be offset to the north of the existing aqueduct alignment along the bypass tunnel and would be excavated to approximately the same depth as the bypass tunnel (i.e., approximately 600 feet below the ground). The shafts would be used for the following purposes during Shaft and Bypass Tunnel Construction:

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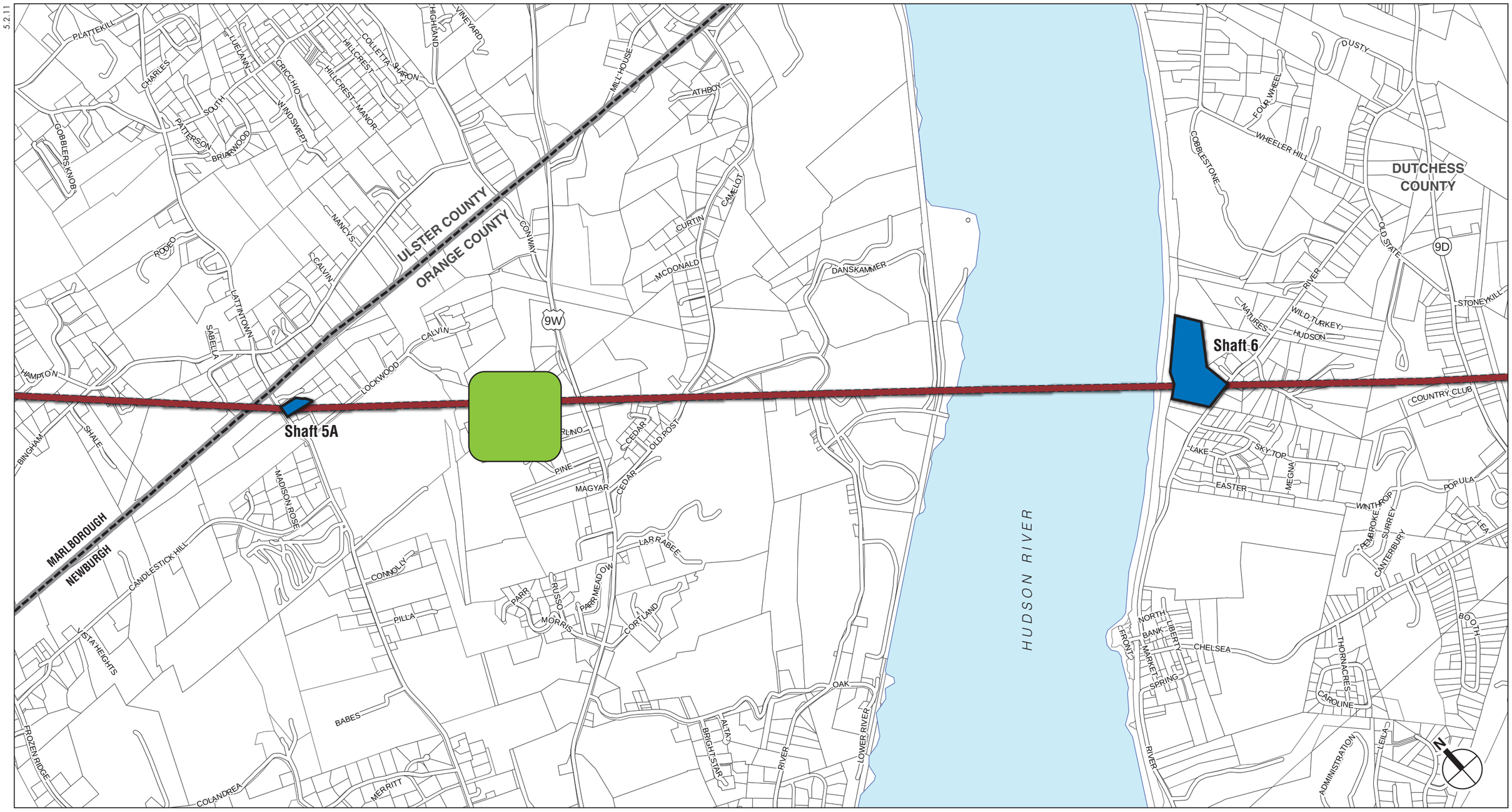


Existing DEP Property

Approximate Potential West Connection Site Location

Delaware Aqueduct
Rondout-West Branch Tunnel

Figure 6
Potential West Connection Site Location

- **Launch and reception of the TBM**. One of the shafts would be used to launch the TBM, while the other would be used to receive the TBM. At this time, DEP is continuing to evaluate whether its preferred option would be to launch the TBM from the east connection site and receive it at the west connection site or to launch from the west connection site and receive it at the east connection site. The EIS will identify the preferred option and will assess the other option as an alternative (see Section H.8, "Alternatives").
- **Access during construction of the bypass tunnel**. Workers would access the bypass tunnel through the shafts, and materials would be delivered via the shafts as well. In addition, excavated materials would be removed through the shafts. Shaft excavation would require blasting activities and would result in a substantial amount of material that would need to be removed from the east and west connection sites. DEP is currently evaluating various options for removal of material. Potential options could include removal of material by barge, rail, or truck. These options are discussed below in Section H.8, "Alternatives."

These shafts would continue to be used during Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing (see Section D.3, below).

During construction, groundwater would infiltrate the tunnel as the TBM advances. This water would need to be removed, and it is anticipated that the connection site that is used as the launch site for the TBM would also serve as the bypass dewatering location during tunnel construction. Recovered groundwater would be treated prior to discharge to the Hudson River.

At the west connection site, a pipeline could be needed to convey the groundwater infiltrating the RWBT tunnel[1] from the west connection site to a new outfall on the Hudson River. The pipeline route has not yet been determined, but, if needed, it would likely extend along existing rights-of-way and some private property before reaching the new outfall.

D.2 PROJECT 2A: WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT

The various additional projects that would be implemented to support Project 2A—Conservation, Catskill Aqueduct Optimization, Queens Groundwater Pumping, New Jersey-New York City Interconnection, Nassau County Interconnection, and the Delaware Watershed Reservoir Improvements—are all in the preliminary stage of facility planning, and not enough information has been developed at this time to enable a complete environmental review. Therefore, this EIS will provide a project description for each of these projects, a preliminary list of actions and approvals necessary to implement each project, an estimated timeframe for when each project would be

[1] Water may require treatment to meet discharge water quality standards.

implemented, and a generic assessment of the potential impacts from each project. Prior to the approval and implementation of any of these projects, additional environmental review as part of a second EIS will be undertaken to evaluate and disclose the potential environmental impacts from these projects.

As discussed below, Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, would require that the flow of water within the RWBT be stopped. As a result, the City of New York will need to augment the water supply to prevent a supply deficiency during the Delaware Aqueduct shutdown. Therefore, DEP has identified and is currently evaluating a series of supplemental water supply sources that could be activated during the shutdown to ensure the available water supply during the shutdown period. In addition, water flowing into the Delaware watershed reservoirs would not be diverted to the RWBT.

Therefore, two types of projects would be needed to support Project 2B:

- Potential Augmentation Projects:
  - Conservation
  - Catskill Aqueduct Optimization
  - Queens Groundwater Pumping
  - New Jersey-New York City Interconnection
  - Nassau County Interconnection
- Potential projects that may be necessary to accommodate the cessation of flow in the RWBT , since water that would normally flow through the RWBT would need to flow elsewhere.

These projects are varied in scope and location (see **Figure 7**). DEP is continuing to evaluate these projects to determine the most cost-effective strategies to meet its water supply demands. The projects identified and discussed in the following sections (see D.2.1 through D.2.6) are conceptual at this time and will be retained for further study. It is possible that as project planning continues, one or more of the projects identified in this Draft Scope may not move forward and/or additional projects may be identified.

D.2.1 CONSERVATION

DEP has an ongoing conservation program that could reduce water demand during the time of Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

DEP's policy and experience is that saving water is usually the most cost-effective and environmentally benign method of ensuring an ample supply of water for the region. The city's water conservation programs address the many sources of water use and waste and have been developed in cooperation and collaboration with regulators, non-governmental organizations, and the citizens and businesses of the city over a period of more than 20 years. With the city's population expected to rise to 9.1 million by 2030, water efficiency will continue to have an important role to play, not just to help assure

Projects Proposed to Supplement the DEP Water Supply System

Delaware Watershed Reservoir Improvements

Schematic Not to Scale

Figure 7

Water Supply System Augmentation and Improvement

supply but also to assist in meeting goals to reduce combined sewer overflows, maintain wastewater quality, and meet nitrogen removal goals.

DEP has previously implemented and is currently implementing a number of water conservation programs including, but not limited to, distribution of water saving kits, implementation of a toilet rebate program, and public educational campaigns. The installation of the city-wide Automated Meter reading (AMR) system, which began in 2008, provides a source of detailed water use information on a customer level. It also enables DEP's Water Leak Notification Program, which can detect unknown leaks by monitoring spikes in usage. In addition, new water use rules took effect on June 22, 2009. The changes address several water quality and leak prevention issues in addition to a number of technical and procedural changes. A "Green Code" task force has been set up in the city with the goal of revising specific parts of the city's Building Code to meet environmental and "green building" goals, including water conservation.

DEP would continue to develop both short-term and long-term strategies that could reduce demand during Project 2B.

D.2.2 CATSKILL AQUEDUCT OPTIMIZATION

The Catskill Aqueduct Optimization project would consist of two main components: 1) cleaning and/or lining the aqueduct and 2) constructing and replacing air vents. Both of these components would occur in the section of the aqueduct between the Ashokan and Kensico Reservoirs. Together, these two components could improve the capacity of the Catskill Aqueduct to supply water.

- **Cleaning and/or Lining**. This component of the Catskill Aqueduct Optimization program may require a series of shutdowns of the Catskill Aqueduct, during which teams of workers would enter the aqueduct and, using pressure washers, clean the aqueduct by removing the existing biofilm layer adhered to the interior of the aqueduct. The aqueduct could then be lined with an epoxy coating to seal the concrete walls and enhance the flow characteristics of the aqueduct.
- **Venting**. The Catskill Aqueduct is a closed conduit, cut-and-cover aqueduct that conveys water at grade. Water flows as open channel or free-surface flow within portions of the conduit; however, there are several segments of the aqueduct that travel under rivers and use pressure tunnels or siphons in these locations. Each segment requires adequate ventilation, especially when at capacity, to prevent trapped air from slowing the flow of the water. This component of the Catskill Aqueduct Optimization project would add and replace air vents along the aqueduct to ensure that, as the flow of water in the aqueduct increases and decreases, sufficient air is ventilated to maintain a maximum flow of water.

D.2.3 QUEENS GROUNDWATER PUMPING

Since 1996, DEP has owned and operated the Queens groundwater supply system that was formerly part of the Jamaica Water Supply Company. At the time of purchase, the groundwater supply system consisted of 68 wells. The well supply has been slowly

phased out of operation, and no well has been operated to distribution since 2007. The source of this water is largely the Magothy Aquifer, located approximately 200 feet below sea level.

The Queens Groundwater Pumping project would consist of the reactivation of groundwater wells during Project 2B.

D.2.4 NEW JERSEY-NEW YORK CITY INTERCONNECTION

This project would consist of constructing a hydraulic connection between New Jersey and New York City. The proposed interconnection with New Jersey water systems would allow DEP to use excess capacity in the system, when it is available, during the tunnel outage. There is a potential for multiple connections to more than one New Jersey water supply entity.

D.2.5 NASSAU COUNTY INTERCONNECTION

This project would consist of the construction of a hydraulic connection to source water from Nassau County. The proposed interconnections with adjacent Nassau County water systems would allow DEP to use Nassau County's excess well and treatment capacity during the tunnel outage. There is a potential of multiple connections to more than one Nassau County water supply entity.

D.2.6 DELAWARE WATERSHED RESERVOIR IMPROVEMENTS

When the Delaware Aqueduct is shut down during Project 2B, water flowing into the Delaware watershed reservoirs would need to be released from the Cannonsville, Pepacton, Neversink, and Rondout Reservoirs into the West and East Branches of the Delaware River, the Neversink River, and the Rondout Creek, respectively.

It is possible that at one or more of the reservoirs will require construction of limited facilities to facilitate and control the increased releases.

D.3 PROJECT 2B: BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

This sub-project would consist of the connection of the bypass tunnel to the existing tunnel and the inspection and repair of the leaking area at Wawarsing and the remainder of the RWBT.

As discussed above, because this sub-project would require that the flow of water within the RWBT be stopped, a number of measures to ensure a continued supply of water to New York City would be required to be in place before the shutdown could commence. The water supply augmentation and improvement efforts (Project 2A) are discussed in section D.2.

D.3.1 BYPASS TUNNEL CONNECTION

Connection of the bypass tunnel to the existing RWBT would involve constructing final bypass tunnel segments that would extend several hundreds of feet from the shafts

constructed as part of Project 1, Shaft and Bypass Tunnel Construction. Before making the connection, flows within the RWBT would be stopped and the tunnel unwatered. DEP's Shaft 6 site (i.e., the east connection site) would likely be used to unwater the tunnel. Once the tunnel is unwatered, the bypass tunnel would be connected to the existing tunnel. DEP is exploring various options to seal off the existing tunnel in the event of a tunnel collapse and subsequent inundation; these options consist of various connection and plug configurations that will be described in more detail in the EIS.

Construction activities would occur at the east and west connection sites but would occur primarily underground within the shafts, the RWBT, and the bypass tunnel. The construction activity at the surface is anticipated to be more limited than during Project 1, Shaft and Bypass Tunnel Construction.

D.3.2 RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

During the period when flows are stopped and after the tunnel has been unwatered, inspections and repairs would be made at the leaking area at Wawarsing as well as to various areas of the RWBT.

Shafts 1, 2A, 8, and 9 of the Delaware Aqueduct could be used during inspection and repair of the RWBT for ventilation of, or access to, the tunnel.

Methods of repair could range from patching and grouting to repairing or adding sections of interliners, which are permanent liners used to support the tunnel. Further inspections would take place along the entire length of the RWBT to assess if additional repairs are necessary along the length of the approximately 45-mile tunnel.

D.4 BYPASS TUNNEL OPERATION

When the connection and the repairs are completed, water flow would be restored to the Delaware Aqueduct, and water would flow through the RWBT and the newly constructed bypass tunnel of the RWBT.

E. PROGRAM SCHEDULE AND PHASING

E.1 PROJECT 1: SHAFT AND BYPASS TUNNEL CONSTRUCTION

Project 1 would begin with construction of the shafts at the east and west connection sites, which would start in 2013 and be complete in 2016. Construction of the bypass tunnel itself would begin in 2015 and be complete in 2019.

E.2 PROJECT 2A: WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT

Since these projects are critical to support the bypass tunnel connection, the implementation of Conservation efforts, Catskill Aqueduct Optimization, Queens Groundwater Pumping, New Jersey-New York City Interconnection, Nassau County Interconnection, and Delaware Watershed Reservoir Improvements would be undertaken

and completed before Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

E.3 PROJECT 2B: BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

When the bypass tunnel addressing the leak at the Roseton crossing is complete, and the water supply system augmentation and improvement projects to support the connection are in place, the existing tunnel would be taken out of service and excavation would begin to connect the bypass tunnel to the existing tunnel. It is anticipated that between 6 and 15 months would be required to complete the bypass tunnel connection.

During this time, while the RWBT is unwatered, inspection and repair of the leaking portions of the aqueduct at Wawarsing, along with additional tunnel sections not bypassed, would be undertaken.

E.4 BYPASS TUNNEL OPERATION

Upon completion of Projects 1 and 2, water flow would be restored to the Delaware Aqueduct, and water would flow through the RWBT and the newly constructed bypass tunnel.

F. PROGRAM APPROVALS AND COORDINATION

The proposed program would require permits and approvals from federal, state, and local agencies. Anticipated permits and approvals are listed in **Tables 1 through 3**, and are organized by project.

The proposed program could also require the use of eminent domain (N.Y. Eminent Domain Procedure Law; N.Y. Public Authorities Law §§1266, 1267) related to the easements needed for the bypass tunnel route.

Table 1
Potential Major Permits, Approvals, Consultation, and Coordination—Project 1: Shaft and Bypass Tunnel Construction

Agency/Entity	Permit/Approval/Consultation/Coordination
FEDERAL	
Coastal Zone Management Act	Projects affecting New York's coastal zone must be consistent with the Coastal Zone Management Act, through the New York State Department of State's Coastal Management Program and approved Local Waterfront Revitalization Plans
U.S. Army Corps of Engineers (USACE)	Joint Permit Application • for tunnel construction under the Hudson River • for work in/adjacent to wetlands
Advisory Council on Historic Preservation	Consultation under Section 106 of the National Historic Preservation Act of 1966
STATE	
New York State Department of State (NYSDOS)	Coastal Zone Management Consistency
	Joint Permit Application • for tunnel construction under the Hudson River • for work in/adjacent to wetlands
New York State Department of Environmental Conservation (NYSDEC)	Joint Permit Application • for tunnel construction under the Hudson River • for work in/adjacent to wetlands
	State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity - GP-0-10-001 (Erosion and Sediment Control for construction activities)
	Individual SPDES Permit or Application Form NY-2C for Industrial Facilities (Shaft dewatering activities requiring discharge to surface water)
	Section 401 Water Quality Certification
	Minor Facility Registration or NYSDEC State Facility Permit (air quality)
New York State Office of Parks, Recreation and Historic Preservation	Consultation to determine potential presence of archaeological and/or historic resources and determine project's potential effects
New York State Office of General Services	Application for Use of Lands Underwater
New York State Department of Transportation (NYSDOT)	Design Related, Highway Work and Traffic Enhancement Permits; General Coordination
AREA MUNICIPALITIES	
New York City	
Public Design Commission of New York City	Design Commission Approval
Town of Wappinger	
Town of Wappinger Planning Board	Site Plan Approval
Town of Wappinger Zoning Board of Appeals	Zoning Board Approval
Town of Wappinger Building Department	Building Permits; Blasting Permits
Town of Newburgh	
Town of Newburgh Planning Board	Site Plan Approval; Clearing and Grading Permits
Town of Newburgh Zoning Board of Appeals	Zoning Board Approval
Town of Newburgh Building Department	Building Permits, Clearing and Grading Permits, Blasting Permits

Table 2
Potential Major Permits, Approvals, Consultation, and Coordination—Project 2A: Water Supply System Augmentation and Improvement

Regulatory Agency	Catskill Optimization	Queens Groundwater Pumping	Nassau County Interconnection	New Jersey – New York City Interconnection
Federal Emergency Management Agency			X	X
U.S. Army Corp of Engineers				X
U.S. Environmental Protection Agency		X		
U.S. Fish and Wildlife Service	X			X
Delaware River Basin Commission				X
Office of the Governor – New Jersey				X
New Jersey Department of Environmental Protection				X
New York State Department of Environmental Conservation	X	X	X	X
New York State Department of Health		X	X	
New York State Department of State			X	X
New York State Department of Transportation	X	X	X	X
New York State Office of General Services				X
New York State Office of Parks, Recreation & Historic Preservation	X	X	X	X
Nassau County			X	
Orange County	X			
Ulster County	X			
Putnam County	X			
Westchester County	X			
Village of New Paltz	X			
City of Newburgh	X			
Town of Marlborough	X			
Village of Cornwall-on-Hudson	X			
Town of New Windsor	X			
Village of Cold Spring	X			
Town of Putnam Valley	X			
Continental Village	X			
City of Peekskill	X			
Town of Cortlandt	X			
Village of Buchanan	X			
Town of Yorktown	X			
Town of New Castle	X			
Village of Pleasantville	X			
Town of Mount Pleasant	X			
New York City Council		X	X	X
New York City Department of Mental Health and Hygiene	X	X	X	X
New York City Department of Transportation		X	X	X
New York City Department of City Planning		X	X	X
New York City Landmarks Preservation Commission		X		
New York City Department of Parks and Recreation		X	X	X
New York City Department of Small Business Services			X	X
New York City Design Commission		X		
NYC Community Boards		X	X	X
NYC Borough Presidents		X	X	X

Table 3
Potential Major Permits, Approvals, Consultation, and Coordination—Project 2B: Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing

Agency/Entity	Permit/Approval/Consultation/Coordination
STATE	
New York State Department of Environmental Conservation (NYSDEC)	Joint Permit Application (for Freshwater Wetlands, related to elimination of leaks)
New York State Department of State (NYSDOS)	Joint Permit Application (for Coastal Consistency Concurrence, related to elimination of leaks)
New York State Department of Health (NYSDOH)	Water Supply Improvement Approval
AREA MUNICIPALITIES	
New York City	
New York City Department of Health and Mental Hygiene	Water Supply Improvement Approval
Ulster County	
Ulster County Department of Health	Coordination
Town of Wawarsing	Coordination
Orange County	
Orange County Department of Health	Coordination
Dutchess County	
Dutchess County Department of Health	Coordination
Putnam County	
Town of Putnam Valley	Coordination
Town of Kent	Coordination

G. ANALYTICAL FRAMEWORK

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 significant adverse impacts on the environment consistent with social, economic, and other essential considerations. In disclosing impacts, the EIS uses an analytical approach that considers the proposed program's potential adverse impacts on the environmental setting. Typically, the majority of a project's effects would occur upon completion of the project, once the project is operational; for example, once a site plan application is approved and construction is complete and the development is occupied, there could be the potential for traffic impacts from people driving to and from the site. Therefore, typically, the technical analyses in an EIS describe conditions today and forecast these conditions to the future first without and then with the proposed project. The Delaware Aqueduct Rondout-West Branch Tunnel Repair program requires a modified analytical approach since it has a substantial construction effort related to various project elements over a broad geographic area, and relatively limited operational impacts.

Below are relevant analytical terms used in the environmental review process, and in subsequent sections these terms are further defined as they will be used in the environmental review for the proposed program.

- **Existing conditions**. In this EIS, existing conditions are observed and assessed, establishing a baseline against which future conditions can be projected. Generally, existing conditions will be evaluated for the study areas and time periods most likely to be affected by the proposed program.
- **No Build condition**. Using existing conditions as a baseline, conditions known to occur or expected to occur in the future, regardless of the proposed program, are then evaluated for the proposed program's interim and operational analysis years. This is the No Build or future without the proposed program condition.
- **Analysis year**. The analysis year refers to a particular future year for which an EIS analyzes a proposed program's likely effects on its environmental setting. There could be a number of analysis years depending on the technical analysis under consideration. For example, if a project would result in substantial construction (like the proposed program), 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 air emissions.

The subsequent section, Section H, "Organization and Scope of the Environmental Impact Statement," discusses the proposed organization of the EIS and provides the methodologies for analysis of the proposed program.

H. ORGANIZATION AND SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

Since the sponsor of the 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* (2010) provides suggested methodologies for conducting environmental assessments performed under CEQR. The methodologies in the *CEQR Technical Manual* provide a structured approach to addressing the potential for significant adverse impacts, and the proposed Draft Scope follows its suggested analytical approaches. However, since the proposed program would be largely located outside New York City, locally and/or state-accepted EIS methodologies will be applied in cases where New York City methodologies are either irrelevant or less stringent.

The remainder of the document describes the analysis and methodologies that will be used in the EIS to assess the potential environmental effects of the proposed program.

- Sections H.1 and H.2 describe how the EIS will include an Executive Summary and a Program Description.
- Section H.3 describes the methodologies that will be used to analyze the probable impacts of Project 1, Shaft and Bypass Tunnel Construction.
- Section H.4 describes how Project 2A, Water Supply System Augmentation and Improvement will be assessed.
- Section H.5 describes how Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, will be assessed.

- Section H.6 describes the methodologies that will be used to analyze the proposed program upon operation.
- Section H.7 describes how the proposed program's cumulative effects will be assessed.
- Section H.8 describes how alternatives to the proposed program will be addressed.
- Sections H.9 and H.10 describe how the EIS will disclose any unavoidable adverse impacts and any irreversible and irretrievable commitment of resources.
- Section H.11 describes how technical appendices will be included as part of the EIS.
- Section H.12 describes how a glossary of acronyms will be included as part of the EIS.

H.1 EXECUTIVE SUMMARY

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

Specifically, the Executive Summary will include:

- Brief description of the proposed program, including background leading to its development and anticipated analysis years.
- List of involved and interested agencies, and required approvals/permits.
- Concise list of the anticipated significant adverse impacts and proposed mitigation measures.
- Description of the alternatives to the proposed program considered in the EIS. A table will be presented that assesses and compares each alternative relative to the various impact issues.

H.2 CHAPTER 1: PROGRAM DESCRIPTION

This chapter of the EIS will provide an understanding of the proposed program and provide the public and decision-makers with context from which to evaluate the proposed program and its alternatives.

The Program Description chapter will contain an overview of the proposed program, including a description of the various project locations, list of all actions and approvals associated with the proposed program, identification of the applicant, and a discussion of the regional setting for the proposed program. It will also incorporate a statement of purpose and need for the proposed program.

This chapter of the EIS will also describe the major project components:

- Project 1: Shaft and Bypass Tunnel Construction;

- Project 2: RWBT repair and water supply system improvements consisting of the following two sub-projects:
  - Project 2A: Water Supply System Augmentation and Improvement; and
  - Project 2B: Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

This chapter will also describe operation of the bypass tunnel.

This section will provide charts, graphics, maps, site plans, and renderings, as well as other supporting documents related to the two major project components of the program, as appropriate. Tax map identification, land ownership, and existing uses of all parcels of land comprising the potential connection sites will be identified. The proposed program will be described in detail, including relative dimensions of project components, where appropriate. An overview of the proposed program's construction schedule and phasing will be provided, and locations where construction may occur (including construction staging areas) will be identified.

Other actions associated with the proposed program will be identified, including but not limited to approvals required and procedures to be followed in the EIS and SEQRA/CEQR processes. Significant components or actions associated with the proposed program will also be described in detail. Involved agencies will be identified in the EIS.

H.3 CHAPTER 2: PROBABLE IMPACTS OF PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION

H.3.1 OVERVIEW

As described above, Project 1, Shaft and Bypass Tunnel Construction would involve construction at the east and west connection sites within the Towns of Newburgh and Wappinger, respectively, as well as the bypass tunnel itself. This portion of the EIS will provide a detailed assessment of potential impacts related to Project 1.

Unlike potential impacts from the operation of a project, which are permanent, impacts from construction are in many cases temporary. These impacts, though temporary, can have a disruptive and noticeable effect on the adjacent community. Because of the complexity and lengthy construction schedule associated with Project 1 it is anticipated that this project could result in potential impacts.

Since Project 1 would consist of intense construction activity, the EIS will focus on the potential effects from this construction effort. The determination of the significance of impacts from construction activities will be based on an assessment of the predicted intensity, duration, and the geographic extent of the impacts. Where potentially significant adverse impacts are identified for each of the technical areas, mitigation measures will be explored and, if feasible, mitigation for any impacts will be presented.

Detailed analyses of the following will be included in the EIS. Categories not listed here will be screened in the EIS:

- Land Use, Zoning, Public Policy, and Open Space
- Neighborhood Character
- Visual Character
- Historic and Archeological Resources
- Socioeconomic Conditions
- Community Facilities and Services
- Natural Resources and Water Resources
- Hazardous Materials
- Transportation
- Air Quality
- Energy and GHG/Climate Change
- Noise
- Infrastructure
- Solid Waste
- Coastal Zone Consistency
- Public Health

H.3.2 CHAPTER 2.1: DESCRIPTION OF PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION

A detailed description of Project 1 construction activities will be provided, including an estimated timeline showing the major proposed activities by each stage of construction through completion of the Project 1, as well as a description of the proposed activities and their locations during each stage. This discussion will include potential storage areas, potential staging and parking areas, truck routes, likely sequencing, and techniques to minimize impacts during construction. For each technical area, a discussion of the impacts for the entire Project 1 construction period and for the evaluated/modeled reasonable worst-case condition will be provided.

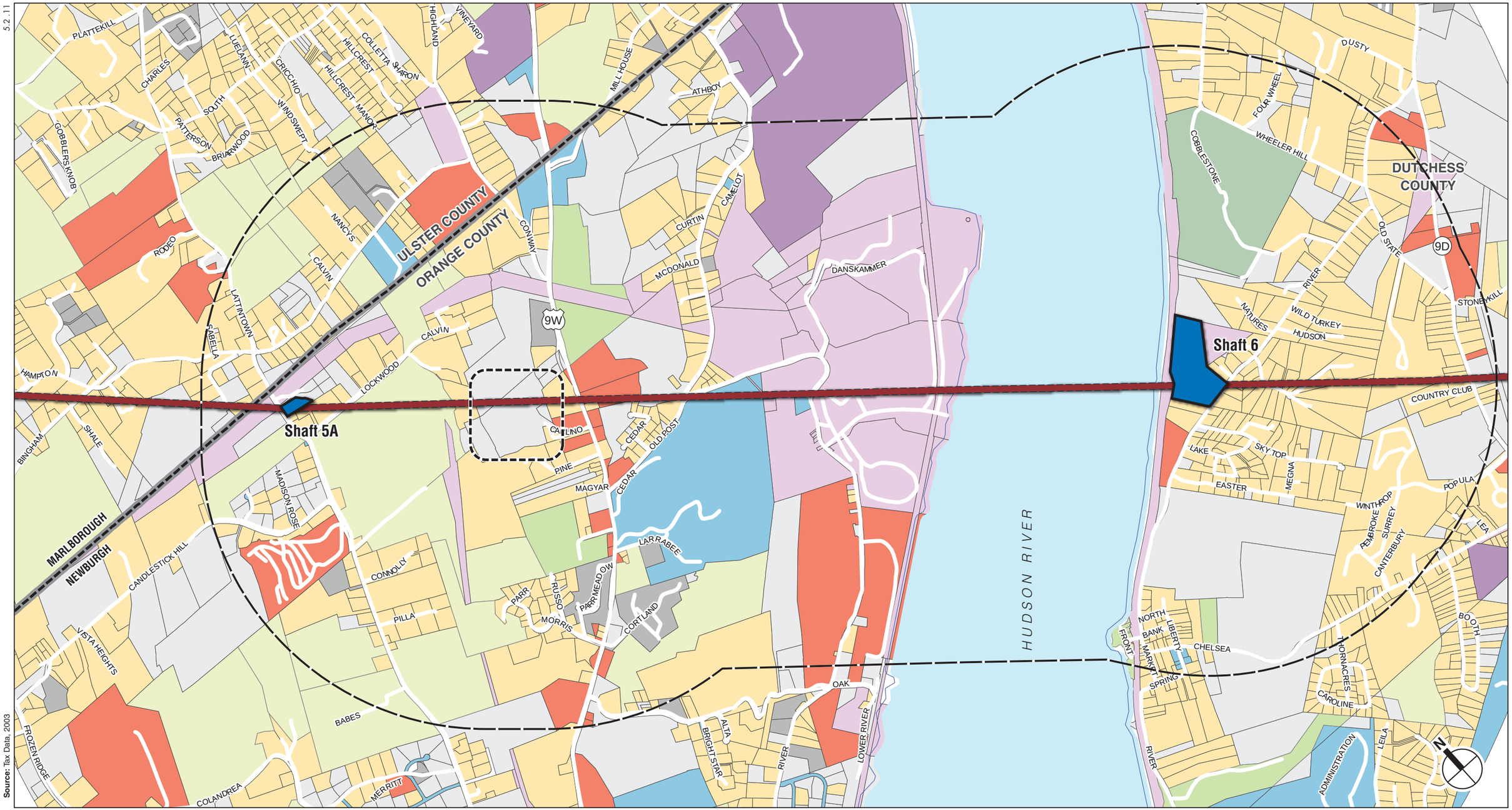
H.3.3 CHAPTER 2.2: LAND USE, ZONING, PUBLIC POLICY, AND OPEN SPACE

The land use, zoning, public policy, and open space analysis will assess the potential for impacts on any sensitive land uses and open spaces from Project 1, Shaft and Bypass Tunnel Construction. The analysis will evaluate impacts within an area of approximately ¼-mile around the project locations where above-ground construction work for Project 1 may occur.

H.3.3.1 Existing Conditions

This analysis will describe existing land uses for the potential connection sites and surrounding study areas. **Figure 8** shows the land uses within a general study area; specific study areas will be defined as sites where above-ground facilities for Project 1 may be located are identified (i.e., connection site locations). All land use information will be compiled and mapped primarily from published data, supplemented with field surveys and aerial photography, as appropriate.

5.2.11



Source: Tax Data, 2003

Existing Shaft Sites 5A and 6
Delaware Aqueduct Rondout-West Branch Tunnel
Approximate Potential West Connection Site Location
Study Area Boundary

Water Supply
Residential
Commercial/Office
Community Facilities

Parks/Conservation
Agricultural
Recreation
Industrial

Transportation and Utility
Vacant Parcel
Not Classified

0 1000 2500 FEET
SCALE

Figure 8
Bypass Tunnel Land Use and Open Space Study Area Overview

The zoning analysis will describe existing zoning regulations that apply to the potential connection sites, including information on allowed uses, building bulk, and setbacks required within the zoning districts. The analysis of public policy will outline the relevant land use policies that apply to the potential connection sites, including local, county, and state policies.

Open spaces within the study areas will be identified using available local, county, and state resources (such as county open space maps, GIS data, and plans) and coordination with the various county planning departments.

H.3.3.2 The Future Without the Project 1, Shaft and Bypass Tunnel Construction

Information on pertinent projects undertaken by DEP, other development projects, and other actions in the study areas will be presented. Anticipated changes included in this section will be based on officially approved or adopted future plans or developments that are anticipated to be completed by the start of operation of the proposed program. If there are any relevant planned and proposed changes to public policy that would occur independent of the proposed program, these will be described.

H.3.3.3 Potential Impacts of Project 1, Shaft and Bypass Tunnel Construction

Potential land use impacts will be assessed based on the activities associated with Project 1, relative to the surrounding land uses. The impact assessment will consider whether the duration of construction activities at certain sites would constitute a land use that could thereby affect land use patterns in the neighborhood.

The public policy analysis will consider consistency of the Project 1 with existing local, state, and federal policies.

The analysis of open space will determine whether Project 1 would directly affect any open space, whether by an increase in shadows, air emissions, or noise.

H.3.4 CHAPTER 2.3: NEIGHBORHOOD CHARACTER

Neighborhood character is an amalgam of the many components that give an area its distinctive personality. These components can include land use; street layout; scale, type, and style of development; historic features; visual resources; patterns and volumes of traffic; noise levels; and other physical or social characteristics that help define a community. However, not all of these elements affect neighborhood character in all cases; a neighborhood usually draws its distinctive character from a few defining elements.

This section of the EIS will assess the potential for impacts on neighborhood character due to Project 1, Shaft and Bypass Tunnel Construction. The analysis will be closely coordinated with the assessment of “Land Use, Zoning, Public Policy, and Open Space” to determine whether construction activities have the potential to result in impacts to the various components that define the character of the neighborhood.

H.3.5 CHAPTER 2.4: VISUAL CHARACTER

This section of the EIS will assess the potential for impacts on visual character from Project 1, Shaft and Bypass Tunnel Construction. Specifically, the analysis will consider the potential for nighttime lighting impacts. The analysis will also consider any 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).

H.3.6 CHAPTER 2.5: HISTORIC AND ARCHAEOLOGICAL RESOURCES

Project 1, Shaft and Bypass Tunnel Construction would necessitate in-ground work for the excavation of shafts at the connection sites and the bypass tunnel; in-ground work would also be needed for the potential pipeline. This subsurface excavation and disturbance may directly affect potential archaeological resources in the area, and the EIS will assess the potential for Project 1 to affect historic and archaeological resources.

H.3.7 CHAPTER 2.6: SOCIOECONOMIC CONDITIONS

As discussed above, DEP has examined the potential use of properties already under DEP jurisdiction for the bypass and connection sites and the associated construction staging area that would be needed for Project 1. However, DEP has limited properties in the project area and some acquisition of property is needed, and therefore, some direct displacement may occur. If direct displacement would occur, an analysis of such displacement will be undertaken. This section of the EIS will also include estimates of the number of employees expected to work on Project 1 and the economic benefits that would result.

H.3.8 CHAPTER 2.7: COMMUNITY FACILITIES AND SERVICES

The section of the EIS will address the potential for impacts to community facilities and emergency service providers. It will address the ability of local emergency service providers to respond to emergencies at the construction sites during the construction period. Staffing levels and equipment for each service provider will be discussed. Any impacts to these service providers that affect their ability to respond to emergencies or result in longer response times will be discussed.

H.3.9 CHAPTER 2.8: NATURAL RESOURCES AND WATER RESOURCES

Following the methodologies presented in the *CEQR Technical Manual*, a natural resources assessment is conducted when such resources are present on or near a project site, and when an action involves disturbance to natural resources. The *CEQR Technical Manual* defines natural resources as "(1) the City's biodiversity (plants, wildlife and other organisms); (2) any aquatic or terrestrial areas capable of providing suitable habitat to sustain the life processes of plants, wildlife, and other organisms; and (3) any areas capable of functioning in support of the ecological systems that maintain the City's environmental stability."

During Project 1, Shaft and Bypass Tunnel Construction, water would continue to flow through the RWBT. Therefore, the natural resources and water resources analysis will assess the potential for Project 1 to adversely affect natural and water resources in and near the connection sites and the pipeline between the west connection site and a new outfall on the Hudson River, with emphasis on the potential areas of disturbance from construction activities.

H.3.9.1 Existing Conditions

Project 1 has the potential to result in clearing of some terrestrial vegetation with the potential to provide habitat for wildlife. Therefore, this analysis will describe existing natural resources in and near the connection sites and the proposed pipeline route and new outfall location, including terrestrial habitats and wildlife, threatened or endangered species, floodplain and groundwater resources, and any surface water bodies and wetlands in and near the connection sites, pipeline route, and new outfall location, as appropriate. The description of existing natural and water resources will be developed on the basis of current information from literature sources and other information obtained from governmental and non-governmental agencies. Existing conditions of surface waters and wetlands with the potential to be affected by Project 1 will be described based on the following sources:

- Current information from literature sources;
- Information from governmental and non-governmental agency sources, including:
  - U.S. Fish and Wildlife Services (USFWS) National Wetland Inventory (NWI) maps;
  - NYSDEC classified water bodies;
  - NYSDEC Natural Heritage Program;
  - National Marine Fisheries Service (NMFS).
- Site reconnaissance visits.

H.3.9.2 Future Without Project 1,Shaft and Bypass Tunnel Construction

The potential for pertinent DEP and other development projects and other actions to affect natural and water resources within the study areas will be assessed on the basis of existing resources and the activities that would be associated with such projects.

H.3.9.3 Potential Impacts of Project 1, Shaft and Bypass Tunnel Construction

As discussed above, the impact assessment will address the potential for construction of the shafts, bypass tunnel, pipeline, and outfall on the western bank of the Hudson River to affect natural and water resources in and near these project elements. This assessment will consider potential impacts to vegetation and wildlife from such construction activities as the clearing of vegetation, noise associated with construction equipment, possible nighttime lighting, construction traffic, increased human activity, and to water resources from the management of stormwater and potential discharges of stormwater and water recovered during dewatering of the shafts and bypass tunnel to surface waters.

Potential impacts to natural and water resources from construction of the bypass tunnel will be assessed, particularly with respect to both temporary and long-term adverse effects to terrestrial resources associated with permanent loss of habitat (e.g., breeding birds and other wildlife).

H.3.10 CHAPTER 2.9: HAZARDOUS MATERIALS

The EIS will address the potential presence of hazardous materials that may be disturbed during Project 1, Shaft and Bypass Tunnel Construction. For locations where it is known that construction would occur, the EIS will summarize any hazardous materials assessments that have been conducted. The EIS will include any necessary recommendations for additional testing or other activities that would be required either prior to or during Project 1, including a discussion of any necessary remedial or related measures, if warranted. The EIS will include a general discussion of the health and safety measures that would be implemented during Project 1 and will identify any appropriate remediation measures, if applicable.

H.3.11 CHAPTER 2.10: TRANSPORTATION

A quantitative construction traffic impact analysis will be undertaken due to the anticipated duration of Project 1, Shaft and Bypass Tunnel Construction and the estimated number of construction workers and construction vehicles. This analysis will identify the relative duration of construction activities (focusing on peak construction conditions) and will assess the potential effects of construction-related traffic at selected key study area intersections. Trip-generation estimates of construction worker vehicle and truck trips will be developed. On- and off-street areas that may be available for construction worker parking will be surveyed and considered in the analyses. Pedestrian issues (particularly safety along truck routes) will be considered, if applicable.

H.3.11.1 Existing Conditions

Study areas will be established based on anticipated traffic volumes, logical traffic routes for both trucks and construction workers, off-site parking locations, and potentially problematic areas. The study area is presented in **Figure 9**. Data collection will conform to the recommendations in the *CEQR Technical Manual* as outlined in the following paragraphs.

As shown in Figure 9, automatic traffic recorder (ATR) counts (24-hour measurements) will be performed for nine consecutive days (in order to collect two weekends of data) at six locations in the study area. Turning movement counts (TMCs) will be collected for one weekday at the Figure 9 locations from 6 AM to 9 AM and from 2 PM to 8 PM (by doing so, the construction and commuter peak hours will be covered). In addition, in anticipation that traffic/noise impact assessments may be required for construction work through the weekends at times, TMCs will be conducted on Saturday from 6 AM to 9 AM and 2 PM to 5 PM. These counts will be collected on the same day the ATR data collection is also being performed. As also shown in Figure 9, vehicle classification counts will be conducted at up to four intersections in the study area concurrent with the

5.2.11

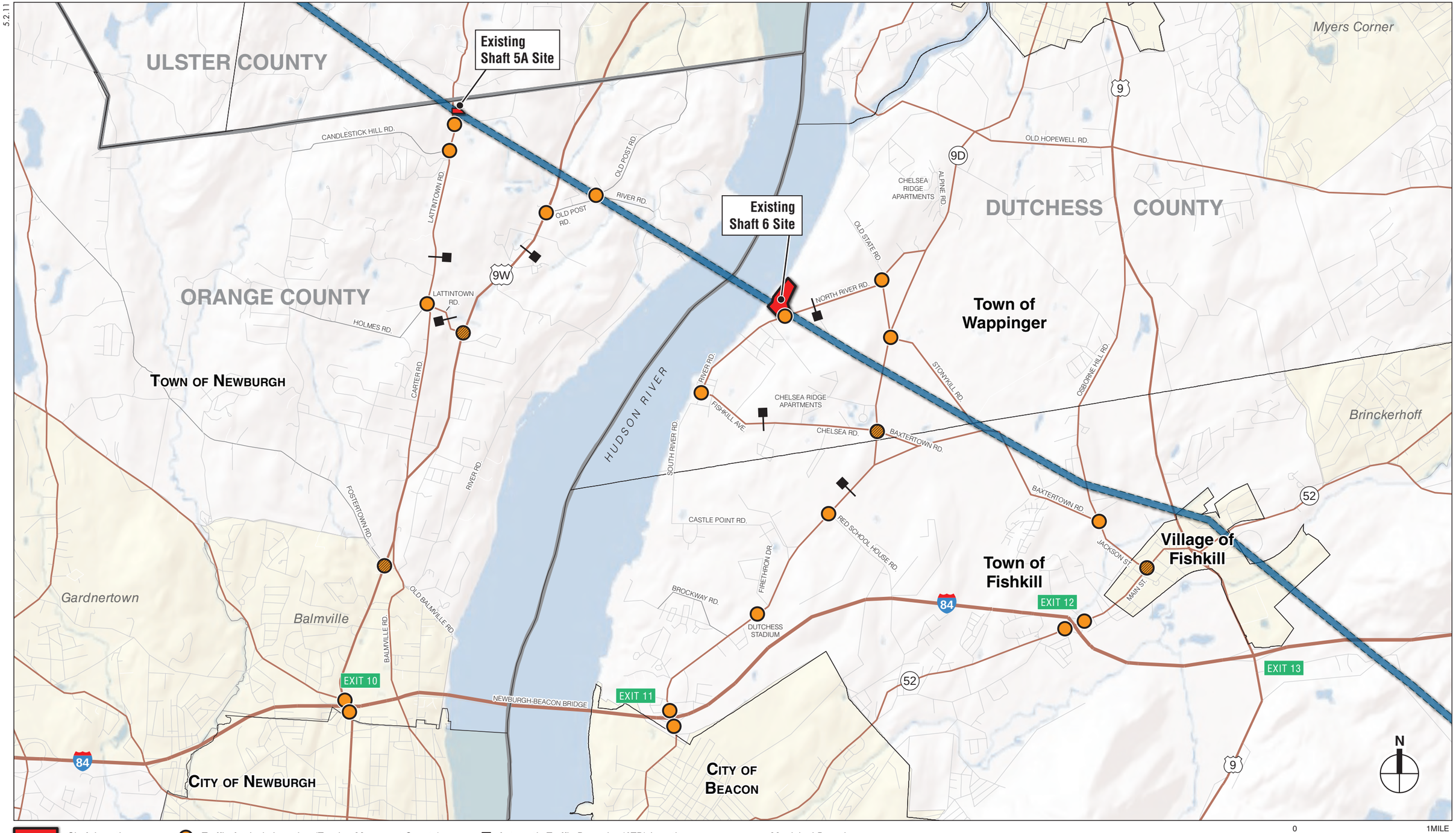


Figure 9

Traffic Data Collection Locations

turning movement counts. Observations of running speeds on U.S. Route 9W and NYS Route 9D, north and south, will be collected concurrent with the TMCs. In addition, pedestrian conditions will be observed at key study area roadways and intersections for use in the capacity analysis.

The existing conditions analysis will also present current traffic counts representative of the existing conditions and will be supplemented as necessary. The analysis will present a capacity study of the street network, which will rely on the *2000 Highway Capacity Manual* latest Synchro methodology. The capacity study will include existing traffic volumes and volume-to-capacity (v/c) ratios of roadways, and levels of service (LOS)[1] of intersections for two peak-hour analysis periods (the AM and PM construction peak hours). The morning and evening construction peak hours generally occur earlier than the weekday AM and PM peak hours. If necessary, potential impacts from lesser project-generated traffic during commuter peak hours will be examined as well.

Furthermore, field information will be presented, including street widths, traffic flow directions, lane markings, and curbside parking regulations, as well as other items required for traffic analysis and parking impact evaluations. In addition, traffic control devices, including traffic signal timings and other traffic controls, will be inventoried and mapped, as appropriate.

Existing pedestrian levels and conditions will be assessed while undertaking the traffic data collection, and the pedestrian characteristics in the immediate vicinity of the potential connection sites will be discussed.

In addition, accident records for a three-year period will be reviewed from NYSDOT accident files and other sources to determine whether any locations in the study area exhibit a high accident frequency.

A general assessment of the existing transit availability and capacity will be presented. Bus routes and schedules serving the study areas will be described. However, since the potential connection sites are not likely to be conveniently accessible via public transit, it is assumed all construction workers would commute by car; thus, no detailed transit analyses are anticipated.

Current parking conditions will be presented. This will include a survey of existing parking facilities and availability of on-street and off-street parking conditions within a reasonable walking distance of the potential work entrances to potential connection sites.

[1] The levels of service are expressed in levels A through F, with level A representing the best operating condition (shortest delay) and F representing the worst operating condition (longest delay).

H.3.11.2 Future Without Project 1, Shaft and Bypass Tunnel Construction

In coordination with the land use, zoning, public policy, and open space analysis, future developments in the study area and associated future without the project traffic volumes will be presented. Traffic volumes, v/c ratios, LOS, and problem intersections will be identified. The future traffic volumes will be estimated using existing traffic volume information, adding incremental increases from future developments, and applying a background growth factor. The growth factor will be identified in coordination with the local planning agencies and NYSDOT. Expected traffic improvements from future developments, if any, will also be taken into consideration.

The future without the project analysis will also project future conditions of parking capacity on the project areas. These conditions will reflect anticipated changes in the parking supply and any changes in accumulated parking demand generated in the future without the project conditions.

H.3.11.3 Potential Impacts of Project 1, Shaft and Bypass Tunnel Construction

The transportation demands due to Project 1, Shaft and Bypass Tunnel Construction will be assessed. Trips will be assigned to the network along truck routes, potential construction worker routes, potential access/egress points on the potential connection sites, and any other logical paths. Trip volumes will be assigned to key intersections. A traffic impact analysis will be performed, and changes in LOS related to the future with the project condition will be identified using *CEQR Technical Manual* criteria guidance and applicable state and local guidance and regulations.

The evaluation of the construction-related traffic impacts will utilize thresholds established in the *CEQR Technical Manual* as a first level of analysis; although these thresholds are designed to determine impact for permanent operation they still serve as a useful tool in assessing traffic impacts during the construction period. These thresholds will be utilized in conjunction with an evaluation of the intensity and duration of the projected impact, as discussed above. The thresholds established in the *CEQR Technical Manual* state that the traffic impact is considered to be a significant adverse impact if an intersection projected to operate at LOS A, B, or C in the future without the project conditions would permanently deteriorate to marginally unacceptable mid-LOS D or unacceptable LOS E or F in the future with the project conditions. Therefore, for a signalized intersection, any LOS change in the future with the project conditions with a delay of 45 seconds (mid-LOS D based on a range of 35 to 55 seconds) or less is not considered an impact for the purposes of this analysis. The *CEQR Technical Manual* further states that for the future without the project, if LOS A, B, or C is predicted to permanently deteriorate to LOS D in future with the project conditions, mitigation to mid-LOS D is required. For a lane group LOS D in future without the project conditions, a permanent increased delay due to Project 1 activity by 5 or more seconds is considered a significant adverse impact if the future with the project conditions delay exceeds mid-LOS D. For a LOS E in future without the project conditions, the threshold is a 4-second increased delay during Project 1 activities, and for a LOS F in future without the project,

a 3-second increased delay due to Project 1 activity is considered a significant adverse impact. In addition, delay and queuing results from the Synchro simulation will be reviewed.

These impact criteria are also applicable to unsignalized intersections. However, as mid-LOS D equates to a delay of 30 seconds for an unsignalized intersection, any LOS change due to Project 1 with a delay of 30 seconds or less would not be considered a significant adverse impact. For the minor street to trigger significant impacts, 90 passenger car equivalents (PCEs) must be identified in the future with the project conditions in any peak hour.

The results of the traffic analysis will be used to determine the potential for significant adverse traffic impacts and to support other EIS analyses, namely air quality and noise. For the assessment of mobile air pollution, volumes, speeds (if necessary), and vehicle classifications in principal study area corridors will be examined, as well as the arrival/departure and auto/truck splits for the project increment in the morning and evening peak periods. Traffic input data will also be used in the noise analysis. These data will include 24-hour background traffic volumes (at select locations) and peak-hour classifications for use in the appropriate existing, future without the project, and future with the project conditions.

A quantitative analysis of potential impacts from construction-related traffic will be conducted for the peak Project 1 construction year. The evaluation of impacts during other periods of construction will be based on the analysis results for the peak period to determine the magnitude and duration of other construction period impacts.

Construction-related traffic will be assigned to the network along truck routes and/or other logical paths. Parking demand during construction will also be evaluated. Locations with high accident frequency will be evaluated in light of the construction traffic volume.

Figure 9 illustrates the possible intersections identified for analysis. These total potential 22 intersections for analysis include:

- East of Hudson:
  - I-84 Westbound ramps and NYS Route 9D
  - I-84 Eastbound ramps and NYS Route 9D
  - NYS Route 9D and Dutchess Stadium
  - NYS Route 9D Red Schoolhouse Road (County Route 36)
  - NYS Route 9D and Chelsea Road (County Route 92) and Baxtertown Road (County Route 34)
  - NYS Route 9D and Old State Road
  - Old State Road and North River Road
  - River Road and Fishkill Avenue

  - Baxtertown Road (County Route 34) and Osbourne Hill Road (County Route 35)
  - Jackson Street and NYS Route 52
  - I-84 Westbound ramps and NYS Route 52
  - I-84 Eastbound ramps and NYS Route 52
  - North River Road and Shaft 6 Driveway
- West of Hudson:
  - I-84 Westbound ramps and U.S. Route 9W
  - I-84 Eastbound ramps and U.S. Route 9W
  - U.S. Route 9W and Fostertown Road (County Route 86)
  - U.S. Route 9W and Lattintown Road
  - U.S. Route 9W and Old Post Road
  - Old Post Road and River Road
  - Lattintown Road and Lockwood Lane
  - Lattintown Road and Holmes Road and Carter Avenue
  - Lattintown Road and Candlestick Hill Road

H.3.12 CHAPTER 2.11: AIR QUALITY

Information on existing ambient air quality conditions from the NYSDEC will be updated and verified, as available. Information will be provided on the following pollutants: nitrogen dioxide (NO_2), carbon monoxide (CO), inhalable particulate matter (PM_{10} and $PM_{2.5}$); sulfur dioxide (SO_2); and ozone (O_3).

While NO_2 and total hydrocarbons (THC) are precursors to formation of ground-level ozone, the reactions are relatively slow and generally take place far from the site where the emissions occur. Therefore, their effects cannot be related on a localized level, but can be on a mesoscale, or regional scale. Consequently, these pollutants are examined for large projects that have the potential to affect ozone level on a regional scale. However, Project 1, Shaft and Bypass Tunnel Construction is not anticipated to result in enough mobile sources to require a mesoscale analysis.

The air quality assessment for construction activities will include an analysis of potential on-site construction activities. The potential for Project 1 to emit greenhouse gases during construction will be discussed in a separate section.

A mobile source analysis will also be conducted, as described below.

H.3.12.1 Existing Conditions

Mobile Sources

A study area for analyzing mobile sources of air pollution will be presented based on input from the traffic analysis. The pollutants of concern in the mobile source (traffic) analysis are CO, PM_{10}, and $PM_{2.5}$. The study area includes those intersections where

traffic congestion is anticipated based on estimates of traffic conditions and incremental vehicular traffic associated with Project 1, Shaft and Bypass Tunnel Construction. Intersections in the study area will be considered using the methodology described in the *CEQR Technical Manual* and will conform to the EPA's *Guidelines on Air Quality Models.* The roadways that have the greatest potential for air quality impacts from motor vehicle traffic will be presented, and modeling of pollutants of concern will be presented. The exact locations of mobile source modeling will be based on a review of relevant traffic data.

Selection of the mobile source modeling sites will also reflect the location of critical sensitive receptors (e.g., schools, hospitals, etc.) and sites where project-generated traffic is highest and the LOS is poor. Vehicular CO emission factors will be obtained from the latest EPA-recommended model for both AM and PM weekday peak analysis periods and will be presented. Vehicle database factors for the appropriate counties that reflect the latest changes in input parameters (e.g., ambient temperature, inspection/maintenance program) will be used with the EPA's MOBILE6.2 Model to generate CO, PM_{10}, and $PM_{2.5}$ emission rates for the dispersion model. The predicted vehicle emissions will be analyzed using EPA's CAL3QHC and CAL3QHCR dispersion model as appropriate. For this analysis, five years of meteorological data from La Guardia Airport and concurrent upper air data from Brookhaven, New York, will be utilized for the simulation program (2005-2009, or later if available). The 1-hour and 8-hour CO, and 24-hour PM_{10} and incremental 24-hour and annual $PM_{2.5}$ average concentrations will be calculated and compared to the applicable impact criteria.

Stationary Sources

Data from the land use and field surveys and searches of NYSDEC's permit data will be undertaken to determine if there are significant sources of stationary air pollutants near the potential connection sites that are not already accounted for in the monitored background levels of air pollutants for analysis.

H.3.12.2 Future Without Project 1, Shaft and Bypass Tunnel Construction

Mobile Sources

The future without the project condition will be determined based on the general background traffic growth in the study area, new trips from development expected to occur in the area, and projected changes in vehicle types on the road (based on turnover), and projected advancements in motor vehicle engine technology. The analysis will be coordinated with the analysis of land use, zoning, open space, and public policy, and traffic and transportation.

Stationary Sources

The future without the project condition will be determined based on projected changes in land use in the study area and existing conditions.

H.3.12.3 Potential Impacts of Project 1, Shaft and Bypass Tunnel Construction

Mobile Sources

The analysis will reflect the air quality impact of construction vehicles, including trucks. The potential impacts will add any changes resulting from Project 1 to the conditions predicted in the future without the project. The differences between these two future conditions and the subsequent potential for significant impacts will be assessed. If applicable, the vehicular emissions from construction worker parking areas will be determined.

The resulting concentrations of pollutants will be compared to applicable impact criteria. Potential significant adverse mobile source air quality impacts from emissions of CO would occur if (1) the incremental increases in CO concentrations with Project 1 exceed CEQR criteria, or (2) Project 1 exceeds the National Ambient Air Quality Standards (NAAQS). A potential significant adverse impact on air quality from mobile sources would occur for $PM_{2.5}$, if the 24-hour average concentration increments are predicted to be greater than 5 $\mu g/m^3$ at a discrete receptor location, or if the predicted increments are greater than 2 $\mu g/m^3$ but not greater than 5 $\mu g/m^3$ based on the frequency, duration, and location of the predicted concentrations. In addition, an annual neighborhood-scale incremental impact greater than 0.1 $\mu g/m^3$ for $PM_{2.5}$ would be considered significant. Note that a neighborhood-scale mobile source impact is the concentration of a receptor placed at a distance from the roadway similar to that used for the placement of neighborhood-scale ambient monitoring stations.

Stationary Sources

An air quality analysis of on-site construction activities will be performed for the peak construction period. The assessment will consider construction equipment and size and their potential locations and hours of operation during the construction period. The analysis will address combustion emissions from stationary on-site engines, such as cranes, and fugitive dust emissions from construction-related equipment, such as unpaved surfaces, excavation, and debris loading at potential connection sites. Emission factors for NO_2, CO, PM_{10}, and $PM_{2.5}$, from on-site construction engines (excluding delivery trucks or other on-road vehicles) will be developed using the EPA's NONROAD (version 2008a) Emissions Inventory Model. Emission rates of NO_2, CO, and PM from combustion of fuel for delivery trucks or other on-road vehicles will be developed using the latest EPA recommended model. Currently, the MOBILE6.2 emissions model is the recommended model; however, it is expected that the EPA MOVES model will replace MOBILE6.2 in 2011 as the recommended model. Emission factors associated with fugitive dust emissions from on-site mobile equipment will be developed using equations presented in EPA's AP-42 *A Compilation of Air Pollution Emission Factors*. A dispersion modeling analysis will be performed to estimate ambient concentrations of air pollutants associated with the emissions produced by on-site construction activities using the EPA's AERMOD dispersion model following EPA's latest Implementation Guide (March 19, 2009) and in accordance with EPA guidance. The predicted ambient concentrations of criteria pollutants will be compared to

applicable regulatory and CEQR thresholds to determine the potential for significant impacts.

Combined Impact Analysis

A combined mobile and stationary source air quality impact analysis for CO and PM will also be performed at discrete receptor locations. The results of this analysis will be compared to applicable regulatory and CEQR thresholds to determine the potential for significant impacts from Project 1.

H.3.13 CHAPTER 2.12: ENERGY AND GREENHOUSE GAS ANALYSIS/CLIMATE CHANGE

Given the importance of global climate change impacts and SEQRA and CEQR's mandate to address adverse environmental impacts, EISs are suggested to include a discussion of energy use or greenhouse gas (GHG) emissions in certain instances. The *CEQR Technical Manual* recommends an assessment of energy impacts for "larger" projects undergoing an EIS; however, the size of projects as addressed in the manual is focused mainly on development projects. Nonetheless, given the expected scale and duration construction, and since the program is a city capital project, an analysis of projected GHG emissions and an analysis of the program's consistency with city policy to reduce GHG emissions is appropriate. The potential need for supplemental energy supply to enable construction of the bypass tunnel will also be addressed.

The bypass tunnel, once constructed and operational, would not result in sources of GHG emissions requiring quantitative assessment. Therefore, the construction related emissions represent the net GHG emissions for the bypass tunnel over its lifetime. To the extent practicable, this section will include emissions from Project 1, the Shaft and Bypass Tunnel Construction , and Project 2B, the Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, over all years of construction.

In addition to the guidance for evaluation and analysis given in the *CEQR Technical Manual*, the analysis will also adhere to the guidance given by NYSDEC for its review or preparation of analyses for EISs under SEQRA, "Guide for Assessing Energy Use and Greenhouse Gas Emissions in an Environmental Impact Statement," published July 15, 2009.

The demand for construction materials during construction of the bypass tunnel will generate GHG emissions. The GHG assessment will therefore include the calculation of GHG emissions from the operation of construction equipment, delivery trucks, and worker vehicle trips. In addition, emissions associated with the production of concrete, steel, and other construction materials that are associated with substantial process- or energy-related emissions during production would also be assessed. Opportunities for alternative fuels, materials, and/or construction approaches that may serve to reduce GHG emissions associated with construction will be qualitatively discussed. Emissions will be calculated based on estimates of the fuel and electricity consumption and material use for the entire construction process.

In addition to its goals to reduce GHG emissions, New York City is developing strategies to secure critical infrastructure against potential threats from sea level rise, and weather changes projected to result from climate change. As discussed in the *CEQR Technical Manual*, DEP is in the process of evaluating and implementing adaptive strategies for its infrastructure. The proposed program will be discussed in the context of all relevant long term strategies and policies of New York City and State.

H.3.14 CHAPTER 2.13: NOISE

Anticipated noise sources during Project 1, Shaft and Bypass Tunnel Construction, would include stationary sources, (e.g., equipment such as generators and compressors) and mobile sources (e.g., construction vehicles). The effect of construction activities depends on the type and quantity of construction equipment used as well as the distance from the construction site to any nearby sensitive receptors (sensitive receptors are land uses considered to be sensitive to noise, such as residences, schools, parks, churches, and hospitals). The on-site construction noise analysis will identify noise levels for the peak construction period (when the highest noise emissions would be generated), in addition to other construction periods. The noise analysis will also evaluate the type and quantity of construction-related equipment and vehicles, and the potential noise impacts on the surrounding community.

The analysis of stationary sources will identify sensitive receptors (e.g., residences) in the vicinity of where construction activities are anticipated to occur.

The mobile source analysis will evaluate the noise generated by construction vehicles at receptor locations along traffic routes to the work entrances to the connection sites. The assessment will be based on monitoring existing noise levels, and incorporating acoustical fundamentals and mathematical models. Existing noise levels will be determined by obtaining measurements during weekday daytime periods. The total or cumulative noise level for construction (both stationary and mobile sources) will be identified and compared to CEQR impact criteria and local noise ordinances.

Since the locations of Project 1, Shaft and Bypass Tunnel Construction, are located outside the City of New York, impact thresholds from state or local entities will be considered and may supersede the suggested *CEQR Technical Manual* impact criteria stated above if they are more stringent. For daytime hours, the *CEQR Technical Manual* suggests that 65 dBA (L_{eq}) is "an absolute noise level that should not be significantly exceeded." Therefore, if the future without the project noise level is 62 dBA (L_{eq}) or above, an incremental increase of 3 dBA would be considered a significant noise level increase; alternatively, if the future without the project noise level is 60 dBA (L_{eq}), the incremental significant impact threshold would be 5 dBA (L_{eq}). For nighttime hours, a change of 3 dBA (L_{eq}) would be considered significant, regardless of the existing background level. In addition to the change in noise levels due to Project 1, the determination of environmental significance would consider the duration of the noise level increase.

Analysis locations for potential stationary and/or mobile source noise analyses are illustrated in **Figure 10**. These total potential nine intersections for analysis include:

- East of Hudson
  - North River Road at Old State Road
  - Fishkill Avenue just east of North River Road
  - NYS Route 9D near Beacon Light Tabernacle Seventh Day Adventist church just north of Firethorn Drive
  - Jackson Street near St. Mary Catholic Church just west of Main Street
  - North River Road and Shaft 6 Driveway
- West of Hudson
  - Lattintown Road at Candlestick Hill Road
  - U.S. Route 9W at Old Post Road
  - Lattintown Road at Carter Avenue/Holmes Road
  - Route 9W between Carlino Drive and Pine Road

Noise effects due to Project 1 construction activities will be evaluated using the Cadna A computerized model, a state-of-the-art analysis tool based on the acoustic propagation standards promulgated in International Standard ISO 9613-2 for noise prediction and assessment developed by DataKustik.

H.3.14.1 Existing Conditions

Existing noise levels will be measured at noise receptor locations that could potentially experience a change in noise levels as a result of construction-related truck traffic. Monitoring locations where continuous noise measurements will be undertaken are considered to be representative of background noise levels near potential connection sites. Noise receptors are selected based on land uses and/or project trip assignments.

To assess the potential noise impacts of project-related mobile sources during construction, existing noise levels will be established for the selected receptor locations during the weekday peak and off-peak hours. The quietest (off-peak) and the noisiest (peak) hours for each day will be determined based on an examination of data collected for the traffic analysis. To establish the existing noise levels, a combination of continuous noise measurements and 20-minute noise measurements will be presented for the receptor locations during these hours. The measurements will be conducted in accordance with the procedures outlined in the *CEQR Technical Manual* and applicable state and local regulations. Following the current guidance in the *CEQR Technical Manual* regarding noise descriptors, it is anticipated that where and when appropriate,

5.2.11

ULSTER COUNTY

ORANGE COUNTY

DUTCHESS COUNTY

Existing Shaft 5A Site

Existing Shaft 6 Site

Town of Wappinger

Town of Fishkill

Village of Fishkill

TOWN OF NEWBURGH

CITY OF NEWBURGH

CITY OF BEACON

Myers Corner

Brinckerhoff

Gardnertown

Balmville

CANDLESTICK HILL RD.

LATTINTOWN RD.

OLD POST RD.

RIVER RD.

LATTINTOWN RD.

HOLMES RD.

CARTER RD.

9W

9

9D

OLD HOPEWELL RD.

CHELSEA RIDGE APARTMENTS

ALPINE RD.

OLD STATE RD.

NORTH RIVER RD.

STONYKILL RD.

OSBORNE HILL RD.

HUDSON RIVER

SOUTH RIVER RD.

FISHKILL AVE.

CHELSEA RD.

BAXTERTOWN RD.

FOSTERTOWN RD.

BALMVILLE RD.

OLD BALMVILLE RD.

CASTLE POINT RD.

FIRETHRON DR.

RED SCHOOL HOUSE RD.

BROCKWAY RD.

DUTCHESS STADIUM

JACKSON ST.

MAIN ST.

52

84

EXIT 10

EXIT 11

EXIT 12

EXIT 13

NEWBURGH-BEACON BRIDGE

N

Shaft Location

Delaware Aqueduct

Noise Analysis Location (Spot Noise Monitoring)

Noise Analysis Location (Continuous Noise Monitoring)

Municipal Boundary

County Boundary

0 1MILE

SCALE

Figure 10

Noise Data Collection Locations

the L_{10},[1] and 1-hour equivalent ($L_{eq(1)}$) noise levels will be examined. Sound analyzers that will be used for measurements are microprocessor-based state-of-the-art instruments that can monitor all the current noise exposure criteria and have tolerance of "type-1" (re: ANSI S1.4-1983) or better. The measurements will be made using a Type 1 noise analyzer and will include measurements of L_{eq}, L_1, L_{10}, L_{50}, and L_{90} noise levels.

Stationary sources of noise include machinery and equipment associated with industrial and manufacturing operations or heating, ventilating, and air-conditioning systems. Existing conditions will be based on the results from continuous and 20-minute noise monitoring. Data from the land use analysis and field surveys will be presented as well as receptor locations. Noise from adjacent stationary sources will be included as part of the ambient background noise levels.

H.3.14.2 Future Without Project 1, Shaft and Bypass Tunnel Construction

Future noise levels associated with the future without the project conditions will be predicted at the selected receptor locations. The traffic data (volume and speed) and roadway geometry predicted for the future without the project will be incorporated into the modeling effort. Resultant levels will be presented.

H.3.14.3 Potential Impacts of Project 1, Shaft and Bypass Tunnel Construction

Mobile Source Noise

Future noise levels associated with the construction-related activities will be predicted using the same methodology used for the future without the project analysis. Resultant levels will be compared to the suggested thresholds in the *CEQR Technical Manual*, and absolute noise limit criteria, the noise exposure guidelines, and any applicable local ordinances. Noise levels predicted for the future without the project will be compared to the Project 1 levels to identify the relative changes in noise levels.

Stationary Source Noise

The type of mechanical equipment that would be used during construction will be identified, and the future noise associated with Project 1 will be predicted. The potential impacts for the quietest ambient conditions will be presented. Any adjacent noise generators not associated with Project 1 will be analyzed as part of the ambient background noise levels. The incremental increase in sound levels from the construction operations will be determined.

The same criteria used in assessing mobile source noise levels would be applied to assess stationary source impacts.

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[1] L_{eq} is the constant sound level that in a given situation and time period conveys the same sound energy as the actual time-varying sound. For example, $L_{eq(1)}$ is the 1-hour equivalent noise level. Statistical sound levels, such as L_1, L_{50}, or L_{90}, indicate a noise level that is exceeded 1, 50, or 90 percent of the time, respectively.

For those sensitive receptors that could be affected by both mobile and stationary noise contributions from the proposed construction activity at the potential connection sites, the stationary and mobile source noise contributions from construction will be considered to determine the combined noise impacts.

H.3.15 CHAPTER 2.14: INFRASTRUCTURE

The EIS will evaluate the potential for stormwater runoff caused by Project 1, Shaft and Bypass Tunnel Construction to affect flooding, sedimentation, and erosion during construction, and stormwater management plans will be described. The consequences of potential stormwater discharges to surface water resources during Project 1 will be presented in the EIS in the "Natural Resources and Water Resources" section.

H.3.16 CHAPTER 2.15: SOLID WASTE

Construction of Project 1, Shaft and Bypass Tunnel Construction would necessitate the disposal of excavated materials. This section of the EIS will present estimates of the amount of excavated materials and describe the disposal methods for these materials.

H.3.17 CHAPTER 2.16: COASTAL ZONE CONSISTENCY

This chapter will assess Project 1, Shaft and Bypass Tunnel Construction, with the applicable policies of the New York State Coastal Zone Management Program since the east connection site and the west connection site, as well as the bypass tunnel route, are located within the New York State Coastal Area Boundary, as detailed in the New York State Department of State Coastal Atlas.

H.3.18 CHAPTER 2.17: PUBLIC HEALTH

According to the guidelines of 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, water quality, hazardous materials, or noise. The EIS will include an assessment of the potential for health-related effects associated with Project 1.

H.3.19 CHAPTER 2.18: MITIGATION

If any potential significant impacts from Project 1, Shaft and Bypass Tunnel Construction, are identified in the analysis areas discussed above, any practicable measures that could avoid or mitigate those impacts will be identified. This section of the EIS will summarize the findings of the relevant analyses and discuss potential mitigation measures. If any adverse impacts cannot be mitigated, they will be described as unavoidable adverse impacts.

H.4 CHAPTER 3: PROBABLE IMPACTS OF PROJECT 2A—WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT

H.4.1 OVERVIEW

The various additional projects that would be implemented to support Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing—Conservation, Catskill Aqueduct Optimization, Queens Groundwater Pumping, New Jersey-New York City Interconnection, Nassau County Interconnection, and the Delaware Watershed Reservoir Improvements—are all in the very preliminary stage of facility planning, and not enough information has been developed at this time to enable a complete environmental review. Therefore, the first EIS will provide a description of these projects and a generic assessment of their potential impacts (see H.4.2, "Scope of Analysis," below).

Prior to the approval and implementation of any of these projects, additional environmental review as part of a second EIS will be undertaken. In the second EIS, more detailed descriptions of the projects will be provided (since facility planning will have been advanced), and detailed evaluations of potential environmental impacts from these projects will be disclosed.

H.4.2 SCOPE OF ANALYSIS

As discussed above, the various additional projects required to support Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing are all in the preliminary stage of facility planning, and not enough information has been developed at this time to enable a complete environmental review. Therefore, this first EIS will provide:

- A project description for each of these projects;
- A preliminary list of actions and approvals necessary to implement each project;
- An estimated timeframe for when the project would be implemented, and;
- A generic assessment of the potential impacts from each project.

H.5 CHAPTER 4: PROBABLE IMPACTS OF PROJECT 2B—BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

H.5.1 OVERVIEW

Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing is in the preliminary stage of facility planning, and not enough information has been developed at this time to enable a complete environmental review. Therefore, this EIS will provide a project description for Project 2B, a preliminary list of actions and approvals necessary, an estimated timeframe for when the project would be implemented, and a generic assessment of its potential impacts. Prior to the approval and implementation of Project 2B, additional environmental review as part of the second EIS

will be undertaken to evaluate and disclose in detail the Project 2B potential environmental impacts.

In general, Project 2B would be less intensive than Project 1, Shaft and Bypass Tunnel Construction. Therefore, this section of the EIS will focus only on those analysis areas where this portion of the program would have the potential for impacts substantially different or greater than Project 1. These impacts relate to the following:

- Effects from physical construction of the inspection and repair (e.g., potential physical effects at shaft sites used to access the tunnel, specifically, at locations beyond those considered in Project 1);
- Effects from stopping the flow of water through the RWBT and unwatering the tunnel so repairs can be made; this would have various effects:
  - By reducing the existing leaks, there is the potential for effects on wetland areas that may be fed by the existing leakage;
  - By unwatering the tunnel during the tunnel shutdown period there is the potential for effects from the discharge of tunnel water;
  - By drawing down the Catskill and Croton reservoirs there is the potential for effects within these reservoir systems; and
  - By cessation of use of the RWBT during construction of Project 2B, there is the potential for effects at the spillways of the Delaware watershed reservoirs and on the receiving water bodies.

The EIS will address each of these effects separately since each would occur in a distinct geographic area. The EIS will analyze in detail the potential physical effects at shaft sites from undertaking the inspection and repair. The EIS will also conceptually discuss the potential effects of reducing the existing leakage, focusing specifically on natural resources and water resources; hazardous materials; and infrastructure. The EIS will generically assess the potential effects from the drawdown of the Catskill and Croton reservoirs and from the increased releases from the Delaware watershed reservoirs.

As stated above, prior to approval and implementation of Project 2B, additional environmental review as part of the second EIS will be undertaken to evaluate and disclose in the detail the Project 2B potential environmental impacts.

H.5.2 CHAPTER 4.1: OVERVIEW OF PROJECT 2B, BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

A description of the proposed Project 2B construction program will be provided, including an anticipated timeline showing the major proposed activities by each stage through completion of this project. A description of the proposed activities and their locations during each stage, including potential storage areas, staging and parking areas, truck routes, likely sequencing, and techniques to minimize impacts during construction will be provided.

This section of the EIS will also include estimates of the number of employees expected to work on Project 2B construction and the economic benefits that would result.

H.5.3 CHAPTER 4.2: EFFECTS FROM PHYSICAL CONSTRUCTION

Shafts 1, 2A, 8, and 9 of the Delaware Aqueduct could be used during inspection and repair of the RWBT for ventilation of or access to the tunnel. The effects of Project 2B construction at these locations will be assessed in the EIS, including their consistency with the applicable policies of New York State's Coastal Zone Management Program.

H.5.4 CHAPTER 4.3: EFFECTS FROM REDUCING THE LEAKAGE

The potential impacts from unwatering the tunnel, from drawing down the Catskill and Croton reservoirs, and from the cessation of use of the RWBT during Project 2B construction will be addressed generically in the EIS.

The potential for Project 2B,to affect the supply of water to DEP's customers will be addressed qualitatively.

The potential effects on wetland areas that may be fed by the existing leakage will also be assessed generically, as follows:

H.5.4.1 Chapter 4.3.1: Natural Resources and Water Resources

As a result of Project 2B, it is expected that leakage from the RWBT of the Delaware Aqueduct would be substantially reduced or cease. It is possible that cessation of the tunnel leakage could affect wetlands, surface waters, and groundwater. Therefore, this section of the EIS will qualitatively assess the potential for Project 2B to result in environmental impacts on natural and water resources within the study areas identified for these resources. Study areas would include wetlands and other water resources, including groundwater resources, with the potential to be affected by the unwatering of the RWBT and the repair of the leaking sections. These potentially affected resources would be identified on the basis of DEP studies being conducted as part of the Delaware Aqueduct RWBT Leakage Investigation, including wetlands and surface waters that may be receiving additional groundwater or water from the RWBT as a result of the leaks, and in consultation with state and federal resource agencies.

Existing Conditions

Based on the information collected as part of Section H-3.9 on existing natural and water resources and supplemented as needed for those resources not described as part of the Project 1 construction assessment, existing conditions of surface waters and wetlands with the potential to be affected by Project 2B will be described. In particular, to the extent it can be determined, the approximate areal extent and the characteristics of wetlands in the study area would be characterized, indicating dominant plant species, wetland hydrology, wildlife, their function within the landscape including the potential for use by threatened or endangered species. Surface waters within the study area would be described with respect to hydrology, water quality, and aquatic biota developed on the basis of existing information and results of aquatic surveys conducted for this EIS.

Future Without Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing

The potential for pertinent DEP and other development projects and other actions to affect natural and water resources within the study areas will be assessed on the basis of existing resources and the activities that would be associated with these proposed projects.

Potential Impacts of Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing

Potential impacts to natural and water resources from construction of Project 2B will be assessed with a particular focus on the following:

- The potential impacts of groundwater discharge to the Hudson River (or local streams) during tunnel unwatering.
- The potential impacts to wetlands and surface waters from the cessation of possible inflows to these systems from the RWBT.
- The potential long-term negative effects to terrestrial resources associated with permanent loss of habitat (e.g., breeding birds and other wildlife).

H.5.4.2 Chapter 4.3.2: Hazardous Materials

This section will describe the potential for infiltration of contaminated ground or surface water during tunnel unwatering.

H.5.4.3 Chapter 4.3.3: Infrastructure

This section of the EIS will generically address the potential for construction of Project 2B to result in impacts on infrastructure; specifically, the potential impacts to the water table and local water supply wells (e.g., drawing down) during tunnel unwatering. In addition, if any chemicals are needed for activation of the bypass tunnel, this will be described in this section of the EIS.

H.5.5 CHAPTER 4.4: MITIGATION

If any potential significant impacts are identified in the analysis areas discussed above, any practicable measures that could avoid or mitigate those impacts will be identified. This section of the EIS will summarize the findings of the relevant analyses and discuss potential mitigation measures. If any project-generated adverse impacts cannot be mitigated, they will be described as unavoidable adverse impacts.

H.6 CHAPTER 5: PROBABLE IMPACTS OF BYPASS TUNNEL OPERATION

H.6.1 OVERVIEW

The EIS will address the potential for operational impacts once the bypass tunnel is in operation, i.e., once Projects 1, 2A, and 2B are complete and water is again flowing through the RWBT and bypass tunnel. In general, effects are anticipated to be minimal during operation since operation of the bypass tunnel would be substantially similar to

current operations. Operation of the bypass tunnel is not expected to result in any additional workers or trucks, and the above-ground elements would be limited. Therefore, detailed analyses of the following areas, which may be affected by the operation of the bypass tunnel and by site changes undertaken as part of Project 1 and Project 2B, will be included in this first EIS:

- Land Use, Zoning, Public Policy, and Open Space
- Visual Character
- Socioeconomic Conditions
- Infrastructure
- Public Health

The second EIS will contain detailed analyses of operation of both the bypass tunnel and the proposed Delaware Aqueduct Rondout-West Branch Tunnel Repair program in its entirety.

H.6.2 CHAPTER 5.1: LAND USE, ZONING, PUBLIC POLICY, AND OPEN SPACE

The land use, zoning, public policy, and open space analysis will assess the potential impacts of any expected changes in land uses resulting from operation of the bypass tunnel and any potential for adverse effects on publicly accessible open spaces. The analysis will evaluate impacts within various study areas, which for purposes of this analysis are defined as the areas that fall within approximately a ¼-mile of the proposed east and west connection site locations.

Information on existing conditions and conditions in the future without the proposed program will be used from other parts of the EIS.

Potential land use impacts will be assessed based on the activities associated with operation of the bypass tunnel relative to the surrounding land uses. The assessment will evaluate whether the bypass tunnel operation would change overall land use trends and patterns.

The zoning analysis will consider how continuing the sites' use would affect the surrounding residential areas.

The public policy analysis will consider consistency of operation of the bypass tunnel with existing policies and any relevant planned and proposed changes to public policy that would occur independent of the proposed program.

The analysis of open space will determine whether operation of the bypass tunnel would directly affect any open space, whether by an increase in shadows, air emissions, or noise.

H.6.3 CHAPTER 5.2: VISUAL CHARACTER

The proposed program may result in some new above-ground construction at certain locations and may necessitate the clearing of some vegetated areas. Therefore, if warranted, a visual character assessment for those changes resulting from Project 1 and Project 2B will be conducted for the EIS at select locations. In addition to the *CEQR Technical Manual* guidance, the assessment will consider NYSDEC's "Assessing and Mitigating Visual Impacts" guidelines, where applicable, as well as any local applicable codes. The visual and contextual relationship of any changes resulting from Project 1 and Project 2B to any nearby historic resources identified as part of the historic resources analysis will be assessed, as appropriate.

H.6.3.1 Existing Conditions

Existing visual resources will be described using photographs. In accordance with *CEQR Technical Manual* methodology, the study area for the visual character analysis will generally correspond to the land use study area. However, in cases where the relationships between visual resources and view corridors extend outside that area, the study area will be expanded to accommodate those specific corridors and resources. Significant visual resources will be identified and may include such landscape elements as water bodies, landmark structures and other cultural resources, parks, unique topographic or geologic features, and critical environmental areas, where applicable. Photographs will be used to document important visual resources.

H.6.3.2 Future Without the Proposed Program

Future conditions without the proposed program will be projected using information on future actions and proposed projects from the land use analysis.

H.6.3.3 Potential Impacts

Potential impacts on visual resources associated with the study areas will be identified and described. Any changes from Project 1 and Project 2B will be described in the context of proximity to identified visual resources, orientation, design context, bulk, and height.

In addition, while no significant impacts from incremental shadows are expected with the Project 1 and Project 2B, a screening analysis for shadows will be conducted in accordance with *CEQR Technical Manual* guidelines. If the screening indicates a detailed assessment is needed, further evaluation will be undertaken.

H.6.4 CHAPTER 5.3: SOCIOECONOMIC CONDITIONS

New York City finances construction of capital improvement projects through the New York City Municipal Water Finance Authority and/or the New York State Revolving Fund Program (SRF). The Municipal Water Finance Authority is authorized to issue bonds to fund the construction of capital improvement projects. The SRF (based on EPA and state matching grants) makes available to municipalities low-cost financing for capital improvement projects. Based on the estimated cost of the proposed program, an

evaluation of the potential incremental costs to New York City water and sewer rates and upstate water rates of users of New York City-provided water will be undertaken.

H.6.5 CHAPTER 5.4: INFRASTRUCTURE

At some locations, the changes associated with Project 1 and Project 2B may result in the expansion of impervious surfaces, and, therefore, an assessment of potential stormwater discharges will be undertaken. If warranted, stormwater management plans will be developed for operation of the bypass tunnel, and stormwater management systems will be described. This chapter will evaluate the potential for additional flooding, sedimentation, and erosion.

H.6.6 CHAPTER 5.5: PUBLIC HEALTH

A discussion of public health will be included in this section of the EIS since the provision of clean, safe drinking water that meets all public health and regulatory requirements is a fundamental obligation of New York City. This chapter will discuss the program's potential to benefit public health by enabling DEP to continue to supply water to its New York City and upstate customers.

H.6.7 CHAPTER 5.6: MITIGATION

Where significant adverse impacts are likely to occur from operation of the bypass tunnel, detailed mitigation measures would be developed to alleviate or eliminate those adverse impacts. These measures would be developed in coordination with relevant agencies, as required, and in accordance with the *CEQR Technical Manual*, state, and/or local guidelines. A range of feasible mitigation measures would be presented, where practical. Mitigation measures that require implementation by or approval from other agencies would be identified.

H.7 CHAPTER 6: CUMULATIVE EFFECTS

Cumulative impacts are two or more individual effects on the environment that, when taken together, compound or increase other environmental impacts, which may rise to the level of significance. The EIS will summarize the potential cumulative impacts from construction and operation of the proposed program.

H.8 CHAPTER 7: ALTERNATIVES

The purpose of an alternatives analysis is to provide the decision-makers with a basis for comparing environmental conditions. This is accomplished by examining reasonable and practicable options that avoid or reduce project-related significant adverse impacts and still achieve the stated goals and objectives of proposed actions.

The alternatives analysis will include an assessment of a No Action Alternative, in which the proposed program is not undertaken. The assessment of a No Action Alternative is required for all EISs. In addition to the No Action Alternative, the EIS will assess a Tunnel Repair Alternative in which a bypass tunnel is not constructed and

various repair methods, such as surface pressure grouting or leak stabilization, are undertaken instead.

Additional alternatives will also be identified and assessed. These alternatives are expected to fall into several main categories:

- **Design Alternatives**. Such alternatives would consist of variations in the design of the proposed program.
  - As discussed above, DEP is continuing to evaluate whether its preferred option would be to launch the TBM from the east connection site and receive it at the west connection site or to launch from the west connection site and receive it at the east connection site. The EIS will assess whichever option is not identified as the preferred option as an alternative.
  - The alternatives analysis will include an assessment of various site selection alternatives in which a different west connection site is assumed.
- **Construction Alternatives**. These alternatives would address different methods of handling construction of the proposed program.
  - The alternatives analysis will include an assessment of various options for the disposal of excavated materials. At this time, it is expected that the EIS will assume that such materials are removed from the TBM launch shaft solely by truck. Therefore, the alternatives addressing the disposal of excavated materials are anticipated to include a barging alternative, in which excavated materials are removed from the east connection site by barge, and a rail alternative, in which excavated materials are removed from the east connection site via the Metro-North rail line adjacent to the Shaft 6 property.
- **Impact Reduction Alternatives**. These alternatives would be evaluated to reduce or eliminate the specific potential impacts of the proposed program identified in the EIS.

Additional alternatives may be identified for inclusion in the EIS as project planning proceeds and as significant adverse impacts from the proposed program are identified.

H.9 CHAPTER 8: UNAVOIDABLE ADVERSE IMPACTS

The proposed program may result in significant or temporary adverse impacts that are unavoidable. These unavoidable significant adverse impacts will be summarized in this chapter.

H.10 CHAPTER 9: IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

The EIS will disclose the irretrievable commitment of resources that the proposed program may require.

H.11 CHAPTER 10: TECHNICAL APPENDICES

A technical appendix to the EIS will be provided that includes necessary CEQR/SEQRA documentation.

H.12 GLOSSARY

The EIS will include a glossary of acronyms.

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