1.0-1 INTRODUCTION

The New York City Department of Environmental Protection (DEP) is proposing the Water for the Future Program: Delaware Aqueduct Rondout-West Branch Tunnel Repair (proposed program) to address the known leaks in the Rondout-West Branch Tunnel (RWBT), an approximately 45-mile section of the Delaware Aqueduct that currently conveys more than 50 percent of the daily 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 1-1**).

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—Water Supply System Augmentation and Improvement.
  - Project 2B—Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing.

When Projects 1 and 2 are completed, the bypass tunnel would be in operation, and water would flow through the RWBT and the newly constructed bypass tunnel. Water would no longer flow through the section of the RWBT between the connection points of the bypass tunnel.

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 located west of the Hudson River west of New York State Route 9W (Route 9W) approximately 1,100 feet north of Old Post Road in the Town of Newburgh, Orange County (called the *west connection site*), and a site east of the river on DEP's Shaft 6 property located along River Road in the Town of Wappinger, Dutchess County (called the *east connection site*). This EIS refers to Project 1 as Shaft and Bypass Tunnel Construction.

DEP is undertaking a two-part approach to the Environmental Impact Statement (EIS) for the proposed program. This first EIS provides 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

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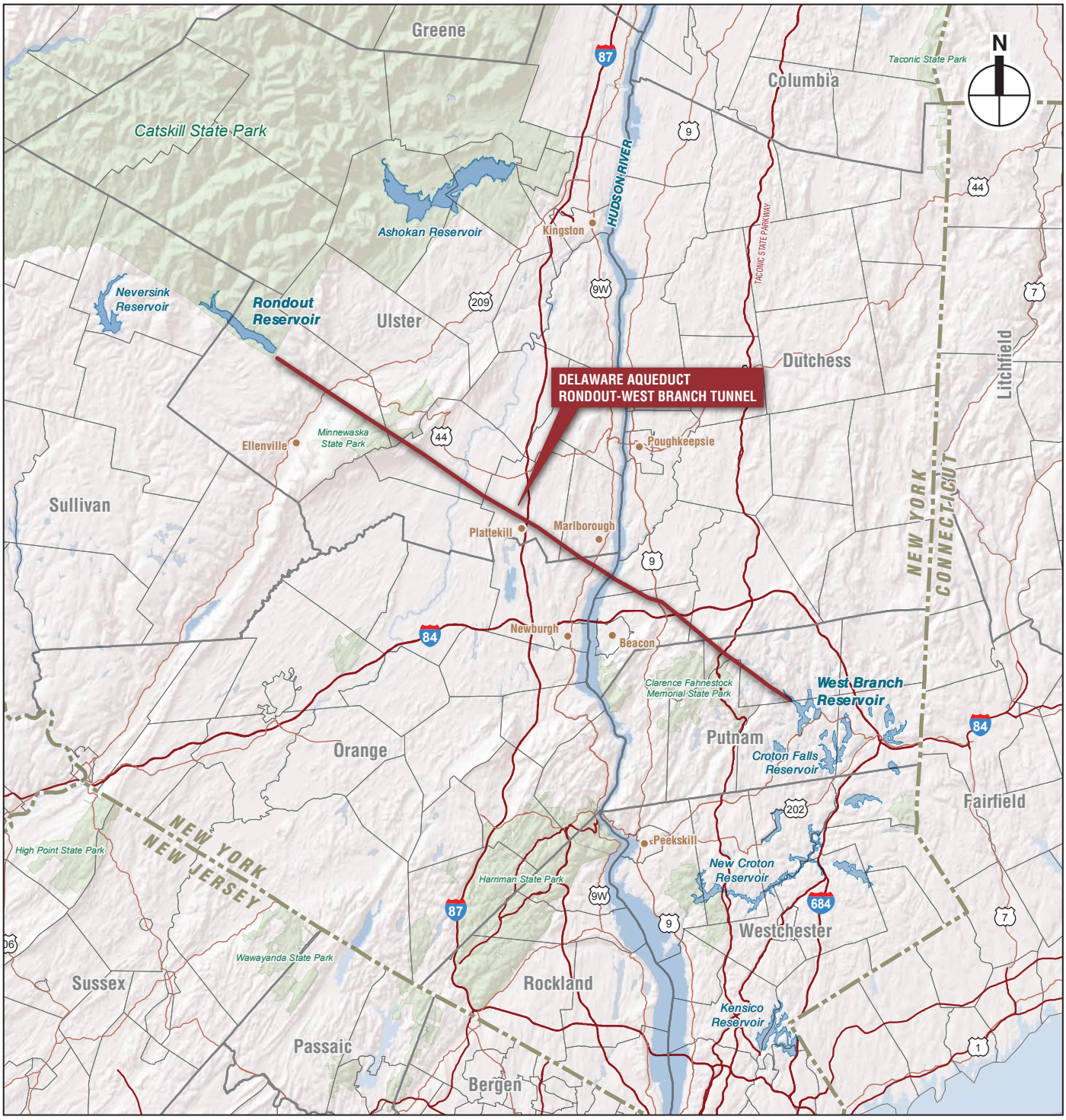

Figure 1-1

Project Location

and RWBT Inspection and Repair, including Wawarsing sub-project (Project 2B) will not be available for several years, this EIS provides—to the extent possible—a qualitative analysis of Project 2. When design information is available, DEP will undertake a second EIS that will provide further details and will quantitatively assess the potential impacts resulting from Project 2 of the proposed program.

The Delaware Aqueduct is critical to the New York City water supply. To support a shutdown of the Delaware Aqueduct during Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, the city must first implement Project 2A, Water Supply System Augmentation and Improvement. Project 2A 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. Additional information on the components proposed as part of Project 2A can be found in section 1.0-4.2 of this chapter and Chapter 3, "Probable Impacts of Project 2A, Water Supply System Augmentation and Improvement."

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 RWBT 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. The bypassed portion of the RWBT would no longer be used.

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.

This EIS has been prepared in conformance with applicable laws and regulations, including Executive Order No. 91, New York City Environmental Quality Review regulations, and follows the guidance of the *CEQR Technical Manual* (May 2010).[1] It contains this description of the proposed program and its environmental setting; the short- and long-term environmental impacts of the proposed program during its construction and operation; the identification of any significant adverse environmental impacts; a discussion of alternatives to the proposed program; any irreversible and irretrievable commitments of resources as a result of the proposed program; and a description of any mitigation measures necessary to minimize significant adverse environmental impacts that could occur with the proposed program. DEP is the lead agency in this environmental review process.

[1] The *CEQR Technical Manual* is available online at: http://home2.nyc.gov/html/oec/html/ceqr/technical_manual.shtml

Chapter 1 is organized as follows:

- Section 1.0-2, "Background and Planning Context"
- Section 1.0-3, "Purpose and Need for the Proposed Program"
- Section 1.0-4, "Rondout-West Branch Tunnel Repair Program: Description of Projects 1, 2A, and 2B"
- Section 1.0-5, "Program Schedule and Phasing"
- Section 1.0-6, "Program Approvals and Coordination"
- Section 1.0-7, "Public Participation Process"
- Section 1.0-8, "Analytical Framework for Environmental Review"
- Section 1.0-9, "Organization of this EIS"

1.0-2 BACKGROUND AND PLANNING CONTEXT

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.

1.0-2.1 NEW YORK CITY WATER SUPPLY SYSTEM

OVERVIEW

DEP operates and maintains the New York City water supply system and is responsible for providing drinking water to more than eight million customers in New York City as well as approximately one 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 1.2 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 1-2**). Together, these watersheds encompass a 1,968-square-mile area within 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.

DELAWARE SYSTEM

Constructed between 1936 and 1964, the Delaware system extends 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

Schematic Not To Scale

Figure 1-2
Water Supply System

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 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 1-2). 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 1-3**).

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's 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 with 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.

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

CATSKILL SYSTEM

The Catskill system includes the Schoharie Reservoir, Shandaken Tunnel, and Ashokan Reservoir (see Figure 1-2). The Schoharie Reservoir delivers up to 615 mgd to the Catskill system via the Shandaken Tunnel, which releases into Esopus Creek and flows into the West Basin of Ashokan Reservoir. Water from Ashokan Reservoir is conveyed via the upper Catskill Aqueduct to Kensico Reservoir at a capacity of up to approximately 590 mgd. At Kensico Reservoir, Catskill system water typically mixes with water from the Delaware system before being disinfected, fluoridated, and conveyed via the lower Catskill Aqueduct to Hillview Reservoir before entering the distribution system. Historically, the Catskill system provides an average of approximately 40 percent of New York City's average daily demand.

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

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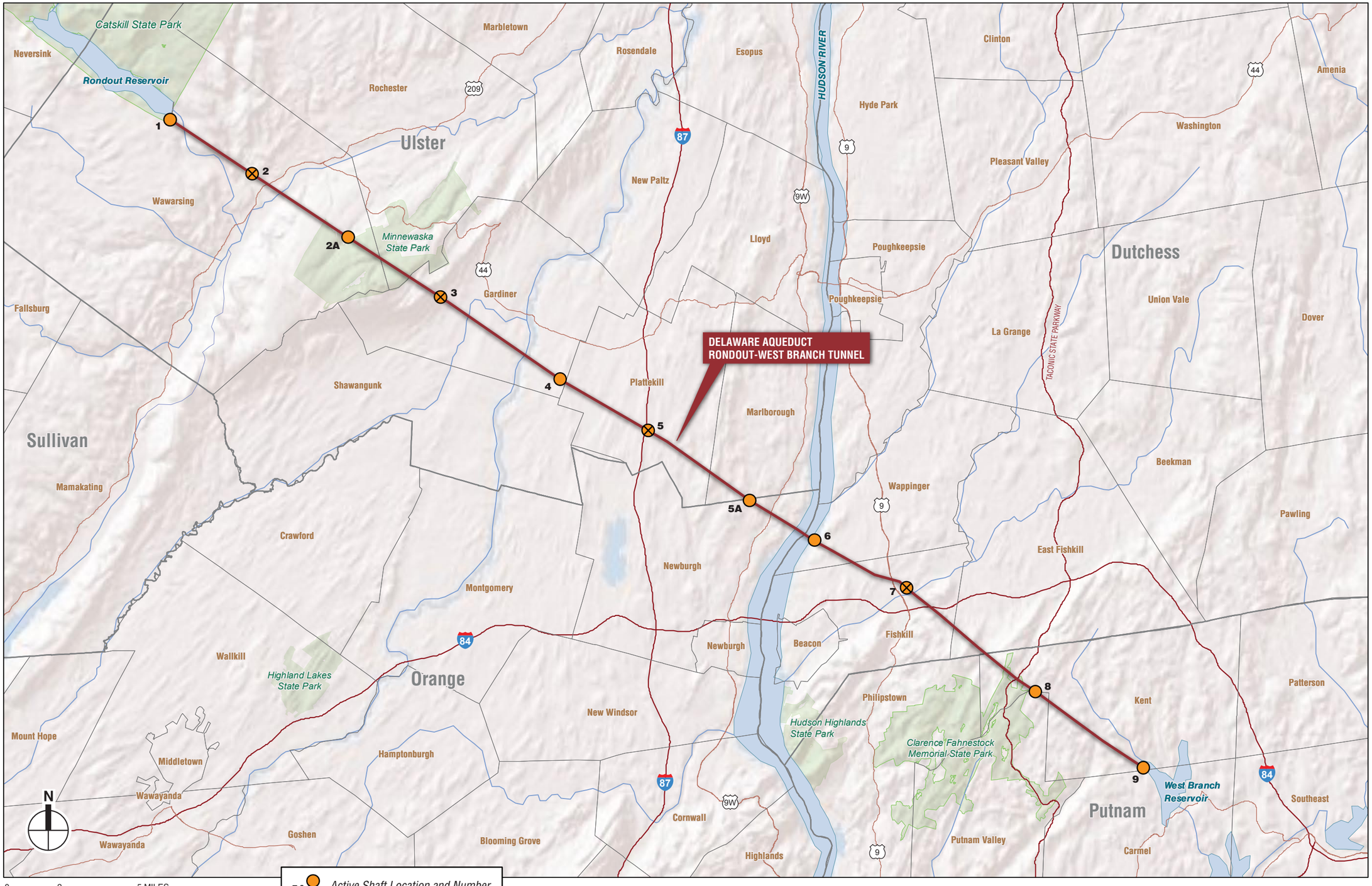

Figure 1-3
Rondout-West Branch Tunnel

and Putnam Counties. The Jerome Park 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. Historically, the Croton system provides approximately 10 percent of the city's average daily demand. During droughts, it can provide up to 30 percent of in-city consumption.

1.0-2.2 EXISTING RWBT CONSTRUCTION AND GEOLOGY

During the construction of the RWBT, heavy reinforcement and steel interlinings were installed in the tunnel in zones where the rock was weak or disintegrated 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 1-4 and 1-5**). 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 1-3). 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.

Shafts 2, 3, 5, and 7 were sealed after construction and would not be available for access or ventilation during implementation of the proposed program. Shafts 4, 5A, and 6 are not sealed, but are not suitable for construction access.

1.0-2.3 OVERVIEW AND CONDITION OF THE RWBT

The last unwatering and physical inspection of the RWBT occurred in 1957-1958. DEP monitors 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.

Approximate Area of Wawarsing Crossing

2 *Existing Shaft Site and Number*

Figure 1-4

Approximate Area of Wawarsing Crossing: Aerial View

Approximate Area of Roseton Crossing

5A *Existing Shaft Site and Number*

Figure 1-5

Approximate Area of Roseton Crossing: Aerial View

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)—an unmanned, self-propelled submarine-shaped vehicle—to conduct a detailed 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.

1.0-2.4 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 various 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, Bypass Tunnel Connection and RWBT Inspection and Repair, 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 Pumping Station (Shaft 11), Carmel, NY. This effort, which is to increase pumping capacity, is expected to be complete in 2014.
  - Cross River Pumping Station (Shaft 13), Bedford, NY. This effort, which is to increase pumping capacity, is expected to be finished in 2012.

1.0-3 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.

DEP considered repairing the existing RWBT from within the tunnel, including the Wawarsing and Roseton crossings. However, this alternative was not advanced due to the length of time that this repair method would require the RWBT to be out of service. Overall, construction of the bypass tunnel is anticipated to 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, including the Town of Newburgh, which obtains its water from Shaft 5A of the Delaware Aqueduct.

1.0-4 WATER FOR THE FUTURE: RONDOUT-WEST BRANCH TUNNEL REPAIR PROGRAM—DESCRIPTION OF PROJECTS 1, 2A, AND 2B

As described above in section 1.0-2, "Background and Planning Context," DEP has conducted and is continuing to conduct studies to determine the specific locations of the RWBT problem

areas. Concurrently, DEP is also undertaking 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 be split into four phases, and would begin with site preparation (Phase 1: Site Preparation), followed by construction of shafts at the west and east connection sites (Phase 2: Shaft Construction), which would start in 2013 and be complete in 2015. Construction of the bypass tunnel itself would begin in 2015 and be complete in 2020. Specifically, tunnel excavation (Phase 3: Bypass Tunnel Excavation) would end in 2018. Tunnel lining, Project 1 demobilization, and preparation for Project 2B (Phase 4) would be completed in 2020.

At some point during Project 1, when adequate progress has been made, Project 2A, Water Supply System Augmentation and Improvement measures, would also be implemented. These measures consist of several projects designed to augment the City's water supply and insure system reliability: reducing the amount of water used, optimizing the Catskill Aqueduct's capacity, rehabilitating DEP-owned wells in Queens, connecting to New Jersey and Nassau County water supplies, and improving Delaware watershed reservoir releases. The water supply augmentation projects would ensure that New York City has sufficient water supply during Project 2B when the RWBT would be taken out of service.

When the new bypass tunnel is complete and Project 2A has been implemented, Project 2B would begin. 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 currently anticipated that 6 to 15 continuous 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 in 2021 or 2022, or later if hydrologic conditions postpone the ability to shutdown the RWBT for connections and repairs, the bypass tunnel would be in operation, and water would flow through the RWBT and the newly constructed bypass tunnel.

Construction of Project 1 would be undertaken within Orange and Dutchess Counties; Project 2B of the proposed program would include construction within Orange, Ulster, Dutchess, and Putnam Counties, NY (see Figure 1-1). 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.

1.0-4.1 PROJECT 1: SHAFT AND BYPASS TUNNEL CONSTRUCTION

INTRODUCTION

Project 1 would consist of construction of the two shafts and bypass tunnel around the highest leakage section of the RWBT, in Roseton. 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 is assumed to be constructed within 1,725 feet to the north of the existing RWBT, between a site being acquired by DEP west of the Hudson River—referred to as the *west connection site*—and currently owned DEP property at Shaft 6 (east of the Hudson River)—referred to as the *east connection site* (see **Figure 1-6**).

Construction of the bypass tunnel would occur underground, with construction staging and support activities at both the west and east connection sites.

The bypass tunnel would be sized to accommodate the existing RWBT flow (as stated later, the bypass tunnel would not result in any change in water delivery capacity) and would be constructed using a tunnel boring machine (TBM). A TBM is similar to a large diameter drill that excavates a circular tunnel section without disturbance at the surface. TBMs are custom designed and built for specific geologic conditions and other project requirements. Use of a TBM would require that two shafts are constructed—one each at the west and east connection sites (see **Figure 1-7**). 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 or 900 feet below the ground depending on the depth of the existing RWBT at each shaft site). The shafts would be used for the following purposes during Project 1:

- **Launch and reception of the TBM**. The TBM would be launched from the west connection site shaft and received at the shaft at the east connection site.
- **Access during construction of the bypass tunnel**. Workers would access the bypass tunnel and materials would be delivered via the shafts. 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 west and east connection sites. (These shafts would continue to be used during Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, for the construction of final bypass tunnel segments that would connect the bypass tunnel to the existing tunnel, as described in section 1.0-4.3, below.)

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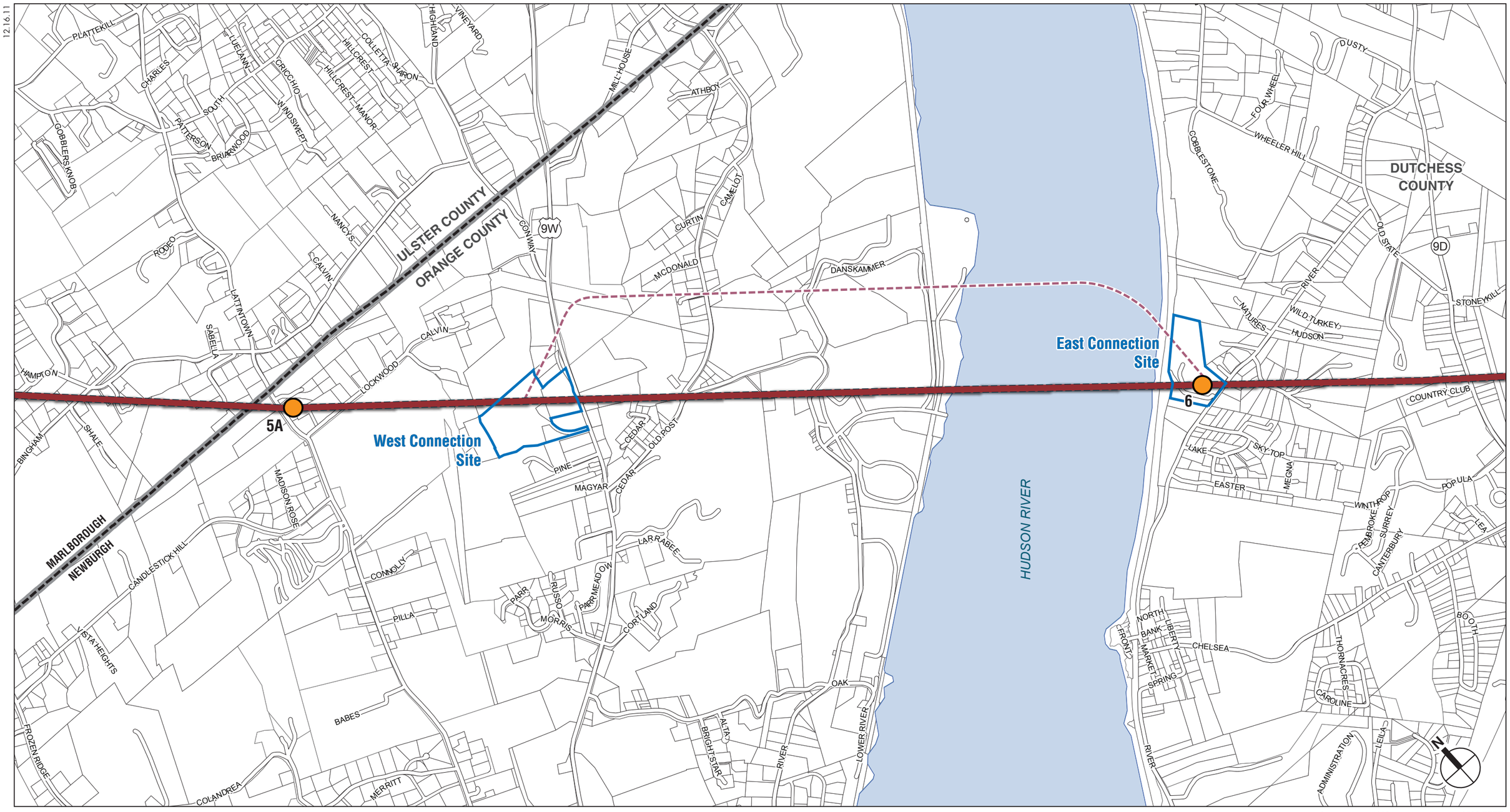


Delaware Aqueduct Rondout-West Branch Tunnel

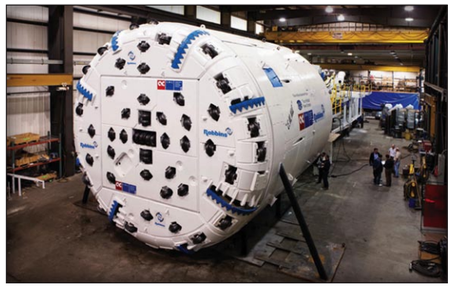
Connection Sites

5A *Active Shaft Location and Number*

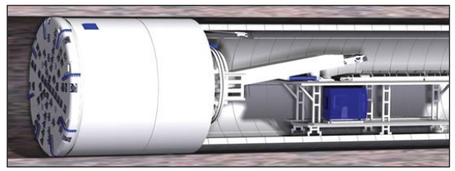
Baseline Bypass Tunnel Alignment

Figure 1-6

Project 1: Shaft and Bypass Tunnel Construction



Tunnel Boring Machine (typical)



Tunnel Boring Machine (typical)

Figure 1-7

Bypass Tunnel: Major Components (Illustrative View)

Once the west connection shaft is completed, a 300-foot "starter tunnel" would be constructed at the bottom of the shaft; the starter tunnel would be larger than the bypass tunnel to allow room to assemble the TBM and prepare it for tunneling.

In addition, initial construction of "connector tunnels" would begin at both connection sites. The connector tunnels are the relatively short tunnels that would ultimately serve as the connection from the bypass tunnel to the existing aqueduct. As shown in Figure 1-7, during Project 1, the connector tunnels would be advanced to a predetermined safe distance from the existing aqueduct; the final connection between the connector tunnel and the existing aqueduct would be made during Project 2B.[2]

In addition to the two shafts, the starter, connector, and bypass tunnels, preparations for installation of "inundation plugs" would be commenced at both the west and east connection sites; these inundation plugs would be used to block off the leaking area of the RWBT in Roseton in the event that water inflow exceeds DEP's ability to pump water out of the tunnel during construction of Project 2B. The inundation plugs would be constructed using drill rigs to drill 26 approximately 18-inch diameter vertical holes (the plug holes) to a safe distance above the existing aqueduct (see Figure 1-7); in addition, three pump shafts would be constructed to a safe distance above the aqueduct. The inundation plugs and pump shafts would be completed during Project 2B, if needed, by pouring gravel at each end of the proposed plug (through certain plug holes) and then by pouring concrete into the tunnel through the remainder of the plug holes. The gravel would act as a dam to retain the concrete until it cures. Water would be pumped out of the tunnel through the pump shafts.

In addition to the elements described above, supporting infrastructure and work areas would be needed at both connection sites.

A description of existing conditions on the west and east connection sites and the key project elements that would be constructed at each site are discussed in detail in the following sections. Chapter 2, Section 2.1, "Description of Project 1 Construction," provides more detail on the major elements to be constructed as part of Project 1, including specific construction phases and tasks, descriptions of timing, equipment, and levels of activity.

[2] The connector tunnels would be advanced to a pre-determined safe distance during Project 1 to minimize the time that the RWBT is out of service. Final connection of the bypass tunnel to the existing aqueduct would require that the existing aqueduct is taken out of service; this would occur under Project 2B.

WEST CONNECTION SITE

Existing Conditions

The west connection site is located in the Town of Newburgh in Orange County. The approximately 32.9-acre site comprises multiple parcels that have been or are in the process of being acquired by DEP: tax parcels 8-1-15.2, 15.3, 16, 17, and 19.1 (see **Figure 1-8**).[3]

The west connection site is located on the west side of New York State Route 9W (Route 9W) approximately 1,100 feet north of Old Post Road. The site is steeply sloped, with a 200-foot elevation change between Route 9W and the western portion of the site. Most of the site is wooded and undeveloped, and a stream runs across part of the site. There are several vacant buildings on the eastern portion of the site, including a former restaurant and bar, and a single-family home with a barn, a cinderblock outbuilding, and several trailers. The western portion of the site contains a vacant single-family home and a shed.

The site currently has two points of access. The eastern portion of the site is accessible by a driveway leading to the vacant home and outbuildings. Vegetation and steep slopes prevent access to the western portion of the site from this driveway. A second driveway, located approximately 650 feet to the south and separated by a non-DEP-owned auto repair facility, provides access to the western (rear) portion of the site. This narrow driveway provides access to the vacant home and to the wooded area at the rear of the site.

Future Conditions

As discussed above, the west connection site would be used as the TBM launch site for bypass tunnel construction.

The following sections describe the main elements that would be in place on the west connection site during Project 1 and Project 2B construction (see **Table 1-1** and **Figure 1-9**): site access and parking, work and office areas, stormwater management, power and water supply, wastewater disposal, roadway improvements, and storage and disposal of excavated rock and soil (e.g., muck). Construction activities (e.g., the dewatering pipeline) that would occur within the area surrounding the west connection site are also described. It should be noted that not all of the elements described for the west connection site would be in place for the entire duration of construction.

[3] As discussed in both the Draft and Final Scopes of Work for the proposed program, in preparation for the repair of the RWBT, DEP examined the potential use of properties already under DEP jurisdiction for the west and east connection sites. Because DEP has limited properties in the project area, some acquisition of property was needed. DEP acquired, or is in the process of acquiring, several parcels from three landowners; these parcels form the west connection site. Acquisition of these properties underwent separate environmental reviews.

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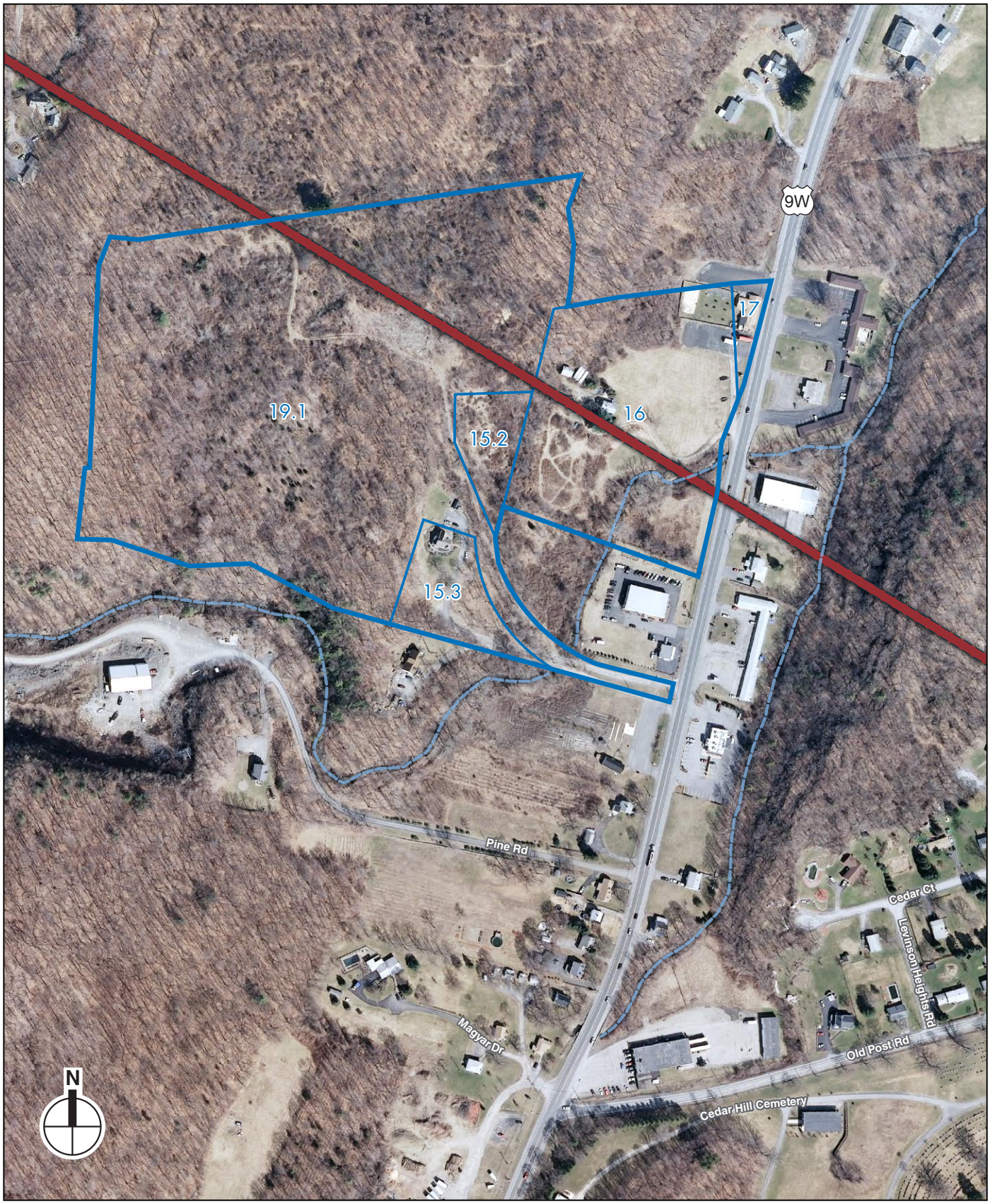

Delaware Aqueduct Rondout-West Branch Tunnel

West Connection Site

15.3 *Parcel Boundary and Lot Number*

Stream

0 200 400 FEET

SCALE

Figure 1-8

West Connection Site: Existing Conditions

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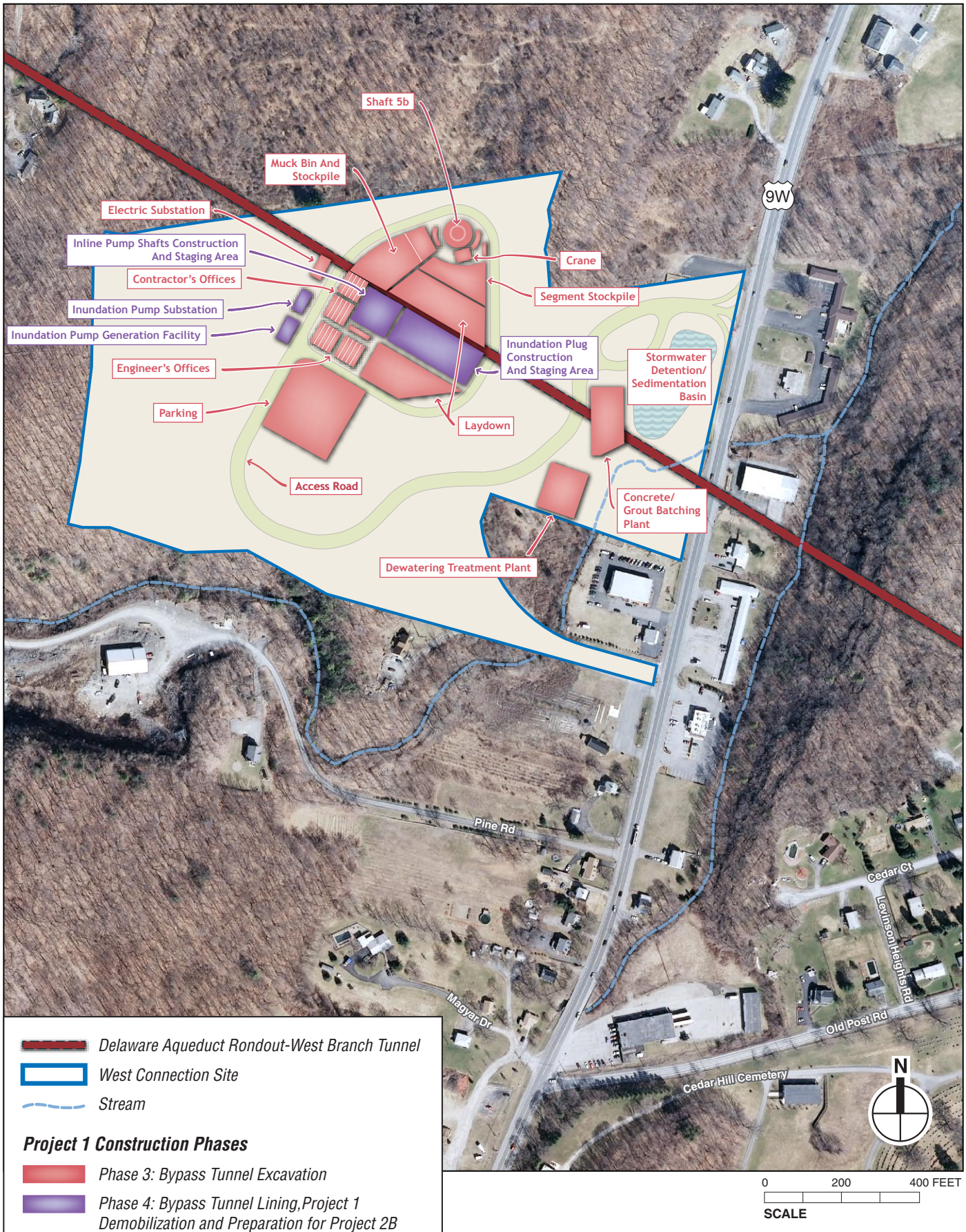

Figure 1-9

West Connection Site: Major Construction Elements

Table 1-1
Summary of Key Project 1 Elements

Project Element	West Connection Site	East Connection Site
Construction use	Shaft and TBM launch site for bypass tunnel construction.	Shaft and TBM receiving site for bypass tunnel construction.
Stormwater infrastructure	New stormwater management system to include stormwater basin to detain and treat runoff during clearing, grading, site preparation, and shaft and tunnel construction, with discharge to existing on-site stream.	Existing stormwater collection system to be modified to accommodate Project 1 and 2B construction.
Site access, roads, and parking	A new site entrance would be constructed at the northern portion of the site, and a new access road would be constructed from the entrance to the work site. Existing southern driveway to be used in early stages of Phase 1: Site Preparation; upon completion of the new site entrance and access road, existing driveway would provide emergency access. Site security provided. Route 9W reconfigured to provide exclusive left-turn lane for northbound traffic to access site and exclusive right-turn lane for southbound traffic to access the site. New traffic signal to be installed. Internal roadway system to provide access to construction locations. Parking to be provided within the limits of disturbance for maximum number of construction workers, managers and visitors.	Existing driveway to be used during construction of Project 1 and Project 2B. Internal roadway system to be modified to provide access to various work areas. Parking to be provided for maximum number of construction workers, managers, and visitors.
Work and/or office areas	Areas for temporary storage of excavated muck, TBM staging and equipment storage, precast concrete segments and tunnel lining materials, drill rigs and other pieces of equipment, and grout/concrete batching plant. Space also provided for maintenance and for contractor and engineer offices.	Areas for temporary storage of excavated muck, support construction equipment and vehicles, and drill rigs. Space also provided for maintenance and for contractor and engineer offices.
Power Supply	Two new electric substations to connect to CHG&E's network. Before substation is in use, power to be supplied by on-site engine generator; later, they would be used for emergency backup power.	Power supplied by new supply feeder from CHG&E. Back-up power generation for life safety reasons only.
Water Supply	Potable and non-potable water to be supplied by a combination of a connection to the Town of Newburgh water supply system and recycled water.	Potable water to be trucked in. Non-potable water to be supplied by an existing tunnel riser during Project 1 and from Hudson River during Project 2B.
Wastewater disposal	Sanitary wastewater to be pumped and hauled from site.	Sanitary wastewater to be pumped and hauled from site.
Dewatering treatment and disposal	Dewatering treatment and disposal system to be implemented to control quality of water discharged from shafts and tunnel during construction. During shaft construction, recovered water would be treated and either reused or discharged to the existing on-site stream. During tunnel construction, dewatering pipeline extending along existing rights-of-way and through some private property to convey groundwater infiltrating the RWBT tunnel from the west connection site to new Hudson River outfall. Two route options to be considered.	Dewatering treatment and disposal to be implemented during shaft construction. Existing outfall would be used.
Off-site roadway improvements	New turn signal at the west connection site access road and new travel lanes described above (see "Site access, roads, and parking").	None
Off-site muck disposal	Muck from shaft construction and bypass tunneling activities to be transported off-site. Destination not yet known.	Muck from shaft construction activities to be transported off-site by truck. Destination not yet known.

Site Access, Roads, and Parking

The existing southern driveway would be improved with minor regrading and gravel placement as needed to make it suitable to provide access to the west connection site during the early stages of Project 1 construction. Once a new access road in the northern section of the site is constructed, the southern driveway would no longer be used except for emergency access.

In connection with the new site access road, Route 9W would be reconfigured to provide a dedicated left-turn lane for northbound traffic to access the site and a dedicated right-turn lane for southbound traffic to access the site. A new traffic signal would also be installed at this location (see **Figure 1-10**).

An internal roadway system would provide access to construction locations, such as the area of excavation for the shaft. The roadway system would be paved.

Parking would be provided to accommodate the maximum number of construction workers (estimated between 100 and 130 spaces, depending on the phase of construction), construction manager staff, and visitors during construction. Parking areas would shift within the west connection site depending on the construction phase, the number of parking spaces needed to accommodate the workers and visitors, and the location within the site of available area. It is expected that the parking areas would be gravel.

Site security would be provided at both site driveways. A reject/exit road would also be provided at the primary entrance to divert unauthorized vehicles without interrupting traffic flows on the site.

Work and Office Areas

Various work areas would be located throughout the west connection site depending on the phase of construction and would include areas for: temporary stockpiling of excavated rock and soil (i.e., muck), TBM staging and equipment storage, storage area for precast concrete segments and tunnel lining materials, an area for drill rigs and other pieces of equipment, and an area for the grout/concrete batching plant (see more details in Section 2.1). On-site diesel storage tanks would allow equipment refueling. Another area on the west connection site would be provided for maintenance and for contractor and engineer offices.

Stormwater Management System

A stormwater management system would be developed to manage stormwater runoff at the west connection site during Project 1 and Project 2B construction, including a stormwater basin to detain and treat stormwater runoff during all phases of construction. (More detail is provided in Chapter 2, Section 2.14, “Probable Impacts of Project 1, Shaft and Bypass Tunnel Construction—Infrastructure”.)

Power Supply

During Phase 1: Site Preparation, power would be supplied to the west connection site by an on-site generator. A primary substation that would connect to Central Hudson Gas and Electric’s

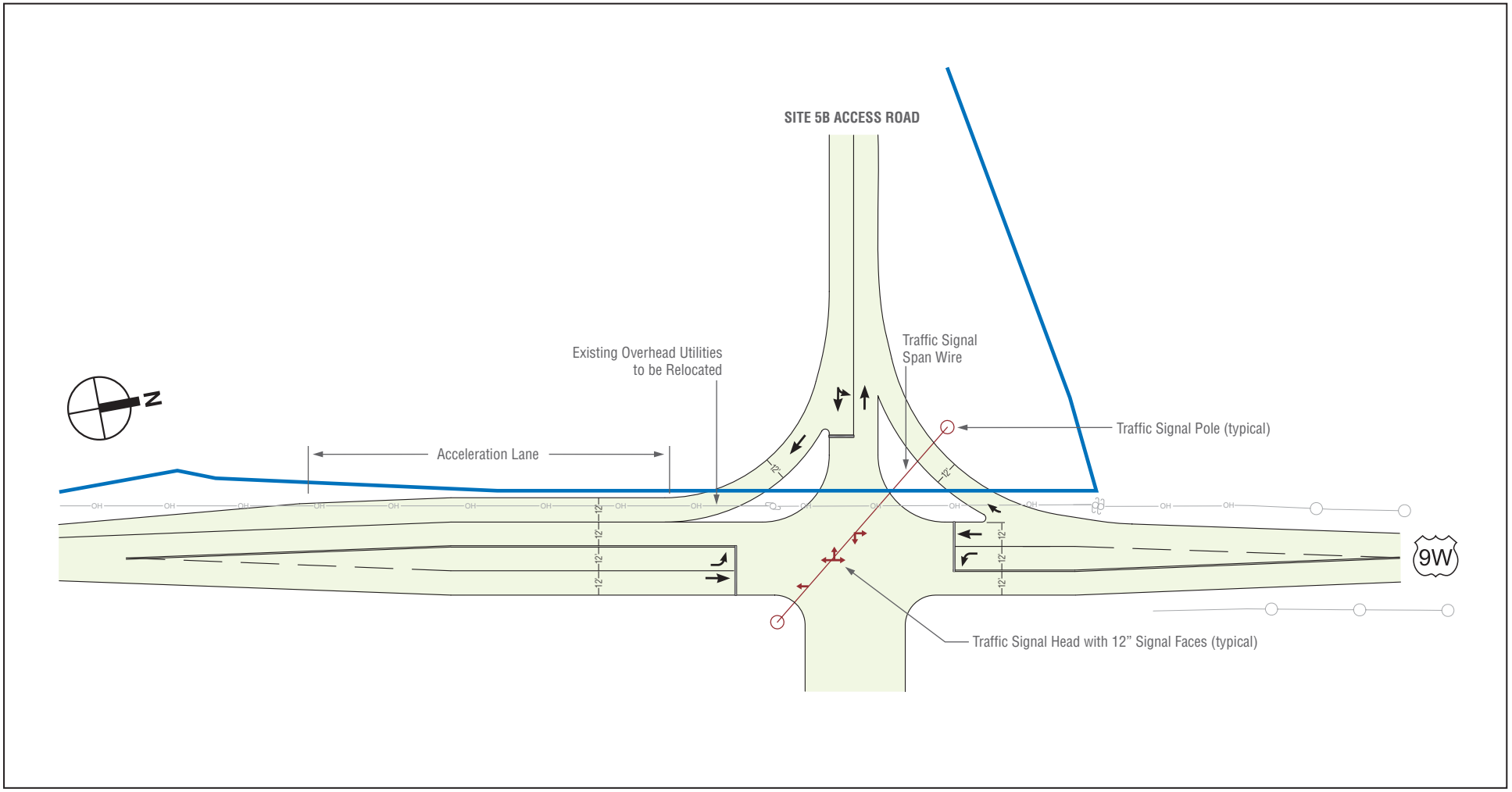

Figure 1-10

West Connection Site: Proposed Site Driveway and Off-Site Improvements

(CHG&E) existing power supply network would be constructed starting in Phase 1: Site Preparation to serve subsequent phases of construction. A second substation would be constructed in Phase 3: Bypass Tunnel Excavation. This substation would be used during Project 2B if the inundation plugs need to be completed.

Water Supply
Potable water would be required for consumption, shower facilities, and fire suppression systems, and non-potable water would be necessary for equipment operation, concrete batch plant process, and dust control. Potable and non-potable water would be supplied by a combination of a connection to the Town of Newburgh water supply system (see **Figure 1-11**). To connect to the Town of Newburgh water supply system, a water main would be extended from the west connection site south along Route 9W to the town's existing main, as shown in Figure 1-11. A pump station would be constructed on the west connection site to boost pressure of the water that would be drawn from the water main extension. Water would also be stored in tanks on the west connection site.

DEP is evaluating the potential use of water from the Hudson River during Project 2B, since the Town of Newburgh would lose its supply from the Delaware system while Project 2B is under construction. If water from the Hudson River were to be used, this system would consist of an intake in the river and a pipeline that could extend from the river to the west connection site. The pipeline could follow the same route as the dewatering pipeline (either option). The potential effects of the intake and use of the Hudson River water will be assessed in the second EIS.

Wastewater Disposal (Sanitary)
Sanitary wastewater from the west connection site would be pumped and hauled from the site.

Construction Dewatering Treatment and Disposal
During construction of the shaft and bypass tunnel, groundwater would infiltrate during excavation. Therefore, a water treatment and disposal system would also be constructed on-site to treat and control the quality of water discharged from the shafts and tunnel. During shaft construction, treated water would be discharged to the on-site stream. During tunnel construction, inflows exceeding the stream capacity may occur. Therefore, a dewatering pipeline would be constructed to convey treated groundwater infiltrating the RWBT tunnel from the west connection site to a new outfall on the Hudson River. Potential routes have been identified for the dewatering pipeline, but not yet finalized. These potential routes are shown in Figure 1-11. As shown in the figure, the pipeline routes extend along existing rights-of-way and through some private property before reaching the new outfall. Specifically, the pipeline routes are as follows:

- *In Option 1,* the dewatering pipeline would extend from the west connection site north entrance, south along Route 9W, east along Old Post Road, and east along River Road. From River Road, it would extend directly east through private property to the Hudson River.

Figure 1-11

West Connection Site: Water Main Extension and Dewatering Pipeline

- *In Option 2*, the dewatering pipeline would initially follow the same route as Option 1 before extending south along River Road to the property line between two privately owned parcels, where it would extend to a cove adjacent to the Hudson River.

Both options could require the relocation of utilities along Old Post and River Roads. Both options would also require stream crossings. In addition, Option 1 would require the crossing of a rail line and utility corridor.

It is assumed that the pipeline would be up to 30 inches in diameter and able to handle up to 10 mgd.[4]

Off-Site Roadway Improvements

As described above under "Site Access, Roads, and Parking," several off-site roadway improvements would be required, including:

- The reconfiguration of Route 9W to provide a dedicated left-turn lane for northbound traffic to access the site and a dedicated right-turn lane for southbound traffic to access the site. After construction is complete, the northbound left-turn lane and the southbound left-turn lane would remain in place.
- A new traffic signal to be installed at Route 9W and the west connection site access road. This signal would be in place for the duration of construction at the west connection site. After construction is complete, the traffic signal would be removed.

These improvements are shown in Figure 1-10.

Off-Site Muck Disposal Site

Muck that would be removed during bypass tunneling activities would be transported off-site by trucks to locations identified by the contractor. At this time a location has not been identified. However, all excavated rock, soil, or fill materials requiring off-site disposal would be handled and disposed of, or reused, in accordance with applicable regulatory requirements.

DEP would require the contractor to identify disposal locations, routes to/from these locations, document material disposed, and document acceptance from the disposal locations. In addition, DEP would require the contractor to demonstrate that the selected disposal locations would have approved SWPPPs and stormwater permits and/or otherwise demonstrate compliance with federal, state, and local stormwater regulations prior to disposal of excavated material.

[4] The dewatering pipeline would typically handle approximately 3 mgd but it would be sized to accommodate 10 mgd for an approximately two-week period during Project 2B in connection with the unwatering of the existing aqueduct. It could also be used to handle up to 10 mgd if the inundation plugs were to be used. As discussed above, the plugs would be used to block off the leaking area of the RWBT in Roseton in the event that water inflow exceeds DEP's ability to pump water out of the tunnel during construction of Project 2B.

Other Elements

At the start of construction, trees would be planted within the west connection site to help screen construction activities. Trees would be planted in the area of the site entrance and near the stormwater basin along Route 9W.

EAST CONNECTION SITE

Existing Conditions

The east connection site is located in the Town of Wappinger in Dutchess County on the west side of River Road (Lot 6056-01-288977-0000). Owned by DEP, the approximately 20.1-acre site is developed with a number of DEP facilities and offices related to the New York City water supply system. These facilities, which include the Shaft 6 superstructure, the Hudson River Pump Station, power supply facilities (substation), roads and parking areas, and stormwater infrastructure, are shown in **Figure 1-12**.

Access to the site is currently provided by a new main driveway entrance at the southern portion of the site and the historic entrance located approximately 180 feet to the north. The new entrance was construction as part of the tunnel and shaft rehabilitation of Shaft 6.

Construction is currently underway at the east connection site as part of the tunnel and shaft rehabilitation of Shaft 6. As stated in section 1.0-2.4, above, this work will improve DEP's ability to unwater the tunnel. Completion of the tunnel unwatering system is expected in 2013.

Future Conditions

As discussed above, the east connection site would be used to receive the TBM on completion of the tunnel boring effort. The following sections describe the main elements that would be in place on the east connection site during Project 1 (and Project 2B) construction. Construction activities that would occur within the area of the east connection site are also described. It should be noted that not all of the elements described for the east connection site would be in place for the entire duration of construction.

During Project 1 construction, the east connection site would have parking, staging, laydown, work, and other areas, as shown in **Figure 1-13**. Workshops, storage areas, offices, and environmental health and safety facilities would be located throughout the site. On-site diesel storage tanks would allow equipment refueling. Other major construction elements are described in the following sections.

Site Access, Roads, and Parking

The existing driveway and parking lots would continue to be used during construction of Project 1 and Project 2B at the east connection site. The site's internal roadway system would be modified to provide access to various work areas.

11.3.11

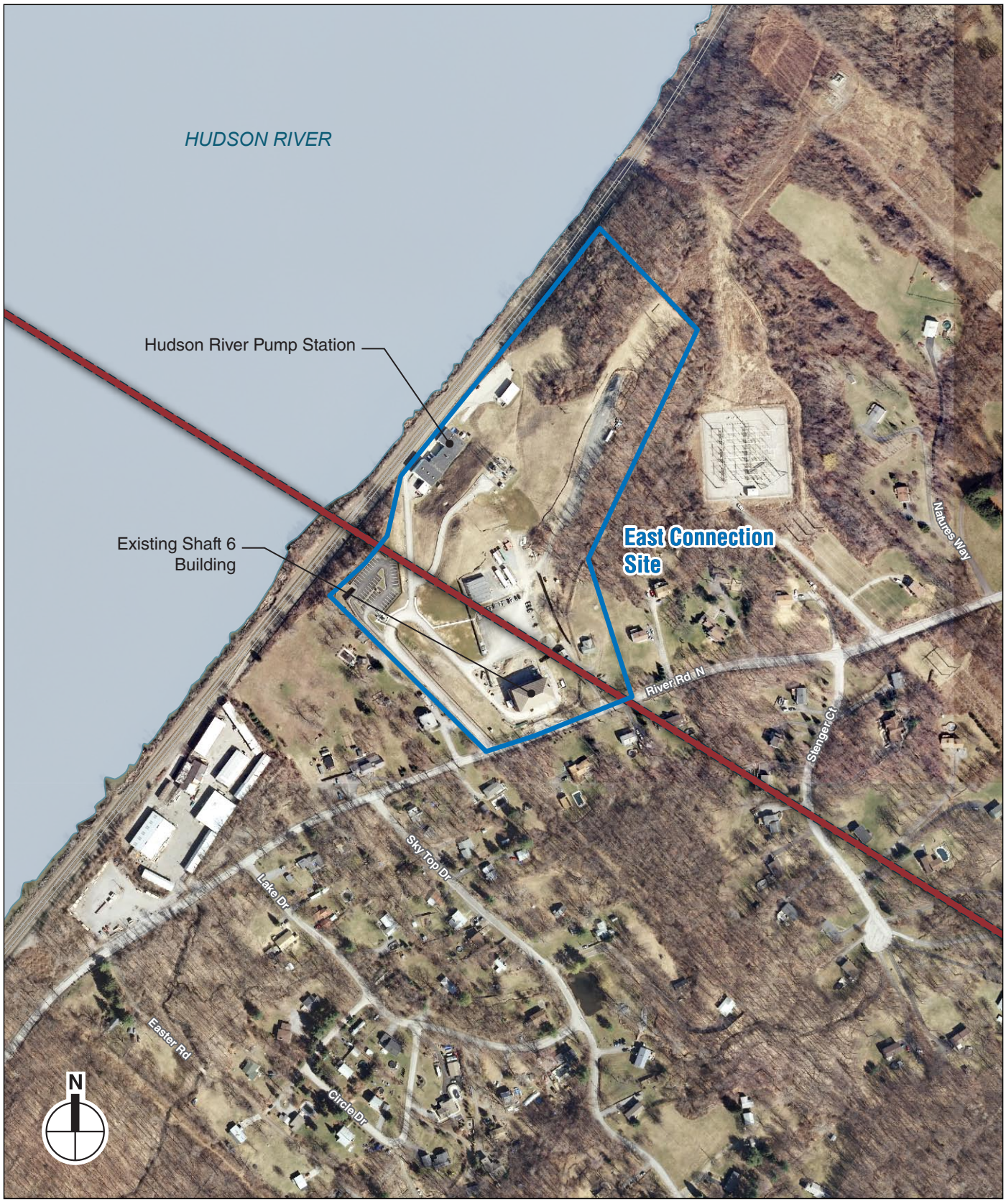

Figure 1-12

East Connection Site: Existing Conditions

11.22.11

Figure 1-13

East Connection Site: Main Construction Elements

Parking would be provided to accommodate the maximum number of construction workers, construction manager staff, and visitors during the construction phases. Parking areas could shift within the east connection site depending on the phase of construction, the number of parking spaces needed to accommodate the construction workers, and the location of available area within the site.

Storm Drainage System
A stormwater basin to detain and treat stormwater runoff during all phases of construction would be developed on the east connection site and connected to the site's existing stormwater collection system.

Work Areas
Various work areas would be located throughout the east connection site depending on the phase of construction, including areas for the temporary stockpiling of excavated material (i.e., muck) from the shaft, support construction equipment and vehicles, and drill rigs.

Power Supply
Power would be supplied at the east connection site by a new supply feeder from CHG&E for all stages of construction. Back-up power generation would be used at the east connection site for life safety reasons only.

Water Supply
Both potable and non-potable water would be needed at the site to support construction activities. Potable water would be trucked in to the east connection site and stored in tanks. Non-potable water would be supplied by an existing tunnel riser during Project 1, and from Hudson River during Project 2B.

Off-Site Roadway Improvements
Construction truck deliveries and related truck traffic would be routed south on River Road through the Hamlet of Chelsea to Chelsea Road and Route 9D.

In consultation with local transportation representatives, DEP has agreed to roadway pavement monitoring on local roads accessed by trucks for the east connection site. DEP would require its contractor to videotape and assess roadway pavement conditions on both River and Chelsea Roads before Project 1 construction, and would conduct annual meetings after the winter with town and county roadway representatives to determine the need for pavement repairs as a result of Project 1 traffic; based on this consultation, DEP would make the necessary pavement repairs.

Off-Site Muck Disposal Site
Muck that would be removed during shaft construction activities would be transported by truck to an off-site location. At this time, a location has not been identified. All excavated rock, soil, or fill materials requiring off-site disposal would be handled and disposed of, or reused, in accordance with applicable regulatory requirements.

DEP would require the contractor to identify disposal locations, routes to and from these locations, document material disposed, and document acceptance from the disposal locations. In addition, DEP would require the contractor to demonstrate that the selected disposal locations would have approved SWPPPs and stormwater permits and/or otherwise demonstrate compliance with federal, state, and local stormwater regulations prior to disposal of excavated material.

Additional Project 1 Commitments
During project construction (for both Project 1 and Project 2B), DEP would require that all trucks associated with project construction depart toward and arrive from south of the east connection site on River Road and utilize Chelsea Road for connection with Route 9D.

In addition, during Project 1 DEP would prohibit trucking activities at the east connection site (other than concrete trucks) between the hours of 11 PM and 7 AM.

BYPASS TUNNEL

The bypass tunnel would extend between the west and east connection sites. As discussed above, the exact route of the bypass tunnel has not been determined, but it is assumed to be constructed approximately 1,725 feet to the north of the existing RWBT. The tunnel would be located approximately 600 feet below the Hudson River water surface with depth below ground surface varying from 600 to 900 feet. It will be approximately parallel to the north and at the same depth as the existing RWBT. The bypass tunnel would be sized to accommodate the full Delaware Aqueduct capacity (i.e., approximately 900 mgd).

1.0-4.2 PROJECT 2A: WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT

As discussed above, the Delaware Aqueduct is critical to the New York City water supply system. Shutting down the Delaware Aqueduct during 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 ready the water supply system for the effects of the shutdown period.

To date, DEP has identified and is currently evaluating five supplemental water supply sources that could be activated during the shutdown to ensure the available water supply during the shutdown period. The potential augmentation projects are as follows:

- Demand Management
- Upper Catskill Aqueduct Optimization
- Queens Groundwater Reactivation
- New Jersey Interconnection
- Nassau County Interconnection

In addition, during the shutdown period, water flowing into the Delaware watershed reservoirs would not be diverted to the RWBT. Therefore, potential projects may be necessary to accommodate the cessation of flow in the RWBT, since water that would normally flow through the RWBT would flow to the existing basins downstream of the diversion dams.

These projects are varied in scope and location (see **Figure 1-14**). 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 are in the preliminary stage of facility planning and are conceptual at this time. It is possible that as project planning continues, one or more of the projects identified in this EIS may not move forward and/or additional projects may be identified.[5]

This chapter provides a brief summary description of each of these projects. Detailed project descriptions for each of the projects, including a preliminary list of actions and approvals necessary to implement each project and an estimated timeframe for when each project would be implemented, are provided in Chapter 3, "Probable Impacts of Project 2A—Water Supply System Augmentation and Improvement." That chapter's subsections also include a generic assessment of the potential impacts from each project.

DEMAND MANAGEMENT

DEP has an ongoing demand management program that will continue to maintain current water demand levels and potentially reduce water demand despite projected population growth in time for Project 2B.

DEP's policy and experience is that saving water is the most cost-effective and environmentally benign method of ensuring an ample supply of water for the region. The City's water demand management programs have been developed in cooperation and collaboration with regulators, non-governmental organizations, citizens and businesses over the last 30 years. With the City's population expected to rise to 9.1 million by 2030, water efficiency will continue to play an important role, not just to help assure ample water supply but also to assist in meeting goals to reduce combined sewer overflow by creating additional storage and treatment capacity in WWTPs, which will allow DEP to meet water quality standards.

In the past, DEP has implemented 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

[5] As stated above, DEP will undertake a second EIS that will provide further details and will quantitatively assess the potential impacts from Project 2A in detail. 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.

12.16.11

Projects Proposed to Supplement the DEP Water Supply System

Delaware Watershed Reservoir Improvements

Figure 1-14

Water Supply System Augmentation and Improvement

level and allows customers to monitor their water usage. It also enables DEP's Water Leak Notification Program, which can detect unknown leaks by monitoring spikes in usage. Due to AMR, extensive metering and Federal, State and Local requirements for low flow fixtures, water demand has declined approximately 30 percent since the early 1990s. Additional ongoing water efficiency programs such as leak management, open hydrant emergency response, water saving kits and residential surveys continue to yield water savings. Various components of the education program are administered through school programs, public events, water conservation seminars, and DEP's website.

DEP would continue to develop both short-term and long-term strategies that could reduce demand during and beyond Project 2B. In addition, DEP would implement a robust public information campaign, including newspaper articles, TV news features, and radio messages to convey the importance of and encourage water conservation.

A more detailed description of this project is presented in Chapter 3, Section 3.2, "Demand Management."

UPPER CATSKILL AQUEDUCT OPTIMIZATION

The Upper Catskill Aqueduct Optimization project would consist of three main components: (1) cleaning and/or lining the aqueduct; (2) chemical addition; and (3) constructing and replacing air vents. All of these components would occur in the section of the aqueduct between the Ashokan and Kensico Reservoirs. Together, these components could improve the capacity of the Catskill Aqueduct to supply water.

- **Cleaning and/or Lining**. This component of the Upper 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.
- **Chemical Addition**. Historical records show that chlorine was routinely added to the Ashokan headwaters to reduce the thickness of wall deposits and maintain Aqueduct capacity. By reintroducing this program, it is anticipated that the benefits achieved by cleaning and/or lining the aqueduct would be maintained. In addition, it is possible that chemical addition alone could provide a capacity increase even without cleaning or lining of the Aqueduct. The addition of chlorine into the Aqueduct at its Ashokan intake location may require the installation of a dechlorination facility at its discharge to Kensico Reservoir.
- **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 Upper 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.

A more detailed description of this project is presented in Chapter 3, Section 3.3, "Upper Catskill Aqueduct Optimization."

QUEENS GROUNDWATER REACTIVATION

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 Reactivation project would consist of the reactivation of groundwater wells during Project 2B.

A more detailed description of this project is presented in Chapter 3, Section 3.4, "Queens Groundwater Reactivation."

NEW JERSEY 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.

A more detailed description of this project is presented in Chapter 3, Section 3.5, "New Jersey Interconnection."

NASSAU COUNTY INTERCONNECTION

This project would consist of the construction of a hydraulic connection to source water from Nassau County. The proposed interconnection(s) 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.

A more detailed description of this project is presented in Chapter 3, Section 3.6, "Nassau County Interconnection."

DELAWARE WATERSHED RESERVOIR IMPROVEMENTS

When the Delaware Aqueduct is shut down during Project 2B, water flowing into 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, would need to be managed differently.

It is possible that at one or more of the reservoirs, construction of limited facilities would be required to facilitate and control releases greater than what is currently possible with existing infrastructure. (See Chapter 4, Section 4-6, "Effects of Delaware Watershed Reservoir Releases." In addition, a detailed description of this work will be presented in the second EIS.)

1.0-4.3 PROJECT 2B: BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

Project 2B would consist of the connection of the new 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 Project 2B 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 1.0-4.2, above.

BYPASS TUNNEL CONNECTION

To connect the bypass tunnel to the existing RWBT, the final bypass tunnel segments would be constructed. These segments, or connector tunnels, would likely be several hundred feet in length and extend between the shaft and the existing tunnel. Before making the connection, however, flows within the RWBT would be stopped and the tunnel unwatered. The east connection site (Shaft 6) would likely be used to unwater the tunnel. Once the tunnel is unwatered, the bypass tunnel would be connected to the existing tunnel.

As described above, inundation plugs could be constructed to seal off the existing tunnel in the event of excessive inflow from the Hudson River. Initial construction of the inundation plugs would begin during construction of Project 1; if needed, the inundation plugs themselves would then be completed during Project 2B. If inundations plugs are required, portions of the tunnel would also be unwatered at the west connection site.

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. Construction activity at the surface is anticipated to be more limited than during Project 1.

To meet the project schedule and minimize the time that the tunnel is out of service, DEP would not prohibit trucking activities to or from the east connection site between the hours of 11 PM and 7 AM during Project 2B construction.

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 and to various areas of the RWBT.

It is anticipated that Shafts 1, 2A, 8, and 9 of the Delaware Aqueduct would 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.

1.0-4.4 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.

No additional workers or substantial vehicle trips would result from the project at the east or west connection sites or within the water supply system once the bypass tunnel is operational. Maintenance of the west connection site would generate only a minimal increase in on-site vehicular activity. These maintenance activities would include security inspections, maintenance of site landscaping, and annual visual inspections of the shaft. Maintenance of the east connection site (Shaft 6) would be similar to existing conditions since this site is in active use by DEP.

SITE RESTORATION

West Connection Site

On the west connection site at the conclusion of Project 2B, the construction offices, storage trailers, and construction equipment and support facilities (e.g., the grout/concrete batch plant, dewatering treatment plant) would be removed, and no above-grade structures would remain other than a fence around the below ground shaft. At the entrance to the site, the traffic signal installed for construction would be removed. The northbound left-turn lane and southbound left-turn lane would remain in place. A portion of the interior roadway would be retained to provide future access to the shaft (Shaft 5B) should it be necessary; Shaft 5B itself would be capped and then covered with a concrete cover and soil. In the areas not occupied by the internal roadway and the shaft, the site would be restored. While the specific details of the restoration plan are still being developed, it is anticipated that the restoration plan would include a combination of planting meadow habitat, with shrubs and some trees (see **Figure 1-15**). Tree species selected may include those with the greatest potential to eventually provide Indiana bat summer roosting habitat, such as shagbark hickory. Vegetation planted as part of the restoration plan would include only native indigenous species to this area of New York.

12.13.11

Figure 1-15

West Connection Site: Post Construction Plan

Upon completion of construction (Project 1 and Project 2B), it is possible that DEP would sell tax parcel 8-1-15.3; it is assumed that the existing vacant house on this parcel would be re-occupied and used as a private residential property.

The dewatering pipeline and water main extension would no longer be in use by DEP. If suitable alternative purposes are found for use by the Town of Newburgh, a separate assessment would be conducted by the Town.

East Connection Site

At the conclusion of Project 2B, the shaft on the east connection site (Shaft 6B) would be capped with a concrete cover and soil. The construction offices, storage trailers, and equipment would be removed. Both the lower parking area and the upper parking area, as well as the graded surface for the inundation plug, would be removed and areas regraded and replanted. The main site driveway would be retained and would continue to provide access to the Hudson River Pump Station at the lower portion of the site and the Shaft 6 superstructure on the upper portion of the site. The internal driveway providing access to the Shaft 6B area would be retained to allow for any future access to the shaft should it be necessary. Shaft 6B itself would be capped and then covered with a concrete cover and soil, and would not be visible from the property line. A restoration program would be completed for portions of the site and would include areas of steep meadow; other areas would be reforested. In addition, certain areas would be maintained as lawn area to allow for future access (see **Figure 1-16**).

WAPPINGER CONNECTION TO RWBT

Upon completion of Projects 1, 2A, and 2B, DEP would make available to the Town of Wappinger a connection to the RWBT. This would consist of a tap only. The Town of Wappinger will conduct its own environmental analyses, including an analysis of the impact of construction and use of any distribution lines, additional piping, or treatment necessary for the distribution of water within the Town of Wappinger.

1.0-5 PROGRAM SCHEDULE AND PHASING

1.0-5.1 PROJECT 1: SHAFT AND BYPASS TUNNEL CONSTRUCTION

Project 1 would begin with site preparation and construction of the shafts at the west and east connection sites, which would start in 2013 and be complete in 2015. Construction of the bypass tunnel itself would begin in 2015 and be complete in 2020. Specifically, tunnel excavation would be complete in 2018 with tunnel lining and Project 1 demobilization/preparation for Project 2B expected in 2020.

As noted above, further specifics on construction phasing and activities for Project 1 is provided in Chapter 2, Section 2.1, “Description of Project 1, Shaft and Bypass Tunnel Construction.”

East Connection Site

Existing Buildings to Remain

Roadways

0 50 100 FEET

SCALE

Figure 1-16

East Connection Site: Proposed Site Restoration Plan (Illustrative)

1.0-5.2 PROJECT 2A: WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT

Since these projects are critical to support the bypass tunnel connection, the implementation of Demand Management efforts, Upper Catskill Aqueduct Optimization, Queens Groundwater Reactivation, New Jersey Interconnection, Nassau County Interconnection, and Delaware Watershed Reservoir Improvements would be completed by 2020 before Project 2B begins. As noted above, further specifics of the specific timing for implementation of the Project 2A projects is provided in Chapter 3, Section 3.1, "Introduction."

1.0-5.3 PROJECT 2B: BYPASS TUNNEL CONNECTION AND RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

When the bypass tunnel 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 this work would begin in 2020 and between 6 and 15 months would be required to complete the bypass tunnel connection. A range for the duration of Project 2B has been estimated to reflect the potential conditions that may be encountered during this phase of the project. In addition, commencement and duration of the work would be dependent on a number of factors: the season, whether the year of commencement is a wet or dry year, and the overall readiness of the water supply system. DEP will continue to evaluate the potential duration of Project 2B as design progresses, and further information will be provided in the second EIS.

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.

As noted above, specific Project 2B construction phases and tasks are described in Chapter 4, Section 4.1.

1.0-5.4 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. This is expected to occur in 2021 or 2022, depending on the length of time required to complete the connection. Operation of the bypass tunnel would not result in any change in water delivery capacity.

1.0-6 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 1-2 through 1-4**, and are organized by project.

Table 1-2
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)	Individual Permit for dewatering pipeline outfall into Hudson River; Nationwide Permit 12—Utility Line Activities; Nationwide Permit 7—Outfall Structures and Associated Intake Structures for work in/adjacent to wetlands.
United States Fish and Wildlife Service	Consultation under Section 7 of the Endangered Species Act; Biological Assessment; Federal Fish and Wildlife Permit
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
New York State Department of Environmental Conservation (NYSDEC)	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)
	SPDES Multisector General Permit for Stormwater Discharges Associated with Industrial Activity (GP-06-002)
	Individual SPDES Permit or Application Form NY-2C for Industrial Facilities (Shaft dewatering activities requiring discharge to surface water)
	Stormwater Pollution Prevention Plan for Stormwater Discharges
	Section 401 Water Quality Certification
	Sanitary Wastewater Pump and Haul Approval
	Air Facility Registration
	Waste Transporter Permit for transport of excavated materials
	Hazardous Substance Bulk Storage Registration (Chemical Bulk Storage Registration)
	Petroleum Bulk Storage Facility Registration
	Natural Heritage Program Consultation—consultation to determine potential presence of threatened or endangered species listed in New York State
	Consultation to determine potential presence of archaeological and/or historic resources and determine project's potential effects
New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP)	Application for Use of Lands Underwater
New York State Office of General Services (OGS)	Approval of Plans for Public Water Supply Improvement
New York State Department of Health (NYSDOH)	State Environmental Review Certification for New York State Revolving Fund
New York State Department of Transportation (NYSDOT)	Major Traffic Generator Permit
	Special Hauling and Load Overweight Permit
	Highway Work Permit
	Use and Occupancy Permit

Table 1-2 (cont'd)
Potential Major Permits, Approvals, Consultation, and Coordination—
Project 1: Shaft and Bypass Tunnel Construction

Agency/Entity	Permit/Approval/Consultation/Coordination
AREA MUNICIPALITIES	
New York City	
Public Design Commission of New York City	Design Commission Approval
Dutchess County	
Dutchess County Planning Approval and Public Works Coordination	Highway Work and Traffic Enhancement Permits; General Coordination
Dutchess County Health Department	Potable Water Supply
Orange County	
Orange County Planning Approval and Public Works Coordination	Highway Work and Traffic Enhancement Permits; General Coordination
Orange County Health Department	Potable Water Supply
Town of Wappinger	
Town of Wappinger Planning Board	Site Plan Approval
Town of Wappinger Zoning Board of Appeals	Area variance for lot coverage; possible additional variances required
Town of Wappinger Building Department	Blasting Permits; Tree Harvesting Registration
Town of Wappinger Highway Superintendent	Highway Work and Traffic Enhancement Permits; General Coordination
Town of Newburgh	
Town of Newburgh Planning Board	Site Plan Approval; Clearing and Grading Permits
Town of Newburgh Zoning Board of Appeals	Variance from Noise code
Town of Newburgh Building Department	Blasting Permits
Town of Newburgh Highway Superintendant	Highway Work and Traffic Enhancement Permits; General Coordination
OTHER ENTITIES	
DEP Police	Coordination
MTA Metro North Railroad	Coordination
Midtown Tracking Ventures	Coordination
CSX Transportation Inc.	Coordination
Central Hudson Gas & Electric	Coordination
Dynegy	Access Agreement

Table 1-3
Potential Major Permits, Approvals, Consultation, and Coordination—
Project 2A: Water Supply System Augmentation and Improvement

Regulatory Agency	Upper Catskill Optimization	Queens Groundwater Reactivation	Nassau County Interconnection	New Jersey 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	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 Health and Mental 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	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	X	X	X
NYC Community Boards		X	X	X
NYC Borough Presidents		X	X	X

Table 1-4
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
FEDERAL	
U.S. Army Corps of Engineers(USACE)	Joint Permit Application (for Freshwater Wetlands, related to elimination of leaks)
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

The proposed program would also require the use of eminent domain (N.Y. Eminent Domain Procedure Law; N.Y. Public Authorities Law §§1266, 1267) related to the sub-surface easements needed for the bypass tunnel route. At this time, the exact route of the proposed bypass tunnel has not been determined. When the exact route of the bypass tunnel has been finalized, owners would be contacted to start the process of obtaining subsurface easements.

1.0-7 PUBLIC PARTICIPATION PROCESS

1.0-7.1 PUBLIC MEETINGS AND COORDINATION WITH LOCAL MUNICIPALITIES

Throughout the public review process for the Delaware Aqueduct Rondout-West Branch Tunnel Repair program, various government agencies, community organizations, and other interested parties were given the opportunity to comment on the Draft Scope of Work published on May 3, 2011.

On May 3, 2011, DEP issued a Positive Declaration and Notice of Intent to Prepare a Draft EIS (DEIS) on the proposed program, in accordance with SEQRA and CEQR procedures. A Draft Scope of Work, prepared in accordance with SEQRA and CEQR regulations and the guidance of the city's *CEQR Technical Manual*, was also distributed on May 3, 2011, for public review and

comment. Copies of the document were made available for public review at the Town of Newburgh Town Hall, the Town of Wappinger Town Hall, and DEP offices in Queens, Valhalla, and Kingston. The document was also made available for public review on DEP's website.

To solicit public comments on the proposed program and, specifically, on the scope of the environmental analysis, public meetings on the Draft Scope were held on June 7, 2011, at the Town of Wappinger Town Hall, 20 Middlebush Road, Wappingers Falls, NY, and July 14, 2011, at Wappingers Junior High School, 30 Major McDonald Way, Wappingers Falls, NY; on June 9, 2011, at the Town of Newburgh Town Hall, 1496 Route 300, Newburgh, NY; and on June 14, 2011, at the Town of Wawarsing Town Hall, 108 Canal Street, Ellenville, NY. Written comments were also accepted through the public comment period, which was extended and held open until July 29, 2011.

The Final Scope of Work was issued on August 31, 2011. The Final Scope addressed comments received during the public review and finalized changes to assessment methodologies that were made subsequent to publication of the Draft Scope. Responses to the comments received during the public meetings and the subsequent comment period were provided as part of the Final Scope.

In addition to these public meetings, DEP met regularly with the Towns of Wappinger and Newburgh, to present the information under development for the EIS, and to review aspects of the program, including potential temporary construction impacts and methods to lessen as much as possible their effects on nearby residents.

1.0-7.2 STATE AND NEW YORK CITY ENVIRONMENTAL QUALITY REVIEW

All state, county, and local government agencies in New York, except the State Legislature and the courts, must comply with the State Environmental Quality Review Act (SEQRA). Pursuant to SEQRA and its implementing regulations, New York City has established rules for its own environmental quality review, abbreviated as CEQR. The environmental review process provides a means for decision-makers to systematically consider environmental effects along with other aspects of project planning and design, to propose reasonable alternatives, and to identify practicable and feasible measures to mitigate significant adverse environmental effects. The process also facilitates public involvement in the process by providing the opportunity for public comment on the DEIS. The environmental review process is outlined below.

- **Establishing a Lead Agency.** Under SEQRA and CEQR, the "lead agency" is the public entity responsible for conducting the environmental review. Usually, the lead agency is also the entity primarily responsible for carrying out, funding, or approving a proposed action. For the Delaware Aqueduct Rondout-West Branch Tunnel Repair Program, the lead agency is DEP.
- **Determination of Significance.** The lead agency's first charge is to determine whether a proposed action might have a significant adverse impact on the environment. To make this

determination, the lead agency prepared an Environmental Assessment Form (EAF). Based on the information contained in the EAF, the lead agency determined that the proposed program could have the potential to result in significant adverse environmental impacts and issued a Positive Declaration on May 3, 2011, initiating the preparation of an EIS.

- **Scoping.** "Scoping," or creating the scope of work, focuses the environmental impact analyses on the key issues to be studied. In addition to the Positive Declaration, the lead agency issued a Draft Scope of Work for the EIS on May 3, 2011. This was distributed to government agencies, elected officials, and other stakeholders. The document was also made available for review by the public at several locations, including DEP's website. See "Public Meetings and Coordination," above for more details.
- **Draft Environmental Impact Statement (DEIS).** The DEIS, prepared in accordance with the final Scope of Work, is a comprehensive document that systematically considers the expected environmental effects of a proposed action, evaluates reasonable alternatives, and identifies feasible mitigation measures that, to the maximum extent practicable, address the significant adverse environmental impacts of the proposed action. The lead agency reviewed all aspects of the DEIS to determine its adequacy and adherence to the work effort outlined in the final Scope of Work. Once the lead agency was satisfied that the DEIS was complete for the purposes of public review and comment, it issued a Notice of Completion and circulated the DEIS for review among government agencies and the general public. Circulation of the DEIS marks the beginning of a public review period, during which time public hearings will be held to solicit comments on the DEIS. The public hearings are scheduled as follows:

  - **Town of Newburgh**

    Monday, January 23, 2012
    7:00 – 9:00 PM
    Town of Newburgh Town Hall
    1496 Route 300, Newburgh, NY 12550
    (snow date Monday, January 30, 2012)

  - **Town of Wappinger**

    Tuesday, January 24, 2012
    7:00 – 9:00 PM
    Wappingers Junior High School
    30 Major McDonald Way
    Wappingers Falls, NY 12590
    (snow date Tuesday, January 31, 2012)

  - **Town of Wawarsing**

    Wednesday, January 25, 2012
    6:00 – 9:00 PM
    Wawarsing Town Hall

108 Canal Street
Ellenville, NY 12428
(snow date Wednesday, February 1, 2012)

- **Public Review.** Publication of the DEIS and issuance of the Notice of Completion signal the beginning of the public review period. During this time, which must extend for a minimum of 30 days, the public may review and comment on the DEIS, either in writing or at a public hearing convened for the purpose of receiving such comments. The lead agency must publish a notice of the hearing at least 14 days before it takes place and must accept written comments for at least 10 days following the close of the hearing. The public comment period closes on Friday, February 17, 2012. All substantive comments received on the DEIS, at the hearing, or during the comment period become part of the SEQRA and CEQR record and will be summarized and responded to in the Final EIS (FEIS).
- **Final Environmental Impact Statement (FEIS).** Once the public comment period for the DEIS closes, the lead agency will prepare the FEIS. This document will include a summary of, and response to, each substantive comment made about the DEIS. Once the lead agency determines that the FEIS is complete, a Notice of Completion will be issued and the FEIS will be circulated.
- **Statement of Findings.** To demonstrate that the responsible public decision-maker has taken a hard look at the environmental consequences of a proposed action, any public agency taking a discretionary action regarding a project must adopt a formal set of written findings, reflecting its conclusions about the significant adverse environmental impacts, potential alternatives, and potential mitigation measures. The findings may not be adopted until 10 days after the Notice of Completion has been issued for the FEIS. Once findings are adopted, the lead agency and involved agencies may take their actions (or "no action").

1.0-8 ANALYTICAL FRAMEWORK FOR ENVIRONMENTAL REVIEW

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. A project's potential to result in significant adverse impacts upon completion and operation is then analyzed

The Delaware Aqueduct Rondout-West Branch Tunnel Repair program requires a modified analytical approach since it has a substantial multi-year construction effort related to various project elements over a broad geographic area, and relatively limited operational impacts. In addition, the designs of Project 2A, Water Supply System Augmentation and Improvement, and Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, will not be available for several years. Therefore, as described above, DEP is undertaking a two-part approach to the EIS for the proposed program.

This first EIS provides a detailed analysis of Project 1, Shaft and Bypass Tunnel Construction, and a mostly qualitative analysis, to the extent possible, of Projects 2A and 2B. For the detailed analysis of Project 1, relevant analytical terms used in the environmental review process are described:

- **Existing conditions**. The assessment of existing conditions establishes a baseline—not against which Project 1 is measured, but from which future conditions can be projected. The prediction of future conditions begins with an assessment of existing conditions because these can be measured and observed. Generally, existing conditions are evaluated for the study areas and time periods most likely to be affected by the proposed project. For example, the existing traffic conditions are analyzed during the time periods when the greatest numbers of new vehicular trips during Project 1, Shaft and Bypass Tunnel Construction, to and from the connection sites are projected to occur.
- **No Build condition**. Using existing conditions as a baseline, conditions known to occur or expected to occur in the future, regardless of Project 1, are then evaluated for the interim and operational analysis years (see "Analysis Year," below). This is the No Build or future without Project 1 condition and is the baseline condition against which the effects of the Project 1 can be measured.
- **Analysis year**. The analysis year refers to a particular future year(s) for which an EIS analyzes a proposed project'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 Project 1), there could be separate interim analysis years or conditions for the traffic and air quality analyses since the peak year for traffic may differ from the peak year for air emissions (see Sections 2.10 and 2.11 for example).

This document uses methodologies and follows the guidelines set forth in the Final Scope and the *CEQR Technical Manual*, where applicable. These are considered to be the most appropriate technical analysis methods and guidelines for environmental impact assessment of discretionary actions in New York City. However, since the proposed program would involve construction is locations outside New York City, locally and/or state-accepted EIS methodologies have been applied in cases where New York City methodologies are either irrelevant or less stringent.

For Project 1, all environmental analysis areas identified in the *CEQR Technical Manual* are assessed in this DEIS, except growth-inducement, which was screened (see Section 2.18).

Study areas relevant for each analysis category are defined. These are the geographic areas most likely to be potentially affected by the proposed project for a given category. Appropriate study areas differ depending on the type of analysis. The specific methods and study areas are discussed in the individual technical analysis chapters.

1.0-9 ORGANIZATION OF THIS EIS

This EIS is organized as follows:

- Following this "Program Description," **Chapter 2** details the construction program for Project 1, Shaft and Bypass Tunnel Construction (**Section 2.1**), the potential impacts that could result from Project 1 in a full range of technical areas (**Sections 2.1 through 2.18**), and potential mitigation measures to address any possible construction-related impacts (**Section 2.19**).
- In **Chapter 3 (Sections 3.1 through 3.6)**, the potential impacts that could result from Project 2A, Water Supply System Augmentation and Improvement, are presented.
- **Chapter 4** details the construction program for Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, in **Section 4.1**. **Sections 4.2 through 4.6** describe potential effects of Project 2B.
- **Chapter 5** describes the potential effects of operating the bypass tunnel.
- Cumulative impacts of the proposed program are described in **Chapter 6**, and **Chapter 7** includes a discussion of the alternatives to the proposed program.
- **Chapter 8** describes unavoidable adverse impacts associated with the proposed program and any irretrievable and irreversible commitment of resources is discussed in **Chapter 9.**
- Technical appendices to the EIS are included at the end of the document. ✷