

## **ES-1 INTRODUCTION AND SUMMARY**

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), a 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 S-1**).

There are two areas of significant leakage in the RWBT, the Wawarsing and Roseton crossings. Together, they leak approximately 35 million gallons of water per day. The Wawarsing crossing can be repaired from within the tunnel; however, the Roseton crossing poses additional challenges. Therefore, DEP plans to construct a bypass tunnel around the leaking areas in Roseton, which would consist of a new tunnel segment to bypass the leaking section, and two shafts at each end—one in the Town of Wappinger, Dutchess County, New York (east connection site), and one in the Town of Newburgh, Orange County, New York (west connection site). This work would begin in 2013 and be completed in 2020 and is referred to as Project 1. Once the shafts and bypass tunnel are constructed, the aqueduct would be shut down and unwatered. At that time the leaks in Wawarsing would be repaired, and the bypass tunnel would be connected to the existing tunnel. This work would begin in 2020 and take between 6 and 15 months; this portion of the proposed program is referred to as Project 2B.

However, to support a shutdown of the aqueduct and connection of the bypass, the city must also implement a number of additional projects to supplement DEP's water supply during the shutdown period. The city is currently planning to implement the following projects—referred to as Project 2A—which would be in place by 2020:

- Conservation (Demand Management)
- Optimization of the Catskill Aqueduct to increase its capacity
- Reactivation of the Queens groundwater system
- Interconnections to New Jersey and Nassau County, New York

Before moving forward with the proposed program, however, DEP (as the lead agency) is required to examine the environmental effects and, to the maximum extent practicable, avoid or mitigate significant adverse impacts on the environment. To accomplish this, DEP is undertaking

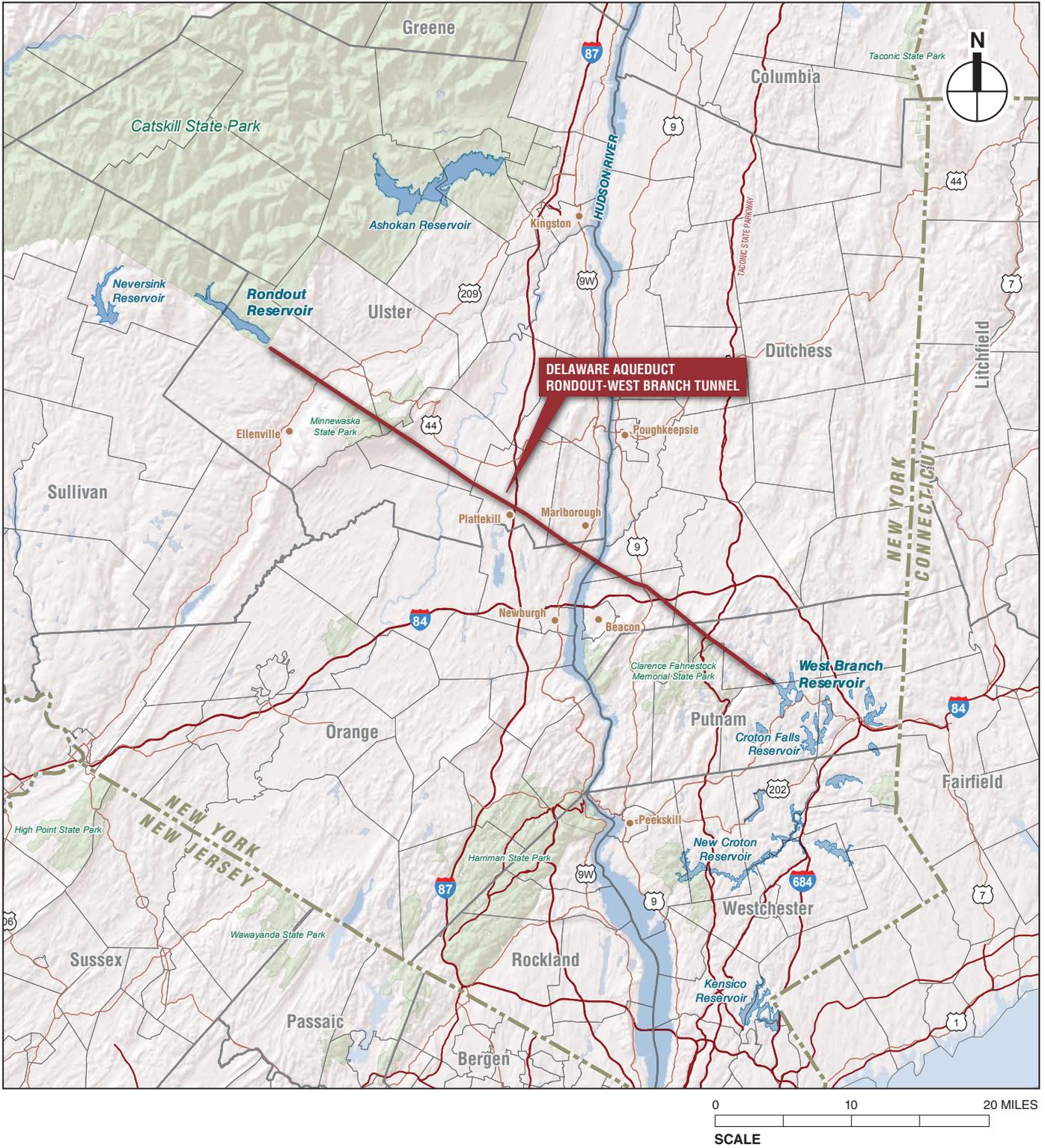


Figure S-1  
Project Location

a two-part approach to the EIS. This EIS provides a detailed analysis of Project 1, shaft and bypass tunnel construction. A second EIS will provide a detailed analysis of the supplemental water supply projects and the connection of the bypass tunnel; however, this EIS does include a generic description of those projects and associated potential impacts are described.

In disclosing impacts, the EIS uses an analytical approach that considers the proposed program's potential adverse impacts on the environment. Therefore, the technical analyses in an EIS typically describes conditions today, and then forecasts these conditions to the future, first without, and then with the proposed project. A project's potential to result in significant adverse impacts once completed and operational is also analyzed.

This EIS assessed potential impacts to a number of technical areas. Based on the analyses, it was determined that construction of Project 1 would not result in significant adverse impacts on land use, zoning, public policy and open space; visual character; historic and archaeological resources; socioeconomic conditions; community facilities; natural resources and water resources; hazardous materials; air quality; energy and greenhouse gas emissions; infrastructure; solid waste; coastal zone consistency; or public health.

However, during Project 1 construction, predicted temporary significant adverse impacts on traffic and noise were determined for both the east and west of Hudson study areas. In addition, a neighborhood character impact was determined in the east of Hudson study area. Mitigation measures to lessen these impacts are proposed and would be incorporated, and many measures have been included in the design that reduced the potential for additional temporary significant adverse impacts. Mitigation measures proposed include signal retimings, upgrading traffic signal controller and detectors, and traffic control plans at impacted intersections, and noise control measures at the construction sites.

While DEP acknowledges that there are some unmitigated temporary significant adverse impacts as part of Project 1, without the Water for the Future Program, the RWBT would continue to leak in both the Roseton and Wawarsing areas, and additional leaks along the RWBT could occur. With the proposed program in place, DEP would be able meet its mandate to provide safe and reliable transmission of drinking water from the watershed in sufficient quantity to consumers to meet all current and future water demands.

DEP encourages the public to comment on this EIS. Public hearings are as follows:

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

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

Wednesday, January 25, 2012  
Wawarsing Town Hall  
108 Canal Street, Ellenville, NY 12428  
6:00 – 9:00 PM.  
(snow date Wednesday, February 1, 2012)

The public comment period closes on Friday, February 17, 2012.

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 New York City Environmental Quality Review (CEQR) process. This EIS has been prepared in conformance with applicable laws and regulations, including Executive Order No. 91, and follows the guidance of the *CEQR Technical Manual* (May 2010). It contains a 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.

Comments can also be submitted in writing to:

Jennifer Farmwald, Project Manager  
Office of Water Supply Infrastructure and Watershed Assessment  
Bureau of Environmental Planning and Analysis  
New York City Department of Environmental Protection  
59-17 Junction Boulevard, 11<sup>th</sup> Floor, Flushing, New York 11373  
Phone: (718) 595-3287  
Fax: (718) 595-4479  
Email: [jfarmwald@dep.nyc.gov](mailto:jfarmwald@dep.nyc.gov)

This Executive Summary is organized as follows:

- Section ES-2, “Background and Planning Context,” provides information on the background and planning context for the proposed program, including an overview of New York City’s water supply system, and a brief summary of how the RWBT was originally constructed, its current conditions, and the planning for its repair.

- Section ES-3, “Purpose and Need for the Proposed Program,” presents the reasons for DEP’s proposal to advance the tunnel repair program, most notably to address the RWBT leaks and ensure the safe and reliable transmission of drinking water.
- Section ES-4, “RWBT Repair Program,” describes the key aspects of Projects 1, 2A, and 2B, with a focus on the construction activity on the west and east connection sites and a summary of potential impacts on the surrounding communities.
- Section ES-5, “Program Schedule and Phasing,” summarizes the timing of the construction efforts by phase; the permits and approvals that would be required from various local, state, and federal agencies; the public participation process to ensure surrounding communities were kept informed and could provide feedback on the proposed program; and how the environmental review for the proposed program is conducted.
- Section ES-6, “Probable Impacts of Project 1 Construction and Mitigation Measures,” discusses the potential temporary significant adverse traffic, noise, and neighborhood character impacts that could result from Project 1 and the measures that would be incorporated into Project 1 construction to eliminate or minimize as much as possible these impacts on surrounding communities.
- Sections ES-7, 8, and 9 briefly explain how Projects 2A and 2B will be more fully analyzed in a second EIS and that operation of the bypass tunnel would have no environmental impacts, respectively.
- Section E-10, “Cumulative Effects of the Water for the Future Program,” discusses the potential for the proposed program to result in two or more individual effects on the environment that, combined, could increase other environmental impacts.
- Section E-11, “Alternatives,” presents summary tables that compare the potential benefits and impacts of other alternatives to the proposed program that were evaluated as part of the EIS.
- Section E-12, “Unavoidable Adverse Impacts,” discusses the potential temporary significant Project 1 traffic, noise, and neighborhood character impacts that could not be fully eliminated by the mitigation measures that would be part of Project 1 construction.
- Section E-13, “Irretrievable and Irreversible Commitment of Resources,” explains how the proposed program would involve the use of certain resources that would then not be able to be used for other projects.

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**ES-2 BACKGROUND AND PLANNING CONTEXT**

**ES-2.1 NEW YORK CITY WATER SUPPLY SYSTEM**

DEP operates and maintains the New York City water supply system and is responsible for providing drinking water to more than 8 million customers in New York City as well as

approximately 1 million upstate customers. The system consists of 19 reservoirs and three controlled lakes with a total storage capacity of approximately 580 billion gallons. The average total system demand is approximately 1.1 billion gallons of water a day (gpd).

There are three upland reservoir systems in New York City's water supply system: the Croton, Catskill, and Delaware systems (see **Figure S-2**), which provide approximately 10, 40, and 50 percent, respectively, of the water supply on an annual average basis. Together, these watersheds encompass a 1,968-square-mile area and all or parts of eight counties in New York and a small portion of western Fairfield County in Connecticut. From these upland storage reservoirs, water flows by gravity to New York City through three aqueducts—New Croton Aqueduct, Catskill Aqueduct, and the Delaware Aqueduct (including the RWBT)—and four tunnels—City Tunnel Nos. 1, 2, and 3, and the Richmond Tunnel.

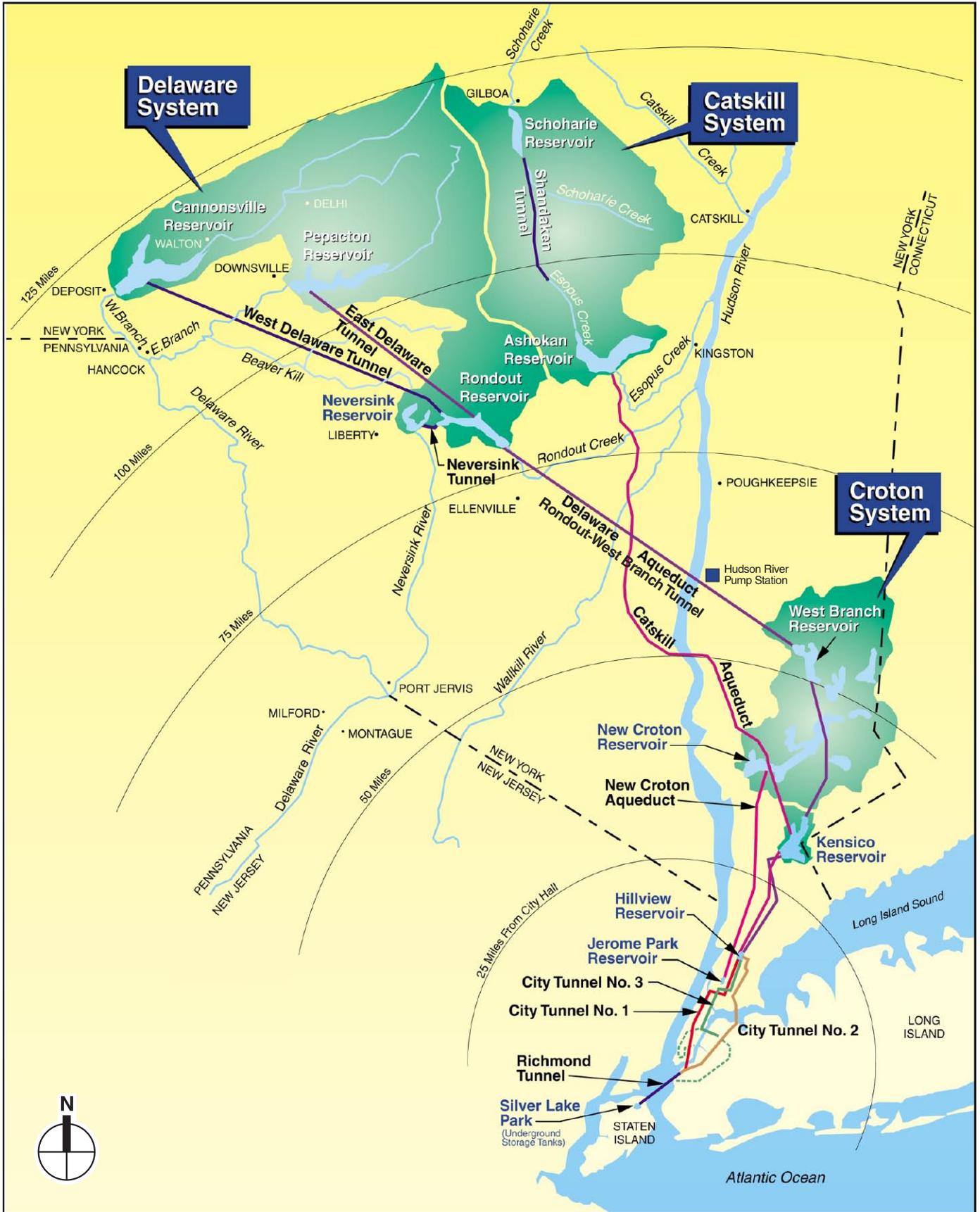
The Delaware watershed consists of four reservoirs: Cannonsville, Pepacton, Neversink, and Rondout. At the Rondout Reservoir, the water is conveyed approximately 45 miles via the RWBT portion of the Delaware Aqueduct to the West Branch Reservoir, located east of the Hudson River in Putnam County (see **Figure S-3**). The RWBT is 13.5 feet in diameter, lined with concrete, and varies in depth from 300 to 2,300 feet below ground (crossing the Hudson River at nearly 600 feet beneath the water surface). The tunnel is a deep rock, pressurized aqueduct that has been in nearly continuous service since 1944. It can convey up to approximately 900 million gallons per day (mgd) of water and delivers an average of 600 mgd annually. All water from the Delaware system flows through the RWBT. Two upstate municipalities are supplied with water from the RWBT: the Town of Newburgh, Orange County, and the Town of Marlborough, Ulster County.

## **ES-2.2      EXISTING RWBT CONSTRUCTION AND GEOLOGY**

During the construction of the RWBT, in zones where the rock was weak or disintegrated, heavy reinforcement and steel interlinings were installed in the tunnel to guard against rupture, excessive leakage and potential collapse. These tunnel sections are known as the *Roseton and Wawarsing crossings*. The Roseton crossing, just west of the Hudson River, includes two sections totaling about 1,030 feet long. The Wawarsing crossing is approximately 600 feet long with multiple contact zones between various rock types. Eleven shafts were excavated along the tunnel route to provide access and/or ventilation during construction (see Figure S-3).

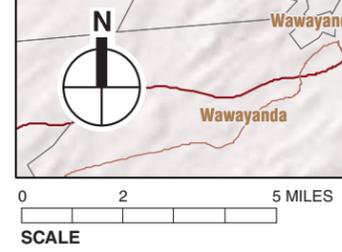
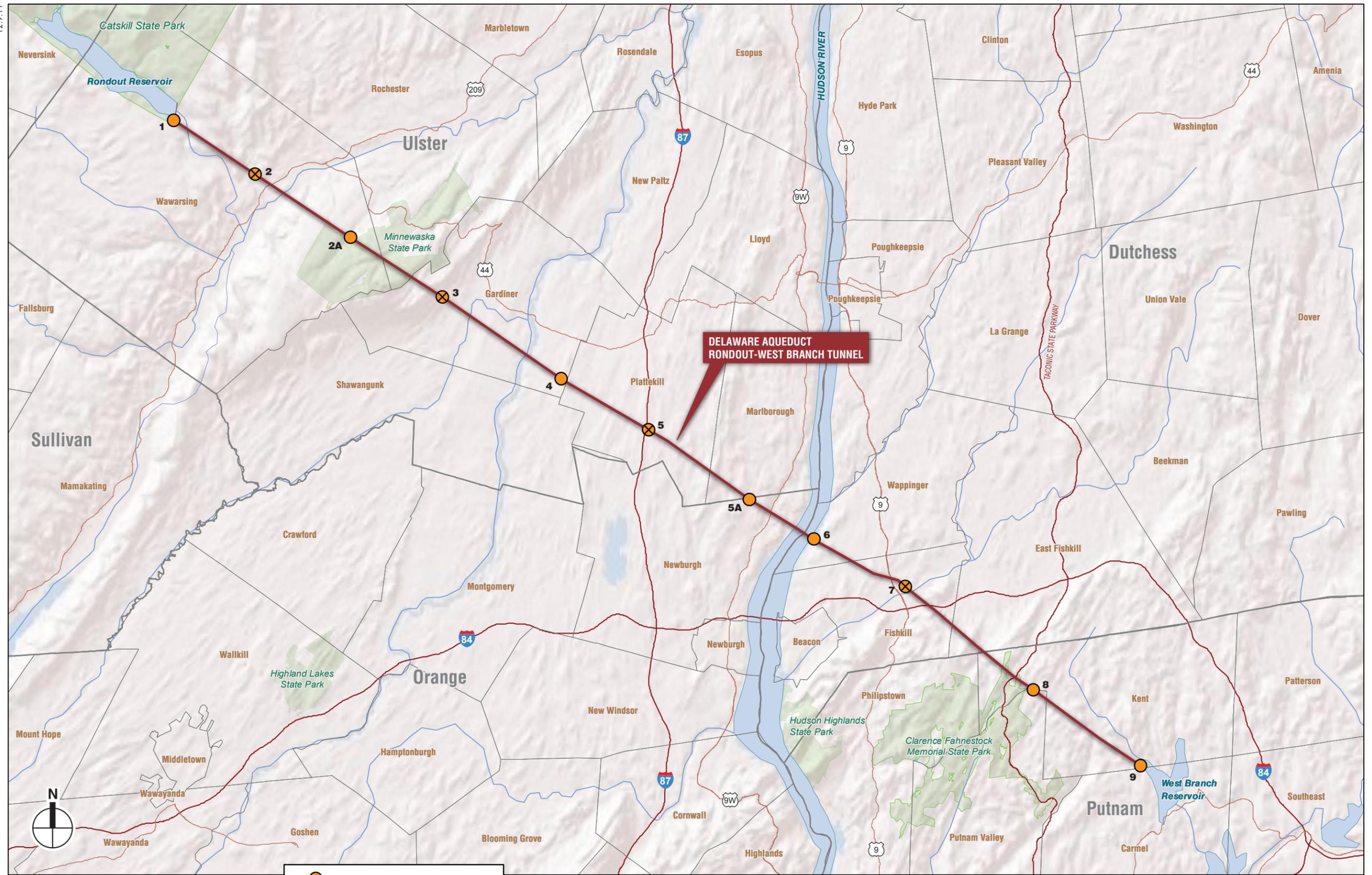
## **ES-2.3      OVERVIEW AND CONDITION OF THE RWBT**

The RWBT was last unwatered and physically inspected in 1957-1958. DEP monitors the RWBT and, since the 1990s, has been investigating the Roseton and Wawarsing crossings in particular. These two RWBT sections appear to be leaking a total of between 10 and 35 mgd of water, depending on the amount of water the aqueduct is carrying. DEP's monitoring efforts have included visual inspections of the tunnel using an unmanned autonomous inspection device



Schematic Not To Scale

Figure S-2  
Water Supply System



- 5A ● Active Shaft Location and Number
- 5 ⊗ Sealed Shaft Location and Number

Figure S-3  
**Rondout-West Branch Tunnel**

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.

#### **ES-2.4 PLANNING FOR THE REPAIR OF THE RWBT**

DEP has undertaken a multitude of planning and design efforts to prepare for the RWBT repair as part of its emergency and long-term planning. Some RWBT improvements have already been constructed or are under construction, others are planned, and others are being evaluated. These projects include: pumping improvements and shaft rehabilitation of Shaft 6 to improve capability to unwater the tunnel (completion expected in 2013); flow metering, instrumentation, and control improvements to allow DEP to continue to investigate the tunnel's condition; and other projects to modernize and improve the water supply system's reliability and aid in Project 2B planning, including the Croton Filtration Plant in the Bronx, NY (completion expected in 2012), Croton Falls, NY, Pumping Station Plant Improvements (Shaft 11) (expected to be complete in 2014), and Cross River, NY, Pumping Station (Shaft 13) (expected to be finished in 2012).

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#### **ES-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 considered repairing the existing RWBT from within the tunnel. However, this alternative was not selected due to the length of time that this repair method would require the RWBT to be out of service. 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.

**ES-4 RONDOUT-WEST BRANCH TUNNEL REPAIR PROGRAM:  
DESCRIPTION OF PROJECTS 1, 2A, AND 2B AND BYPASS TUNNEL  
OPERATION**

**ES-4.1 PROJECT 1: SHAFT AND BYPASS TUNNEL CONSTRUCTION**

***OVERVIEW***

Project 1 would entail the construction of the bypass tunnel around the RWBT’s highest leakage section in Roseton. Bypass tunnel construction would occur underground using a tunnel boring machine (TBM), with staging and support activities at the west and east connection sites (see **Figure S-4**). A TBM is similar to a large diameter drill that excavates a circular tunnel section without disturbance at the surface. A shaft at each connection site would also be required (see **Figure S-5**). These shafts would be excavated to the north of the existing aqueduct alignment along the bypass tunnel to approximately 600 or 900 feet below ground, depending on the RWBT’s depth at each shaft site. During Project 1, the west connection shaft would be used to launch the TBM and the east connection shaft would receive it. The shafts would also be used by workers to access the bypass tunnel, for equipment delivery, and to remove excavated materials.

In addition, a 300-foot “starter tunnel” would be constructed at the bottom of each shaft; the starter tunnel would be larger than the bypass tunnel to allow room to assemble the TBM and prepare it for tunneling. Next, 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 during Project 2B. Finally, “inundation plugs” would also be commenced at the 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 following sections describe existing conditions at the west and east connection sites and the Project 1 work in more detail.

***WEST AND EAST CONNECTION SITES—EXISTING CONDITIONS***

***West Connection Site***

The west connection site is located on the west of New York State Route 9W approximately 1,100 feet north of Old Post Road 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 (see **Figure S-6**).

Most of the steeply sloped site is wooded and undeveloped, and a stream runs across part of it. 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.

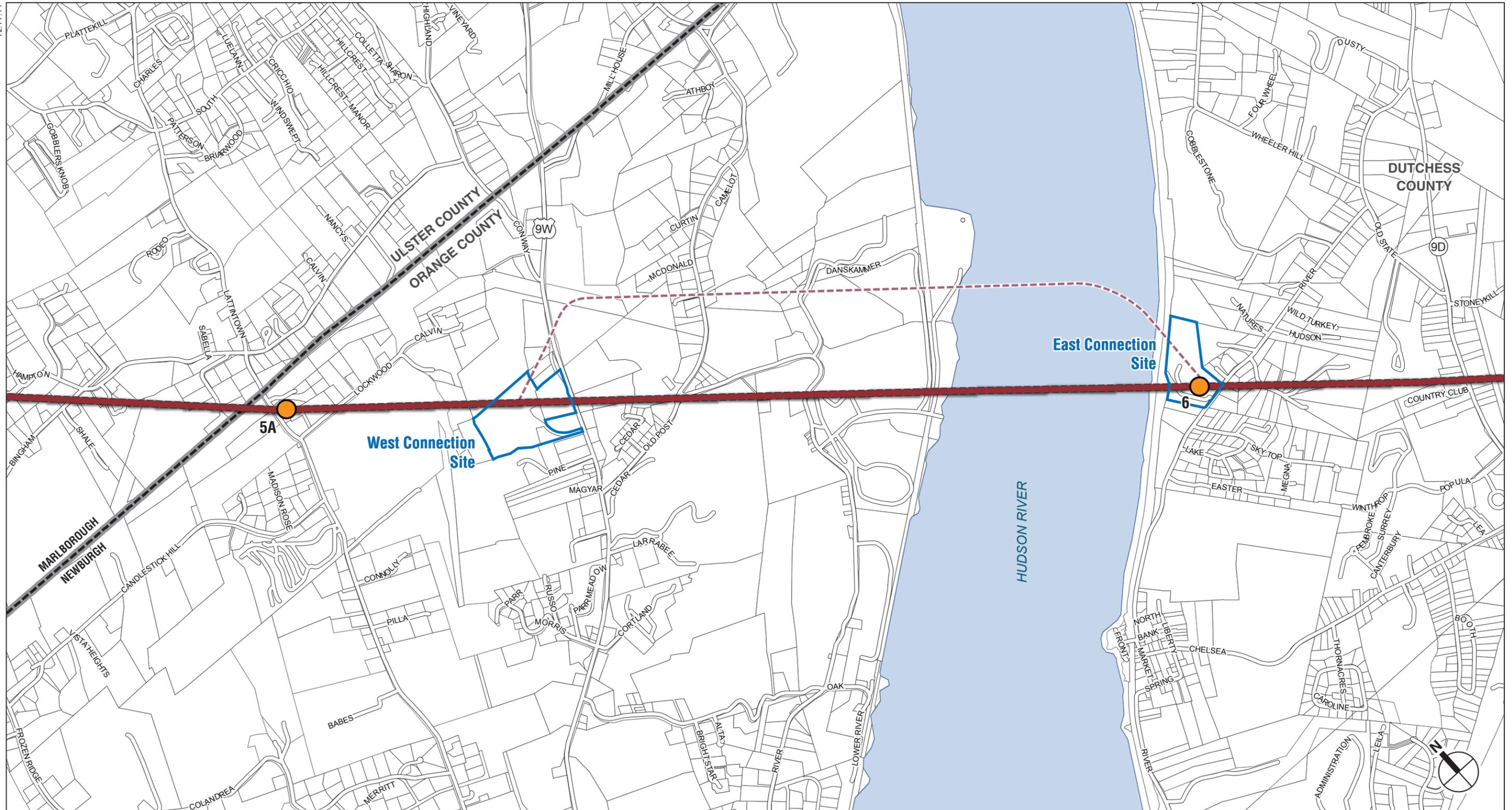
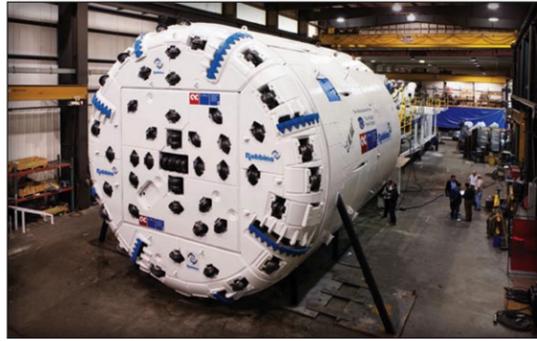
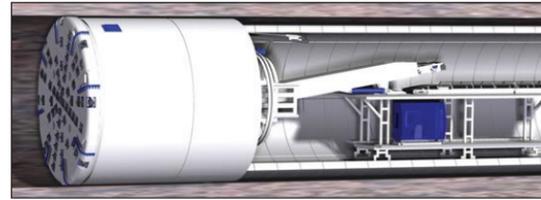


Figure S-4  
Project 1: Shaft and Bypass Tunnel Construction



Tunnel Boring Machine (typical)



Tunnel Boring Machine (typical)

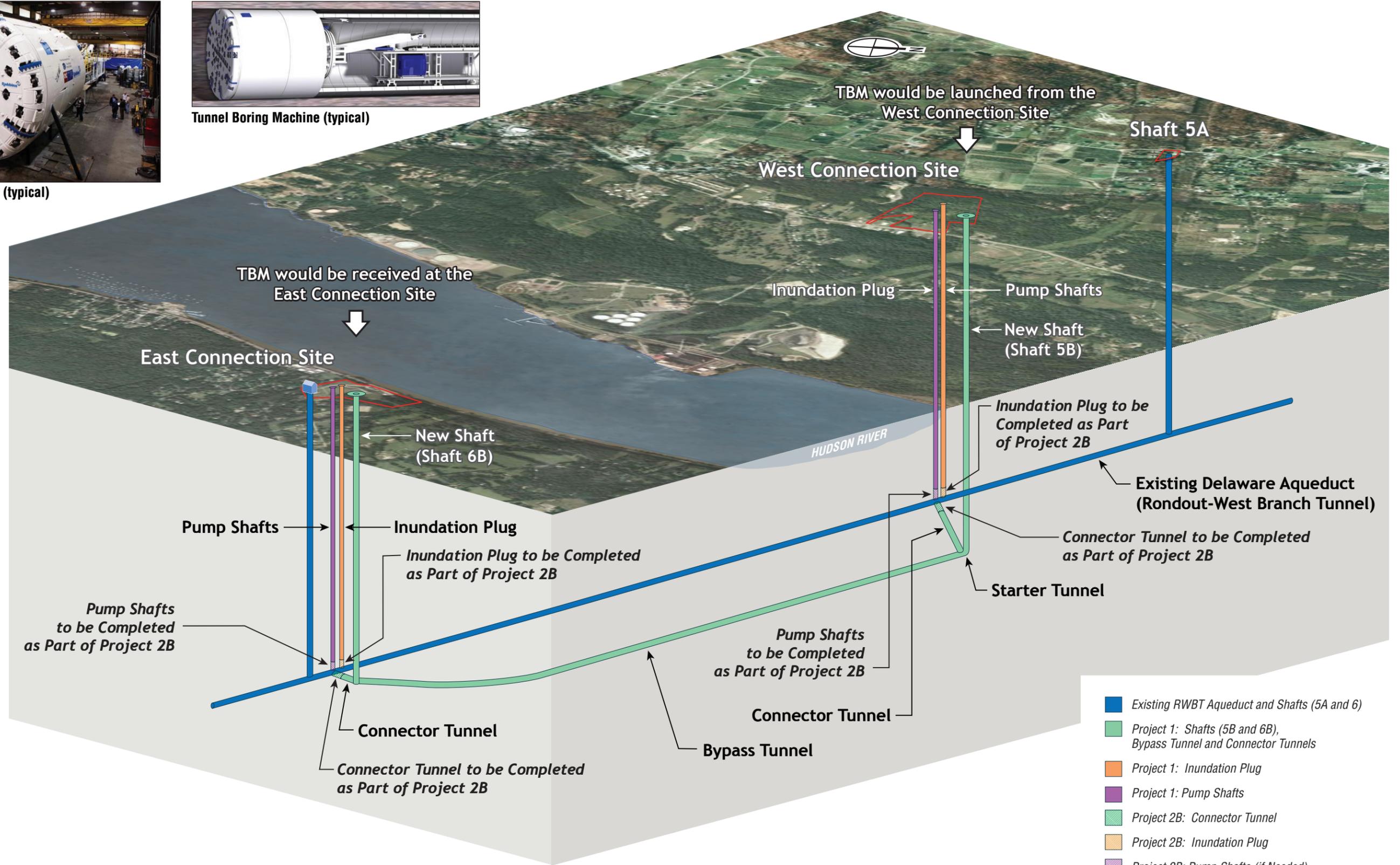
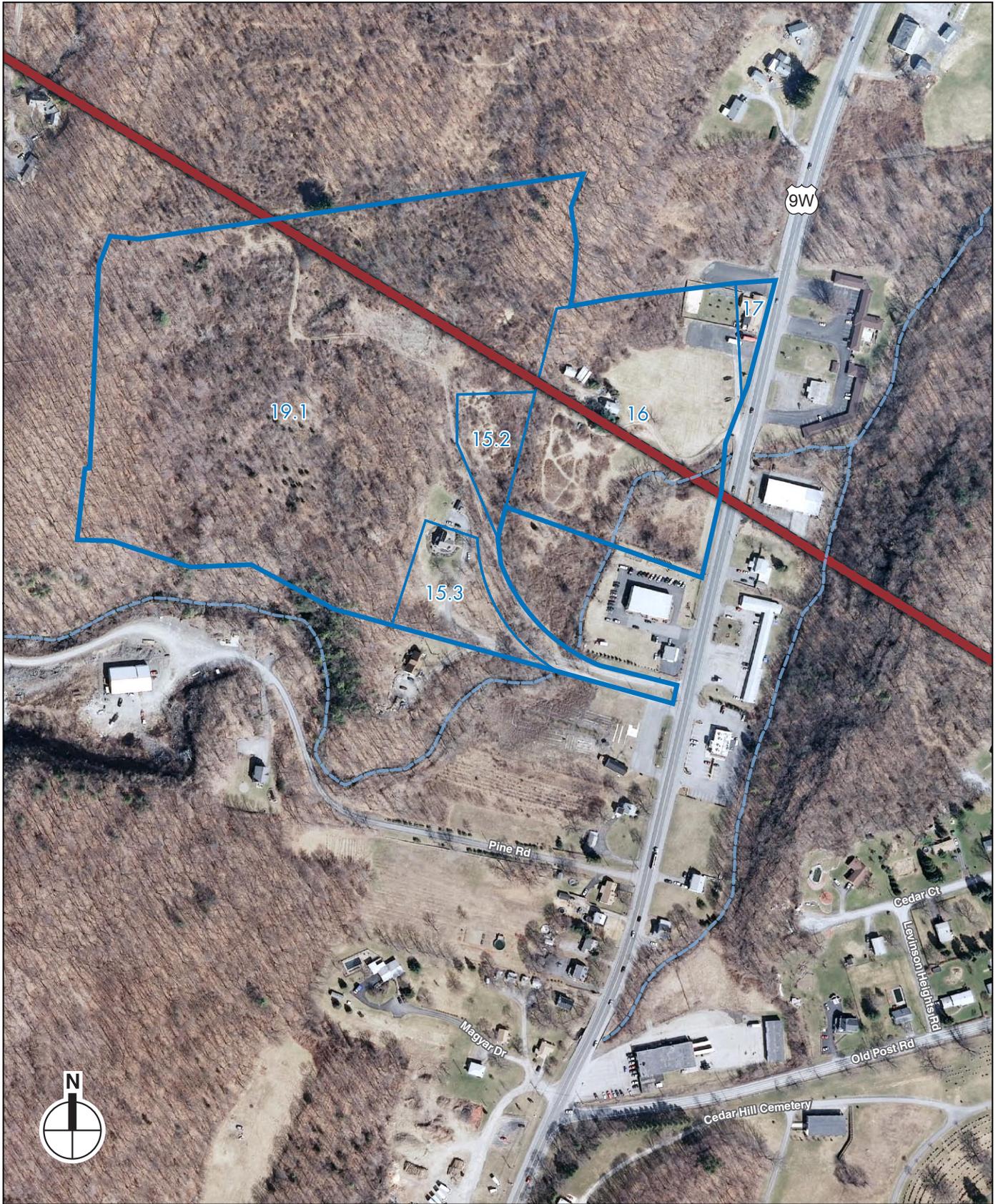


Figure S-5  
Bypass Tunnel: Major Components (Illustrative View)



-  Delaware Aqueduct Rondout-West Branch Tunnel
-  West Connection Site
-  Parcel Boundary and Lot Number
-  Stream

0 200 400 FEET  
SCALE

Figure S-6  
**West Connection Site: Existing Conditions**

### ***East Connection Site***

The east connection site is located in the Town of Wappinger in Dutchess County on the west side of River Road. 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, including the Delaware Aqueduct Shaft 6 superstructure, Hudson River Pump Station, power supply facilities, roads and parking areas, and stormwater infrastructure (see **Figure S-7**). Construction is currently underway at the east connection site as part of the pumping improvements and rehabilitation of Shaft 6 project.

## ***DESCRIPTION OF PROJECT 1 CONSTRUCTION PROGRAM***

### ***Construction Schedule and Phasing***

All construction for Project 1 is expected to be completed over an approximately 7½ year period between 2013 and 2020. Project 1 construction can be organized into four primary phases that would be carried out at or between both the west and east connection sites:

- Phase 1: Site Preparation
- Phase 2: Shaft Construction
- Phase 3: Bypass Tunnel Excavation
- Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Preparation for Project 2B

The overall schedule shown on **Figure S-8** illustrates the anticipated timeline for the four primary construction phases described below by connection site.

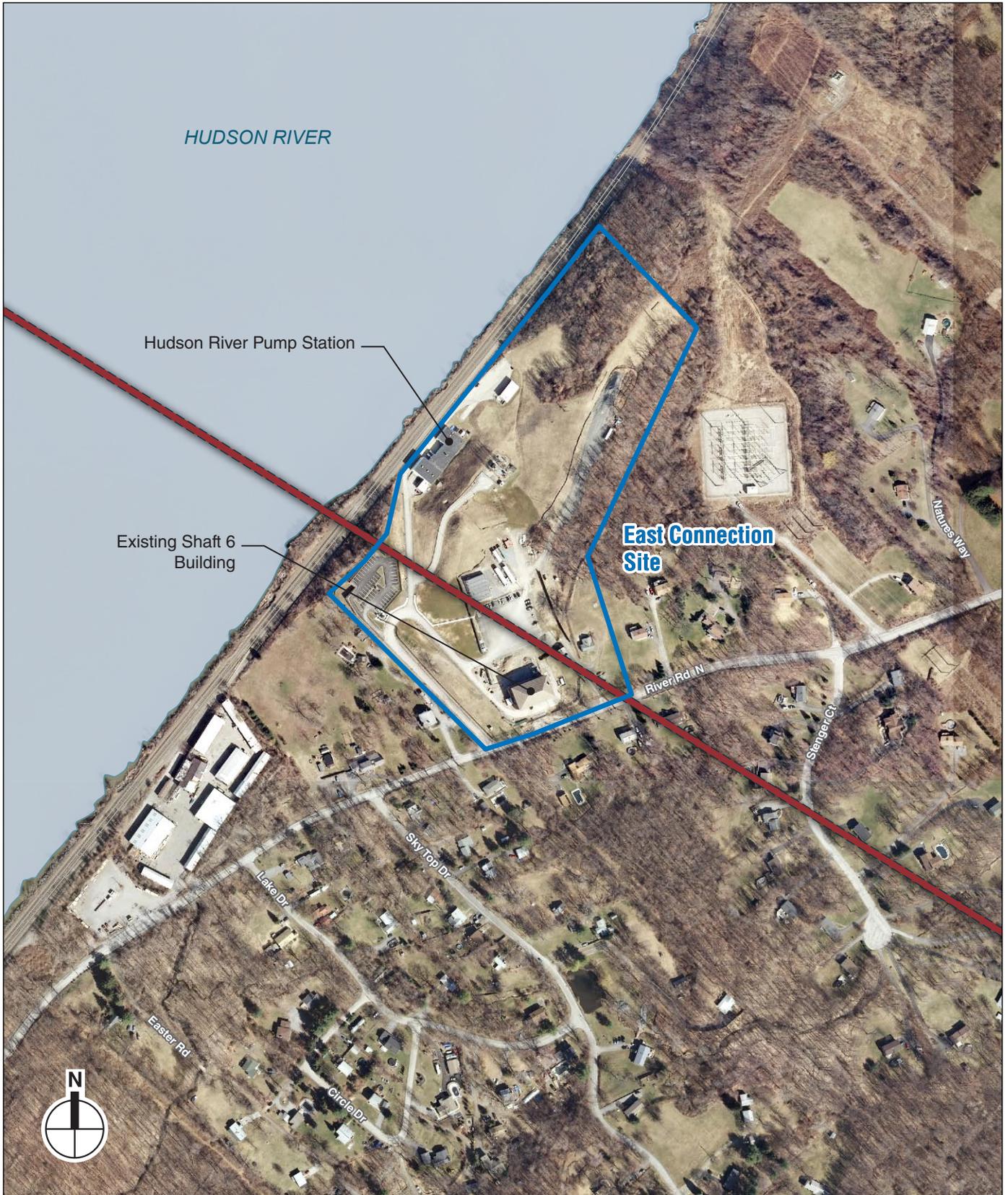
### ***Description of Project 1 Construction Phases—West Connection Site***

*Phase 1: Site Preparation:* On the west connection site, Phase 1: Site Preparation is expected to begin in early 2013 and be complete in the first quarter of 2014 (see **Figures S-9 and S-10**).

Phase 1 would consist of the demolition of certain on-site structures, the clearing and grading of a large portion of the site, and the construction of certain facilities in preparation for future construction phases. These facilities would consist of a new site access road, a stormwater management system, and some of the infrastructure necessary for later construction phases.

*Phase 2: Shaft Construction:* Site preparation activities would be followed by Phase 2: Shaft Construction, which would include the construction of a new shaft on the west connection site (Shaft 5B) (see **Figure S-11**). Shaft construction is expected to commence in the first quarter of 2014 and be complete in the first quarter of 2015.

*Phase 3: Bypass Tunnel Excavation* would follow. **Figure S-12** shows the potential site layout during Phase 3. Work during Phase 3 would consist of the construction of the bypass tunnel, the starter tunnel, a portion of the connector tunnel, and a portion of the inundation plug (see **Figure S-5**). All the Phase 3 work is expected to be undertaken between the first quarter of 2015 and the third quarter of 2018.



 Delaware Aqueduct Rondout-West Branch Tunnel  
 East Connection Site

0 200 500 FEET  
 SCALE

Figure S-7  
**East Connection Site: Existing Conditions**

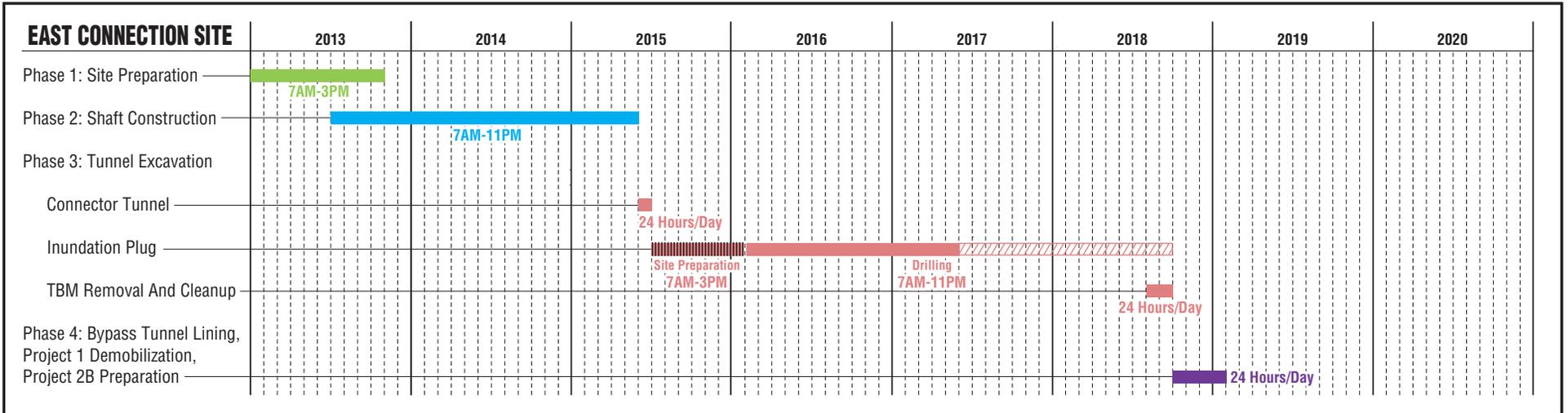
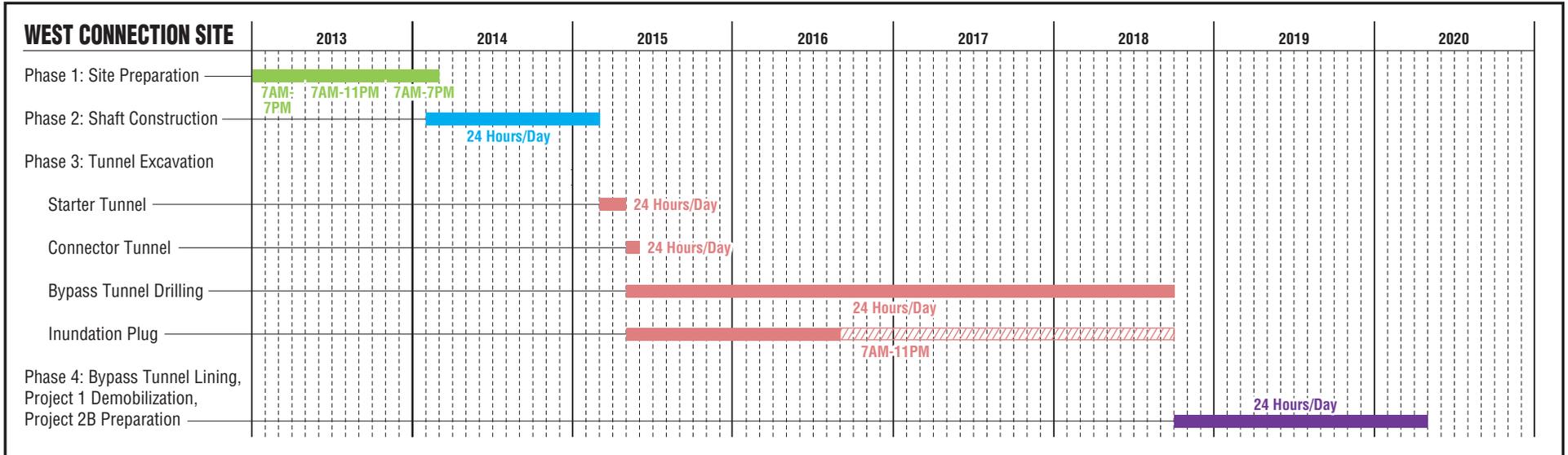


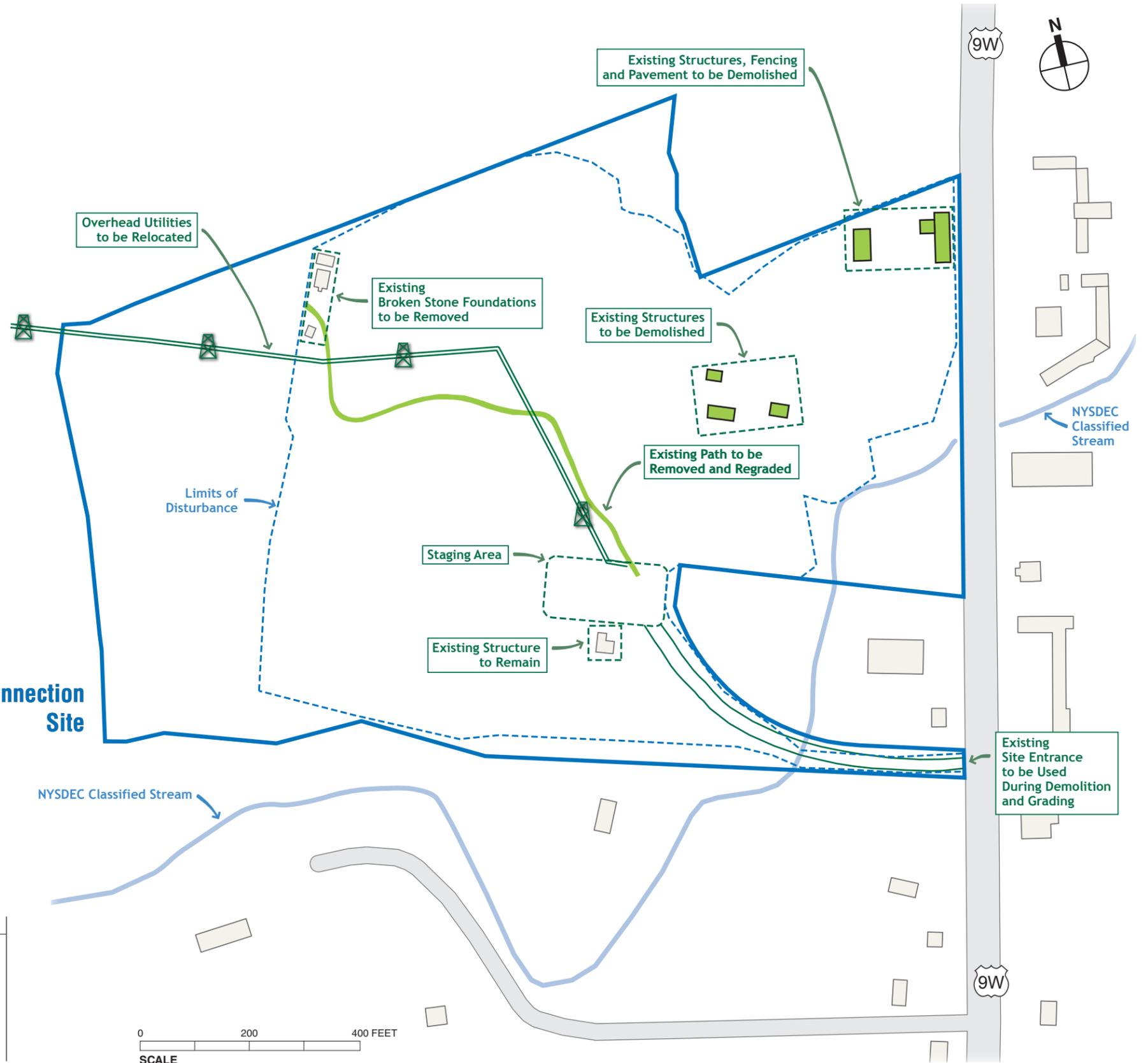
Figure S-8  
Construction Schedule and Work Hours

# KEY MAP



12.9.11

## West Connection Site



# CONSTRUCTION SCHEDULE

| WEST CONNECTION SITE  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|------|------|------|------|------|------|------|------|
| Phase 1: Site Preparation   | █    |      |      |      |      |      |      |      |
| Phase 2: Shaft Construction   |      | █    |      |      |      |      |      |      |
| Phase 3: Tunnel Excavation  |      |      | █    |      |      |      |      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |      |      |      |      |      | █    |      |      |

## West Connection Site

## Phase 1: Site Preparation (Demolition and Clearing)

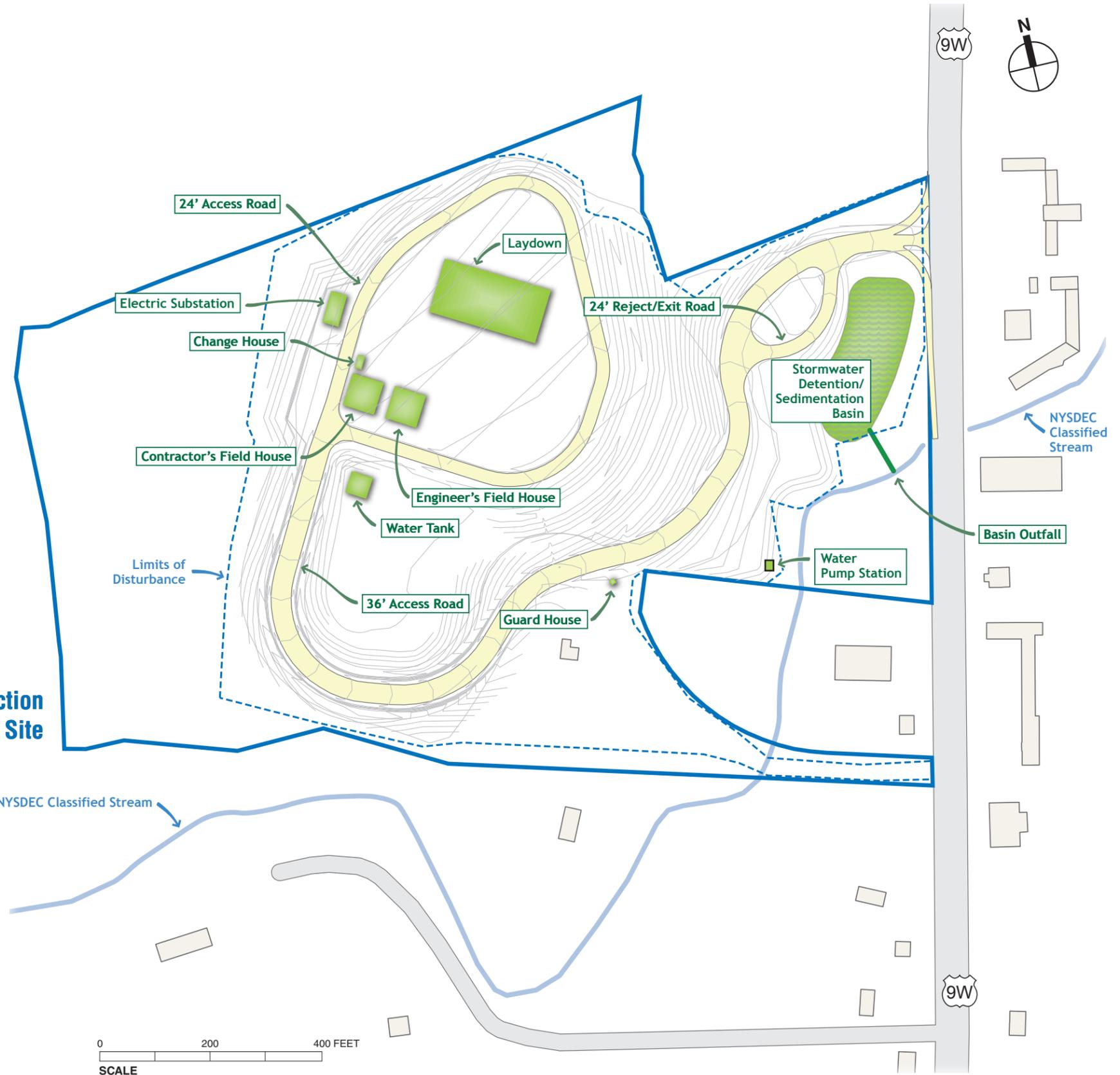
Figure S-9

# KEY MAP



12.12.11

West Connection Site



# CONSTRUCTION SCHEDULE

| WEST CONNECTION SITE  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|------|------|------|------|------|------|------|------|
| Phase 1: Site Preparation   | █    |      |      |      |      |      |      |      |
| Phase 2: Shaft Construction   |      | █    |      |      |      |      |      |      |
| Phase 3: Tunnel Excavation  |      |      | █    |      |      |      |      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |      |      |      |      |      |      | █    |      |

West Connection Site

Phase 1: Site Preparation (Site Infrastructure)

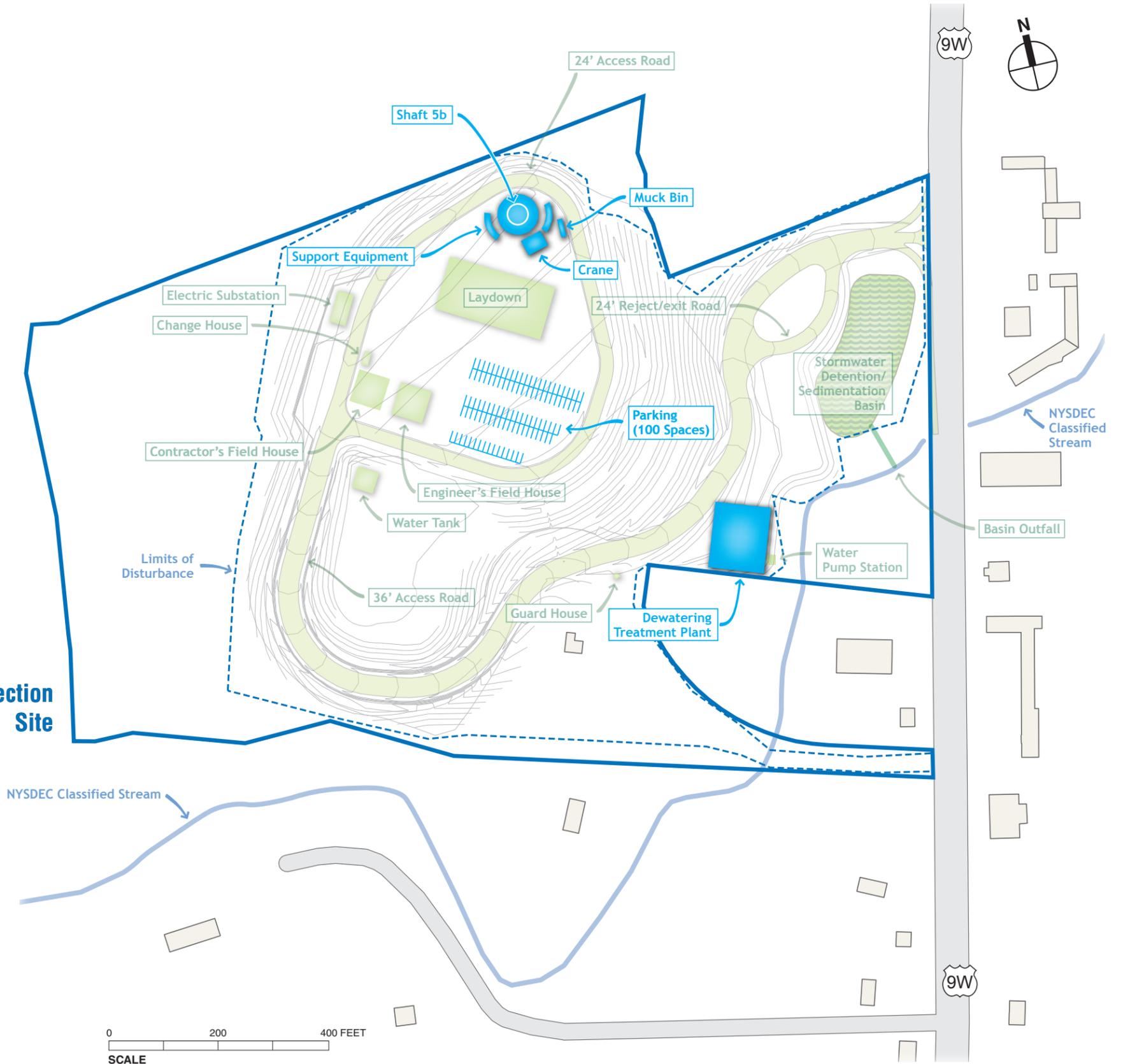
Figure S-10

# KEY MAP



12.12.11

## West Connection Site



# CONSTRUCTION SCHEDULE

| WEST CONNECTION SITE  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|------|------|------|------|------|------|------|------|
| Phase 1: Site Preparation   | █    |      |      |      |      |      |      |      |
| <b>Phase 2: Shaft Construction</b>  |      | █    |      |      |      |      |      |      |
| Phase 3: Tunnel Excavation  |      |      | █    |      |      |      |      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |      |      |      |      |      |      | █    |      |

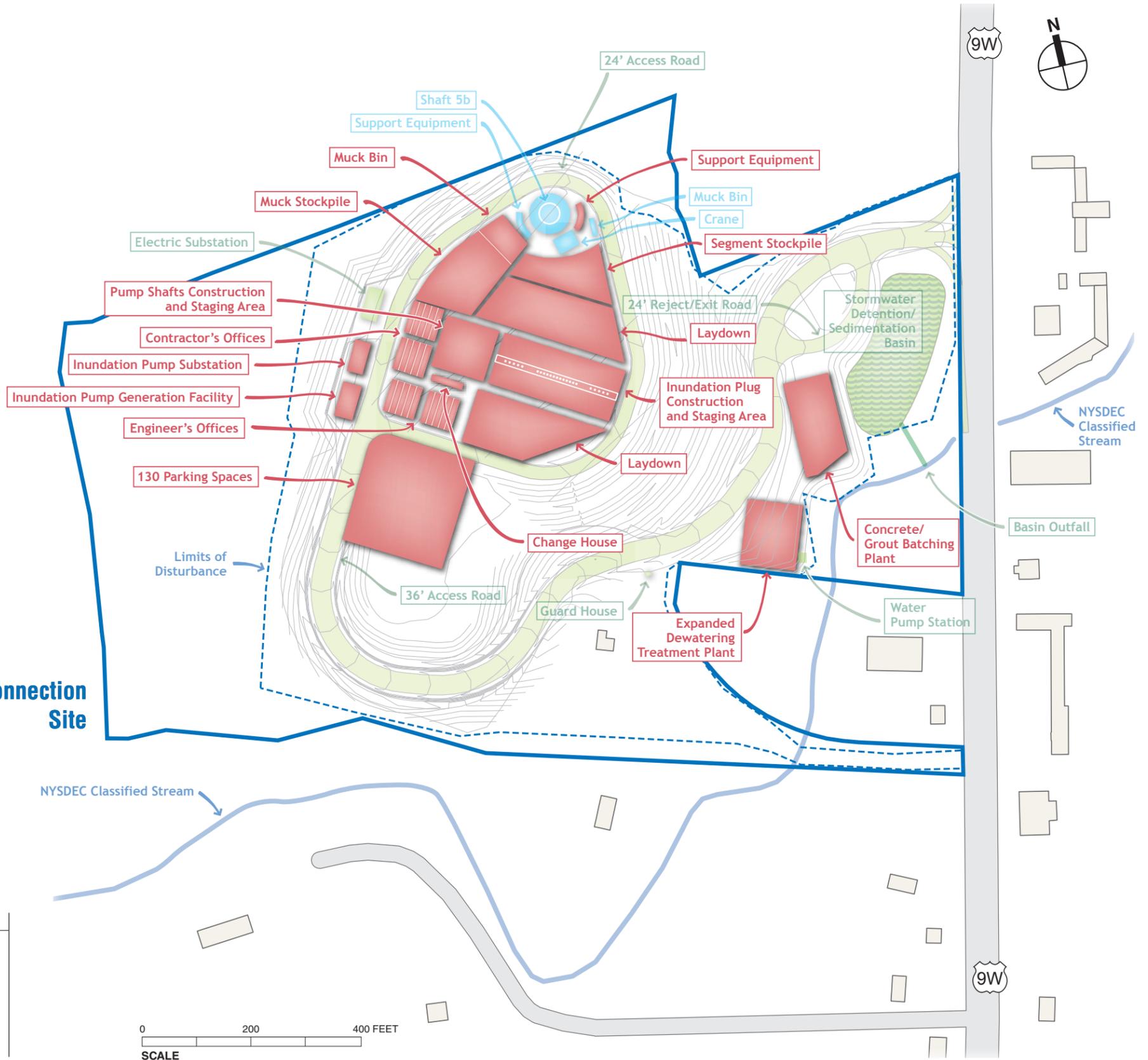
## West Connection Site

Figure S-11  
**Phase 2: Shaft Construction**

# KEY MAP



12.12.11



# CONSTRUCTION SCHEDULE

| WEST CONNECTION SITE  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|------|------|------|------|------|------|------|------|
| Phase 1: Site Preparation   | █    |      |      |      |      |      |      |      |
| Phase 2: Shaft Construction   |      | █    |      |      |      |      |      |      |
| <b>Phase 3: Tunnel Excavation</b>   |      |      | █    |      |      |      |      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |      |      |      |      |      |      | █    |      |

## West Connection Site

## Phase 3: Bypass Tunnel Excavation

Figure S-12

Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Preparation for Project 2B is expected to start in the fourth quarter of 2018 and would extend through the second quarter of 2020. Phase 4 would consist of the installation of the final liner through the length of the bypass tunnel, construction of a shaft plug and distribution chamber, the demobilization from the west connection site, and preparation to support Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing. **Figure S-13** shows the potential site layout during Phase 4.

*Level of Activity at the West Connection Site (Workers, Trucks, and Equipment)*

**Table S-1** provides a summary of the number of shifts per day, the number of days per week in which work would take place, work hours, and the length of time each phase is expected to last at the west connection site.

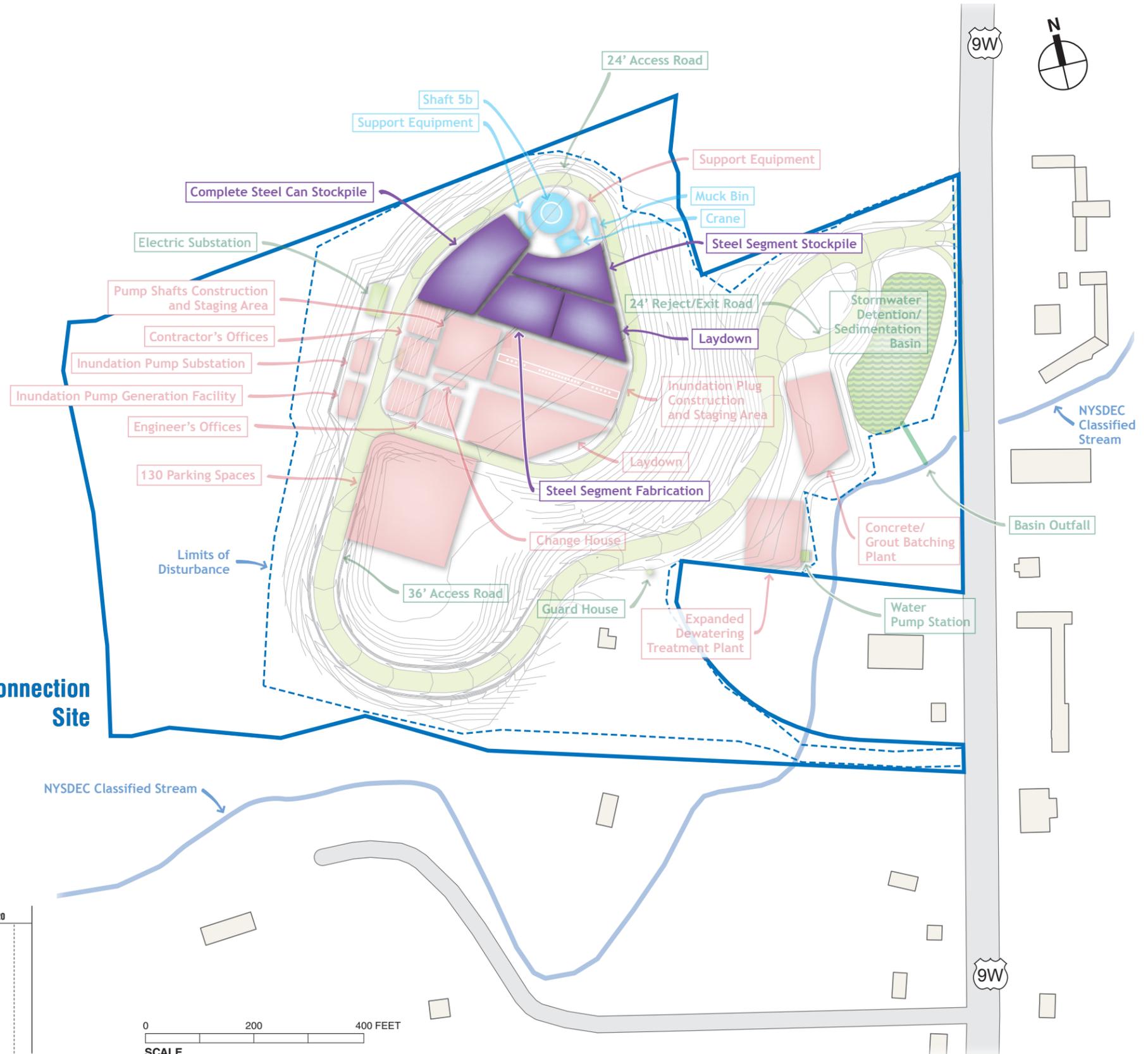
Truck trip estimates would vary over the construction phases, with the greatest amount of truck trips during Phase 3: Tunnel Excavation, when there would be an average of 90 truck trips per day (i.e., 45 trucks, one in and one out of the site totaling two trips per truck).

**Table S-1**  
**West Connection Site Construction Activity**

| Phase   | Shifts/Day          | Days/Week | Work Hours                                       |
|---|---------------------|-----------|--|
| Phase 1: Site Preparation<br>(One shift for first and last 4 months and two shifts for 6 months)  | 1 or 2 <sup>1</sup> | 6         | 1 Shift: 7 AM to 7 PM<br>2 Shifts: 7 AM to 11 PM |
| Phase 2: Shaft Construction<br>(13 months, with 1 month overlap with Phase 1)   | 3                   | 5         | 24 hours/day                                     |
| Phase 3: Tunnel Excavation<br>(except Inundation Plug work)<br>(43 months)  | 3                   | 5         | 24 hours/day                                     |
| Phase 3: Tunnel Excavation<br>(Inundation Plug work)<br>(13 months; longer if fewer than three drill rigs employed)   | 2                   | 5         | 7 AM to 11PM                                     |
| Phase 4: Bypass Tunnel Lining,<br>Project 1 Demobilization, and<br>Preparation for Project 2B<br>(19 months)  | 3                   | 5         | 24 hours/day                                     |
| <b>Note:</b> <sup>1</sup> During Phase 1: Site Preparation, activities such as demolition, tree clearing, and log hauling would generally occur during one shift, while rock cutting, breaking, blasting, grading, and paving activities would occur over two shifts. |                     |           |  |

The number of workers on-site would vary with the various work shifts and would also vary over the construction phases. The peak number of workers on the west connection site per day would occur during Phase 3: Bypass Tunnel Excavation and would total 228 workers (81 workers during both the 7 AM to 3 PM and 3 PM to 11 PM shifts and 66 workers during the 11 PM to 7 AM shift).

# KEY MAP



# CONSTRUCTION SCHEDULE

| WEST CONNECTION SITE  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|------|------|------|------|------|------|------|------|
| Phase 1: Site Preparation   | █    |      |      |      |      |      |      |      |
| Phase 2: Shaft Construction   |      | █    |      |      |      |      |      |      |
| Phase 3: Tunnel Excavation  |      |      | █    |      |      |      |      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |      |      |      |      |      |      | █    |      |

## West Connection Site

## Phase 4: Bypass Tunnel Lining

Figure S-13

***Description of Project 1 Construction Phases—East Connection Site***

*Phase 1: Site Preparation* would consist of the removal or relocation of certain on-site buildings, trailers, and storage containers that would be on-site in connection with DEP’s tunnel and shaft rehabilitation construction effort (see **Figure S-14**).<sup>1</sup> In addition, certain facilities would be constructed in preparation for future construction phases (see **Figure S-15**). It is expected to begin in early 2013 and be complete in the fourth quarter of the same year.

*Phase 2: Shaft Construction*, which would consist of the construction of a new shaft, would overlap with Phase 1, and is expected to commence in mid-2013 and continue to mid-2015 (see Figure S-15).

*Phase 3: Bypass Tunnel Excavation* would consist of three main efforts: the construction of the first part of a connector tunnel,<sup>2</sup> the construction of the first part of an inundation plug, and the extraction of the TBM. As described above, the bypass tunnel would be excavated from the west connection site, where the TBM would be launched; the TBM would be extracted at the east connection site at the end of this phase. **Figure S-16** shows the potential site layout during Phase 3. Phase 3 is expected to extend from mid-2015 through the end of the third quarter of 2018.

*Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Preparation for Project 2B* would consist of lining a portion of the bypass tunnel and connector tunnel using concrete, constructing a shaft plug and shaft access chamber, and preparing the site for Project 2B (see Figure S-16). Phase 4 is expected to commence in late 2018 and be complete in early 2019.

***Level of Activity at the East Connection Site (Workers, Trucks, and Equipment)***

**Table S-2** below provides a summary of the number of shifts per day, the number of days per week in which work would take place, work hours, and the length of time each phase is expected to last at the east connection site. Truck trip estimates would vary over the construction phases, with the greatest amount of truck trips generated during Phase 1: Shaft Construction, when there would be an average of 48 truck trips per day (i.e., 24 trucks, one in and one out of the site totaling two trips per truck).

The number of workers on-site would vary with the various work shifts and would also vary over the construction phases. The peak number of workers on the east connection site per day would occur during Phase 2: Shaft Construction and would total 116 workers (58 workers during both the 7 AM to 3 PM and 3 PM to 11 PM shifts).

---

<sup>1</sup> The tunnel and shaft rehabilitation work will improve DEP’s capability to unwater the tunnel and is expected to be complete in 2013.

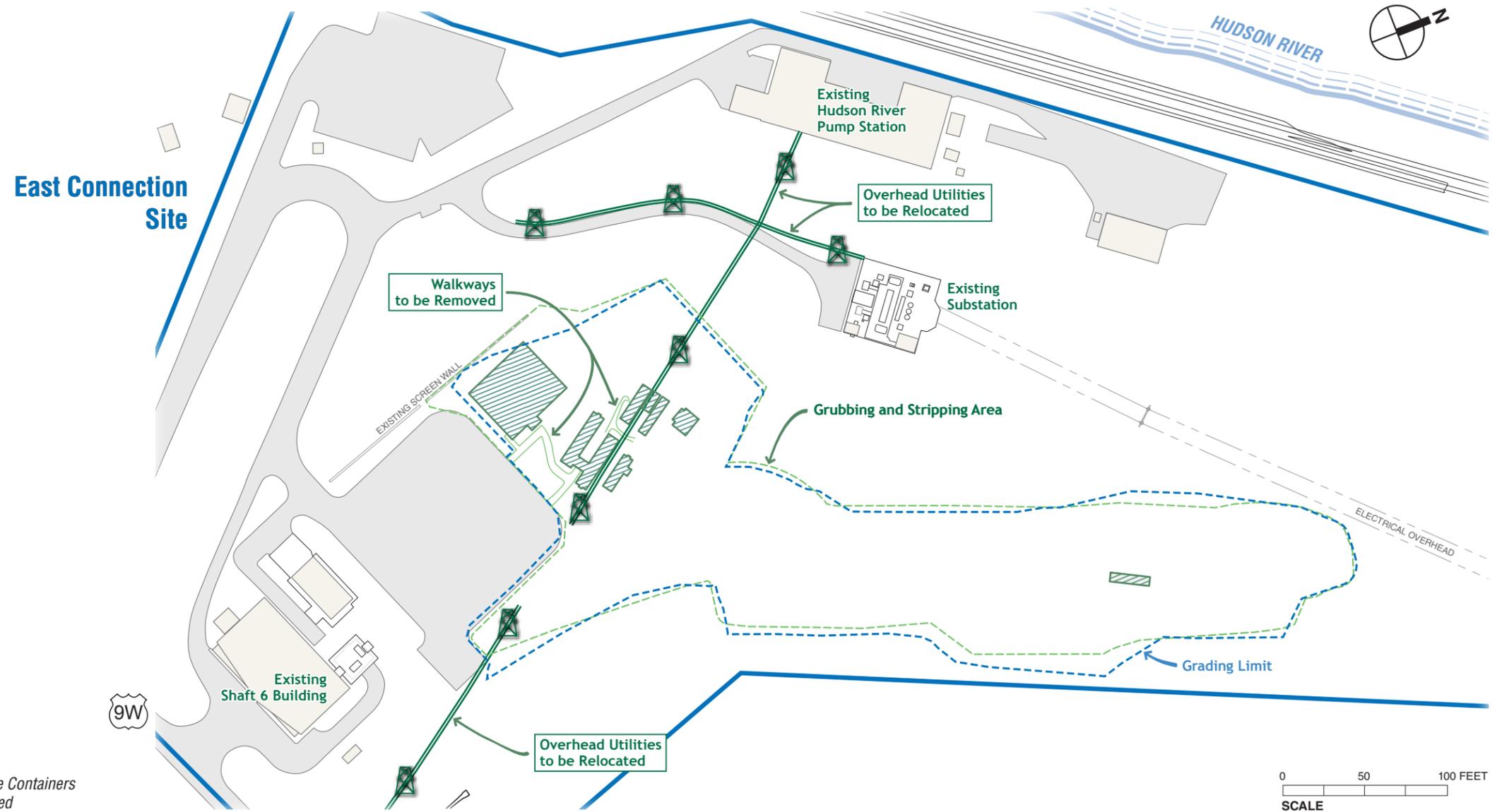
<sup>2</sup> The connector tunnel is the relatively short tunnel that would provide the ultimate connection from the bypass tunnel to the existing aqueduct. In this phase, only a portion of the connector tunnel would be constructed. The remaining segment would be constructed during the connection of the bypass tunnel to the existing Delaware Aqueduct (Project 2B).

## KEY MAP



## CONSTRUCTION SCHEDULE

| EAST CONNECTION SITE  | 2013                           | 2014 | 2015                         | 2016 | 2017 | 2018                 | 2019 |
|---|--------------------------------|------|------------------------------|------|------|----------------------|------|
| <b>Phase 1: Site Preparation</b>  | [Green bar spanning 2013-2014] |      |                              |      |      |                      |      |
| Phase 2: Shaft Construction   | [Blue bar spanning 2013-2015]  |      |                              |      |      |                      |      |
| Phase 3: Tunnel Excavation  |                                |      | [Red bar spanning 2015-2018] |      |      |                      |      |
| Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation |                                |      |                              |      |      | [Purple bar in 2018] |      |



### East Connection Site

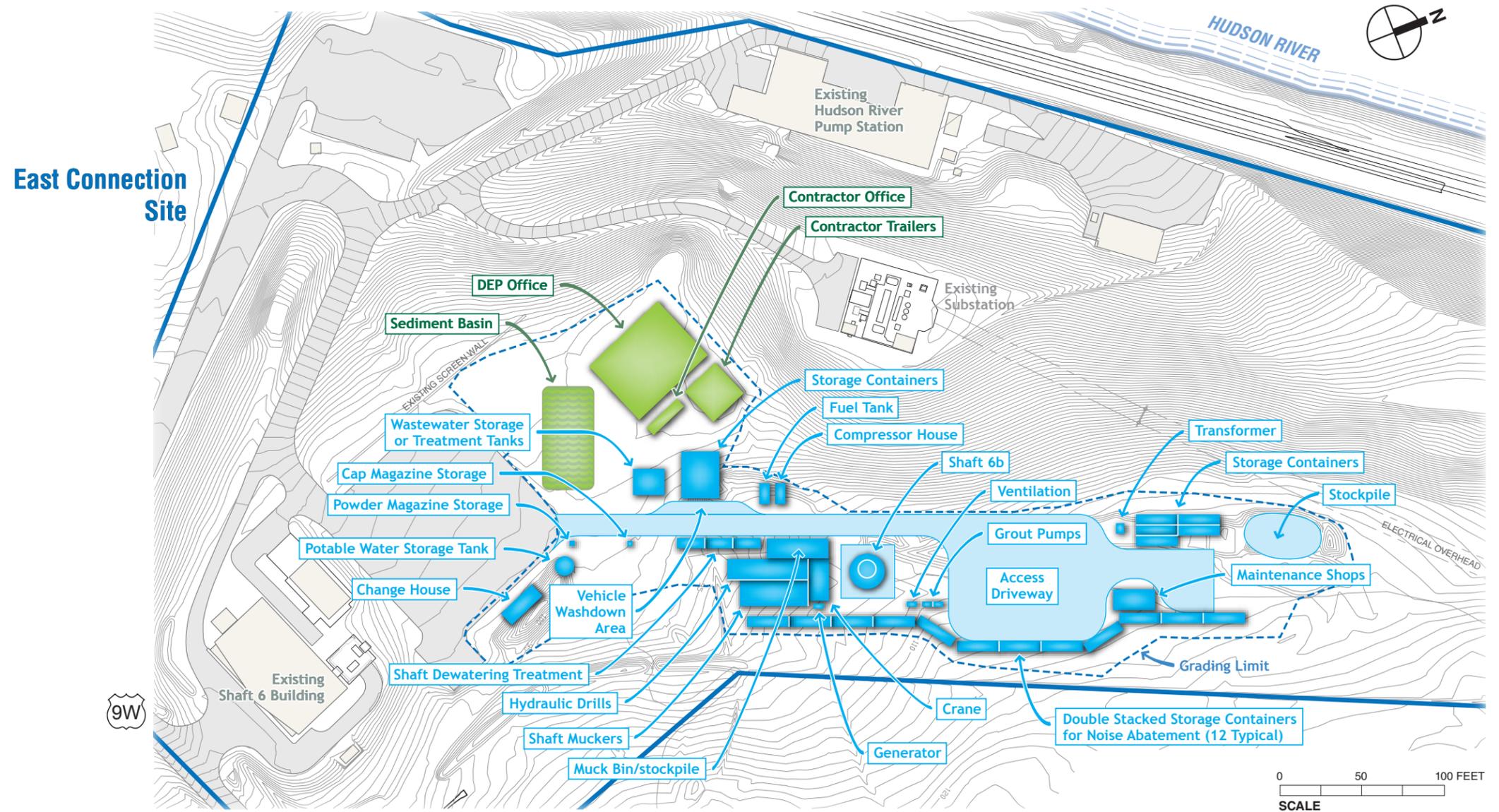
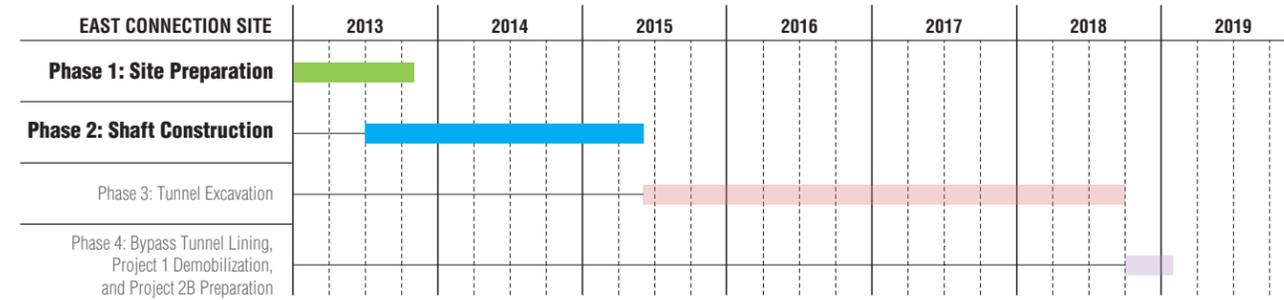
### Phase 1: Site Preparation (Demolition and Clearing)

Figure S-14

## KEY MAP



## CONSTRUCTION SCHEDULE

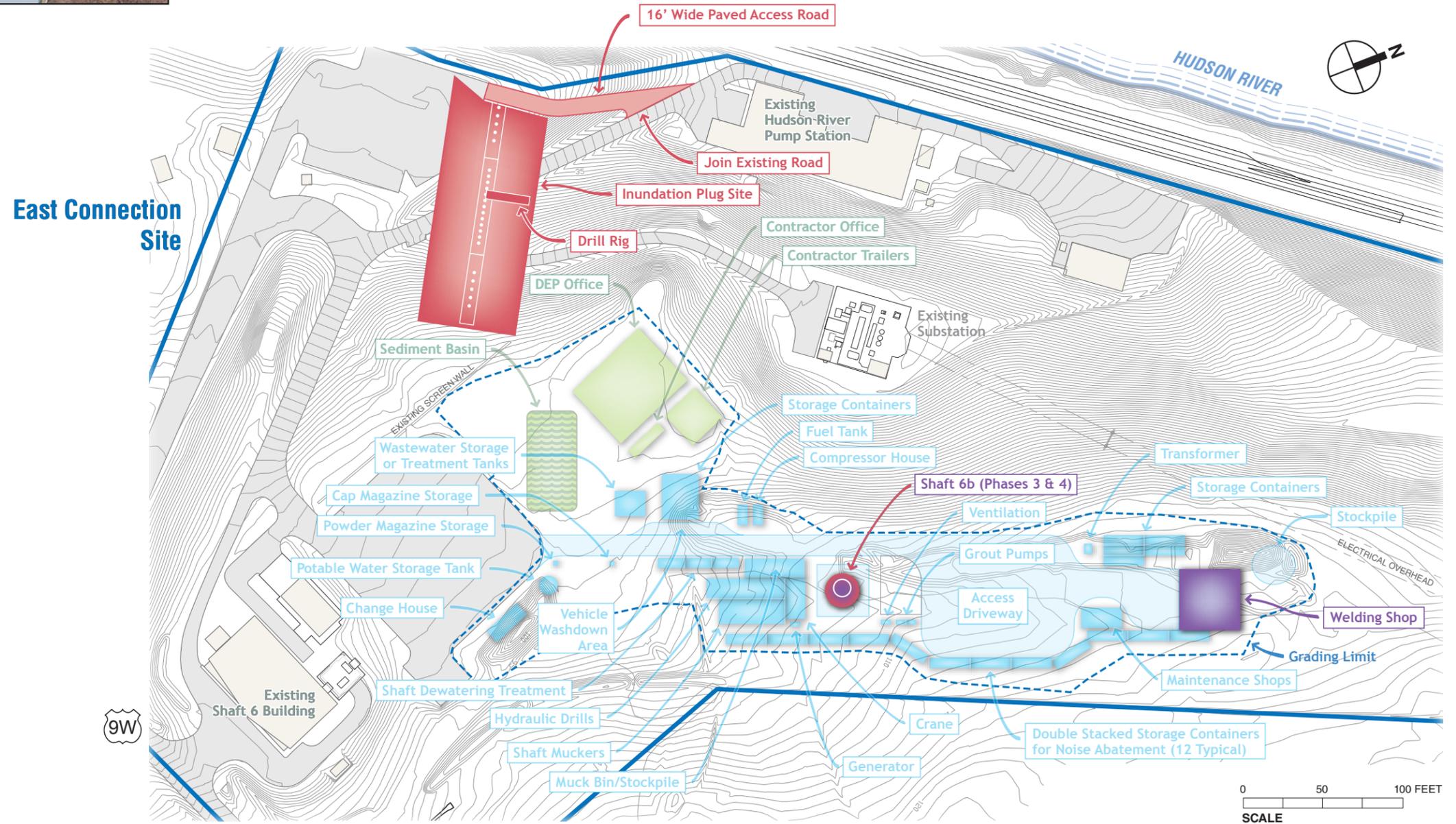


## KEY MAP



## CONSTRUCTION SCHEDULE

|  | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|--|------|------|------|------|------|------|------|
| Phase 1: Site Preparation  | █    |      |      |      |      |      |      |
| Phase 2: Shaft Construction  | █    |      |      |      |      |      |      |
| <b>Phase 3: Tunnel Excavation</b>  |      |      | █    |      |      |      |      |
| <b>Phase 4: Bypass Tunnel Lining, Project 1 Demobilization, and Project 2B Preparation</b> |      |      |      |      |      | █    |      |



**Table S-2**  
**East Connection Site Construction Activity**

| Phase  | Shifts/Day | Days/Week | Work Hours    |
|--|------------|-----------|---------------|
| Phase 1: Site Preparation<br>(8 months)  | 1          | 5         | 7 AM to 3 PM  |
| Phase 2: Shaft Construction<br>(23 months)   | 2          | 5         | 7 AM to 11 PM |
| Phase 3: Bypass Tunnel<br>Excavation<br>(Connector Tunnel and TBM<br>Removal)<br>(Total of 3 months)                             | 3          | 5         | 24 hours/day  |
| Phase 3: Bypass Tunnel<br>Excavation<br>(Inundation Plug work)<br>(19 months, longer if fewer than<br>three drill rigs employed) | 2          | 5         | 7 AM to 11 PM |
| Phase 4: Bypass Tunnel Lining,<br>Project 1 Demobilization, and<br>Preparation for Project 2B<br>(4 months)                      | 3          | 5         | 24 hours/day  |

### *General Construction Practices*

Certain activities would apply throughout Project 1, including community relations, coordination with appropriate governmental and regulatory agencies, and site security. A DEP field representative would be at each connection site throughout the entire construction period. The representative would serve as the contact point for the community and local leaders to voice any concerns about construction activities. Security staff would be on-site 24 hours a day, 365 days a year.

### *Infrastructure and Work Areas*

Supporting infrastructure and work areas would be needed at the two connection sites, as summarized in **Table S-3**.

### *Blasting*

*West Connection Site.* Blasting would be needed intermittently for approximately 3 to 6 months during Phase 1: Site Preparation for site grading. Blasting would also be required for the full duration of Phase 2: Shaft Construction, for a total of between 22 and 25 months. One or two blasts can be expected on a given day. The Town of Newburgh regulates blasting in §66-9 of the Town Code. The Town Code limits blasting activity to the hours of 8 AM to 7 PM. The selected contractor would need to apply for a local blasting permit from the Town of Newburgh.

*East Connection Site.* Blasting during shaft construction at the east connection site would occur during Phase 2 over a 21-month period, during which one or two blasts can be expected on a given day. The Town of Wappinger Town Code permits blasting activity between the hours of

8:30 AM and 3 PM and requires that notice be given to adjacent property owners 7 days prior to a scheduled blast. The selected contractor and/or licensed blaster would apply for a blasting permit to conduct all necessary blasting activity.

*Lighting Plan*

Lighting plans for both the west and east connection sites would be subject to the local town codes and standards as well as operational performance requirements. Where local regulations or specific limits for site lighting are undefined, professional best-practice recommendations would be followed.

*Site Security During Construction*

Site security would be the contractor's responsibility. Where not already installed, fencing would be erected around the east and west connection work sites. Security gates would be installed at both the main site entrance of the west connection site and the access road used during site preparation.

*Sustainable Design Guidelines Related To Construction*

Erosion and sediment control practices would be implemented for all construction activities where any excavation, stripping, filling, grading, or earth movement takes place in compliance with state requirements.

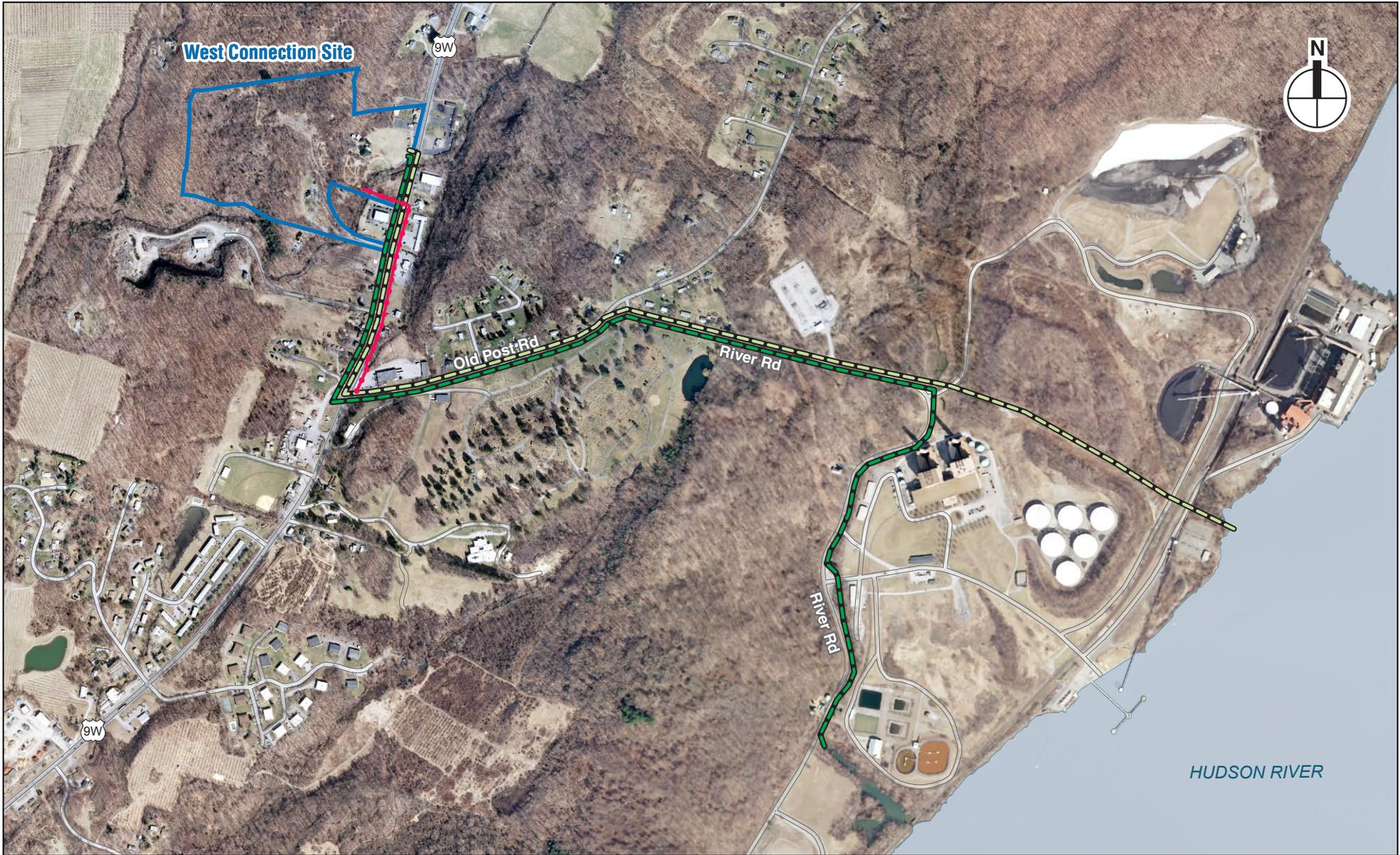
**ES-4.2      PROJECT 2A: WATER SUPPLY SYSTEM AUGMENTATION AND IMPROVEMENT**

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 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. These potential augmentation projects are: Demand Management, Upper Catskill Aqueduct Optimization, Queens Groundwater Reactivation, New Jersey Interconnection, and 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.

**Table S-3**  
**Summary of Key Project 1 Elements**

| <b>Project Element</b>            | <b>West Connection Site</b>   | <b>East Connection Site</b>  |
|-----------------------------------|---|--|
| 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 will be constructed at the northern portion of the site, and a new access road will 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.<br>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.<br>Internal roadway system to provide access to construction locations.<br>Parking to be provided within the limits of disturbance for maximum number of construction workers. | Existing driveway to be used during construction of Project 1 and Project 2B.<br>Internal roadway system to be modified to provide access to various work areas.<br>Parking to be provided for maximum number of construction workers. |
| 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. Connection to the Town of Newburgh supply would require construction of a water main extension (see <b>Figure S-17</b> ).   | 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.<br>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 (see <b>Figure S-17</b> ).   | 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.  |



-  West Connection Site
-  Dewatering Pipeline Option 1
-  Dewatering Pipeline Option 2
-  Water Main Extension

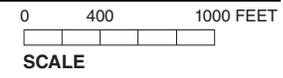


Figure S-17  
**West Connection Site: Water Main Extension and Dewatering Pipeline**

These projects are varied in scope and location (see **Figure S-18**). DEP is continuing to evaluate these projects to determine the most cost-effective strategies to meet its water supply demands. The projects 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. 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 would be undertaken to evaluate and disclose the potential environmental impacts.

### ***DEMAND MANAGEMENT***

DEP's policy and experience is that saving water is usually the most cost-effective and environmentally benign method of ensuring an ample supply of water for the region. DEP has previously implemented and is currently implementing a number of water demand management programs including, but not limited to, distribution of water saving kits, implementation of a toilet rebate program, and public educational campaigns. The installation of the city-wide Automated Meter reading (AMR) system, which began in 2008, provides a source of detailed water use information on a customer level. It also enables DEP's Water Leak Notification Program, which can detect unknown leaks by monitoring spikes in usage. In addition, new water use rules took effect on June 22, 2009. The changes address several water quality and leak prevention issues in addition to a number of technical and procedural changes. DEP would continue to develop both short-term and long-term strategies that could reduce demand during Project 2B.

### ***UPPER CATSKILL AQUEDUCT OPTIMIZATION***

The goal of the Upper Catskill Aqueduct Optimization project is to increase the carrying capacity of the aqueduct by improving the speed at which water flows. It would consist of three main components: (1) cleaning and/or lining the aqueduct, (2) chemical addition, and (3) constructing and replacing air vents. These components would occur in the section of the aqueduct between the Ashokan and Kensico Reservoirs.

### ***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.



- Projects Proposed to Supplement the DEP Water Supply System
- Delaware Watershed Reservoir Improvements

Figure S-18  
**Water Supply System  
 Augmentation and Improvement**

### ***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.

### ***NASSAU COUNTY INTERCONNECTION***

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

### **ES-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.

### ***BYPASS TUNNEL CONNECTION***

To connect the bypass tunnel to the existing RWBT, the final bypass connector tunnels would be constructed. These connector tunnels would likely be several hundred feet in length and would extend between the shaft and the existing tunnel. Before making the connection, however, flows within the RWBT would be stopped and the tunnel unwatered. 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.

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, the start 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.

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.

***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.

**ES-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.

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.

***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 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 the southbound left-turn lane would remain in place. A portion of the interior roadway would be retained to provide future access to shaft 5B should it be necessary; the shaft 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 with a combination of planting meadow habitat, with shrubs and some trees (see **Figure S-19**).

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.



 West Connection Site

0 100 200 FEET  
SCALE

Figure S-19  
**West Connection Site: Post Construction Plan**



- East Connection Site
- Existing Buildings to Remain
- Roadways

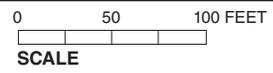


Figure S-20  
**East Connection Site: Proposed Site Restoration Plan (Illustrative)**

### ***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 S-20**).

### ***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.

## **ES-4.5 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 S-4 through S-6**, and are organized by project.

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.

**Table S-4**

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

| Agency/Entity  | Permit/Approval/Consultation/Coordination  |
|--|--|
| <b>FEDERAL</b>   |  |
| 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   |
| <b>STATE</b>   |  |
| 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   |

**Table S-4 (cont'd)**

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

| Agency/Entity   | Permit/Approval/Consultation/Coordination                                  |
|---|--|
| <b>STATE (CONTINUED)</b>  |  |
| 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   |
| <b>AREA MUNICIPALITIES</b>  |  |
| <b>New York City</b>  |  |
| Public Design Commission of New York City                                       | Design Commission Approval   |
| <b>Dutchess County</b>  |  |
| Dutchess County Planning Approval and Public Works Coordination                 | Highway Work and Traffic Enhancement Permits; General Coordination         |
| Dutchess County Health Department   | Potable Water Supply   |
| <b>Orange County</b>  |  |
| Orange County Planning Approval and Public Works Coordination                   | Highway Work and Traffic Enhancement Permits; General Coordination         |
| Orange County Health Department   | Potable Water Supply   |
| <b>Town of Wappinger</b>  |  |
| 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         |
| <b>Town of Newburgh</b>   |  |
| Town of Newburgh Planning Board   | Site Plan Approval   |
| Town of Newburgh Zoning Board of Appeals  | Variance from Noise code   |
| Town of Newburgh Building Department  | Blasting Permits   |
| Town of Newburgh Highway Superintendent   | Highway Work and Traffic Enhancement Permits; General Coordination         |
| <b>OTHER ENTITIES</b>   |  |
| 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 S-5**

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

| Regulatory Agency  | Upper<br>Catskill<br>Optimization | Queens<br>Groundwater<br>Reactivation | Nassau County<br>Interconnection | New Jersey<br>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 S-6**

**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   |
|--|---|
| <b>FEDERAL</b>   |   |
| U.S. Army Corps of Engineers (USACE)                             | Joint Permit Application (for Freshwater Wetlands, related to elimination of leaks)             |
| <b>STATE</b>   |   |
| 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   |
| <b>AREA MUNICIPALITIES</b>                                       |   |
| <b>New York City</b>   |   |
| New York City Department of Health and Mental Hygiene            | Water Supply Improvement Approval   |
| <b>Ulster County</b>   |   |
| Ulster County Department of Health                               | Coordination  |
| Town of Wawarsing  | Coordination  |
| <b>Orange County</b>   |   |
| Orange County Department of Health                               | Coordination  |
| <b>Dutchess County</b>   |   |
| Dutchess County Department of Health                             | Coordination  |
| <b>Putnam County</b>   |   |
| Town of Putnam Valley  | Coordination  |
| Town of Kent   | Coordination  |

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**ES-5            PROBABLE IMPACTS OF PROJECT 1 CONSTRUCTION AND  
MITIGATION MEASURES**

**ES-5.1        MEASURES INCORPORATED INTO PROJECT 1**

Since DEP is concurrently undertaking design of the proposed bypass tunnel construction and connection while the EIS was under preparation, many measures have been incorporated into the Project 1 design that have substantially reduced the potential for additional temporary significant adverse impacts resulting from the construction of Project 1. These included the decision to employ inundation plugs at both connection sites instead of constructing additional shafts at each site; limiting work hours at the east connection site for phases of work that do not delay completion of Project 1; limiting truck traffic to and from the east connection site between 11 PM and 7 AM; committing to tree clearing at both connection sites during seasonal periods that would not disturb potential Indiana bat populations; and utilizing connection sites already under DEP ownership or sold to DEP by willing sellers.

In addition, within technical study areas, initial evaluations of potential impacts from the construction of Project 1 were developed, and where potential temporary significant adverse impacts were identified, measures to reduce such impacts were evaluated.

**ES-5.2 SUMMARY OF PROBABLE IMPACTS FROM PROJECT 1**

The EIS examined the full range of technical areas. Based on the EIS analyses, it was determined that Project 1 would not result in significant adverse impacts on land use, zoning, public policy and open space; visual character; historic and archaeological resources; socioeconomic conditions; community facilities; natural resources and water resources; hazardous materials; air quality; energy and greenhouse gas emissions; infrastructure; solid waste; coastal zone consistency; or public health.

Project 1, Shaft and Bypass Tunnel Construction is expected to result in several predicted temporary significant adverse impacts on traffic and noise in both the west and east of Hudson study areas, and on neighborhood character in the east of Hudson study area while construction activities are under way.

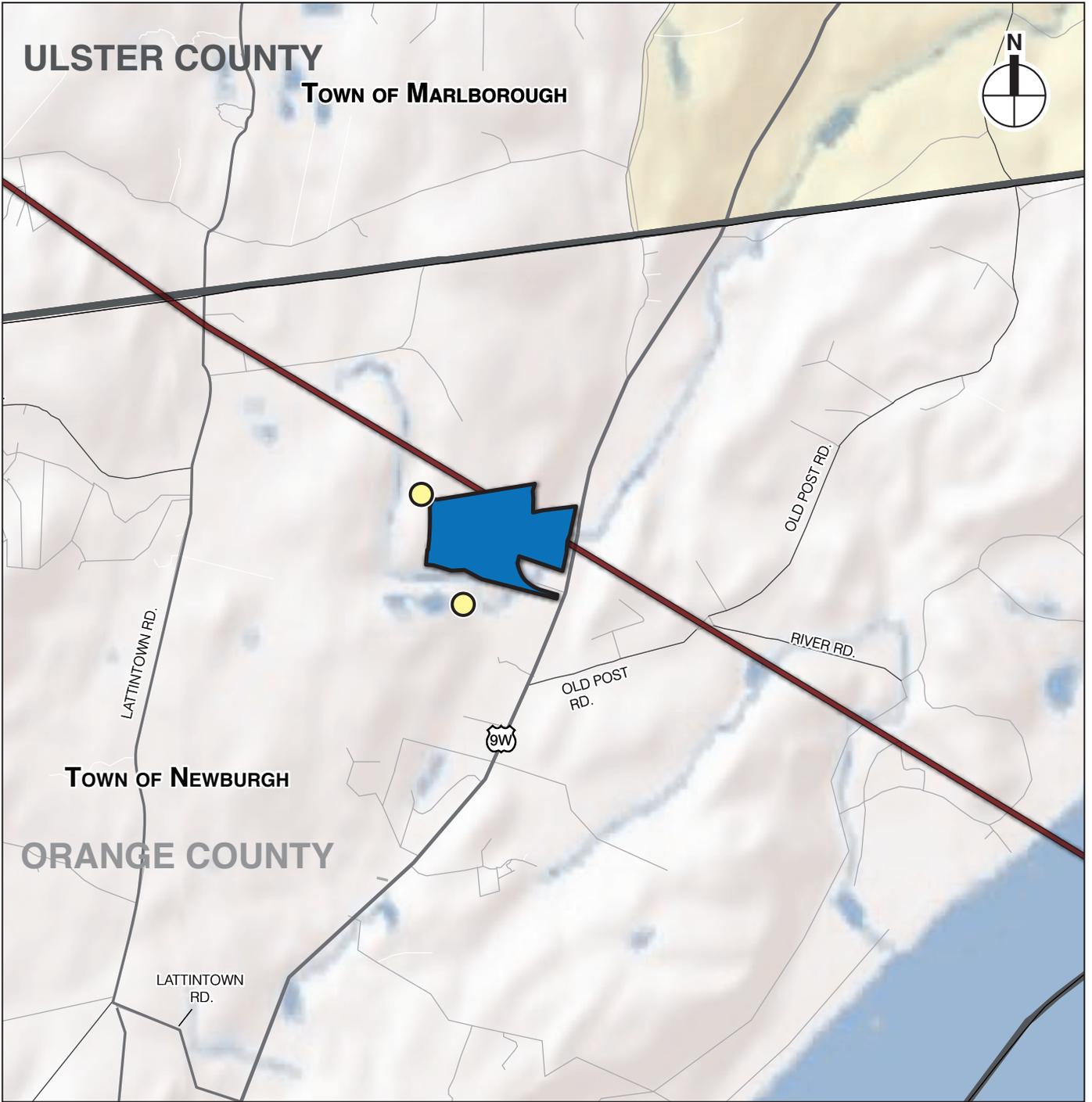
Mitigation measures to reduce these impacts and minimize disruptions to the surrounding communities would be incorporated as part of Project 1 construction. Additional feasible measures that could fully mitigate or further lessen any remaining predicted temporary significant adverse impacts from the construction of Project 1 have been identified (see “Unavoidable Adverse Impacts,” below, for a discussion of Project 1 construction impacts that could not be fully mitigated).

The potential impacts and proposed mitigation measures are summarized below in **Table S-7**.

**Table S-7**  
**Summary of Project 1 Temporary Significant Adverse Impacts and Mitigation Measures**

| Technical Area         | Potential Impacts   |  | Mitigation Measures   |  | Results   |   |
|------------------------|---|--|---|--|---|---|
|                        | <i>West of Hudson</i>   | <i>East of Hudson</i>  | <i>West of Hudson</i>   | <i>East of Hudson</i>  | <i>West of Hudson</i>   | <i>East of Hudson</i>                         |
| Traffic                | Predicted temporary significant adverse impacts at nine signalized approaches (six in AM peak and three in PM peak) at five intersections.  | Predicted temporary significant adverse impacts at eight signalized approaches (three in AM peak and five in PM peak) at four intersections.   | Signal timing changes, upgrading traffic signal controller and detectors at some intersections, Traffic Management Plan (including outreach/communication plan with towns, schools, police, and other area agencies). | Same as west of Hudson, plus roadway pavement monitoring on local roads accessed by trucks for east connection site and clearing some vegetation in right-of-way near a few intersections. | All traffic impacts would be fully mitigated, except at intersection of Route 9W and Fostertown Road during AM and PM peak hours. | All traffic impacts would be fully mitigated. |
| Noise                  | Predicted temporary significant adverse impacts at two receptors <sup>1</sup> near west connection site:<br>- Pine Road west of Route 9W<br>- 65 Lockwood Lane<br>See <b>Figure S-21</b> .  | Predicted temporary significant adverse impacts at five receptors <sup>1</sup> near the east connection site:<br>- River Road North at Sky Top Drive<br>- 191 River Road North<br>- 198 River Road North<br>- 217 River Road North<br>- 219 River Road North<br>See <b>Figure S-22</b> . | Project 1 would comply with DEP’s “Notice of Adoption of Rules for Citywide Construction Noise Mitigation,” which supplements NYC Noise Control Code. All practical noise control measures would be incorporated.     | Same as west of Hudson.  | Temporary significant adverse noise impacts could not be fully mitigated.   | Same as west of Hudson.                       |
| Neighborhood Character | <i>East of Hudson</i><br>Temporary significant adverse neighborhood character impact on residences immediately surrounding east connection site from changes to visual character of the east connection site and increases in traffic, lighting, and noise. |  | <i>East of Hudson</i><br>See mitigation above for traffic and noise.  |  | <i>East of Hudson</i><br>Temporary significant adverse neighborhood character impacts could not be mitigated.                     |   |

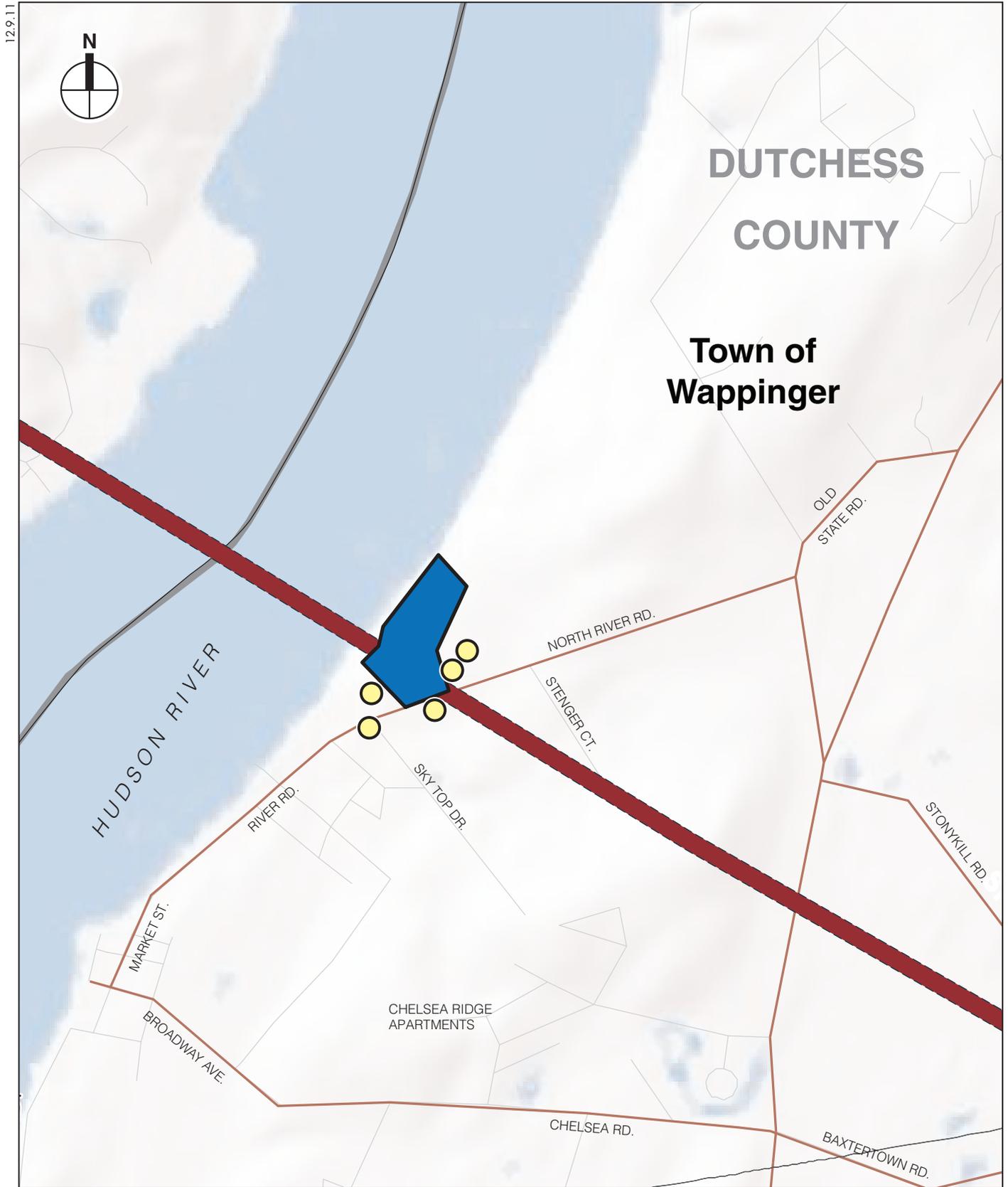
**Note:** These noise receptors are in residential areas or locations and are representative of other sensitive noise receptors in the immediate study area



- East Connection Site
- Delaware Aqueduct Rondout-West Branch Tunnel
- Noise Receptor Location



Figure S-21  
**West Connection Site: Predicted Temporary Significant Adverse Noise Impact Receptor Locations**



East Connection Site  
 Delaware Aqueduct Rondout-West Branch Tunnel

Noise Receptor Location

0 1/2 MILE  
 SCALE

Figure S-22

**East Connection Site: Predicted Temporary Significant Adverse Noise Impact Noise Receptor Locations**

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**ES-6            PROBABLE IMPACTS OF PROJECT 2A, WATER SUPPLY SYSTEM  
AUGMENTATION AND IMPROVEMENT**

The EIS provides a generic assessment of the Project 2A projects. The potential for the Project 2A projects to result in significant adverse impacts will be assessed in the second EIS.

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**ES-7            PROBABLE IMPACTS OF PROJECT 2B, BYPASS TUNNEL  
INSPECTION AND RWBT CONNECTION AND REPAIR, INCLUDING  
WAWARSING**

This EIS provides a detailed assessment of the potential for Project 2B to result in significant adverse impacts from construction at the west and east connection sites. However, the second EIS will assess in detail the potential for impacts from Project 2B construction at Shafts 1, 2A, 8, and 9 (i.e., the tunnel inspection and repair). The second EIS will also assess in detail the potential for a possible intake on the Hudson River on the west side to result in significant adverse impacts on natural resources.

**ES-7.1           WEST OF HUDSON**

The traffic mitigation measures suggested for Project 1 would be equally applicable for Project 2B. The mitigation measures suggested for Project 1 and applied during Project 2B construction would completely eliminate the predicted extended temporary significant adverse traffic impacts in the west of Hudson study area, except at the intersection of Route 9W and Fostertown Road during the AM and PM peak hours, where the proposed mitigation would reduce temporary impacts from Project 2B construction traffic. The mitigation for Project 2B would simply be a continuation of ongoing practices implemented during Project 1.

Construction of Project 2B would have the potential to extend the duration of a predicted temporary significant adverse noise impact in the area represented by the Pine Road west of Route 9W receptor location.

**ES-7.2           EAST OF HUDSON**

Project 2B would be expected to extend the temporary significant adverse impact on neighborhood character near the east connection site identified for Project 1.

Like with Project 1, all predicted temporary significant adverse traffic impacts would be fully mitigated.

Construction of Project 2B would have the potential to extend the duration of predicted temporary significant adverse noise impacts within the area represented by the same five residential receptors that would be affected during Project 1.

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**ES-8            PROBABLE IMPACTS OF BYPASS TUNNEL OPERATION**

Operation of the bypass tunnel would not result in any significant adverse impacts.

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**ES-9            CUMULATIVE EFFECTS OF THE WATER FOR THE FUTURE PROGRAM**

Cumulative adverse impacts are two or more individual effects on the environment that, when taken together, compound or increase other environmental impacts, which may then rise to the level of significance. Cumulative adverse impacts can result from a single action or from a number of individually minor but collectively significant actions taking place over a period of time. They may include indirect or secondary impacts, long-term impacts, and synergistic effects.

For the Water for the Future Program, potential cumulative adverse impacts to the extent they can be identified at this time are addressed in the EIS for Project 1, those portions of Project 2B that would occur at the west and east connection sites (i.e., connection), and future operation of the tunnel after repairs.

For example, the greenhouse gas emissions analysis evaluates potential cumulative emissions from the construction of Project 1 and those portions of Project 2B described above.

For the assessment of impacts on water rates, the total cost of Project 1 and those portions of Project 2B described above are included (however, the second EIS will also evaluate the cumulative water rate impact of Project 1 and Project 2).

Additionally, the potential cumulative traffic, air, and noise impacts that could occur from construction on both connection sites are considered in the respective impact evaluations.

The second EIS will provide further details on Projects 2A and 2B and will quantitatively assess the potential for cumulative impacts resulting from Project 2 of the proposed program. The second EIS will also consider any potential cumulative impacts of the Water for the Future Program.

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**ES-10           ALTERNATIVES**

The EIS considers two categories of alternatives: alternatives to the Water for the Future Program (Projects 1, 2A, and 2B), summarized in **Table S-8**, and alternatives that are specific to Project 1, summarized in **Table S-9**.

For the alternatives to the Water for the Future Program, the alternatives are compared to the proposed program in terms of whether that alternative meets the purpose and need of the proposed program; whether it is feasible and results in lesser or greater risk, cost, and implementation time; whether any additional land would be required to be acquired; and whether the alternative would result in any substantially different environmental effects.

For the alternatives to Project 1, the alternatives are compared to Project 1 for the full range of environmental effects discussed in the EIS.

**Table S-8  
Alternatives to the Proposed Program**

| Issue                   | Proposed Program  | Alternatives to the Proposed Water for the Future Program                       |   |  |  |   |  |  |
|-------------------------|---|---|---|--|--|---|--|--|
|                         |   | No Action   | Tunnel Repair   |  | Unwatering and Repair with Expanded Project 2A   | Modified Project 2B - Completed in Multiple Intervals                       | Bypass Tunnel in Wawarsing in Addition to Roseton  | Third Aqueduct   |
|                         |   |   | Surface Pressure Grouting   | Leak Stabilization   |  |   |  |  |
| <b>Purpose and Need</b> | Meets program goals and permanently addresses RWBT leaks and reliability  | Does not meet program goals because does not address RWBT leaks and reliability | Does not meet program goals because unlikely to permanently address RWBT leaks and reliability                  | Does not meet program goals because not proven to permanently address RWBT leaks and reliability | Could meet program goals and permanently address RWBT leaks and reliability  | Could meet program goals and permanently address RWBT leaks and reliability | Does not meet program goals because of higher cost to design and construct                             | Does not meet program goals because of greater time required to design and construct                           |
| <b>Feasibility</b>      | Feasible  | Not feasible  | Not feasible  | Under investigation  | Feasible   | Under investigation   | Feasible   | Feasible   |
| <b>Risk</b>             | Acceptable  | Much greater than proposed program  | Much greater than proposed program  | Greater than proposed program  | Much greater than proposed program   | Under investigation   | Similar to proposed program  | Greater than proposed program because of additional time required to design and complete                       |
| <b>Cost</b>             | \$2.1 billion   | N/A   | Less than proposed program  | Less than proposed program   | Much greater than proposed program   | Under investigation   | Greater than proposed program  | Much greater than proposed program   |
| <b>Time to Complete</b> | 8-9 years   | N/A   | Less than proposed program  | Less than proposed program   | Greater than proposed program because of longer RWBT shutdown  | Under investigation   | Similar to proposed program  | Much greater than proposed program   |
| <b>Land Acquisition</b> | Necessary for west connection site and possibly for augmentation projects | N/A   | Likely less land area needs to be purchased than proposed program, but easements needed on many more properties | Less than proposed program; would not require new shaft sites                                    | Would eliminate land acquisition associated with new shaft sites, but may introduce new land acquisition because of expanded water supply augmentation | Same as proposed program  | Greater than proposed program; would require acquisition of properties for additional connection sites | Much greater than proposed program; would require acquisition of numerous shaft sites and subsurface easements |
| <b>Environmental</b>    | Analyzed in first and second EISs   | Possible risk to water supply provided by RWBT                                  | Possibility of contaminating aqueduct, groundwater and surface wetlands with grout                              | To be analyzed in the second EIS if determined to be feasible                                    | Would eliminate impacts associated with new shaft sites, but may introduce new impacts because of expanded water supply augmentation                   | To be analyzed in the second EIS if determined to be feasible               | Greater than proposed program; would result in localized impacts at additional connection sites        | Much broader range of impacts than proposed program; localized impacts at many new shaft sites                 |

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**Table S-9  
Environmental Alternatives to Project 1**

| Issue                    | Project 1 Impacts   | Alternatives to Project 1   |   |   |   |  |   |   | Impact Reduction Alternative   |
|--------------------------|---|---|---|---|---|--|---|---|--|
|                          |   | Design Alternatives   |   |   |   | Construction Alternatives  |   |   |  |
|                          |   | Tunnel Drive Direction  | Alternate West Connection Site  | Three Shafts at Each Connection Site  | No Reception Shaft at East Connection Site, Bury TBM  | East Connection Site - Shaft Muck Removal by Barge   | East Connection Site - Shaft Muck Removal by Rail   | Extended Work Hours and/or Work Week Alternative  |  |
| Land Use                 | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below  | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Neighborhood Character   | Temporary significant adverse impacts (east connection site only)                           | Impacts would be of longer duration and greater intensity in the area surrounding the east connection site  | See "Other" below   | Would require additional workers, construction activity, and muck removal, thereby potentially intensifying the neighborhood character impact at the east connection site | See "Other" below   | See "Other" below  | Comparable to Project 1   | See "Other" below   | Reductions already achieved to maximum extent practicable through project improvements and mitigation measures |
| Visual Resources         | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | Increased visibility from the Hudson River   | Increased visibility from the Hudson River  | Comparable to Project 1   | N/A  |
| Historic Resources       | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below  | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Socioeconomic Conditions | No temporary significant adverse impacts  | Comparable to Project 1   | Any alternate west connection site that would require a longer bypass tunnel would result in higher costs         | Would result in higher costs  | Relative decrease in cost because of eliminating reception shaft; possible increase in cost because of burying TBM and greater construction complexity;   | Additional costs associated with design, construction, and operation of the wharf  | Additional costs associated with design, construction, and operation of the rail connection | Construction labor costs would be higher  | N/A  |
| Community Facilities     | No temporary significant adverse impacts  | See "Other" below   | Comparable to Project 1   | See "Other" below   | Comparable to Project 1   | Comparable to Project 1  | Comparable to Project 1   | See "Other" below   | N/A  |
| Natural Resources        | No temporary significant adverse impacts  | A greater portion of the east connection site would be required for staging and construction activities, necessitating additional clearing and grading        | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below; would introduce in-water natural resource impacts   | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Hazardous Materials      | No temporary significant adverse impacts  | Comparable to Project 1   | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below  | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Transportation           | Temporary significant adverse impacts at several locations (west and east connection sites) | See "Other" below   | See "Other" below; would result in greater traffic impacts on local roads   | See "Other" below   | See "Other" below   | Potential reduction in truck trips from Project 1 at the east connection site (during Phase 2: Shaft Construction); however, temporary significant adverse traffic impacts would still occur | Comparable to Project 1   | See "Other" below   | Reductions already achieved to maximum extent practicable through project improvements and mitigation measures |
| Air Quality              | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below  | Comparable to Project 1   | See "Other" below   | N/A  |
| GHG/Energy               | Consistent with PlaNYC goals  | Comparable to Project 1   | Any alternate west connection site that would require a longer bypass tunnel would result in higher GHG emissions | Would result in higher GHG emissions  | Relative decrease in GHG emissions because of eliminating reception shaft; possible increase in GHG emissions because of burying TBM and greater construction complexity;   | Higher GHG emissions because of construction and operation of the wharf  | Higher GHG emissions because of construction and operation of the rail connection           | Comparable to Project 1   | N/A  |
| Noise                    | Temporary significant adverse impacts at several locations (west and east connection sites) | See "Other" below   | See "Other" below   | See "Other" below; would result in greater noise impacts  | See "Other" below   | See "Other" below  | Comparable to Project 1   | See "Other" below   | Reductions already achieved to maximum extent practicable through project improvements and mitigation measures |
| Infrastructure           | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | Comparable to Project 1  | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Solid Waste              | No temporary significant adverse impacts  | Comparable to Project 1   | Comparable to Project 1   | Comparable to Project 1   | Comparable to Project 1   | Comparable to Project 1  | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| CZM                      | No temporary significant adverse impacts  | Comparable to Project 1   | Comparable to Project 1   | Comparable to Project 1   | Comparable to Project 1   | Potential issues with compatibility of wharf with other water-related uses   | Comparable to Project 1   | Comparable to Project 1   | N/A  |
| Public Health            | No temporary significant adverse impacts  | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below   | See "Other" below  | Comparable to Project 1   | See "Other" below   | N/A  |
| Other                    | N/A   | Would increase impacts and/or need for project improvements at the east connection site, and reduce impacts/need for improvements at the west connection site | Could have localized impacts or require project improvements at the alternate west connection site                | Could increase impacts and/or need for project improvements at both connection sites  | Would reduce but not eliminate localized impacts and/or need for project improvements in the vicinity of the east connection site -- an inundation plug would still be needed at this location; would increase impacts and/or need for project improvements at the west connection site | Would reduce but not eliminate impacts and/or need for project improvements associated with truck trips, and could introduce new impacts/need for project improvements associated with wharf | N/A   | Effects and impacts from construction activities would occur over longer work hours and on Saturdays at both connection sites | N/A  |

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## **ES-11 UNAVOIDABLE ADVERSE IMPACTS**

Unavoidable significant adverse impacts are defined as those that meet the following two criteria:

- There are no reasonably practicable mitigation measures to eliminate the impacts; and
- There are no reasonable alternatives that would meet the purpose and need of the action, eliminate the impact, and not cause other or similar significant adverse impacts.

As discussed above, construction of Project 1 and 2B is expected to result in temporary significant adverse impacts on traffic (both east and west of Hudson study areas), noise (both east and west of Hudson study areas) and neighborhood character (east of Hudson study area near the east connection site). In some cases these temporary significant adverse impacts could not be fully mitigated.

The second EIS will also summarize the potential for the project to result in unavoidable adverse impacts from the Water for the Future Program since a determination of unavoidable significant adverse impacts from Project 2A and from certain aspects of Project 2B cannot be made at this time.

### **ES-11.1 NEIGHBORHOOD CHARACTER**

During construction of both Project 1 and 2B, the changes to visual character as well as the increases in traffic, lighting, and noise would temporarily adversely affect the neighborhood character near the east connection site. In particular, residences immediately surrounding the construction site would experience increased activity and light, along with temporary significant adverse noise impacts. Therefore, near the east connection site, construction of Project 1 and 2B is expected to result in a temporary significant adverse impact on neighborhood character. However, these impacts to neighborhood character would be temporary and would not be expected to result in disruptions to neighborhood character once construction is complete. Since these temporary adverse impacts could not be fully mitigated, the impact on neighborhood character in the east of Hudson study area near the east connection site from the construction of Project 1 and 2B would be an unavoidable temporary significant adverse impact.

### **ES-11.2 TRANSPORTATION**

Mitigation measures would reduce temporary impacts from Project 1 and 2B construction traffic at the intersection of Route 9W and Fostertown Road in the west of Hudson study area during the AM and PM peak hours but would not fully mitigate the impact. Therefore, this impact is an unavoidable temporary significant adverse impact from the construction of Projects 1 and 2B.

**ES-11.3 NOISE**

DEP examined the potential off-site noise impacts from the expected construction activities in each phase of construction, and undertook evaluations of a range of potential measures to eliminate or reduce those impacts. As a result, for both the west of Hudson and east of Hudson study areas, all practical noise control methods would be implemented as part of the project. The remaining temporary significant adverse noise impacts at residents adjacent to both connection sites could not be fully mitigated, and are identified as unavoidable temporary significant adverse impacts from the construction of Project 1 and 2B.

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**ES-12 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES**

Construction and operation of the proposed program would involve the use of various construction materials, materials for operation and maintenance, fuels and energy for construction and operation, and the land area for Project 1, Project 2A, and Project 2B. Some of these materials that would be used for the proposed program are nonrenewable resources and are considered irretrievably and irreversibly committed, because reuse is not possible or is highly unlikely.

Construction materials include concrete and other materials that would be used to construct the shafts on the west and east connection sites and the bypass tunnel. Maintenance materials include any materials that may be used in final maintenance of the west and east connection sites. During construction, fuel would be used for operation of construction equipment (e.g., various trucks, the TBM, cranes, front end loaders, etc.). The RWBT and bypass tunnel themselves do not require electricity to deliver water from the Rondout Reservoir to the West Branch Reservoir since the water supply system relies on gravity.

Without the Water for the Future Program, however, the RWBT would continue to leak in both the Roseton and Wawarsing areas, and additional leaks along the RWBT could occur. With the proposed program in place, DEP would be able meet its mandate to provide safe and reliable transmission of drinking water from the watershed in sufficient quantity to consumers to meet all current and future water demands.

No potential significant irreversible or irretrievable resources impacts are expected. \*