4.1-1 INTRODUCTION

Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing would consist of the connection of the bypass tunnel to the existing Delaware aqueduct and the inspection and repair of the leaking area at Wawarsing and the remainder of the RWBT. Project 2B would require that the flow of water within the RWBT be stopped and therefore would be implemented after the Project 2A, Water Supply System Augmentation and Improvement, projects are complete.

Chapter 4 provides additional information about Project 2B. This section describes all of the activities, approvals, timeline and potential impacts of Project 2B in more detail. Section 4.2 evaluates the potential effects of construction at the locations where Project 2B construction would occur or be supported from—i.e., the west and east connection sites and Shafts 1, 2A, 8, and 9. An outline of potential effects related to Project 2B are included in this chapter, but Sections 4.3 through 4.6 provide more detail and a generic assessment of the potential effects expected to occur from implementation of Project 2B. As described in Chapter 1, "Program Description," DEP will undertake a second EIS or a subsequent environmental review, as appropriate, that will provide further details on Project 2B and will quantitatively assess the potential impacts resulting from Project 2B of the proposed program.

This section is organized as follows:

- Section 4.1-2, "Description of Project 2B," provides a brief description of the effort that would be undertaken to complete Project 2B.
- Section 4.1-3, "Preliminary List of Actions and Approvals," provides a preliminary list of actions and approvals necessary for Project 2B.
- Section 4.1-4, "Timeline for Project 2B Implementation," discusses the proposed timeframe for implementing Project 2B. The range of Project 2B's duration is also discussed.
- Section 4.1-5, "Potential Impacts of Project 2B," describes the types of impacts that could result from implementation of Project 2B and outlines which section of Chapter 4 discusses those impacts in more detail.

4.1-2 DESCRIPTION OF PROJECT 2B

This section provides a brief description of the two main components of Project 2B:

- Bypass Tunnel Connection; and
- RWBT Inspection and Repair, including Wawarsing.

4.1-2.1 BYPASS TUNNEL CONNECTION

As described in Chapter 1, "Program Description," Project 1 would consist of the construction of shafts at both the west and east connection sites (Shaft 5B and Shaft 6B, respectively) and the bypass tunnel. Project 1 would also include the initial construction of connector tunnels and inundation plugs and pump shafts. The connector tunnels would be the relatively short tunnels that would serve as the connection from the bypass tunnel to the existing aqueduct. The inundation plugs would be used to block off the leaking area of the RWBT in Roseton if water inflow exceeds DEP's ability to pump water out of the tunnel during construction of Project 2B. The inundation plugs would be constructed using drill rigs to drill 26 approximately 18-inch diameter vertical holes (the plug holes) to a safe distance above the existing aqueduct (see Figure 1-7); in addition, three pump shafts would be constructed to a safe distance above the aqueduct. The inundation plugs and pump shafts would be completed during Project 2B, if needed, as described below.

During Project 2B, the final connections between the connector tunnels and the existing aqueduct would be made. In addition, the inundation plugs and pump shafts would be completed if needed. These final connections, which would allow water to flow through the bypass tunnel once Project 2B is complete, are described in more detail in the next several paragraphs.

Before making these final connections, however, flows within the RWBT would be stopped and the tunnel unwatered. <u>The bypassed portion of the RWBT would no longer be used, and no water would flow through the bypassed section of the RWBT.</u> The east connection site would likely be used to unwater the tunnel due to its proximity to the Hudson River and its existing tunnel unwatering facilities. Once the tunnel is watered, the final connections would be made. The connections would likely involve breaking into the side of the existing tunnel at each connection site through the new connector tunnels, constructing a reinforced concrete junction structure, and constructing permanent bulkheads or plugs in the existing tunnel to isolate the bypassed portion of the tunnel from the new bypass tunnel.

There is a small chance that the inundation plugs may need to be completed to seal off the existing tunnel if there is excessive inflow from the Hudson River. If it is determined that they would be required, the inundation plugs started during Project 1would be completed by drilling from the remaining distance above the existing tunnel into the tunnel. ~~First, gravel~~ Most of the 26 inundation plug holes would be used to pour concrete into the tunnel to create a plug. Prior to pouring concrete, gravel would be poured at each end of the proposed plug through inundation plug holes that are not used for concrete, to act as dams to retain the concrete until it cures. When the plugs are complete

and water has been pumped out of the remainder of the tunnel through the pump shafts on the west and east connection sites, the section of tunnel under the river would be isolated from the bypass connection points, allowing connection work to proceed without the impacts of excessive water in the tunnel. If required, construction of the inundation would take approximately 2 months.

Construction activities would take place at the west and east connection sites, but they 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.

4.1-2.2 RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

After flows within the Delaware Aqueduct are stopped and tunnel has been unwatered, the full length of the aqueduct would be inspected and repairs made, if needed. In addition, the repairs required at Wawarsing would also be undertaken.

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 (see **Figure 4.1-1**). Specifically, Shafts 1 and 9 would be used for ventilation; Shaft 2A would provide access for materials, equipment, and personnel to repair the existing leak in Wawarsing; and Shaft 8 would provide access for materials and equipment. Construction activities at each of these shaft sites are described in Section 4.2.

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. Section 4.2 provides more detail.

4.1-3 PRELIMINARY LIST OF ACTIONS AND APPROVALS

Table 4.1-1 provides a preliminary list of actions and approvals for Project 2B.

Table 4.1-1
Potential Major Permits, Approvals, Consultation, and Coordination—
Project 2B: Bypass Tunnel Connection and
RWBT Inspection and Repair, including Wawarsing

Agency/Entity
U.S. Army Corps of Engineers
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of Health
New York City Department of Health and Mental Hygiene
Ulster County Department of Health
Orange County Department of Health
Dutchess County Department of Health
Town of Kent
Town of Newburgh
Town of Putnam Valley
Town of Wappinger
Town of Wawarsing

11.4.11

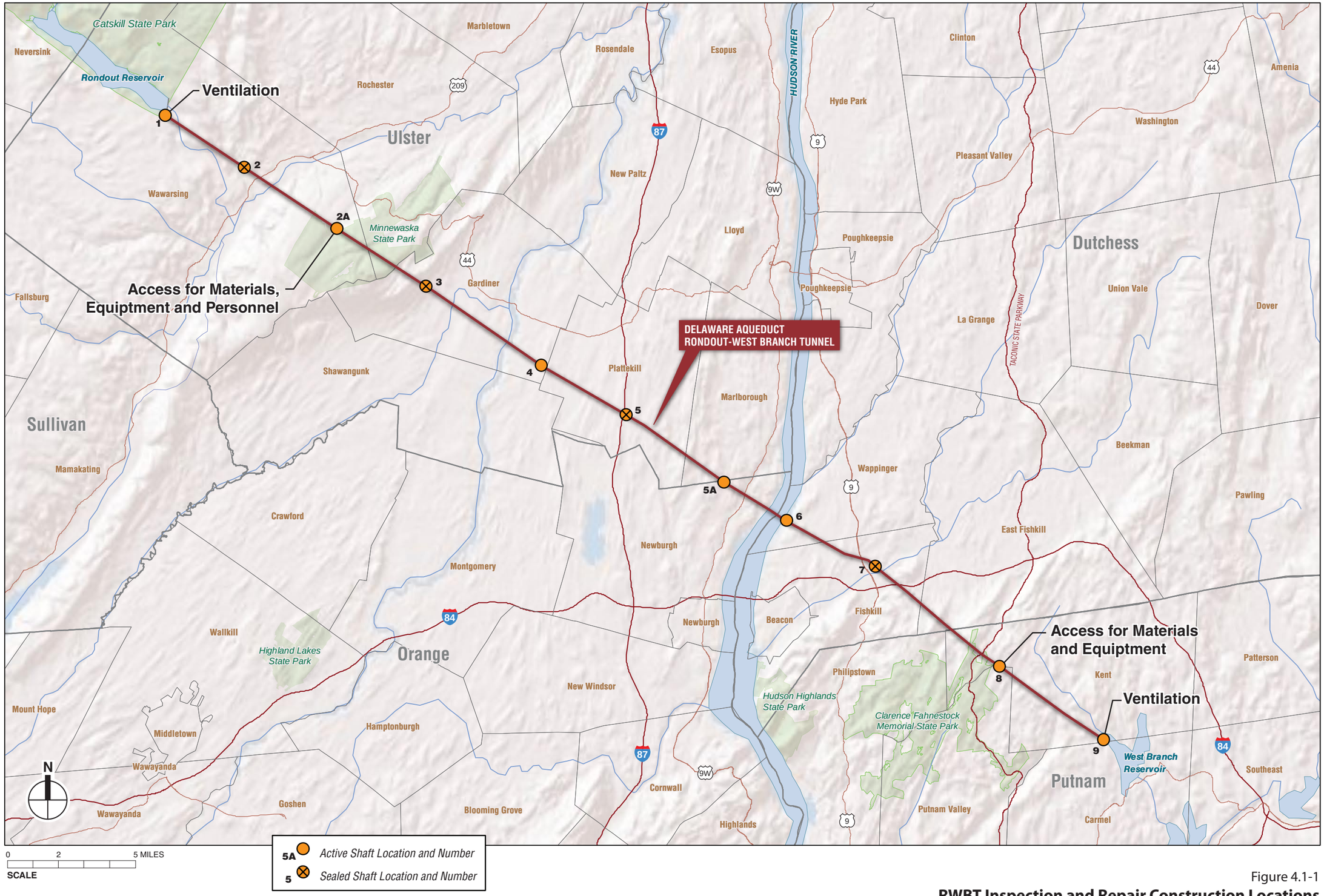

Figure 4.1-1

RWBT Inspection and Repair Construction Locations

4.1-4 TIMELINE FOR PROJECT 2B IMPLEMENTATION

Project 2B would not be implemented until after Project 1, Shaft and Bypass Tunnel Construction, and Project 2A, Water Supply System Augmentation and Improvement are complete and DEP has had enough lead time to prepare the water supply system for the RWBT shutdown needed to implement Project 2B. Currently, it is anticipated that Project 2B would begin in 2020, and between 6 and 15 months would be required to complete the bypass tunnel connection. However, commencement and duration of the work is 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. In addition, the duration of the work depends on whether the inundation plugs would be needed to seal off the existing tunnel in the event of excessive inflow from the Hudson River. DEP will continue to evaluate the potential duration of Project 2B as design progresses, and further information will be provided in the second EIS or a subsequent environmental review, as appropriate.

It is expected that work on Project 2B would commence in the fall since the fall and winter seasons are typically low water demand periods. If required, Project 2B could be delayed to a subsequent fall (e.g., 2021) to ensure that the water supply system is ready for the extended shutdown needed to implement Project 2B.

Project 2B would start with the unwatering of the RWBT, which is further described in Chapter 4.4, “Effects from Tunnel Unwatering.” Following the unwatering, and, if required, the completion of the inundation plugs, the connector tunnels would be extended to the existing tunnel.

During this time, while the RWBT is unwatered and the connections are being undertaken at the west and east connection sites, inspection and repair of the leaking portions of the aqueduct at Wawarsing, along with additional tunnel sections not bypassed, would be undertaken. A description of this work is in Section 4.2.

4.1-5 POTENTIAL IMPACTS OF PROJECT 2B

As discussed in Chapter 1, “Program Description,” prior to the approval and implementation of Project 2B, additional environmental review as part of a second EIS or a subsequent environmental review, as appropriate, will be undertaken to evaluate and disclose in detail Project 2B’s potential environmental impacts.

For the assessment of potential Project 2B impacts, a generic assessment is provided except for the potential effects on traffic, noise, and lighting of construction at the west and east connection sites, which are analyzed in detail to the extent possible at this time. The remaining sections within Chapter 4 address impacts from Project 2B related to the following:

- Effects from physical construction of the bypass tunnel connections and from the inspection and repair of the RWBT. Potential impacts from physical construction and inspection are discussed in more detail in Section 4.2, "Effects from Physical Construction."
- Effects from stopping the flow of water through the RWBT and unwatering the tunnel so repairs can be made; this would have various effects:
    i. By reducing the existing leaks, there is the potential for effects on wetland areas that may be fed by the existing leakage. These potential impacts are discussed generically in Section 4.3, "Effects from Reducing the Leakage."
    ii. By unwatering the tunnel during the tunnel shutdown period there is the potential for effects from the discharge of tunnel water. These potential impacts are discussed generically in Section 4.4, "Effects from Tunnel Unwatering."
- By drawing down the Catskill and Croton reservoirs, potentially beyond levels that would typically be experienced during drought conditions, there is the potential for effects within these reservoir systems. These potential impacts are discussed generically in Section 4.5, "Effects of Reservoir Drawdown."
- During construction of Project 2B, the RWBT would not be in use. Therefore, there is the potential for effects at the spillways of the Delaware watershed reservoirs and on the receiving water bodies. These potential impacts are discussed generically in Section 4.6, "Effects of Delaware Watershed Reservoir Releases."

4.1-6 PROJECT 2B EMPLOYMENT AND POTENTIAL ECONOMIC BENEFITS

The Final Scope of Work published August 31, 2011, stated that an estimate of the number of employees and the economic benefits that would result from Project 2B construction would be included in this section of the EIS. These estimates are incorporated into the analysis provided in Chapter 2, "Probable Impacts of Project 1, Shaft and Bypass Tunnel Construction," Section 2.6, "Socioeconomic Conditions." ✷

4.2-1 INTRODUCTION

Section 4.1 provides a brief description of the two main components of Project 2B:

- Bypass Tunnel Connection; and
- Rondout-West Branch Tunnel (RWBT) Inspection and Repair, including Wawarsing.

Specifically, this section provides more detail on the work that is anticipated to occur along the length of the RWBT during Project 2B to the extent it can be defined at this time.

While the second EIS or a subsequent environmental review, as appropriate, will address the impacts of Project 2B, this section also evaluates the potential effects of construction at the locations where Project 2B construction would occur or be supported from—i.e., the west and east connection sites and Shafts 1, 2A, 8, and 9.

This section is organized as follows:

- Section 4.2-2, "Bypass Tunnel Connection," describes the potential construction schedule, activities, and a detailed assessment of the impacts of Project 2B at the west and east connection sites.
- Section 4.2-3, "RWBT Inspection and Repair, including Wawarsing," describes the potential construction activities and impacts of Project 2B at Shafts 1, 2A, 8, and 9.

4.2-2 BYPASS TUNNEL CONNECTION

Following is a description of the likely construction schedule and activities at each connection site, along with projections of construction trucks and workers during the connection phase. Finally, a detailed assessment of potential transportation, noise, and visual character for lighting impacts at the east and west connection sites is provided.

4.2-2.1 CONSTRUCTION SCHEDULE

Section 4.1, "Overview of Project 2B," provides a general discussion of the likely construction elements during the connection phase. Once conditions are suitable, the existing RWBT would be taken out of service and unwatered. If there is no excessive inflow of water, a series of

construction phases would be undertaken. All of this work would occur below ground, supported by facilities at the surface worksites. First, the connections of the bypass tunnel to the existing RWBT would be completed by drill-and-blast techniques. Next, a reinforced concrete junction structure (which would join the bypass with the existing RWBT) would be constructed. In addition, permanent bulkheads or plugs would be constructed in the existing tunnel to isolate the bypassed portion of the tunnel from the new bypass tunnel. With all these elements completed, the bypass tunnel would be completed, and the bypassed section of the existing RWBT would be sealed off and abandoned. Work would be performed 24 hours/day, 7 days/week and could be completed in as little as 6 months between the start of the construction work and completing the integration of the bypass with the existing RWBT.

There is a small chance that inundation plugs may be required to seal off the existing tunnel in the event of excessive inflow from the Hudson River. If excessive inflow is observed after tunnel unwatering, it would be necessary to complete the inundation plugs before starting the tunnel connections. Completion of the plugs would generally involve completing the drilling of a series of holes from the ground surface into the top of the tunnel. The 26 approximately 18-inch diameter vertical holes would be pre-drilled to a safe distance above the tunnel during Project 1, Shaft and Bypass Tunnel Construction. In Project 2B, the holes would be completed by drilling all the way into the existing tunnel, and pouring concrete into the tunnel to create a plug. On completion of the plugs, the section of tunnel under the river would be isolated from the bypass connection points, allowing connection work to proceed without the impacts of excessive water in the tunnel.

It would take approximately 2 months to complete construction of the inundation plugs. Much of this 2-month time for the inundation plugs would be spent drilling the holes to break into the existing tunnel. The actual filling and creation of the concrete plugs would be expected to take less than 2 weeks at each connection site. Construction of inundation plugs would result in a minimum timeframe of 8 months total to integrate the bypass with the existing tunnel.

While the 6- to 8-month timeframe would be the lower-end time estimate to complete and integrate the bypass tunnel in the RWBT, DEP recognizes that certain conditions could extend the duration of the RWBT's outage. These could include complications as a result of conditions encountered at either of the two connection sites or at additional locations along the 45-mile RWBT. Therefore, DEP has conservatively projected up to 7 more months (for 15 months in total) for the complete integration of the bypass tunnel to the RWBT and reactivation of the Delaware Aqueduct. During this additional time period, work is anticipated to be comparable to that projected for the minimum 6- to 8-month timeframe to complete the integration of the bypass tunnel to the RWBT.

Following the subsurface connection and reactivation of the Delaware Aqueduct, there would still be some construction elements to complete at the surface of the connection sites. These would include final site restoration, cleanup and demobilization, which could take an additional

four months to complete. Depending on the time of year after the bypass work is completed, plantings on the connection sites may have to be delayed until the appropriate season.

4.2-2.2 CONSTRUCTION ACTIVITIES

WEST CONNECTION SITE

Description of Construction Work

The infrastructure improvements to support the connection phase of Project 2B would be largely implemented during Project 1, and no new site preparation activities are anticipated. Stormwater would be discharged through the same systems implemented for Project 1. Sanitary waste would continue to be hauled from the west connection site; no changes to on-site road or parking would be required, and power utility requirements would be implemented in Project 1.

However, during the connection phase, water from the Delaware system would not be available to the Town of Newburgh. However, ~~and while it is expected that~~ the Town of Newburgh would be able to meet the potable water demands for the connection site for Project 1. In addition, subsequent to the issuance of the DEIS, DEP determined that non-potable water could be supplied to the west connection site during the tunnel connection phase (i.e., Project 2B) without construction of an intake on the Hudson River (discussed on page 4.2-3 of the DEIS). Therefore, the need for construction of an intake and additional analyses of such was not considered in the FEIS as part of Project 2B~~. it is possible that the town would not be able to meet the entire non-potable water demands at the site during the construction phase (Project 2B). Under such conditions, an alternative supply of non-potable water would be required, and the use of water from the Hudson River or the tidal portion of the unnamed Class C stream within the Roseton stream study site would be explored. As currently contemplated, this alternative supply of non-potable water would consist of a new intake structure with screens designed to exclude debris and to meet any other exclusion requirements specified by the NYSDEC, a pump station or stations, and a water supply pipe connecting the Hudson River or the tidal portion of the unnamed Class C stream within the Roseton stream study site to the west connection site.~~ The dewatering pipeline constructed in Project 1 would also be used for Project 2B at the west connection site.

The grout and concrete batch plant constructed at the west connection shaft would likely remain, and could support both the west and east connection sites during this phase.

Level of Activity (Trucks and Workers)

Truck Projections

Based on the likely activities involved for the connection work, estimates of the average and maximum number of daily truck trips were generated. The maximum average truck trips per day

during the connection phase would be 52, including trucks from the west connection site supporting the east connection site work.

Worker Projections
Based on the likely activities involved for the connection work, estimates of the average and maximum number of construction workers were developed; the maximum estimated workers by shift are presented in **Table 4.2-1**.

Table 4.2-1
West Connection Site: Maximum Estimated Workers for the Connection Phase

	7 AM – 3 PM	3 PM – 11 PM	11 PM – 7 AM	Total Daily
Connection Phase	48	42	42	132

Lighting

Due to the critical issues associated with the shutdown of the Delaware system, construction-related work at west connection site would need to occur 24 hours/day, 7 days/week during this critical phase until the subsurface connection and integration of the bypass tunnel is complete. Due to the nature of the 24-hour work, lighting would be required, and the lighting plan would be comparable to that expected during Phase 3 of Project 1 at the west connection site.

EAST CONNECTION SITE

Description of Construction Work

The infrastructure improvements to support the connection phase of Project 2B would be largely implemented in Project 1. No new site preparation activities are anticipated. Stormwater would be discharged through the systems implemented for Project 1. Sanitary waste would continue to be hauled from the site; no changes to on-site road or parking would be required, and power utility requirements would be implemented in Project 1.

However, during the connection phase, water from the Delaware system would not be available from Shaft 6 (i.e., east connection site), and an alternative supply of non-potable water would be required. The use of water from the Hudson River for non-potable water supplies would likely be required for this phase of work. Water withdrawal from the Hudson River through the existing forebay of the Hudson River Pumping Station (HRPS) could provide adequate flow and volume to the project site for non-potable construction related water use.

Level of Activity (Trucks and Workers)

Truck Projections
Based on the likely activities involved for the connection work, estimates of the average and maximum number of daily truck trips were generated. The maximum average truck trips per day during the connection phase would be 40. However, unlike Project 1, there would be no limits on

truck support activities from 11 PM to 7 AM during the connection phase when the tunnel is shut down.

Worker Projections
Based on the likely activities involved for the connection work, estimates of the average and maximum number of construction workers were developed; the maximum estimated workers by shift are presented in **Table 4.2-2**.

Table 4.2-2
East Connection Site: Maximum Estimated Workers for the Connection Phase

	7 AM – 3 PM	3 PM – 11 PM	11 PM – 7 AM	Total Daily
Connection Phase	48	42	42	132

Lighting

Due to the critical issues associated with the shutdown of the Delaware system, construction-related work at east connection site would need to occur 24 hours/day, 7 days/week during this critical phase until the subsurface connection and integration of the bypass tunnel is complete. Due to the nature of the 24-hour work, lighting would be required, and the lighting plan would be comparable to that expected during Phase 3 of Project 1 at the east connection site.

4.2-2.3 POTENTIAL IMPACTS FROM CONSTRUCTION OF PROJECT 2B

Based on the assessments undertaken for Project 1 and the likely construction work hours, activities, and schedule of Project 2B, the most likely impacts near the connection sites and in the study areas would be related to neighborhood character (east of Hudson study area only), visual character, traffic, noise, and public health. The potential for Project 2B to result in predicted temporary significant adverse impacts in addition to or extended in duration from those determined for Project 1 is summarized below. In addition, since non-potable water may be required from the Hudson River for both connection sites, the potential impacts on natural resources and water resources are also assessed.

WEST CONNECTION SITE

Visual Character

Construction-related work at the west connection site until the subsurface connection and integration of the bypass tunnel is complete would need to occur 24 hours/day, 7 days/week. During this construction period, DEP would likely continue to use the lighting installed on-site during Project 1 (see Section 2.4) to maintain safety and security of the site. An analysis of the expected lighting conditions during construction was evaluated as part of Section 2.4.

The lighting likely required for the site includes site lighting for security and circulation (e.g., driveways and parking areas) and portable lighting units, which would be used to illuminate the work areas during construction activity. These portable units would comply with local codes and would be removed once construction is complete. Construction lighting would be oriented away from neighboring properties and would not result in any significant light spillover at the west connection site property line. All lighting would be installed to be consistent with local codes as well as the most recent editions of the Illuminating Engineering Society Handbook, and the American National Practice for Roadway Lighting (RP-8) approved by the American National Standards Institute (ANSI).While there would at times be a glow visible from the site when lighting is used, the photometric models show that light levels at the property lines would be below 0.5 footcandles based on the analysis performed for Project 1. DEP would attempt to minimize any spillover of light onto adjacent properties to the extent practicable.

Natural Resources and Water Resources

Subsequent to the issuance of the DEIS, DEP determined that non-potable water could be supplied to the west connection site during the tunnel connection phase (i.e., Project 2B) without construction of an intake on the Hudson River (discussed on page 4.2-3 of the DEIS). Therefore, the need for construction of an intake and additional analyses of potential impacts of the intake on natural resources and water resources was not considered in the FEIS as part of Project 2B.

~~During the connection phase, a supplemental source of non-potable water for construction of Project 2B may be required should a sufficient supply be unavailable from the Town of Newburgh, since the water from the Delaware system to the Town of Newburgh would be unavailable. As currently contemplated, this supply could be withdrawn through a new intake on the Hudson River or the tidal portion of the Class C stream in the Roseton stream study site, and conveyed to the west connection site through a new non-potable water supply pipeline. A pump station would likely be constructed near the intake, and at this time, the route of the non-potable water supply for construction of Project 2B has not been determined.~~

~~Construction of the non-potable water supply pipeline for construction of Project 2B would have the potential to produce sediment disturbance, resulting in minor, short-term increases in suspended sediment within the Hudson River or the Class C stream within the Roseton stream study site. These temporary effects would be localized and confined to the immediate vicinity of sediment-disturbing activities.~~

~~An intake construction on the Hudson River for the non-potable water supply for construction of Project 2B would likely require authorization from the USACE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and from the NYSDEC under Article 15 of the Environmental Conservation Law, and Section 401 Water Quality Certification. An intake construction on the Class C stream within the Roseton stream study site for the non-potable water supply for construction of Project 2B would likely require authorization from the~~

~~USACE under Section 404 of the Clean Water Act and a Section 401 Water Quality Certification from the NYSDEC.~~

~~During the construction of the intake, appropriate measures, such as the use of a coffer dam structure and bottom-weighted turbidity curtain to contain re-suspended sediment, would likely be implemented to minimize increases of suspended sediment. With the implementation of these measures, the construction of the intake would not be anticipated to result in potential significant adverse impacts to aquatic resources of the Hudson River or the tidal portion of the stream within the Roseton stream study site. The minimal temporary loss of bottom habitat within the coffer dam, the permanent loss of bottom habitat within the footprint of the intake, and the benthic macroinvertebrate individuals associated with these areas unable to move from the area of disturbance would not be expected to result in a significant adverse impact to the benthic macroinvertebrate populations within the Hudson River or the unnamed stream, or result in a significant loss of prey for fish.~~

~~To protect Atlantic sturgeon, intake construction on the Hudson River would likely occur within the late fall during the period recommended by the NYSDEC to minimize impacts to this species. Use of the coffer dam and turbidity curtain would also minimize the potential for construction of the intake to adversely impact shortnose or Atlantic sturgeon that may forage in the vicinity of the proposed intake location on the Hudson River.~~

~~The intake would likely be designed and operated to exclude debris and to meet any other exclusion requirements specified by the NYSDEC. With these measures in place, the operation of the intake to supply non-potable water for Project 2B would not be expected to result in potential significant adverse impacts to aquatic resources of the Hudson River or to the Class C stream within the Roseton stream study site. Withdrawals would be reported to the NYSDEC in accordance with ECL Article 15 Title 33.~~

~~The second EIS will include a detailed assessment of natural resource impacts from these potential activities.~~

Transportation

Project 1 would not result in potential temporary significant adverse impacts to pedestrians, parking, or mass transit in the west of Hudson study area, and Project 2B is also not expected to result in predicted temporary significant adverse impacts on these transportation issues. However, potential temporary significant adverse traffic impacts are predicted to occur at nine signalized approaches at five intersections in the study area for Project 1. Based on the results from the Project 1 analysis and the projected trip generation for Project 2B, there are no new potentially affected intersections in the study area. The five intersections impacted during Project 1 would be the only potential intersections that could be significantly impacted from Project 2B construction. Therefore, the potential for the extended duration of temporary significant adverse traffic impacts during Project 2B at these locations was evaluated.

Predicted Exceedances of the Traffic Impact Guideline at Signalized Intersections
Following the methodology and general assumptions used in Section 2.10, "Transportation," for Project 1, estimates of potential impacts from construction worker auto and truck trips to and from the west connection site during the peak construction period of Project 2B were developed. In Section 2.10, the minimum number of vehicles required to result in an exceedance of the CEQR *Technical Manual* (January 2012) traffic impact guideline was determined. Next, the anticipated peak hour of construction traffic for Project 2B was developed and compared to the minimum threshold required to result in an exceedance. Based on this analysis, the following six approaches to four signalized intersections are predicted to have exceedances of the CEQR traffic impact guideline for the Project 2B peak construction period:

- Route 9W and I-84 EB Ramps (AM)
- Route 9W and N. Plank Road/I-84 WB Off-Ramp (AM)
- Route 9W and Fostertown Road (AM and PM)
- Route 9W and Carter Avenue (AM and PM)

Duration of Impacts
Similar to what was done for Project 1 in Section 2.10, an assessment was performed to determine the likely duration of Project 2B's potential traffic impacts. The estimated construction traffic over the full Project 2B construction period was developed and compared to the minimum number of vehicles required to result in an exceedance over time. The results, which represent the likely amount of time during Project 2B construction when a predicted exceedance of the CEQR traffic impact guideline would occur, are shown in **Table 4.2-3**.

Table 4.2-3
Project 2B Extended Duration of Impacts Near West Connection Site—West of Hudson Study Area

	Duration of Extended Impact							
	Route 9W & I-84 EB Ramps		Route 9W & N. Plank Rd./I-84 WB Off Ramp		Route 9W & Fostertown Road		Route 9W & Carter Avenue	
	AM	PM	AM	PM	AM	PM	AM	PM
Approximate Duration of Impact	12 months	0	4 months	0	12 months	12 months	4 months	12 months
Impact Duration as a Percent of Construction Period	100%	0	30%	0	100%	100%	30%	100%

These estimates, which also included the potential requirement of inundation plugs at the west connection site, were developed for the 8-month minimum timeframe to connect and integrate the bypass into the RWBT, plus the 4-month period to restore, clean up, and demobilize the site, resulting in a total of 12 months. If the 7 additional months DEP has conservatively projected would be required for the complete integration of the bypass tunnel to the RWBT and reactivation of the Delaware Aqueduct, then the impact durations could be for an additional 7 months (a total of up to 19 months).

Based on this evaluation, it was determined that construction of Project 2B would result in extended predicted temporary significant adverse impacts at six signalized approaches at four intersections in the study area.

Mitigation

Section 2.19, "Mitigation," provides a summary of mitigation measures to address predicted significant adverse traffic impacts from construction-related traffic for Project 1. The traffic mitigation measures suggested for Project 1 would be equally applicable for Project 2B. Traffic mitigation measures would include signal timing changes, upgrading traffic signal controller and detectors at some intersections, and a Traffic Management Plan (which would include an outreach/communication plan with the towns, schools, police, and other area agencies) for the west connection site and west of Hudson study area. The mitigation for Project 2B would simply be a continuation of ongoing practices implemented during Project 1.

As with Project 1, the only exception to complete mitigation would be at the intersection of Route 9W and Fostertown Road during the AM and PM peak hours, where the proposed mitigation would reduce extended temporary impacts from Project 2B construction traffic.

Noise

Similar to Project 1 construction, the maximum allowed sound pressure values for residential districts between the hours of 7 PM and 7 AM specified by the Town of Newburgh Code are expected to be exceeded near the west connection site with the construction of Project 2B. However, the measured existing noise levels in the west of Hudson study area can exceed the Town of Newburgh Code limits during the applicable time periods.

Predicted temporary significant adverse noise impacts would occur with Project 1 at locations near the west connection site. No temporary significant adverse impacts are predicted at locations farther from the site due to on-road noise sources from Project 1, and, therefore, none would be expected from Project 2B based on the estimated construction trucks expected from Project 2B and comparable hours of construction work operation with Project 1.

The potential for additional or extended adverse noise impacts to occur during Project 2B were evaluated for locations near the west connection site. Following the methodology and assumptions used in Section 2.13, "Noise," for Project 1, estimates of potential noise sources from on-site operations during Project 2B were developed. These estimates, which also included the potential requirement of inundation plugs, were developed for the 8-month minimum timeframe to connect and integrate the bypass into the RWBT, plus the 4 month period to restore, clean up, and demobilize the site.

Construction of Project 2B would entail a number of activities at the west connection site. Noise sources would likely include the equipment listed in **Table 4.2-4** as well as trucks accessing and moving about the construction areas. Much of the equipment for Project 2B would be a subset of equipment likely required to construct the shafts and tunnel under Project 1.

Following the methodology in Section 2.13, a noise analysis was conducted to assess noise effects due to the construction activities during the connection phase for all three proposed shifts. **Tables 4.2-5, 4.2-6, and 4.2-7** summarize the following for the connection phase at each receptor site (see Figure 2.13-2) during the three construction shifts:

- Existing noise levels;
- Resulting calculated future total construction noise level for the worst-case period; and
- Maximum predicted incremental increase in noise levels for the worst-case period.

Table 4.2-4
Estimated Construction Equipment Data for the Connection Phase at the West Connection Site

Construction Equipment	L_{max} Noise Level at 50 Feet (dBA)
Compressors	58[1]
Concrete Batch Plant	83
Concrete Mixer Truck	85
Concrete Pump	82
Crane (shaft crane)	71[2]
Drill Jumbo	91[2]
Drill Rig Truck	84
Drum Mixer	80
Dump Truck	84
Excavator	85
Fuel Truck (flatbed truck)	84
Front End Loader	80
Generator	65[2]
Tractor Trailer	84
Ventilation System	82[2]

Notes:
[1] Level mandated by New York City Noise Code.
[2] Level supplied by vendor information.
Sources: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006, and Federal Highway Administration Roadway Construction Noise Model (FHWA RCNM), 2006.

Table 4.2-5
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, West Connection Site, Worst-Case Period First Shift (7 AM to 3 PM)

Site	Existing Noise Level	Project 2B: Tunnel Connection Phase	
		Total Construction Noise Level	Maximum Predicted Increment
1[W]	61.4	61.4	0.0
2[W]	74.2	74.4	0.2
3[W]	61.4	62.1	0.7
4[W]	61.4	61.6	0.2
5[W]	74.2	74.2	0.0

Notes: For the first shift there were no predicted exceedances of the *CEQR Technical Manual* impact guideline.
CEQR impact guideline (7 AM to 10 PM)
1. If the future without proposed project ≤ 60 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$
2. If the future without proposed project = 61 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 4 dBA $L_{eq(1)}$
3. If the future without proposed project ≥ 62 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Table 4.2-6
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, West Connection Site, Worst-Case Period Second Shift (3 PM to 11 PM)

Site	Existing Noise Level	Project 2B: Tunnel Connection Phase	
		Total Construction Noise Level	Maximum Predicted Increment
1^W	57.8	57.8	0.0
2^W	71.2	71.7	0.5
3^W	57.8	59.3	1.5
4^W	57.8	58.3	0.5
5^W	71.2	71.3	0.1

Notes: For the second shift there were no predicted exceedances of the *CEQR Technical Manual* impact guideline.
CEQR impact guideline (10 PM to 7 AM)
1. The guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Table 4.2-7
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, West Connection Site, Worst-Case Period Third Shift (11 PM to 7 AM)

Site	Existing Noise Level	Project 2B: Tunnel Connection Phase	
		Total Construction Noise Level	Maximum Predicted Increment
1^W	48.6	48.9	0.3
2^W	65.8	67.2	1.4
3^W	48.6	55.0	**6.4**
4^W	48.6	51.5	2.9
5^W	65.8	66.0	0.2

Notes: Locations where predicted incremental noise levels would exceed the CEQR impact guideline are shown in **bold**.
CEQR impact guideline (10 PM to 7 AM)
1. The guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Locations where predicted incremental noise levels would exceed the CEQR impact guideline are shown in **bold**.

Using the lower limits for a residential zone, the Newburgh Town Code has a maximum sound pressure level of 65 dBA from 8 AM to 10 PM and 56 dBA from 10 PM to 8 AM. As discussed in Section 2.13, "Noise," construction is exempt from the Town Code noise limits from 7 AM to 7 PM. Therefore, there is a period from 7 PM to 7 AM in which the construction of Project 1 would be subject to the maximum allowable sound pressure levels in the Town of Newburgh's Code. Since construction would occur 24 hours/day, 7 days/week for most of Project 2B, the 56 dBA level was conservatively applied for the period from 7 PM to 7 AM in this assessment.

During construction of Project 2B, only one receptor is anticipated to exceed the maximum allowable sound pressure levels specified by the Newburgh Town Code (56 dBA). At receptor 2^W, construction noise due to Project 2B is predicted to exceed the maximum allowable sound pressure level for residential districts during the worst-case periods between the hours of 7 PM and 7 AM. As noted in Section 2.13-1.2, the measured existing noise levels at most measurement locations in the west of Hudson study area along the Route 9W corridor currently exceed the

Newburgh Town Code limits during the applicable time periods. Based on the predicted values, DEP may need to apply to the Zoning Board of Appeals for a variance.

At receptors 1^{w}, 2^{w}, 4^{w}, and 5^{W}, the CEQR noise impact guideline is not predicted to be exceeded during any time period during any of phases of construction of Project 2B. Provided below is an assessment of predicted exceedances of the CEQR noise impact guideline at receptor 3^{w}, the evaluation of predicted incremental noise levels during the worst-case period, and the expected duration of these incremental noise levels. In the discussions of the potential extended impacts below, the tunnel connection phase of Project 2B that requires second and third shifts is presented as 8 months. However, as noted earlier in this section, there may be an additional 7 months (for a total of 15 months for the complete integration of the bypass tunnel to the RWBT and reactivation of the Delaware Aqueduct). All of this information was considered in making a determination of the potential for additional or extended predicted temporary significant adverse noise impacts at these locations.

Receptor 3^{w} – Residence on Pine Road Immediately South of the West Connection Site
At receptor 3^{W}, representing the residence on Pine Road immediately south of the west connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance for the third shift.

Third Shift (11 PM to 7 AM). The magnitude of the increase at this receptor during the worst-case period is predicted to be 6.4 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck trips, the operation of on-site equipment, and the particularly low existing noise levels at this location.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B during the third shift (11 PM to 7 AM).

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residence on Pine Road immediately south of the west connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B would be ~~34.5~~ 48.0 dBA with windows open, and 34.0 dBA with windows closed—below the 45

dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Residences that would be expected to experience interior noise levels that exceed the level considered acceptable by CEQR criteria during overnight periods as a result of construction of Project 1 would be eligible for receptor controls, such as interior windows and air conditioners, to bring interior noise levels within the acceptable range according to CEQR (see Appendix 2.19-2).

As noted in Section 2.13, "Noise," DEP has committed to an extensive series of noise control measures, which are outlined in the Conceptual Noise Mitigation Plan (CNMP) in Appendix 2.19-2. The CNMP presents from a conceptual standpoint the noise control measures that would be implemented by DEP, its construction management staff, and its contractors as part of Project 1 and Project 2B. A goal of the CNMP is to ensure that the proposed program's noise during construction is decreased to the maximum extent practicable.

Public Health

The areas of concern for potential effects on public health from Project 2B construction are similar to those addressed for Project 1 construction related to the west connection site (see Section 2.17, "Public Health"). These include potential air quality, water quality, hazardous materials, or noise impacts within the study areas, and impacts on water supply users.

Based on the detailed assessment completed for Project 1 in Section 2.17 and the assessments included in this section, no significant adverse public health impacts are expected in the west of Hudson study area or on water supply users from Project 2B construction.

EAST CONNECTION SITE

Neighborhood Character

Section 2.3, "Neighborhood Character," addresses potential impacts on neighborhood character from the construction of Project 1 and concludes that there would be temporary significant adverse impacts on neighborhood character from construction of Project 1 near the east connection site. Impacts to neighborhood character with Project 2B would be expected to be similar at times than those resulting from Project 1, due to the required 24-hour construction activities.

The site's visual character would change during Project 1, and these visual character changes would continue with Project 2B, primarily as a result of tree clearing for the construction of the new internal driveway and shaft, the new construction equipment that would be brought onto the site, and the installation of additional noise barriers on the site. In particular, residences immediately surrounding the construction site would experience increased activity and light from the site along with extended temporary significant adverse noise impacts from construction of

Project 2B. Therefore, near the east connection site, construction of Project 2B is expected to result in an extended 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.

Visual Character

Construction related work at the east connection site would need to occur 24 hours/day, 7 days/week. During this construction period, DEP would likely continue to use the lighting installed on-site during Project 1 (see Section 2.4) to maintain safety and security of the site. An analysis of the expected lighting conditions during construction was developed as part of the site plan application.

The lighting likely required for the site includes site lighting for security and circulation (e.g., driveways and parking areas) and portable lighting units, which would be used to illuminate the work areas during construction activity. These portable units would comply with local codes and would be removed once construction is complete. Construction lighting would be oriented away from neighboring properties and would not result in any significant light spillover at the east connection site property line. All lighting would be installed to be consistent with local codes as well as the most recent editions of the Illuminating Engineering Society Handbook, and the American National Practice for Roadway Lighting (RP-8) approved by the ANSI. While there would at times be a glow visible from the site when lighting is used, the photometric models show that light levels at the property lines would be below 0.5 footcandles with the exception of one point at the edge of the parking area in the southwestern portion of the site, where an existing light fixture right next to the property line results in a level of 1.2 footcandles based on the analysis performed for Project 1. DEP would attempt to minimize any spillover of light onto adjacent properties to the extent practicable.

Section 2.4, “Visual Character,” provides a full assessment of potential visual character impacts from Project 1, and Project 2B would result in extending the visual character changes at the east connection site. Views of the site and to the Hudson River along River Road near the east connection site would be adversely affected by the construction of Project 2B. However, these impacts would be temporary, limited in location, and are not expected to result in significant adverse impacts on the visual character of the study area. Therefore, construction of Project 2B is not expected to result in any significant adverse visual impact.

Natural Resources and Water Resources

During the connection phase, an alternative source of non-potable water for construction of Project 2B would be required, since the water from Delaware system to Shaft 6 (i.e., the east connection site) would be unavailable. As noted in Chapter 1, “Program Description,” an alternate option to provide a reliable potable water supply to the east connection site would involve the potential installation of a water main between the site and the Town of Wappinger

water supply (United Wappinger Water District [UWWD]) prior to construction of the east connection shaft under Project 1. For Project 2B, it is expected that this source would be used to provide potable water for the east connection site. The construction and environmental review of this water main connection would be undertaken by the Town of Wappinger. ~~The Hudson River Pumping Station intake would be evaluated to determine if debris and any other exclusion requirements to avoid adverse impacts to fish can be accommodated. The second EIS will include a detailed assessment of natural resource impacts from these potential activities. A generic assessment of potential impacts is addressed in the remaining sections of Chapter 4~~.

Transportation

Project 1 would not result in potential temporary significant adverse impacts to pedestrians, parking, or mass transit in the east of Hudson study area, and Project 2B is also not expected to result in predicted temporary significant adverse impacts on these transportation issues. However, potential temporary significant adverse traffic impacts are predicted to occur at up to eight signalized approaches at four intersections in the study area for Project 1. Based on the results from the Project 1 analysis and the project trip generation for Project 2B, there are no new potentially affected intersections in the study area. The four intersections impacted during Project 1 would only be the potential intersections that could be significantly impacted from Project 2B construction. Therefore, the potential for the extended duration of temporary significant adverse traffic impacts during Project 2B at these locations was evaluated.

Predicted Exceedances of the Traffic Impact Guideline at Signalized Intersections

Following the methodology and general assumptions used in Section 2.10, "Transportation," for Project 1, estimates of potential impacts from construction worker auto and truck trips to and from the east connection site during the peak construction period of Project 2B were developed. In Section 2.10, the minimum number of vehicles required to result in an exceedance of the *CEQR Technical Manual* traffic impact guideline was determined. Next, the anticipated peak hour of construction traffic for Project 2B was developed and compared to the minimum threshold required to result in an exceedance. Based on this analysis, the following seven approaches to four signalized intersections are predicted to have exceedances of the CEQR traffic impact guideline for the Project 2B peak construction period:

- NYS Route 9D and I-84 EB Ramps (AM and PM)
- NYS Route 9D and Red School House Road (PM)
- NYS Route 9D and Chelsea Road/Baxtertown Road (AM and PM)
- NYS Route 9D and New Hamburg Road/Old Hopewell Road (County Route 28) (AM and PM)

Duration of Impacts

Similar to what was done for Project 1 in Section 2.10, an assessment was performed to determine the likely duration of Project 2B's potential traffic impacts. The estimated construction traffic over the

full Project 2B construction period was developed and compared to the minimum number of vehicles required to result in an exceedance over time. The results, which represent the likely amount of time during Project 2B construction when a predicted exceedance of the CEQR traffic impact guideline would occur, are shown in **Table 4.2-8**.

Table 4.2-8
Project 2B Extended Duration of Impacts Near the East Connection Site—East of Hudson Study Area

	Duration of Extended Impact							
	Route 9D & I-84 EB Ramps[1, 2, 3]		Route 9D & Red School House Road[1, 2, 3]		Route 9D & Chelsea Road/ Baxtertown Road[1, 2, 3]		Route 9D & New Hamburg Road /Old Hopewell Road (County Route 28)[1, 2, 3]	
	AM	PM	AM	PM	AM	PM	AM	PM
Total Duration of Impact	12 months	12 months	0	3 months	3 months	4 months	9 months	3 months
Impact Duration as a Percent of Construction Period	100%	100%	0%	25%	25%	30%	75%	25%

Notes:
[1] Scenario 1
[2] Scenario 2
[3] Scenario 3

These estimates, which also included the potential requirement of inundation plugs at the east connection site, were developed for the 8-month minimum timeframe to connect and integrate the bypass into the RWBT, plus the 4-month period to restore, clean up, and demobilize the site, resulting in a total of 12 months. If the 7 additional months DEP has conservatively projected would be required for the complete integration of the bypass tunnel to the RWBT and reactivation of the Delaware Aqueduct, then the impact durations could be for an additional 7 months (a total of up to 19 months).

Based on this evaluation, it was determined that construction of Project 2B would result in extended predicted temporary significant adverse impacts at seven signalized approaches at four intersections in the study area.

Mitigation

Section 2.19, "Mitigation," provides a summary of mitigation measures to address predicted significant adverse traffic impacts from construction-related traffic for Project 1. The traffic mitigation measures suggested for Project 1 would be equally applicable for Project 2B. Traffic mitigation measures would be composed of signal timing changes, upgrading traffic signal controller and detectors at some intersections, a Traffic Management Plan (which would include an outreach/communication plan with the towns, schools, police, and other area agencies) for the east connection site and east of Hudson study area, roadway pavement monitoring on local roads accessed by trucks for the east connection site, potential additional signage (including no parking signs) and clearing some vegetation in the right-of-way near a few intersections in the east of Hudson study area. The mitigation for Project 2B would simply be a continuation of ongoing

practices implemented during Project 1.The mitigation measures suggested for Project 1 applied to Project 2B would completely eliminate these predicted extended temporary significant adverse traffic impacts in the east of Hudson study area.

Noise

Predicted temporary significant adverse noise impacts for Project 1 would occur at locations near the east connection site. No temporary significant adverse impacts were predicted at locations farther from the site due to on-road noise sources from Project 1.

The potential for additional or extended adverse noise impacts to occur during Project 2B was evaluated for locations near the east connection site. However, since Project 2B would not have a limitation on trucking after 11 PM, locations along construction truck and worker routes were also examined. Following the methodology and assumptions used in Section 2.13, "Noise," for Project 1, estimates of potential noise sources from on-site operations during Project 2B were developed. These estimates, which also included the potential requirement of inundation plugs at the east connection site, were developed for the 8-month minimum timeframe to connect and integrate the bypass into the RWBT, plus the 4 month period to restore, clean up, and demobilize the site.

Construction of Project 2B would entail a number of activities at the east connection site. Noise sources would likely include the equipment listed in **Table 4.2-9** as well as trucks accessing and moving about the construction areas. Much of the equipment for Project 2B would be a subset of equipment likely required to construct the shafts and tunnel under Project 1.

Table 4.2-9
Estimated Construction Equipment Data for the Connection Phase at the East Connection Site

Construction Equipment	L_{max} Noise Level at 50 Feet (dBA)
Compressors	58[1]
Concrete Batch Plant	83
Concrete Mixer Truck	85
Concrete Pump	82
Crane (shaft crane)	71[2]
Drill Jumbo	91[2]
Drill Rig Truck	84
Drum Mixer	80
Dump Truck	84
Excavator	85
Fuel Truck (flatbed truck)	84
Front End Loader	80
Generator	65[2]
Tractor Trailer	84
Ventilation System	82[2]

Notes:
[1] Level mandated by New York City Noise Code.
[2] Level supplied by vendor information.
Sources:
Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006, and Federal Highway Administration Roadway Construction Noise Model (FHWA RCNM), 2006.

Following the methodology in Section 2.13, a noise analysis was conducted to assess noise effects due to the construction activities during the connection phase during all three proposed shifts. The noise control measures that are included in the proposed construction program, and that would be implemented as part of Project 1, would also be incorporated into Project 2B, but the predicted noise levels without the noise control measures are included here to illustrate the effectiveness of the measures, compared with the scenario without any noise control. As noted in Section 2.13, "Noise," between the DEIS and FEIS, additional barriers within the east connection site located immediately south of the site's shaft location were deemed to be feasible and practicable. These barriers were incorporated into the analysis of noise impacts for Project 1, which resulted in somewhat lower predicted noise levels at certain receptors during certain phases and shifts of construction. The results for Project 2B presented below were also updated for the FEIS with these additional barriers. In addition, the five additional receptors included in the FEIS as discussed in Section 2.13, "Noise," were included in this assessment. **Tables 4.2-10, 4.2-11,** and **4.2-12** summarize the following for the connection phase at each receptor site (see Figure 2.13-3) during the three construction shifts:

- Existing noise levels;
- Resulting calculated future total construction noise level for the worst-case period without the planned noise control measures;
- Maximum predicted incremental increase in noise levels for the worst-case period without the planned noise control measures;
- Resulting calculated future total construction noise level for the worst-case period with the planned noise control measures;
- Maximum predicted incremental increase in noise levels for the worst-case period with the planned noise control measures; and
- The noise level reduction (e.g., noise control benefit) expected from the planned noise control measures for the worst-case period.

Locations where predicted incremental noise levels with the planned noise control measures would exceed the CEQR impact guideline are shown in **bold**.

Using the updated octave bands for a residential zone, the Wappinger Town Code has a maximum sound pressure level of 45 dBA before 8 AM and after sunset. Since the first shift would start before 8 AM and the second and third shifts would occur after sunset, the 45 dBA limit would apply to all three shifts. At all receptors, except for receptors 9^E through 12^E, construction noise due to Project 2B is predicted to exceed the maximum allowable sound pressure level for residential districts during the worst-case periods before the hour of 8 AM and after sunset. As noted in Section 2.13-1.2, the measured existing noise levels at most measurement locations in the east of Hudson study area currently exceed the Wappinger Town Code limits. Based on the predicted values, DEP may need to apply to the Zoning Board of Appeals for a variance.

~~At all of the east of Hudson receptors, the CEQR noise impact guideline is predicted to be exceeded during at least one time period during the tunnel connection phase of Project 2B for the worst-case period.~~ At receptors 9[E], 10[E], 11[E], and 12[E], the *CEQR Technical Manual* impact guideline for a potential noise impact is not predicted to be exceeded during any time period during any of phases of construction even for the worst-case construction periods. Provided below is an assessment of predicted exceedances of the CEQR noise impact guideline at receptors 1[E], 2[E], 3[E], 4[E], 5[E], 6[E], 7[E], 8[E], and 13[E], the evaluation of predicted incremental noise levels during the worst-case period, and the expected duration of these incremental noise levels. In the discussions of the potential extended impacts below, the tunnel connection phase of Project 2B that requires second and third shifts is presented as 8 months. However, as noted earlier in this section, there may be an additional 7 months (for a total of 15 months for the complete integration of the bypass tunnel to the RWBT and reactivation of the Delaware Aqueduct). All of this information was considered in making a determination of the potential for additional or extended predicted temporary significant adverse noise impacts at these locations.

Table 4.2-10
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, East Connection Site, Worst-Case Period First Shift (7 AM to 3 PM)

Site Phase 1: Site Preparation	Existing Noise Level	Total Construction Noise Level (No Noise Control)	Maximum Predicted Increment (No Noise Control)	Total Construction Noise Level (with Noise Control)	Maximum Predicted Increment (with Noise Control)	Noise Control Benefit
1[E]	58.5	60.7	2.2	60.5	2.0	0.2
2[E]	60.1	61.9	1.8	~~61.9~~61.8	~~1.8~~1.7	~~0.0~~0.1
3[E]	61.0	65.8	4.8	~~65.6~~64.4	~~4.6~~3.4	~~0.2~~1.4
4[E]	52.5	57.3	4.8	~~56.3~~55.7	~~3.8~~3.2	~~1.0~~1.6
5[E]	49.7	67.3	17.6	~~62.7~~59.4	**~~13.0~~9.7**	~~4.6~~7.9
6[E]	61.0	66.3	5.3	~~63.4~~62.0	~~2.4~~1.0	~~2.9~~4.3
7[E]	43.2	72.2	29.0	~~65.9~~63.5	**~~22.7~~20.3**	~~6.3~~8.7
8[E]	43.2	73.4	30.2	~~65.7~~64.2	**~~22.5~~21.0**	~~7.7~~9.2
9[E]	69.7	70.1	0.4	70.5	0.8	-0.4
10[E]	52.2	52.2	0.0	52.2	0.0	0.0
11[E]	64.6	64.6	0.0	64.7	0.1	-0.1
12[E]	74.7	74.8	0.1	74.9	0.2	-0.1
13[E]	42.8	56.0	13.2	48.5	**5.7**	7.5

Notes: Locations where predicted incremental noise levels would exceed the CEQR impact guideline with the planned noise control measures are shown in **bold**.
CEQR impact guideline (7 AM to 10 PM)
1. If the future without proposed project ≤ 60 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$
2. If the future without proposed project = 61 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 4 dBA $L_{eq(1)}$
3. If the future without proposed project ≥ 62 dBA $L_{eq(1)}$, the guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Table 4.2-11
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, East Connection Site, Worst-Case Period Second Shift (3 PM to 11 PM)

Site Phase 1: Site Preparation	Existing Noise Level	Total Construction Noise Level (No Noise Control)	Maximum Predicted Increment (No Noise Control)	Total Construction Noise Level (with Noise Control)	Maximum Predicted Increment (with Noise Control)	Noise Control Benefit
1[E]	54.0	58.6	4.6	58.2	**4.2**	0.4
2[E]	64.2	65.0	0.8	65.0	0.8	0.0
3[E]	59.1	65.3	6.2	~~65.0~~63.7	**~~5.9~~4.6**	~~0.3~~1.6
4[E]	48.2	56.2	8.0	~~54.9~~54.1	**~~6.7~~5.9**	~~1.3~~2.1
5[E]	49.5	67.3	17.8	~~62.7~~59.4	**~~13.2~~9.9**	~~4.6~~7.9
6[E]	59.1	65.8	6.7	~~62.4~~60.5	**~~3.3~~**1.4	~~3.4~~5.3
7[E]	44.9	72.2	27.3	~~65.9~~63.6	**~~21.0~~18.7**	~~6.3~~8.6
8[E]	44.9	73.4	28.5	~~65.7~~64.3	**~~20.8~~19.4**	~~7.7~~9.1
9[E]	69.3	69.8	0.5	70.2	0.9	-0.4
10[E]	54.3	54.3	0.0	54.3	0.0	0.0
11[E]	67.0	67.0	0.0	67.1	0.1	-0.1
12[E]	73.3	73.5	0.2	73.6	0.3	-0.1
13[E]	41.5	56.0	14.5	48.2	**6.7**	7.8

Notes: Locations where predicted incremental noise levels would exceed the CEQR impact guideline with the planned noise control measures are shown in **bold**.
CEQR impact guideline (7 AM to 10 PM)
1. The guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Table 4.2-12
L_{eq} 1-hour Noise Levels (in dBA) with Construction of Project 2B, East Connection Site, Worst-Case Period Third Shift (11 PM to 7 AM)

Site Phase 1: Site Preparation	Existing Noise Level	Total Construction Noise Level (No Noise Control)	Maximum Predicted Increment (No Noise Control)	Total Construction Noise Level (with Noise Control)	Maximum Predicted Increment (with Noise Control)	Noise Control Benefit
1[E]	42.6	57.0	14.4	56.4	**13.8**	0.6
2[E]	45.8	57.5	11.7	~~57.5~~57.3	**~~11.7~~11.5**	~~0.0~~0.2
3[E]	46.7	64.2	17.5	~~63.8~~61.9	**~~17.1~~15.2**	~~0.4~~2.3
4[E]	42.6	55.7	13.1	~~54.2~~53.2	**~~11.6~~10.6**	~~1.5~~2.5
5[E]	42.6	67.2	24.6	~~62.5~~59.0	**~~19.9~~16.4**	~~4.7~~8.2
6[E]	46.7	64.9	18.2	~~59.8~~55.6	**~~13.1~~8.9**	~~5.1~~9.3
7[E]	42.6	72.2	29.6	~~65.9~~63.5	**~~23.3~~20.9**	~~6.3~~8.7
8[E]	42.6	73.4	30.8	~~65.7~~64.2	**~~23.1~~21.6**	~~7.7~~9.2
9[E]	64.1	65.4	1.3	66.5	2.4	-1.1
10[E]	49.1	49.1	0.0	49.2	0.1	-0.1
11[E]	61.8	61.9	0.1	62.0	0.2	-0.1
12[E]	68.7	69.1	0.4	69.5	0.8	-0.4
13[E]	42.0	56.0	14.0	48.3	**6.3**	7.7

Notes: Locations where predicted incremental noise levels would exceed the CEQR impact guideline with the planned noise control measures are shown in **bold**.
CEQR impact guideline (10 PM to 7 AM)
1. The guideline for a significant impact would be an increase of at least 3 dBA $L_{eq(1)}$

Receptor 1[E] – Residential Locations Along River Road North and Old State Road North of the East Connection Site

At receptor 1[E], representing residential locations along River Road North and Old State Road north of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the second shift (3 PM to 11 PM) and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). No significant noise level increases are predicted during the first shift.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be 4.2 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck and worker trips, which would be limited to a short period when employees enter/exit the east connection site.

Third Shift (11 PM to 7 AM). The magnitude of the increase at this receptor during the worst-case period is predicted to be 13.8 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck and worker trips, and construction worker trips would be limited to a short period when employees enter/exit the east connection site.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B. However, during periods with less construction worker traffic, noise impacts would be less than the peaks analyzed, and at times could be less than the CEQR impact guideline.

Determination of Significance of Noise Impacts. The predicted exceedances of the CEQR impact guideline in the second shift (3 PM to 11 PM) and third shift (11PM and 7 AM) at this location would be a result of the construction worker shift periods when employees enter/exit the east connection site. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, there would be no predicted temporary significant adverse noise impact at this receptor, which is representative of residential locations along River Road North and Old State Road north of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B would be 40.5 dBA with windows open—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period.

Receptor 2^E – Residential Locations Along Chelsea Road South of the East Connection Site
At receptor 2^E, representing residential locations along Chelsea Road south of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). No significant noise level increases are predicted during the first shift.

Second Shift (3 PM to 11 PM). No significant noise level increases are predicted during the second shift.

Third Shift (11 PM to 7 AM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~11.7~~ 11.5 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck and worker trips, and construction worker trips would be limited to a short period when employees enter/exit the east connection site.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B. However, during periods with less construction worker traffic, noise impacts would be less than the peaks analyzed, and at times could be less than the CEQR impact guideline.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, there would be no predicted temporary significant adverse noise impact at this receptor, which is representative of residential locations along River Road North and Old State Road north of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B would be ~~42.0~~ 41.3 dBA with windows open—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period.

Receptor 3^E – Residential Locations Along River Road East of the East Connection Site
At receptor 3^E, representing residential locations south of and near the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the second shift (3 PM to 11 PM) and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). No significant noise level increases are predicted during the first shift.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~5.9~~ 4.6 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck trips and worker trips traveling along River Road North to the east connection site and the operation of on-site equipment.

Third Shift (11 PM to 7 AM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~17.1~~ 15.2 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck trips and worker trips traveling along River Road North to the east connection site and the operation of on-site equipment.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of a residential location south of and near the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be ~~48.3~~ 54.9 dBA with windows open and ~~36.3~~ 40.9 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Receptor 4^E – Residential Locations Along Cobblestone Road North of the East Connection Site
At receptor 4^E, representing residential locations along Cobblestone Road north of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the second shift (3 PM to 11 PM) and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). No significant noise level increases are predicted during the first shift.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~6.7~~ 5.9 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Third Shift (11 PM to 3 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~11.6~~ 10.6 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. As noted in Section 2.13, "Noise," construction of Project 1 would not result in a predicted significant adverse noise impact at this location. Predicted exceedances of the CEQR impact guideline resulted from the worst-case noise level for construction of Project 2B, which could be for approximately 8 months. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline and the determination of no predicted significant adverse impacts at this location for the construction of Project 1, there would be no predicted temporary significant adverse noise impact at this receptor for the construction of Project 2B, which is representative of residential locations along Cobblestone Road north of the east connection site. The second EIS or a subsequent environmental review, as appropriate, will include an updated detailed assessment of noise impacts from these potential activities at this and the other receptor locations included in this section.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B would be ~~38.3~~ 46.2 dBA with windows open, and 32.2 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Receptor 5^{E} – Residence at 191 River Road North Immediately South of the East Connection Site
At receptor 5^{E}, representing 191 River Road North, a residential location along River Road immediately south of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the first shift (7 AM to 3 PM), second shift (3 PM to 11 PM), and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). The magnitude of the increase during the worst-case period at this receptor is predicted to be ~~13.0~~ 9.7 dBA, which exceeds the CEQR impact guideline of 5 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and the particularly low existing noise levels at this location.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~13.2~~ 9.9 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Third Shift (11 PM to 3 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~19.9~~ 16.4 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residence at 191 River Road North immediately south of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be ~~44.6~~ 52.0 dBA with windows open and ~~34.6~~ 38.0 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period.

Receptor 6^E – Residence at 198 River Road East of the East Connection Site
At receptor 6^E, representing a residential location at 198 River Road North east of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the ~~second shift (3 PM to 11 PM) and~~ third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). No significant noise level increases are predicted during the first shift.

Second Shift (3 PM to 11 PM). No significant noise level increases are predicted during the first shift. ~~The magnitude of the increase at this receptor during the worst-case period is predicted to be 3.3 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck trips and worker trips traveling along River Road North to the east connection site and the operation of on-site equipment.~~

Third Shift (11 PM to 7 AM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~13.1~~ 8.9 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of construction truck trips and worker trips traveling along River Road North to the east connection site and the operation of on-site equipment.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residence at 198 River Road North east of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be ~~44.3~~ 48.6 dBA with windows open and ~~34.3~~ 34.6 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Receptor 7^E – Residence at 217 River Road North Immediately North of the East Connection Site

At receptor 7^E, representing 217 River Road North, a residential location along River Road immediately north of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the first shift (7 AM to 3 PM), second shift (3 PM to 11 PM), and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). The magnitude of the increase during the worst-case period at this receptor is predicted to be ~~22.7~~ 20.3 dBA, which exceeds the CEQR impact guideline of 5 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and the particularly low existing noise levels at this location.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~21.0~~ 18.7 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Third Shift (11 PM to 3 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~23.3~~ 20.9 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR

impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residence at 217 River Road North immediately north of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be ~~50~~ 56.5 dBA with windows open and ~~38.0~~ 42.5 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Receptor 8^{E} – Residence at 219 River Road North Immediately North of the East Connection Site

At receptor 8^{E}, representing 219 River Road North, a residential location along River Road immediately north of the east connection site, the *CEQR Technical Manual* impact guideline is predicted to be exceeded during the first shift (7 AM to 3 PM), second shift (3 PM to 11 PM), and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). The magnitude of the increase during the worst-case period at this receptor is predicted to be ~~22.5~~ 21.0 dBA, which exceeds the CEQR impact guideline of 5 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and the particularly low existing noise levels at this location.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~20.8~~ 19.4 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Third Shift (11 PM to 3 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be ~~23.1~~ 21.6 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residence at 219 River Road North immediately north of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in Section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be ~~47.8~~ 57.2 dBA with windows open and ~~37.8~~ 43.2 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 11 PM to 7 AM period with windows closed.

Receptor 13^{E} – Residences at the End of Stenger Court

At receptor 13^{E}, representing residential locations at the end of Stenger Court, immediately east of the east connection site, the *CEQR Technical Manual* impact criteria is predicted to be exceeded during the first shift (7 AM to 3 PM), second shift (3 PM to 11 PM), and third shift (11 PM to 7 AM) of the tunnel connection phase of Project 2B. Provided below is a summary of the expected magnitude and duration of the CEQR impact guideline exceedance by shift.

First Shift (7 AM to 3 PM). The magnitude of the increase during the worst-case period at this receptor is predicted to be 5.7 dBA, which exceeds the CEQR impact guideline of 5 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and the particularly low existing noise levels at this location.

Second Shift (3 PM to 11 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be 6.7 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Third Shift (11 PM to 3 PM). The magnitude of the increase at this receptor during the worst-case period is predicted to be 6.3 dBA, which exceeds the CEQR impact guideline of 3 dBA. It was determined that the noise level increase would be primarily a result of the operation of on-site equipment and low measured background levels.

Duration of Predicted Exceedances. Since the predicted worst-case noise level, which is conservatively representative of the entire tunnel connection phase, would exceed the CEQR impact guideline, the duration of the predicted incremental worst-case noise levels is expected to be approximately 8 months of the tunnel connection phase of Project 2B.

Determination of Significance of Noise Impacts. Based on the potential duration and magnitude of the exceedances of the CEQR impact guideline, as described above, the duration of the predicted temporary significant adverse noise impact would be extended during the tunnel connection phase of Project 2B at this receptor, which is representative of the residences at the end of Stenger Court, east of the east connection site.

The interior $L_{10(1)}$ noise level, calculated as described in section 2.13-2, "Methodology," at this receptor during the period of the greatest incremental noise increase would be 41.2 dBA with windows open and 27.2 dBA with windows closed—below the 45 dBA CEQR guideline of acceptability (see section 2.13-1.2) for the 3 PM to 11 PM period.

Residences that would be expected to experience interior noise levels that exceed the level considered acceptable by CEQR criteria during overnight periods as a result of construction of Project 1 would be eligible for receptor controls such as interior windows and air conditioners to bring interior noise levels within the acceptable range according to CEQR (see Appendix 2.19-2).

As noted in Section 2.13, "Noise," DEP has committed to an extensive series of noise control measures, which are outlined in the CNMP in Appendix 2.19-2. The CNMP presents from a conceptual standpoint the noise control measures that would be implemented by DEP, its construction management staff, and its contractors as part of Project 1 and Project 2B. A goal of the CNMP is to ensure that the proposed program's noise during construction is decreased to the maximum extent practicable.

Public Health

The areas of concern for potential effects on public health from Project 2B construction are similar to those addressed for Project 1 construction related to the east connection site (see Section 2.17, "Public Health"). These include potential air quality, water quality, hazardous materials, or noise impacts within the study areas and impacts on water supply users.

Based on the detailed assessment completed for Project 1 in Section 2.17 and the assessments included in this section, no significant adverse public health impacts are expected in the east of Hudson study area or on water supply users from Project 2B construction.

4.2-3 CONCLUSIONS

4.2-3.1 WEST OF HUDSON

VISUAL RESOURCES

Construction-related work at the west connection site would need to occur 24 hours/day, 7 days/week. During this construction period, DEP would likely continue to use the lighting installed on-site during Project 1 to maintain safety and security of the site. No significant adverse impacts on visual resources and lighting are expected from Project 2B.

NATURAL RESOURCES AND WATER RESOURCES

~~During the construction of the intake to supply non-potable water for Project 2B, appropriate measures, such as the use of a coffer dam structure and bottom-weighted turbidity curtain to contain re-suspended sediment, would likely be implemented to minimize increases of suspended~~

~~sediment. To protect Atlantic sturgeon, intake construction on the Hudson River would likely occur within the late fall during the period recommended by the NYSDEC to minimize impacts to this species. Use of the coffer dam and turbidity curtain would also minimize the potential for construction of the intake to adversely impact shortnose or Atlantic sturgeon that may forage in the vicinity of the proposed intake location on the Hudson River.~~

~~The intake would likely be designed and operated to exclude debris and to meet any other exclusion requirements specified by the NYSDEC. With these measures in place, the operation of the intake to supply non-potable water for Project 2B would not be expected to result in potential significant adverse impacts to aquatic resources of the Hudson River or to the Class C stream within the Roseton stream study site. The second EIS will include a detailed assessment of natural resource impacts from these potential activities~~.

Subsequent to the issuance of the DEIS, DEP determined that non-potable water could be supplied to the west connection site during the tunnel connection phase (i.e., Project 2B) without construction of an intake on the Hudson River (discussed on page 4.2-3 of the DEIS). Therefore, the need for construction of an intake and additional analyses of potential impacts of the intake on natural resources and water resources was not considered in the FEIS as part of Project 2B.

TRANSPORTATION

The west of Hudson study area for this traffic analysis comprises eight intersections (with a ninth intersection at the west connection site driveway) in Orange County, NY. The analysis conducted for the west of Hudson study area determined that predicted extended temporary significant adverse impacts would result at six approaches to four signalized intersections from the construction of Project 2B (if an approach to an intersection would be impacted during both the AM and PM periods, then two approaches are considered to be impacted).

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 these 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.

NOISE

The maximum allowed sound pressure values for residential districts between the hours of 7 PM and 7 AM specified by the Town of Newburgh Code are expected to be exceeded near the west connection site with the construction of Project 2B. However, the measured existing noise levels in the west of Hudson study area can exceed the Town of Newburgh Code limits during the applicable time periods.

Construction of Project 2B would have the potential to extend the duration of a predicted temporary significant adverse noise impact at receptor 3^W near the west connection site. However, at this residence the interior $L_{10(1)}$ noise levels during construction of Project 2B would be acceptable (less than 45 dBA) even with windows open for the 11 PM to 7 AM period.

Residences that would be expected to experience interior noise levels that exceed the level considered acceptable by CEQR criteria during overnight periods as a result of construction of Project 1 would be eligible for receptor controls, such as interior windows and air conditioners, to bring interior noise levels within the acceptable range according to CEQR (see Appendix 2.19-2).

As noted in Section 2.13, "Noise," DEP has committed to an extensive series of noise control measures, which are outlined in the CNMP in Appendix 2.19-2. The CNMP presents from a conceptual standpoint the noise control measures that would be implemented by DEP, its construction management staff, and its contractors as part of Project 1 and Project 2B. A goal of the CNMP is to ensure that the proposed program's noise during construction is decreased to the maximum extent practicable.

PUBLIC HEALTH

Based on the detailed assessment completed for Project 1 in Section 2.17 and the assessments included in this section, no significant adverse public health impacts are expected in the west of Hudson study area or on water supply users from Project 2B construction.

4.2-3.2 EAST OF HUDSON

NEIGHBORHOOD CHARACTER

Section 2.3, "Neighborhood Character," addresses potential impacts on neighborhood character from the construction of Project 1 and concludes that there would be a temporary significant adverse impact on neighborhood character from construction of Project 1 near the east connection site. Impacts to neighborhood character with Project 2B would be expected to extend this temporary significant adverse impact on neighborhood character near the east connection site.

VISUAL RESOURCES

Construction-related work at the east connection site would need to occur 24 hours/day, 7 days/week. During this construction period, DEP would likely continue to use the lighting installed on-site during Project 1 to maintain safety and security of the site.

Views of the site and to the Hudson River along River Road near the east connection site would be adversely affected by the construction of Project 2B. However, these impacts would be

temporary, limited in location, and are not expected to result in significant adverse impacts on the visual character of the study area. Therefore, construction of Project 2B is not expected to result in any significant adverse visual impact.

NATURAL RESOURCES AND WATER RESOURCES

During the connection phase, an alternative source of non-potable water for construction of Project 2B would be required, since the water from Delaware system to Shaft 6 (i.e., the east connection site) would be unavailable. As noted in Chapter 1, "Program Description," an alternate option to provide a reliable potable water supply to the east connection site would involve the potential installation of a water main between the site and the Town of Wappinger water supply (United Wappinger Water District [UWWD]) prior to construction of the east connection shaft under Project 1. For Project 2B, it is expected that this source would be used to provide non-potable water for the east connection site. The construction and environmental review of this water main connection would be undertaken by the Town of Wappinger. ~~The Hudson River Pumping Station intake would be evaluated to determine if debris and any other exclusion requirements specified by the NYSDEC can be accommodated. Withdrawals would be reported to the NYSDEC in accordance with ECL Article 15 Title 33. The second EIS will include a detailed assessment of natural resource impacts from these potential activities~~.

TRANSPORTATION

The east of Hudson study area for this traffic analysis comprises 23 intersections in Dutchess County, NY. The analysis conducted for the east of Hudson study determined that predicted extended temporary significant adverse impacts would result at seven approaches to four signalized intersections from the construction of Project 2B (if an approach to an intersection would be impacted during both the AM and PM periods, then two approaches are considered to be impacted).

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 these predicted extended temporary significant adverse traffic impacts in the east of Hudson study area. The mitigation for Project 2B would simply be a continuation of ongoing practices implemented during Project 1.

NOISE

Similar to Project 1 construction, the maximum allowed sound pressure values for residential districts between sunset and 8 AM specified by the current Town of Wappinger Code are expected to be exceeded near the east connection site with the construction of Project 2B. However, the measured existing noise levels in the east of Hudson study area can exceed the Town of Wappinger Code limits during the applicable time periods.

Construction of Project 2B would have the potential to extend the duration of predicted temporary significant adverse noise impacts at receptors 3^E, 5^E, 6^E, 7^E, and 8^E near the east connection site. However, at these residences the interior $L_{10(1)}$ noise levels during construction of Project 2B would be acceptable (less than 45 dBA) for the 11 PM to 7 AM period with windows closed.

Residences that would be expected to experience interior noise levels that exceed the level considered acceptable by CEQR criteria during overnight periods as a result of construction of Project 1 would be eligible for receptor controls, such as interior windows and air conditioners, to bring interior noise levels within the acceptable range according to CEQR (see Appendix 2.19-2).

As noted in Section 2.13, "Noise," DEP has committed to an extensive series of noise control measures, which are outlined in the CNMP in Appendix 2.19-2. The CNMP presents from a conceptual standpoint the noise control measures that would be implemented by DEP, its construction management staff, and its contractors as part of Project 1 and Project 2B. A goal of the CNMP is to ensure that the proposed program's noise during construction is decreased to the maximum extent practicable.

PUBLIC HEALTH

Based on the detailed assessment completed for Project 1 in Section 2.17 and the assessments included in this section, no significant adverse public health impacts are expected in the east of Hudson study area or on water supply users from Project 2B construction.

4.2-4 RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

The construction schedule for the RWBT Inspection and Repair, including Wawarsing, would be within the time periods discuss above, approximately 6 to 15 months. Following is a description of the likely construction activities, which including anticipated repair methods and uses of additional shaft sites to support these operations, and an assessment of potential impacts that may result from such.

4.2-4.1 CONSTRUCTION ACTIVITIES

As discussed in Section 4.1, 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. Provided below is a discussion of likely methods to be undertaken for repairs in the Wawarsing Area, with access/support to these operations from Shafts 1 and 2A. These activities are demonstrative of comparable activities, should they be required, that would likely be taken at Shafts 8 and 9 east of the Hudson to support repairs of the RWBT east of the Hudson River.

Similar to the work at the connection sites, due to the critical issues associated with the shutdown of the Delaware system, construction-related work at other access shaft sites would need to occur 24 hours/day, 7 days/week during this critical phase until the inspection and repair work in the tunnel is complete. Due to the nature of the 24-hour work, lighting would be required, along with backup power as appropriate.

WAWARSING REPAIR METHODS

For the repair within the Wawarsing area, a segment of tunnel would be washed, surveyed, and inspected

Based on the inspections, a repair program would be implemented. The repair methods available for the Wawarsing area are dependent on the strength and effectiveness; durability; construction environment; time for implementation; and compatibility with drinking water standards.

Based on the inspections and the above criteria, the following methods of repair could be used:

- **Crack Repair**. Crack repair would include tunnel liner repairs, such as the patching and grouting of existing grout holes and the sealing of construction joints and other openings. Structural cracks could be repaired using rigid epoxy injection systems if the crack is not actively leaking.
- **Contact Grouting**. This method fills the void space immediately between the tunnel liner and rock mass along the tunnel. Grout holes would be drilled into the rock along the tunnel. Grout would then be injected between the liner and the rock mass in attempt to achieve tight contact.
- **Cut-off Grouting**. This method decreases permeability and improves rock strength. Grouting that extends 10 feet beyond the rock line around the tunnel would help to fill open joints, fractures, faults, and other defects in the rock mass. Finer rock fractures would require ultrafine cement grout.

Shafts 1 and 2A (see Figure 1-3), both of which located in the Town of Wawarsing, would be used for the repair of the Wawarsing area. DEP's contractor would be responsible for preparing and maintaining the Shaft 1 and Shaft 2A sites. It is expected that some coordination with utilities would be required. In addition, the contractor would provide any necessary noise attenuation barriers, lighting, fuel, spare cranes, portable power units, water supply, grout materials, office trailers, and mobile cranes or headframe mobilization and erection. Equipment procured, stored, and maintained under earlier DEP contracts that may be utilized for tunnel repair under Project 2B includes:

- Temporary shaft cover grating and hatch plates (Shaft 1 and 2A)
- Head frames and hoisting system (Shaft 2A)
- In tunnel transport vehicles

- Steel liners (in tunnel)
- Compact mobile batch plant (in tunnel)
- Grout plants (surface) and ancillary equipment
- Grout tank and pump (ancillary to grout plant)
- Tamrock drill (in tunnel)
- Vertical turbine pumps (in tunnel)
- Shaft cap covers

Other equipment to be supplied by the contractor would include, but is not limited to, power generators, shaft cranes, temporary lighting and electrical power, inspection and testing equipment, ventilation systems and ventilation monitoring, hoisting equipment to permit access and removal for personnel and equipment into the tunnel from the ground surface, logistical support including vehicles, platforms, and safety equipment, temporary electrical, standby power, and water supply and tunnel washing equipment.

4.2-4.2 PROBABLE IMPACTS OF PROJECT 2B, RWBT INSPECTION AND REPAIR, INCLUDING WAWARSING

This section provides a summary of existing conditions at the likely shaft sites (Shafts 1, 2A, 8, and 9) that would likely be used to support repairs of the RWBT. A description of the existing conditions is provided, followed by planned improvements underway at these locations already in advance at these locations from earlier DEP contracts in anticipation of supporting tunnel repair. Finally, a generic discussion of potential impacts from the Project 2B is provided for Shafts 1, 2A, 8, and 9.

SHAFT 1

Existing Conditions

Shaft 1 is located in a rural area within the Town of Wawarsing, Ulster County, NY, on approximately 30,800 square feet (0.7 acres) of the overall 23.8 acres owned and maintained by DEP. The shaft site is located in the northeast portion of the Town of Wawarsing and may generally be accessed via NYS Route 55. A low density residential area is located about 1,000 feet to the south, vacant land lies to the south and west, and land of unknown designation lies to the west of the shaft site. The shaft site is located on lands designated for water supply and immediately adjacent to vacant land. Over half of the study area is owned by New York City, including the land between the Rondout Reservoir and NYS Route 55 to the north of the shaft site. NYS Route 55 runs southeast to northwest along the Rondout Reservoir.

Improvements at this site recently implemented by DEP include:

- Soil excavation and the removal and replacement of existing earth berm above the shaft cap;
- Grading, widening, and placement of gravel along the existing shaft access road and entrance way;
- Removal of existing fencing and installation of new perimeter fencing;
- Routing of electrical service to the shaft site from existing power utility pole;
- Resurfacing of a portion of the area around the shaft site with crushed stone;
- Installation of hook-ups at the shaft site for future standby power; and
- Installation of hydraulic grade line (HGL) monitoring equipment, which will include pressure instrumentation installed within the shaft, and a data acquisition system that will be installed outside the shaft to transmit pressure reading from the tunnel.

Potential Impacts from Project 2B

During construction of Project 2B, Shaft 1 would largely be used for ventilation. In addition to improvements already undertaken, there would also likely be the need for a security guard house, an emergency generator, a vehicle access gate, and a parking area. Any additional temporary roads and staging areas would be surfaced with compacted gravel. A determination would be made as to the electrical load available at the site and whether this load would be adequate for the demand from the equipment and operations at the site.

Potential impacts at this shaft site from Project 2B would likely be limited, related to the construction and operation of the ventilation support equipment.

SHAFT 2A

Existing Conditions

Shaft 2A is located in a rural area within the Town of Wawarsing, Ulster County, NY on approximately 30,300 square feet (0.7 acres) of the overall 0.91 acres owned and maintained by DEP. The shaft is located in the eastern portion of the Town of Wawarsing, on an access road comprised of crushed stone, and may generally be accessed via Routes 55, 209, 44, and 299. The shaft site is located on land designated as water supply, and is immediately bordered by vacant land and open space with an abandoned mine pit to the north, west, and south of the shaft site. The site is surrounded by low density residential, open space, and vacant land.

Future Without Project 2B

Improvements at this site planned by DEP include:

- Removal and replacement of existing earth berm above the shaft cap;
- Construction of the foundation for head frame supports and approach slab;

- Grading and placement of gravel along the existing shaft access road and entrance way;
- Removal of existing fencing and installation of new perimeter fencing;
- Routing of electrical service to the shaft site from existing power utility pole;
- Resurfacing of a portion of the area around the shaft site with crushed stone;
- Installation of hook-ups at the shaft site for standby power; and
- Installation of HGL monitoring equipment, which will include pressure instrumentation installed within the shaft, and a data acquisition system that will be installed outside the shaft to transmit pressure reading from the tunnel.

Potential Impacts from Project 2B

During construction of Project 2B, Shaft 2A would be used to provide access for materials and equipment. Personnel would also access the RWBT in this area from Shaft 2A. In addition to the future without Project 2B improvements, there would also likely be the need for a security guard house, an emergency generator, a vehicle access gate, and a parking area. Any additional temporary roads and staging areas would be surfaced with compacted gravel. A determination would be made as to the electrical load available at the site and whether this load would be adequate for the demand from the equipment and operations at the site.

Activities at Shaft 2A would include the placement of a gravel surface to minimize trafficable mud within the shaft staging areas, for access around the shaft within the fenced area, on the access road, and on temporary roads. There would also be pruning of trees along the existing dirt access road to allow a clear path to each site so as to prevent damage to the surrounding trees from equipment, installation of a grout batch plant, an emergency generator, a parking area, site change and wash facilities, site offices, a security guard house, and a vehicular access gate.

Potential impacts at this shaft site from Project 2B would be related to the additional site preparation activities, and the supply of materials and construction workers to support repairs. Areas of potential impact could include traffic and noise. However, since the work would be expected to be less than 2 years in duration, significant temporary adverse impacts would not be expected from these activities.

Additional potential impacts could result from the grout injections to repair the existing tunnel, and the migration of such materials into ground or surface water.

In addition, under the scenario that plugs have to be installed into the existing RWBT, there would be an option to unwater the tunnel from this location, and discharge to a local stream. This may require consent of adjacent landowners and approvals for such discharges. The second EIS or a subsequent environmental review, as appropriate, will include a detailed assessment of potential impacts from these activities.

SHAFT 8

Existing Conditions

Shaft 8 is located in a rural area within the Town of Putnam Valley, Putnam County, NY on approximately 33,800 square feet (0.8 acres) of the overall 0.92 acres of DEP-owned property. The shaft site is located in the northeast portion of the Town of Putnam Valley, on an unmarked dirt and gravel access road, and may generally be accessed via County Road 301. The shaft site is located on land designated as water supply and is immediately bordered by vacant land to the north, south, east, and west. A low density residential area is located about 1,000 feet to the east and northwest. Vacant lands, low and high density residential areas, and institutional/government uses are located within the study area.

Future Without Project 2B

Improvements at this site planned by DEP include:

- Removal and replacement of existing earth berm above the shaft cap;
- Construction of the foundation for head frame supports and approach slab;
- Grading and placement of gravel along the existing shaft access road and entrance way;
- Paving driveway from Route 301 up to existing shaft access road;
- Removal of existing fencing and installation of new perimeter fencing;
- Routing of electrical service to the shaft site from existing power utility pole;
- Resurfacing of a portion of the area around the shaft with crushed stone;
- Installation of hook-ups for future stand-by power; and
- Installation of HGL monitoring equipment, which will include pressure instrumentation installed within the shaft, and a data acquisition system that will be installed outside the shaft to transmit pressure reading from the tunnel.

Potential Impacts from Project 2B

During construction of Project 2B, Shaft 8 would be used for access of materials and equipment, which could include installation of a grout batch plant, an emergency generator, a parking area, site change and wash facilities, site offices, a security guard house, and a vehicular access gate. In addition, there may need to be a road easement, the removal of an existing concrete slab on the site, the demolition and removal of an existing concrete wall, and the installation of a headframe. A determination would be made as to the electrical load available at the site and whether this load is adequate for the demand from the equipment and operations at the site.

Potential impacts at this shaft site from Project 2B would be related to the additional site preparation activities, and the supply of materials and construction workers to support repairs. Areas of potential impact could include traffic and noise. However, since the activity would be

expected to be less than 2 years in duration, significant temporary adverse impacts would not be expected from these activities.

Additional potential impacts could result from the grout injections to repair the existing tunnel, and the migration of such materials into ground or surface water. The second EIS or a subsequent environmental review, as appropriate, will include a detailed assessment of potential impacts from these activities.

SHAFT 9

Existing Conditions

Shaft 9 is located on the northwest side of the West Branch Reservoir in the Town of Kent, Putnam County, NY, on approximately 39,000 square feet of the overall 4 million square feet of DEP-owned property. Shaft 9 is part of the Delaware Aqueduct flow system and controls water from the Rondout Reservoir that is discharged from the Delaware Aqueduct in West Branch Reservoir.

Improvements that have already been implemented at Shaft 9 site include the following:

- Reconstruction of entrance road;
- Repair and relocation of the parking area;
- Improvements to site drainage;
- Installation of a chemical unloading area;
- Stabilization of eroded embankment;
- Replacement of roof tiles;
- Installation of a security fence, crash and barrier gates, security guard booth, and security lighting;
- Installation of an emergency generator; and
- Installation of a sewage holding tank.

Potential Impacts from Project 2B

During construction of Project 2B, Shaft 9 would largely be used for ventilation. In addition to improvements already undertaken, there would also likely be the need for a security guard house, an emergency generator, a vehicle access gate, and a parking area. Any additional temporary roads and staging areas would be surfaced with compacted gravel. A determination would be made as to the electrical load available at the site and whether this load would be adequate for the demand from the equipment and operations at the site.

Potential impacts at this shaft site from Project 2B would likely be limited, related to the construction and operation of the ventilation support equipment.

4.2-5 CONCLUSIONS

RWBT Inspection and Repair, including Wawarsing would likely require the use of DEP Shafts 1, 2A, 8, and 9 to support these activities. Shafts 1 and 9 would likely provide ventilation support, while Shafts 2A and 8 would provide access for materials and access to the existing RWBT. Temporary impacts from noise, construction traffic, and lighting would occur at Shafts 2A and 8. However, these impacts would be of short duration, and would not be expected to result in temporary significant adverse impacts. Additional potential impacts could result from the grout injections to repair the existing tunnel, and the migration of such materials into ground or surface water. The second EIS or a subsequent environmental review, as appropriate, will include a detailed assessment of potential impacts from these activities. ✷

4.3-1 INTRODUCTION

As described in Section 4.1, "Introduction," as a result of Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, leakage from the RWBT is anticipated to be eliminated. DEP field investigations conducted since the early 1990s have indicated that most of the leakage is occurring in the Roseton area in the Town of Newburgh, Orange County, NY, and that a lesser amount is leaking in the Town of Wawarsing, Ulster County, NY. As described in Chapter 2, "Probable Impacts of Project 1, Shaft and Bypass Tunnel Construction," section 2.8-3.1 "Existing Conditions—West of Hudson" (in Section 2.8, "Natural Resources and Water Resources"), surface expressions of the leak (see **Figures 4.3-1 and 4.3-2**) have been observed to contribute flow to Segments 3 and 4 of a Class C stream within the Roseton stream study site.

At Wawarsing, tunnel depressurizations have confirmed that leakage from the RWBT influences groundwater elevation in the Wawarsing area. Results of dye tracer studies conducted in the early 1990s indicate that some surface expressions (springs) in the Wawarsing area are influenced by leaking tunnel water.

As discussed in Chapter 1, "Program Description," and Section 4.1, "Introduction," the detailed environmental review of Project 2B will be conducted in a second EIS or a subsequent environmental review, as appropriate. Therefore, this section of Chapter 4 presents a generic evaluation of the potential impacts on natural resources of the Roseton stream study site (i.e., groundwater, wetlands, surface water, aquatic biota, and terrestrial resources) and on groundwater resources within the Wawarsing area resulting from reducing the leakage of water from the RWBT.

This section is organized as follows:

- Section 4.3-2 focuses on the effects in the Roseton stream study site and consists of two sections:
  - Section 4.3-2.1 provides a preliminary assessment of the potential impacts on the natural resources of the Roseton stream study site, as described in detail in section 2.8-3.1, from the reduction in the leakage of water from the RWBT.

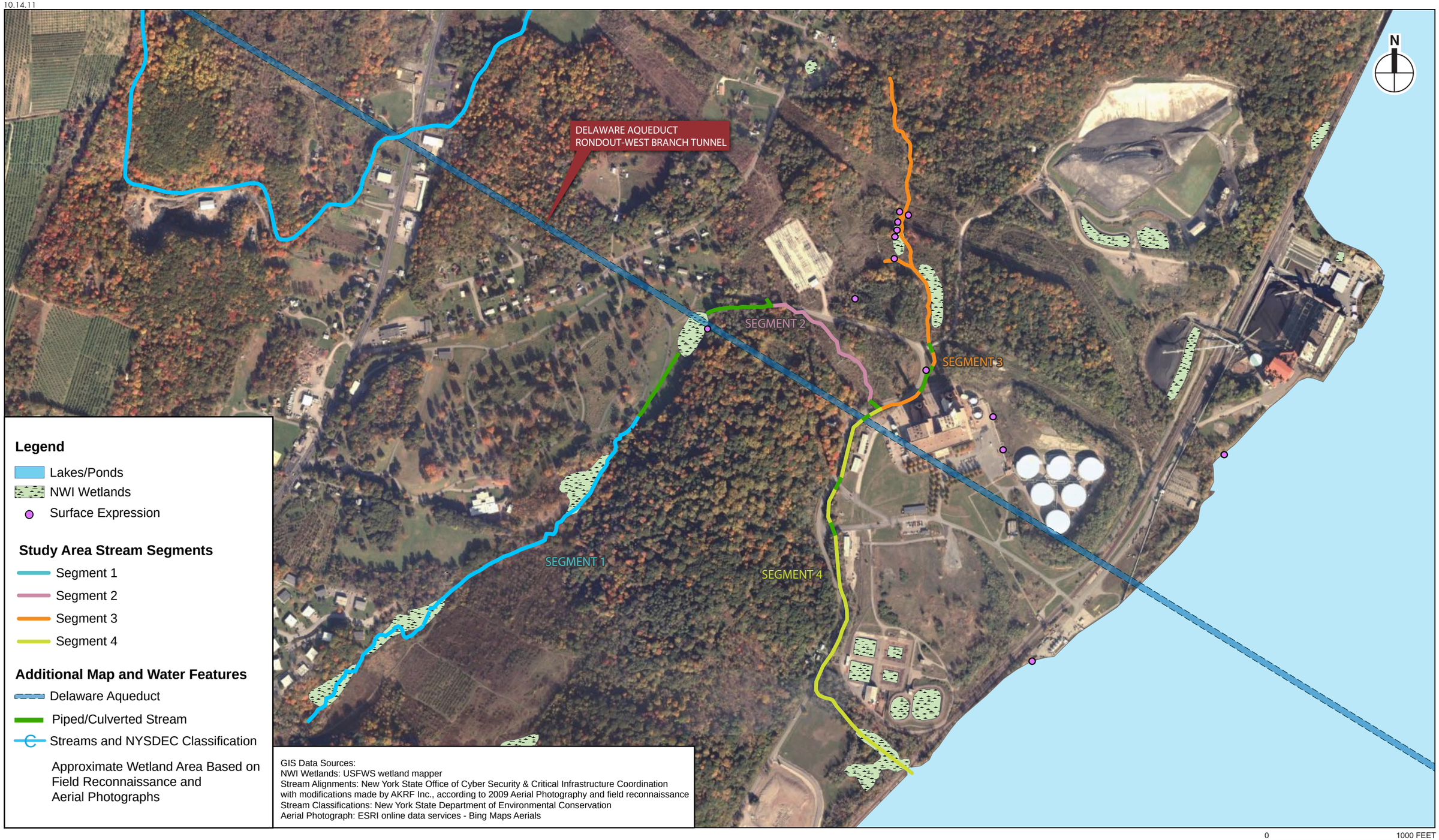

Figure 4.3-1

Roseton Stream Study Area Mapped Surface Water

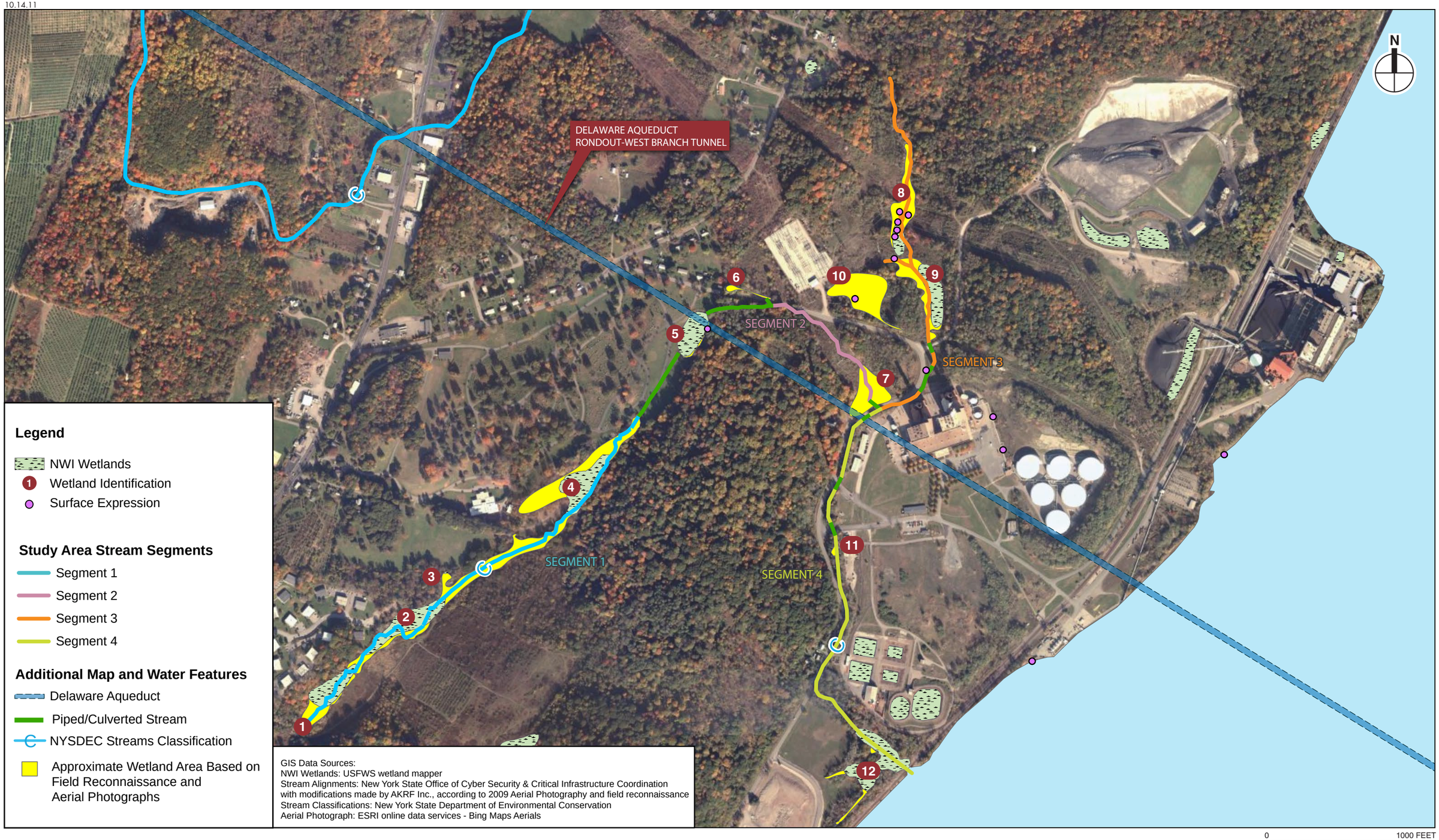

Figure 4.3-2

Roseton Stream Study Area Surface Waters on Basis of Field Reconnaissance

  - Section 4.3-2.2 describes a brief, potential approach for conducting the detailed analysis of potential impacts on natural resources of the Roseton stream study site in the second EIS or a subsequent environmental review, as appropriate.

- Section 4.3-3 focuses on the potential effects in the groundwater resources of the Wawarsing area and consists of two sections:
  - Section 4.3-3.1 provides a preliminary assessment of the potential impacts on groundwater resources in the Wawarsing area from the repair of the RWBT.
  - Section 4.3-3.2 describes a brief, potential approach for conducting a detailed analysis of potential impacts on groundwater resources in the Wawarsing area being influenced by the tunnel leak
- Section 4.3-4 presents conclusions to the extent they can be made at this time.

4.3-2 EFFECTS FROM REDUCING LEAKAGE—ROSETON STREAM STUDY SITE

4.3-2.1 PRELIMINARY ASSESSMENT OF IMPACTS

The stream within the Roseton stream study site is described in detail in section 2.8-3.1, "Existing Conditions—West of Hudson," in Section 2.8, "Natural Resources and Water Resources." It is an unnamed Class C tributary of the Hudson River, located to the southeast of the west connection site in the Roseton area of the Town of Newburgh (see Figures 2.8-1 and 2.8-2). For characterization purposes, the stream is broken into four segments (see Figures 2.8-1 and 2.8-2). Segments 1 and 2 do not appear to receive discharge from surface expressions (springs) of the RWBT leak. Segment 1 is generally shallow (less than 4 inches deep) and narrow (less than 3 feet) with low base flow. Soils along this segment of the stream include hydric and non-hydric soils. Mapped hydric soils generally coincide with forested, emergent, and scrub/shrub wetlands that occur along the stream and are mapped by the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI). Bottom substrate is muddy with substantial areas of emergent wetland vegetation and submerged macrophytes. Mapped hydric soils are absent along the stream Segments 2, 3, and 4. Segment 2 receives discharge from the Cemetery Pond, running through woodlands and transmission right-of-way before discharging to Segment 3. Emergent/scrub shrub wetlands occur along portions of this segment, particularly at the confluence with Segment 3. Segment 2 is also shallow (less than 4 inches deep) and narrow (less than 3 feet) with low base flow. It receives some flow from a small vegetated swale with woody and emergent wetland vegetation that appears to originate from a groundwater seep located at the toe of the slope associated with River Road.

Segment 3 appears to directly receive discharge from leak surface expressions. It is about 3 to 13 feet wide and between 1 and 5 feet deep with substantial base flow. The water is clear, and the bottom substrate includes cobble, sand, brick, and terracotta rubble with some areas of muddy

bottom. Emergent wetlands occur along both stream banks and in association with various minor surface expressions, portions of which have been mapped by the NWI. Segment 4 receives discharge from Segments 2 and 3 and discharges to the Hudson River. The lower portion of this segment (approximately 900 feet) is tidal. Segment 4 is generally less than 7 feet wide and greater than 3 feet deep with significant current velocity, with a bottom substrate of bedrock and/or cobble. The tidal portion of this segment is wider (greater than 16 feet) with a mud bottom. Wetlands along Segment 4 include a small wooded wetland and the mostly mud bottom tidal wetland portion at the confluence with the Hudson River that has a fringe of emergent and scrub/shrub vegetation. The tidal portion of the stream is mapped as estuarine wetland by the NWI.

The aquatic biota of the stream exhibit two distinct communities, with Segments 1 and 2 exhibiting the characteristics of a warm, shallow stream containing aquatic invertebrates generally with high tolerances for pollution and only one species of fish, American eel. Segments 3 and 4, which receive the discharge from the surface expressions of the RWBT leak, exhibit characteristics of cool water streams containing aquatic invertebrates that are less tolerant to pollutants, brown trout that appear to be reproducing in the stream, and American eel. The majority of the habitat available to terrestrial wildlife is limited to common reed stands and fragmented secondary growth forest surrounding the stream channel, with some areas of early successional forest and shrubland present within the transmission line corridor. Wildlife species inhabiting the stream corridor are generally those commonly associated with suburban areas and developed landscapes, such as common yellowthroat, red-winged blackbird, American robin, and song sparrow. Wetland-dependent reptiles and amphibians inhabiting the stream include primarily disturbance-tolerant species such as green frog, bullfrog, and northern watersnake.

The following section presents a preliminary assessment of the potential effects on these resources from the reduction of leakage from the RWBT on the basis of the baseline conditions presented in section 2.8-3.1 and summarized above.

GEOLOGY AND SOILS

The reduction of leakage from the tunnel would not be expected to adversely affect geologic and soil resources within the Roseton stream study site.

GROUNDWATER

Surface expressions of the RWBT leak have been documented within the Roseton area of the Town of Newburgh, indicating that water leaking from the tunnel is affecting groundwater elevations within the bedrock through which the tunnel is constructed (i.e., the Wappinger limestone) and within the surficial glacial till material (i.e., overburden). The leakage from the RWBT appears to have raised the groundwater elevations within Segment 3 of the Roseton stream study site, as evidenced by the surface expressions discharging to this segment of the

stream, possibly affecting water levels in private wells within the Roseton area outside the stream study site. The Town of Newburgh water supply system is not currently providing service to all portions of the Roseton area (Orange County Water Authority, 2010) but is available to areas above the RWBT alignment.[1] Homes not receiving drinking water from the Town of Newburgh water supply rely on private bedrock wells. With the reduction of water leaking from the RWBT, groundwater elevations would be expected to lower and flow to surface water features reduced. Following completion of the bypass tunnel connection, the bedrock and surficial groundwater elevation would be expected to drop to a new equilibrium level. Lowering of the groundwater elevation within the bedrock aquifer would have the potential to affect private groundwater supply wells within the Roseton area.

Lowering of the groundwater elevation within the surficial glacial material would have the potential to result in a reduction of flow to the Class C stream within the Roseton stream study site, reduce the groundwater contribution to the hydrology of some of the wetlands within the study site, and result in a reduction in baseflow to some segments of the Class C stream, as described below.

FLOODPLAINS

The only area of 100-year floodplain within the Roseton stream study site is within the tidal portion of the Class C stream at its confluence with the Hudson River. An additional area within the 500-year floodplain surrounds this tidal portion of the stream. Because the 100- and 500-year floodplain is affected by the flooding of the Hudson River, reduction in leakage from the RWBT would not affect floodplain resources.

WETLANDS

There are no New York State Department of Environmental Conservation (NYSDEC) mapped freshwater wetlands within the Roseton stream study site. As indicated in Figure 2.8-1, the NWI mapped eight freshwater wetland areas comprising approximately 9 acres along or adjacent to the Class C stream within the Roseton stream study site. Site reconnaissance and review of aerial photography suggests that the wetlands associated with the Roseton stream study site to be of greater areal extent than as mapped by the NWI (see Figure 2.8-2).

The wetlands associated with the headwater portion of the stream (Segment 1) all occur within or immediately adjacent to soils identified as hydric (see Figure 2.8-13). The hydrology of these wetlands appears to be due to surface runoff and groundwater. No surface expressions of the RWBT leak have been identified as contributing water to these wetlands. The presence of mapped hydric soils and absence of reported surface expressions discharging to this stream system suggests that reduction of the RWBT leak would have limited potential to affect the

[1] Orange County Water Authority. 2010. 2010 Annual Report.

freshwater wetlands within the headwater portion of the Class C stream of the Roseton stream study site. The wetlands associated with Segment 2 do not occur within soils mapped as hydric and are not mapped by the NWI. It is unknown whether the small wetland swale north of the stream and River Road that discharges to Segment 2 receives discharge from surface expressions of the RWBT leak, but because it does originate as a seep it may have the potential to be affected by the reduction of the RWBT leak. The hydrology of the wetland at the confluence of Segment 2 and 3 is primarily from the stream flow in this segment. No surface expressions of the leak have been observed discharging to this wetland.

The freshwater wetlands observed within stream Segments 3 and 4 do not occur within soils identified as hydric. Within stream Segment 3, the freshwater wetlands determined on the basis of site reconnaissance are more extensive than mapped by the NWI, and include additional areas not identified as wetland on the NWI. The hydrology of the freshwater wetlands associated with Segment 3, and the small area of additional wetland identified along stream Segment 4 (see Figure 2.8-2), appear to be affected by discharge from surface expressions of the RWBT leak. Therefore, these wetlands appear to have the potential to be affected by reduction of water leaking from the RWBT. Potential effects on Wetland 7 within Segment 2 are uncertain. The tidal wetland #12 at the confluence of the Class C stream with the Hudson River would be expected to be influenced by tidal flow from the Hudson River, and would have limited potential to be affected by the reduction of leakage from the RWBT.

Reduction of the surface expressions and lowering of the groundwater elevation would affect the hydrology of these wetlands, resulting in potential changes to their size and plant community. Although the cessation or reduction of the leak would not result in activities (i.e., discharge of dredged or fill material) that would appear to be regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act, the resulting potential hydrologic change to the stream and wetlands may require authorization from USACE and mitigation to offset potential loss of wetlands.

AQUATIC RESOURCES

Water leaking from the RWBT does not appear to have influence on the hydrology of stream Segments 1and 2 of the Class C stream within the Roseton stream study site. Segment 1, the headwater portion of the stream, is generally shallow (less than 4 inches deep) and narrow (less than 3 feet wide) with low base flow at the same time that stream Segments 3 and 4, which receive flow from surface expression of the leak, are noticeably deeper and wider. Segment 2, which originates from the Cemetery Pond, is similar to Segment 1, in that it is shallow and narrow with relatively low base flow. Therefore, reduction or cessation of the RWBT leak would have limited potential to affect water quality or aquatic biota within these two segments of the Class C stream.

Although the hydrology of stream Segment 3 would continue to receive surface runoff and baseflow contributed from the upper portion of its watershed, much of the flow within stream Segments 3 and 4 appears to be contributed by the surface expressions of the RWBT leak. The surface expressions of the leak have modified the habitat in the stream and influence the composition of the fish and benthic invertebrate communities. Because of low water temperatures associated with the leak, Segments 3 and 4 are now supporting a cold water brown trout fishery. Additionally, the portion of the stream under tidal influence closest to the Hudson River, an area of Hudson River tributaries that should provide habitat for American eel and such resident species as the tessellated darter, appears to have little or no fish and benthic invertebrates, probably as a result of the rapid fluctuations in water temperature occurring with the tidal cycle. Additional fish sampling conducted during late fall when these rapid temperature fluctuations were less prominent, collected banded killifish, pumpkinseed, darter, and bluegill within the tidal portion of this stream. Therefore, reduction or elimination of water leaking from the RWBT would have the potential to affect the water quality and aquatic resources within Segments 3 and 4 due to decreased stream flow and physiochemical changes (e.g., increased water temperature), as suggested by the results of the late fall fish sampling. The cold water fishery would be eliminated and replaced with a more temperate fish and benthic community characteristic of Hudson River tributaries within this portion of New York.

TERRESTRIAL RESOURCES

Because stream Segments 1 and 2 have limited potential to be affected by the reduction or elimination of the leak from the RWBT, wildlife habitat and wildlife associated with these two stream segments would also have limited potential to be affected by the reduction in the RWBT leak.

The majority of stream Segment 3, which receives discharge from surface expressions of the RWBT leak, is bordered by forested slopes on both sides and appears to be a natural stream channel that receives input from snowmelt, rain, and other natural sources within the upstream portion of the watershed. While reduction or cessation of the leak would have the potential to affect this segment of the stream through reduced stream flow, a reduction in stream flow would not be expected to significantly alter the surrounding ecological communities or the existing wildlife community. Most of the bird species observed within this portion of the Roseton stream study site during the breeding period are those associated with upland habitats and were found along the wooded slopes and in the transmission line corridor, upland areas that would be unaffected by changes in stream flow.

However, reptile and amphibian species occurring in the open wetlands along the lower section of Segment 3 would have the potential to be affected by reductions in stream flow and areal extent of wetlands resulting from reductions of the RWBT leak. Should the stream and associated wetlands become reduced in size, less habitat would be available for some semi-aquatic wildlife species that are considered to have the potential to occur at the Roseton stream

study site, such as snapping turtle, wood turtle, painted turtle, red-eared slider, and northern watersnake, and the reduction in habitat size may make some areas unsuitable for some individuals of these species. Other species presently inhabiting the area, such as green frogs and bullfrogs, would likely remain, but the number of individuals supported would likely decrease. Similarly, fewer pairs of wetland-associated birds, such as common yellowthroats and red-winged blackbirds, may be able to nest in the area. Although reduction of the RWBT leak would have the potential to adversely affect individual reptile or amphibians, and certain waterfowl, the loss of these individuals would not result in significant adverse impacts on regional populations of these species.

THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES

Federally Listed Species

Indiana Bat
Reductions in flow through Segments 3 and 4 would have limited potential to affect the suitability of the Roseton stream study site as potential Indiana bat roosting or foraging habitat.

American Eel
Reductions in flow through Segments 3 and 4 may have the potential to affect use of the Roseton stream study site by American eel.

Small Whorled Pogonia
Reductions in flow through Segments 3 and 4 would not be expected to affect the potential for small whorled pogonia to occur within the Roseton stream study site.

New York State Listed Species

Bald Eagle
The Roseton stream study site does not provide habitat suitable for use by bald eagles. Therefore, any potential changes in stream flow within this study area would not affect bald eagles nesting or overwintering on the Hudson River.

Peregrine Falcon
Reductions in stream flow or wetland area for the Class C stream within the Roseton stream study site would not have the potential to affect possible use by peregrine falcon for foraging habitat.

Sharp-Shinned Hawk
Appropriate breeding habitat for sharp-shinned hawks is lacking in and near the Roseton stream study site. The site and its surroundings may offer adequate wintering and migration stopover habitat, but reductions in stream flow resulting from Project 2B would not significantly reduce

habitat availability or suitability for sharp-shinned hawks wintering in, or migrating through, the vicinity of the stream study site.

Cooper's Hawk
Similar to the discussion above for sharp-shinned hawk, possible changes in stream flow at the Roseton stream study site would not impact Cooper's hawks or their habitat.

Red-Shouldered Hawk
Any changes in stream characteristics at the Roseton stream study site would not affect habitat suitability for red-shouldered hawks potentially occurring at the site.

Northern Harrier
The Roseton stream study site does not contain any suitable breeding or non-breeding habitat for northern harriers. Therefore, the reductions in the RWBT leak would not have the potential to affect northern harriers or their habitat.

Horned Lark
The Roseton stream study site does not contain any suitable breeding or non-breeding habitat for horned larks. Therefore, reductions in the RWBT leak would not have the potential to affect horned larks.

Jefferson Salamander
Jefferson salamanders have the potential to occur at the Roseton stream study site, but they were not observed during field reconnaissance. Reductions in stream flow would have limited potential to substantially alter habitat suitability for Jefferson salamanders within the stream corridor, as some stream flow would be expected to occur following the reduction or elimination of the leak.

Marbled Salamander
Similar to the discussion above for Jefferson salamanders, changes in stream flow at the Roseton stream study site would have limited potential to significantly alter habitat suitability for marbled salamanders potentially occurring in the area.

Spotted Turtle
Reductions in stream flow would have the potential to impact any spotted turtles occurring at the Roseton stream study site by reducing the size of the open wetland area that may presently represent suitable overwintering habitat. Any spotted turtles using the open water portions of the wetlands associated with stream Segment 3 would be expected to move away from the Roseton stream study site over time as the groundwater elevation decreases and the open water portion of the wetlands decrease. Suitable habitat may be present within the wetlands associated with stream Segment 1.

Eastern Box Turtle

Eastern box turtles are a terrestrial, upland species and would be most likely to occur at the Roseton stream study site in the early successional habitat in the transmission line corridors. Alterations in stream flow at the site would not be expected to significantly impact eastern box turtles or their habitat.

4.3-2.2 POTENTIAL APPROACH FOR DETAILED ASSESSMENT OF PROBABLE IMPACTS ON THE ROSETON STREAM STUDY SITE IN THE SECOND EIS OR A SUBSEQUENT ENVIRONMENTAL REVIEW, AS APPROPRIATE

While the preliminary assessment of potential impacts on the natural resources of the Roseton stream study site does identify the potential for effects on groundwater, wetlands and aquatic resources, the extent and significance of these effects will be reviewed in a second EIS or a subsequent environmental review, as appropriate, with further evaluations. As discussed previously, the second EIS or a subsequent environmental review, as appropriate, will provide a detailed evaluation of the potential for reduction of the RWBT leak to adversely affect the resources described within the Roseton stream study site, and, in particular, stream Segments 3 and 4. This evaluation will potentially consider:

- The potential zone of impact to groundwater elevations developed using information on existing wells and groundwater users, review of NYSDEC's private well database, possible well monitoring during any planned changes in operation of the RWBT, results of previous groundwater monitoring studies conducted to assess the RWBT leaks, and results of aquifer modeling if appropriate.
- Hydrogeological information that more definitively identifies those stream segments and wetlands with the potential to be affected by decreases in the groundwater elevation resulting from the reduction or cessation of the leak.
- Delineated wetland boundaries, using the USACE three parameter approach, [2] of those wetlands identified as having a potential to be affected by reduction of the leak.
- Evaluate the potential impact to the coldwater fishery and benthic community resulting from reduction of the leak, including possible reduction in use by American eel.

[2] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.; U.S. Army Corps of Engineers. 2009. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-09-19. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

- Species specific habitat surveys for species of special concern, such as the spotted turtle, identified as having a potential to be adversely affected by potential effects on existing wetland characteristics within the Roseton stream study site.
- Evaluate the potential for beneficial effects on groundwater users and surface hydrology.
- If the second EIS or a subsequent environmental review, as appropriate, identifies significant adverse impacts on groundwater users or wetlands from the reduction of the leak, mitigation strategies would be developed.

4.3-3 EFFECTS FROM REPAIR OF THE RWBT AT WAWARSING

4.3-3.1 PRELIMINARY ASSESSMENT OF IMPACTS

In Wawarsing, ongoing USGS studies have provided additional insights and are expected to further quantify the current contribution of leaking water from the RWBT to the higher groundwater elevations. These studies have identified a potential zone of influence of the leak on groundwater elevations. Repair of the RWBT to fix leaks would reduce the contribution of tunnel water to groundwater elevations, likely resulting in a lowering of the groundwater elevation within the unconsolidated (i.e., overburden) and bedrock aquifers within this potential zone of influence. There are some public and private water supply wells within this potential zone with the potential to be affected.

An area of high water levels within the unconsolidated/overburden aquifer occurs within the potential zone of influence of the tunnel leak. Elimination of leaks within the Wawarsing area could have the potential to affect public and private wells located within this area.

4.3-3.2 POTENTIAL APPROACH FOR DETAILED ASSESSMENT OF EFFECTS WITHIN THE WAWARSING STUDY AREA IN THE SECOND EIS OR A SUBSEQUENT ENVIRONMENTAL REVIEW, AS APPROPRIATE

The preliminary assessment of potential effects from the reduction of the leak in Wawarsing identifies a potential for effects on groundwater and groundwater users.

The extent and significance of these effects will be evaluated in detail in the second EIS or a subsequent environmental review, as appropriate. This later evaluation will potentially consider:

- The USGS Report, "Preliminary Analysis of the Hydrologic Effects of Temporary Shutdowns of the Rondout-West Branch Water Tunnel on the Groundwater-Flow System in Wawarsing, New York", describes the potential zone of impact to groundwater elevations, from the Delaware Aqueduct which were compared to rise due to seasonal precipitation. While incremental rise in the water table was shown in both the bedrock and overburden, future tunnel shutdowns will provide more information for the USGS monitoring network further refining this issue.

- Evaluation of potential for adverse effects on groundwater users; and
- Evaluate the potential for beneficial effects on groundwater users and surface hydrology.

The approach described here for conducting the detailed assessment of effects is only a potential approach that will likely be revised throughout the duration of the project's environmental review. If required, a well monitoring program similar to that in Project 1 for the west and east connection sites would be implemented.

4.3-4 CONCLUSIONS

Within the Roseton stream study site, elimination or reduction of the leak from the RWBT has the potential to affect groundwater elevation within the overburden (surficial) and bedrock within this study area. This reduction in groundwater elevation would have the potential to affect private groundwater supply wells, reduce dry weather baseflow to the Class C stream within the study areas, and the groundwater contribution to the hydrology of some of the wetlands identified within the study area. Reduction or elimination of the leak would reduce the flow within the portion of the Class C stream currently receiving discharge from the surface expressions of the leak (i.e., Segments 3 and 4) and would change the hydrology of wetlands that also receive input from the surface expressions. The change in hydrology for these wetlands would have the potential to affect their size and habitat characteristics. The discharge of water through the surface expressions to the Class C stream have modified the habitat of the stream and influenced the composition of the fish and benthic invertebrate communities. The lower temperature of the water being discharged through the surface expressions supports a cold water brown trout fishery. Results of additional fish sampling during the late fall indicate that fish use the tidal reach when the temperature fluctuations during the tidal cycle are reduced, as compared to sampling during warmer months. Therefore, the reduction of the leak may result in a change to a more temperate fish and benthic community and might reduce the temperature fluctuations currently occurring in the tidal portion of the Class C stream, resulting in improved aquatic habitat.

The reduction or elimination of the leak could have limited potential to affect wildlife within the Roseton stream study site, as most of the species expected to occur in this area are dependent on upland habitat, which would not be affected by the elimination of the leak. The exception would be certain reptile and amphibian species that may use the open water habitats currently being influenced by the discharge of water from the surface expressions. Should the stream and wetland areas be reduced in size, these habitats may no longer provide suitable habitat for some of these species, which may include the spotted turtle, a NYSDEC special concern species.

In Wawarsing, reduction of the leak would have the potential to lower groundwater elevations, potentially affecting public and private groundwater supply wells. ✷

4.4-1 INTRODUCTION

As detailed in Chapter 1, "Program Description," when the bypass tunnel is complete and the water supply system augmentation and improvement projects to support the connection are in place, the RWBT would be taken out of service, the water would be removed from the tunnel (i.e., unwatered) using pumps, and excavation would begin to connect the bypass tunnel to the RWBT. Once the RWBT is unwatered, inspection and repair of the leaking portions of the aqueduct at Wawarsing, along with the remaining sections of the RWBT not bypassed, would be undertaken. Following the initial unwatering, residual groundwater would infiltrate the tunnel and would be pumped out throughout the construction period.

There are two general scenarios for unwatering. In the more likely scenario, there would be no need for inundation plugs. In this case, initial tunnel unwatering would be accomplished entirely at the east connection site, using existing Shaft 6 facilities. The tunnel would be un-watered using pumps at rates up to approximately 50 million gallons per day (mgd) over a period of 10 to 15 days. Following initial unwatering, ongoing removal of groundwater infiltrating the tunnel (i.e., dewatering) would be required throughout the connection period. This water would be discharged predominantly at the existing Shaft 6 facilities and existing Hudson River outfall, at rates up to 50 mgd and less than 3 mgd for the west connection site.

In the less likely scenario that inundation plugs would be required as part of the bypass connection, initial unwatering of the RWBT would still occur at the Shaft 6 facility, until it was determined that rate of infiltration to the tunnel was excessive. At that point, the unwatering would cease, the plugs would be constructed, and then unwatering would resume. Following completion of the plugs, unwatering would be required at both connection sites at an estimated maximum rate of 10 mgd at the west connection site and between 16 and 32 mgd at the east connection site, for a period of 10 to 15 days. In the scenario with the inundation plugs, the on-going dewatering throughout the connection period is expected to be at a maximum rate of approximately 5 mgd at each site.

At the west connection site, the water removed from the RWBT both during unwatering and then as a result of dewatering throughout the connection phase would be conveyed ~~to the Hudson River (Option 1) or~~ to the Class A portion of the stream ~~near the Hudson River~~ within the

Roseton stream study site at its confluence with the Hudson River (Option 2) (see Figure 1-11) through the dewatering pipeline that would be constructed as part of Project 1~~, Shaft and Bypass Tunnel Construction~~. Note that while Figure 1-11 depicts both dewatering pipeline options for reference purposes, subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline and selected one potential dewatering pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS. At the east connection site, water removed from the tunnel would be discharged to the Hudson River through the existing Shaft 6 facilities and outfall. As discussed in Chapter 1 and Section 4.1, "Introduction," the detailed environmental review of Project 2B will be conducted in a second EIS or a subsequent environmental review, as appropriate. This section of Chapter 4 presents a preliminary evaluation of the potential impacts on natural resources of Roseton stream study site and the Hudson River from the short-term discharge of water removed from the RWBT before conducting inspections and repairs.

This section is organized as follows:

- Section 4.4-2 generally assesses the potential impacts on natural resources of the tidal portion of the ~~Class C~~ stream (Use Class A) within the Roseton stream study site from the discharge of water removed from the RWBT at the west connection site.
- Section 4.4-3 generally assesses the potential impacts on natural resources of the Hudson River from the discharge of water removed from the RWBT at the west and east connection sites. This water would then be discharged to the Hudson River through ~~a possible new outfall on~~ the dewatering pipeline outfall located on the tidal portion of the stream at its confluence with the Hudson River ~~the west side constructed as part of the Option 1 of the dewatering pipeline~~ and through the existing DEP Shaft 6 outfall for the west and east connection sites, respectively.
- Section 4.4-4 describes a proposed approach for conducting a detailed analysis of potential impacts on natural resources from the discharge of water removed from the RWBT during unwatering.
- Section 4.4-5 presents conclusions to the extent they can be made at this time.

4.4-2 EFFECTS ON NATURAL RESOURCES FROM UNWATERING THE RWBT AT WEST CONNECTION SITE, DEWATERING OF THE RWBT, AND DISCHARGING TO THE ROSETON STREAM STUDY SITE

The discharge of up to 10 mgd through the dewatering pipeline to the tidal portion (Class A) of the stream within the Roseton study site ~~Class C stream~~ for about a 2-week period to unwater the portion of the RWBT at the west connection site ~~(Dewatering Option 2)~~ (if the inundation plugs are required) would have a potential to temporarily affect the aquatic habitat within this tidal portion of this Class A ~~stream~~ water when there is a temperature difference between the stream

and the discharge. Because the RWBT water and recovered residual inflows discharged would need to meet surface water effluent standards for discharge to the stream in accordance with the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) permitting requirements, the discharge of the tunnel water would not result in a failure to meet the Class A standards or be expected to significantly affect aquatic biota within this segment of the stream. For reasons similar to what is described for the construction of Project 1 in Section 2.8, "Natural Resources and Water Resources," for the dewatering of the bypass tunnel during construction, the discharge of up to 5 mgd of groundwater recovered during dewatering of the RWBT during the connection phase would not be expected to result in significant adverse impacts to aquatic resources of the Class A portion of the stream within the Roseton stream study site.

The outfall would be designed to ~~comply with the NYSDEC maximum 2 feet/second discharge velocity to~~ prevent scouring of the stream bank and minimize increases in suspended sediment.

4.4-3 EFFECTS ON NATURAL RESOURCES FROM UNWATERING AND DEWATERING THE RWBT AND DISCHARGING TO THE HUDSON RIVER

The anticipated discharges to the Hudson River during initial tunnel unwatering, as described above, would be one of the following scenarios:

- Without inundation plugs, up to 50 mgd (77 cubic feet per second [cfs]) for up to 15 days via existing outfall at the east connection site.
- With subsequent inundation plugs, up to 10 mgd via proposed dewatering pipeline ~~force main~~ outfall from west connection site, and 16 to 32 mgd via existing outfall at east connection site, totaling up to 42 mgd for up to 15 days.

In either scenario, these discharges would not be expected to result in significant adverse impacts on water quality or aquatic biota of the Hudson River. The discharge from both outfalls would meet NYSDEC SPDES permitting requirements and would not result in water quality conditions that would cause this portion of the river to fail to meet the Class A water quality standards. The discharge rates to the Hudson River through one or both of these outfalls would comprise an extremely small component of the flow within this segment of the river. Maximum flood and ebb flows reported within this portion of the Hudson River by U.S. Geological Survey (USGS) (de

Vries and Weiss 2001)[1] were 200,000 and 193,000 cfs, respectively. The discharges to the Hudson River through each outfall would be expected to mix with the Hudson River water within the vicinity of the ~~outfalls~~ discharge and would not be expected to result in adverse impacts on water quality or aquatic biota.

In addition, it is anticipated that ongoing de-watering would be required for groundwater infiltrating the RWBT throughout the connection phase as described for the construction of Project 1 in Section 2.8, "Natural Resources and Water Resources."

The infiltrating water would be discharged to the Hudson River from the outfall for the west side dewatering pipeline or the existing DEP outfall on the east connection site. Maximum ongoing discharge rates would be about 30 mgd via the existing outfall, and about 5 mgd via the proposed ~~force main~~ dewatering pipeline outfall. These discharge rates would not be expected to result in significant adverse impacts to aquatic resources of the Hudson River.

The outfall on the west ~~bank~~ side of the Hudson River associated with the dewatering pipeline would be designed to ~~comply with the NYSDEC maximum discharge velocity of 2 feet/second to~~ prevent scouring of the stream bank and minimize increases in suspended sediment. On the east connection site, the discharge of tunnel water through the existing DEP outfall would not be expected to result in scouring of the bank or bottom of the Hudson River, because the maximum anticipated discharge rates would be significantly below the 80 mgd design flow for this outfall.

4.4-4 POTENTIAL APPROACH FOR REASSESSMENT IN SECOND EIS OR A SUBSEQUENT ENVIRONMENTAL REVIEW, AS APPROPRIATE

This section outlines the proposed assessment of potential effects to the Roseton stream study site's natural resources as a result of the discharge of water from the RWBT during unwatering. This action has the potential to temporarily affect the aquatic habitat within ~~this~~ the tidal portion of the ~~Class C~~ stream when there is a temperature difference between the stream and the discharge. The additional analysis to be conducted in the second EIS or a subsequent environmental review, as appropriate, would reassess, as necessary, the potential for temporary impacts associated with the discharge of tunnel water during unwatering when additional detail is available, and the potential for the discharge of tunnel water to result in adverse impacts to aquatic resources. Possible temporary measures implemented during this short period would be developed as necessary in consultation with the NYSDEC during the SPDES permitting process.

[1] de Vries, M. Peter, and L.A. Weiss. 2001. Salt-Front Movement in the Hudson River Estuary, New York-Simulations by One-Dimensional Flow and Solute-Transport Models. U.S. Geologic Survey (USGS) Water-Resources Investigations Report 99-4024. Prepared in cooperation with the New York City Department of Environmental Protection, New York State Department of Environmental Conservation, and Hudson Valley Regional Council, Troy, New York.

The preliminary analysis does not identify a potential for the discharge of tunnel water during unwatering and recovered treated groundwater during dewatering to adversely effect the Hudson River from the west and east connection sites. The additional analysis to be conducted in the second EIS or a subsequent environmental review, as appropriate, to assess potential impacts on the Hudson River will be developed in consultation with the NYSDEC during the SPDES permitting process.

4.4-5 CONCLUSIONS

Water discharged from the tunnel to the Hudson River via the tidal portion of the stream within ~~or the Class C stream within~~ the Roseton stream study site would need to meet surface water effluent standards for discharge to Class A waters ~~both of these water bodies~~. The temporary discharge of the RWBT water through the outfall on the Class A portion of the stream within the Roseton stream study site during unwatering would have a potential to temporarily affect the aquatic habitat within the tidal portion of the stream when there is a temperature difference between the stream and the discharge. The outfall~~s for both dewatering pipeline options (Option 1 on the Hudson River and Option 2 on the Class C stream within the Roseton study site)~~ would be designed to c~~omply with the NYSDEC maximum 2 feet/second discharge velocity to~~ prevent scouring of the stream bank and would not result in increased suspended sediment. Similar to Project 1 (see Section 2.8, "Natural Resources and Water Resources"), the discharge of up to 5 mgd of groundwater recovered during dewatering of the RWBT during the connection phase would not be expected to result in significant adverse impacts to aquatic resources of the Class A portion of the stream within the Roseton stream study site.

The discharge of water from the RWBT to the Hudson River via the outfall on the tidal (Class A) portion of the stream within the Roseton stream study site ~~through the dewatering pipeline Option 1~~ for the west connection site and the existing DEP outfall for the east connection site during unwatering would not be expected to result in significant adverse impacts on water quality or aquatic biota of the Hudson River. The discharge from both outfalls would have to meet NYSDEC SPDES permitting requirements such that this section of the river continues to meet Class A standards. Additionally, the maximum anticipated flows comprise extremely small components of the flow within this segment of the river and would not, therefore, be expected to result in significant adverse environmental impacts on the aquatic resources of the river.

As described for the construction of Project 1 in Section 2.8, "Natural Resources and Water Resources," for the dewatering of the bypass tunnel, the discharge of groundwater recovered during dewatering of the RWBT during the connection phase to the Hudson River via the outfall on the tidal (Class A) portion of the stream within the Roseton stream study site ~~from the outfall for the dewatering pipeline Option 1~~ or the existing DEP outfall on the east connection site would not be expected to result in significant adverse impacts to aquatic resources of the Hudson River. ✷

4.5-1 INTRODUCTION

As described in Section 4.1, "Introduction," as a result of Project 2B, Bypass Tunnel Connection and Rondout-West Branch Tunnel (RWBT) Inspection and Repair, including Wawarsing," when the RWBT is taken out of service and unwatered for inspection and repair, the approximately 600 million gallons per day (mgd) of water normally supplied by the Delaware system would need to be supplied by the Catskill and Croton system reservoirs, the West Branch Reservoir in the Delaware system and augmentation projects (see Figure 1-14). The increased reliance on the Catskill and Croton Watershed systems could cause the associated reservoirs to be significantly drawn down. The extent of the drawdowns would depend on a number of factors: the actual demand, availability of additional water supplies, duration of the shutdown, and hydrologic conditions during the shutdown. The second EIS or a subsequent environmental review, as appropriate, will address the impacts discussed in this chapter in more detail.

This section is organized as follows:

- Section 4.5-2 provides an overview of the management of New York City's water supply operations under normal conditions and those expected during Project 2B.
- Section 4.5-3 generally assesses the potential environmental effects from the increased drawdown of the Catskill and Croton system reservoirs and West Branch Reservoir.
- Section 4.5-4 describes the proposed approach for conducting a detailed analysis of the potential impacts from the increased drawdown of the Catskill and Croton system reservoirs.
- Section 4.5-5 presents conclusions to the extent they can be made at this time.

4.5-2 MANAGEMENT OF NEW YORK CITY'S WATER SUPPLY OPERATIONS

As discussed in Chapter 1, "Program Description," New York City's water supply system is made up of the Delaware, Catskill, and Croton systems (Figure 1-2). The Delaware system includes the three Delaware River basin reservoirs, Pepacton, Cannonsville, and Neversink, from which water is diverted to Rondout Reservoir. From Rondout Reservoir, water is conveyed to

West Branch and Kensico Reservoirs via the Delaware Aqueduct. The Catskill system includes the Schoharie and Ashokan Reservoirs, which send water to Kensico Reservoir. From Kensico, water is sent to Hillview Reservoir and subsequently conveyed to New York City via City Tunnel Nos. 1, 2, and 3. The Croton system, which is currently not in service pending completion of the Croton Water Treatment Plant, includes 12 reservoirs and three controlled lakes that can deliver water to the Jerome Park Reservoir in the Bronx for distribution.

The city manages the water supply system to maximize its overall reliability, maintain high quality water for those dependent on it for their water supply needs, address environmental concerns, and meet regulatory and other legal obligations.

The following sections describe the major objectives for which New York City's water supply system is operated.

4.5-2.1 WATER SUPPLY OPERATIONS: NORMAL CONDITIONS

WATER SUPPLY RELIABILITY

New York City's core priority is to meet the water supply needs of the city and upstate users. Accordingly, overall system reliability is the most important objective. The city operates the system in a proactive manner to be prepared for unplanned events that could impair its ability to deliver high-quality water.

The city seeks to maintain water supply reliability and protect against potential drought or infrastructure failure. To this end, operators manage the system so that reservoirs are full by the beginning of the annual drawdown period, on or around June 1, as the highest water supply demand typically occurs in the summer and the lowest demand in the winter. Operators and managers then balance the system drawdown across 22 reservoirs, taking into account refill probability, water quality, reservoir release requirements, and economics. To do this, operators must balance several factors: the forecasted inflow to each reservoir, the estimated probability of drawing the reservoirs down to undesirably low levels during the drawdown period, and the ability to refill the system to support demand for the next summer. Performing this analysis is a difficult task, particularly in a system as extensive and complex as New York City's. New system modeling software, known as the Operations Support Tool (OST), is being developed by the city and will greatly assist in this effort.

WATER QUALITY RELIABILITY

The city must maintain a safe, reliable, high-quality water supply for its consumers, and be ready to respond to a water quality event when it occurs. For example, high turbidity resulting from storm runoff, chemical spills in or near a reservoir, or an algae bloom could affect water quality. An integral part of maintaining water quality includes management of the reservoir system to ensure that delivered water is the best available quality. In the event that contaminants in

delivered water could rise to unacceptable levels, appropriate physical and/or chemical treatment must be undertaken.

The city's comprehensive water quality monitoring plan is designed to ensure compliance with all federal, state, and local regulations; protect the water supply for public health; protect and improve the watersheds to meet the terms of the Filtration Avoidance Determination; meet the needs for current and future predictions of watershed conditions and reservoir water quality; support operational decisions and policies; and provide surveillance to ensure delivery of the best quality water to consumers.

ENVIRONMENTAL OBJECTIVES

In addition to providing a high-quality, reliable supply of drinking water to its water supply users, the city operates pursuant to rules that serve to protect downstream users, fish habitat, and stream ecosystems. Reservoir releases are made in accordance with the New York State Environmental Conservation Law 6 NYCRR Parts 670 and 672 to maintain flows from Rondout Reservoir and in the Croton and Catskill systems. Minimum releases to tributaries of the Delaware River are defined by the terms of the 1954 Supreme Court Decree, agreements among the Parties to the Decree, DRBC dockets, New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 671, and the current Flexible Flow Management Program (FFMP). The Shandaken Tunnel, which diverts water from the Schoharie Reservoir to the Ashokan Reservoir, is operated pursuant to NYSDEC State Pollutant Discharge Elimination System (SPDES) Permit NY-0268151. Releases from The Ashokan Reservoir to the Esopus Creek are made pursuant to the DEC/DEP Interim Ashokan Release Protocol, which includes "Community Releases" to provide environmental, recreational and economic benefits to the lower Esopus Creek in a manner that will not adversely impact water supply. The Protocol includes provisions for modifications as necessary to address water supply issues.

ECONOMIC CONSIDERATIONS

During normal conditions, the operation of the reservoir systems can be tailored to address important economic objectives. These economic objectives include minimizing the cost of operations and maintenance to customers of the water system, minimizing energy consumption, and maintaining flows to meet various cold-water fishery and recreational needs. When drought conditions develop, the operation of the system shifts toward supply preservation. Under drought or extended shutdown conditions, the city would pump and treat Croton water at a higher cost. Due to necessary system modifications required to provide filtration for Croton water the system will no longer operate as a gravity system and pumping will be required to treat and distribute this water.

4.5-2.2 WATER SUPPLY OPERATIONS: DURING PROJECT 2B

WATER SUPPLY RELIABILITY

During an extended shutdown of the RWBT, the Catskill and Croton systems would be optimized to maintain water supply reliability. This means that, to the extent possible, the Catskill and Croton system reservoirs would be maintained at the highest levels possible. In the Catskill system, storage in Ashokan Reservoir would be maintained at the maximum level possible. In addition, operation of the Ashokan Release Channel for Community releases may be modified or suspended to conserve storage.

The Schoharie diversion of water through the Shandaken Tunnel to the Ashokan Reservoir would be maximized. The tunnel is currently operated pursuant to NYSDEC SPDES Permit NY-0268151. This permit requires cold water releases and limits volume, turbidity, and temperature. Any changes in its operation would need to be addressed with NYSDEC.

Spill mitigation for Ashokan and Schoharie would likely be addressed through higher diversions rather than releases.

The Croton system would be relied on for additional supply once the Croton Water Treatment Plant is on line. The city would potentially seek modifications to existing release requirements under NYCRR Parts 672-3 through discussions with NYSDEC. Operation of the Croton Falls and Cross River Pump Stations would also be available to transfer Croton water into the Delaware Aqueduct.

WATER QUALITY RELIABILITY

It is likely that aluminum sulfate (alum) addition would be necessary to safeguard water quality at Kensico Reservoir should a turbidity event occur in the Croton or Catskill Systems since during the shutdown period DEP would not be able to reduce flows to minimize impacts from turbidity to water quality. Alum could be added at Kensico Reservoir at the Pleasantville Alum Plant on the Catskill Aqueduct and at Delaware Aqueduct Shaft 17 to address flows added to the Delaware Aqueduct by the Croton Falls and Cross River Pumping Stations.

ENVIRONMENTAL EFFECTS FROM INCREASED DRAWDOWN OF RESERVOIRS

The increased drawdown of the Catskill and Croton system reservoirs and the West Branch Reservoir in the Delaware system may have the potential to result in abnormally low water elevations within these reservoirs for longer durations than has historically occurred during droughts. Low water levels and measures to maintain storage may have the potential to result in adverse impacts to water quality, wildlife, aquatic biota, and aesthetic character of the reservoirs. In addition, restoring the reservoirs to regular levels could have the potential to impact water quality. Low levels could also affect municipal supplies that draw directly from the reservoirs if

the water level drops below the elevation of their intakes or increased turbidity due to additional erosion.

4.5-3 POTENTIAL APPROACH FOR CONDUCTING A DETAILED ANALYSIS OF POTENTIAL ENVIRONMENTAL EFFECTS DUE TO RESERVOIR DRAWDOWN

To limit the potential for the increased reservoir discharges to result in significant adverse environmental impacts, the additional analysis that would be conducted in the second EIS or a subsequent environmental review, as appropriate, would potentially consider:

- Historic fluctuations in water elevation within the reservoirs, including elevations during previous significant drawdowns or droughts and the duration of these drawdown periods;
- Information on any habitat restoration measures, including fish stocking and vegetation management, implemented following previous drawdown events;
- The potential range of reservoir water levels and durations of such changes that would occur during the RWBT shutdown;
- Existing reservoir and main tributary stream stem aquatic habitats (e.g., deeper water, shallow shoreline, and emergent and subaqueous vegetation), aquatic biota, terrestrial resources, threatened or endangered species, recreational uses, and any other resources of special concern within reservoir lands;
- Municipal intakes in the reservoirs;
- Reservoir operational constraints including conservation releases;
- Potential for impacts to occur as a result of modifying conservation releases;
- Potential for aesthetic character effects taking into consideration historic fluctuations in water elevation; and
- Identify mitigation measures to offset any potential adverse environmental impacts identified to occur due to the increased drawdowns.

4.5-4 CONCLUSIONS

For the Catskill and Croton system reservoirs, and the West Branch Reservoir, the low water levels resulting from the reservoir drawdowns could have the potential to result in adverse impacts to water quality within the reservoirs, wildlife, aquatic biota, aesthetic character of the reservoirs, and to municipal supplies that draw directly from the reservoirs if the water level drops below the elevation of their intakes. Implementation of multiple protection measures available to the DEP to protect drinking water quality (e.g., watershed protection, selective withdrawal, water quality monitoring, Waterfowl Management Program, disinfection) would be amended or modified ensure that the quality of drinking water would be protected. ✷

4.6-1 INTRODUCTION

As described in Section 4.1, "Overview of the Project 2B," as a result of Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, when the RWBT is taken out of service and unwatered for inspection and repair, the approximately 600 million gallons per day (mgd) of water that normally enters the tunnel from Rondout Reservoir would instead be diverted to the rivers downstream of Cannonsville, Pepacton, Neversink, and Rondout Reservoirs. Section 4.5-2, "Management of New York City's Water Supply Operations," provides the expected operational effects on releases during Project 2B.

This section is organized as follows:

- Section 4.6-2 generally assesses the potential environmental effects from the increased discharge from the Cannonsville, Pepacton, Neversink, and Rondout Reservoirs.
- Section 4.6-3 describes a potential approach for conducting a detailed analysis in the second EIS or a subsequent environmental review, as appropriate, of the potential impacts from increased reservoir releases.
- Section 4.6-4 presents conclusions to the extent they can be made at this time.

4.6-2 ENVIRONMENTAL EFFECTS FROM INCREASED RESERVOIR RELEASES

Unregulated increased discharges from the Delaware watershed reservoirs would have the potential to result in downstream flooding, erosion of stream banks, or other impacts on natural, cultural, or socioeconomic resources in the potentially affected downstream communities.

Therefore, all additional reservoir releases would be controlled to remove the necessary flow from the Delaware watershed system, and minimize the potential for increased flooding, scouring, or other impacts on water quality, aquatic, cultural, or socioeconomic resources downstream from the reservoirs. Potential measures may include the construction of siphons at each of the Delaware watershed reservoirs to increase DEP's ability to safely release additional water.

As discussed in Section 4.5, "Effects of Reservoir Drawdown," Cannonsville, Pepacton, and Neversink Reservoirs discharge to tributaries of the Delaware River (see Figure 1-2) and minimum releases from these reservoirs are defined by the terms of the 1954 Supreme Court Decree, agreements among the Parties to the Decree, Delaware River Basin Commission (DRBC) dockets, New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 671, and the current Flexible Flow Management Program (FFMP). Therefore, the increased discharges would be examined in conjunction with the new interim flow program for the Delaware River and under the FFMP. The Rondout Reservoir discharges to Rondout Creek, which is within the Hudson River watershed.

A complete assessment of all potential impacts related to construction of water management infrastructure, such as siphons at each reservoir, and increased releases as a result of Project 2B will be addressed in the second EIS or a subsequent environmental review, as appropriate.

4.6-3 POTENTIAL APPROACH FOR CONDUCTING A DETAILED ANALYSIS OF POTENTIAL ENVIRONMENTAL EFFECTS FROM INCREASED RESERVOIR RELEASES

To address the potential for the increased reservoir discharges to result in significant adverse environmental impacts, the additional analysis to be conducted in the second EIS or a subsequent environmental review, as appropriate, to assess the potential environmental impacts would potentially consider:

- The increase in flow that would be discharged to the receiving streams;
- Potential changes in the management of the reservoir systems before the RWBT is taken out of service;
- Discharge constraints for each reservoir;
- Potential effects on natural resources and water resources, which would include downstream environmental characteristics, including flow, physiochemical parameters, aquatic biota, and riparian habitats within the receiving streams, and threatened or endangered species;
- Potential effects on land uses and businesses (i.e., socioeconomic conditions) within the 500-year floodplain;
- Potential effects on cultural resources within the 500-year floodplain; and
- Alternative mitigation measures to minimize the potential for adverse impacts on natural, cultural, and socioeconomic resources.

If warranted, the second EIS or a subsequent environmental review, as appropriate, will also consider potential effects from increased releases on how other utilities operate their water supply systems during this period.

4.6-4 CONCLUSIONS

Increased discharges from the Cannonsville, Pepacton, Neversink, and Rondout Reservoirs would have the potential to result in downstream flooding, erosion of stream banks, or other impacts on natural, cultural or socioeconomic resources in the potentially affected downstream communities. Therefore, the additional reservoir releases would be the minimum required to remove the necessary flow from the Delaware watershed system, and limit the potential for increased flooding, scouring, or other impacts on water quality, aquatic, cultural, or socioeconomic resources downstream from the reservoirs. The second EIS or a subsequent environmental review, as appropriate, will provide a complete assessment of all potential impacts related to construction of water management infrastructure and increased releases as a result of Project 2B. ✷