This chapter of the Final ~~Draft~~ Environmental Impact Statement (FD~~D~~EIS) evaluates the proposed Rondout-West Branch Tunnel Inspection and Repair (inspection and repair) that would occur as part of Upstate Water Supply Resiliency:

- Inspection and repair of the Rondout-West Branch Tunnel (RWBT); and
- Decommissioning of the bypassed section of the RWBT (see Section 11.9, "Proposed Decommissioning").

This chapter provides background on the purpose and need for the inspection and repair, describes the activities and schedule for the project, and presents the environmental impact assessments for all applicable impact categories.

11.1 PURPOSE AND NEED

The inspection and repair would recover capacity and improve resiliency in the RWBT, a vital piece of the City's overall water supply system. The inspection and repair would result in the cessation of leaks along the RWBT, which, in turn, would reduce water losses in the Delaware water supply system (Delaware System). As a result, the inspection and repair would contribute to the long-term sustainability of the Delaware Aqueduct, thereby ensuring continued water supply service for current and future generations of Department of Environmental Protection (DEP) customers.

11.2 PROJECT DESCRIPTION

Constructed between 1936 and 1964, the Delaware System extends 125 miles northwest of the City and is the source of approximately 50 percent of the City's water supply. Water from the Delaware System is transported via one of the City's most critical pieces of water supply infrastructure: the Delaware Aqueduct. The Delaware Aqueduct has been in operation since the 1940s and transports water a distance of approximately 85 miles from the Delaware System to the City. The aqueduct is comprised of several segments, the longest of which is the 45-mile long RWBT. The RWBT connects Rondout Reservoir, located in Ulster and Sullivan Counties, New York, to the West Branch Reservoir in Putnam County, New York. The RWBT is leaking up to 35 million gallons per day (mgd), primarily in the area known as the Roseton crossing in the Town of Newburgh, Orange County, New York. A second leaking section is located in the area known as the Wawarsing crossing near the Town of Wawarsing, Ulster County, New York (see **Figure 11.2-1**).

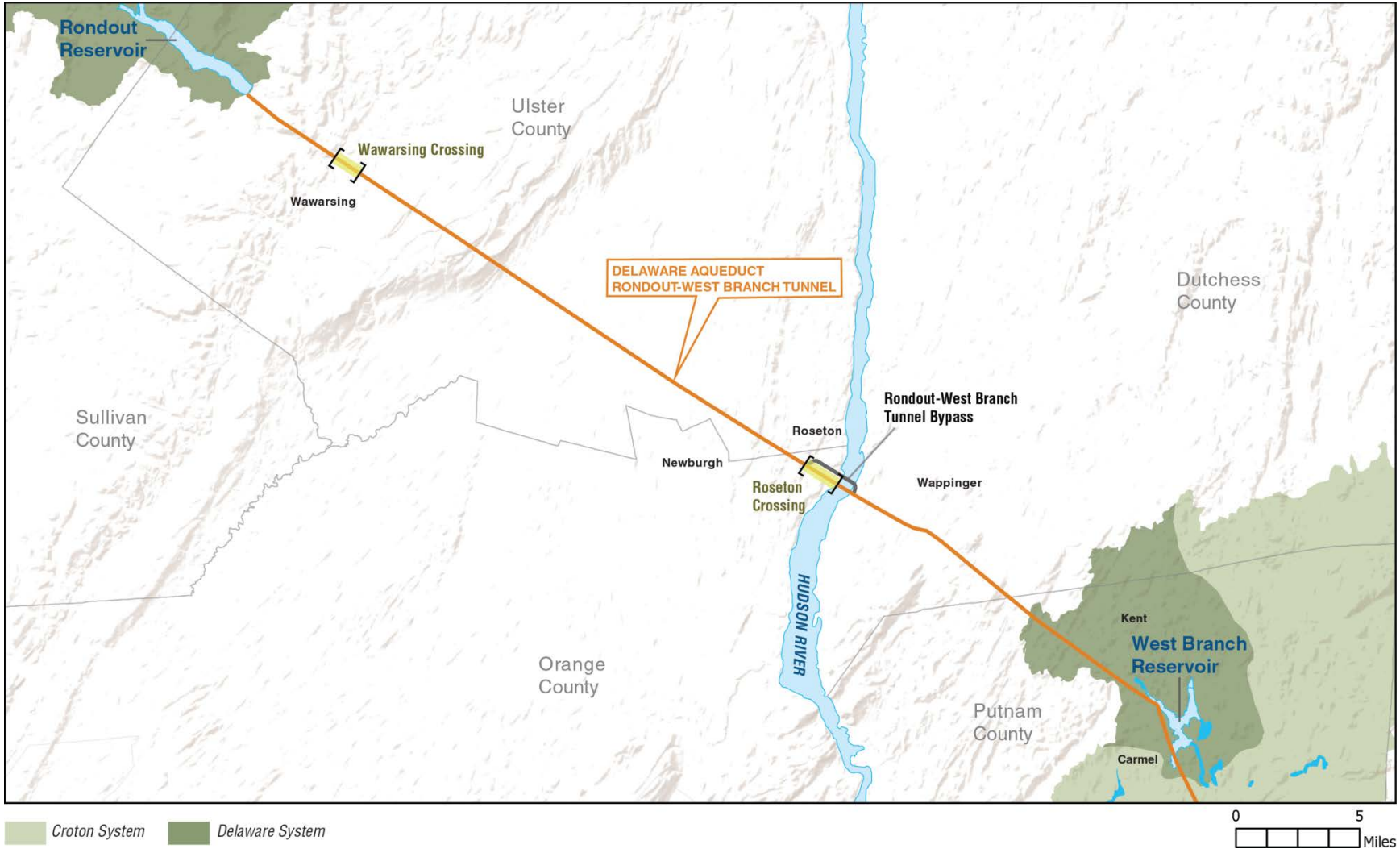


Figure 11.2-1: Rondout-West Branch Tunnel: Roseton and Wawarsing Crossings

To address these leaks, an iterative planning process involving complex modeling paired with considerations for both time and cost was undertaken to determine the optimal method of repair (see Chapter 4, "Water for the Future Background and Planning"). As a result of this planning process, DEP elected to construct a bypass tunnel and two associated shafts to permanently circumvent the leaking section at the Roseton crossing, and to conduct internal repairs to the leaking section near Wawarsing. The work undertaken to circumvent the leaking section in the Roseton crossing area is referred to as the "RWBT Bypass" (see **Figure 11.2-2)**.

Repairing the RWBT is necessary for the City to continue to meet its water supply obligations, as it is the City's only direct conduit to the source waters of the Delaware System west of the Hudson River.[1] The goal of the inspection and repair is to reduce RWBT leakage throughout the full length of the RWBT.

The RWBT Bypass work was previously evaluated in a Final Environmental Impact Statement issued on May 18, 2012, and work on this project has commenced. Once the RWBT Bypass and shafts are completed in 2022, the RWBT would be temporarily shut down and drained to allow for:

- Connection of the RWBT Bypass to the existing RWBT;
- An inspection of the sections of the RWBT upstream and downstream of the bypass connection points; and
- Internal repairs to the RWBT in the Wawarsing crossing.

Should any areas outside of the Wawarsing crossing be identified during the inspection as requiring repair, that work would be performed during the RWBT temporary shutdown. DEP estimates that the maximum duration of the temporary shutdown to perform these activities would be approximately 8 months.

During this temporary shutdown, water from the Delaware System west of the Hudson River would be unavailable to the City and its customers. This would temporarily affect the water supply of the two community users, the Towns of Newburgh and Marlborough, that draw water from the RWBT. DEP has developed an ongoing program to work with these community users, including reviewing the availability of back-up water supplies, and analyzing the ability of these users to accommodate reduced or limited access to the RWBT during the temporary shutdown, as appropriate. The temporary shutdown would not take place without sufficient back-up water supplies for all potentially affected communities that draw water from the RWBT.

Decommissioning refers to when the RWBT Bypass is connected and the bypassed section of the RWBT would no longer be in service.

[1] In addition to the RWBT, critical segments of the Delaware Aqueduct include those between West Branch and Kensico reservoirs, and between Kensico Reservoir and the City's distribution system.

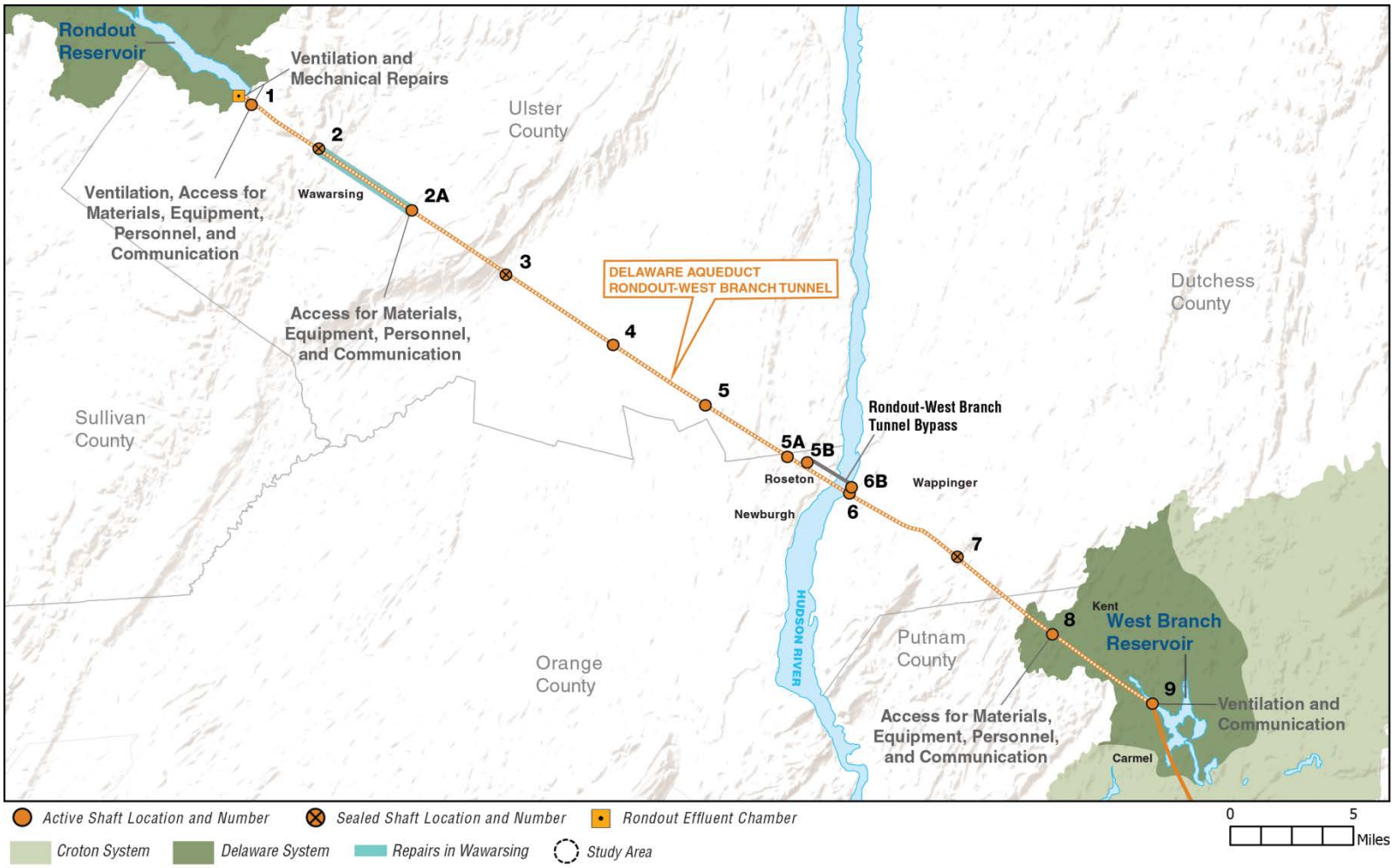


Figure 11.2-2: Rondout-West Branch Tunnel Inspection and Repair

This chapter will analyze the potential impacts from the inspection and repair and decommissioning due to:

- Unwatering of the RWBT during the temporary shutdown and connection of the RWBT Bypass; and
- The cessation of leaks over the long term.

Since the inspection and repair and decommissioning activities would affect different locations at different time intervals, the potential for impacts associated with decommissioning is evaluated in Section 11.9, "Proposed Decommissioning."

This chapter evaluates the potential for impacts associated with the cessation of RWBT leaks in study areas within the Towns of Wawarsing and Roseton (described below), along with activities associated with the inspection and repair at the Rondout Effluent Chamber and 4 of the 13 shaft sites – Shaft 1, Shaft 2A, Shaft 8, and Shaft 9.[2] Specifically, activities at these five sites and the study areas associated with the RWBT leak repairs would support inspection and repair work within the RWBT as described below, as well as the RWBT Bypass connection and decommissioning, as described further in Section 11.9, "Proposed Decommissioning."

11.2.1 OVERVIEW OF RONDOUT-WEST BRANCH TUNNEL LEAKS

During the original construction of the RWBT, high groundwater inflows were observed at locations where the bedrock was fractured or weathered, where a fault line occurred, and where the geology changed from one rock type to another. The areas where the most fractured and weathered rocks were encountered are beneath the Towns of Wawarsing and Newburgh. In both locations, a special reinforced section consisting of a steel interliner was constructed between the tunnel wall and liner to support the RWBT and cut off groundwater flows. In 2003, 2009, and most recently in October 2014, DEP deployed an autonomous underwater vehicle (AUV) to inspect the interior of the RWBT. These AUV inspections revealed that most of the cracking in the liner of the RWBT is within the section where the steel interliner was installed. During the AUV inspections, sensors on the vehicle measured various parameters, including the precise measurements of the vehicle velocity, and observed possible leak sources. These measurements were then used to directly calculate the leak rate. Near the Town of Wawarsing, the leak was estimated to be approximately 1 mgd. As evidenced by studies completed by the U.S. Geological Survey (USGS), leaking aqueduct water near the Town of Wawarsing is contributing to the area's local groundwater.

USGS has monitored groundwater in the Town of Wawarsing since 2008. USGS monitoring covers a 12-square-mile study area consisting of an array of groundwater wells and two surface water monitoring locations. During the USGS monitoring period, DEP modified operations of the RWBT four times. The modified operations consisted of depressurizing and subsequently repressurizing the tunnel. The depressurization and repressurization events are together referred to as "depressurizations" within this F~~D~~EIS. During the four depressurizations, the RWBT flow

[2] Shafts 2, 5, and 7 have been permanently sealed. There would be no activities at Shafts 3, 4, 5A, 5B, 6A, and 6B that are subject to environmental review in this F~~D~~EIS.

was stopped, which reduced pressure in the tunnel and, therefore, decreased the amount of water escaping through leaks. The USGS monitoring locations were observed during these events to evaluate the response of groundwater and surface water in this area.

Similarly, at the Roseton crossing in the Town of Newburgh, the leaks originating from the RWBT manifest at the surface in a number of locations, referred to as "surface expressions." Groundwater and RWBT monitoring studies conducted by DEP have indicated that several of the surface expressions are hydraulically connected to the leaking RWBT. Due to the nature of the rock formations underlying this area of Roseton, it is believed that water leaking from the pressurized RWBT is reaching the ground surface through different below-ground geologic features such as faults, fractures, joints, beds, and in-filled discontinuities. When the RWBT Bypass is connected and the RWBT repairs near the Town of Wawarsing are completed, the leaks are expected to be effectively eliminated. The potential for impacts associated with the cessation of these leaks is evaluated in Section 11.9, "Proposed Decommissioning."

11.2.2 INSPECTION AND REPAIR ACTIVITIES

As described above, the inspection and repair would allow DEP to repair the leaking portion of the RWBT near the Town of Wawarsing and connect the bypass tunnel to the RWBT. Site preparation associated with the inspection and repair would begin up to 6 months prior to the temporary shutdown in order to prepare the Rondout Effluent Chamber and the four shaft sites. Once all proper precautions and safety measures have been installed and are operational, the RWBT would be unwatered, and Shafts 1, 2A, and 8 would be used for access to conduct the inspection of the RWBT and repairs within the Wawarsing crossing. As shown in **Table 11.2-1** and **Figure 11.2-2**, some sites would be prepared with hoists to allow manned access, while others would have ventilation installed to ensure adequate air flow throughout the RWBT to support the inspection and repair and RWBT Bypass connection activities. In addition, a surface-to-tunnel communications system would be installed.

Once access, ventilation, and communication systems are in place, the inspection would begin. The inspection and repair crew members would access the RWBT through Shaft 2A for RWBT segments west of the Hudson River between Shaft 5B and Shaft 1. The inclined tunnel between Shaft 1 and the Rondout Effluent Chamber would be accessed through Shaft 1. Crew members would access the RWBT through Shaft 8 for inspections east of the Hudson River from Shaft 6B to Shaft 9. The inspection would include a technical assessment, and documentation of the current conditions and features of the tunnel (condition assessment), including data related to structural features (e.g., cracks), groundwater infiltration, and sediment intrusion. The condition assessment would generally take place 24 hours per day, with most activities occurring between 7 AM and 7 PM. The condition assessment would occur over the course of approximately 5 weeks total: 3 weeks for the RWBT segments west of the Hudson River, and 2 weeks for the RWBT segments east of the Hudson River.

Table 11.2-1: Primary Inspection and Repair Activities by Site

Site	Location	Primary Inspection and Repair Activities
Rondout Effluent Chamber	Town of Wawarsing, Ulster County, New York	A ventilation location during the inspection and repair and RWBT Bypass connection. The site would also support mechanical repairs internal to the Rondout Effluent Chamber.
Shaft 1	Town of Wawarsing, Ulster County, New York	The primary ventilation exhaust fan location during the inspection and repair and RWBT Bypass connection. A primary entry and exit point for personnel and equipment to support the inspection for RWBT segments west of the Hudson River between the Rondout Effluent Chamber and Shaft 1. It would also be used as a communication and emergency entry and exit point for personnel and equipment for RWBT segments west of the Hudson River, including the Town of Wawarsing. A hoisting system would be used to facilitate entry and exit to the RWBT.
Shaft 2A	Town of Wawarsing, Ulster County, New York	The primary entry and exit point for personnel and equipment to support the proposed inspection for most of the RWBT segments west of the Hudson River, including the internal repairs near the Town of Wawarsing. A hoisting system would be used to facilitate entry and exit to the RWBT. It would also be used to facilitate communication during the inspection and repair.
Shaft 8	Town of Putnam Valley, Putnam County, New York	The primary entry and exit point for personnel and equipment to support the inspection for the RWBT segments east of the Hudson River. A hoisting system would be used to facilitate entry and exit to the RWBT. It would also be used to facilitate communication during the inspection and repair.
Shaft 9	Town of Kent, Putnam County, New York	The primary ventilation supply location during the inspection and repair. It would also be used to facilitate communication during the inspection and repair.

Upon completion of the condition assessment staged from Shaft 2A, activities at the Rondout Effluent Chamber and at Shafts 1, 8, and 9 are anticipated to become intermittent. Repair activities would begin within a 1,300-foot long section of the RWBT in the Wawarsing crossing area along with the connection of the RWBT Bypass to the existing RWBT. Shaft 2A would function as the primary surface location supporting the Wawarsing crossing repairs. Activities at the Shaft 2A site would peak at this time, and are expected to occur 24 hours per day, 7 days a week throughout the 8-month temporary shutdown. The extent and method of construction work to carry out the repairs at the Wawarsing crossing would be based on condition assessments, but activities at the Shaft 2A site during these repairs would generally consist of staging for workers, cement delivery, and grouting within the RWBT in the vicinity of the steel interliner near the Town of Wawarsing.

Construction noise would be contained to the extent practicable at the Rondout Effluent Chamber and shaft sites through the installation of noise barriers, as necessary. After construction activities are completed, the Rondout Effluent Chamber and shaft sites would remain active for ventilation or emergency exit until the RWBT Bypass is connected to the

existing RWBT. During this time, activities at the Shaft 1, 8, and 9 sites and the Rondout Effluent Chamber would be limited, requiring up to two workers at each site for 24 hours per day, primarily for safety and security reasons.

To support inspection and repair activities, diesel-powered generators and water would be utilized at some or all of the sites. Trucks to deliver fuel for generators would travel to the sites intermittently. The Shaft 2A site would also require water to be trucked to the site for use in the grouting operations. Diesel-powered generators would be used to supply power for construction trailers, communication systems, and valve work, and to power the ventilation and hoisting systems. Any waste generated at Shaft 2A from general construction activities and demolition would be containerized on site prior to being trucked off site. Wash water generated within the RWBT during the course of conducting the internal repairs would flow through the tunnel to the Shaft 5B site west of the Hudson River, where it would be pumped to the surface and treated.

During the inspection and repair, approximately two delivery and hauling trucks would enter and exit the sites per hour via existing access roads. Generally, overnight deliveries would be prohibited. For sites that require minor excavation and grading, all soil would be stockpiled on site for reuse during site restoration. While peak construction activities are underway, 8 to 25 workers would be at each site during the work hours described above. It is anticipated that the workers would park their vehicles at each site or adjacent to the security fence, and would use existing access roads to enter the sites. No new impervious surfaces would be required for vehicle access to the sites, parking, or any other construction-related activities.

11.2.3 SCHEDULE

This section describes the proposed schedule for the completion of the inspection and repair. Site preparation activities at the Rondout Effluent Chamber and four shaft sites would occur up to 6 months in advance of the 8-month temporary shutdown period, during the spring and summer of 2022. The site preparation activities would consist of activities to ready the site for staff and equipment at the Rondout Effluent Chamber and shaft sites (see **Table 11.2-1**). These activities would take place Monday through Friday from 7 AM to 7 PM at all locations, with the exception of the Shaft 8 site, where activities would take place from 8 AM to 5 PM. Following completion of site preparation activities, the temporary shutdown of the RWBT would begin on October 1, 2022, as described in Chapter 4, "Water for the Future Background and Planning." To ensure this critical piece of infrastructure is repaired as quickly as possible, 24-hour access would be required at these sites for up to 8 months during the RWBT temporary shutdown. First, the RWBT would be unwatered (drained) over the course of approximately 20 days. Following the RWBT's unwatering, the condition assessment would begin in mid-October 2022, and occur over 7 days a week over the course of approximately 5 weeks. Concurrent with the condition assessment, repairs to the RWBT near the Town of Wawarsing would take place 7 days a week, 24 hours per day throughout the remainder of the temporary shutdown. Concurrent with the inspection and repair activities, the connection of the RWBT Bypass would commence once the tunnel is unwatered, with work continuing until the end of May 2023 (see **Figure 11.2-3**).

The schedule presented above reflects a best estimate for the timing and duration of the proposed activities. However, the activities described above could be shifted to take place at any time over the temporary shutdown period.

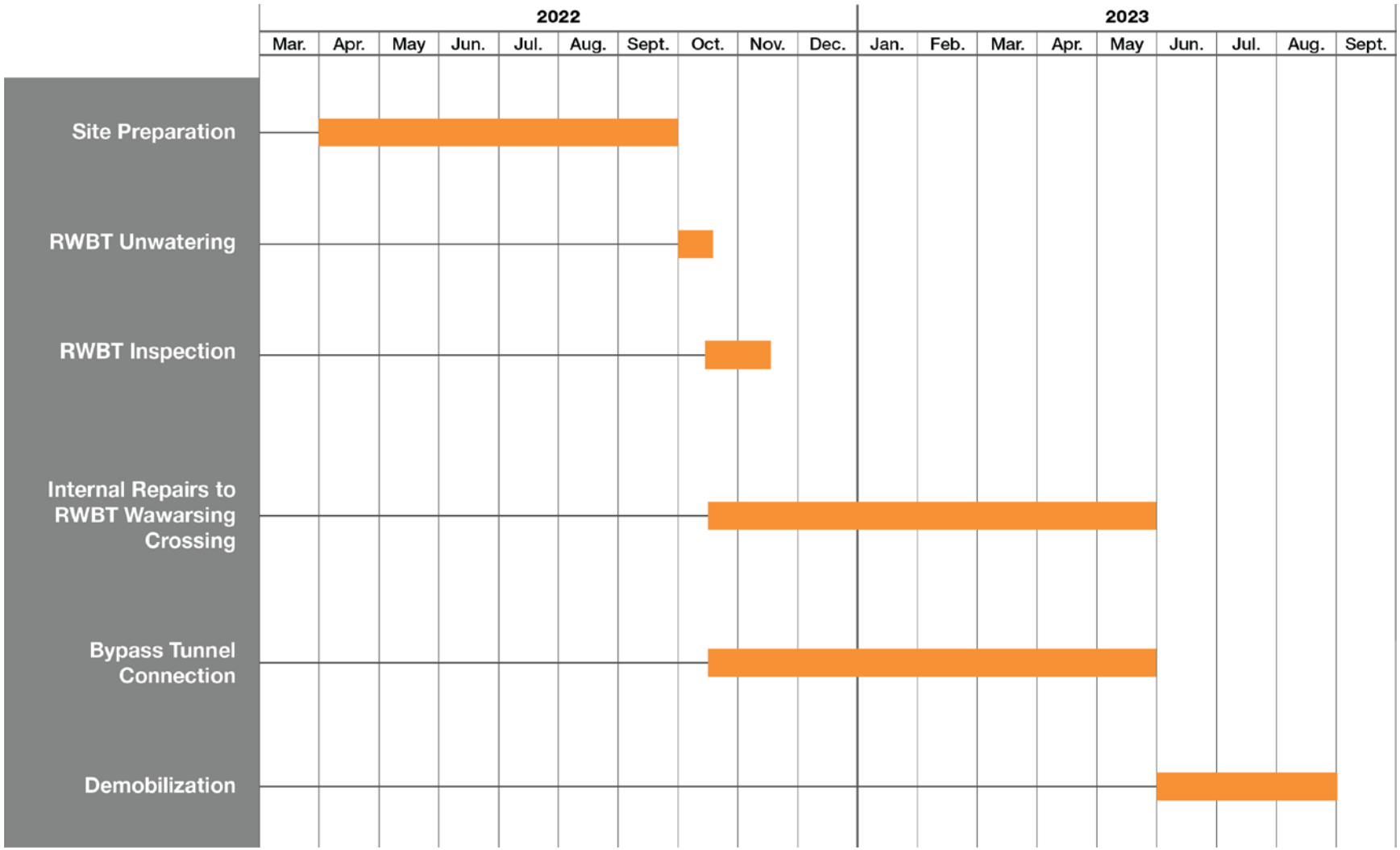


Figure 11.2-3: Conceptual Linear Schedule

11.3 SCREENING ASSESSMENT AND IMPACT ANALYSIS METHODOLOGY

This section describes the screening assessments and, if applicable, the impact analysis methodology applied for each impact category identified as requiring an analysis in this F~~D~~EIS. For the purposes of this chapter, the screening assessment included a preliminary analysis of potential impacts, described below. In those instances where more a detailed analysis was required, the results are described in Section 11.4, "Rondout Effluent Chamber Study Area Impact Analysis" through Section 11.8, "Shaft 9 Study Area Impact Analysis."

The study areas for the inspection and repair activities are the Rondout Effluent Chamber Study Area; the Shaft 1, 8, and 9 study areas (shaft study areas); and the Shaft 2A and Wawarsing Leak Repair Study Area (see **Figure 11.3-1**). The Shaft 2A and Wawarsing Leak Repair Study Area has been divided in many of the analyses as the "Shaft 2A Study Area" and the "Leak Repair Study Area" because the planned inspection and repair activities and their anticipated effects to environmental resources differ substantially from each other. For the screening assessment and impact analysis methodology for the Proposed Decommissioning portion of the inspection and repair, see Section 11.9.4, "Screening Assessment, Methodology, and Impact Analysis Overview."

The construction activities within the study areas surrounding the Rondout Effluent Chamber site and the Shaft 1, 2A, 8, and 9 sites (shaft sites) would result in temporary physical changes to the sites. Therefore, potential short-term effects as a result of surface construction activities at the Rondout Effluent Chamber site and shaft sites were evaluated. However, following completion of the inspection and repair, each of these sites would be restored to baseline conditions. In addition, the temporary shutdown of and internal repairs to the RWBT in the section where the RWBT crosses through the Town of Wawarsing would cause the cessation of leaks. This could result in both short- and long-term changes in surface water and groundwater levels within a portion of the Shaft 2A and Wawarsing Leak Repair Study Area, known as the Leak Repair Study Area. The potential changes in groundwater levels could result in reduced flows to local groundwater aquifers. Therefore, the potential short- and long-term effects resulting from the permanent cessation of RWBT leaks were evaluated within the Leak Repair Study Area.

Per the *City Environmental Quality Review (CEQR) Technical Manual*, a 0.25-mile radius study area is appropriate to encompass a proposed project's immediate effects and potential secondary effects on the surrounding area. Therefore, to analyze the surface construction activities at the Rondout Effluent Chamber site and each of the shaft sites, a 0.25-mile radius was circumscribed around each site (study area). Data previously collected by USGS were used to circumscribe the study area for the potential for impacts associated with the cessation of leaks within the Leak Repair Study Area. These data demonstrate that the RWBT leaks influence local groundwater levels at various distances from the RWBT, dependent on the local geology (see Section 11.3.8.1, "Water Resources," for a more detailed description of the Leak Repair Study Area).

In addition to the general criteria for establishing study areas, the *CEQR Technical Manual* allows for study areas to vary in size for specific impact categories, as appropriate. For the following impact categories, it was appropriate to establish impact category-specific study areas: visual resources, natural resources, and stationary noise.

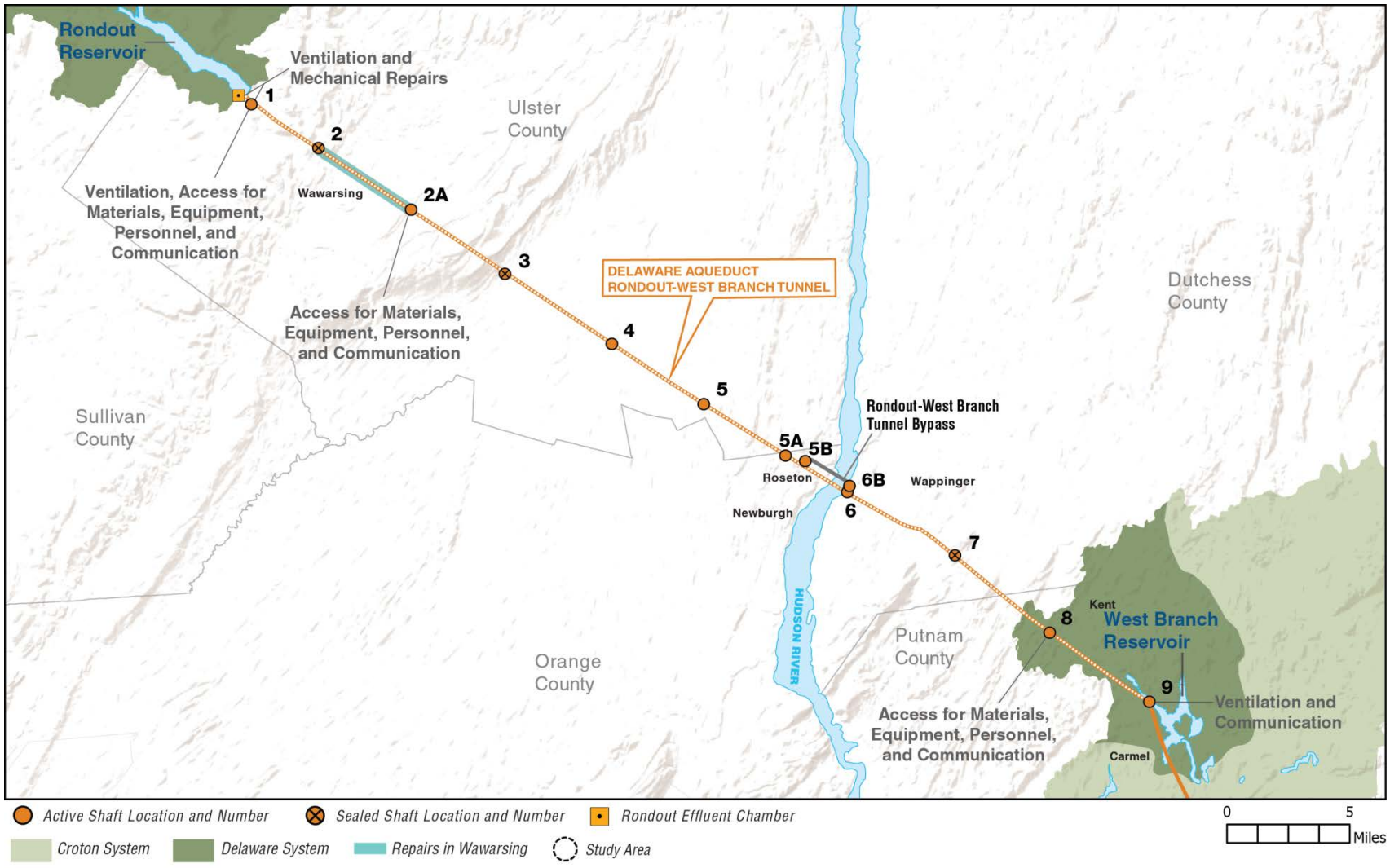


Figure 11.3-1: Rondout-West Branch Tunnel Inspection and Repair Study Areas

For visual resources, New York State Department of Environmental Conservation (NYSDEC) guidance recommends that large projects include visual resources within 5 miles of the project in the analysis of potential for impacts. However, since the inspection and repair would not involve construction that would be considered large in scale, the study area boundaries for the visual resources screening assessments and impact analyses were the same as the general 0.25-mile study area boundary. Additional view corridors that extend beyond the study area were evaluated, as required.

For the natural resources screening assessments and applicable impact analyses, the boundary of the Rondout Effluent Chamber Study Area, the shaft study areas (including surface construction activities at the Shaft 2A site within the Shaft 2A and Wawarsing Leak Repair Study Area), were based on a 400-foot radius circumscribed around the site. Per the *CEQR Technical Manual*, a 400-foot study area is appropriate to encompass a proposed project's immediate effects on the surrounding area. Where appropriate, natural resources screening assessments and applicable impact analyses reference the Leak Repair Study Area within the Shaft 2A and Wawarsing Leak Repair Study Area.

Finally, the boundary for the stationary noise screening assessments and applicable impact analyses for the Rondout Effluent Chamber Study Area, the shaft study areas, and the study area associated with surface construction at the Shaft 2A site (within the Shaft 2A and Wawarsing Leak Repair Study Area) were based on a 1,500-foot radius circumscribed around the site. Per the *CEQR Technical Manual*, receptors within a 1,500-foot radius from the sites that would have a direct line of sight to the proposed project should be considered for a stationary noise analysis.

11.3.1 SCREENING ASSESSMENT APPROACH

For the purposes of this EIS, screening assessments were conducted to form an initial characterization of baseline conditions, including an inventory of relevant data and environmental resources within the inspection and repair study areas, to determine which impact categories warranted an impact analysis. The screening assessments relied primarily on desktop evaluations (e.g., review of GIS data, maps, aerial imagery, online databases, and local agency consultations). These desktop evaluations, and any supplementary field visits, are referenced or summarized in each screening assessment below. In addition, a review of potentially applicable State and local public policies informed many of the screening assessments to determine whether the inspection and repair would be consistent with these policies. Those public policies with which the inspection and repair could be inconsistent warranted an impact analysis and were identified relative to the applicable impact category.

Several of the impact categories did not warrant an assessment, and were thus screened out of the impact analysis. A shadows assessment is not applicable because the inspection and repair would not result in new structures or additions to existing structures greater than 50 feet tall, or be located adjacent to, or across from, a sunlight-sensitive resource. Similarly, a solid waste and sanitation services assessment is not applicable because the inspection and repair would not result in the generation of 50 tons per week or more of solid waste. In addition, a greenhouse gas emissions and climate change assessment is not applicable because the inspection and repair would not result in any significant generation of greenhouse gases. Finally, a Critical

Environmental Area assessment is not applicable because the inspection and repair sites are not located in any Critical Environmental Area.

As described further below, impact categories that screened out do not warrant an impact analysis. These categories include: land use and zoning; socioeconomic conditions; community facilities and services; energy; air quality; and mobile noise. Impact categories that did not screen out, and therefore required an impact analysis, include: public policy; open space and recreation; historic and cultural resources; visual resources (an urban design assessment is not needed since the inspection and repair is not located in an urban setting); natural resources; hazardous materials; water and sewer infrastructure; transportation; stationary noise; neighborhood character; and public health. See **Table 11.3-1** for a summary of the impact categories and whether there is a screening assessment or impact analysis presented herein. See Sections 11.3.2, "Land Use, Zoning, and Public Policy," through 11.3.16, "Public Health," for the screening assessments and impact analysis methodologies and Sections 11.4, "Rondout Effluent Chamber Study Area Impact Analysis," through 11.8, "Shaft 9 Study Area Impact Analysis," for the impact analyses.

11.3.1.1 Methodology and Impact Analysis

For each impact category that did not screen out, an impact analysis was conducted that included an evaluation of baseline conditions, future conditions without the inspection and repair, and future conditions with the inspection and repair, as described further below.

As part of the impact analyses, baseline conditions applicable to each impact category were generally established by compiling data gleaned from a review of desktop information (e.g., hydrologic data, maps, plans, aerial imagery, ArcGIS data), as well as observations made during field visits conducted between late 2012 and early 2015. Pursuant to the *CEQR Technical Manual*, future conditions for each impact category both with and without the inspection and repair were evaluated for the same year, 2023, when the temporary shutdown would be complete. By 2023 the RWBT would unwatered, inspected, and repaired, and the bypass tunnel would be connected to the existing RWBT. Following the connection, the bypassed segment of the RWBT would be decommissioned in place. These activities would be expected to continue through spring 2023. Future conditions without the inspection and repair were based on typical operations during these same time periods and the continuation of leaks in the RWBT. The potential for significant adverse impacts for each applicable impact category were then determined by comparing future conditions with and without the inspection and repair.

In addition to the above-noted analyses, the potential for impacts from the inspection and repair to result in cumulative impacts is also included as part of a cumulative assessment for Upstate Water Supply Resiliency. Chapter 12, "Cumulative Impacts" presents the cumulative assessment addressing energy, greenhouse gas emissions and climate change, water supply infrastructure, socioeconomic conditions, and public health.

The following sections summarize the screening assessments and impact analysis methodologies for each of the impact categories.

Table 11.3-1: Inspection and Repair Impact Categories with Screening Assessment and/or Impact Analyses

Impact Categories	Screening Assessment and/or Impact Analyses per Study Area				
	Rondout Effluent Chamber	**Shaft 1**	**Shaft 2A and Wawarsing Leak Repair**	**Shaft 8**	**Shaft 9**
Land Use, Zoning, and Public Policy	✓[1]	✓[1]	✓[1]	✓[1]	✓[1]
Socioeconomic Conditions	-	-	-	-	-
Community Facilities and Services	-	-	-	-	-
Open Space and Recreation	✓	-	✓	✓	✓
Critical Environmental Areas	NA	NA	NA	NA	NA
Shadows	NA	NA	NA	NA	NA
Historic and Cultural Resources	-	-	✓	-	-
Visual Resources	✓	✓	✓	-	✓
Natural Resources	✓	✓	✓	✓	✓
Hazardous Materials	✓	✓	✓	✓	✓
Water and Sewer Infrastructure	-	-	✓	-	-
Solid Waste and Sanitation Services	NA	NA	NA	NA	NA
Energy	-	-	-	-	-
Transportation	✓	✓	✓	✓	✓
Air Quality	-	-	-	-	-
Greenhouse Gas Emissions and Climate Change	NA	NA	NA	NA	NA
Noise	✓[2]	✓[2]	✓[2]	✓[2]	✓[2]
Neighborhood Character	✓	✓	✓	✓	✓
Public Health	✓	✓	✓	✓	✓

Notes:

- = Screens out. Does not warrant an impact analysis.

✓ = Impact analysis conducted.

NA = Not applicable to the project; does not warrant a screening assessment.

[1] Land use and zoning screen out and do not warrant an analysis. An impact analysis was conducted for public policy.

[2] Mobile noise screens out and does not warrant an analysis. An impact analysis was conducted for stationary noise.

11.3.2 LAND USE, ZONING, AND PUBLIC POLICY

This section presents the screening assessment and analyzes the potential for the inspection and repair to: (1) result in direct effects to, and non-compatible conditions with, existing land use and zoning, or (2) conflict with public policies within the study areas from activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.3.2.1 Screening Assessment

The inspection and repair activities at the Rondout Effluent Chamber site and shaft sites would be minimal and temporary, consistent with existing public service/utility land use(s), and not affect the land uses in the surrounding study area. Furthermore, the inspection and repair would not require a zoning change for the sites or alter existing zoning within the surrounding study areas. In addition, the permanent cessation of RWBT leaks within the Leak Repair Study Area, (which lies within the Shaft 2A and Wawarsing Leak Repair Study Area), would not affect land uses within the study area or require a zoning change. In sum, the inspection and repair would not physically displace existing land uses, or alter existing land uses or zoning within the study areas. Following completion of the inspection and repair, the sites would be restored to baseline conditions. Therefore, a land use and zoning impact analysis for the study areas is not warranted. For informational purposes, a basic description of existing land use and zoning is provided for each study area.

The inspection and repair would be required to be compatible with public policy, including county and local plans and town codes, within the surrounding study areas. The potential for impacts associated with the inspection and repair's compatibility with applicable public policies within the study areas were evaluated in their respective "Public Policy" sections using the methodology described below.

11.3.2.2 Impact Analysis Methodology – Public Policy

The public policy impact analysis consisted of: (1) establishing and describing the baseline conditions within the applicable study area by identifying relevant public policies, including adopted State, county, neighborhood, and community plans; (2) establishing future conditions without the inspection and repair by identifying anticipated updates to public policies planned and programmed for implementation within the study area by the analysis year; (3) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (4) analyzing the potential for impacts from the inspection and repair by evaluating whether the proposed project would potentially be non-compatible with applicable public policies.

The following plans contain policies and/or goals relevant to the inspection and repair impact analysis: Ulster County Open Space Plan, Town of Wawarsing Comprehensive Plan, and Town of Kent Comprehensive Plan. County and local plans applicable to the inspection and repair for each study area are shown in **Table 11.3-2**.

Table 11.3-2: Public Policies Applicable to the Inspection and Repair and Corresponding Study Areas

County and Local Plans	Rondout Effluent Chamber Study Area	Shaft 1 Study Area	Shaft 2A and Wawarsing Leak Repair Study Area	Shaft 8 Study Area	Shaft 9 Study Area
Ulster County Open Space Plan	✓	✓	✓	-	-
Town of Wawarsing Comprehensive Plan	✓	✓	✓	-	-
Town of Kent Comprehensive Plan	-	-	-	✓	✓

Notes:
- = Not applicable to the study area.
✓ = Applicable to the study area; impact analysis was conducted.

Below is a summary of the applicable plans that were reviewed to determine the compatibility of inspection and repair with public policies of the affected counties and municipalities. These were analyzed in the respective "Public Policy" sections.

Ulster County Open Space Plan (2007)

The Ulster County Open Space Plan (Ulster County 2007) established a framework for the management and protection of open space resources identified by Ulster County, including protected open space, water resources, working landscapes, landforms and natural features, ecological communities, cultural and historic resources, and recreational resources. To provide guidance on these open space resources, Ulster County established the 10 "Principles of the Open Space Plan" that seek to safeguard the open space values of Ulster County. Of those 10 principles, the following two are applicable to the inspection and repair:

(1) Preserve and protect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty and the rural character of Ulster County; and

(2) Protect and enhance the county's most valuable open space landforms and natural features with coordinated planning and safeguard policies.

Town of Wawarsing Comprehensive Plan (2006)

The Town of Wawarsing Comprehensive Plan (Town of Wawarsing 2006) is a guide for the Town's improvement and its future growth, development, and protection. It includes recommendations related to maintaining the Town's growth and appearance, while preserving the residential character, and transportation services, and maintaining and improving public infrastructure. Recommendations within the Town of Wawarsing Comprehensive Plan establish a clear direction for the Town over a period of 3 to 5 years. The Comprehensive Plan does not discuss issues related to construction of individual projects or specific parcels or tracts of land. The Comprehensive Plan includes the following recommendation potentially relevant to the effects of the inspection and repair:

- *Maintain and improve important public infrastructure.*

Town of Kent Comprehensive Plan (2008)

Recommendations found in the Town of Kent Comprehensive Plan (Town of Kent 2008) broadly address topics related, but not limited, to environmental protection, open space, historic and scenic assets, transportation, economic development, housing development and residential zoning, and public services and facilities. The Comprehensive Plan is intended to be reviewed and updated every 10 years. No goals or recommended actions within the Comprehensive Plan specifically pertain to the inspection and repair. However, the Comprehensive Plan does contain recommendations related to the following topics potentially relevant to the effects of the inspection and repair in proximity to West Branch Reservoir only:

- *Environmental Protection.*
    - Groundwater and Surface Water Protection: Implement stormwater management processes to limit peak runoff flows and to limit turbidity discharges.

11.3.2.3 Town Codes

In addition to local and county plans, several town codes would apply to the inspection and repair study areas, respective to their individual locations. Town code chapters applicable to the inspection and repair for each study area are provided in **Table 11.3-3**.

Table 11.3-3: Inspection and Repair Applicable Town Codes and Corresponding Study Areas

Applicable Town Code	Rondout Effluent Chamber Study Area	Shaft 1 Study Area	Shaft 2A and Wawarsing Leak Repair Study Area	Shaft 8 Study Area	Shaft 9 Study Area
Town of Wawarsing Chapter 78, Noise Control	✓	✓	✓	-	-
Town of Wawarsing Chapter 112, Zoning	✓	✓	✓	-	-
Town of Putnam Valley Chapter 82, Noise	-	-	-	✓	-
Town of Putnam Valley Chapter 165, Zoning	-	-	-	✓	-
Town of Kent Chapter 48, Noise	-	-	-	✓	✓
Town of Kent Chapter 77, Zoning	-	-	-	✓	✓
Town of Carmel Chapter 104, Noise	-	-	-	-	✓

Notes:
- = Town Code not applicable to study area.
✓ = Town Code applicable to study area.

Below is a summary of the applicable town codes.

Town of Wawarsing Codes

Relevant sections of the Town of Wawarsing codes that apply to the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and the Shaft 2A and Wawarsing Leak Repair Study Area are described below.

Chapter 78, Noise Control

§78-4, Maximum Sound Levels; unnecessary sound prohibited

A. No person shall cause, suffer, allow or permit the operation of any source of sound on a particular category of property or any public space or right-of-way in such a manner as to create a sound level that exceeds the particular sound level limits set forth as follows: between 6:00 a.m. and 10:00 p.m., 73 dBA's, and between 10:00 p.m. and 6:00 a.m., 63 dBA's, when determined by a sound-level measure at the adjoining property line nearest to the sound source.

B. No person shall cause, suffer, allow or permit the existence of unnecessary sound which tends to injure, alarm, annoy, harass or disturb the peace or enjoyment of property of another.

The inspection and repair's compliance with the Town of Wawarsing Noise Control Law within the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and Shaft 2A and Wawarsing Leak Repair Study Area is discussed in their respective "Noise" sections.

Chapter 112, Zoning

It is the legislative intent of this Zoning Law to provide standards and procedures to guide land use and new development. This chapter is specifically intended to implement the Town of Wawarsing Comprehensive Plan, including but not limited to the following purposes:

A. Preserve the Town's character and appearance.

B. Allocate ample sites for future residential growth in hamlets, leaving the majority of the land in large lot residential, agricultural, resort and forest uses.

C. Provide a system of flexible zoning regulations designed to encourage physically attractive and socially desirable development.

D. Protect and enhance natural waterways (Rondout Creek, Sandburg Creek and tributaries, Rondout Reservoir and lakes and ponds) and scenic areas (Shawangunk Mountains and Catskill Mountains).

E. Encourage creation of attractive and effective signage.

F. Provide a system of open spaces and park and recreation facilities.

G. Preserve important historic sites and resources.

H. Create an orderly pattern of growth through concentrations of new residential developments in areas which presently are or which can conveniently be serviced with public facilities and avoid intensive residential development in scattered rural areas and areas of difficult accessibility that, if developed, would involve excessive costs for road improvements, road maintenance, school bus transportation and utility installation.

I. Regulate population densities to reflect the desired character of the Town.

J. Prevent intrusion of incompatible uses in residential areas, by requiring good standards of improvements in new residential developments and by preserving, protecting and using natural beauty wherever possible.

K. Encourage cluster development.

L. Provide a variety of living environments and housing types to suit a range of incomes, tastes and needs.

M. Require adequate amounts of off-street parking for both residential and nonresidential uses.

N. Discourage further strip business development on frontage access highways.

O. Provide for safe, convenient access to resort areas.

P. Encourage development of Route 209 in a way that addresses coordinated planning among hamlets, improved access management and the creation of appropriate alternative routes for local traffic.

Q. Improve the Town's economic base by providing sites for further resort development, compatible industries and other business development.

R. Preserve and enhance the natural beauty and man-made environment, assuring the maintenance and increase of property values and continued resort activity.

S. Protect groundwater sources that supply drinking water in the Town.

T. Protect surface water quality with riparian buffers and related measures.

U. Protect and promote agriculture.

V. Recognize the importance of the Village of Ellenville as the economic center of the Town of Wawarsing and integrate Town and Village planning.

W. Protect the scenic character of the Shawangunk Ridge.

X. Protect all watersheds from pollution, including those portions of the Town within the New York City Water Supply System Watershed.

The zoning code of the Town of Wawarsing regulates the use of land and any structures placed on a property, including the existing public service/utility land use on the Rondout Effluent Chamber site and shaft sites. Public and semi-public uses are permitted within rural residential districts subject to site plan review and compliance with §112-5, supplementary regulations applicable to public utilities.

§112-18f, General commercial and industrial standards, Lighting

(1) Lighting for all commercial, residential, institutional, and industrial uses shall be shielded to prevent glare and spillover of light onto adjoining properties.

(2) All lighting shall be designed so as to avoid unnecessary or unsafe spillover of light and glare onto operators of motor vehicles, pedestrians and land uses in proximity to the light source.

(3) No direct or sky-reflected glare, whether from floodlights or from high-temperature processes such as combustion or welding or other sources, so as to be visible at the property line on a regular or continuing basis, shall be permitted.

(4) Lighting contours shall be required on site plans for purposes of determining compliance with this section. Average footcandles at the property line shall be less than 1.0, except at site entrances.

(5) Globe lights shall not be permitted.

(6) Light pole heights shall not exceed building heights and none shall exceed 25 feet in height.

(7) All lighting over 2,000 lumens in strength shall meet the full cutoff standard of the Illuminating Engineering Society of North America (IESNA).

(8) All site activity areas, including parking lots and walkways, shall meet minimum IESNA standards and exceed those standards by no more than 25%.

(9) All gasoline canopy lighting shall be fully recessed, and the average light level under the vehicular canopy shall not exceed 20 horizontal maintained footcandles.

The inspection and repair's compliance with the Town of Wawarsing code related to lighting standards within the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and Shaft 2A and Wawarsing Leak Repair Study Area is discussed in Section 11.3.7, "Visual Resources."

§112-19, Stormwater Management

Every application for a new or substantially modified special use or any other use requiring site plan review by the Town of Wawarsing Planning Board shall include provisions for stormwater management as required by the New York State Department of Environmental Conservation (DEC) and the standards of this section. Additionally, should any person intend to make land changes by grading, filling, excavating or the removal or destruction of the natural topsoil or vegetative covering thereon in accordance with a site plan submitted to the Town, the same shall only be approved and accomplished after the developer has submitted to the Town a stormwater pollution prevention plan in compliance with the DEC regulations. Applicants shall, when required by the Town Planning Board, submit the following for review and approval by the Town:

A. An erosion and sedimentation control plan (basic SWPPP) prepared in accordance with DEC requirements. The plans shall illustrate those measures to be employed during construction and as may be necessary to prevent loss of soil from erosion and to prevent resulting property damage, siltation and contamination of watercourses or impoundments.

B. A stormwater pollution prevention plan (SWPPP) prepared in accordance with the New York State Stormwater Management Design Manual published by DEC. Such plan shall be subject to review by both the Town of Wawarsing and New York State DEC and meet both sets of standards. Where such standards conflict, the higher standard shall apply. The SWPPP shall identify those practices employed after construction and as may be necessary to prevent property damage by and pollution of associated watercourses or impoundments.

(1) Proposed areas of disturbance shall be drawn to scale and quantified in support of applicable SWPPP requirements (including a basic SWPPP).

(2) Postconstruction stormwater practices shall reduce stormwater peak runoff to 75% of the preconstruction peak runoff for the ten-year event. The Planning Board shall be authorized to modify these criteria if immediate discharge is appropriate.

(3) Postconstruction stormwater practices shall reduce stormwater peak runoff to 90% of the preconstruction peak runoff for the one-hundred-year event. The Planning Board shall be authorized to modify these criteria if immediate discharge is appropriate.

(4) A certified copy of a completed notice of intent to proceed (NOI), signed by the applicant and certified by the applicant's professional representative shall be supplied. A copy of the New York State DEC reply to the NOI shall also be supplied when issued.

(5) Storm drainage facilities shall be designed to handle the anticipated peak discharge from the applicable catchment for a ten-year event with one foot of freeboard remaining at peak flow.

(6) All drainage structures required to accommodate stream flows with a cross-sectional area less than 25 square feet during a ten-year rainfall event shall be designed and constructed to provide one foot of freeboard during the ten-year rainfall event.

(7) All drainage structures required to accommodate stream flows with a cross-sectional area greater than 25 square feet during a ten-year rainfall event shall be designed to provide two feet of freeboard during a fifty-year rainfall event, and safely pass a one-hundred-year rainfall event. Drainage structures in this category shall have a design life of at least 50 years, be designed by a licensed professional engineer and be approved by the Town Highway Superintendent or the Superintendent's designee.

(8) Applicants shall use infiltration practices whenever acceptable under DEC guidelines. Applicants shall provide deep test pits and percolation tests in support of this or demonstrate infiltration is not a viable practice for the site in question. Dry grass swales and other similar measures shall also be encouraged wherever practical.

(9) All stormwater management improvements shall be properly maintained so as to continue to perform in their intended manner. Sediment shall, at a minimum, be removed from sediment traps or sediment ponds whenever their design capacity has been reduced by 50%. The Town Building Inspector, upon observing that such improvements are not being so maintained, may direct a property owner to undertake such maintenance. Failure to comply after a minimum of 30 days' notice shall constitute a violation of this chapter.

(10) No person shall allow, or cause to allow, stormwater discharges into any separate storm sewer systems of the Town or Village that are not composed entirely of stormwater, discharges from firefighting, water from foundation drains, flows from natural sources and flows from other similar uncontaminated sources. No drain or conveyance, whether on the surface or subsurface, that allows any other water discharge or wastewater (including floor drains and the like) to enter such a separate storm sewer system shall be permitted.

At the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and Shaft 2A and Wawarsing Leak Repair Study Area, stormwater would be managed on site by installing and maintaining erosion and sediment control practices, such as silt fencing and hay bales, and turbidity barriers, for the duration of construction. As applicable, a SWPPP would be prepared for the study areas in accordance with applicable regulations.

§112-61, Environmental Quality Review

All actions taken with respect to this chapter shall comply with the New York State Environmental Quality Review Act ("SEQRA"), and applicants shall be responsible for providing such data as may be required to determine the significance of any environmental impacts associated with such actions.

The inspection and repair is undergoing an environmental review in compliance with SEQRA. As such, the inspection and repair is compliant with the Town of Wawarsing code related to Environmental Quality Review.

Town of Putnam Valley Codes

Relevant sections of the Town of Putnam Valley Codes that apply to the Shaft 8 Study Area are described in detail below.

Chapter 82, Noise Law

§82-5, Unreasonably loud, disturbing or unnecessary noise

The creation of unreasonably loud, disturbing, or unnecessary noise by any of the following acts and their causes is declared to be a violation of this chapter.

A. Between the hours of 8:00 p.m. and 8:00 a.m. on weekdays (8:00 p.m. and 6:00 a.m. for the Town of Putnam Valley Highway Department, or any of its contractors repairing or maintaining public roads and highways, from June 1 through September 30), and the hours of 7:00 p.m. and 9:00 a.m. on weekends and holidays, the following acts are not permitted:

(1) The use of heavy equipment, motorized lawn equipment or any noise-making equipment.

(2) The operation of engines in residential zones outdoors. This would include the stationary idling of any engine, including but not limited to automobiles, trucks, motorcycles, motorboats, minibikes, snowmobiles or all-terrain vehicles for more than five minutes.

(3) Any noise from a vehicle, machine or signaling device for an unnecessary or unreasonable period of time.

(4) The use of explosives, firearms, or similar devices.

(5) The operation of any audio equipment or the use of any musical instrument or human voice, including but not limited to in parked or moving vehicles, in such a manner or with such volume as to annoy or disturb the quiet, comfort or repose of persons in any dwelling, hotel or other type of residence.

(6) Every motorboat over two horsepower shall be provided with an underwater exhaust or muffler so constructed and used as to muffle the noise so that the noise of the motor shall be effectively muffled. The use of cutouts or similar appliances is prohibited.

§82-7, Exceptions

F. Noise generated by a municipality during any emergency repair and maintenance or any other repair or maintenance undertaken by the municipality.

The inspection and repair's compliance within the Shaft 8 Study Area with the Town of Putnam Valley Noise Control Law is discussed Section 11.7.7, "Noise."

Chapter 165, Zoning

The zoning regulations and districts as herein established have been designed to implement and promote the Master Plan for the Town of Putnam Valley for the purpose of promoting the health, safety and general welfare of the town. The regulations have been designed to protect the fragile natural resources in the town; to prevent the overcrowding of land; to facilitate the adequate provision of transportation, water, sewage, parks and public requirements; to provide for a range in housing opportunities; and to promote the public interest, health, comfort, convenience, safety and general welfare; to protect and conserve property values; to assure orderly community growth; to regulate the use of buildings, structures and land; to regulate the location, height and arrangement of buildings and structures; to regulate the size and use of lots, yards and other open spaces; to regulate the percentage of a lot which may be occupied by buildings and other land uses and to regulate the intensity of land use. The regulations have been made with reasonable consideration, among other things, for the character of the district and its peculiar suitability for the particular uses specified and with a view toward conserving natural resources and encouraging the most appropriate use of land throughout the Town consistent with the Master Plan.

The zoning code of the Town of Putnam Valley regulates the use of land and any structures. Public and semi-public uses are permitted within planned commercial (PC) districts subject to site plan review and compliance with §165-60, supplementary regulations applicable to public utilities.

§165-106, Environmental Quality Review

The Town of Putnam Valley requires compliance with SEQRA.

The inspection and repair is undergoing an environmental review in compliance with SEQRA. As such, the inspection and repair is compliant with the Town of Putnam Valley Code related to Environmental Quality Review.

Town of Kent Codes

Relevant sections of the Town of Kent Codes that apply to the Shaft 8 and 9 study areas are described in detail below.

Chapter 48, Noise

§48-6, Specific Acts Constituting Violation

The following shall be a violation of this chapter when same constitutes an unreasonable, unreasonably loud, disturbing or unnecessary noise, as such is defined in §48-3 hereof:

B. The creation of noise in connection with the loading or unloading of any vehicle between 7:00 p.m. and 7:00 a.m. the following day, and at any time on Sunday; or the operation of any commercial vehicle for the purpose of the pickup or delivery of goods or refuse between the hours of 11:00 p.m. and 5:00 a.m. the following day.

D. In the process of any construction, drilling or demolition operations, between the hours of 9:00 p.m. and 7:00 a.m. the following day, and between the hours of 9:00 p.m. Saturday and 8:00 a.m. Sunday, to operate or use any tools, pile driver, pneumatic hammer, tractor, derrick, electrical hoist, gasoline or electric powered saw or other mechanical apparatus or equipment the use of which is attended by noise.

The inspection and repair's compliance within the Shaft 8 and 9 study areas with the Town of Kent noise code is discussed in their respective Impact Analysis "Noise" sections.

Chapter 77, Zoning

A. This chapter 77 of the Town of Kent Town Code is enacted pursuant to the authority and power granted by the Municipal Home Rule Law of the State of New York and the Town Law of the State of New York, and in conformance with the 2008 Kent Comprehensive Plan duly adopted by the Town Board. As stated herein, specific sections of Article 16 of the Town Law have been superseded by this chapter pursuant to the authority of §10 of the Municipal Home Rule Law.

B. This chapter is adopted to protect and promote the health, safety, comfort, convenience, economy, aesthetics and general welfare and for the following additional purposes:

(1) To guide the future development of the Town in accordance with the Kent Comprehensive Plan so that the Town may realize its potential as a place to live and to work, with the most beneficial and convenient relationships among the residential and commercial districts of the Town and with due consideration to:

(a) The character of the district and its peculiar suitability for particular uses.

(b) Existing conditions and trends in population, economic activity, land use, and building development.

(c) Conserving the value of buildings and neighborhoods by encouraging the most appropriate use of land throughout the Town.

(2) To prevent the pollution of streams, ponds and all other water resources, to prevent floods and to encourage the wise use and sound management of natural resources throughout the Town in order to preserve the integrity, stability and beauty of the community and the value of the land.

(3) To protect the character and the social and economic stability of all parts of the Town and to enhance the appearance of the Town as a whole by ensuring that all development shall be orderly and beneficial to the Town, by eliminating inappropriate and poor quality design in the exterior appearance of structures and by controlling the erection and maintenance of signs throughout the Town.

(4) To protect residential areas and to provide privacy for families by the preservation of such areas from, among others, the visual intrusion of nonresidential uses and, wherever reasonable, by the elimination of nonconforming uses which exert a deleterious influence on their surroundings.

(5) To facilitate the adequate provision of transportation, water, sewage, schools, parks and other public requirements.

(6) To encourage flexibility in the design of land developments so as to promote the most appropriate use of lands, to facilitate the adequate and economical provision of streets and utilities and to preserve, to the extent feasible, the natural qualities and functions of open lands.

(7) To make provision for access to sunlight and the accommodation of solar energy systems and equipment and other alternative energy systems.

(8) To assure adequate sites for residence, industry and commerce.

(9) To facilitate the efficient and adequate provision of public facilities and services.

(10) To gradually eliminate nonconforming uses and, where this is not possible, enhance the compatibility of such uses with adjoining uses.

The zoning code of the Town of Kent regulates the use of land and any structures. Public and semi-public uses are permitted within single-family residence (R-80) districts subject to site plan review and compliance with §77-70.

§77-61, Environmental Quality Review

(5) Implementation and completion of environmental mitigation measures as required under any negative declaration or findings statement adopted for the project pursuant to Article 8 of the Environmental Quality Review Act (SEQRA), whether such mitigation measures are depicted on the approved site plan or not.

The inspection and repair is undergoing an environmental review in compliance with SEQRA. As such, the inspection and repair is compliant with the Town of Kent code related to Environmental Quality Review.

§77-70, Lighting

F. Exempt lighting.

(1) The following shall be exempt from the provisions of this section, provided that such luminaire, except for those set forth in Subsection F(1)(a) and (b) below, do not cause glare:

(b) Outdoor lighting required by utility companies, law enforcement, fire and rescue, the New York Department of Transportation or other emergency response agencies to perform emergency or construction repair work, or to perform nighttime road construction on major thoroughfares.

The inspection and repair's compliance within the Shaft 8 and 9 study areas with the Town of Kent codes related to lighting standards discussed in Section 11.3.7, "Visual Resources."

Town of Carmel Codes

As the Shaft 9 Study Area is located within both the Towns of Kent and Carmel, relevant sections of the Town of Carmel codes that apply to this study area are described in detail below.

Chapter 104, Noise

§104-13, Sound Level Standards

C. Air-conditioning and air-handling devices. No person shall operate or permit to be operated an air-conditioning or air-handling device that exceeds the maximum sound-level limitations provided in this section.

(1) In areas zoned residential, single-family or multiple-dwelling units, continuous sound in air which has crossed the property line shall not exceed 55 db(A)'s at any point.

(2) The provisions of this section shall not apply if the sound from the air conditioner or air-handling device produces less increase than five db(A)'s in the sound level that exists in the absence of such sound.

§104-13, Sound Levels By Receiving Land Use

D. Construction activities. No person shall conduct or permit to be conducted construction activities in a manner so as to produce a sound level exceeding the limitations in this section.

(1) Residential-zoned districts. During the hours of 8:00 a.m. to 6:00 p.m., noise levels from a construction site shall not exceed an L10 of 70 db(A)'s when measured at a distance of 400 feet from the construction site; during the hours of 6:00 p.m. to 8:00 a.m., noise levels shall not exceed an L10 of 55 db(A)'s when measured at a distance of 400 feet from the construction site.

(2) Commercial retail-zoned districts. During normal business hours, noise levels shall not exceed an L10 of 75 db(A)'s when measured at a distance of 400 feet from the construction site; during other than normal business hours, noise levels shall not exceed and L10 of 80 db(A)'s when measured at a distance of 400 feet from the construction site.

The inspection and repair's compliance within the Shaft 9 Study Area with the Town of Carmel noise code is discussed in Section 11.8.8, "Noise."

11.3.3 SOCIOECONOMIC CONDITIONS

This section presents the screening assessment of the potential for the inspection and repair to result in direct or indirect effects to factors that influence the socioeconomic conditions or character of the study areas, including land use, population, housing, and economic activity within the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.3.3.1 Screening Assessment

The inspection and repair construction activities at the shaft sites would entail work on DEP-owned sites. The inspection and repair construction activities would be short-term and would not result in changes to socioeconomic conditions of residences, businesses, or industry within the study areas. Following the temporary shutdown, the shaft sites would be restored to baseline conditions. As a result, the proposed project would not result in changes to socioeconomic conditions to residences, businesses, or industry. Therefore, a socioeconomic conditions impact analysis for the shaft study areas, including the surface construction activities at the Shaft 2A site within the Shaft 2A and Wawarsing Leak Repair Study Area, is not warranted.

In addition, the repair of the RWBT leaks would result in the permanent cessation of leaks, which may reduce groundwater levels within the Leak Repair Study Area, which lies within the Shaft 2A and Wawarsing Leak Repair Study Area. However, these changes are expected to be minimal. Therefore, they would not result in indirect or direct displacement of the residential populations or existing businesses or institutions; nor would they have adverse effects on specific

industries in the study area. Therefore, a socioeconomic conditions impact analysis for the Leak Repair Study Area is not warranted.

11.3.4 COMMUNITY FACILITIES AND SERVICES

This section presents the screening assessment of the potential for the inspection and repair to result in changes to community facilities and services within the study areas from: activities at the Rondout Effluent Chamber site and shaft sites, and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could physically displace or alter community facilities and services within the study areas.

11.3.4.1 Screening Assessment

The screening assessment included a desktop evaluation and a windshield survey to verify the local community facilities and service providers within the study areas. Community facilities and services were not identified within the Rondout Effluent Chamber site and shaft sites. Therefore, a community facilities and services impact analysis within these study areas is not warranted.

Eight community facilities and service providers were identified within the Leak Repair Study Area, which lies within the Shaft 2A and Wawarsing Leak Repair Study Area, as shown in **Table 11.3-4**.

Table 11.3-4: Community Facilities and Services within the Leak Repair Study Area

Community Facilities and Services	Address
Wawarsing Christian Academy	7227 U.S. Route 209, Wawarsing, NY, 12489
Community Bible Church	15 Port Ben Road, Wawarsing, NY, 12489
Southern Ulster Public Safety Association	25 Port Ben Road, Napanoch, NY, 12458
State Police Department Office	6721 U.S. Route 209, Kerhonkson, NY, 12446
Ellenville Congregation of Jehovah's Witnesses	40 Fox Hill Road, Wawarsing, NY, 12489
Colony Farms[1]	678 U.S. Route 209, Wawarsing, NY, 12489
Town of Wawarsing Garage [2]	7286 U.S. Route 209, Wawarsing, NY, 12489
Eastern New York Correctional Facility	30 Institution Road, Napanoch, NY, 12458

Notes:

[1] Previously, Colony Farms was used to provide agricultural education to the community. However, windshield surveys conducted within the Shaft 2A and Wawarsing Leak Repair Study Area indicate that the facility is not regularly used for these purposes.

[2] The Town of Wawarsing Garage is used to maintain and store Town vehicles and equipment such as school buses, garbage trucks, and dump trucks.

Inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area includes construction activities staged from the Shaft 2A site to support internal repairs to the RWBT that would result in the permanent cessation of RWBT leaks, which could affect groundwater and surface water levels in the area in the Leak Repair Study Area. However, settlement caused by the cessation of RWBT leaks within the Leak Repair Study Area is expected to be negligible. As a

result, the inspection and repair would not physically displace or alter land occupied by a community facility or service within the Leak Repair Study Area. In addition, the inspection and repair would not require the use of community facility or services within the Shaft 2A and Wawarsing Leak Repair Study Area. Therefore, a community facilities and services impact analysis for this study area is not warranted.

11.3.5 OPEN SPACE AND RECREATION

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to open space and recreation within the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could alter the quality or availability of open space and recreation for continued public and private uses within the study areas.

11.3.5.1 Screening Assessment

The open space and recreation screening assessment characterized existing and potential future open space uses at the county and local level within the study areas that have the potential to be affected by the inspection and repair. This was performed using a desktop assessment. ArcGIS and field visits provided further information about these uses. Open space and recreation resources were not identified within the Shaft 1 Study Area. Therefore, an open space and recreation impact analysis for this study area is not warranted.

Open space and recreation resources were identified within the following study areas, as shown in **Table 11.3-5**: Rondout Effluent Chamber Study Area, Shaft 2A and Wawarsing Leak Repair Study Area, Shaft 8 Study Area, and Shaft 9 Study Area. Of the seven open space resources identified within the Shaft 2A and Wawarsing Leak Repair Study Area, six were identified within the area where work activities would occur within the tunnel approximately 700 feet below the ground surface. These activities would not encroach upon, cause a loss of, impact the physical character of, or affect views from open space and recreation resources. Therefore, an open space and recreation impact analysis for these six resources within this study area is not warranted.

The other open space and recreation resource identified, the Minnewaska State Park Preserve, is located within the Shaft 2A Study Area, and has the potential to be impacted by the surface construction activities staged from the Shaft 2A site. Three open space and recreation resources were also identified within each of the study areas surrounding the Rondout Effluent Chamber, Shaft 8, and Shaft 9 sites. Open space and recreation within these study areas warrant an impact analysis. The potential for impacts to these five open space and recreation resources was evaluated in their respective "Open Space and Recreation" sections using the methodology described below.

11.3.5.2 Impact Analysis Methodology

The impact analysis consisted of: (1) establishing and describing the baseline conditions within the applicable study area by mapping existing uses of open space and recreation resources,

Table 11.3-5: Open Space and Recreation Resources within the Inspection and Repair Study Areas

Study Area	Open Space and Recreation Resources
Rondout Effluent Chamber	Rondout Reservoir
Shaft 2A and Wawarsing Leak Repair	Minnewaska State Park Preserve
	Vernooy Kill State Forest (part of Sundown Wild Forest)
	Hebrew Aide Cemetery
	Ezrath Israel Cemetery
	Le Fevre Cemetery
	Lippman Park
	Delaware & Hudson Canal Heritage Corridor Rail Trail
Shaft 8	Chuang Yen Monastery
Shaft 9	West Branch Reservoir

including those identified in local open space plans; (2) establishing future conditions without the inspection and repair by identifying plans to expand or create new open space and recreational resources within the study areas that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (4) analyzing the potential for impacts from the inspection and repair on open space and recreational resources by evaluating if the proposed project would potentially restrict public access to open space and recreational resources.

11.3.6 HISTORIC AND CULTURAL RESOURCES

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to historic and cultural resources within the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could alter the integrity of historic and cultural resources.

11.3.6.1 Screening Assessment

The screening assessment consisted of comparing the limits of previous site disturbance to the potential for ground disturbance associated with the inspection and repair to determine if the proposed project could affect historic and cultural resources within the study areas.

The historic and cultural resources assessments were conducted in accordance with the New York State Historic Preservation Act of 1980, as set forth in Section 14.09 of the New York State Parks, Recreation, and Historic Preservation Law. The assessments have also been prepared in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA). These laws require that State and federal agencies, respectively, consider the effects of their actions on any properties listed on or determined eligible for listing on the National and State Registers of Historic Places (N/SR).

A consultation with New York State Historic Preservation Office (SHPO) at the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) for activities at the Rondout Effluent Chamber site and the Shaft 1, Shaft 2A and Shaft 8 sites was completed in 2005. Pursuant to that consultation, SHPO has determined that the inspection and repair would have no impact upon cultural resources in or eligible for inclusion in the N/SR at these sites. In addition, all of the activities associated with the inspection and repair at Shaft 9 would be within the confines of the existing building, and no ground disturbance or exterior site work is proposed. Therefore, a historic and cultural resources impact analysis for the Rondout Effluent Chamber Study Area, Shaft 1, 2A, 8 and 9 study areas is not warranted.

The screening assessment also included a consultation with SHPO at the NYSOPRHP in February 2015 for the Leak Repair Study Area portion of the Shaft 2A and Wawarsing Leak Repair Study Area that would potentially be affected by reduced groundwater levels as a result of the cessation of RWBT leaks. One site within this area, the Ontario and Western Railway (O&W) Railroad Station at Port Ben, is listed on the N/SR sites and therefore was analyzed for potential for impacts as a result of the inspection and repair. The potential for impacts to historic and cultural resources within the Leak Repair Study Area was evaluated in Section 11.6.7, "Historic and Cultural Resources," using the methodology described below.

11.3.6.2 Impact Analysis Methodology

The impact analysis consisted of: (1) describing existing historic and cultural resources; (2) establishing and describing the baseline conditions within the assessed study areas by identifying previous disturbance areas and activities; (3) establishing future conditions without the inspection and repair by identifying whether any changes to existing or potential archeological resources are likely to occur by the analysis year; (4) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (5) analyzing the potential for impacts from the inspection and repair on historic and cultural resources by evaluating whether the proposed project would potentially disturb or alter the integrity of historic and cultural resources.

11.3.7 VISUAL RESOURCES

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to views to or from visual resources or within view corridors with aesthetic value within the study areas that could be altered from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. The potential effects to nearby sensitive resources due to nighttime lighting were also assessed.

11.3.7.1 Screening Assessment

NYSDEC provides a list of categories of State aesthetic and visual resources that should be included in an evaluation of the potential for impacts to visual resources, as identified in **Table 11.3-6**. Local resources are also considered in this analysis, such as parks, historic structures and landmarks, and the Hudson River as an American Heritage River. American Heritage Rivers are designated by federal Executive Order 13061 to protect natural resources and the environment, support economic revitalization, and preserve historic and cultural resources.

Table 11.3-6: Inspection and Repair Visual Resources Screening Assessment Summary

Aesthetic and Visual Resource	Description	Analysis Required
National/State Register of Historic Places	Listed or eligible for listing on the N/SR (sites, districts, buildings, structures, and objects that are deemed worthy of preservation).	Yes, within the Shaft 2A and Wawarsing Leak Repair Study Area
State Parks	Defined by New York State Parks, Recreation and Historic Preservation Law §3.09 to encourage, promote, and provide recreational opportunities.	Yes, within the Rondout Effluent Chamber Study Area, the Shaft 1 Study Area, and the Shaft 2A and Wawarsing Leak Repair Study Area
Heritage Areas	Designated by New York State as special places to honor history, celebrate the present, and plan the future of our communities.	No
State Forest Preserve/State Forests	State Forest Preserves are designated by the New York State Legislature with Constitution Article XIV, and protected as "forever wild." State Forests are lands acquired and managed by NYSDEC as Reforestation Areas, Multiple-Use Areas, Unique Areas, and State Nature and Historic Preserves, as authorized by the 1929 State Reforestation Act.	No
National/State Wildlife Refuge, State Wildlife Management Areas	National Wildlife Refuges are designated public lands and waters given special protection by the National Wildlife Refuge System Administration Act 16 U.S. Code (USC) 668dd-668ee and amended by Public Law 105-57 to conserve fish, wildlife, and plants. State Game Refuges are designated by NYSDEC's Environmental Conservation Law §11-2105 as lands for the protection of fish and wildlife, and State Wildlife Management Areas are owned by New York State under the control and management of NYSDEC's Division of Fish, Wildlife, and Marine Resources for the protection and promotion of fish and wildlife resources.	No
National Natural Landmarks	Designated by the Secretary of the Interior and defined by 36 CFR Part 62 as conservation sites that contain outstanding biological and geological resources, including both public and private lands, and are selected for their condition, illustrative value, rarity, diversity, and value to science and education.	No

Table 11.3-6: Inspection and Repair Visual Resources Screening Assessment Summary

Aesthetic and Visual Resource	Description	Analysis Required
National Park System, Recreation Areas, Seashores, Forests	Established by an act of Congress and defined by 16 USC §1c to identify Parks, Preserves, Battlefields, Memorials, Recreation Areas, Seashores, Monuments, Rivers, Parkways, and Cemeteries as significant resources.	No
National/State Wild, Scenic, or Recreational Rivers	Established by an act of Congress and defined by Public Law 90-542 under the Wild and Scenic Rivers Act and New York State Wild, Scenic, and Recreational Rivers System Act, defined under NYSDEC's ECL §15-27 for outstanding natural, cultural, and recreational values in a free-flowing condition.	No
Scenic Site, Area, Lake, Reservoir or Highway	Designated and defined by NYSDEC's ECL Article 49, Protection of Natural and Man-Made Beauty or highways designated by the U.S. Department of Transportation Federal Highway Administration or the New York State Department of Transportation as scenic roads and byways.	Yes, within the Shaft 2A and Wawarsing Leak Repair Study Area
Scenic Areas of Statewide Significance	Designated by the New York State Department of State to identify the scenic qualities of coastal landscapes that possess inherent scenic qualities, including the presence of water, dramatic shorelines, expansive views, historic landings, working landscapes, and great estates.	No
National/State Trails	Federal trails, as defined by 16 USC Chapter 27 and designated by the Secretary of the Interior or the Secretary of Agriculture, and State trails, as part of New York State Parks, Historic Sites, and Forests to provide a variety of outdoor recreation uses.	No
Adirondack Park Scenic Vistas	Identified in the Adirondack Park State Land Master Plan as scenic pull-offs within the Adirondack Park, as established by an act of the State Legislature and defined by Adirondack Park Agency and NYSDEC.	No

Table 11.3-6: Inspection and Repair Visual Resources Screening Assessment Summary

Aesthetic and Visual Resource	Description	Analysis Required
State Nature and Historic Preserve Areas	Designated by the State Legislature and defined by Section 4 of Article XIV of the New York State Constitution for the protection of natural resources, development of agricultural lands, and to conserve and protect its natural resources and scenic beauty and encourage the development and improvement of its agricultural lands for the production of food and other agricultural products.	No
Palisades Interstate Park	The Palisades Interstate Park Commission operates the Park in New Jersey and the State Parks and Historic Sites that comprise New York State's Palisades Region. Palisades Interstate Park Commission's mission is to support, protect, and educate the public and raise awareness of the natural and cultural resources of the parks and historic sites of the Palisades Interstate Park system.	Yes, within the Shaft 2A and Wawarsing Leak Repair Study Area
Bond Act Properties	Bond Act properties are properties purchased under the "exceptional scenic beauty" or "open space" category of the Environmental Bond Act of 1986, established by the State Legislature.	No
American Heritage Rivers	The American Heritage Rivers Protection Program, created by Executive Order 13061, and designated by the EPA to advance three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation.	No
Local	Defined or designated by regional planning entities, such as counties, and local communities, such as municipalities.	Yes, within the Rondout Effluent Chamber Study Area, the Shaft 2A and Wawarsing Leak Repair Study Area, and Shaft 9 Study Area

The visual resources screening assessment included characterizing existing visual resources within the study areas based on these categories that may be affected by the inspection and repair. This was performed using a desktop assessment. ArcGIS and field visits provided further information about these visual resources, as necessary.

Changes in views to and from visual resources may have the potential to occur with the use of nighttime lighting. Although visual resources are generally viewed during daytime hours, a screening assessment of the potential for visual resources impacts associated with the nighttime

lighting needed for the inspection and repair was conducted. The assessment considered applicable local codes pertaining to lighting, the most recent edition of the Illuminating Engineering Society of North America Handbook, and the most recent edition of the American National Practice for Roadway Lighting (RP-8) approved by the American National Standards Institute to evaluate whether nighttime lighting has the potential to affect nearby sensitive resources.

Lighting used at the inspection and repair sites would be the minimal amount necessary for security and safety, and all lighting over 2,000 lumens would meet the full cut-off standard of the Illuminating Engineering Society of North America. Full cut-off standards generally include shielding of the lights to avoid light spilling onto adjacent properties. As such, the inspection and repair would comply with the Towns of Wawarsing and Kent codes related to lighting standards. Therefore, a visual resources impact analysis related to temporary nighttime lighting within the study areas is not warranted.

A review of the inventory of aesthetic and visual resources in the inspection and repair study areas revealed five aesthetic and visual resource categories that require analysis, as shown in **Table 11.3-6** and **Table 11.3-7**. Visual resources were not identified within the Shaft 8 Study Area. Therefore, a visual resources impact analysis for this study area is not warranted. Aesthetic and visual resources were identified within the previously disturbed and fenced-in Rondout Effluent Chamber Study Area, Shaft 1 Study Area, Shaft 2A and Wawarsing Leak Repair Study Area, and Shaft 9 Study Area. The potential for impacts to visual resources within these study areas was evaluated in their respective "Visual Resources" sections using the methodology described below.

Table 11.3-7: Visual Resources within the Inspection and Repair Study Areas

Town/Village	Study Area	Visual Resource
Town of Wawarsing	Rondout Effluent Chamber	Catskill Park Rondout Reservoir
	Shaft 1	Catskill Park
	Shaft 2A and Wawarsing Leak Repair	O&W Railroad Station at Port Ben Minnewaska State Park Preserve Vernooy Kill State Forest Shawangunk Mountains Scenic Byway Le Fevre Cemetery Delaware & Hudson Canal Heritage Corridor Rail Trail
Town of Kent	Shaft 9	West Branch Reservoir

11.3.7.2 Impact Analysis Methodology

The impact analysis consisted of: (1) establishing and describing the baseline conditions within the study areas by determining existing aesthetic and visual resources, including a characterization of existing public view corridors within the study areas; (2) establishing future conditions without the inspection and repair by identifying proposed projects that would alter

views within the study areas that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (4) analyzing the potential for impacts from the inspection and repair on visual resources through a qualitative determination of the effect to view corridors from the inspection and repair and the magnitude of change for the project to eliminate or substantially limit views which are deemed to have aesthetic value from within the study area.

11.3.8 NATURAL RESOURCES

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to natural resources within the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could disturb natural resources within the study areas. Natural resources include geology and soils, water resources, aquatic and benthic resources, terrestrial resources, wildlife, federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and other unlisted rare or vulnerable species.

The screening assessment was comprised of a combination of desktop evaluations and field visits. Desktop evaluations (e.g., review of maps, aerial imagery, online databases, local agency consultations) were used to form an initial characterization of baseline conditions, including an inventory of relevant environmental resources within the inspection and repair study areas. These desktop evaluations were used to inform field visits. Results of these visits were then used to expand upon the desktop evaluations, as necessary.

The results of the screening assessment for natural resources are shown in **Table 11.3-8** for all study areas. Per the screening assessment provided below, there would be no disturbance to aquatic and benthic resources, federal/State Candidate Species, State Species of Special Concern, and unlisted rare and vulnerable species associated with the inspection and repair. Therefore, an impact analysis related to these natural resources is not warranted.

The natural resources that do not screen out for one or more study area, and are therefore included are: geology and soils, water resources, terrestrial resources, wildlife, and federal/State Threatened and Endangered Species. Impact analyses for these natural resources were conducted through an evaluation of baseline conditions, future conditions without implementation of the inspection and repair, and future conditions with implementation of the inspection and repair, as described further below.

11.3.8.1 Water Resources

The water resources within the study areas, including groundwater, surface water, wetlands, and floodplains, were evaluated as described below.

Groundwater

This section presents the screening assessment for identifying which study areas have the potential for impacts to groundwater resources.

Table 11.3-8: Inspection and Repair Natural Resources Screening Assessment

Screening Assessment					
Natural Resource	**Rondout Effluent Chamber Study Area**	**Shaft 1 Study Area**	**Shaft 2A and Wawarsing Leak Repair Study Area**	**Shaft 8 Study Area**	**Shaft 9 Study Area**
Water Resources	-	-	✓	-	-
Geology and Soils	-	-	✓	-	-
Aquatic and Benthic Resources	-	-	-	-	-
Terrestrial Resources	-	-	✓	-	-
Wildlife	-	-	✓	-	-
Federal/State Threatened, Endangered Species, and Candidate Species, State Species of Special Concern, and Unlisted Rare and Vulnerable Species[1]	✓	✓	✓	✓	✓

Notes:

- = Screens out. Does not warrant an impact analysis.

✓ = Impact analysis conducted.

[1] Federal/State Candidate Species, State Species of Special Concern, and unlisted rare and vulnerable species screen out and do not warrant an impact analysis. An impact analysis was conducted for applicable federal/State Threatened and Endangered Species.

Screening Assessment

Inspection and repair work activities at the Rondout Effluent Chamber Study Area, and the Shaft 1, 8, and 9 study areas would not influence groundwater and, therefore, an impact analysis is not warranted for these study areas.

The RWBT leaks influence groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area, and an impact analysis is warranted for this study area. However, the groundwater in only a portion of this study area would be affected by the cessation of leaks. Therefore, the final step in the screening assessment was to define the area within the Shaft 2A and Wawarsing Leak Repair Study Area that could be affected due to a decline in groundwater levels that could occur as a result of cessation of leaks from the RWBT. This area, called the "Leak Repair Study Area" is the study area for the groundwater impact analysis. The boundaries of the Leak Repair Study Area (described further below) were determined based on the geologic and hydrogeologic data and the area of the Town of Wawarsing that could be affected by reducing flow in the RWBT, shown by the data collected by the U.S. Geological Survey (USGS).

Leak Repair Study Area

The Leak Repair Study Area boundary was developed based on DEP construction documents of the RWBT, the geology and hydrogeology of the area as characterized by USGS, and the area of groundwater shown to be affected by changing flow in the RWBT during the USGS monitoring.

During construction of the RWBT, DEP documented the specific areas where leaks occurred near the Town of Wawarsing. They documented that:

- The RWBT was constructed through a sequence of northeast-trending sedimentary rocks that include limestone, shale, and sandstone; and
- Bedrock contains dissolution features, fractures, and faults. Groundwater flowed through the dissolution features, fractures, and faults into the tunnel during construction of the RWBT.

The Leak Repair Study Area was defined based on these geologic units and water levels measured by the USGS when DEP reduced flow in the RWBT. The northeastern and southwestern boundaries were defined as the areas where parcels are supplied with water from water districts and changes to groundwater levels are likely to be negligible in the bedrock aquifer as a result of reducing flow in the RWBT. The southeastern boundary coincides with a divide in the regional groundwater flow system that extends along and to the east of Rondout Creek. The northwestern boundary of the study area aligns with a change in bedrock from limestone to shale as no inflow of water from this shale into the RWBT was recorded during construction. This boundary also coincides with the location where topography transitions from a valley floor to the surrounding hills to the northwest (see **Figure 11.3-2**).

USGS has been monitoring groundwater within the Town of Wawarsing since 2008, as previously discussed in Section 11.2.1, "Overview of Rondout-West Branch Tunnel Leaks." Groundwater monitoring measured potential groundwater level changes in the bedrock and unconsolidated aquifers in response to changes in flow in the RWBT. Changes in water pressure and the water level above the tunnel were recorded on a Hydraulic Grade Line (HGL) as shown on **Figure 11.3-3.** Changing RWBT flow (pressure and water level above the tunnel) also changes the amount of water leaking into the bedrock and unconsolidated aquifers near the Town of Wawarsing.

USGS monitored the water level in wells and surface water locations (using staff gauges) over a 12-square-mile study area when DEP reduced flow (i.e., pressure and water level) in the RWBT on four separate occasions. The results of the USGS monitoring are presented in two reports:

(1) "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," (Stumm et al. 2012); and

(2) "Preliminary Assessment of Water Chemistry Related to Groundwater Flooding in Wawarsing, New York 2009-11," (Brown et al. 2012).

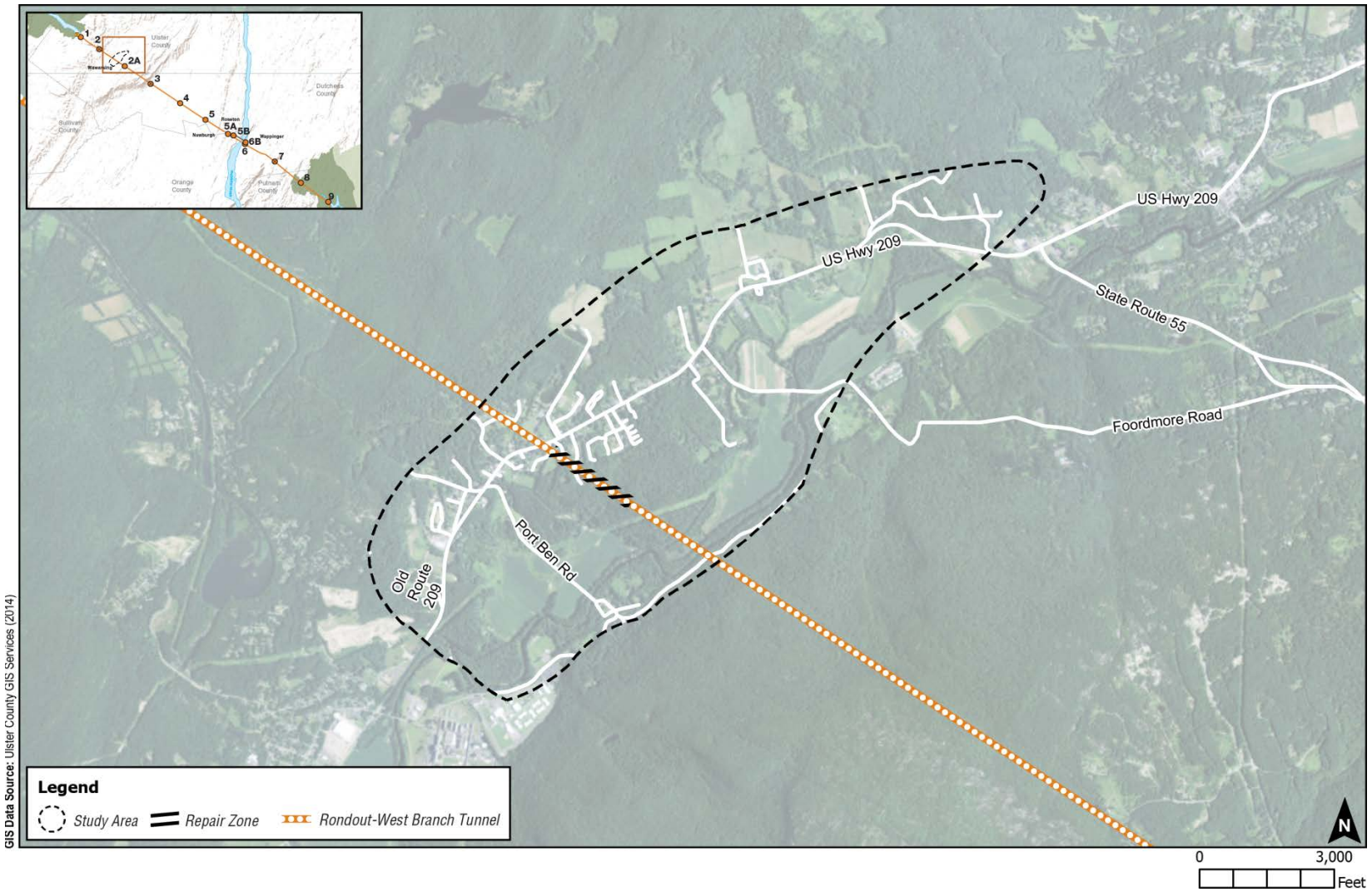


Figure 11.3-2: Leak Repair – Study Area

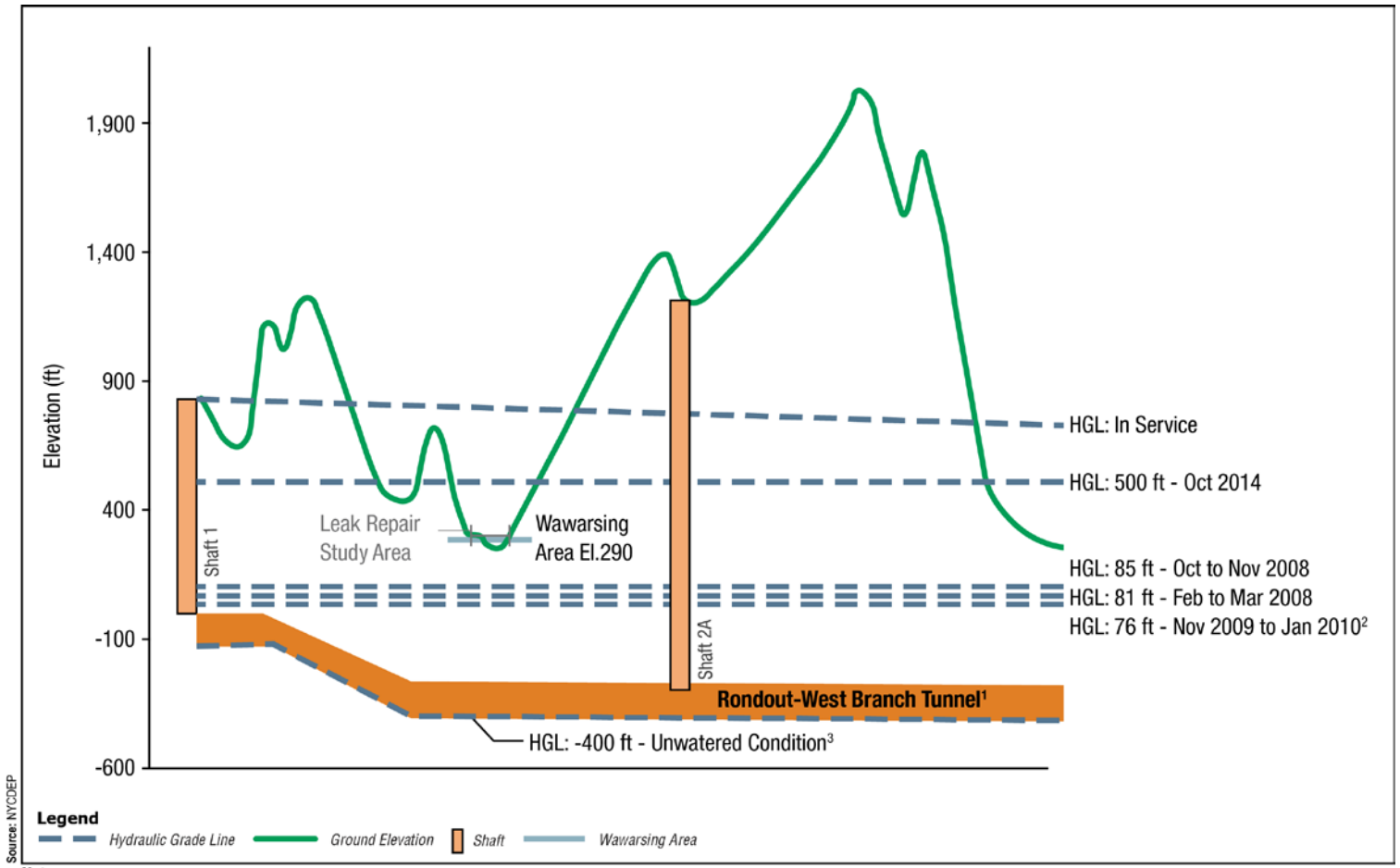


Figure 11.3-3: Example of Hydraulic Grade Line (HGL) in the RWBT

These reports, referred to as the Stumm and Brown reports, include:

- Descriptions of groundwater flow in and between the bedrock and unconsolidated aquifers in Wawarsing;
- Water level and water quality data collected when DEP reduced flow in the RWBT in Wawarsing; and
- The natural seasonal water level variation in the bedrock and unconsolidated aquifers.

Other sources of published data describing the geology and hydrogeology that were used in this impact analysis include Frimpter (Frimpter 1970), Reynolds (Reynolds 2007), and Nystrom (Nystrom 2010).

The groundwater impact analysis was performed for the Leak Repair Study Area shown on **Figure 11.3-2**. Potential impacts to groundwater resources in the Leak Repair Study Area from the inspection and repair was evaluated in Section 11.6.9.1, "Water Resources," using the methodology described below.

Impact Analysis Methodology

The groundwater impact analysis consisted of:

(1) Summarizing USGS data and evaluating the applicability of that information to this assessment;

(2) Describing baseline groundwater levels, groundwater quality, and groundwater temperature in the Town of Wawarsing presented in the USGS reports;

(3) Describing future groundwater conditions without the inspection and repair;

(4) Analyzing data in the USGS reports to estimate the potential impacts that the inspection and repair could have on groundwater quantity and groundwater quality in the study area, including during the temporary shutdown; and

(5) Analyzing data in the USGS reports to estimate the potential impacts that the inspection and repair could have on groundwater quantity and groundwater quality in the study area, including during the temporary shutdown. Surface Water

This section presents a screening assessment of the potential for the inspection and repair to result in changes to surface water at the Rondout Effluent Chamber site and shaft sites, and in the Shaft 2A and Wawarsing Leak Repair Study Area.

Screening Assessment

Surface water within the study areas was identified using mapping, ArcGIS data, and NYSDEC hydrography data. As shown in **Table 11.3-9**, one or more surface waterbodies were identified within the Rondout Effluent Chamber Study Area, the Shaft 2A and Wawarsing Leak Repair Study Area, and the Shaft 9 Study Area.

Table 11.3-9: Surface Water within the Inspection and Repair Study Areas

Study Area	Surface Water	NYSDEC Part 701 Classification	Waters Index Number
Rondout Effluent Chamber	Rondout Reservoir	AA (TS)	H-139-14-P 815a
Shaft 2A and Wawarsing Leak Repair	Stony Kill (Tributary to Rondout Creek)	AA (T)	H-139-14-19
	Rondout Creek (Upstream of Vernooy Kill)	C (T)	H-139-14
	Rondout Creek (Downstream of Vernooy Kill)	B (T)	H-139-14
	Vernooy Kill (Tributary to Rondout Creek)	C (TS)	H-139-14-35 portion
	Unnamed Tributary 1 to Rondout Creek	C	H-139-14-22a, 24 P 789b, 24a, 26 and trib
	Unnamed Tributary 2 to Rondout Creek	C (TS)	H-139-14-33
	Unnamed Tributary 3 to Rondout Creek	C (TS)	H-139-14-29
Shaft 9	West Branch Reservoir	AA (TS)	H-31-P 44-23-P 67

Rondout Effluent Chamber Study Area and Shaft 9 Study Area

Rondout Reservoir and West Branch Reservoir, located in the Rondout Effluent Chamber and the Shaft 9 study areas, are DEP water supply reservoirs that are part of the Delaware water supply system.

Inspection and repair activities at the Rondout Effluent Chamber and Shaft 9 sites would not include work directly in the surface waterbodies identified in **Table 11.3-9**, and there would be no construction unwatering of, or discharge to, these or any other surface waterbodies in the study area. Prior to the start of the inspection and repair, soil and erosion control measures such as silt fencing would be installed around areas where soil would be disturbed to prevent transport of sediment into surface water. Each site would be restored to baseline conditions following the completion of the inspection and repair.

There would be no disturbance to surface water associated with the inspection and repair that would affect surface water within the Rondout Effluent Chamber Study Area and Shaft 9 Study Area, or any unidentified surface waterbodies within the Shaft 1 and 8 study areas. Therefore, a surface water impact analysis for these study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

Inspection and repair activities at the Shaft 2A and Wawarsing Leak Repair Study Area would consist of staging construction equipment at the Shaft 2A site to support internal repairs to the RWBT.

Inspection and repair activities at the Shaft 2A Study Area would not include work directly in the surface waterbodies identified in **Table 11.3-9**, and there would be no construction unwatering of, or discharge to, these surface water features or any other surface water within the study area.

Prior to start of the inspection and repair, soil and erosion control measures such as silt fencing would be installed around areas where soil would be disturbed to prevent transport of sediment into surface water. Each site would be restored to baseline conditions following the completion of the inspection and repair.

There would be no disturbance to surface water associated with the inspection and repair that would affect surface water within the Shaft 2A Study Area. However, the unwatering of the RWBT during the temporary shutdown and the cessation of leaks after the internal inspection and repair could have the potential to affect surface water levels in the Leak Repair Study Area. USGS evaluated the potential affects to these resources. To determine if the surface water levels changed as a result of reducing flow in the RWBT, USGS:

- Measured surface water levels at staff gauges and groundwater levels in monitoring wells in the Leak Repair Study Area during three depressurizations of the RWBT beginning in 2008; and

- Monitored surface water sites where water was identified at the ground surface before, during, and after the RWBT depressurizations.

Results showed there was no measurable connection between the surface water and changing flow in the RWBT.

USGS also monitored the water level at Lippman Lake, a man-made surface waterbody near the RWBT, when DEP changed flow in the RWBT to determine if there was a measurable change in lake level (Stumm et al. 2012). Results showed there was no measurable change in water level in Lippman Lake.

Since monitoring showed no connection between pressure or flow in the RWBT and the water level or flow of various surface waterbodies within the Leak Repair Study Area, no significant effects on surface water are anticipated. Therefore, a surface water impact analysis for the Shaft 2A and Wawarsing Leak Repair Study Area is not warranted.

Wetlands

This section presents the screening assessment of the potential for the inspection and repair to result in a disturbance to wetlands in the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area that could result in direct or indirect effects to wetland water levels and quality within the study areas.

Screening Assessment

Wetlands potentially occurring within the inspection and repair study areas were identified through a desktop evaluation of NYSDEC freshwater wetlands maps and U.S. Fish and Wildlife

Service (USFWS) National Wetlands Inventory (NWI) wetland maps. NYSDEC freshwater wetland maps are based on aerial photography, soil surveys, elevation data, and other wetland inventories. NYSDEC typically does not regulate (or map) wetlands smaller than 12.4 acres. USFWS NWI identifies wetlands of at least 0.5 acre in size according to mapping standards and may not identify smaller wetlands that could be federally or locally regulated. NWI maps are based on aerial photography, supplemented by published soil survey maps and USGS topographic maps. No ground-truthing of NWI wetlands was performed by USFWS to validate or verify the mapping. USFWS NWI classifies mapped wetlands and deepwater habitats. Freshwater (palustrine) wetlands are further based on their cover type (e.g., emergent, scrub-shrub, forested, unconsolidated bottom) (Cowardin et al. 1979). Deepwater habitats on NWI maps that occur in the study areas are discussed in the wetlands analyses. In addition to these mapping tools, DEP records were also reviewed for the presence of wetlands in the inspection and repair study areas. Using DEP records from past projects at the inspection and repair study areas, no wetlands were known to occur at any study areas, with the exception of Shaft 8.

Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 Study Areas

Wetlands were not identified within the Shaft 1 Study Area. Using the NYSDEC and USFWS NWI wetland maps, wetlands and deepwater habitats were identified within the Rondout Effluent Chamber Study Area and Shaft 8 and 9 study areas (see **Table 11.3-10**). At the Rondout Effluent Chamber Study Area, a deepwater habitat was identified by USFWS NWI maps and refers to Rondout Reservoir. The wetland located within the Shaft 8 Study Area was identified by USFWS NWI as a freshwater forested wetland and is identified by NYSDEC wetland maps as Wetland OL-58. At the Shaft 9 Study Area, a deepwater habitat was identified by USFWS NWI maps and refers to West Branch Reservoir.

Table 11.3-10: Wetlands within the Rondout Effluent Chamber Study Area and Shaft 8 and 9 Study Areas

Study Area	Wetland Acreage (Total)	Wetland Acreage (Within Study Area)	Wetland	Cowardin Classifications
Rondout Effluent Chamber	85,863	4.20	Rondout Reservoir	USFWS NWI L1UBHh
Shaft 8	14.6	0.33	NYSDEC Freshwater Wetland OL-58[1]	NYSDEC Wetland OL-58; USFWS NWI PFO1C
Shaft 9	27,332	4.40	West Branch Reservoir	USFWS NWI L1UBHh

Note:
[1] Wetland OL-58 is a 14.6-acre Class 2 freshwater wetland (NYCRR Part 664 – Freshwater Wetlands Maps and Classifications).

Inspection and repair activities would not include work directly within wetlands or deepwater habitats identified within the Rondout Effluent Chamber Study Area and Shaft 8 and 9 study areas, and there would be no discharges from inspection and repair activities to these wetlands and deepwater habitats. Soil and erosion control measures (e.g., silt fencing) would be installed

at the Rondout Effluent Chamber site and the Shaft 8 and 9 sites to prevent the transport of sediment into these wetlands during the inspection and repair activities at those sites. Following completion of the inspection and repair, the Rondout Effluent Chamber site and the Shaft 8 and 9 sites would be restored to baseline conditions. There would be no disturbance to wetlands associated with the inspection and repair within the Rondout Effluent Chamber site and the Shaft 8 and 9 sites. Therefore, a wetlands impact analysis for these study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

Within the Shaft 2A and Wawarsing Leak Repair Study Area, no wetlands were identified within the Shaft 2A site, although numerous USFWS NWI wetlands were identified in the Leak Repair Study Area (see **Table 11.3-11**). There are no NYSDEC-regulated wetlands identified in the study area. In total, USFWS identifies approximately 17 acres of freshwater emergent wetlands, approximately 62 acres of freshwater forested/shrub wetlands, and approximately 6.5 acres of freshwater ponds. Additionally, Rondout Creek is listed as an approximately 123-acre riverine wetland.

The inspection and repair activities at the Shaft 2A and Wawarsing Leak Repair Study Area would consist of construction activities staged from the Shaft 2A site to support internal repairs to the RWBT, which would result in the permanent cessation of leaks within the Leak Repair Study Area. The cessation of leaks could affect groundwater and surface water levels in the Leak Repair Study Area. Inspection and repair activities would not include work directly within wetlands, and there would be no construction unwatering or discharge into surface water features or wetlands. According to DEP and USGS (Stumm et al. 2012) studies, there were no discernible connections between the RWBT leaks and the flow of water from various surface expressions, and they were unable to quantify surface water elevation differences during previous depressurizations. Based on this information, there would be no disturbance associated with the inspection and repair to wetlands within the Shaft 2A and Wawarsing Leak Repair Study Area. Therefore, a wetlands impact analysis for this study area is not warranted.

Floodplains

This section presents the screening assessment of the potential for the inspection and repair to result in a disturbance to floodplains in the study areas from: construction activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

Screening Assessment

Floodplains, identified by the Federal Emergency Management Agency (FEMA) as special flood hazard areas, mitigate flooding by allowing floodwaters to dissipate their energy and recharge into the ground. Floodplains, or special flood hazard areas, were identified in the inspection and repair study areas using FEMA national flood hazard area maps. FEMA flood hazard area maps were not available digitally for mapping purposes for the Rondout Effluent Chamber Study Area, the Shaft 1 Study Area, and the Shaft 2A and Wawarsing Leak Repair Study Area. Floodplains for these study areas were identified using FEMA Digital Q3 Flood Zone Data.

Table 11.3-11: USFWS NWI Wetlands within the Leak Repair Study Area

Wetland Type	Cowardin Code[1]	Acres
Freshwater Emergent Wetland	PEM1F	7.76
Freshwater Emergent Wetland	PEM1E	0.81
Freshwater Emergent Wetland	PEM1E	0.95
Freshwater Emergent Wetland	PEM1C	2.07
Freshwater Emergent Wetland	PEM1E	2.78
Freshwater Emergent Wetland	PEM1C	1.69
Freshwater Emergent Wetland	PEM1A	0.55
Freshwater Emergent Wetland	PEM1C	0.72
Freshwater Forested/Shrub Wetland	PFO1C	7.47
Freshwater Forested/Shrub Wetland	PFO1C	1.20
Freshwater Forested/Shrub Wetland	PFO1A	2.20
Freshwater Forested/Shrub Wetland	PFO1C	28.65
Freshwater Forested/Shrub Wetland	PFO1A	1.61
Freshwater Forested/Shrub Wetland	PFO1A	9.74
Freshwater Forested/Shrub Wetland	PSS1C	1.42
Freshwater Forested/Shrub Wetland	PFO1A	3.96
Freshwater Forested/Shrub Wetland	PFO1A	4.06
Freshwater Forested/Shrub Wetland	PSS1E	0.41
Freshwater Forested/Shrub Wetland	PSS1E	1.17
Freshwater Pond	PUBHh	0.08
Freshwater Pond	PUBF	0.96
Freshwater Pond	PUBHh	3.46
Freshwater Pond	PUBHh	0.38
Freshwater Pond	PUBFb	1.23
Freshwater Pond	PUBHx	0.34
Riverine[2]	R2UBH	123.38

Notes:
[1] Classification Code adopted by USFWS to describe wetland habitat type (Cowardin et al. 1979).
[2] Rondout Creek.

Q3 data are geo-referenced versions of Flood Insurance Rate Maps (FIRM), but are not considered the official FEMA flood hazard area map. Paper copies of the FIRMs were referenced to confirm the Q3 data.

FEMA FIRMs were reviewed for the inspection and repair study areas. Floodplains were not identified within the Shaft 1 and 8 study areas. The Rondout Effluent Chamber Study Area, the Leak Repair Study Area within the Shaft 2A and Wawarsing Leak Repair Study Area, and the Shaft 9 Study Area were found to include portions of the 100-year and 500-year floodplains (see **Table 11.3-12**) (FEMA 2014). These flood hazard areas are associated with Rondout Reservoir, Rondout Creek, Vernooy Kill, and West Branch Reservoir. FEMA flood hazard area maps do not depict 100-year or 500-year floodplain within the Shaft 2A Study Area along Stony Kill or any of the unnamed tributaries.

Table 11.3-12: Floodplains within the Inspection and Repair Study Areas

Study Area	Surface Water	Special Flood Hazard Area
Rondout Effluent Chamber	Rondout Reservoir	Zone A[1]
Wawarsing Leak Repair	Rondout Creek	Zone AE[2]
	Rondout Creek	Zone X[3]
	Vernooy Kill	Zone AE[2]
Shaft 9	West Branch Reservoir	Zone A[1]

Notes:

[1] An area inundated by 1% annual chance flooding, for which no base flood elevations have been determined.

[2] An area subject to inundation by the 1% annual chance flood event, for which base flood elevations are shown.

[3] Areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood. An area inundated by 0.2% annual chance flooding.

Temporary facilities at the Rondout Effluent Chamber site may be constructed on paved areas within the Zone A floodplain. However, these facilities would not result in an appreciable change to the floodplains or to surface water hydrology. All construction activities at the Shaft 9 site would be contained within the existing Shaft 9 building. Following completion of the inspection and repair, the Rondout Effluent Chamber site and Shaft 9 site would be restored to baseline conditions, and no new impervious surfaces are proposed. The inspection and repair at the Rondout Effluent Chamber and Shaft 9 sites would not affect the floodplain's ability to attenuate flooding. The inspection and repair activities proposed within the Leak Repair Study Area would take place within the RWBT approximately 700 feet below the ground, and are therefore not anticipated to affect the floodplain associated with Rondout Creek or Vernooy Kill. Therefore, since there would be no disturbance to floodplains associated with the inspection and repair, a floodplains impact analysis for these study areas is not warranted.

11.3.8.2 Geology and Soils

This section presents the screening assessment of the potential for the inspection and repair to result in a disturbance to geologic resources in the study areas from: activities at the Rondout Effluent Chamber Study Area and shaft sites; and construction activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

This section analyzes the potential for the inspection and repair to result in:

- Erosion or instability of, or composition changes to, geology and soils at the Rondout Effluent Chamber site and shaft sites within the study areas; and
- A permanent change to geology and soils in the form of settlement from reduced groundwater levels in the Shaft 2A and Wawarsing Leak Repair Study Area during the temporary shutdown and from cessation of leaks.

Screening Assessment

Geology within the study areas was identified using:

- Historic record drawings of the Delaware Aqueduct (City of New York Board of Water Supply, Northern Department, Newburgh Division, Delaware Aqueduct, Rondout-West Branch Tunnel, Construction Record Drawings 1939–1945);
- New York State Bedrock and Surficial Geology maps; and
- USGS reports and other scientific literature.

Soils within the study areas were identified using:

- U.S. Department of Agriculture (USDA) Web Soil Survey and published soil surveys; and
- Land Capability Classes in Part 622 of the USDA National Soil Survey Handbook and Agricultural Handbook No. 210 (USDA 2000; USDA 1961).

Geology in the study areas varies greatly as the RWBT crosses several different geologic formations. Generally, the surficial geology across the study areas includes: alluvium, glacial outwash, lacustrine deposits, and kame deposits and till. These deposits range in grain size from clay to coarse gravel.

The bedrock geology below the unconsolidated deposits includes the Helderberg Group, Oneonta Formation, Hamilton Group, Bloomsburg Formation, Rondout Formation, and the Onondaga Limestone. Bedrock is occasionally exposed at the ground surface where the unconsolidated deposits are absent. The most dominant surficial soils in the study areas are loams.

Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 Study Areas

Activities during the inspection and repair would be small in scale and temporary, and would take place within DEP-owned sites, all of which have been previously disturbed. There would be limited grading and excavation at some of the sites including:

- Exposure and removal of existing shaft caps;
- Installation of construction support facilities (e.g., construction trailers and equipment storage); and
- Installation of the hoisting, ventilation, and communication systems.

Prior to commencement of the inspection and repair, soil and erosion control measures such as silt fencing would be installed around areas of disturbance to prevent transport of sediment into surface water. All grading and excavated material would be stockpiled on site and reused for backfill. Following completion of the inspection and repair, each site would be restored to baseline conditions.

Therefore, since disturbance to geology and soils at the inspection and repair sites would be minor and each site would be restored following completion of the temporary shutdown, a geology and soils impact analysis within the Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

Activities at the Shaft 2A and Wawarsing Leak Repair Study Area would consist of construction activities staged from the Shaft 2A site to support internal repairs to the RWBT. These repairs would result in the permanent cessation of leaks near the Town of Wawarsing. The cessation of these leaks could affect groundwater and surface water levels in the Shaft 2A and Wawarsing Leak Repair Study Area.

Surface construction activities would be staged from the Shaft 2A site. Activities within the Shaft 2A Study Area would be small in scale and temporary, and would take place within the previously disturbed DEP-owned site. There would be limited grading and excavation at the Shaft 2A site associated with site preparation activities, including:

- Exposure and removal of the existing shaft cap;
- Installation of construction support facilities (e.g., construction trailers and equipment storage); and
- Installation of hoisting and communication systems.

Prior to commencement of the inspection and repair, soil and erosion control measures, such as silt fencing, would be installed around areas of disturbance to prevent transport of sediment into surface water. All grading and excavated material would be stockpiled on site and reused for backfill. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. Since disturbance to geology and soils at Shaft 2A would be minor and the site would be restored following completion of the inspection and repair, a geology and soils impact analysis for the surface construction activities at Shaft 2A is not warranted.

Inspection and repair would result in the permanent cessation of RWBT leaks near Wawarsing. This could affect groundwater and surface water levels and could have the potential to result in settlement of unconsolidated geology and soils in a portion of the Shaft 2A and Wawarsing Leak Repair Study Area (the Leak Repair Study Area described in Section 11.3.8.1, "Water Resources"). Therefore, the potential for impacts to geology and soils within the Leak Repair Study Area associated with the inspection and repair were evaluated in Section 11.6.9.2, "Geology and Soils," using the methodology described below.

Impact Analysis Methodology

An impact analysis was completed to determine if the inspection and repair of the RWBT could impact the geology and soils in the Leak Repair Study Area. The impact analysis focused on evaluating the potential for changes in ground surface elevation and subsurface conditions during the temporary shutdown and after inspection and repair is complete.

The impact analysis is based on:

- The magnitude of stress increase; the duration of the change in groundwater levels while the system is equilibrating to the new lowered water level; and the grain size, compressibility, and thickness of the geology and soils;
- The fact that bedrock has a solid (consolidated) structure that is rigid and resistant to changes, so the additional stress caused by the changes in groundwater levels would not result in settlement of the bedrock;
- The potential for settlement would be isolated to specific types of unconsolidated geology and soils. Fine-grained soils are typically more compressible than coarse-grained soils due to their particle size and particle arrangement. Therefore, fine-grained soils are more susceptible to settlement than coarse-grained geology and soils;
- The fact that fine-grained soils are susceptible to settlement over long time periods as changes in water pressure in fine-grained soils occur over long time periods; and
- The fact that coarse-grained soils are susceptible to small increments of settlement over short time periods as changes in water pressure in coarse-grained soils occur over short time periods.

The analysis to identify the potential for impacts to geology and soils in the Leak Repair Study Area was completed using the following approach:

(1) Baseline geology and soils conditions were established based on a desktop assessment of available information on the geology and soils, infrastructure, and surface water that has been associated with the leaking RWBT;

(2) The potential types of settlement were identified based on these conditions;

(3) A targeted geotechnical field investigation was conducted and areas were assessed for potential settlement. Based on the desktop assessment and estimated changes in groundwater levels from USGS reports, a targeted geotechnical field investigation was completed to collect additional information on geology and soils within the Leak Repair Study Area. Two subsurface borings (WA-01 and WA-02) (see **Figure 11.3-4**) were drilled to determine the thickness of compressible soil layers and to collect samples for geotechnical laboratory analyses. The soil samples were tested to determine soil properties (moisture content, plasticity, and particle size). These results were used to correlate to the settlement characteristics of the soil. Constant rate of strain consolidation tests were also conducted to provide measured values of compressibility, stress history and time rate of compression (how long for a sample to compress under a load); and

(4) The data collected during the investigation were used with the estimated water level changes that could occur during the inspection and repair to estimate areas, if any, that could be subject to settlement.

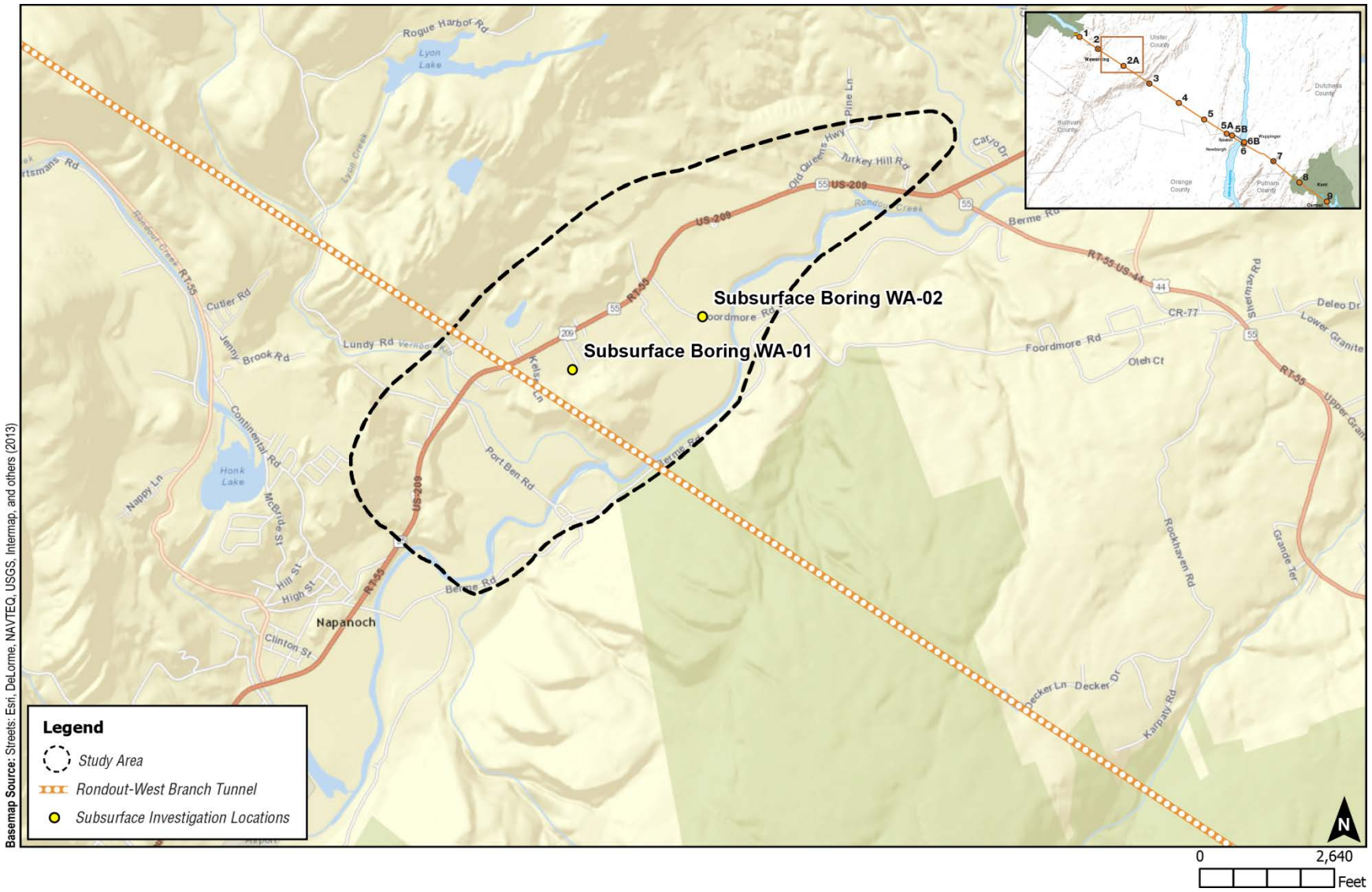


Figure 11.3-4: Subsurface Investigation Locations – Leak Repair Study Area

11.3.8.3 Aquatic and Benthic Resources

This section presents the screening assessment of the potential for the inspection and repair to result in a disturbance to aquatic and benthic resources in the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area that could cause direct or indirect effects on aquatic and benthic resources that would potentially be present within surface water and/or wetlands, identified within the study areas.

Screening Assessment

Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 Study Areas

Watercourses were not identified within the Shaft 1 and 8 study areas. Inspection and repair activities at the Rondout Effluent Chamber site and the Shaft 9 site would not include activities that would affect surface water identified within those sites' respective study areas, and appropriate erosion and sediment controls would be installed as a precaution.

Following completion of the inspection and repair, these sites would be restored to baseline conditions. As a result, there would be no effects to aquatic and benthic resources within these study areas. Therefore, an aquatic and benthic resources impact analysis for the Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

The inspection and repair activities at the Shaft 2A and Wawarsing Leak Repair Study Area would consist of construction activities staged from the Shaft 2A site to support internal repairs to the RWBT, which would result in the permanent cessation of leaks that could affect groundwater and surface water levels. Inspection and repair activities would not include work directly within surface water. In addition, according to DEP and USGS studies, there were no discernible connections between the RWBT leaks and the flow of water from various surface expressions, and the agencies were unable to quantify surface water elevation differences during previous depressurizations (Stumm et al. 2012). As such, there would be no disturbances to surface water associated with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area. Therefore, an aquatic and benthic resources impact analysis for this study area is not warranted.

11.3.8.4 Terrestrial Resources

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in a disturbance to terrestrial resources from: activities at the Rondout Effluent Chamber Study Area site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area and that could cause a disturbance to significant natural communities within the surrounding study areas.

Screening Assessment

Ecological and terrestrial communities were identified using aerial imagery, USGS topographic maps, and New York Natural Heritage Program (NYNHP) consultation results. An ecological community is defined as a variable assemblage of interacting plant and animal populations that share a common environment. A terrestrial cultural community is defined as a community that is created or modified and subsequently maintained by human influence to such a degree that the physical conformation of the substrate or the biological composition of the resident community is substantially different than before it was modified by humans (Edinger et al. 2014).

Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 Study Areas

Ecological communities within the Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 study areas consist primarily of forested areas and terrestrial cultural communities. The forested areas throughout these study areas are primarily deciduous. However, there are also several stands of coniferous trees. Common ecological communities found in Ulster and Putnam Counties that would be expected in the study areas include Appalachian oak-hickory forest, beech-maple mesic forest, hemlock-northern hardwood forest, and successional forest. Common tree species found in these communities include red oak (*Quercus rubra*), white oak (*Q. alba*), black oak (*Q. velutina*), pignut hickory (*Carya glabra*), shagbark hickory (*C. ovata*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), sugar maple (*A. saccharum*), hop hornbeam (*Ostrya virginiana*), American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), sweet birch (*B. lenta*), eastern hemlock (*Tsuga canadensis*), chestnut oak (*Q. prinus*), white pine (*Pinus strobus*), and black cherry (*Prunus serotina*).

Terrestrial cultural communities found within the Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 study areas include mowed lawn, paved road/path, unpaved road/path, cropland/field crops, reservoir/artificial impoundment, and riprap/artificial shore (Edinger et al. 2014).

As described above, the inspection and repair activities would be temporary and confined to the previously disturbed and fenced-in Rondout Effluent Chamber site and Shaft 1, 8, and 9 sites. No tree or vegetation clearing would occur within these study areas. Following completion of the inspection and repair, the Rondout Effluent Chamber site and Shaft 1, 8, and 9 sites would be restored to baseline conditions. There would be no disturbance to terrestrial resources associated with the inspection and repair within the study areas. Therefore, a terrestrial resources impact analysis for these study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

The inspection and repair activities at the Shaft 2A and Wawarsing Leak Repair Study Area would consist of construction activities staged from the Shaft 2A site to support internal repairs to the RWBT, which would result in the permanent cessation of leaks within the Leak Repair Study Area. The cessation of leaks could affect groundwater and surface water levels in the Leak Repair Study Area.

Significant natural communities are defined as rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. Significant natural

communities are not afforded any formal legal protection under the New York State Environmental Conservation Law, but are inventoried and monitored because of their unique attributes or the rare plant and animal species found within them. NYNHP consultations located one significant natural community, a chestnut oak forest, located within the Shaft 2A Study Area. Therefore, the potential for impacts to terrestrial resources associated with the inspection and repair within the Shaft 2A Study Area was evaluated in Section 11.6.9, "Natural Resources," using the methodology described below.

Impact Analysis Methodology

The impact analysis consisted of: (1) describing baseline conditions for terrestrial resources based on a desktop analysis using Arc GIS data, NYNHP consultation, and observations of ecological habitats during site surveys; (2) establishing future conditions without the inspection and repair due to natural processes and by identifying proposed projects within the Shaft 2A Study Area that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair, based on the proposed activities within the Shaft 2A Study Area; and (4) analyzing the potential for impacts associated with inspection and repair on terrestrial resources by estimating the potential disturbance to significant natural communities.

11.3.8.5 Wildlife

This section presents the screening assessment and analyzes the potential for the inspection and repair to disturb wildlife or their habitat in the study areas from: activities within the Rondout Effluent Chamber site and shaft sites, and the Shaft 2A and Wawarsing Leak Repair Study Area.

Screening Assessment

Potential wildlife occurring within the inspection and repair study areas were identified by consulting the following NYSDEC resources: the 2000-2005 New York State Breeding Bird Atlas, NYSDEC Amphibian & Reptile Atlas Project (Herp Atlas), and NYSDEC Nature Explorer.

The 2000-2005 Breeding Bird Atlas is the result of a 5-year survey in which the State of New York was divided into 3-mile by 3-mile survey blocks that were assessed for breeding bird species by State biologists, researchers, and volunteer ornithologists and bird watchers. This data is available in a database through the NYSDEC website. The blocks that include the inspection and repair study areas are 5462A (Rondout Effluent Chamber and Shaft 1 study areas), 5462D (Shaft 2A and Wawarsing Leak Repair Study Area), 5562C (Shaft 2A and Wawarsing Leak Repair Study Area), 5959D (Shaft 8 Study Area), and 6058A (Shaft 9 Study Area).

The Herp Atlas is a statewide survey of wildlife that was conducted over 10 years starting in 1990. The Herp Atlas information is organized by USGS 7.5-minute topographic quadrangles. The inspection and repair study areas are located within the Rondout Reservoir (Rondout Effluent Chamber and Shaft 1 study areas), Kerhonkson (Shaft 2A and Wawarsing Leak Repair Study Area), Napanoch (Shaft 2A and Wawarsing Leak Repair Study Area), Lake Oscawana (Shaft 8 Study Area), and Lake Carmel (Shaft 9 Study Area) quadrangles. Species reported on

these quadrangle maps are conservatively considered to have the potential to occur within the study area.

The NYSDEC Nature Explorer is a database that compiles information from the aforementioned databases, as well as wildlife survey and database information from NYNHP. Species location information in this database is provided on a countywide level.

These databases were consulted to identify common and protected wildlife that has the potential to occur within the inspection and repair study areas.

Rondout Effluent Chamber Study Area and Shaft 1, 8, and 9 Study Areas

Within the Rondout Effluent Chamber site and Shaft 1, 8, and 9 sites, the inspection and repair activities would be temporary and confined to the previously disturbed, fenced-in sites and would not include clearing or habitat disturbance. However, there may be temporary increases in noise levels at certain inspection and repair sites that may temporarily discourage wildlife from inhabiting or frequenting areas within and adjacent to the sites. Sediment and erosion control measures would be installed around each site to prevent temporary effects to surface water features inhabited or frequented by wildlife. However, upon completion of the inspection and repair, the sites would be restored and noise-generating activities would cease. Therefore, a wildlife impact analysis for these study areas is not warranted.

Shaft 2A and Wawarsing Leak Repair Study Area

Within the Shaft 2A and Wawarsing Leak Repair study areas, the inspection and repair activities would be temporary and confined to the previously disturbed, fenced-in Shaft 2A site, and would not include clearing or habitat disturbance. However, a significant natural community was identified by NYNHP as occurring in the Shaft 2A Study Area, and significant natural communities are known to be of importance to a wide range of wildlife. Therefore, the potential for impacts to wildlife associated with the inspection and repair within the Shaft 2A Study Area was evaluated in Section 11.6.9, “Natural Resources,” using the methodology described below.

Impact Analysis Methodology

The impact analysis consists of: (1) mapping and describing baseline conditions of potential habitat based on desktop analysis of aerial imagery, and NYNHP consultation; (2) establishing future conditions, without the inspection and repair, due to natural processes and by identifying proposed projects within the Shaft 2A Study Area that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair, based on the proposed activities within the Shaft 2A Study Area; and (4) analyzing the potential for impacts from the inspection and repair by evaluating whether the proposed inspection and repair activities would potentially cause a disturbance to wildlife within the surrounding areas.

11.3.8.6 Federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and Unlisted Rare and Vulnerable Species

This section presents the screening assessment and analyzes the potential for the inspection and repair to disturb federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and unlisted rare and vulnerable species or their habitat in the study areas from activities at the Rondout Effluent Chamber site, and Shaft 1, 8, and 9 sites; and the Shaft 2A and Wawarsing Leak Repair Study Area.

Screening Assessment

Federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and other unlisted rare or vulnerable species within the study areas were identified in consultation with USFWS, NYNHP, and NYSDEC. DEP coordinated with these agencies as well as county and local offices, as applicable, to determine whether additional analyses would be necessary for the study areas. Desktop mapping was also used to identify broad habitat characteristics of the study areas.

Based on consultations with the above-noted agencies, federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and unlisted rare or vulnerable species were reported as occurring within or adjacent to the study areas. USFWS was consulted, in accordance with the Endangered Species Act of 1973, as amended, and Fish and Wildlife Coordination Act of 1934, and provided an online report of any federal listed Endangered, Threatened, Candidate, or proposed for listing species known to exist within the study area counties. NYNHP provided a database listing that identified the species and habitats with State, heritage, and global rankings based on species rarity, population trends, and threats, along with other information related to the species. The NYSDEC Breeding Bird Atlas and the Herp Atlas were also consulted for the presence of federal/State Threatened, Endangered, and Candidate Species, State Species of Special Concern, and unlisted rare or vulnerable species.

In addition to data provided by NYNHP and USFWS, local and county legislation was reviewed to determine if any additional Endangered, Threatened, and State Species of Special Concern Species lists applied to the inspection and repair study areas. However, Ulster and Putnam Counties do not have lists in addition to NYNHP and USFWS. Species provided protection under the Migratory Bird Treaty Act of 1918 (MBTA) and other protective legislation, such as the Bald and Golden Eagle Protection Act (BGPA), were evaluated if documented to occur within the study area. The screening assessment for species currently or proposed for federal or State protection is shown in **Table 11.3-13** and described in detail below. No species proposed for listing were identified.

Table 11.3-13: Potentially Affected Federal/State Threatened and Endangered Species within the Inspection and Repair Study Areas

Common Name	Scientific Name	Federal and State Listing Status	USFWS Official Species List	Rondout Effluent Chamber	Shaft 1	Shaft 2A and Wawarsing Leak Repair	Shaft 8	Shaft 9
Amphibians and Reptiles								
Bog Turtle	*Clemmys [=Glyptemys] muhlenbergii*	Federal: Threatened State: Endangered	Ulster and Putnam	-	-	-	✓	-
Timber Rattlesnake	*Crotalus horridus*	Federal: Unlisted State: Threatened	-	✓	✓	✓	-	-
Birds								
Bald Eagle	*Haliaeetus leucocephalus*	Federal: BGPA State: Threatened	-	✓	✓	-	-	✓
Mammals								
Allegheny Woodrat	*Neotoma magister*	Federal: Unlisted State: Endangered	-	-	-	✓	-	-
Indiana Bat	*Myotis sodalis*	Federal: Endangered State: Endangered	Ulster and Putnam	●	●	●	●	●
Northern Long-eared Bat	*Myotis septentrionalis*	Federal: Threatened State: Threatened	Ulster and Putnam	●	●	●	●	●
Invertebrates								
Dwarf Wedgemussel	*Alasmidonta heterodon*	Federal: Endangered State: Endangered	Ulster and Putnam	●	●	●	●	●
Fish								
Atlantic Sturgeon	*Acipenser oxyrhynchus oxyrhynchus*	Federal: Endangered State: Endangered	-	●	●	●	●	●

Table 11.3-13: Potentially Affected Federal/State Threatened and Endangered Species within the Inspection and Repair Study Areas

Common Name	Scientific Name	Federal and State Listing Status	USFWS Official Species List	Rondout Effluent Chamber	Shaft 1	Shaft 2A and Wawarsing Leak Repair	Shaft 8	Shaft 9
Shortnose Sturgeon	*Acipenser brevirostrum*	Federal: Endangered State: Endangered	-	●	●	●	●	●
Plants								
Northern Wild Monkshood	*Aconitum noveboracense*	Federal: Threatened State: Endangered	Ulster	-	-	✓	-	-

Notes:

BGPA: Bald and Golden Eagle Protection Act

✓ = Species was identified as having the potential to occur within the study area, and an impact analysis was performed.

● = Species was identified as having the potential to occur within the study area but screened from further analysis.

- = Species was not identified as having the potential to occur within the study area.

Source: USFWS Official Species List for Ulster and Putnam Counties; NYNHP Database Consultation; NYSDEC Nature Explorer; NYSDEC Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.

The assessments for federal Threatened and Endangered Species determine whether the inspection and repair activities have the potential to affect or result in a take of a species. Where there is a federal nexus with the project, species are assessed under Section 7 of the Endangered Species Act. Under Section 7, a project's impacts to protected species are designated as one of the following: "no effects," "may affect but is not likely to adversely affect," and "may affect and is likely to adversely affect." A finding of "no effects" means there will be no impacts, positive or negative, to protected resources. A finding of "may affect but is not likely to adversely affect" means that project impacts would either be beneficial, not measurable or undetectable, or otherwise unable to be evaluated. A finding of "may affect and is likely to adversely affect" means protective resources are likely to be exposed to the project action or environmental consequences and would respond negatively. Under Section 10 of the Endangered Species Act, projects are evaluated on their potential to result in "take" to a protected resource. Take is defined in the Endangered Species Act as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct", and "harm" includes actions that result in significant habitat modification. There is no take to any species anticipated.

Bog Turtle (Clemmys [=Glyptemys] muhlenbergii)

The bog turtle (*Clemmys [=Glyptemys] muhlenbergii*) is a small species of turtle that is listed as federally Threatened and State Endangered. Bog turtle habitat consists of open areas with cool, shallow, slow-moving water; deep, soft, mucky soils; and tussock-forming herbaceous vegetation, such as wetlands. Wetlands that provide bog turtle habitat are usually emergent wetlands characterized by a mosaic of micro-habitats that include dry pockets, saturated areas, and areas that are periodically flooded. Bog turtles depend on a diversity of micro-habitats for foraging, nesting, basking, hibernation, shelter, and other needs. Throughout the bog turtles' northern range, these wetlands are often seep or spring-fed emergent wetlands located at the headwaters of streams or small tributaries. Forested, closed-canopy wetlands are primarily considered unsuitable habitat for bog turtles. However, bog turtles may be found in this environment when migrating to suitable wetlands (USFWS 2001).

Screening Assessment

NYSDEC freshwater wetlands maps and USFWS NWI maps were consulted for the presence of freshwater wetlands potentially providing suitable bog turtle habitat in the inspection and repair study areas. As noted in Section 11.3.8.1, "Water Resources," the wetlands identified within the Rondout Effluent Chamber Study Area and Shaft 9 Study Area are lacustrine deepwater habitats, which are not suitable bog turtle habitat. No NWI or NYSDEC wetlands were identified in the study areas surrounding the Shaft 1 Study Area. DEP records of past projects in the study areas were reviewed and no wetlands were known to occur. Therefore, it is highly unlikely that potential bog turtle habitat exists within this study area. Habitat disturbance associated with the proposed work activities at the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the Shaft 2A site, where no NWI or NYSDEC wetlands were identified. Any disturbance at the Rondout Effluent Chamber, and Shaft 1, 2A, and 9 sites would be limited to upland areas, as erosion and sediment controls would be implemented, as needed, to protect watercourses in the vicinity of the sites. Therefore, there are no effects to bog turtles or their habitat within these study areas and a natural resources impact analysis is not warranted.

One NYSDEC freshwater, forested wetland was identified within the Shaft 8 Study Area, which is NYSDEC Wetland OL-58, listed in **Table 11.3-10**. Bog turtles do not utilize forested wetlands as core habitat. However, bog turtles may migrate through forested wetlands while moving between two areas of suitable habitat. Therefore, the potential for impacts to bog turtles and their habitat associated with the inspection and repair within the Shaft 8 Study Area were evaluated in Section 11.7.4, "Natural Resources," using the methodology described below.

Impact Analysis Methodology – Bog Turtle

Ecological community descriptions were reviewed to determine if suitable habitat is present within the Shaft 8 site. For the Shaft 8 Study Area, a desktop analysis in ArcGIS was conducted and utilized aerial photography, USGS topographic maps, USDA NRCS Web Soil Survey maps, NYSDEC wetland mapping, and USFWS NWI maps to determine the potential for impacts to bog turtles based on the proposed activities from the inspection and repair. DEP records of previous projects at this site were also reviewed.

Bald Eagle (Haliaeetus leucocephalus)

The Bald Eagle (*Haliaeetus leucocephalus*) was de-listed from the Federal Endangered Species Act in 2007, but remains federally protected under the BGPA and the MBTA. Bald Eagles are also currently listed by the State as Threatened. Bald Eagles engage in courtship and nest-building in December and fledge young by late March. Nests are typically several feet wide and located in tall, live trees near water (Nye 2008). Bald Eagles occur in the lower Hudson River Valley and have also been regularly observed in the vicinity of most DEP reservoirs during migration and in the winter months. Bald Eagles exhibit site fidelity, returning to the same breeding territory for multiple years, prefer relatively undisturbed areas near large open bodies of water for foraging opportunities, and seek out forested areas for nesting habitat. During late summer and early fall, non-breeding Bald Eagles move to their wintering grounds, moving as far south as necessary to obtain food, and quickly returning to breeding territories once open water conditions return (NYSDEC 2015).

Screening Assessment

The Shaft 8 Study Area is not located near open water where Bald Eagles would nest or forage. Therefore, no effects to Bald Eagle at the Shaft 8 Study Area are anticipated. While the Shaft 2A portion of the Shaft 2A and Wawarsing Leak Repair Study Area is not located near open water where Bald Eagles would nest or forage, the Leak Repair Study Area is adjacent to suitable open water habitat for Bald Eagles (i.e., Rondout Creek). However, the cessation of RWBT leaks is not anticipated to create measurable changes to surface water levels within the Shaft 2A and Wawarsing Leak Repair Study Area (see Section 11.3.8.1, "Water Resources"). Therefore, there are no effects to Bald Eagles or their habitat anticipated within these study area and a natural resources impact analysis is not warranted.

NYNHP has identified an active Bald Eagle nest located on Rondout Reservoir several miles north of the Rondout Effluent Chamber Study Area. NYNHP also identified several inactive Bald Eagle nests along Rondout Reservoir, the closest of which is approximately 1.3 miles north of the Rondout Effluent Chamber Study Area. NYNHP additionally identified the entirety of

Rondout Reservoir and some area adjacent to Rondout Reservoir as non-breeding Bald Eagle habitat. The Rondout Effluent Chamber Study Area is located within the non-breeding habitat area. The Shaft 1 Study Area does not overlap with the non-breeding habitat. However, the site is within 1 mile of Rondout Reservoir and Rondout Creek; both waterbodies are known to support Bald Eagles. Shaft 9 is located on the shore of West Branch Reservoir, which is a waterbody known to support Bald Eagles. NYNHP identified breeding Bald Eagles within 1 mile of the Shaft 9 Study Area.

Therefore, the potential for impacts to Bald Eagles and their habitat within the Rondout Effluent Chamber Study Area and the Shaft 1 and 9 study areas was evaluated in the respective "Natural Resources" sections for the Rondout Effluent Chamber Study Area and the Shaft 1 and 9 study areas using the methodology described below.

Impact Analysis Methodology – Bald Eagle

ArcGIS data was used to determine the potential for impacts to Bald Eagles from the inspection and repair activities at the Rondout Effluent Chamber Study Area, and Shaft 1 and 9 study areas based on the proposed activities. This information was used to determine whether a buffer restriction would be required in accordance with the USFWS's "National Bald Eagle Management Guidelines."

The desktop analysis of breeding Bald Eagle habitat consisted of performing an ArcGIS analysis to determine nest proximity to the sites. Bald Eagles are known to reside around many of the City's watershed and reservoir systems, utilizing lands surrounding the reservoirs as foraging habitat. Flight patterns are critical for breeding adults transporting food back to the nest to feed young. The distance to each known Bald Eagle nest from the study areas was analyzed to determine if a buffer restriction would be required in accordance with the USFWS's "National Bald Eagle Management Guidelines."

The desktop analysis of non-breeding Bald Eagle habitat consisted of using ArcGIS data to evaluate potential areas of roosting and foraging habitat, as well as their proximity to the sites. Roosting habitat consists of large perch trees near open water where individuals can sit and observe their prey. Bald Eagles are an opportunistic species that feed primarily on fish, waterfowl, and carcasses of deer and other animals, but also feed on small mammals and reptiles. Potential foraging areas consist of forested shorelines adjacent to reservoirs or rivers, areas below dams, and other areas where food resources are abundant (Beans and Niles 2003 and USFWS 2007a). The desktop survey concentrated on areas determined to be the most likely for potential roosting and foraging habitats for the species, as well as the closest of these areas to the study area. The distance from the study areas to these potential roosting and foraging habitats was analyzed to determine if a buffer restriction would be required in accordance with the USFWS's "National Bald Eagle Management Guidelines."

Indiana Bat (Myotis sodalis)

The Indiana bat (*Myotis sodalis*) is a federal/State Endangered Species. According to the USFWS Official Species List for Ulster County and Putnam County, this species has the potential to be located within the inspection and repair study areas. Indiana bats require trees

with exfoliating bark or cracks and crevices to roost in during the summer months. These trees are often mature and exposed to direct sunlight for a majority of the day (USFWS 2007). Indiana bats will migrate to and from winter hibernacula, where they typically hibernate from mid-October through early April. Indiana bats hibernate in subterranean environments such as caves and mines in which the temperature is regulated at approximately 50 degrees Fahrenheit but may fluctuate, rarely dropping below freezing (USFWS 2012). In New York, Indiana bats have not been observed at elevations greater than 900 feet above sea level (USFWS 2012). A USFWS tree-cutting moratorium that extends from April 1 through September 30 prohibits cutting or clearing of trees that provide suitable Indiana bat summer roosting habitat (USFWS 2012).

Screening Assessment

Forested areas that may contain potential Indiana bat habitat are located within the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, Shaft 8 Study Area, Shaft 9 Study Area, and Shaft 2A Study Area. There would be no tree clearing as part of the inspection and repair, and the limits of disturbance for the inspection and repair activities are confined to the previously disturbed Rondout Effluent Chamber and Shaft 1, 2A, 8, and 9 sites. There may be temporary noise that discourages Indiana bats from roosting in the immediate vicinity of the inspection and repair sites. However, there is abundant suitable habitat in the surrounding areas in which Indiana bats could roost. All construction would occur within the previously disturbed sites, and therefore no foraging habitat would be affected. No currently known hibernaculum were identified by NYNHP within the study areas and no suitable rock formations or mines were identified using desktop mapping methods as occurring within the study areas. Upon completion of the inspection and repair, the sites would be restored, and noise-generating activities would cease. Therefore, there are no effects to Indiana bat or their habitat within these study areas and a natural resources impact analysis is not warranted.

The Leak Repair Study Area contains roosting and foraging habitat for Indiana bats. As described in Section 11.3.8.1, "Water Resources," no impacts to surface water, which provide foraging opportunities for bats, are anticipated to occur due to the inspection and repair work. The leak repair may affect groundwater levels. However, changes to the groundwater levels are not anticipated to alter the characteristics of the existing roosting or foraging habitat available in the study area. Therefore, there are no effects to Indiana bats or their habitat within this study area and a natural resources impact analysis is not warranted.

Northern Long-eared Bat (Myotis septentrionalis)

The northern long-eared bat (*Myotis septentrionalis*) is a federal/State Threatened Species. According to the USFWS Official Species List for Ulster County and Putnam County, northern long-eared bat populations have the potential to be located within the inspection and repair study areas. Similar to the Indiana bat, the northern long-eared bat roosts in trees with exfoliating bark or suitable cracks and crevices and hibernates in subterranean environments such as caves and abandoned mines. The northern long-eared bat is also known to roost in smaller trees and in man-made structures (USFWS 2014).

Screening Assessment

Forested areas that may contain suitable northern long-eared bat habitat are located within the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, Shaft 2A and Wawarsing Leak Repair Study Area, and Shaft 8 and 9 study areas. There would be no tree clearing and no demolition of structures as part of the inspection and repair. The currently existing shafts are covered and therefore not accessible by bats. There would be no tree clearing as part of the inspection and repair, and the limits of disturbance for the inspection and repair activities are confined to the previously disturbed Rondout Effluent Chamber and Shaft 1, 2A, 8, and 9 sites. There may be temporary noise that discourages northern long-eared bats from roosting in the immediate vicinity of the inspection and repair sites. However, there is abundant suitable habitat in the surrounding areas within which northern long-eared bats could roost. All construction would occur within the previously disturbed sites, and therefore no foraging habitat would be affected. No currently known hibernaculum were identified by NYNHP within the study areas and no suitable rock formations or mines were identified using desktop mapping methods as occurring within the study areas. In addition, as described in Section 11.3.8.1, "Water Resources," no impacts to surface water, which provide foraging opportunities for bats, are anticipated to occur due to the inspection and repair work. Upon completion of the inspection and repair, the sites would be restored, and noise-generating activities would cease. Therefore, there are no effects to northern long-eared bats or their habitat within these study areas and a natural resources impact analysis is not warranted.

The Leak Repair Study Area contains roosting and foraging habitat for northern long-eared bats. As described in Section 11.3.8.1, "Water Resources," no impacts to surface water, which provide foraging opportunities for bats, are anticipated to occur due to the inspection and repair work. The leak repair may affect groundwater levels. However, changes to the groundwater levels are not anticipated to alter the characteristics of the existing roosting or foraging habitat available in the study area. Therefore, there are no effects to northern long-eared bats or their habitat within this study area and a natural resources impact analysis is not warranted.

Dwarf Wedgemussel (Alasmidonta heterodon)

The dwarf wedgemussel (*Alasmidonta heterodon*) is a federal/State Endangered Species. Typical habitat includes cool, clear, freshwater brooks to rivers (up to approximately 325 feet wide) with slow to moderate velocities and silt, sand, and gravel substrates distributed in small areas between and downstream of larger cobbles and boulders. The only known population in the State occurs in the Neversink River and the upper Delaware River (NYNHP 2013).

Screening Assessment

Neither the Neversink River nor the upper Delaware River occurs in the study areas. There would be no disturbance associated with the inspection and repair to the dwarf wedgemussel or its habitat within the inspection and repair study areas. Therefore, there are no effects to dwarf wedgemussels or their habitat within these study areas and a natural resources impact analysis is not warranted.

Shortnose Sturgeon (Acipenser brevirostrum)

The shortnose sturgeon (*Acipenser brevirostrum*) is a federal/State Endangered Species and is found in the Hudson River estuary between New York City and the Federal Dam in Troy, New York (Carlson 1998). Shortnose sturgeon inhabit near-shore marine habitats, estuarine habitats, deep and shallow water lakes, and medium to large rivers with low to moderate gradient. The USFWS does not include this species in its Official Species Lists in New York because this species is regulated by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS).

Screening Assessment

Activities pertaining to the inspection and repair would take place in proximity to select watercourses that are components of the Hudson River drainage basin and identified in Section 11.3.8.1, "Water Resources." Within the inspection and repair study areas, there are no activities that occur within waterbodies. Prior to commencement of the inspection and repair, soil and erosion control measures, such as silt fencing, would be installed at the Rondout Effluent Chamber site and the Shaft 1, 2A, 8, and 9 sites to prevent the transport of sediment into surface water. Therefore, there are no effects to shortnose sturgeon or their habitat within these study areas and a natural resources impact analysis is not warranted.

Atlantic Sturgeon (Acipenser oxyrhynchus oxyrhynchus)

The Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) is a federal/State Endangered Species and is found in the Hudson River estuary between New York City and the Federal Dam in Troy (Carlson 1998). Atlantic sturgeon inhabit near-shore marine habitats, estuarine habitats, and medium to large rivers with low to moderate gradient. The USFWS does not include this species in its Official Species Lists in New York because this species is regulated by the NMFS.

Screening Assessment

Activities pertaining to the inspection and repair would take place in proximity to select watercourses that are components of the Hudson River drainage basin. These waterbodies and watercourses are identified in Section 11.3.8.1, "Water Resources." Within the inspection and repair study areas, there are no activities that would occur within waterbodies or regulated buffers. Prior to commencement of the inspection and repair, soil and erosion control measures, such as silt fencing, would be installed at the Rondout Effluent Chamber site and the Shaft 1, 2A, 8, and 9 sites to prevent the transport of sediment into surface water. Therefore, there are no effects to Atlantic sturgeon or their habitat within these study areas and a natural resources impact analysis is not warranted.

Northern Wild Monkshood (Aconitum noveboracense)

The northern wild monkshood (*Aconitum noveboracense*) is a federally Threatened and State Endangered plant species. This species has specific habitat requirements and is found adjacent to high elevation, partially shaded, cold headwater streams, or groundwater seeps. The headwater streams or groundwater seeps create constant, cold soil temperatures and cold air. These

conditions cumulatively create a microclimate with high relative humidity (NatureServe 2014). Extant occurrences of the species in New York were located at elevations between approximately 1,300 feet and 3,300 feet above sea level (NYNHP 2013). If suitable soil conditions are present, northern wild monkshood could be found at lower and higher elevations (USFWS 1983).

Screening Assessment

According to the USFWS Official Species List for Putnam County, northern wild monkshood is not known to occur in the Shaft 8 and 9 study areas. The Rondout Effluent Chamber Study Area and Shaft 1 Study Area are both located at approximately 800 feet above sea level. This elevation is not close to the known range of northern wild monkshood in New York and is unlikely to contain the habitat conditions required by this species. Therefore, there are no effects to northern wild monkshood or its habitat within these study areas and a natural resources impact analysis is not warranted.

The Shaft 2A site is located approximately between 1,200 and 1,300 feet in elevation and falls within the range of currently known occurrences of northern wild monkshood in New York. Therefore, the potential for impacts to northern wild monkshood and its habitat associated with the inspection and repair within the Shaft 2A Study Area was evaluated in Section 11.6.9, "Natural Resources," using the methodology described below.

Impact Analysis Methodology – Northern Wild Monkshood

Aerial imagery and topographic maps were reviewed to determine if the Shaft 2A Study Area has the potential to contain suitable northern wild monkshood habitat. For this site, a desktop analysis using ArcGIS was conducted to determine the potential for impacts to northern wild monkshood from the inspection and repair, based on the proposed activities and the proximity to suitable habitat (e.g., topography, proximity of streams).

State Listed Species

Two species currently under State protection were identified as having the potential to occur within the study areas. No species proposed for listing were identified. Therefore, a screening assessment for these two species was conducted. For these two species, the inspection and repair activities within each of the study areas was evaluated, and site visits were conducted to determine if there was the potential for disturbance to the species or its habitat. Based on this screening assessment, both species were identified to have the potential to be affected by the inspection and repair within one or more of the study areas. The species-specific impact analysis methodology for these two species is provided below.

Timber Rattlesnake (Crotalus horridus)

The timber rattlesnake (*Crotalus horridus*) is a State Threatened Species. Timber rattlesnakes inhabit primarily deciduous forests in mountainous terrain. However, in summer they can be found in coniferous forests, mixed forests, and old fields, and near wetlands (Gibbs et al. 2007). Timber rattlesnakes find dens to overwinter that are located on mountain slopes with southern

exposure, where canopy coverage is less than complete, and where there is access to subterranean environments. The species does not reach reproductive maturity until 4 to 11 years of age and has declined primarily due to loss of habitat, illegal collection, and hunting. The timber rattlesnake is found in the Hudson Highlands, in addition to populations in the Catskill and Shawangunk Mountains.

Screening Assessment

The Herp Atlas indicates that the timber rattlesnake has the potential to occur in the region proximate to the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and the Shaft 2A and Wawarsing Leak Repair Study Area. NYNHP identified that timber rattlesnake hibernacula occur within 1.5 miles of the Rondout Effluent Chamber and Shaft 1 study areas and the Shaft 2A Study Area. According to these sources, timber rattlesnake and timber rattlesnake hibernacula do not have the potential to occur within the Shaft 8 and 9 study areas. Therefore, there are no effects to timber rattlesnakes or their habitat within these study areas and a natural resources impact analysis is not warranted.

The potential for impacts to timber rattlesnake and its habitat associated with the inspection and repair within the Rondout Effluent Chamber Study Area, Shaft 1 Study Area, and Shaft 2A Study Area were evaluated in the respective "Natural Resources" sections for these study areas using the methodology described below.

Impact Analysis Methodology – Timber Rattlesnake

Aerial imagery and topographic maps were reviewed to determine if these study areas have the potential to contain suitable timber rattlesnake habitat. For these study areas, a desktop analysis using ArcGIS was conducted to determine the potential for impacts to timber rattlesnake from the inspection and repair, based on the proposed activities and the proximity to suitable habitat.

Allegheny Woodrat (Neotoma magister)

The Allegheny woodrat (*Neotoma magister*) is a State Endangered Species. In the State, Allegheny woodrat habitat consists of extensive boulder fields at the bases of ridges with rock outcrops or talus slopes. Allegheny woodrats may also inhabit caves or old mines (NYNHP 2013; NatureServe 2014). This species was once thought to have been mostly extirpated with the only known occurrence being in Rockland County, but new occurrences of the species have been discovered in Ulster and Orange counties.

Screening Assessment

No potential habitat for the Allegheny woodrat was identified using aerial imagery and USGS topographic desktop mapping within the Rondout Effluent Chamber site, or the Shaft 1, 8, and 9 sites. Therefore, there are no effects to Allegheny woodrats or their habitat within these study areas and a natural resources impact analysis is not warranted.

The only study area with suitable rocky habitat for this species, based on aerial imagery and topographic maps, is the Shaft 2A Study Area. The potential for impacts to Allegheny woodrat

and its habitat associated with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area was evaluated in the Section 11.6.9, "Natural Resources," using the methodology described below.

Impact Analysis Methodology – Allegheny Woodrat

A desktop analysis was conducted using ArcGIS to review aerial imagery and topographic maps to determine if the Shaft 2A site: has the potential to contain suitable Allegheny woodrat habitat; and the potential for impacts to this species during inspection and repair activities based on the proposed work within the site and the proximity to suitable habitat.

State Species of Special Concern

In addition to the federal and State protected species discussed above, 12 additional State Species of Special Concern were identified as having the potential to occur within the study areas. State Species of Special Concern are not currently protected species. They generally have stable populations, but may be declining in all or part of their range, or a significant threat to the species has been identified. For these 12 species, the inspection and repair activities within each of the study areas was evaluated to determine if there is the potential for disturbance to the species or its habitat.

State Species of Special Concern identified as having the potential to be located within the inspection and repair study areas are:

- Blue-spotted salamander (*Ambystoma laterale*)
- Cooper's Hawk (*Accipiter cooperii*)
- Eastern box turtle (*Terrapene carolina*)
- Eastern hognose snake (*Heterodon platyrhinos*)
- Eastern small-footed myotis (*Myotis leibii*)
- Jefferson salamander (*Ambystoma jeffersonianum x laterale*)
- Marbled salamander (*Ambystoma opacum*)
- New England cottontail (*Sylvilagus transitionalis*)
- Red-shouldered Hawk (*Buteo lineatus*)
- Sharp-shinned Hawk (*Accipiter striatus*)
- Spotted turtle (*Clemmys guttata*)
- Wood turtle (*Glyptemys insculpta*)

The limits of ground disturbance for the inspection and repair activities are confined to previously disturbed areas within the Rondout Effluent Chamber sites and Shaft 1, 2A, 8, and 9 sites. These sites are covered with either gravel or mowed lawn, neither of which is preferred habitat for any of these species. Following completion of the inspection and repair, the Rondout

Effluent Chamber and all shaft sites would be restored to baseline conditions. No ground disturbance is proposed in the Leak Repair Study Area, and therefore no impact analysis is warranted.

The inspection and repair activities at the sites would be small in scale and short in duration, taking place over an approximately 8-month period, with site preparation commencing up to 6 months in advance of the 8-month period. Activities at the Rondout Effluent Chamber, Shaft 1, Shaft 8, and Shaft 9 sites would peak during the condition assessment, which would occur over approximately 6 weeks. Activities at the Shaft 2A site would peak during the condition assessment and the repair, which would occur over approximately 4 months. There may be temporary noise-related impacts that discourage State Species of Special Concern from occupying the vicinity of the inspection and repair sites. However, following completion of the inspection and repair, the State Species of Special Concern near the inspection and repair sites, if any, would be anticipated to be unaffected. As discussed in Section 11.3.8.1, "Water Resources," the inspection and repair is not anticipated to impact surface water resources. Therefore, the State Species of Special Concern that inhabit or forage in surface water would not be affected by an impact to that component of their habitat.

Based on this information, there would be no disturbance associated with the inspection and repair to State Species of Special Concern or their habitat within the inspection and repair study areas. Therefore, there are no effects to State Species of Special Concern or their habitat within these study areas and a natural resources impact analysis is not warranted.

Unlisted Rare and Vulnerable Species

In addition to the federal/State listed species and State Species of Special Concern discussed above, other unprotected species considered rare or vulnerable to disturbance and tracked by NYNHP were considered. However, NYNHP did not identify any of these species as occurring or potentially occurring in the study areas. Therefore, a natural resources impact analysis related to unlisted rare and vulnerable species within the study areas is not warranted.

11.3.9 HAZARDOUS MATERIALS

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes in exposure to hazardous materials in the study areas from activities where ground disturbance would be required: at the Rondout Effluent Chamber site and shaft sites; and within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could increase pathways to human or environmental exposure to hazardous materials within the surrounding study areas. The potential transport of contaminated groundwater near the site of the landfill in the Town of Wawarsing associated with inspection and repair activities is presented in Section 11.3.8.1, "Water Resources."

11.3.9.1 Screening Assessment

The screening assessment evaluated the construction activities to determine the study areas where ground disturbance would be performed for the inspection and repair. In addition, the screening assessment identified the study areas that would potentially be used to temporarily

store back-up fuel supplies and chemicals or petroleum substances for trucks and equipment. Because ground disturbance and/or temporary storage or use of hazardous materials would occur within the study areas, the potential for impacts from the presence or disturbance of hazardous materials associated with the inspection and repair were evaluated in the respective "Hazardous Materials" sections using the methodology described below.

11.3.9.2 Impact Analysis Methodology

The impact analysis consists of: (1) establishing and describing baseline and future conditions without the inspection and repair project; (2) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (3) analyzing the potential for changes in exposure to hazardous materials within the surrounding study areas. To establish the baseline and future conditions, a hazardous materials assessment, in accordance with the American Society for Testing and Materials (ASTM) E1527-00 guidelines, was performed of the Rondout Effluent Chamber, and Shaft 1, 2A, 8, and 9 study areas. Additionally, a desktop analysis of Environmental Data Resources proprietary records that include numerous federal and State environmental databases, which are listed below, was performed.

The potential for hazardous material impacts was analyzed using the following federal, State, and proprietary environmental databases, resources, and records, in accordance with ASTM E1527-00 guidelines:

- Federal Databases and Records
  - National Priority List (NPL) database
  - NPL LIENS: Federal Superfund Liens
  - Delisted NPL database
  - Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database
  - CERCLIS - No Further Remedial Action Planned (NFRAP) database
  - Resource Conservation and Recovery Act Corrective Action Sites (RCRA-CORRACTS)
  - RCRA Information System (RCRIS) - Treatment, Storage and Disposal (TSD) database
  - RCRA Generator (RCRAGN) database
  - RCRA Non-Generator/No Longer Regulated (RCRA NonGen/NLR) database
  - Emergency Response Notification System (ERNS)
  - Federal Institutional Controls/Engineering Controls (EC/IC) Registries (Federal and State Lists)
  - Facility Index System (FINDS) database

- New York State Databases and Records
  - National Priority List (NPL) database for New York State
  - State Hazardous Waste Site (SHWS)/Hazardous Substance Waste Disposal Sites (HSWDS) databases
  - Inactive Hazardous Waste Disposal Sites (IHWDS) database
  - Vapor Reopened
  - Solid Waste Facilities/Landfills (SWF/LF) database
  - Hazardous Waste Manifest System
  - Leaking Underground Storage Tank (LUST)/Leaking Storage Tank (LTANK) database
  - Spills database
  - Underground Storage Tank (UST) and Aboveground Storage Tank (AST) database
  - Chemical Bulk Storage (CSB) - (AST/UST) databases
  - Historic/Landmark lists locations on the National Register of Historic Places
  - Voluntary Cleanup Program (VCP) database
  - Brownfields Sites database
  - State Pollutant Discharge Elimination System (SPDES)
  - Polychlorinated biphenyl (PCB) Activity Database (PADS)
- Environmental Data Resources (EDR) Proprietary Records
  - Manufactured Gas Plants (MGP)
  - Dry Cleaners and Historic Cleaners databases
  - Historic Auto Stations

11.3.10 WATER AND SEWER INFRASTRUCTURE

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in impacts to water and sewer infrastructure in the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.3.10.1 Screening Assessment

The inspection and repair activities at the Rondout Effluent Chamber Study Area and shaft study areas would be minimal and temporary. They would not result in the need for increased water service or treatment capacity. Therefore, a water and sewer impact analysis within these study areas is not warranted.

The permanent cessation of RWBT leaks within the Leak Repair Study Area, which lies within the Shaft 2A and Wawarsing Leak Repair Study Area, could affect water and sewer within this study area. Specifically, potential impacts to water and sewer infrastructure resulting from the temporary shutdown and inspection and repair could be caused by a decline in groundwater levels associated with unwatering of the RWBT and cessation of leaks. Lowering of the groundwater level within the Leak Repair Study Area could affect the ability of a private well to supply a home with water. However, lowering the groundwater level would not affect the ability of a septic system to dispose of wastewater. Therefore, the potential for impacts to water and sewer infrastructure within this study area is evaluated in Section 11.6.11, "Water and Sewer Infrastructure," using the methodology described below.

11.3.10.2 Impact Analysis Methodology

The analysis to evaluate the potential for impacts to water and sewer infrastructure within the Leak Repair Study Area as a result of the repairs consisted of:

(1) Identifying parcels of land within the study area that do not have access to public water supply through the use of aerial imagery and town tax billing information;

(2) Describing the baseline conditions of groundwater levels within the Leak Repair Study Area using the USGS data summarized in Section 11.6.9.1, "Water Resources";

(3) Describing the future groundwater conditions without the inspection and repair; and

(4) Describing future groundwater levels for those parcels that have a potential water supply well, or that could be developed in the future, and that could be affected by lower water levels during the temporary shutdown and from permanent cessation of the RWBT leaks. Only those parcels with an existing structure on the property were assumed to have an existing groundwater supply well to provide water.

11.3.11 ENERGY

This section presents the screening assessment of the potential for the inspection and repair to result in changes to energy supply or demand in the study areas from activities at the Rondout Effluent Chamber site and four shaft sites that could generate energy demands within the surrounding study areas. The permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area is not expected to result in changes to energy supply or demand.

11.3.11.1 Screening Assessment

The inspection and repair would require energy use at the Rondout Effluent Chamber site and shaft sites primarily for the installation and operation of ventilation, hoisting, and communication systems; the use of equipment during the inspection and repair; and vehicle use on and off site. Energy would be required to operate the ventilation fans, hoisting, and communication systems; a gas heater for ventilating hot air during cold weather; all-terrain vehicles used within the RWBT to transport inspectors viewing the tunnel segments; and equipment used to repair the

RWBT. To support the inspection and repair, diesel-powered generators would be used to generate energy at the sites. Fossil fuels would be used by trucks and cars within the Rondout Effluent Chamber Study Area and shaft sites that would transport construction materials and personnel to and from the sites. Following completion of the inspection and repair, the sites would be restored to baseline conditions. As a result, the energy demand required by the inspection and repair could be met without significant impact on the power requirements of the surrounding community and without significant need for additional power generation capacity from the national power grid. Therefore, an energy impact analysis within the study areas is not warranted.

11.3.12 TRANSPORTATION

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to transportation in the study areas from activities at the Rondout Effluent Chamber site and shaft sites that could alter traffic flow, volume, or parking within the surrounding study areas. The permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area is not expected to result in changes to transportation.

11.3.12.1 Screening Assessment

The inspection and repair is not anticipated to generate pedestrian or public transit trips. However, the inspection and repair would include vehicles traveling to and from the Rondout Effluent Chamber site and shaft sites. The transportation impact analysis takes into account such factors as location, extent, and intensity of construction activities. The estimated number of vehicles that would be temporarily generated by inspection and repair and an analysis of potential impacts are evaluated in the respective "Transportation" sections for each study area using the methodology described below.

11.3.12.2 Impact Analysis Methodology

The impact analysis consisted of: (1) establishing and describing the baseline conditions within the applicable study area by identifying existing traffic conditions, public transportation, and pedestrian activity in the immediate vicinity of the work sites; (2) establishing future conditions without the inspection and repair by identifying proposed projects that would result in changes in land use or an increase in traffic within the study areas that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair based on the temporal distribution of the proposed construction vehicles traveling to the work sites and staging areas for the inspection and repair based on the proposed activities within the study area; (4) determining the peak-hour vehicle trips (including transportation Passenger Car Equivalents (PCEs), for inbound and outbound trips) that would temporarily be generated by the inspection and repair within the study area such that 50 percent of construction workers would carpool to the study area; and (5) analyzing the potential for impacts from the inspection and repair based on the estimated number of vehicles (converted to transportation PCEs) that would be temporarily generated and the duration of the activity. The analysis considers: the extent and duration of increases in vehicle trips from inspection and repair workers and equipment; street, roadway, or sidewalk closures; potential for impacts on parking supply; and losses in other transportation services during the inspection and repair within the study areas.

11.3.13 AIR QUALITY

This section presents the screening assessment of the potential for the inspection and repair to result in changes to air quality in the study areas from activities at the Rondout Effluent Chamber site and shaft sites that could generate air quality emissions from stationary and/or mobile sources. The permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area is not expected to result in changes to air quality.

11.3.13.1 Screening Assessment

The inspection and repair construction activities would be minimal and temporary. Air quality emissions from mobile and stationary sources associated with the inspection and repair primarily consist of construction equipment, including worker and delivery vehicles, fugitive dust emissions associated with excavation and grading activities, and diesel exhaust from heavy equipment. The number of heavy equipment units needed at a given location within the inspection and repair study areas at a single time is expected to be very limited (e.g., generator, grader, excavator, fans, material delivery trucks). In addition, there are no sensitive receptors immediately adjacent to the inspection and repair sites.

Once construction is completed, the construction equipment and vehicles would be removed from the work sites. The inspection and repair activities would be small in scale and short in duration, taking place over an approximately 8-month period, with site preparation activities commencing up to 6 months in advance of the 8-month period. Following completion of the inspection and repair, the sites would be restored to baseline conditions. Therefore, an air quality impact analysis within the study areas is not warranted.

11.3.14 NOISE

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to noise in the study areas from activities at the Rondout Effluent Chamber site and shaft sites that could alter noise within the surrounding study areas by generating noise emissions from construction-related stationary and/or mobile sources. The permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area is not expected to result in changes to noise.

11.3.14.1 Screening Assessment

Stationary Noise

The stationary noise source screening assessment considered noise-sensitive receptors within 1,500 feet of the Rondout Effluent Chamber site and Shaft 1, 2A, 8, and 9 sites and included an evaluation of the stationary noise sources to be used at the sites.

The stationary noise construction analysis accounts for such factors as location of the work activities in relation to noise-sensitive receptors and the magnitude and intensity of work activities. If noise-sensitive receptors would be located within 1,500 feet of constant stationary noise sources to be used for the inspection and repair, a stationary noise impact analysis was conducted. Based on the screening assessment, there would be temporary, stationary, noise-generating equipment used constantly during construction at the Rondout Effluent

Chamber site and Shaft 1, 2A, 8, and 9 sites for operation of ventilation, hoisting, and communication systems. This noise-generating equipment would be within 1,500 feet of noise-sensitive receptors within these study areas. In addition, a stationary noise impact analysis was performed to determine whether construction would comply with local noise code scheduling requirements and quantitative noise limits. Therefore, the potential for stationary construction noise impacts associated with the inspection and repair is evaluated in their respective "Noise" sections for the study areas using the methodology described below.

Mobile Noise

The mobile noise construction analysis accounts for such factors as location of the work activities in relation to noise-sensitive receptors and the magnitude and intensity of work activities. Mobile construction noise sources would include vehicles traveling to and from the work sites within the study areas that would range from approximately 42 to 120 peak-day vehicle trips (1,330 to 4,996 noise PCEs). The peak-hour project-related traffic would range from approximately 17 to 33 vehicle trips (approximately 523 to 1,275 noise PCEs). However, the inspection and repair activities would be short in duration, taking place over an approximately 8-month period, with site preparation activities commencing up to 6 months in advance of the 8-month period. Activities at the Rondout Effluent Chamber, Shaft 1, Shaft 8, and Shaft 9 sites would peak during the condition assessment, which would occur over approximately 6 weeks. Activities at the Shaft 2A site would peak during the condition assessment and the repair, which would occur over approximately 4 months. Following completion of the inspection and repair, the sites would be restored to baseline conditions. Therefore, a noise impact analysis related to mobile noise associated with the inspection and repair within the study areas is not warranted.

11.3.14.2 Impact Analysis Methodology – Stationary Noise

The impact analysis consisted of: (1) establishing and describing the baseline conditions within the applicable study area by identifying existing noise levels and sources; (2) establishing future conditions without the inspection and repair by identifying proposed projects that would result in a change in land use or new noise-generating sources that would contribute to an increase in ambient noise levels within the study areas that are anticipated to be completed by the analysis year; (3) establishing noise levels that would be received at the area of outdoor use of a noise-sensitive receptor from construction equipment to be used for the inspection and repair at the work sites based on the proposed activities within the study area; and (4) analyzing the potential for impacts from the inspection and repair by determining if the construction schedule and noise levels that would be emitted from construction equipment in the future with the inspection and repair would comply with local codes.

Existing noise levels within the study areas were estimated using typical noise levels for residential land uses obtained from American National Standards Institute/Acoustical Society of America S12.9 Part 3 (2013) and are shown in **Table 11.3-14**. The existing noise levels selected for the study areas are comparable to a very quiet suburban and rural residential environment based on proximity to major transportation corridors, population density of the areas, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA L_{eq} during the day and 34 dBA L_{eq} at night.

Table 11.3-14: Typical Daytime and Nighttime Noise Levels for Residential Land Use Categories

Residential Land Use Category	Daytime Noise Levels (L_{eq}, dBA)	Nighttime Noise Levels (L_{eq}, dBA)
Very noisy urban residential	66	58
Noisy urban residential	61	54
Urban and noisy suburban residential	55	49
Quiet urban and normal suburban residential	50	44
Quiet suburban residential	45	39
Very quiet suburban and rural residential	40	34
Source: American National Standards Institute/Acoustical Society of America S12.9 Part 3 (2013).		

Reference equipment noise levels for the impact analyses were obtained from the *CEQR Technical Manual* and/or equipment manufacturers. Because only constant noise sources were considered (e.g., ventilation systems), each piece of equipment was given a usage factor of 100 percent. Spreadsheet calculations were performed to estimate stationary noise levels at the property line or the nearest noise-sensitive receptors, as applicable. The number and types of noise-generating equipment analyzed were based conservatively on peak construction operating conditions. The equipment was assumed conservatively to be located in close proximity to each other at the center of the site. The reference noise levels were adjusted to the appropriate distance, assuming free field conditions with attenuation from existing dense tree zones, if applicable.[3] The amount of tree zone attenuation was based on methods from the Federal Transit Administration's Transit Noise and Vibration Impact Assessment.

If the estimated noise levels were predicted to exceed local noise code requirements, or if construction activities would occur during time periods prohibited by local noise codes, DEP would work with the Town(s), as appropriate.

11.3.15 NEIGHBORHOOD CHARACTER

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to neighborhood character in the study areas from: activities at the Rondout Effluent Chamber site and shaft sites; and activities and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area. These changes were evaluated to determine whether they could generate significant adverse effects in any of the technical areas that are considered when analyzing neighborhood character. These technical areas include: land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; and noise.

[3] Free field conditions refers to an environment free from obstructions that could affect the way sound travels away from the noise source.

11.3.15.1 Screening Assessment

Based on the screening assessments presented above for inspection and repair, there would be no potential for inspection and repair to affect land use and zoning; socioeconomic conditions; shadows; and urban design. However, an impact analysis is warranted for public policy, open space and recreation, historic and cultural resources, visual resources, transportation, and noise, as discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," Section 11.3.5, "Open Space and Recreation," Section 11.3.6, "Historic and Cultural Resources," Section 11.3.7, "Visual Resources," Section 11.3.12, "Transportation," and Section 11.3.14, "Noise." Therefore, the potential for impacts to neighborhood character from potential impacts in these categories within the study areas was evaluated in the respective "Neighborhood Character" sections using the methodology described below.

11.3.15.2 Impact Analysis Methodology

The impact analysis consisted of: (1) establishing and describing the baseline neighborhood character conditions for the study areas; (2) establishing future conditions without the inspection and repair by identifying proposed projects that would alter neighborhood character within the study areas that are anticipated to be completed by the analysis year; (3) establishing future conditions with the inspection and repair based on the proposed activities within the study area; and (4) analyzing the potential impacts from the inspection and repair to neighborhood character through a qualitative assessment of the potential for impacts from the inspection and repair based on adverse effects from one or a combination of the technical areas that could cumulatively affect a neighborhood's defining features. If the inspection and repair would potentially result in significant direct or indirect change(s) to a factor contributing to the study areas' neighborhood character, the degree and type of such change was evaluated.

11.3.16 PUBLIC HEALTH

This section presents the screening assessment and analyzes the potential for the inspection and repair to result in changes to public health in the study areas due to significant unmitigated adverse impacts associated with air quality, water supply (quantity and quality), hazardous materials, and noise from: activities at the Rondout Effluent Chamber site and shaft sites and reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.3.16.1 Screening Assessment

Based on the screening assessments presented above in Section 11.3.13, "Air Quality," there would be no potential for air quality impacts from the inspection and repair. However, an analysis is warranted for water supply (quantity and quality), hazardous materials, and noise. These are discussed in the following sections: Section 11.3.8, "Natural Resources," Section 11.3.9, "Hazardous Materials," Section 11.3.10, "Water and Sewer Infrastructure," and Section 11.3.14, "Noise." Therefore, the potential for impacts to public health within the study areas were evaluated in the respective "Public Health" sections using the methodology described below.

Since the residents in the Leak Repair Study Area rely on groundwater as a drinking water source, the potential for impacts to public health due to changes in groundwater quantity and quality within the Leak Repair Study Area was evaluated in Section 11.6.15, "Public Health," using the methodology described below to ensure they remain within acceptable drinking water standards.

11.3.16.2 Impact Analysis Methodology

The impact analysis consisted of assessing the potential for an unmitigated significant adverse impact from the inspection and repair in one or more of the public health-related assessment areas: water supply (quantity and quality), hazardous materials, and noise.

As stated above, the primary source of drinking water in the Leak Repair Study Area is groundwater from water supply wells in the unconsolidated and bedrock aquifers. As described in Section 11.3.8.1, "Water Resources," and Section 11.3.10, "Water and Sewer Infrastructure," impact analyses were completed to evaluate the potential changes to groundwater resources and water supply wells.

The potential for impacts to public health from effects on the water supply (quantity and quality) in the Leak Repair Study Area was analyzed by: (1) describing baseline conditions of groundwater quality by summarizing the data within the USGS reports and comparing them to applicable drinking water standards; (2) defining the area where groundwater quantity and quality changes could occur based on the hydrogeology and the RWBT leak influence; (3) describing future groundwater quantity and quality without the inspection and repair; and (4) assessing possible changes in groundwater quantity and quality during the temporary shutdown and due to permanent cessation of RWBT leaks.

11.4 RONDOUT EFFLUENT CHAMBER STUDY AREA IMPACT ANALYSIS

The Rondout Effluent Chamber Study Area is located at the head of the RWBT in the Town of Wawarsing, Ulster County, New York. As described in Section 11.2, "Project Description," the Rondout Effluent Chamber Study Area would serve primarily as a ventilation location during the condition assessment of the inclined tunnel between the Rondout Effluent Chamber and Shaft 1. Repair work would also be performed within the Rondout Effluent Chamber during this time. Activities to ready the site would begin up to 6 months before the temporary shutdown of the RWBT. During the temporary shutdown, once the inspection and repair has begun, it is anticipated that the condition assessment for the inclined tunnel at the Rondout Effluent Chamber would last approximately 7 days. The section below provides further description of the existing Rondout Effluent Chamber Study Area and study area conditions, as well as the inspection and repair activities that would be performed at this site.

The potential for impacts to public policy; open space and recreation; visual resources; natural resources, consisting of federal/State Threatened and Endangered Species; hazardous materials; transportation; noise; neighborhood character; and public health associated with the inspection and repair within the Rondout Effluent Chamber Study Area are discussed below. As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," an impact analysis related to land use and zoning; socioeconomic conditions; community facilities and services; historic and cultural resources; other natural resources subcategories, including water resources; geology and soils, aquatic and benthic resources; terrestrial resources, wildlife; federal/State Candidate Species, State Species of Special Concern and unlisted rare and vulnerable species; water and sewer infrastructure; energy; and air quality within the Rondout Effluent Chamber Study Area is not warranted.

11.4.1 RONDOUT EFFLUENT CHAMBER STUDY AREA PROJECT DESCRIPTION

11.4.1.1 Description of Existing Site and Study Area

The Rondout Effluent Chamber site consists of approximately 3 acres of an approximately 2,300-acre property owned by DEP at the head of the RWBT in the Town of Wawarsing (Tax ID 66.4-1-29, Block 1, Lot 29). The site is bounded by State Route 55 to the south, wooded areas to the west and east, and Rondout Reservoir to the north, as shown on **Figure 11.4-1**. The site is accessible via a 15-foot wide paved private road connected to State Route 55. The existing land uses within the circular 0.25-mile Rondout Effluent Chamber Study Area include public services, single-family residential, and vacant land, as shown on **Figure 11.4-2**.

The Rondout Effluent Chamber site is located in a rural residential (RU) zoning district within the Town of Wawarsing, as shown on **Figure 11.4-3**. A rural residential (RU) zoning district is intended to limit the density of development and may accommodate larger land uses involving agriculture or recreation (§112-5 Enumeration of Districts of the Town of Wawarsing Zoning Code). Permitted uses within this district include agricultural land uses, bed and breakfasts, conservation subdivisions, farm produce stands, greenhouses, mining and extractive uses, nurseries, places of worship, timber harvesting, public and semi-public uses, public buildings,

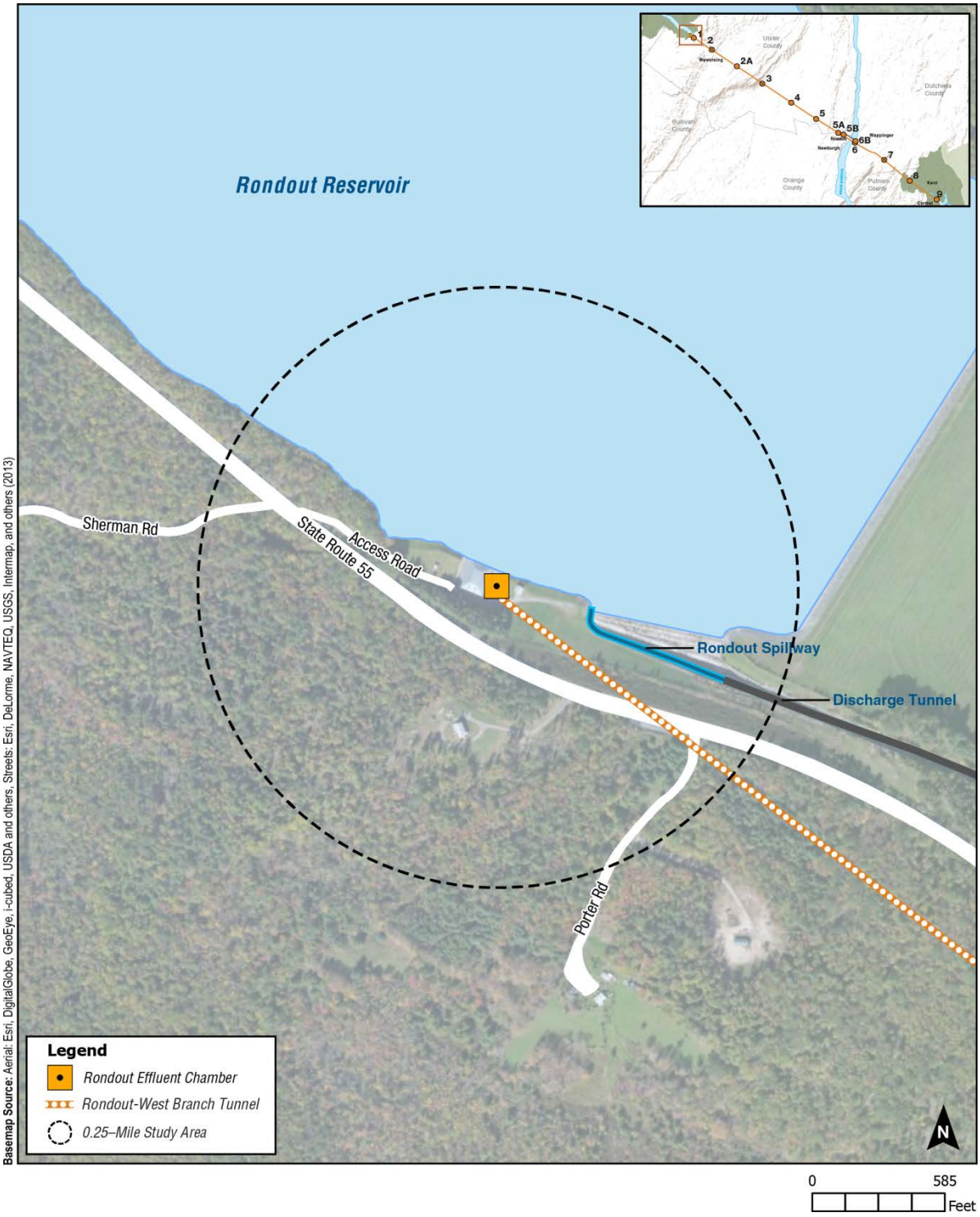


Figure 11.4-1: Site Location – Rondout Effluent Chamber Study Area

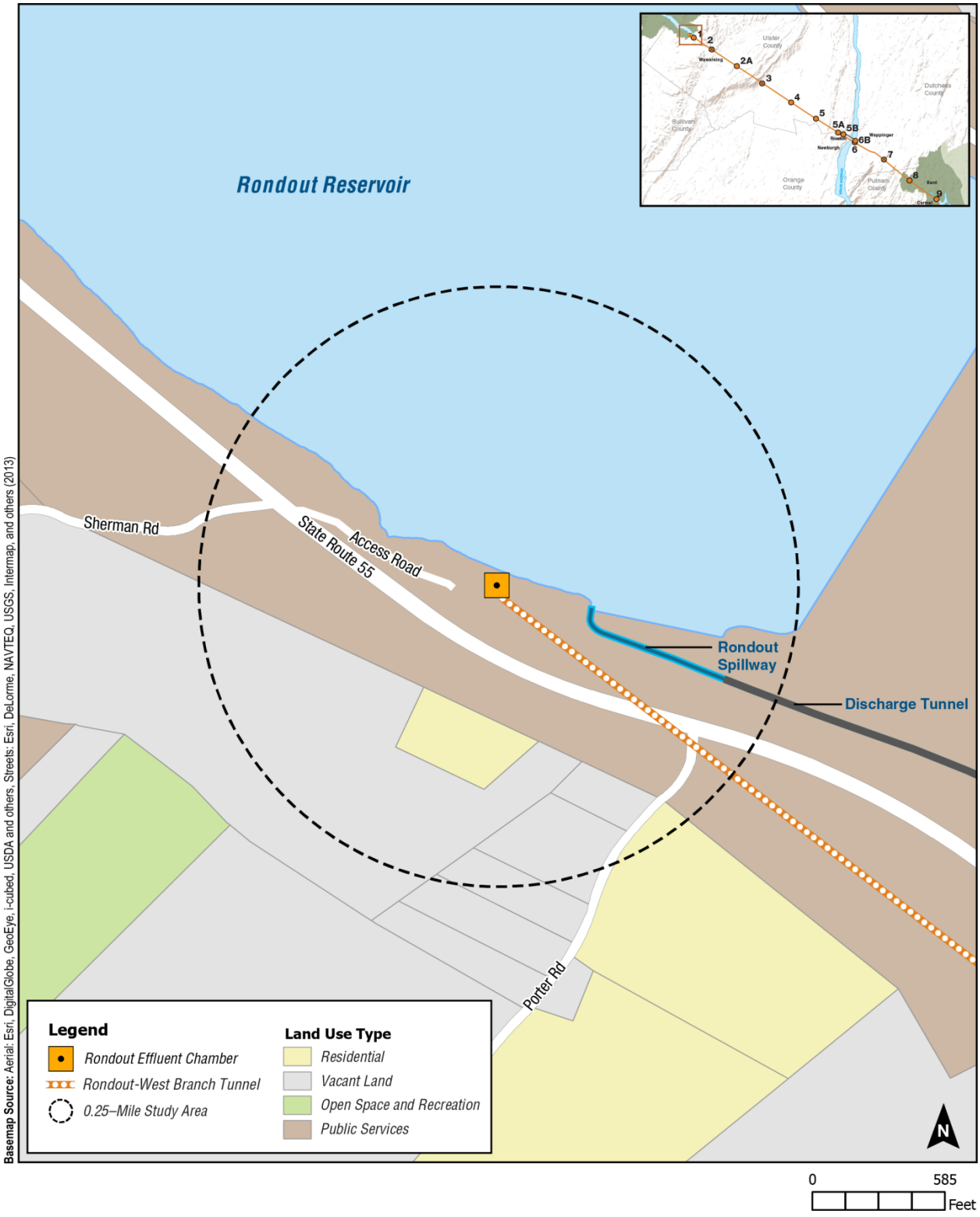


Figure 11.4-2: Land Use – Rondout Effluent Chamber Study Area

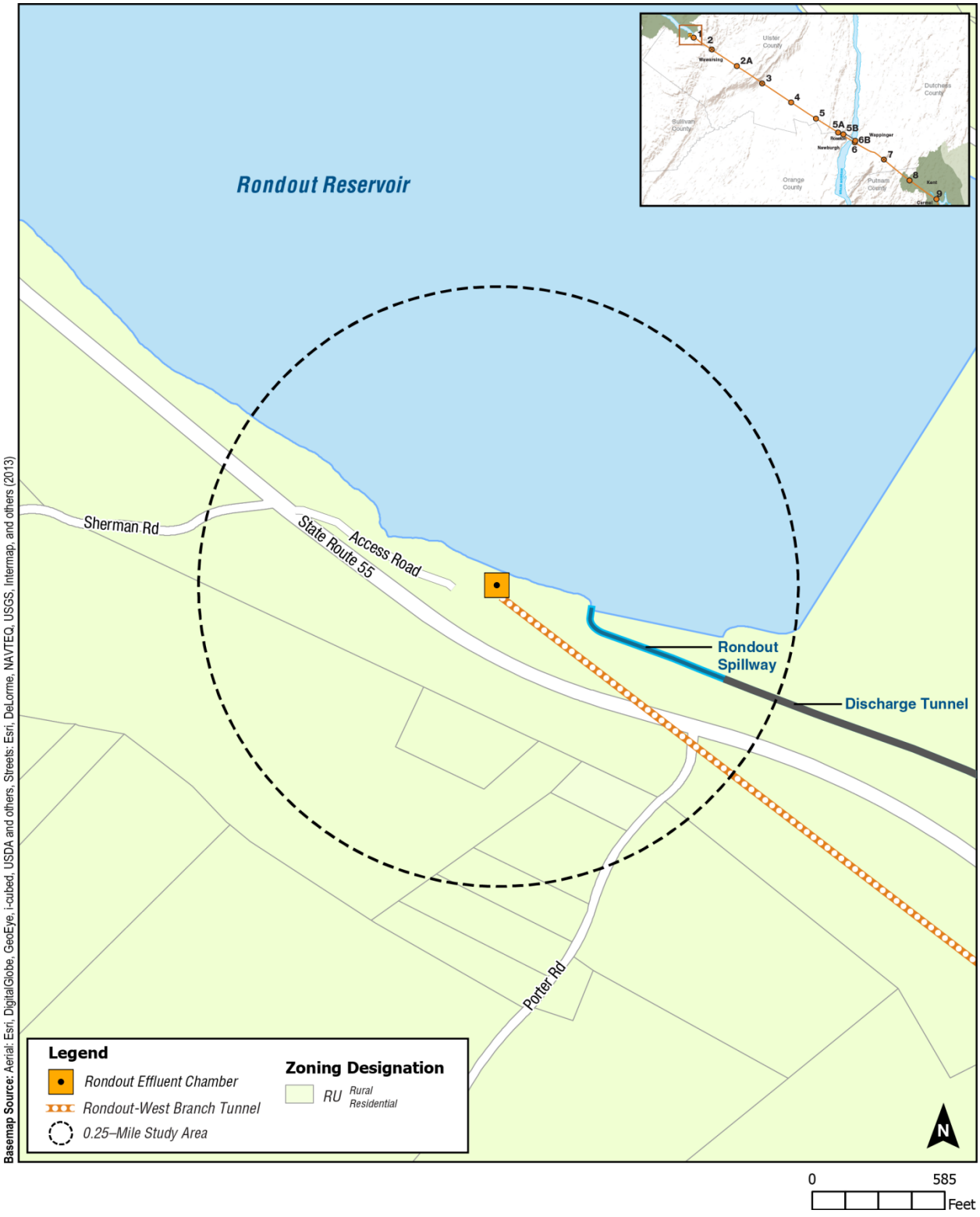


Figure 11.4-3: Zoning – Rondout Effluent Chamber Study Area

public parks and playgrounds, single-family detached dwellings, and two-family dwellings. The Rondout Effluent Chamber constitutes a public service use, which is a permitted use within the rural residential (RU) zoning district.

11.4.1.2 Proposed Activities at the Rondout Effluent Chamber Site

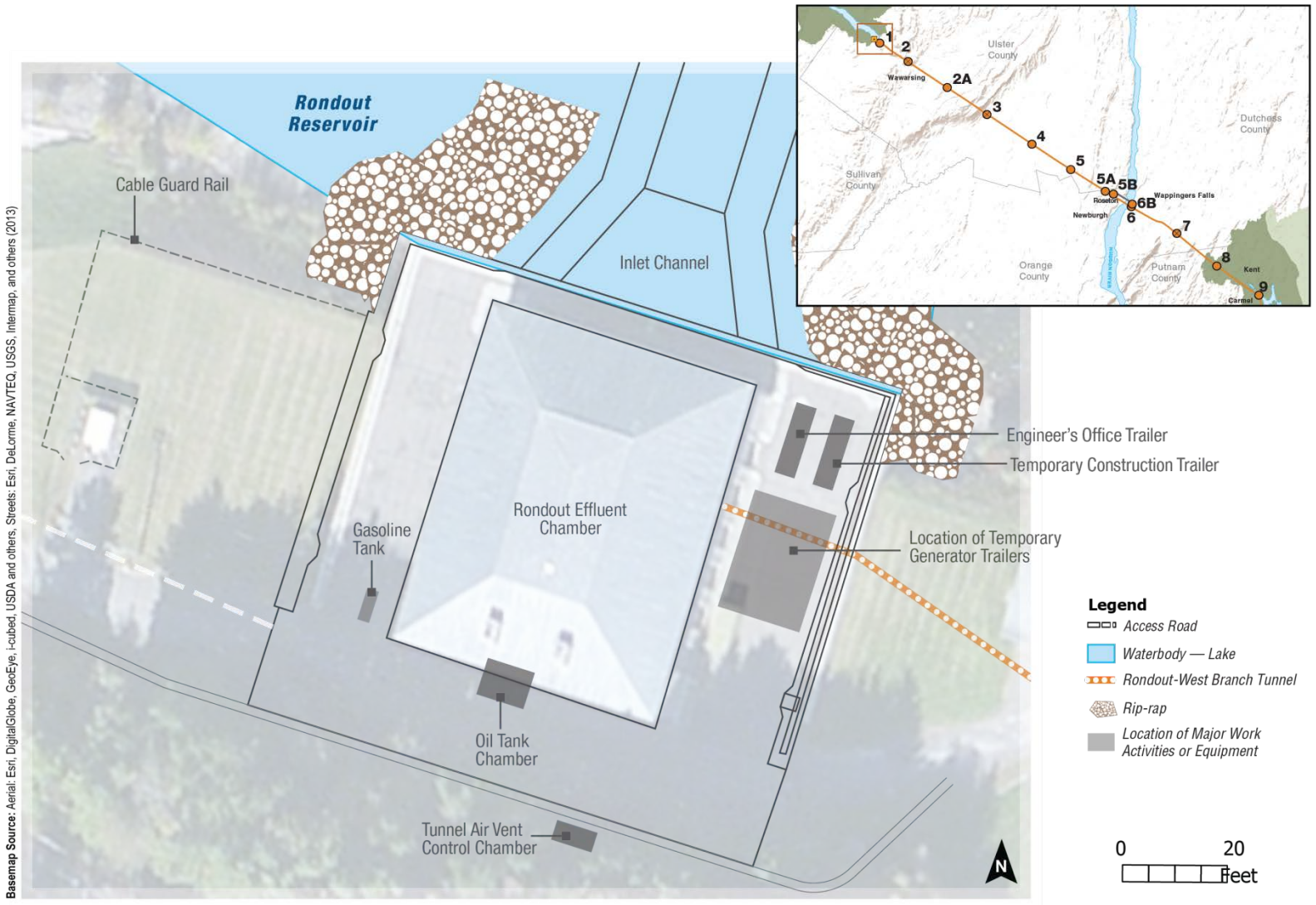
As described above, the Rondout Effluent Chamber site would be primarily a ventilation location during the inspection and repair. The site would also support mechanical repairs internal to the Rondout Effluent Chamber.

Access to the site would be provided via the existing paved private road. The activities anticipated at the Rondout Effluent Chamber site include: site preparation beginning up to 6 months before the RWBT temporary shutdown; installation of ventilation and communication systems; installation of two temporary office/construction trailers, two generators mounted on trailers, and double containment bulk fuel oil storage tanks for the generators; establishment of parking areas; construction of temporary barriers to prevent and contain any spills; and, finally, demobilization and site restoration.

Once the RWBT temporary shutdown begins, the site would be used to support the inspection and repair, including installation and operation of a ventilation system at the existing air pipe vent. Mechanical repairs would also be undertaken at the Rondout Effluent Chamber during this time. As shown on **Figure 11.4-4**, all disturbance and activities would occur within the Rondout Effluent Chamber site footprint. Although the property is approximately 2,300 acres, the area used during the inspection and repair would be limited to approximately 3 acres, though most of the inspection and repair activities would be contained within the Rondout Effluent Chamber site (see **Figure 11.4-4**). Once the inspection and repair is completed, the site would be restored to baseline conditions.

The Rondout Effluent Chamber site would also be used for staging and as a work area to construct temporary siphon pipes over the Merriman Dam Spillway that is immediately adjacent to the Rondout Effluent Chamber to support Water for the Future Shutdown System Operations (WSSO), described further in Chapter 10, "Water for the Future Shutdown System Operations." Construction of the temporary siphons would begin in April 2021, almost 1 year in advance of site preparation activities for the inspection and repair, and would occur over a 6-month period. Temporary siphons would be operating as needed during the 8-month temporary shutdown over the Merriman Dam Spillway.

Site preparation at the Rondout Effluent Chamber site would begin in March 2022, up to 6 months before the temporary shutdown of the RWBT and would occur only Monday through Friday between 7 AM and 7 PM. Activities would include the installation of soil and erosion control measures on the inside of the existing perimeter fence and a tire washing system between the Rondout Effluent Chamber and the gate to the public roadway. It is anticipated that a minimal amount of debris is located at the bottom of the Rondout Effluent Chamber, which would be removed as part of the site preparation work and trucked to appropriate off-site waste disposal facilities. Barriers would be installed around the Rondout Effluent Chamber on the inside of the existing perimeter fence to protect personnel during inspection and repair activities.



Note: The gray lines show the edge of the work area/site and outline other features of the existing shaft site.

Figure 11.4-4: Rondout Effluent Chamber

Noise and vibration barriers would also be installed, as necessary. In addition, temporary security measures would be installed at the site that would be manned 24 hours per day, including jersey barriers, a security booth, and security cameras. During site preparation, ventilation and communication systems would be installed to support the condition assessment of the inclined portion of the RWBT between the Rondout Effluent Chamber and Shaft 1. Prior to conducting the proposed inspection, a ventilation fan would be installed at the existing air pipe vent to supply fresh air to the RWBT. Communication systems would also be installed to allow for continuous tunnel-to-surface communication. Construction materials to be stored at the site would include repair materials, bulk fuel for on-site use, and temporary barriers for spill containment. The types of equipment that may be used at the Rondout Effluent Chamber site would include construction vehicles (e.g., pickup trucks, flat trucks, and wheel loaders), 100-horsepower fans, cranes/hoists, 220-kilowatt generators, compressors, utility vehicles, grout plants, and air tracks, as well as grout and initial support equipment for the repair work.

Once the inspection and repair begins, work at the Rondout Effluent Chamber site would occur 7 days a week from 7 AM to 7 PM. At this time, the RWBT would be drained, which is anticipated to take approximately 20 days. After preparation at the bottom of Shaft 1 is complete, starting in mid-October 2022, the condition assessment would begin. Additional activities associated with mechanical repairs within the Rondout Effluent Chamber could include fabrication of new stop shutters, inspection and cleaning of existing slide grooves, and refurbishment of leaf gates to ensure that all components function properly. These mechanical repairs and the condition assessment would be completed by a single team consisting of approximately 15 workers, and are expected to last approximately 7 days. The peak activities at the site would occur during the condition assessment, which would take place over the course of approximately 1 week beginning in October 2022.

After the RWBT Bypass is connected and the inspection and repair is completed, demobilization from the Rondout Effluent Chamber site would commence, including removal of all equipment and materials. The site would be restored to baseline conditions by September 2023.

11.4.2 PUBLIC POLICY

As described in Section 11.3.2, "Land Use, Zoning, and Public Policy," a land use and zoning impact analysis for the inspection and repair within the Rondout Effluent Chamber Study Area is not warranted.

The study area for the public policy analysis is the area within 0.25 mile of the Rondout Effluent Chamber site, as shown on **Figure 11.4-1**. As discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," the inspection and repair's consistency with the applicable policies of the Ulster County Open Space Plan and the Town of Wawarsing Comprehensive Plan within the Rondout Effluent Chamber Study Area is analyzed as follows.

11.4.2.1 Ulster County Open Space Plan (2007)

The Ulster County Open Space Plan (Ulster County 2007) establishes a framework for the management and protection of open space resources identified by Ulster County. These include water resources, working landscapes, landforms and natural features, ecological communities, cultural and historic resources, and recreational resources. To provide guidance on these open

space resources, Ulster County has established the 10 "Principles of the Open Space Plan" that seek to safeguard the open space values of Ulster County. Of those 10 principles, two are applicable to the inspection and repair.

> *(1) Preserve and protect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty and the rural character of Ulster County.*

Open space and recreation resources, visual resources, terrestrial resources, and water resources were identified within the Rondout Effluent Chamber Study Area. The potential for impacts to these resources associated with the inspection and repair within this study area were evaluated in Section 11.4.3, "Open Space and Recreation," Section 11.4.4, "Visual Resources," and Section 11.4.5, "Natural Resources," respectively. As described in Section 11.3.6, "Historic and Cultural Resources," no historic and cultural resources were identified within this study area.

Under this principle, the Ulster County Open Space Plan recommends protecting valuable landforms and natural features in order to benefit residents and preserve the rural character of Ulster County. This principle was analyzed for inspection and repair as work in the study areas would potentially impact existing open space, visual resources, and natural resources, directly or indirectly.

As discussed in these sections, the inspection and repair would confined to an area not accessible to the general public at the existing DEP-owned Rondout Effluent Chamber site, and would be minimal and temporary. The inspection and repair at the Rondout Effluent Chamber would not impact the physical character of or affect views from the open space and recreation, including Rondout Reservoir; would not result in changes to the future visual and aesthetic resource conditions of the views to or from visual resources; and would have no significant adverse impacts to natural resources, including water resources. Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions.

As such, the inspection and repair within the Rondout Effluent Chamber Study Area would not affect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty, or the rural character of Ulster County. Therefore, the inspection and repair would be consistent with this principle.

> *(2) Protect and enhance the county's most valuable open space landforms and natural features with coordinated planning and safeguard policies.*

As described above, one open space and recreation resource was identified within the Rondout Effluent Chamber Study Area, Rondout Reservoir, and the potential for impacts to this resource associated with the inspection and repair within this study area was evaluated in Section 11.4.3, "Open Space and Recreation."

Under this principle, the Ulster County Open Space Plan recommends preserving the visual or ecological values of significant landforms and natural features in order to protect against inappropriate development. This principle was analyzed for inspection and repair as work in the study areas would potentially impact existing open space, directly or indirectly.

As discussed in Section 11.4.3, "Open Space and Recreation," the inspection and repair would be confined to an area not accessible to the general public at the existing DEP-owned Rondout Effluent Chamber site, and would be minimal and temporary. The inspection and repair at the Rondout Effluent Chamber would not impact the physical character of or affect views from the open space and recreation, including Rondout Reservoir. Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions.

As such, the inspection and repair at the Rondout Effluent Chamber site would not affect open space landforms and natural features within Ulster County. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Ulster County Open Space Plan and would not result in significant adverse impacts to public policy within Rondout Effluent Chamber Study Area.

11.4.2.2 Town of Wawarsing Comprehensive Plan (2006)

The Town of Wawarsing Comprehensive Plan (Town of Wawarsing 2006) is a guide for the Town's improvement and its future growth, development, and protection, and includes recommendations related to maintaining the town's growth and appearance while preserving the residential character, transportation services, and maintaining and improving public infrastructure. Recommendations within the Town of Wawarsing Comprehensive Plan establish a clear direction for the Town over a period of 3 to 5 years. The Comprehensive Plan does not discuss issues related to construction of individual projects or specific parcels or tracts of land. The Comprehensive Plan includes the following recommendation potentially relevant to effects of the inspection and repair:

- *Maintain and improve important public infrastructure.*

Under this principle, the Comprehensive Plan recommends the Town provide a variety of approaches to managing the Town's infrastructure system in order to identify and potentially avoid costs involved with deferred maintenance of Town facilities. This principle was analyzed for inspection and repair as work in the study area would potentially impact transportation, economic development, housing, and environmental policies directly or indirectly. The inspection and repair would support the long-term provision of water supply to the City's approximately 9 million water consumers. As such, the inspection and repair is considered a water infrastructure project of regional significance. However, the inspection and repair would not reduce or influence local public infrastructure. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Ulster County Open Space Plan and would not result in significant adverse impacts to public policy within Rondout Effluent Chamber Study Area.

11.4.3 OPEN SPACE AND RECREATION

The study area for the open space and recreation analysis is the area within 0.25 mile of the Rondout Effluent Chamber site, as shown on **Figure 11.4-5**.

There is one open space within the Rondout Effluent Chamber Study Area: the Rondout Reservoir, with surrounding watershed lands. Approximately 49 acres of Rondout Reservoir lies within the Rondout Effluent Chamber Study Area. Rondout Reservoir provides recreational opportunities in the form of fishing and is stocked with trout by NYSDEC. DEP provides site access via 30 gates surrounding the Rondout Reservoir. One of these access gates is located within the Rondout Effluent Chamber Study Area. Fishing at Rondout Reservoir is permitted at the shoreline or from non-motorized boats with a DEP watershed access permit and fishing license. Boat storage for use in the reservoir is provided by DEP along the shoreline. There are approximately 1,131 privately owned boats stored at the Rondout Reservoir, which are launched from the shoreline. However, as shown on **Figure 11.4-5**, DEP Recreation Rules restrict access within 500 feet of any dikes, dams, tunnel outlets, spillways, buildings, and other significant water supply structures (Watershed Rules and Regulations Part 16-15(b)(1)).

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no plans to expand or create new open space or recreational resources are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, are anticipated to continue. Use of the identified open space is anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that open space and recreation within the Rondout Effluent Chamber Study Area would be the same as baseline conditions.

Inspection and repair activities at the Rondout Effluent Chamber site would be temporary and would take place on DEP property within an area not accessible to the general public. The inspection and repair would not hinder boating and fishing on Rondout Reservoir. The potential for impacts to open space and recreation at Rondout Reservoir associated with shutdown operations of the water supply system is discussed in Chapter 10, "Water for the Future Shutdown System Operations." In addition, construction-related noise generated by the inspection and repair would not impact recreation since it would not be substantially louder than typical Rondout Effluent Chamber site operations, as described in Section 11.4.8, "Noise."

Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions. As such, the inspection and repair would not encroach upon, cause a loss of open space to, impact the physical character of, or affect views from the open space and recreation of the Rondout Reservoir, as described in Section 11.4.4, "Visual Resources."

Therefore, the inspection and repair would not result in significant adverse impacts to open space and recreation within the Rondout Effluent Chamber Study Area.

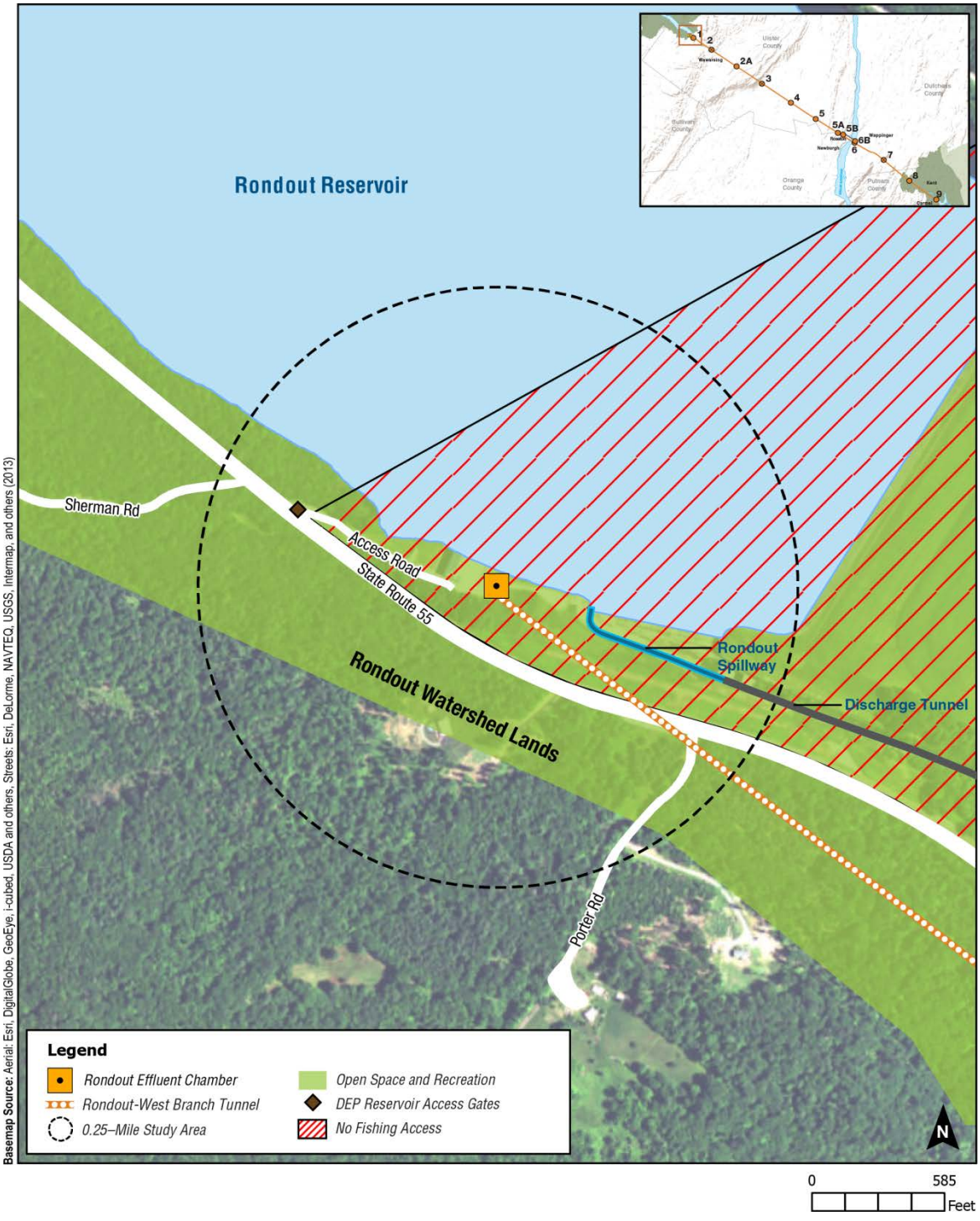


Figure 11.4-5: Open Space and Recreation – Rondout Effluent Chamber Study Area

11.4.4 VISUAL RESOURCES

The study area for the visual resources analysis is the area within 0.25 mile of the Rondout Effluent Chamber site, as shown on **Figure 11.4-6**. It also includes view corridors that extend beyond, based on the locations that are publicly accessible.

Two visual resources exist within the Rondout Effluent Chamber Study Area: Catskill Park, which is identified as a State Park, and one locally significant resource, the Rondout Reservoir, with the surrounding watershed lands (see **Figure 11.4-6**). The Catskill Park consists of approximately 700,000 acres, with 287,500 acres preserved as New York State Forest. The Park includes mountainous areas of public and private lands in Ulster, Greene, Delaware, and Sullivan counties, New York. The study area is situated on the perimeter of the Catskill Park's southern boundary, but is not located within a section of the Park dedicated to tourism or recreation. There are no view corridors from the Park that include the Rondout Effluent Chamber Study Area. The Rondout Reservoir is almost completely surrounded by heavily forested watershed lands, limiting many views of the Rondout Effluent Chamber from within the reservoir. Recreational users with valid permits would have direct views of the existing Rondout Effluent Chamber and proposed work activities from only the southernmost portion of the reservoir itself. However, as DEP Recreation Rules state, no access is permitted within 500 feet of any dikes, dams, tunnel outlets, spillways, buildings, and other significant water supply structures (Part 16-15(b)(1)), thus limiting the discernible details of the work activities. **Figure 11.4-5** illustrates the area of the reservoir with fishing restrictions.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no new projects or structures that would alter views from visual or aesthetic resources are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, are anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that visual resources within the study area would be the same as baseline conditions.

The inspection and repair at the Rondout Effluent Chamber site would occur on DEP property and would be minimal and temporary. As noted, there are no view corridors that include the Rondout Effluent Chamber Study Area. Following completion of the inspection and repair, the site would be restored to baseline conditions. As such, the inspection and repair would not result in changes to the future visual and aesthetic resource conditions of the views to the Catskill Park or Rondout Reservoir.

Therefore, the inspection and repair would not result in significant adverse impacts to visual resources within the Rondout Effluent Chamber Study Area.

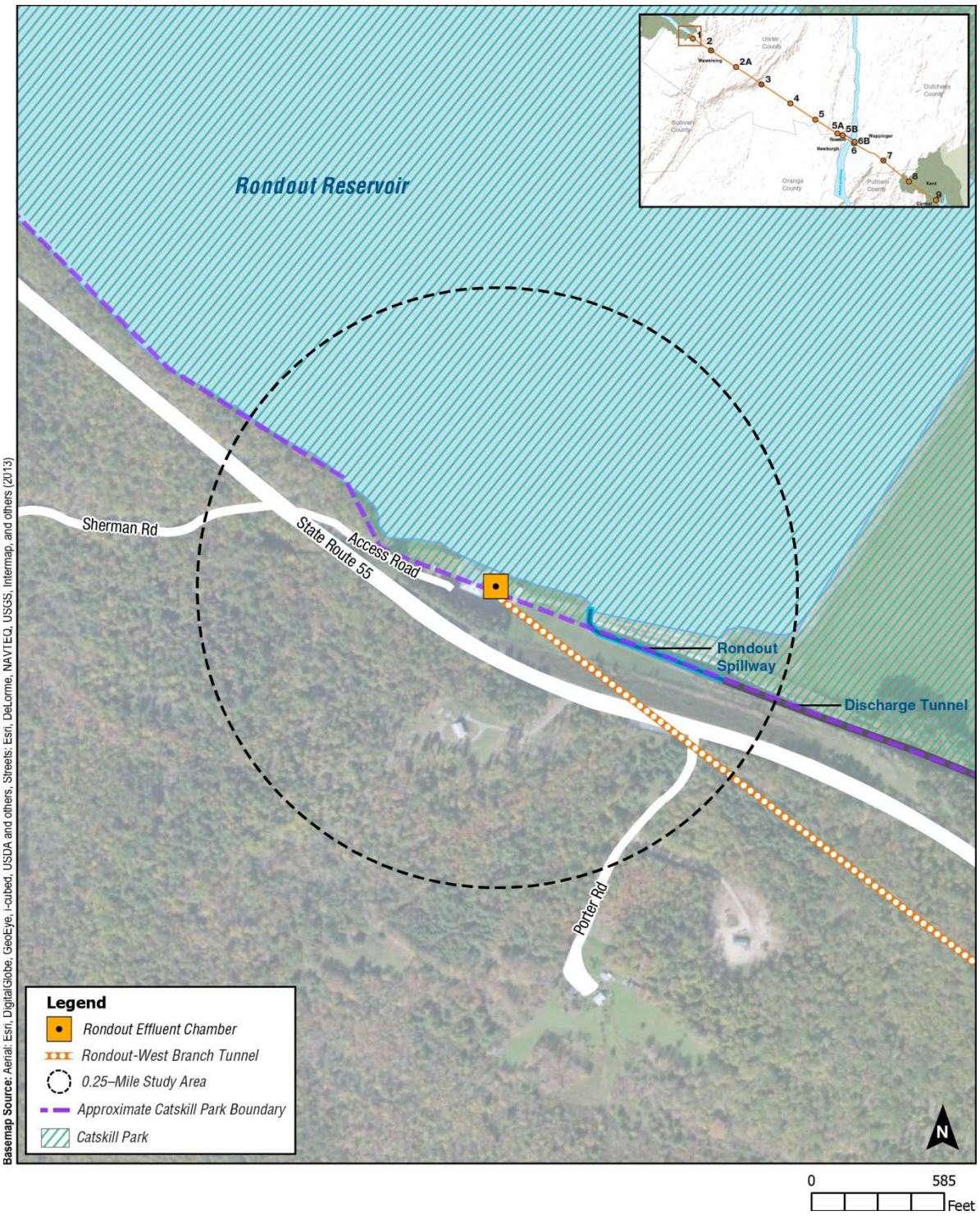


Figure 11.4-6: Visual Resources – Rondout Effluent Chamber Study Area

11.4.5 NATURAL RESOURCES

The study area for the natural resources analysis is the area within 400 feet of the Rondout Effluent Chamber site, as shown on **Figure 11.4-7**.

As described in Section 11.3.8, "Natural Resources," an impact analysis related to geology and soils, water resources (including groundwater, surface water, wetlands, and floodplains), aquatic and benthic resources, terrestrial resources, and wildlife within the Rondout Effluent Chamber Study Area is not warranted.

11.4.5.1 Federal/State Threatened and Endangered Species

Federal/State Threatened and Endangered Species that have the potential to occur within the Rondout Effluent Chamber Study Area are shown in **Table 11.4-1**. As described in Section 11.3.8, "Natural Resources," these species were identified by performing a review of the USFWS Official Species Lists and NYNHP database results, as well as data from the NYSDEC Nature Explorer, NYSDEC Breeding Bird Atlas, and the Herp Atlas.

Table 11.4-1: Federal/State Threatened and Endangered Species, and Habitat Potentially within the Rondout Effluent Chamber Study Area

Common Name	Scientific Name	Federal Listing	State Listing	Potential for Habitat	Potential for Species
Amphibians and Reptiles					
Timber Rattlesnake	*Crotalus horridus*	--	T	Yes	Not Anticipated
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	BGPA	T	Yes	Yes

Notes:
BGPA: Bald and Golden Eagle Protection Act
T: Threatened
Source: USFWS Official Species List for Ulster and Putnam Counties; NYNHP Database Consultation; NYSDEC Nature Explorer; Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the study area would largely be the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

Timber rattlesnake (Crotalus horridus)

As noted in Section 11.3.8, "Natural Resources," populations of timber rattlesnakes (*Crotalus horridus*) have been documented in the region proximate to the study area, and suitable habitat for this species is known to exist in this area of Ulster County. According to records received from the NYNHP, there is a timber rattlesnake hibernaculum located less than 2 miles from the Rondout Effluent Chamber site. Timber rattlesnakes inhabit primarily deciduous forests in mountainous terrain. However, in summer they can be found in coniferous forests, mixed forests, old fields, and near wetlands. The Rondout Effluent Chamber site contains a portion of the Catskill Park's southern boundary. Therefore, it is conservatively assumed that potential habitat is present within the Rondout Effluent Study Area.

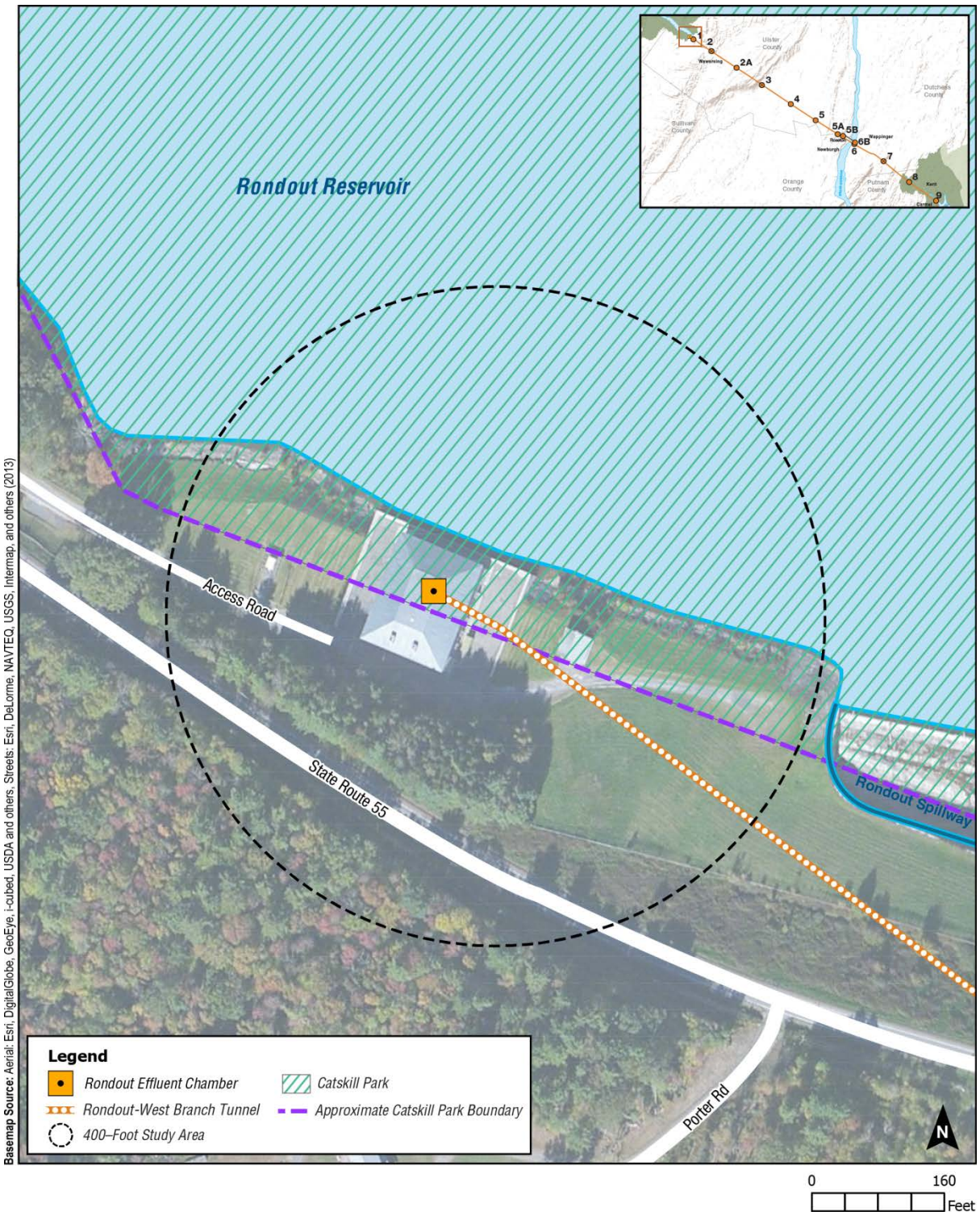


Figure 11.4-7: Natural Resources – Rondout Effluent Chamber Study Area

The inspection and repair at the Rondout Effluent Chamber site would occur on DEP property and would be minimal and temporary. The limits of disturbance for the inspection and repair would be confined to the previously disturbed, fenced-in Rondout Effluent Chamber site. Prior to commencing work, any timber rattlesnakes occurring on the site would be relocated by a DEP Wildlife Specialist, and perimeter soil and erosion control measures would be erected to help prevent additional individuals from entering the site. Vehicles entering and exiting the site would take precaution to avoid any timber rattlesnakes that could be basking on or traveling across the road.

Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions. As such, the inspection and repair may affect, but is not likely to adversely affect, timber rattlesnakes.

Bald Eagles (Haliaeetus leucocephalus)

As noted in Section 11.3.8, "Natural Resources," Bald Eagles (*Haliaeetus leucocephalus*) have been documented in the region proximate to the study area, and suitable habitat for this species is known to exist in this area of Ulster County. A consultation with NYNHP indicated that several pairs of breeding Bald Eagles nest at Rondout Reservoir. The distance to the nearest known nest at Rondout Reservoir is approximately 6,800 feet from the Rondout Effluent Chamber site. This nest is well beyond the recommended buffer restriction of 330 and 660 feet outlined by USFWS guidelines (USFWS 2007a). In the future with the inspection and repair, the proposed activities would not affect Rondout Reservoir or the area within the 330- or 660-foot buffer surrounding the Bald Eagles' nest. As such, the inspection and repair activities at the Rondout Effluent Chamber site, including any noise temporarily generated at the site, are not anticipated to disturb Bald Eagles because of the distance to the nest. Bald Eagles may still utilize the study area for non-breeding purposes such as foraging and perching.

Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions. There would be no disturbance associated with the inspection and repair to Bald Eagles or their habitat within the study area. Therefore, the inspection and repair may affect, but is not likely to adversely affect, Bald Eagles within the Rondout Effluent Chamber Study Area.

Federal/State Threatened and Endangered Species Conclusions

Based on the impact analysis, no take is anticipated. Inspection and repair may affect, but is not likely to adversely affect, timber rattlesnakes or Bald Eagles. Therefore, the inspection and repair would not result in significant adverse impacts to federal/State Threatened and Endangered Species within the Rondout Effluent Chamber Study Area.

11.4.6 HAZARDOUS MATERIALS

The study area for the hazardous materials analysis is the area within 0.25 mile of the Rondout Effluent Chamber site (see **Figure 11.4-1**).

The Rondout Effluent Chamber site is bounded by State Route 55 to the south, wooded areas to the west and southeast, and Rondout Reservoir to the north and east. The Rondout Effluent Chamber site consists of a level surface that is paved with concrete. A gasoline tank is located near the southern corner of the west wall of the main building. Along the south wall of the main building, there is an oil tank chamber (see **Figure 11.4-4)**. As described in Section 11.3.9, "Hazardous Materials," a hazardous waste and contaminated materials screening was performed in 2015.

The RCRA Generators database search identified the Rondout Effluent Chamber as an "RCRA-Conditionally Exempt Small Quantity Generator." Conditionally exempt small-quantity generators produce less than 100 kg of hazardous waste per calendar month, or less than 1 kg of acutely hazardous waste per month. The Rondout Effluent Chamber site generates less than 100 kg per month of hazardous waste. Therefore, it is classified as conditionally exempt in this database.

The NYSDEC Spill Database revealed five historic reported spills of mercury and petroleum at or adjacent to the Rondout Effluent Chamber on DEP property. All five cases were reported closed, with corrective action taken. In addition to the NYSDEC Spill Database, the New York State Hazardous Waste Manifest System identified three listings occurring between 2002 and 2015 at the Rondout Effluent Chamber. This system tracks hazardous waste from the time it leaves the generator facility where it was produced until it reaches the off-site waste management facility for treatment, storage, and disposal. Based on a review of this database, several manifests associated with non-hazardous solids and/or debris, as well as unknown wastes, were handled at the Rondout Effluent Chamber. No additional information was provided in the database in connection with these manifests.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no developments or structures that would introduce hazardous materials to the environment are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that the presence of hazardous materials within the Rondout Effluent Chamber Study Area would be the same as baseline conditions.

Inspection and repair activities would not require soil disturbance at or removal from the Rondout Effluent Chamber site. Activities would include site preparation, installation of several temporary structures including two generator trailers and double containment bulk fuel oil storage tanks, equipment storage and installation, and operation of a temporary ventilation system. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements. Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements.

Following completion of the inspection and repair, the Rondout Effluent Chamber site would be restored to baseline conditions. As such, the inspection and repair would not result in significant increases to the public's or environment's exposure to hazardous materials within the Rondout Effluent Chamber Study Area.

Therefore, the inspection and repair would not result in significant adverse impacts from the presence or disturbance of hazardous materials within the Rondout Effluent Chamber Study Area.

11.4.7 TRANSPORTATION

The study area for the transportation analysis is the area within 0.25 mile of the Rondout Effluent Chamber site, as shown on **Figure 11.4-8**.

Access to the Rondout Effluent Chamber site is via a driveway from State Route 55. The site access road is an approximately 15-foot-wide paved private road. State Route 55 is a two-lane, paved, rural major collector that carries approximately 795 vehicles per day in the vicinity of the Rondout Effluent Chamber site, based on 2011 traffic counts. There is no public transportation to or from the Rondout Effluent Chamber. There is little to no pedestrian activity in the immediate vicinity of the Rondout Effluent Chamber Study Area. Under current operations, several employees may be working at the Rondout Effluent Chamber at a given time. This small number of DEP employee vehicles has little to no effect on traffic conditions within the study area.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use or increases in traffic due to outside developments are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that traffic, public transportation, and pedestrian activities within the study area would be similar to baseline conditions.

The inspection and repair would result in vehicle trips for the transportation of crews and materials to and from the Rondout Effluent Chamber site during the day and during peak traffic hours. All inspection and repair traffic is expected to access the Rondout Effluent Chamber site via State Route 55 to the south from Interstate 87 and State Route 299. To the extent available, the inspection and repair trucks would travel on truck-permitted roadways directly to and from the Rondout Effluent Chamber site. For the purposes of this analysis, the peak project-generated traffic hour is assumed to coincide with typical construction hours for employee vehicles entering the site, from 6 AM to 7 AM and, as a result, is unlikely to coincide with the peak hour for existing traffic.

The estimated number of maximum daily one-way vehicle trips to the Rondout Effluent Chamber site is 21 vehicles, or approximately 42 peak-day vehicle round trips, with 17 vehicle trip ends (34 PCEs) during the peak hour of construction. Approximately 6 vehicle trip ends, or 6 PCEs, would be workers during the peak hours of construction.[4] The remaining 11 vehicle trips

[4] This analysis assumes 90 percent of worker vehicles and 75 percent of trucks would arrive and depart during the peak hour.

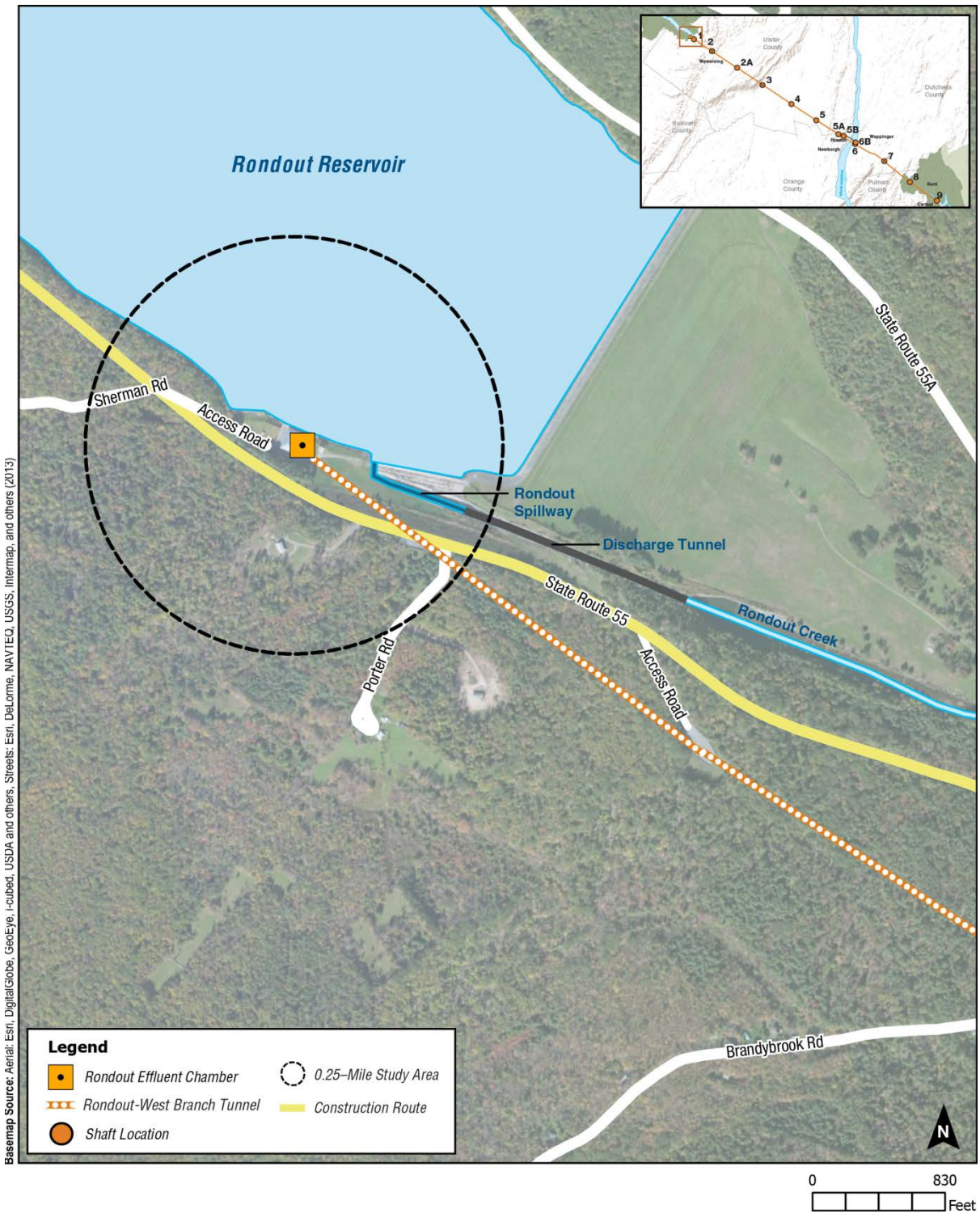


Figure 11.4-8: Transportation – Rondout Effluent Chamber Study Area

ends (28 PCEs) during the peak hours of construction would be trucks or other construction traffic. On an average day, the estimated number of vehicle round trips would be approximately 26, with 11 vehicle trip ends that would occur during the peak hour.

Inspection and repair trucks for the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would travel along on State Route 55 to reach their respective sites. Assuming that separate construction crews would be used for each site for the inspection and repair activities, the trucks would converge on State Route 55 and result in 82 maximum daily one-way vehicle trips, or approximately 164 peak-day vehicle round trips, with 67 vehicle trips ends (123 PCEs) during the peak hour of construction.

The inspection and repair at the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would result in 67 peak-hour vehicle trip ends along State Route 55, which is above the *CEQR Technical Manual* screening threshold of 50 peak-hour vehicle trip ends as described in Section 11.3.12, "Transportation." However, the inspection and repair activities at the Rondout Effluent Chamber Study Area would be short-term (approximately 8 months, with site preparation activities commencing up to 6 months in advance of the temporary shutdown). The peak activities at the site would occur during the condition assessment, which together would take place over the course of approximately 1 week beginning in October 2022.

The inspection and repair would not generate demands for public parking or transportation or an increase in pedestrian activity within the Rondout Effluent Chamber Study Area. Following completion of the inspection and repair, traffic patterns would return to baseline conditions.

Therefore, although there would be a minor temporary increase in traffic, the inspection and repair would not result in significant adverse impacts to transportation within the Rondout Effluent Chamber Study Area.

11.4.8 NOISE

As described in Section 11.3.14, "Noise," mobile noise associated with the inspection and repair within the Rondout Effluent Chamber Study Area does not warrant analysis. This section includes an analysis of potential impacts from stationary noise associated with the inspection and repair to sensitive noise receptors within the Rondout Effluent Chamber Study Area. The study area for the noise analysis is the area within 1,500 feet of the Rondout Effluent Chamber site, as shown on **Figure 11.4-9**.

The Rondout Effluent Chamber Study Area includes two residential properties located in the southern portion of the study area. The peak activities at the site would occur during the condition assessment, which together would take place over the course of approximately 1 week beginning in October 2022. As noted in Section 11.3.14.1, "Screening Assessment," the temporary construction activities were evaluated to determine compliance with local noise codes.

The inspection and repair is subject to the Town of Wawarsing Noise Control Law. The Town of Wawarsing Noise Control Law (§78-4) prohibits "the operation of any source of sound" that exceeds the sound level limit of 73 dBA between the hours of 6 AM and 10 PM and 63 dBA between the hours of 10 PM and 6 AM "when determined by a sound-level measure at the adjoining property line nearest to the sound source." The nearest adjoining property line is a residential parcel. Therefore, compliance with applicable local noise regulations in the Town of Wawarsing was evaluated at this residential parcel.

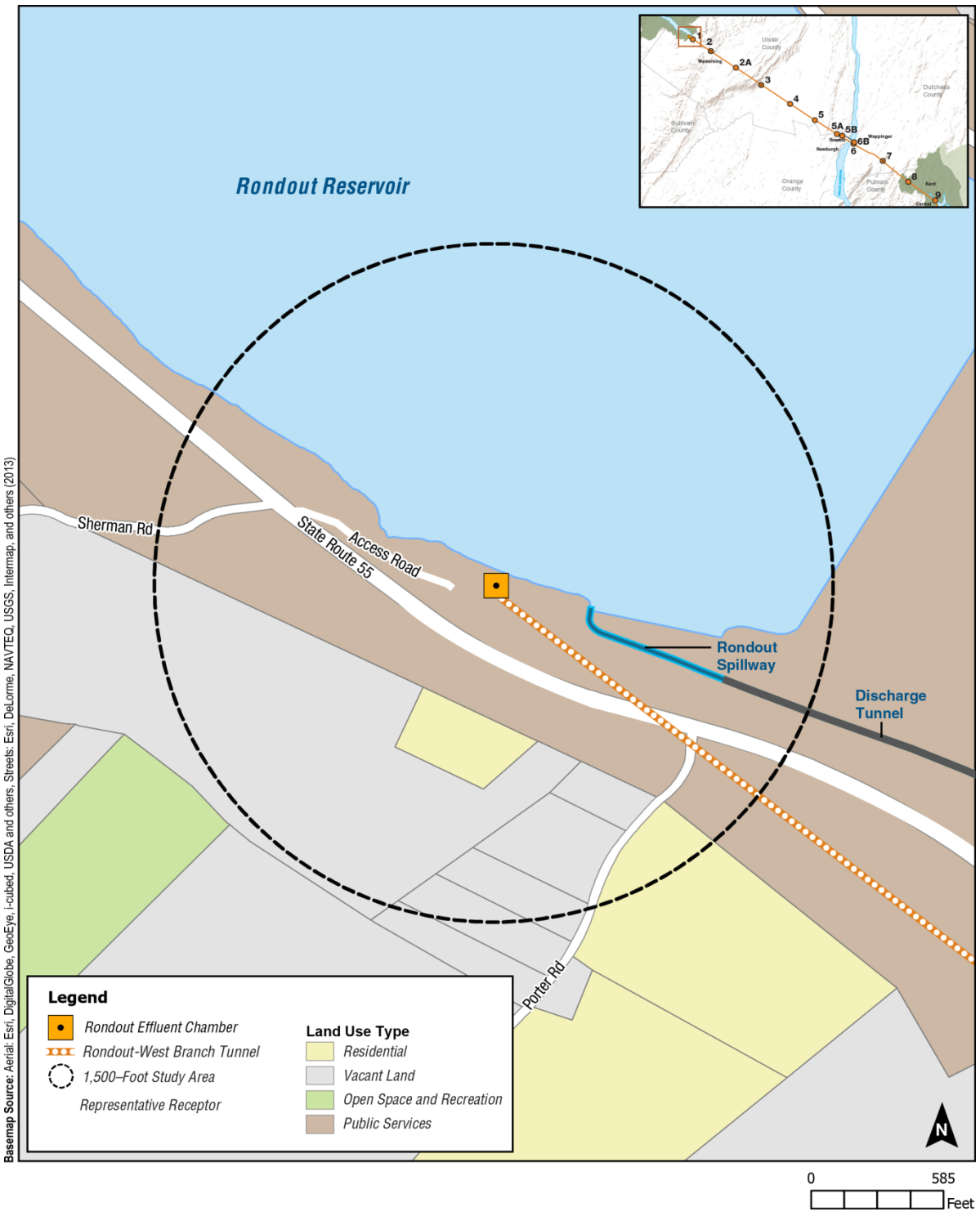


Figure 11.4-9: Noise – Rondout Effluent Chamber Study Area

Existing ambient noise levels within the Rondout Effluent Chamber Study Area are influenced by vehicular traffic on State Route 55. The existing noise levels within the study area are comparable to a very quiet suburban and rural residential environment based on proximity to major transportation corridors, population density of the area, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA Leq during the day and 34 dBA Leq at night.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no major projects that would result in a change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels, are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that ambient noise levels within the Rondout Effluent Chamber Study Area would be similar to baseline conditions.

In the future with the inspection and repair, stationary noise-producing activities would occur on 3 acres of DEP-owned land surrounding the Rondout Effluent Chamber and would include site preparation, operation of a staging area, support for mechanical repairs internal to the Rondout Effluent Chamber, and operation of ventilation systems. Peak inspection and repair activities at the Rondout Effluent Chamber site would occur between 7 AM and 7 PM, 7 days a week, for approximately 1 week. All construction would occur on DEP property.

The noise analysis focused on stationary noise-generating equipment expected to operate constantly at the Rondout Effluent Chamber site. The equipment types included in the stationary noise analysis and their reference noise levels are shown in **Table 11.4-2**. The number and types of noise-generating equipment analyzed were conservatively based on peak construction operating conditions.

Table 11.4-2: Stationary Source Construction Equipment Modeled at the Rondout Effluent Chamber Site and Reference Noise Levels (L_{eq})

Equipment Type (Quantity)	Reference Noise Level (L_{eq}) at 50 feet (dBA)	Source
Generator (2)	75	Caterpillar[1]
Ventilation Fan (2)	51	Clarage[2]
Compressor (1)	80	CEQR[3]

Notes:
[1] Caterpillar Weather Protective and Sound Attenuated Enclosures (2014).
[2] Clarage 5155 AF – SWSI manufacturer sound pressure level estimate (2014).
[3] *City Environmental Quality Review (CEQR) Technical Manual,* Chapter 22.

A section of dense trees, approximately 150 feet wide, is located between the Rondout Effluent Chamber site and the residential receptor. Therefore, tree zone attenuation of 7.5 dB was applied for the residential receptor. The results of the stationary noise analysis are shown in **Table 11.4-3**.

As shown in **Table 11.4-3**, the inspection and repair activities at the Rondout Effluent Chamber site would comply with the Town of Wawarsing Noise Control Law at the nearest adjoining property line (residential parcel). Following completion of the inspection and repair, the Rondout

Table 11.4-3: Stationary Noise Analysis Results (L_{eq}) at the Nearest Noise-Sensitive Receptors within the Rondout Effluent Chamber Study Area

Nearest Noise-Sensitive Receptor	Distance from Site (feet)	Conditions Analyzed	Predicted Stationary Noise Level at Noise-Sensitive Receptor (dBA)	Town of Wawarsing Noise Limit (dBA)	Potential for Exceedance (Yes or No)
Nearest Adjoining Property Line (Residential Parcel)	497	Daytime	55	73[1]	No
		Nighttime	NA[2]	63[3]	NA[2]

Notes:
NA = Not Applicable
[1] Noise limit between the hours of 6 AM and 10 PM.
[2] Construction operations at the Rondout Effluent Chamber would occur during daytime hours only, 7 AM to 7 PM.
[3] Noise limit between the hours of 10 PM and 6 AM.

Effluent Chamber site would be restored to baseline conditions. The inspection and repair activities would be temporary, with the peak construction activities occurring during a limited period (approximately 1 week). Therefore, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the Rondout Effluent Chamber Study Area.

Noise levels in the Rondout Effluent Chamber Study Area would be influenced by the inspection and repair activities described above and concurrent siphon operation. Temporary siphons would be operating over the Merriman Dam Spillway immediately adjacent to the Rondout Effluent Chamber to support Water for the Future Shutdown System Operations (WSSO), as discussed in Chapter 10, "Water for the Future Shutdown System Operations." Temporary siphons would be in operation for approximately 8 months and would be used as needed during the temporary shutdown. Noise levels from the spillway would vary based on the amount of discharge, outlet design, and environmental conditions. Noise levels at the nearest residences would be further reduced due to the local topography, distance, and the presence of dense trees zones between the spillway and residences. The siphon outfall would be located approximately 150 feet below the nearest residential parcels without a direct line of sight between the siphons and the residential parcels. However, any noise generated by siphon operation would be short in duration, for approximately 8 months, including fall and winter months when residents typically have windows closed.

Therefore, although there would be a temporary increase in noise, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the Rondout Effluent Chamber Study Area

11.4.9 NEIGHBORHOOD CHARACTER

The character of the Rondout Effluent Chamber Study Area is largely defined by a mix of public services, single-family residential, and vacant land uses and its physical setting within a rural location (see **Figure 11.4-2**). The site is bounded by State Route 55 to the south, wooded areas to the west and east, and Rondout Reservoir to the north. The site is located within a public services parcel owned and maintained by DEP. Access to the site would be from State Route 55 onto DEP driveways.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use and no new projects or structures are anticipated within the Rondout Effluent Chamber Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that neighborhood character within the study area would be similar to baseline conditions.

As described in Section 11.3.15, "Neighborhood Character," there would be no potential for the inspection and repair to affect shadows and urban design. In addition, based on the screening assessment for land use and zoning, socioeconomic conditions, and historic and cultural resources, an impact analysis for the Rondout Effluent Chamber Study Area is not warranted, as discussed in the following sections: Section 11.3.2, "Land Use, Zoning, and Public Policy," Section 11.3.3, "Socioeconomic Conditions," and Section 11.3.6, "Historic and Cultural Resources." As described in Section 11.4.3, "Open Space and Recreation," and Section 11.4.4, "Visual Resources," the work activities would not affect open space and recreation and visual resources in the Rondout Effluent Chamber Study Area. Furthermore, the public policy impact analysis provided in Section 11.4.2, "Public Policy," concluded the work activities were consistent with applicable plans.

The work activities in the Rondout Effluent Chamber Study Area would be short-term (up to 6 months before and approximately 1 week during the temporary shutdown, and also up to 1 year for construction of temporary siphons; siphon construction is evaluated in Chapter 10, "Water for the Future Shutdown System Operations") and would result in a temporary increase in traffic and noise. Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area and traffic patterns would return to baseline conditions. These temporary increases in traffic and noise levels would not result in a density of activity or service conditions that would affect the overall character of the study area. The inspection and repair would not generate significant adverse effects in land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to neighborhood character within the Rondout Effluent Chamber Study Area.

11.4.10 PUBLIC HEALTH

Water supply and, in particular, the community users drawing water from the Delaware Aqueduct, would not be significantly affected by the inspection and repair within the

Rondout Effluent Chamber Study Area. DEP has developed an ongoing program to work with these communities, including reviewing the availability of back-up water supplies and analyzing the ability of these users to accommodate reduced access to the Delaware Aqueduct during the temporary shutdown, as appropriate and to meet all applicable drinking water standards.

Based on the environmental investigations completed within the Rondout Effluent Chamber Study Area, results do not suggest the need for special management, handling, or health and safety measures at this time. Inspection and repair work activities would require the potential storage and use of a variety of petroleum and other chemical products, such as diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals during construction. DEP would handle all materials in accordance with applicable federal, State, and local regulations and guidelines. The work activities at the study area would be short-term (up to 6 months before and approximately 1 week during the temporary shutdown, and also up to 1 year for construction of temporary siphons) and would result in a temporary increase in noise. Following the inspection and repair, the construction equipment, vehicles, and chemical storage would be removed from the study area, and operation of the Delaware Aqueduct would be consistent with baseline conditions.

Based on the analyses above, the inspection and repair would not result in significant adverse impacts in any of the technical areas related to public health: air quality, water supply (quantity or quality), hazardous materials, or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to public health within the Rondout Effluent Chamber Study Area.

11.5 SHAFT 1 STUDY AREA IMPACT ANALYSIS

The Shaft 1 site is located along the RWBT in the Town of Wawarsing, Ulster County, New York. As described in Section 11.2, "Project Description," the Shaft 1 site would be a primary ventilation exhaust location during the inspection and repair. The Shaft 1 site would also be a primary entry and exit point for personnel and equipment to support the inspection for the RWBT between the Rondout Effluent Chamber and Shaft 1. Once the inspection and repair has begun, it is anticipated that the condition assessment for the RWBT segment between the Rondout Effluent Chambers and Shaft 1 is expected to last approximately 7 days. Activities at the Shaft 1 site to support ventilation of the RWBT would continue throughout the inspection and repair. The sections below provide a description of the existing Shaft 1 site and study area conditions, as well as the inspection and repair activities that that would be performed at the Shaft 1 site.

The potential for impacts to public policy; visual resources; natural resources, consisting of federal/State Threatened and Endangered Species; hazardous materials; transportation; noise; neighborhood character and public health associated with the inspection and repair within the Shaft 1 site are discussed below. As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," an impact analysis related to land use and zoning; socioeconomic conditions; community facilities and services; open space and recreation; historic and cultural resources; aquatic and benthic resources; other natural resources subcategories, including water resources, geology and soils, terrestrial resources, wildlife, federal/State Candidate Species, State Species of Special Concern and unlisted rare and vulnerable species; water and sewer infrastructure; energy; and air quality within the Shaft 1 Study Area is not warranted.

11.5.1 SHAFT 1 STUDY AREA PROJECT DESCRIPTION

11.5.1.1 Description of Existing Site and Study Area

The Shaft 1 site consists of approximately 0.75 acre of an approximately 2,300-acre property owned by DEP and located along the RWBT in the Town of Wawarsing (Tax ID 66.4-1-29, Block 1, Lot 29). The site is generally bounded by State Route 55 to the north and surrounded by wooded areas, as shown on **Figure 11.5-1**. The site is accessible via a gravel access road connected to State Route 55. The existing land uses within the circular 0.25-mile study area include residential, vacant land, and public services, as shown on **Figure 11.5-2**.

The Shaft 1 site is located in a rural residential (RU) zoning district within the Town of Wawarsing, as shown on **Figure 11.5-3.** Other zoning districts within the Shaft 1 Study Area include the residential settlement (RS) zoning district, which provides low-density residential uses. The Shaft 1 site constitutes a public service use, which is a permitted use within the rural residential (RU) zoning district.

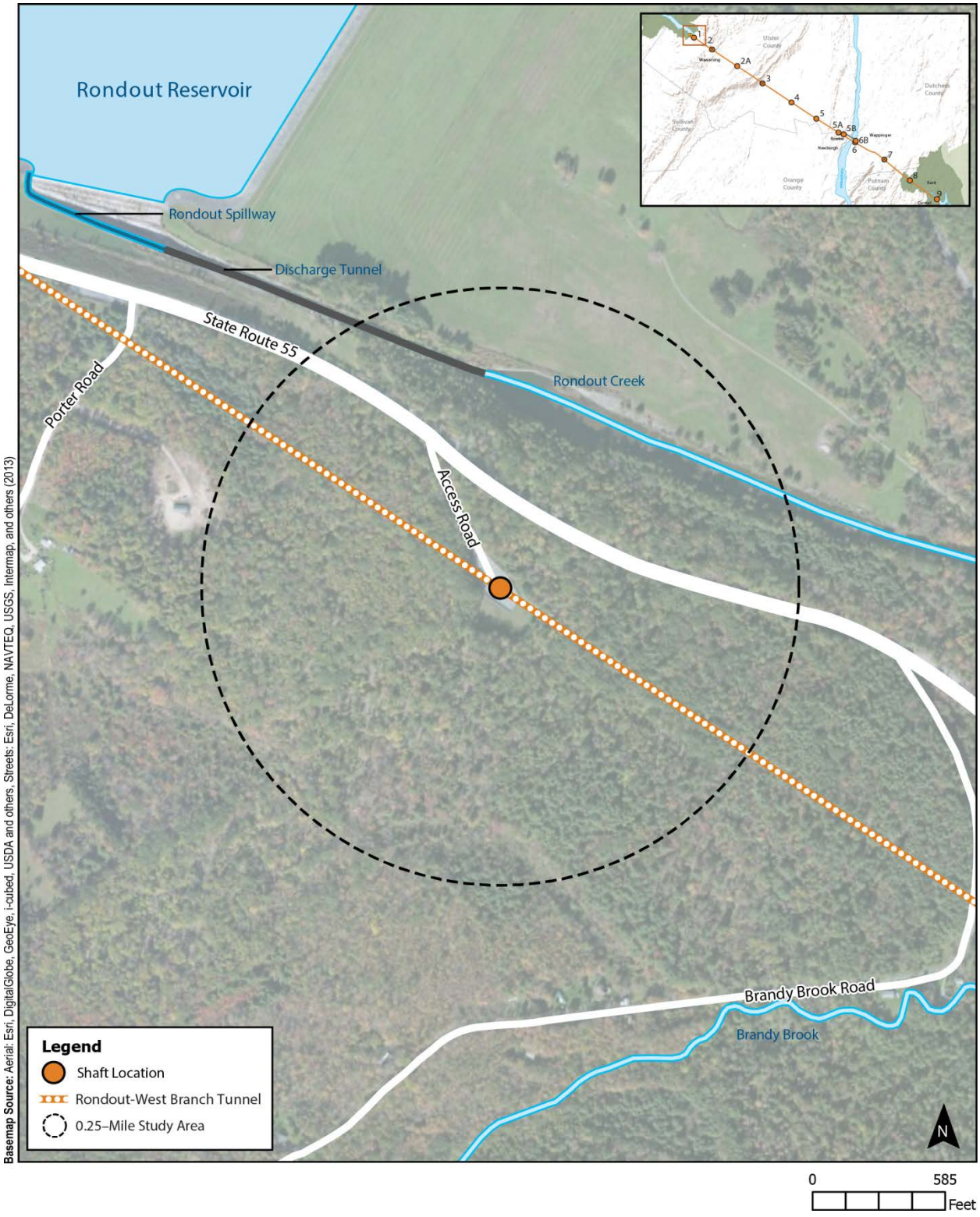


Figure 11.5-1: Site Location – Shaft 1 Study Area

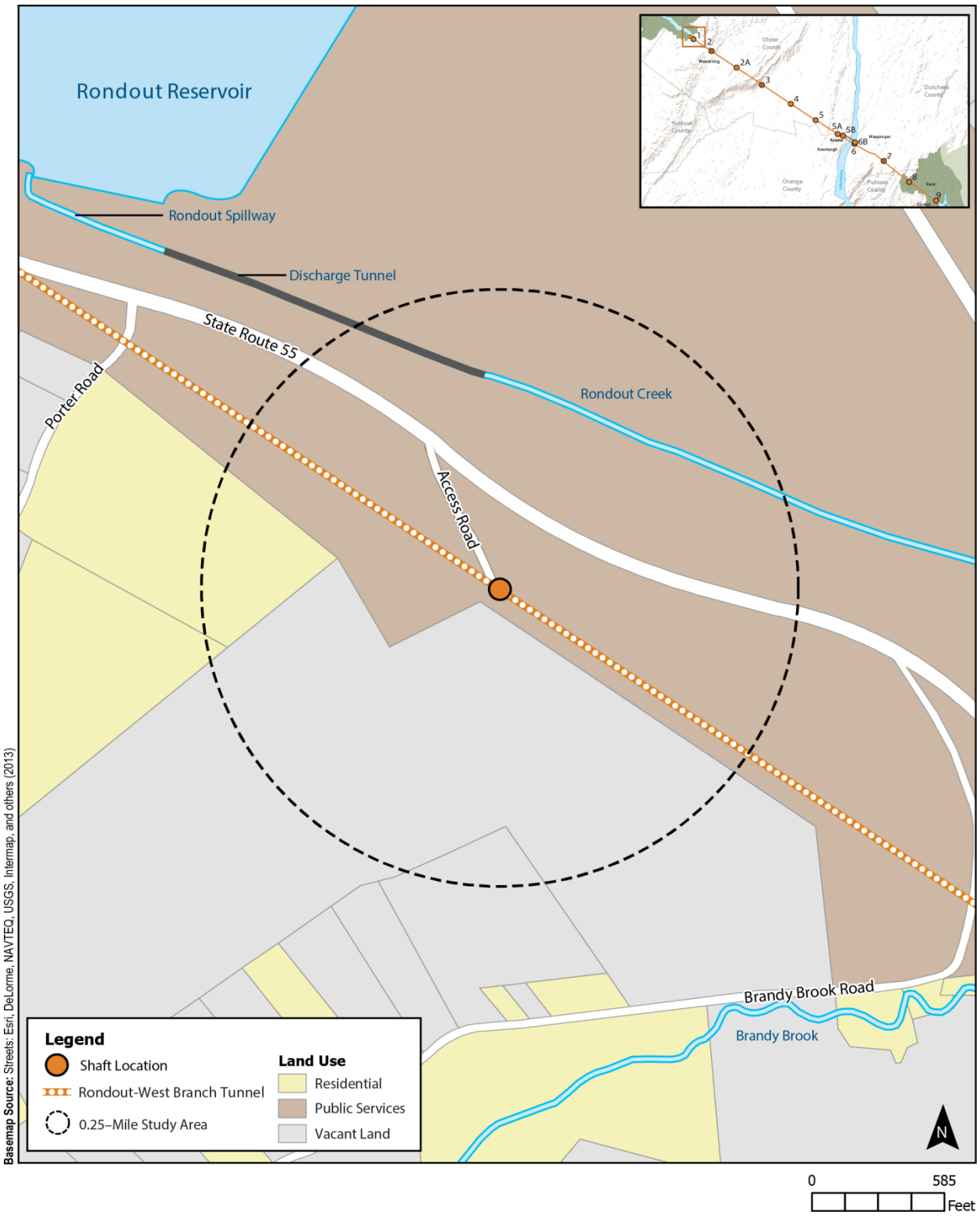


Figure 11.5-2: Land Use – Shaft 1 Study Area

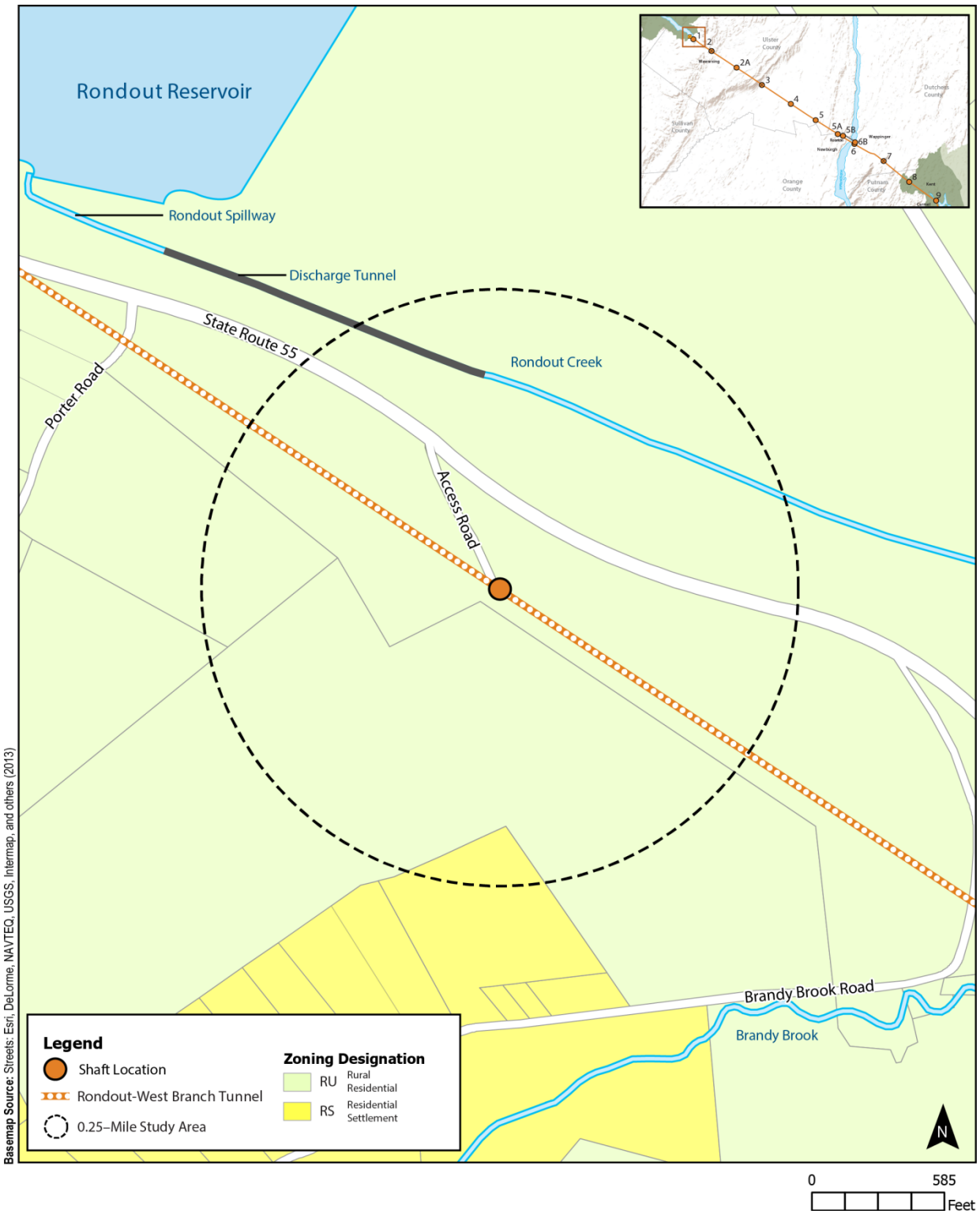


Figure 11.5-3: Zoning – Shaft 1 Study Area

11.5.1.2 Proposed Activities at the Shaft 1 Site

As previously described, the Shaft 1 site would be a primary ventilation location during the inspection and repair. The Shaft 1 site would also be the primary entry and exit point for personnel and equipment to support the proposed inspection of the RWBT between the Rondout Effluent Chamber and Shaft 1.

Access to the site would be provided via the existing gravel access road. The inspection and repair activities anticipated at the Shaft 1 site would include site preparation of support equipment beginning up to 6 months before the RWBT temporary shutdown; installation and operation of ventilation, communication, and hoisting systems; condition assessment access and support; and, finally, demobilization and site restoration. All disturbance and activities would occur within the Shaft 1 site (see **Figure 11.5-4**). Although the property is approximately 2,300 acres, the area used during the inspection and repair would be limited to approximately 0.75 acre.

Site preparation at the Shaft 1 site would begin up to 6 months before the temporary shutdown of the RWBT and would occur only Monday through Friday between 7 AM to 7 PM. Activities would include the installation of soil and erosion control measures on the inside of the existing perimeter fence and a tire washing system between the shaft and gate to the public roadway. Limited excavation and grading would be required on site to access the shaft. Barriers would be installed on the inside of the existing perimeter fence to protect personnel and retain debris during the inspection and repair work. Noise and vibration barriers would also be installed, as necessary. The addition of a sliding gate at the perimeter fence and a security booth that would be manned 24 hours per day during the inspection and repair would serve as a temporary security measure.

During site preparation, minor grading would be carried out to uncover existing hoisting foundations for the hoisting system. The hoisting system, which would be transported via truck to the Shaft 1 site once the inspection and repair begins, would allow for the installation of the ventilation and communication systems. The hoisting system would also support the entrance and exit of personnel and the requisite inspection equipment (e.g., communication) and materials used during the course of the work. A construction platform would also be erected to support inspection of the inclined tunnel. Communication systems would be installed to allow for continuous tunnel-to-surface communication. In addition, a ventilation fan would be installed at Shaft 1 to exhaust air from the RWBT, providing adequate air supply for personnel performing work within the tunnel.

Construction equipment and materials required for site preparation would be brought to the site by truck, when needed, via the existing access road. This equipment and materials would include construction vehicles (e.g., pickup trucks, flat trucks, wheel loaders, and a small excavator), 100-horsepower fans, cranes/hoists, 220-kilowatt generators, compressors, and air tracks.

Once the inspection and repair begins, work at the Shaft 1 site would occur 7 days a week from 7 AM to 7 PM. At this time, the RWBT would be drained, which is anticipated to take approximately 20 days. At this time, the existing shaft cap would be demolished to eventually allow equipment, materials, and personnel to enter or exit the shaft during the inspection and repair.

Note: The gray lines show the edge of the work area/site and outline other features of the existing shaft site.

Figure 11.5-4: Shaft 1

After preparation at the bottom of Shaft 1 is complete, starting in mid-October 2022, the condition assessment would begin and would be performed from 7 AM to 7 PM. The assessment is expected to be completed by a single team consisting of approximately 8 to 12 workers and to last approximately 7 days. The peak activities at the site would occur during the condition assessment, which together would take place over the course of approximately 1 week, beginning in October 2022. However, the ventilation systems would operate 24 hours per day, 7 days a week, for up to 8 months. During the remainder of the inspection and repair, the site would be used for ventilation.

After the RWBT Bypass is connected and the inspection and repair activities are completed, demobilization from the Shaft 1 site would commence. Demobilization would include removal of all equipment and materials. The site would be restored to baseline conditions by September 2023.

11.5.2 PUBLIC POLICY

As described in Section 11.3.2, "Land Use, Zoning, and Public Policy," a land use and zoning impact analysis for the inspection and repair within the Shaft 1 Study Area is not warranted.

The study area for the public policy analysis is the area within 0.25 mile of the Shaft 1 site, as shown on **Figure 11.5-1**. As discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," the inspection and repair's consistency with the applicable policies of the Ulster County Open Space Plan and the Town of Wawarsing Comprehensive Plan within the Shaft 1 Study Area is analyzed as follows.

11.5.2.1 Ulster County Open Space Plan (2007)

The Ulster County Open Space Plan (Ulster County 2007) establishes a framework for the management and protection of open space resources identified by Ulster County. These include water resources, working landscapes, landforms and natural features, ecological communities, cultural and historic resources, and recreational resources. To provide guidance on these open space resources, Ulster County has established the 10 "Principles of the Open Space Plan" that seek to safeguard the open space values of Ulster County. Of those 10 principles, two are applicable to the inspection and repair.

> *(1) Preserve and protect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty and the rural character of Ulster County.*

Historic and cultural resources, visual resources, water resources, and terrestrial resources within the Shaft 1 Study Area are discussed in Section 11.3.6, "Historic and Cultural Resources," Section 11.5.3, "Visual Resources," and Section 11.3.8, "Natural Resources," respectively. Open space and recreation resources were not identified within the Shaft 1 Study Area.

Under this principle, the Open Space Plan recommends protecting valuable landforms and natural features in order to benefit residents and preserve the rural character of Ulster County. This principle was analyzed for inspection and repair as work in the study areas would potentially impact existing visual resources, historic resources, and natural resources, directly or indirectly. As discussed in Section 11.3.6, "Historic and Cultural Resources," Section 11.5.3,

"Visual Resources," and Section 11.3.8, "Natural Resources," the inspection and repair would occur at the existing Shaft 1 site, would be minimal and temporary, take place on DEP property, and be confined to an area not accessible to the general public. The inspection and repair at the existing Shaft 1 site would not alter view corridors. Following completion of the inspection and repair, the Shaft 1 site would be restored to baseline conditions. As such, the inspection and repair within the Shaft 1 Study Area would not affect open space; unique natural areas and heritage areas and sites; wetlands, water, and woodland resources; scenic views; areas of natural beauty; or the rural character of Ulster County. Therefore, the inspection and repair would be consistent with this principle.

(2) Protect and enhance the county's most valuable open space landforms and natural features with coordinated planning and safeguard policies.

Under this principle, the Open Space Plan recommends preserving the visual or ecological values of significant landforms and natural features in order to protect against inappropriate development. This principle was analyzed for inspection and repair.

The inspection and repair at Shaft 1 would not affect landforms and natural features such as valleys, ridgelines, slopes, coastal areas, or scenic areas. Inspection and repair activities at the Shaft 1 site would take place on DEP property at the end of an access road. The Shaft 1 site is surrounded by a buffer of trees and is not within the public viewshed. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Ulster County Open Space Plan and would not result in significant adverse impacts to public policy within the Shaft 1 Study Area.

11.5.2.2 Town of Wawarsing Comprehensive Plan (2006)

The Town of Wawarsing Comprehensive Plan (Town of Wawarsing 2006) is a guide for the town's improvement and its future growth, development, and protection and includes recommendations related to maintaining the town's growth and appearance while preserving the residential character, transportation services, and maintaining and improving public infrastructure. Recommendations within the Town of Wawarsing Comprehensive Plan establish a clear direction for the Town over a period of 3 to 5 years. The Comprehensive Plan does not discuss issues related to construction of individual projects or specific parcels or tracts of land. The Comprehensive Plan includes the following recommendation potentially relevant to effects of the inspection and repair:

- *Maintain and improve important public infrastructure*

Under this principle, the Town of Wawarsing Comprehensive Plan recommends the Town provide a variety of approaches to managing the Town's infrastructure system in order to identify and potentially avoid costs involved with deferred maintenance of Town facilities. This principle was analyzed for inspection and repair as work in the study area would potentially impact transportation, economic development, housing, and environmental policies directly or indirectly.

The inspection and repair would support the long-term provision of water to the City's approximately 9 million water consumers. As such, the inspection and repair is considered a

water infrastructure project of regional significance. However, the inspection and repair would not reduce or influence local public infrastructure. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Town of Wawarsing Comprehensive Plan and would not result in significant adverse impacts to public policy within the Shaft 1 Study Area.

11.5.3 VISUAL RESOURCES

The study area for the visual resources analysis is the area within 0.25 mile of the Shaft 1 site, as shown on **Figure 11.5-5**. It also includes view corridors that extend beyond, based on the locations that are publicly accessible.

One visual resource exists within the Shaft 1 Study Area, Catskill Park, which is identified as a State Park. Catskill Park consists of approximately 700,000 acres, with 287,500 acres preserved as New York State Forest. The Park includes mountainous areas of public and private lands in Ulster, Greene, Delaware and Sullivan counties, New York. The northern portion of the study area, approximately 10.5 acres, is situated on the perimeter of the Catskill Park's southern boundary, but is not located within a section of the Park dedicated to tourism or recreation. Shaft 1 is not located within the Park's boundary. There are no view corridors from the Park that include the Shaft 1 Study Area.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no new projects or structures that would alter views from visual or aesthetic resources are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, are anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that visual resources within the study area would be the same as baseline conditions.

The inspection and repair at the Shaft 1 site would occur on DEP property and would be minimal and temporary. As noted, there are no view corridors that include the Shaft 1 Study Area. Following completion of the inspection and repair, the site would be restored to baseline conditions. As such, the inspection and repair would not result in changes to the future visual and aesthetic resource conditions of the views to the Catskill Park.

Therefore, the inspection and repair would not result in significant adverse impacts to visual resources within the Shaft 1 Study Area.

11.5.4 NATURAL RESOURCES

The study area for the natural resources analysis is the area within 400 feet of the Shaft 1 site, as shown on **Figure 11.5-6**.

As described in Section 11.3.8, "Natural Resources," an impact analysis related to geology and soils, water resources (including groundwater, surface water, wetlands, and floodplains), aquatic and benthic resources, terrestrial resources, and wildlife within the Shaft 1 Study Area is not warranted.

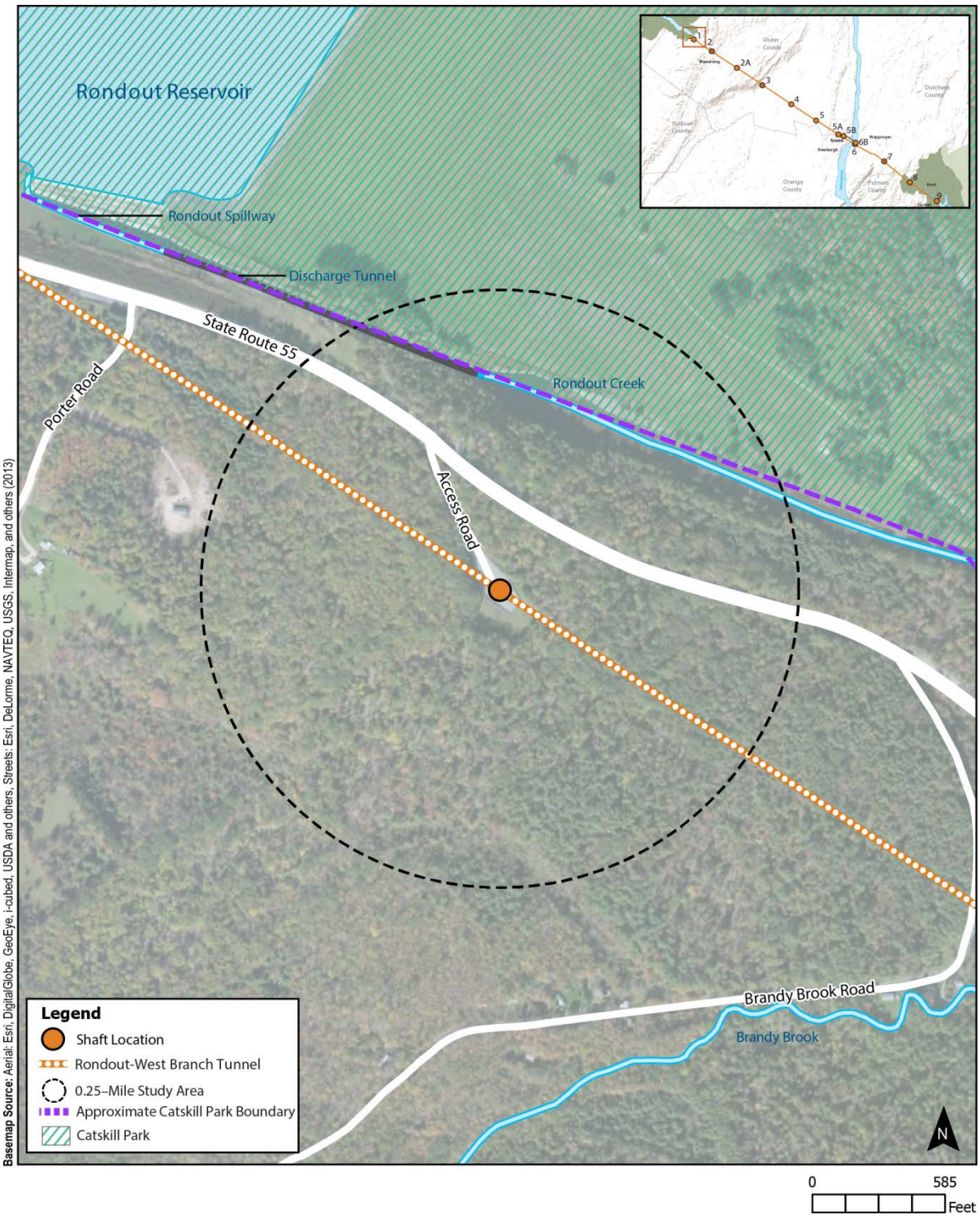


Figure 11.5-5: Visual Resources – Shaft 1 Study Area

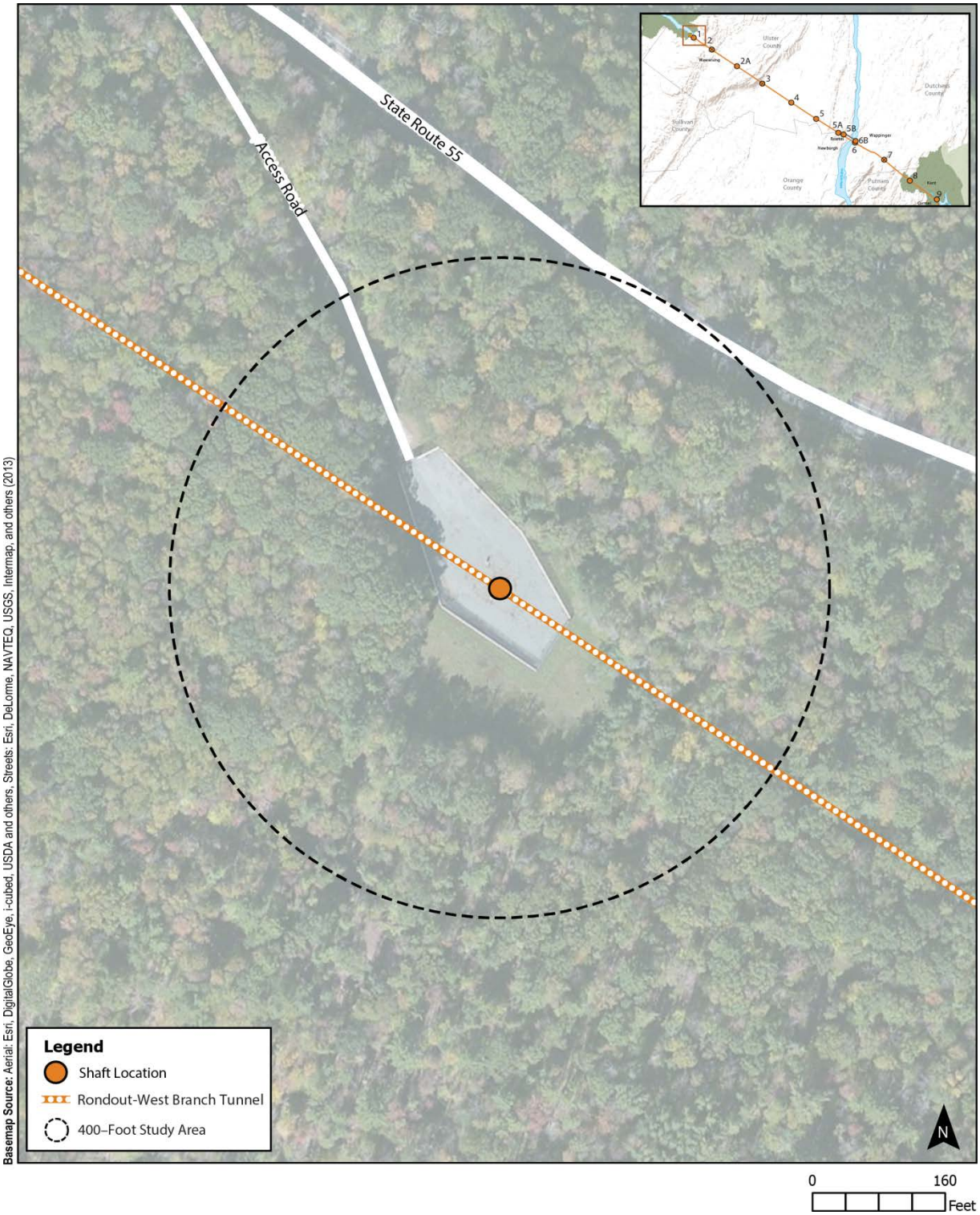


Figure 11.5-6: Natural Resources – Shaft 1 Study Area

11.5.4.1 Federal/State Threatened and Endangered Species

Federal/State Threatened and Endangered Species that have the potential to occur within the Shaft 1 Study Area are shown in **Table 11.5-1**. As described in Section 11.3.8, "Natural Resources," these species were identified by performing a review of the USFWS Official Species Lists and NYNHP database results, as well as data from the NYSDEC Nature Explorer, NYSDEC Breeding Bird Atlas, and Herp Atlas.

Table 11.5-1: Federal/State Threatened and Endangered Species, and Habitat Potentially within the Shaft 1 Study Area

Common Name	Scientific Name	Federal Listing	State Listing	Potential for Habitat	Potential for Species
Amphibians and Reptiles					
Timber Rattlesnake	*Crotalus horridus*	--	T	Yes	Not Anticipated
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	BGPA	T	Yes	Yes

Notes:
BGPA: Bald and Golden Eagle Protection Act
T: Threatened
Source: USFWS Official Species List for Ulster and Putnam Counties; NYSDEC-NYNHP Database Consultation; NYSDEC Nature Explorer; Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the study area would largely be the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

Timber rattlesnake (Crotalus horridus)

As noted in Section 11.3.8, "Natural Resources," populations of timber rattlesnakes (*Crotalus horridus*) have been documented in the region proximate to the study area, and suitable habitat for this species is known to exist in this area of Ulster County. According to records received from NYNHP, there is a timber rattlesnake hibernaculum located within 1.5 miles from the Shaft 1 site. Timber rattlesnakes inhabit primarily deciduous forests in mountainous terrain. However, in summer, they can be found in coniferous forests, mixed forests, and old fields.

Although wetlands were not identified within the Shaft 1 Study Area, the study area does consist largely of forested land. Therefore, it is assumed that potential habitat is present within the Shaft 1 Study Area.

In the future with the inspection and repair, activities at the Shaft 1 site would occur within DEP property, and would be temporary. The limits of disturbance for the inspection and repair would be confined to the previously disturbed, fenced-in Shaft 1 site. Prior to the commencement of work, any timber rattlesnakes occurring within the site would be relocated by a DEP Wildlife

Specialist, and perimeter soil and erosion control measures would be erected to help prevent additional individuals from entering the site. Vehicles entering and exiting the site would take precautions to avoid any timber rattlesnakes that could be basking on or traveling across the road. Neither vehicles nor construction activities would occur close to the hibernaculum documented by NYNHP.

Following completion of the inspection and repair, the Shaft 1 site would be restored to baseline conditions. As such, the inspection and repair would not disturb timber rattlesnakes. Therefore, the inspection and repair may affect but is not likely to adversely affect timber rattlesnakes within the Shaft 1 Study Area.

Bald Eagle (Haliaeetus leucocephalus)

A consultation with NYNHP indicated that several pairs of breeding Bald Eagles (*Haliaeetus leucocephalus*) nest at Rondout Reservoir, which is located north of the Shaft 1 Study Area. However, Rondout Reservoir is not located within the study area, nor are other large open water areas, which are required by Bald Eagles for breeding purposes. The distance to the nearest known nest at Rondout Reservoir is approximately 9,800 feet from the Shaft 1 site, well beyond the recommended buffer restrictions of 330 and 660 feet outlined by USFWS guidelines (USFWS 2007a). In the future with the inspection and repair, the proposed activities would not affect Rondout Reservoir or the area within the 330- or 660-foot buffer surrounding the Bald Eagles' nest. As such, the inspection and repair activities at the Shaft 1 site, including any noise temporarily generated at the site, are not anticipated to disturb Bald Eagles because of the distance to the nest. Bald Eagles may still utilize the study area for non-breeding purposes such as foraging and perching.

Following completion of the inspection and repair, the Shaft 1 Study Area would be restored to baseline conditions. There would be no disturbance associated with the inspection and repair to Bald Eagles or their habitat within the study area. Therefore, the inspection and repair may affect but is not likely to adversely affect Bald Eagles within the Shaft 1 Study Area.

Federal/State Threatened and Endangered Species Conclusions

Based on the impact analysis, no take is anticipated. Inspection and repair may affect, but is not likely to adversely affect, timber rattlesnakes or Bald Eagles. Therefore, the inspection and repair would not result in significant adverse impacts to federal/State Threatened and Endangered Species within the Shaft 1 Study Area.

11.5.5 HAZARDOUS MATERIALS

The study area for the hazardous materials analysis is the area within 0.25 mile of the Shaft 1 site (see **Figure 11.5-1**).

The Shaft 1 site is generally bounded by State Route 55 to the north and surrounded by wooded areas. Shaft 1 would be the primary ventilation exhaust shaft and serve as an alternate point of entrance during the inspection and repair. As described in Section 11.3.9, "Hazardous Materials," a hazardous waste and contaminated materials screening was performed in 2015. Environmental database searches performed resulted in no identifiable hazardous materials, hazardous and non-

hazardous treatment and storage facilities, or air and wastewater discharges within the Shaft 1 Study Area. The database searches provided no documentation or indication of current contamination at the Shaft 1 Study Area or from surrounding properties.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no developments or structures that would introduce hazardous materials to the environment are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that the presence of hazardous materials within the Shaft 1 Study Area would be the same as baseline conditions.

The inspection and repair at the Shaft 1 site would involve minor site preparation activities (i.e., grading and excavation) but would not require soil removal. All grading and excavated material would be stockpiled on site and reused for backfill. Inspection and repair activities at the Shaft 1 site would include site preparation, installation of double containment bulk fuel oil storage tanks, and installation and operation of ventilation, hoisting, and communication systems. Proposed inspection and repair activities at the Shaft 1 site would require the use of a variety of petroleum and other chemical products (e.g., diesel fuel for vehicle, generators, and back-up power; lubricating oil for construction vehicles; and miscellaneous cleaning and maintenance chemicals). Construction equipment and materials required for the inspection and repair would be trucked to the Shaft 1 site when needed. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements. Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements.

Following completion of the inspection and repair, the Shaft 1 site would be restored to baseline conditions. As such, the inspection and repair would not result in significant increases to the public's or environment's exposure to hazardous materials within study area.

Therefore, the inspection and repair would not result in significant adverse impacts from the presence or disturbance of hazardous materials within the Shaft 1 Study Area.

11.5.6 TRANSPORTATION

The study area for the transportation analysis is the area within 0.25 mile of the Shaft 1 site, as shown on **Figure 11.5-7**.

The Shaft 1 site is served by an 8-foot wide gravel access road that connects to State Route 55. State Route 55 is a two-lane, paved, rural major collector that carries approximately 795 vehicles per day in the vicinity of the Shaft 1 site, based on 2011 NYSDOT counts. There are currently no DEP employees who work at or visit the Shaft 1 site on a daily basis, although the site is visited intermittently for typical maintenance and operational purposes. The small number of DEP employee vehicles has little to no effect on traffic conditions within the Shaft 1 Study Area. There is no public transportation to or from the Shaft 1 Study Area. There is little to no pedestrian activity in the immediate vicinity of the Shaft 1 Study Area.

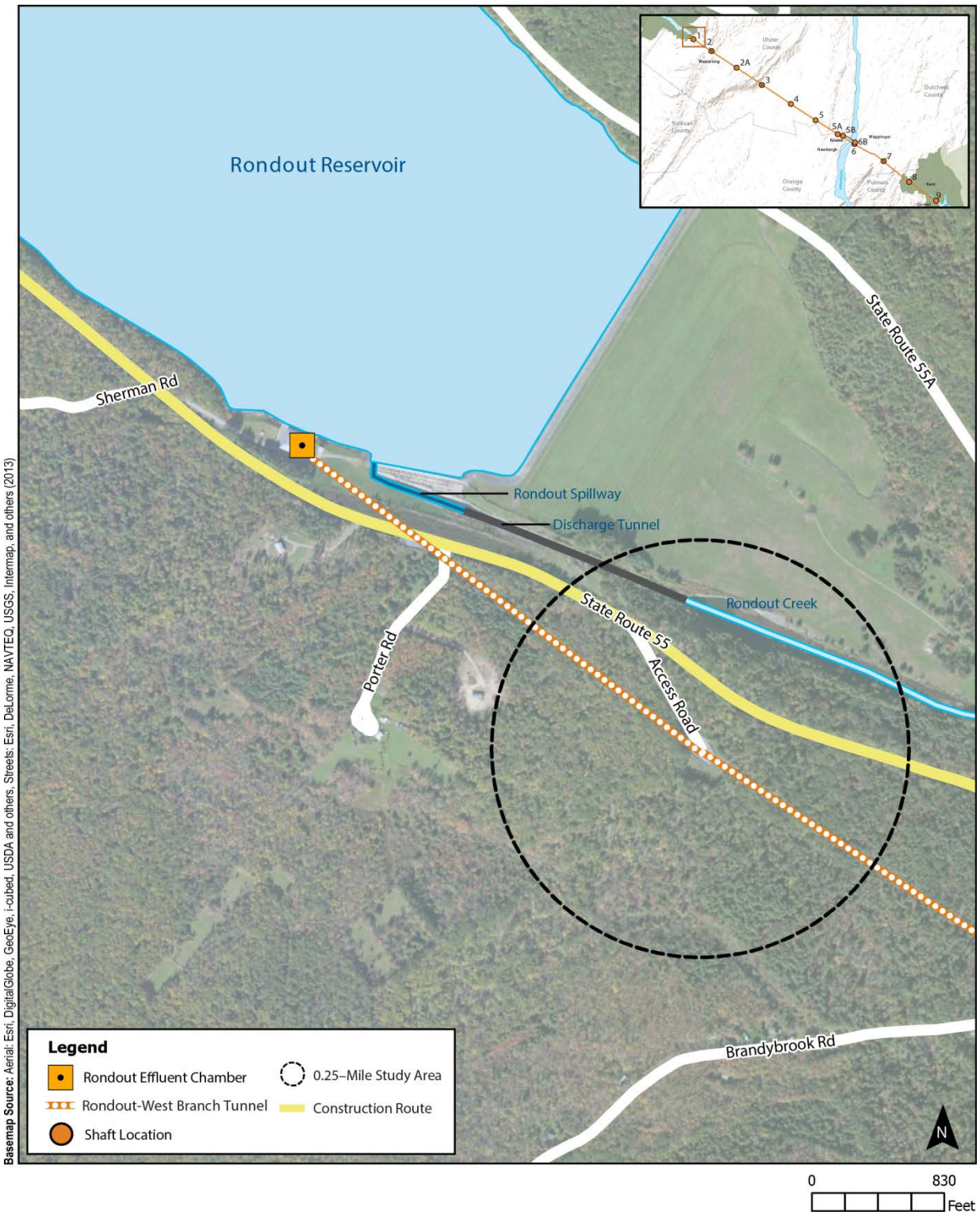


Figure 11.5-7: Transportation – Shaft 1 Study Area

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use or increases in traffic due to outside developments are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that traffic, public transportation, and pedestrian activities within the study area would be similar to baseline conditions.

For the purposes of this analysis, the peak project-generated traffic hour is assumed to coincide with typical construction hours for employee vehicles entering the site: from 6 AM to 7 AM. As a result, it is unlikely to coincide with the peak hour for existing traffic. Moreover, this peak number of vehicle trips to and from the site would occur only during a limited period during the inspection and repair activities at the Shaft 1 Study Area (i.e., no more than 4 weeks). To the extent available, inspection and repair trucks would travel on truck-permitted roadways directly to and from the Shaft 1 site.

The inspection and repair would occur at the DEP-owned Shaft 1 site and would result in vehicle trips for the transportation of crews and materials to and from the Shaft 1 site during the day and during peak existing traffic hours. All inspection and repair traffic is expected to arrive and depart the Shaft 1 site via State Route 55. The estimated number of maximum daily one-way vehicle trips to the Shaft 1 site is 30 vehicles, or approximately 60 peak-day vehicle round trips to and from the Shaft 1 site. Of these peak-day vehicle round trips, up to 25 vehicle trip ends (45 PCEs) could occur during the peak hour, based on the assumption that 90 percent of the inspection and repair worker vehicles and 75 percent of the inspection and repair trucks would arrive or depart during the peak hour of construction. On an average day, the estimated number of the inspection and repair vehicle round trips would be approximately 20, with 17 vehicle trip ends (25 PCEs) that would occur during the peak hour of construction.

Inspection and repair trucks for the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would travel along on State Route 55 to reach their respective sites. Assuming that separate construction crews would be used for each site for the inspection and repair activities, the trucks would converge on State Route 55 and result in 82 maximum daily one-way vehicle trips, or approximately 164 peak-day vehicle round trips, with 67 vehicle trip ends (123 PCEs) during the peak hour of construction.

The inspection and repair at the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would result in 67 peak-hour vehicle trip ends along State Route 55, which is above the *CEQR Technical Manual* screening threshold of 50 peak-hour vehicle trip ends as described in Section 11.3.12, "Transportation." However, the inspection and repair activities at the Shaft 1 Study Area would be short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period). The peak activities at the site would occur during the condition assessment, which together would take place over the course of approximately 1 week beginning in October 2022.

The inspection and repair would not generate demands for public parking or transportation or an increase in pedestrian activity within the Shaft 1 Study Area. Following completion of the inspection and repair, the Shaft 1 site would be restored to baseline conditions.

Therefore, although there would be a minor temporary increase in traffic, the inspection and repair would not result in significant adverse impacts to transportation within the Shaft 1 Study Area.

11.5.7 NOISE

As described in Section 11.3.14, "Noise," mobile noise associated with the inspection and repair within the Shaft 1 Study Area does not warrant analysis. This section includes an analysis of potential impacts from stationary noise associated with the inspection and repair to sensitive receptors within the Shaft 1 Study Area. The study area for the noise analysis is the area within 1,500 feet of the Shaft 1 site, as shown on **Figure 11.5-8**.

The Shaft 1 Study Area includes one residential property and public parklands. Peak inspection and repair activities at the Shaft 1 Study Area would occur for approximately 1 week. As noted in Section 11.3.14.1, "Screening Assessment," the temporary construction activities were evaluated to determine compliance with local noise codes. The inspection and repair is subject to the Town of Wawarsing Noise Control Law. The Town of Wawarsing Noise Control Law (§78-4) prohibits "the operation of any source of sound" that exceeds the sound level limit of 73 dBA between the hours of 6 AM and 10 PM and 63 dBA between the hours of 10 PM and 6 AM "when determined by a sound-level measure at the adjoining property line nearest to the sound source." The nearest adjoining property line, which is at a vacant land use, was used to evaluate compliance with applicable local noise regulations in the Town of Wawarsing. In addition, the temporary construction activities were evaluated to disclose potential noise levels at the nearest residential parcel.

Existing ambient noise levels within the Shaft 1 Study Area are influenced by vehicular traffic on State Route 55. The existing noise levels within the study area are comparable to a very quiet suburban and rural residential environment based on proximity to major transportation corridors, population density of the area, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA L_{eq} during the day and 34 dBA L_{eq} at night.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no major projects that would result in a change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels, are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis.

Therefore, in the future without the inspection and repair, it is assumed that ambient noise levels within the Shaft 1 Study Area would be similar to baseline conditions.

In the future with the inspection and repair, stationary noise-producing activities would occur on approximately 1 acre of DEP-owned land surrounding Shaft 1. They would include operation of ventilation systems and hoisting systems to support the entrance and exit of personnel and the requisite inspection equipment (e.g., communication) and materials used during the course of the work. Peak inspection and repair activities at the Shaft 1 site would occur primarily between 7 AM and 7 PM, 7 days a week, for approximately 1 week. However, the ventilation systems would operate 24 hours per day, 7 days a week, for up to 8 months. All construction would occur on DEP property.

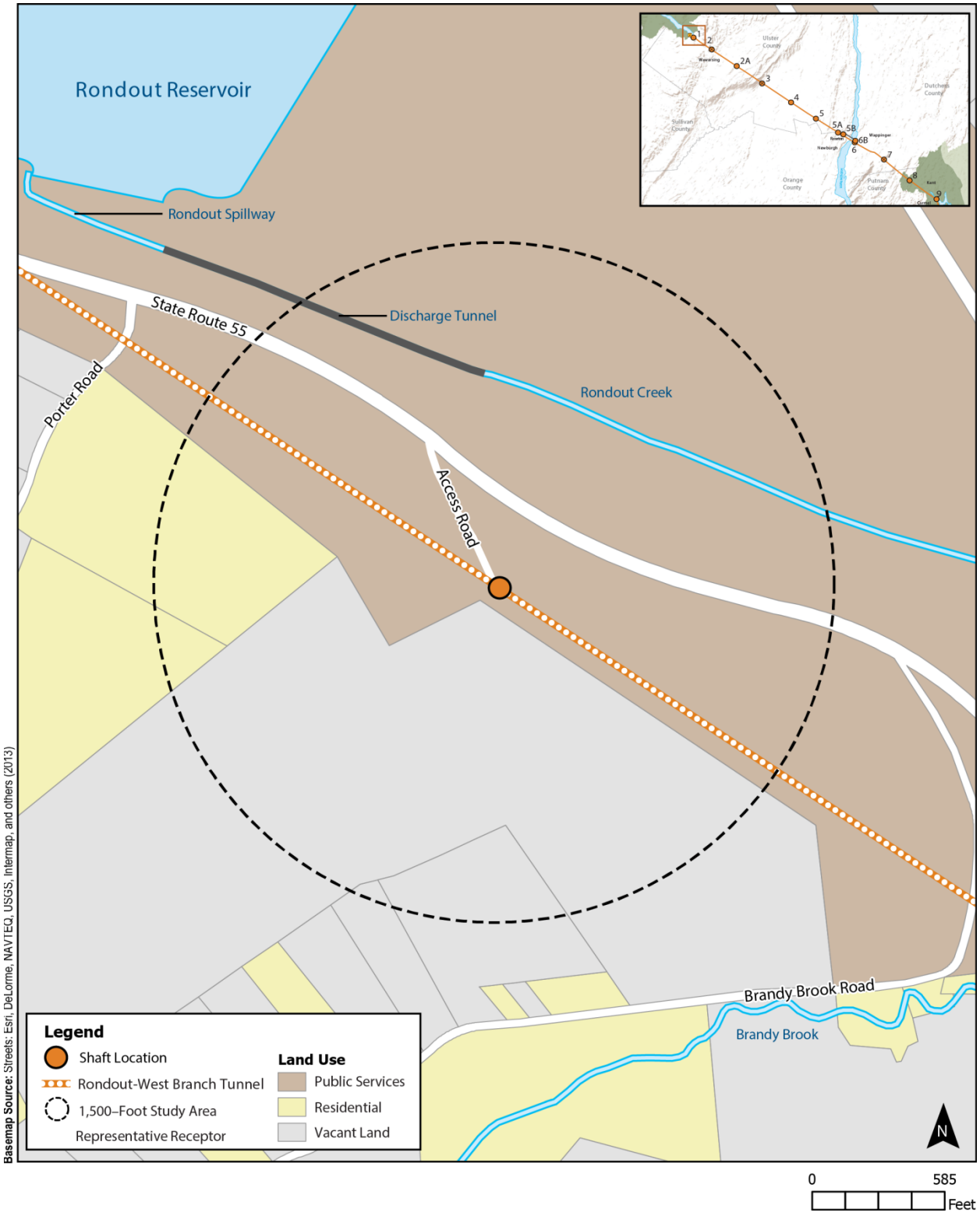


Figure 11.5-8: Noise – Shaft 1 Study Area

The noise analysis focused on stationary noise-generating equipment expected to operate constantly at the Shaft 1 site. The equipment types included in the stationary noise analysis and their reference noise levels are shown in **Table 11.5-2**. The number and types of noise-generating equipment analyzed were based conservatively on peak construction operating conditions.

Table 11.5-2: Stationary Source Construction Equipment Modeled at the Shaft 1 Site and Reference Noise Levels (L_{eq})

Equipment Type (Quantity)	Reference Noise Level (L_{eq}) at 50 feet (dBA)	Source
Generator (2)	75	Caterpillar[1]
Ventilation Fan (2)	51	Clarage[2]
Compressor (1)	80	CEQR[3]
Crane (1)[4]	85	CEQR[3]

Notes:
[1] Caterpillar Weather Protective and Sound Attenuated Enclosures (2014).
[2] Clarage 5155 AF – SWSI manufacturer sound pressure level estimate (2014).
[3] *City Environmental Quality Review (CEQR) Technical Manual,* Chapter 22.
[4] Crane operations at Shaft 1 would occur during daytime hours only, 7 AM to 7 PM.

The Shaft 1 site is surrounded by trees, so a wide section of dense trees is located between the Shaft 1 site and the residential receptor. Therefore, the maximum tree zone attenuation of 10 dB is applied for the residential receptor. The results of the stationary noise analysis are shown in **Table 11.5-3**. As shown in **Table 11.5-3**, the inspection and repair activities at the Shaft 1 site would exceed the daytime and nighttime noise limits of the Town of Wawarsing Noise Control Law at the nearest adjoining property line (vacant land use). Therefore, DEP would work with the Town of Wawarsing, as appropriate. Although there would be an increase in stationary noise levels during 24-hour construction, work would take place in the fall and winter months when residents typically have windows closed, and noise levels inside would be further reduced to approximately 59 dBA during the daytime hours and 54 dBA during the nighttime hours.[5]

Following completion of the inspection and repair, the Shaft 1 site would be restored to baseline conditions. The inspection and repair would be temporary (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period).

Therefore, although there would be a temporary increase in noise, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the Shaft 1 Study Area.

[5] Calculated assuming a 24 dBA reduction from the predicted exterior noise levels for a closed window condition (with at least a single-pane and storm window, or double-pane window).

Table 11.5-3: Stationary Noise Analysis Results (L_{eq}) at the Nearest Noise-Sensitive Receptors within the Shaft 1 Study Area

Nearest Noise-Sensitive Receptor	Distance from Site (feet)	Conditions Analyzed	Predicted Stationary Noise Level at Noise-Sensitive Receptor (dBA)	Town of Wawarsing Noise Limit (dBA)	Potential for Exceedance (Yes or No)
Nearest Adjoining Property Line (Vacant Land Use)	81	Daytime	83	73[1]	Yes
		Nighttime	78	63[2]	Yes
Nearest Residential Property Line	734	Daytime	53	NA	NA
		Nighttime	49	NA	NA

Notes:
NA = Not Applicable
[1] Noise limit between the hours of 6 AM and 10 PM.
[2] Noise limit between the hours of 10 PM and 6 AM.

11.5.8 NEIGHBORHOOD CHARACTER

The character of the Shaft 1 Study Area is largely defined by public service land uses and its physical setting within a rural location (see **Figure 11.5-2**). The site is generally bounded by State Route 55 to the northwest and surrounded by wooded areas. The work sites are located within a public services parcel owned and maintained by DEP. Access to both sites would be from State Route 55 onto DEP driveways.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use and no new projects or structures are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that neighborhood character within the study area would be similar to baseline conditions.

As described in Section 11.3.15, "Neighborhood Character," there would be no potential for the inspection and repair to affect shadows and urban design. In addition, based on the screening assessment for land use and zoning, socioeconomic conditions, open space and recreation and historic and cultural resources, an impact analysis for the Shaft 1 Study Area are not warranted, as discussed in the following sections: Section 11.3.2, "Land Use, Zoning, and Public Policy," Section 11.3.3, "Socioeconomic Conditions," Section 11.3.5, "Open Space and Recreation," and Section 11.3.6, "Historic and Cultural Resources." As described in Section 11.5.3, "Visual Resources," the work activities would not affect open space and recreation and visual resources in the Shaft 1 Study Area. Furthermore, the public policy impact analysis provided in Section 11.5.2, "Public Policy," concluded that the work activities were consistent with applicable plans.

The work activities in the Shaft 1 Study Area would be short-term (approximately 6 months before and approximately 1 week during the temporary shutdown) and would result in a

temporary increase in traffic and noise. Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area and traffic patterns would return to baseline conditions. These temporary increases in traffic and noise levels would not result in a density of activity or service conditions that would affect the overall character of the study area. The inspection and repair would not generate significant adverse effects in land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to neighborhood character within the Shaft 1 Study Area.

11.5.9 PUBLIC HEALTH

Water supply and, in particular, the community users drawing water from the Delaware Aqueduct, would not be significantly affected by the inspection and repair within the Shaft 1 Study Area. DEP has developed an ongoing program to work with these communities, including reviewing the availability of back-up water supplies and analyzing the ability of these users to accommodate reduced access to the Delaware Aqueduct during the 8-month shutdown, as appropriate and to meet all applicable drinking water standards.

Based on the environmental investigations completed within the Shaft 1 Study Area, results of testing conducted on soils support the reuse of excavated materials as backfill and do not suggest the need for special management, handling, or health and safety measures at this time. Inspection and repair work activities would require the potential storage and use of a variety of petroleum and other chemical products, such as diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals during construction. DEP would handle all materials in accordance with applicable federal, State, and local regulations and guidelines. The work activities at the study area would be short-term (approximately 6 months before the temporary shutdown and approximately 1 week during the temporary shutdown) and would result in a temporary increase in noise. Following construction of the inspection and repair, the construction equipment, vehicles, and chemical storage would be removed from the study area, and operation of the Delaware Aqueduct would be consistent with baseline conditions.

Based on the analyses above, the inspection and repair would not result in significant adverse impacts in any of the technical areas related to public health: air quality, water supply (quantity or quality), hazardous materials, or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to public health within the Shaft 1 Study Area.

11.6 SHAFT 2A AND WAWARSING LEAK REPAIR STUDY AREA IMPACT ANALYSIS

11.6.1 SHAFT 2A AND WAWARSING LEAK REPAIR STUDY AREA PROJECT DESCRIPTION

The repairs to the RWBT near the Town of Wawarsing in Ulster County, New York, would be supported via construction staging and access at Shaft 2A. This section assesses both surface construction at Shaft 2A and repairs to the RWBT that would take place within the tunnel. It includes the potential impacts associated with the permanent cessation of leaks following the completion of inspection and repair activities near the Town of Wawarsing, as shown in **Figure 11.6-1**. The proposed activities and impact analyses are described in their respective study areas.

As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," per the *CEQR Technical Manual*, a 0.25-mile radius study area is appropriate to encompass the immediate effects and potential secondary effects on the area surrounding the Shaft 2A site. Therefore, a 0.25-mile study area boundary around the shaft was used for most impact categories to assess the potential for impacts associated with surface construction at the Shaft 2A site. The *CEQR Technical Manual* also allows for study areas to vary for specific impact categories, as appropriate. To assess the potential for impacts associated with the surface construction at Shaft 2A, it was appropriate to establish specific study areas for natural resources and stationary noise. Per the *CEQR Technical Manual*, a study area boundary of 400 feet and 1,500 feet surrounding the Shaft 2A site is appropriate to encompass the immediate and potential secondary effects to natural resources and stationary noise, respectively.

There would be no direct surface disturbance in the Leak Repair Study Area, which is the area within the Shaft 2A and Wawarsing Leak Repair Study Area that would potentially be affected by reduced groundwater levels as a result of the cessation of RWBT leaks. As discussed in Section 11.3.8.1, "Water Resources," the boundaries of this study area are based on data previously collected by the USGS, which shows that the leaks from the RWBT influence local groundwater levels at various distances from the RWBT, dependent on the local geology. Therefore, the Leak Repair Study Area is used to assess the potential for impacts as a result of the cessation of RWBT leaks.

The Shaft 2A and Wawarsing Leak Repair Study Area is shown on **Figure 11.6-1**.

11.6.2 SHAFT 2A AND WAWARSING LEAK REPAIR STUDY AREA

As described in Section 11.2, "Project Description," the Shaft 2A site would be a primary entry and exit point for personnel and equipment to support the proposed inspection of the RWBT and the proposed internal repairs in the Wawarsing area. The Shaft 2A Study Area is located along the RWBT in the Town of Wawarsing. Activities to mobilize the site would begin up to 6 months before the temporary shutdown of the RWBT. Once the inspection and repair has begun, it is anticipated that the condition assessment is expected to last approximately 2 weeks and internal repairs near the Town of Wawarsing are anticipated to last the remainder of the 8-month temporary shutdown. Activities at the site would peak during the repairs near the Town of Wawarsing.

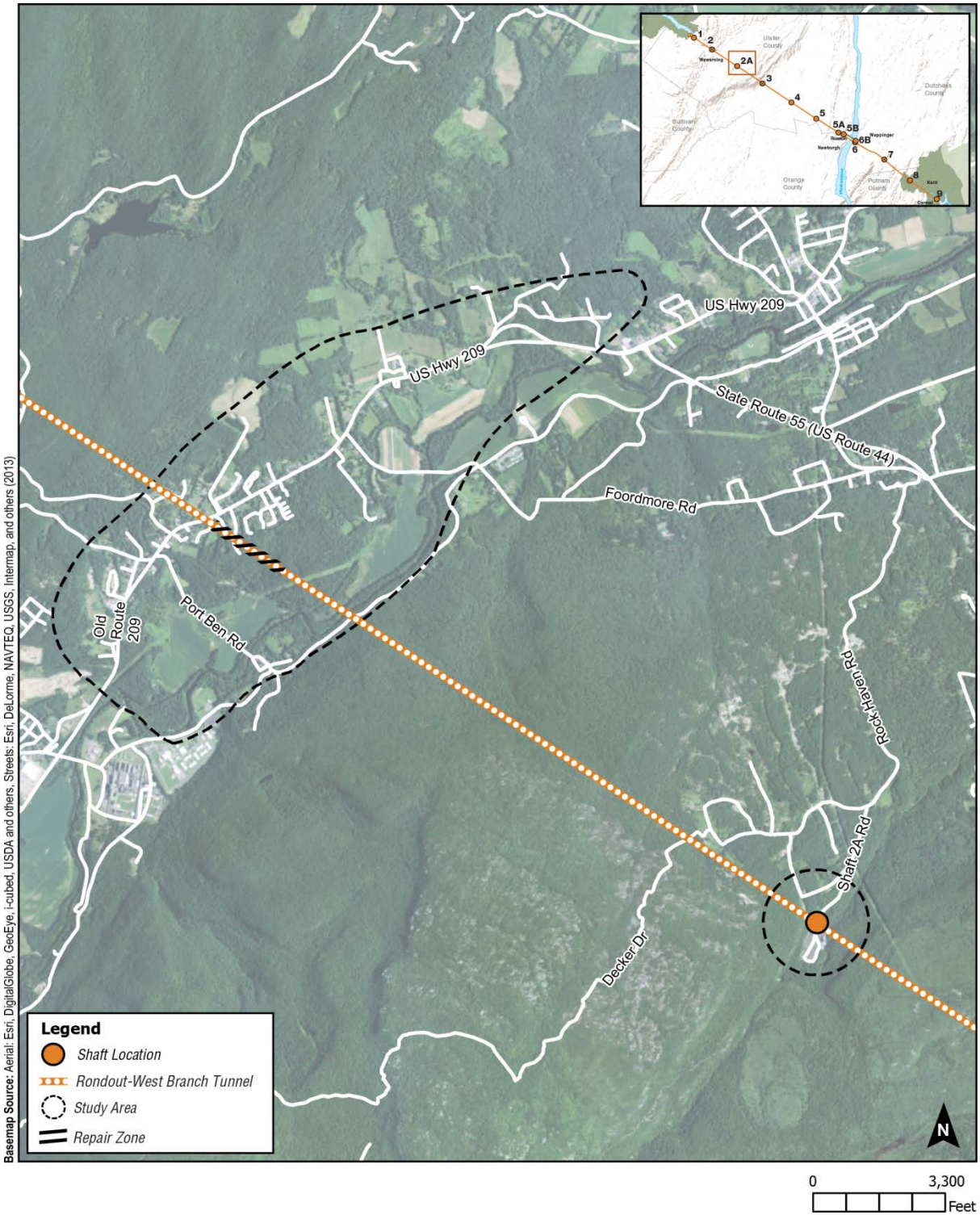


Figure 11.6-1: Site Location – Shaft 2A and Wawarsing Leak Repair Study Area

The Leak Repair Study Area encompasses approximately 1,710 acres of public and privately owned land and is located in the Town of Wawarsing. No aboveground activities would take place within this study area, as activities would be limited to condition assessments and leak repairs that would be performed within the RWBT, which is approximately 700 feet below the ground surface in this area. The boundaries of the Leak Repair Study Area are described further Section 11.3.8.1, "Water Resources."

The sections below provide further description of the existing Shaft 2A and Wawarsing Leak Repair Study Area locations and baseline conditions for the surrounding areas, as well as the inspection and repair activities that would be performed at the Shaft 2A site and within the RWBT.

The potential for impacts to the following are discussed below: public policy; open space and recreation; historic and cultural resources; visual resources; natural resources, consisting of water resources, geology and soils, terrestrial resources, wildlife, and federal/State Threatened and Endangered Species; hazardous materials; water and sewer infrastructure; transportation; noise; neighborhood character; and public health. As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," an impact analysis related to land use and zoning; socioeconomic conditions; community facilities and services; other natural resources subcategories including, aquatic and benthic resources, federal/State Candidate Species, State Species of Special Concern and unlisted rare and vulnerable species; energy; and air quality within the Shaft 2A and Wawarsing Leak Repair Study Area is not warranted.

11.6.3 DESCRIPTION OF EXISTING SHAFT 2A AND WAWARSING LEAK REPAIR SITES AND STUDY AREAS

The Shaft 2A site is an approximately 0.9-acre property owned by DEP located along the RWBT in the Town of Wawarsing (Tax ID 84.1-1-11, Block 1, Lot 11). The site is generally bounded by Shaft 2A Road to the north, vacant land to the west, and forested areas to the north and south, as shown on **Figure 11.6-2**. The site is accessible via a gravel road connected to Shaft 2A Road. The existing land uses within the 0.25-mile study area include public services property, consisting of the DEP-owned Shaft 2A site; forested and cleared open space property, including park properties managed by the Palisades Interstate Park Commission and NYSOPRHP; vacant property; and privately owned residential property, as shown in **Figure 11.6-3**.

The Shaft 2A site is located within a rural residential (RU) zoning district within the Town of Wawarsing (see **Figure 11.6-4**). The rural residential (RU) zoning district surrounds the study area and is the only zoning classification located within the study area. The Shaft 2A site constitutes a public service use, which is a permitted use within the rural residential (RU) zoning district.

The boundaries of the Leak Repair Study Area encompass approximately 1,710 acres in the Town of Wawarsing, Ulster County (see **Figure 11.6-5**). The Leak Repair Study Area is comprised of agricultural, residential, commercial, industrial, community facilities, vacant land, open space, and public service land uses (see **Figure 11.6-6**).

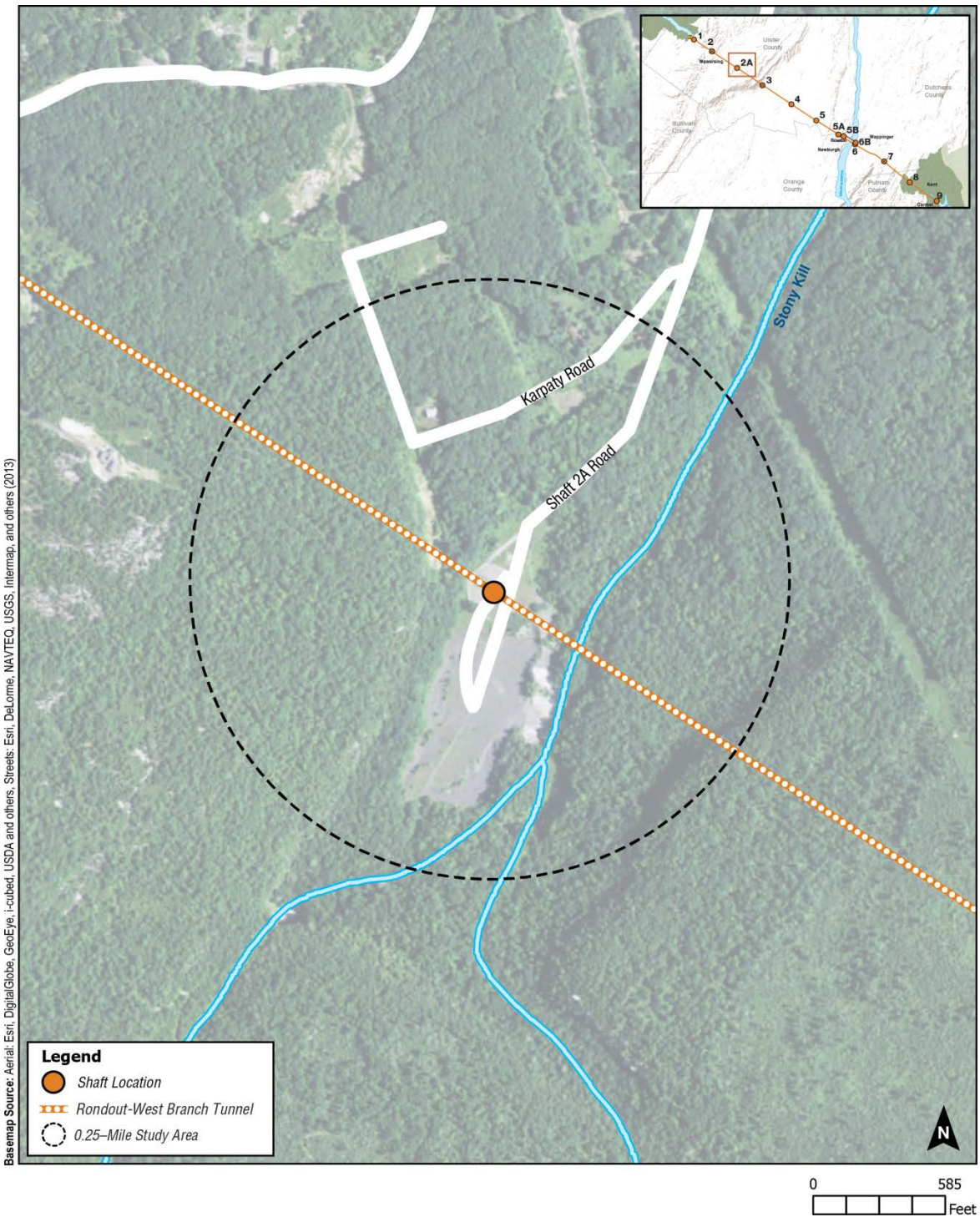


Figure 11.6-2: Site Location – Shaft 2A Study Area

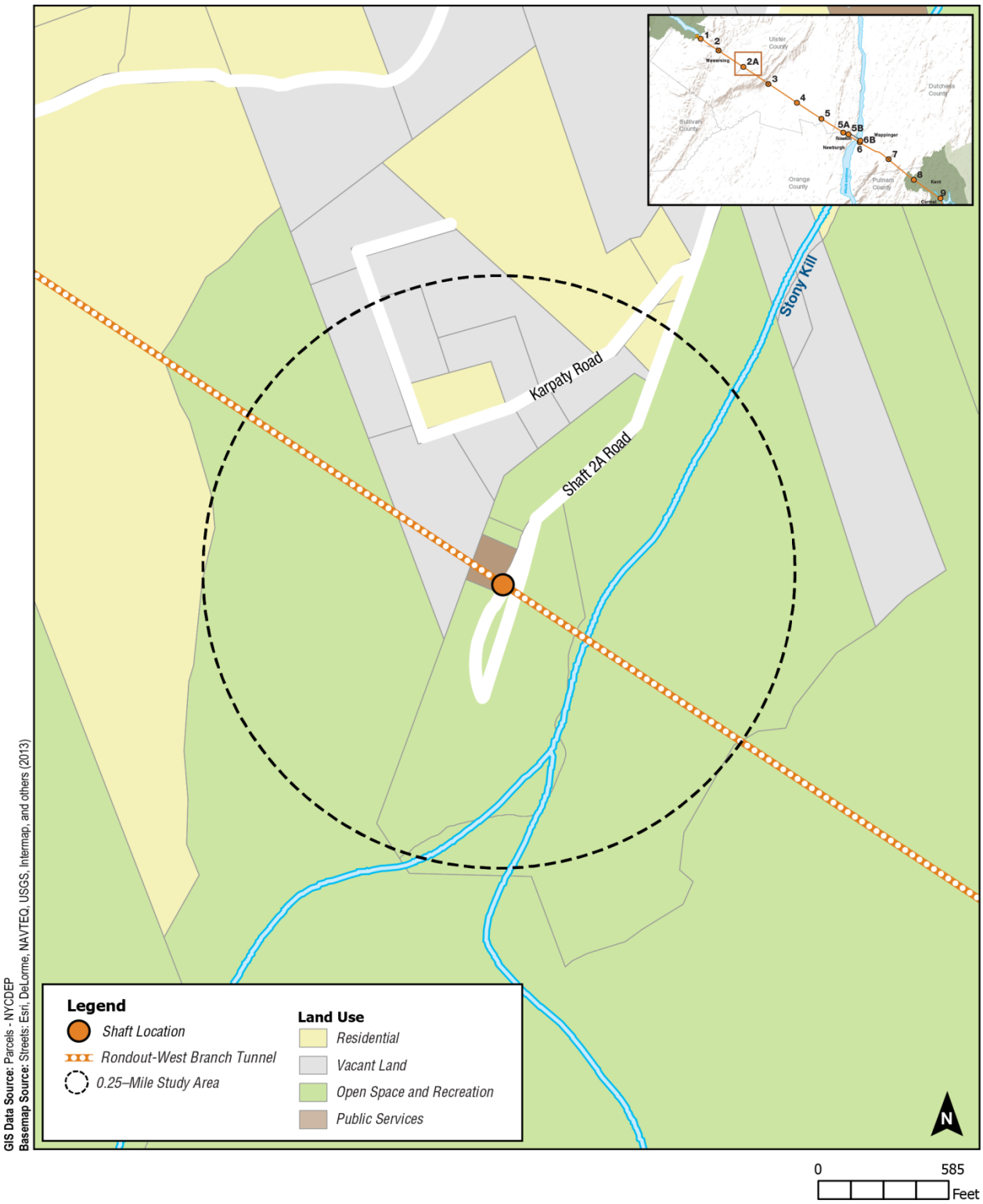


Figure 11.6-3: Land Use – Shaft 2A Study Area

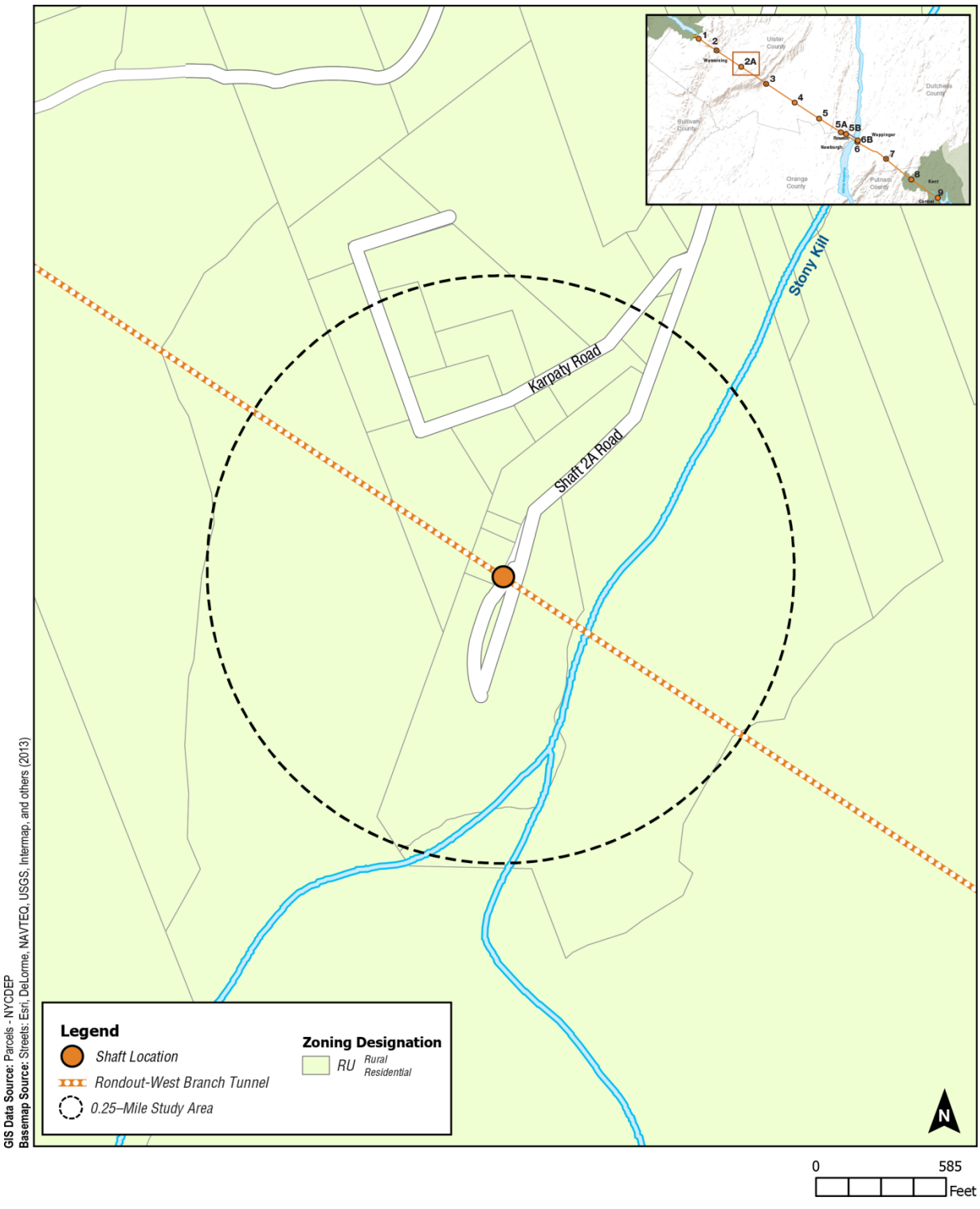


Figure 11.6-4 Zoning – Shaft 2A Study Area

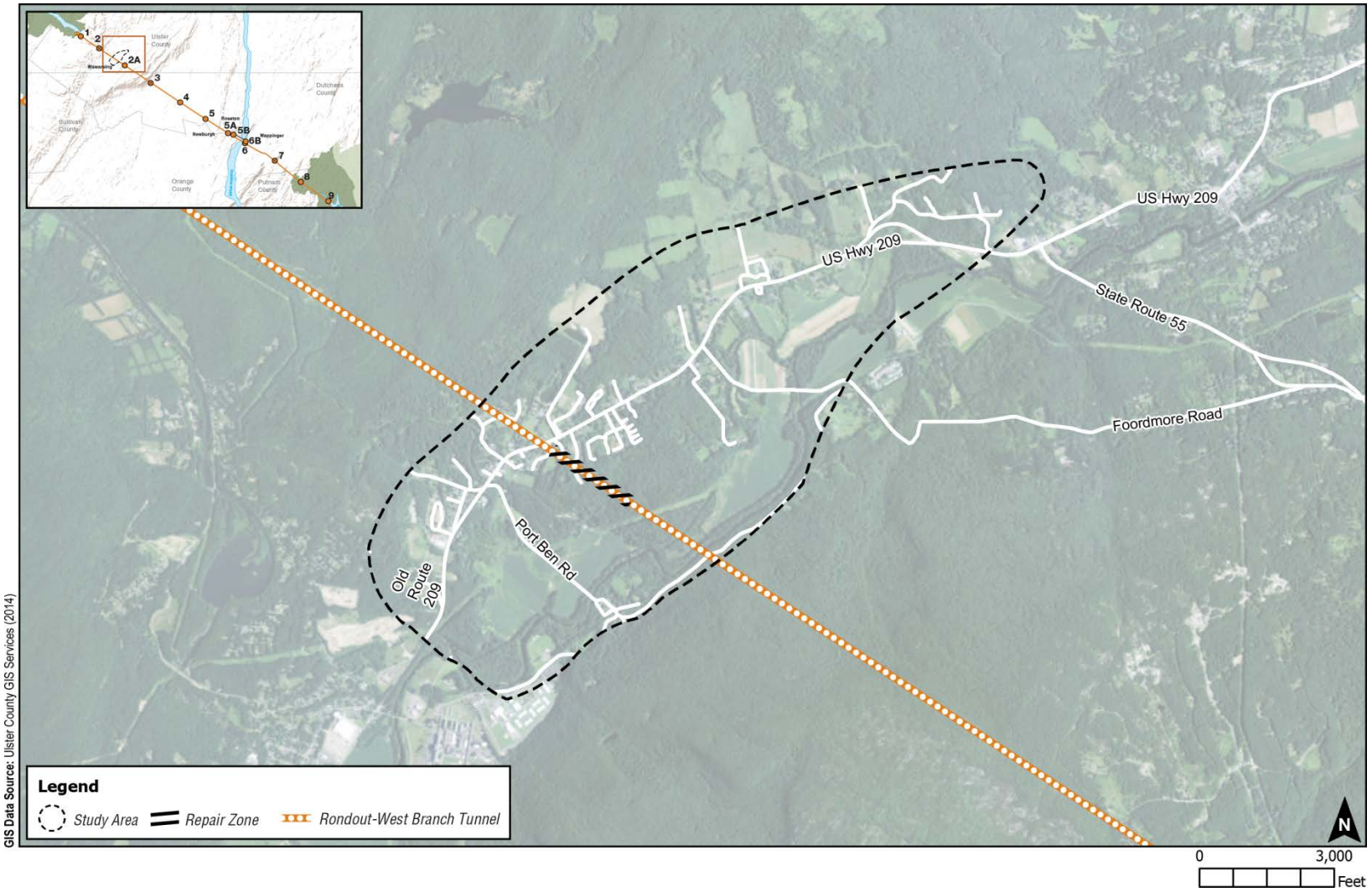


Figure 11.6-5: Site Location – Leak Repair Study Area

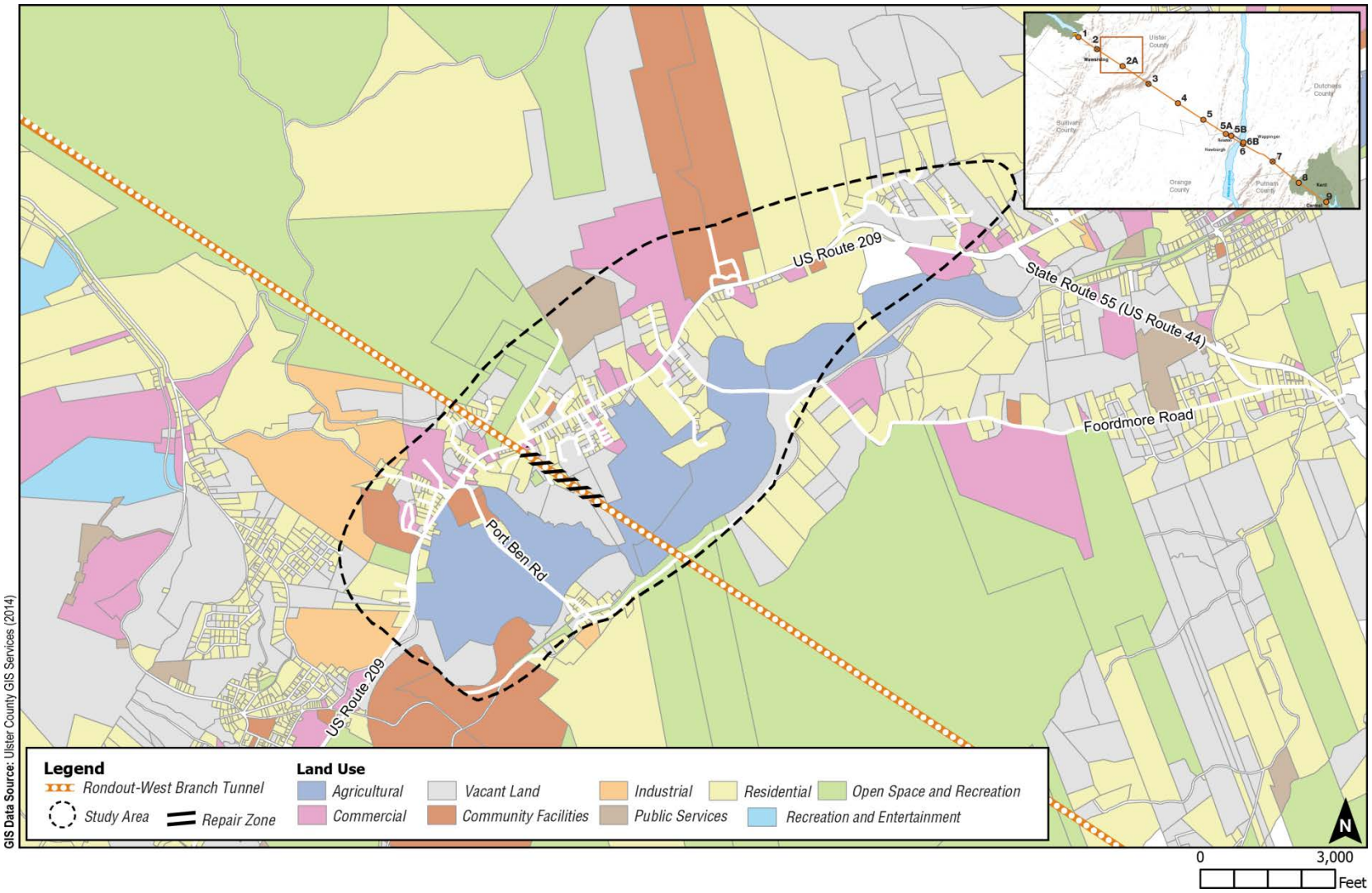


Figure 11.6-6: Land Use – Leak Repair Study Area

The Leak Repair Study Area is located in several zoning districts. The dominant zoning district is the rural residential (RU) zoning district (see **Figure 11.6-7**). Other zoning districts within the study area are primarily located along U.S. Route 209 and include low- and moderate-density residential settlement (RS-1 and R-2) zoning districts, residential manufactured housing (RMH) zoning district, business-highway (BH) zoning district, and mixed use (MU) zoning district (Chapter 112-Zoning of the Wawarsing Town Code).

11.6.4 PROPOSED ACTIVITIES AT THE SHAFT 2A AND WAWARSING LEAK REPAIR STUDY AREA

As described above, the Shaft 2A site would be a primary entry and exit point for personnel and equipment to support the inspection for most RWBT segments west of the Hudson River, including the internal repairs near the Town of Wawarsing. Access to the site would be provided via the existing gravel road. The inspection and repair activities anticipated at the Shaft 2A site would include: site preparation of support equipment beginning up to 6 months before the RWBT temporary shutdown; condition assessment support; support of repairs to the leaking portion of the RWBT near the Town of Wawarsing; and demobilization and site restoration. All disturbance and activities would occur within the Shaft 2A site footprint (see **Figure 11.6-8**). It is anticipated that all of the approximately 0.9 acre of the property would be used during inspection and repair.

Equipment and materials would include construction vehicles (e.g., pickup trucks, flat trucks, wheel loaders, excavators), cranes/hoists, 220-kilowatt generators, compressors, utility vehicles, grout plants, and air tracks, as well as drilling, grout, and initial support equipment for the repair work. Limited excavation and grading would be required on site to allow for installation of the temporary hoisting system.

Repair work would be conducted along a 1,300-foot long section of RWBT near Wawarsing using grouting and structural repairs. Once the tunnel is drained, the repairs may take place 24 hours per day, 7 days a week for the duration of the temporary shutdown, which would be approximately 7.5 months. In order to reduce water flow from the leaks through the rock mass, pressure grouting would be performed in the RWBT in the vicinity of the steel interliner in the Wawarsing area. Grout would be mixed within the RWBT using portable mixers and bags of Portland cement. The mixers consist of a mixing tank, a holding tank, and a pump. The dry Portland cement is poured from the bags into the plant and water is added. The grout is then pumped into the predrilled holes until refusal. These mixers, as well as pumping equipment and pneumatic drilling equipment, would be powered by diesel or compressed air. This fuel would be stored on site above ground in temporary storage tanks. These RWBT repairs in the Wawarsing crossing, once completed, would be anticipated to result in the permanent cessation of RWBT leaks in the Leak Repair Study Area.

Support activities at the Shaft 2A site for the duration of the repairs would include receiving deliveries of construction materials; hoisting materials, personnel, and debris in and out of the RWBT; and removing waste materials and debris associated with repair and grouting work from the site. The majority of the equipment and activity associated with the RWBT repair work would be located within the RWBT.

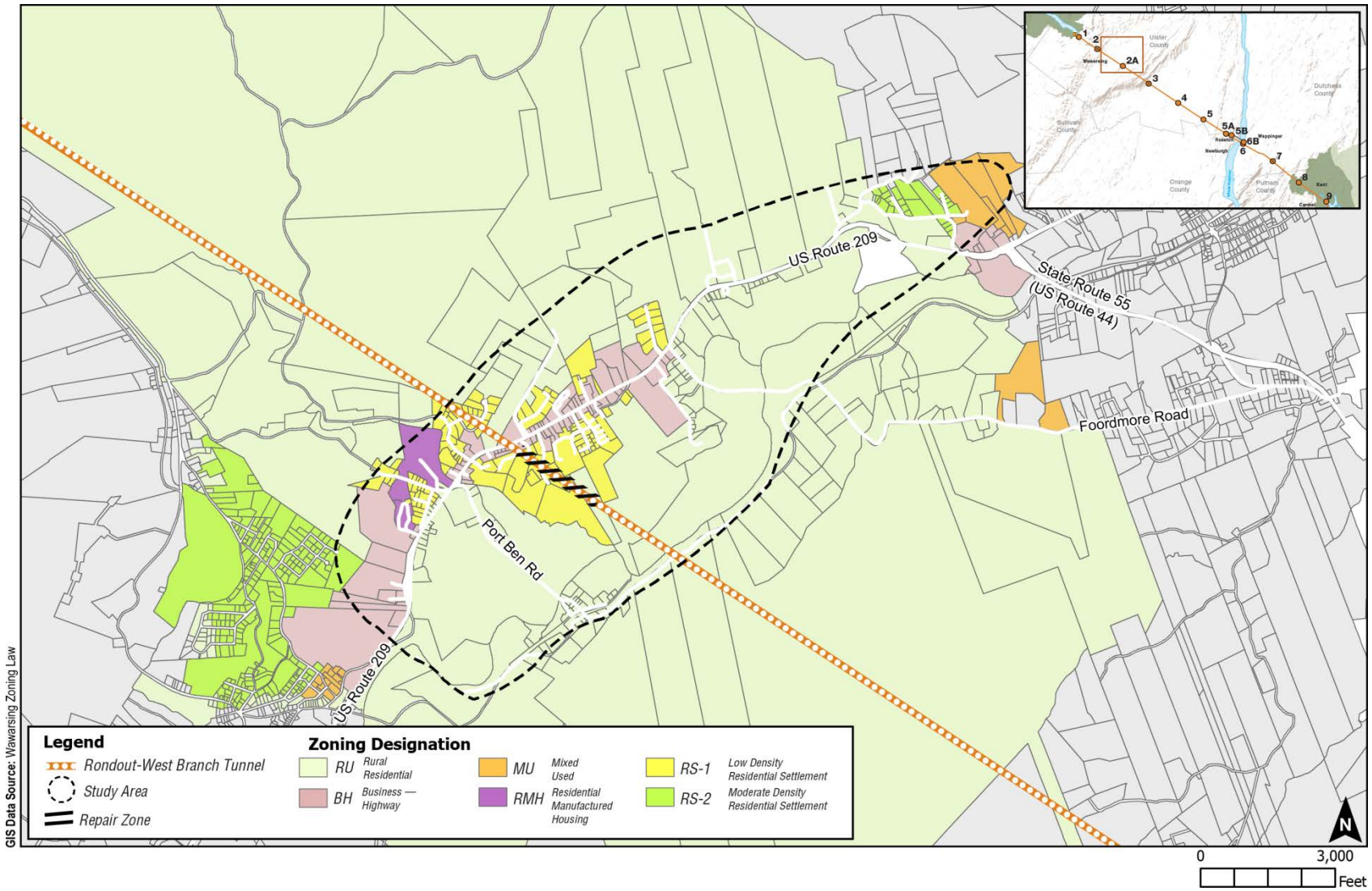
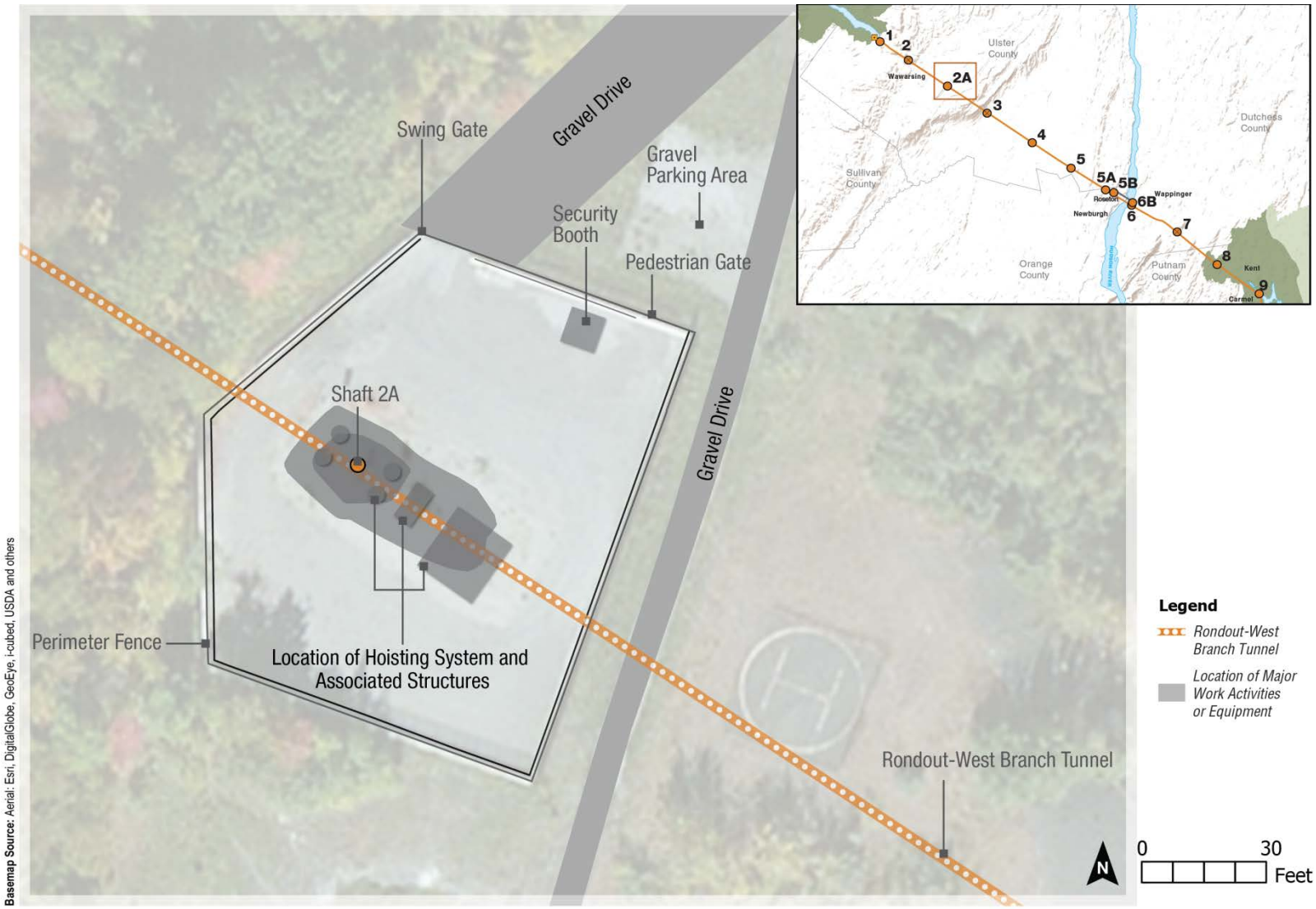


Figure 11.6-7: Zoning – Leak Repair Study Area



Note: The gray lines show the edge of the work area/site and outline other features of the existing shaft site.

Figure 11.6-8: Shaft 2A

The impact analysis for the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area consists of determining the potential for impacts associated with temporary surface construction at the Shaft 2A site along with impacts from the permanent cessation of RWBT leaks.

Site preparation at the Shaft 2A site would begin up to 6 months before the temporary shutdown of the RWBT and would occur only Monday through Friday between 7 AM to 7 PM. Limited grading and excavation would be carried out to uncover existing hoisting foundations for the hoisting system, and soil and erosion control measures would be installed. The hoisting system, which would be transported via truck to the Shaft 2A site once the inspection and repair begins, would allow for the installation of the communication systems. The hoisting system would also support the entrance and exit of personnel and the requisite inspection equipment (e.g., vehicles, communication) and materials used during the course of the work. Communication systems would also be installed to allow for continuous tunnel-to-surface communication. Noise and vibration barriers would be installed, as necessary. In addition, temporary security measures would be installed at the site, including jersey barriers, a security booth, and security cameras. Once the RWBT temporary shutdown begins, the existing shaft cap would be demolished to allow equipment, materials, and personnel to enter or exit the shaft. After preparations at the bottom of Shaft 2A are complete, the condition assessment would be performed 7 days a week between 7 AM and 7 PM. These assessments would be completed by a single team consisting of approximately 8 to 12 workers, and are expected to last approximately 2 weeks. Repairs near Wawarsing would commence after the condition assessments staged from Shaft 2A are completed. Activities associated with access to and repair of the RWBT would take place 24 hours per day, 7 days a week, and would last throughout the temporary shutdown once the tunnel is drained. As mentioned above, the Shaft 2A site activities would peak during this time, since it would function as the primary surface location supporting these repairs. This work would be completed in two shifts consisting of approximately 6 to 12 workers each.

After the RWBT Bypass is connected and the inspection and repair activities are completed, demobilization from the Shaft 2A site would commence, including removal of all equipment and materials. The site would be restored to baseline conditions by September 2023.

11.6.5 PUBLIC POLICY

As described in Section 11.3.2, "Land Use, Zoning, and Public Policy," a land use and zoning impact analysis for the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area is not warranted. Public policies within this study area are applicable to both the surface construction activities at the Shaft 2A site, as well as the potential for impacts associated with the permanent cessation of leaks following the completion of inspection and repair activities to repair the RWBT leaks. The study area for the public policy analysis associated with surface construction at the Shaft 2A site is the area within 0.25 mile of this site. The study area for the public policy analysis associated with the effects to groundwater as a result of the permanent cessation of RWBT leaks is the Leak Repair Study Area. These are shown on **Figure 11.6-1**.

As discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," the inspection and repair's consistency with the applicable policies of the Ulster County Open Space Plan and the Town of Wawarsing Comprehensive Plan within the Shaft 2A and Wawarsing Leak Repair Study Area is analyzed as follows.

11.6.5.1 Ulster County Open Space Plan (2007)

The Ulster County Open Space Plan (Ulster County 2007) establishes a framework for the management and protection of open space resources identified by Ulster County. These include water resources, working landscapes, landforms and natural features, ecological communities, cultural and historic resources, and recreational resources. To provide guidance on these open space resources, Ulster County has established the 10 "Principles of the Open Space Plan" that seek to safeguard the open space values of Ulster County. Of those 10 principles, two are applicable to the inspection and repair.

> *(1) Preserve and protect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty and the rural character of Ulster County.*

Open space and recreation, historic and cultural resources, visual resources, terrestrial resources, and water resources were identified within the Shaft 2A and Wawarsing Leak Repair Study Area. The potential for impacts to these resources associated with the surface construction activities at Shaft 2A within this study area were evaluated in Section 11.6.6, "Open Space and Recreation," Section 11.6.7, "Historic and Cultural Resources," Section 11.6.8, "Visual Resources," and Section 11.6.9, "Natural Resources," respectively.

Under this principle, the Ulster County Open Space Plan recommends protecting valuable landforms and natural features in order to benefit residents and preserve the rural character of Ulster County. This principle was analyzed for inspection and repair as work in the study areas would potentially impact existing open space, visual resources, historic resources, natural resources, geology and soils, and water resources, directly or indirectly.

As discussed in Section 11.6.7, "Open Space and Recreation," Section 11.6.7, "Historic and Cultural Resources," Section 11.6.8, "Visual Resources," and Section 11.6.9, "Natural Resources," the future with the inspection and repair would consist of the construction activities at the Shaft 2A site to support the internal repairs to the RWBT and permanent cessation of RWBT within the Leak Repair Study Area. The construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site, and would be minimal and temporary. The inspection and repair at the existing Shaft 2A site would not impact the physical character of or affect views from nearby open space and recreation areas, including Minnewaska State Park Preserve; would have no impact upon cultural resources in or eligible for inclusion in the State and National Registers of Historic Places; would not result in changes to the future visual and aesthetic resource conditions of the views to or from visual resources; and would have no significant adverse impacts to natural resources. Therefore, the inspection and repair within the Shaft 2A Study Area would be consistent with this policy. In addition, the work activities associated with the internal repairs to the RWBT and permanent cessation of RWBT leaks within the Leak Repair Study Area would occur within the tunnel, approximately 700 feet

below the ground surface, and would not encroach upon, cause a loss of, impact the physical character of, or affect views from the seven aforementioned open space and recreation resources. These activities would have no impact upon cultural resources in or eligible for inclusion on the National and State Registers of Historic Places, and would not result in changes to the future visual and aesthetic resource conditions of the views to or from visual resources. As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible. Leak cessation would not result in changes to the seven aforementioned open space and recreation resources within the Leak Repair Study Area. Therefore, the inspection and repair would not result in significant adverse impacts within the Shaft 2A and Wawarsing Leak Repair Study Area.

As noted in 11.3.8.1, "Water Resources," the permanent cessation of these leaks would affect groundwater levels within the area. Although the changes to groundwater levels would be permanent, the groundwater resources within the Leak Repair Study Area are expected to revert to a condition that is similar to adjacent areas in Ulster County that are unaffected by the RWBT leaks.

Therefore, the inspection and repair would not result in significant adverse impacts to groundwater within the Leak Repair Study Area. As such, the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would not affect open space, unique natural areas and heritage areas and sites, wetlands, water and woodland resources, scenic views, areas of natural beauty, or the rural character of Ulster County. Therefore, the inspection and repair would be consistent with this principle.

(2) Protect and enhance the county's most valuable open space landforms and natural features with coordinated planning and safeguard policies.

Open space and recreation resources were identified within the Shaft 2A Study Area. The potential for impacts to these resources associated with the surface construction activities was evaluated in Section 11.6.6, Open Space and Recreation."

Under this principle, the Open Space Plan recommends preserving the visual or ecological values of significant landforms and natural features in order to protect against inappropriate development. This principle was analyzed for inspection and repair as work in the study areas would potentially impact existing open space, directly or indirectly.

As discussed in Section 11.6.6, "Open Space and Recreation," the construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site, and would be minimal and temporary. The inspection and repair at the existing Shaft 2A site would not impact the physical character of or affect views from the open space and recreation resources, including Minnewaska State Park Preserve. No Minnewaska State Park Preserve hiking trails are located within the study area, and the Shaft 2A site is outside of the public viewshed. In addition, the work activities associated with the internal repairs to the RWBT and permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area would take place within the tunnel, approximately 700 feet below the ground surface, and would not encroach upon, cause a loss of, impact the physical character of, or affect views from the seven aforementioned open space and recreation resources.

As such, the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would not affect open space landforms and natural features within Ulster County. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Ulster County Open Space Plan and would not result in significant adverse impacts to public policy within the Shaft 2A and Wawarsing Leak Repair study areas.

11.6.5.2 Town of Wawarsing Comprehensive Plan (2006)

The Town of Wawarsing Comprehensive Plan (Town of Wawarsing 2006) is a guide for the Town's improvement and its future growth, development, and protection, and includes recommendations related to maintaining the town's growth and appearance while preserving the residential character, transportation services, and maintaining and improving public infrastructure. Recommendations within the Town of Wawarsing Comprehensive Plan establish a clear direction for the Town over a period of 3 to 5 years. The Comprehensive Plan does not discuss issues related to construction of individual projects or specific parcels or tracts of land. The Comprehensive Plan includes the following topic that is potentially relevant to the inspection and repair:

- *Maintain and improve important public infrastructure.*

Under this principle, the Comprehensive Plan recommends the Town provide a variety of approaches to managing the Town's infrastructure system in order to identify and potentially avoid costs involved with deferred maintenance of Town facilities. This principle was analyzed for inspection and repair as work in the study area would potentially impact transportation, economic development, housing, and environmental policies directly or indirectly.

The inspection and repair would support the long-term provision of water supply to the City's approximately 9 million water consumers. As such, the inspection and repair is considered a water infrastructure project of regional significance. As discussed in the Section 11.6.9.1, "Water Resources," and Section 11.6.11, "Water and Sewer Infrastructure," the future with the inspection and repair includes the permanent cessation of RWBT leaks within the Leak Repair Study Area, which could, in turn, affect groundwater levels within in the area. Lowering of the groundwater level could affect properties with private wells. As a result, the inspection and repair could affect potable water supplies to properties with existing private supply wells within the Leak Repair Study Area. However, as described in Section 11.6.11, "Water and Sewer Infrastructure," DEP is committed to implementing a Well Action Plan for potentially affected water supply wells within the study area that would experience a reduction in the reliability of the supply as a result of the cessation of leaks. DEP would work with property owners to implement the elements of the Well Action Plan, as applicable and necessary, which would include yield testing and well depth measurement, if required, and well monitoring for 12 months before, during, and up to 12 months after the shutdown. The Well Action Plan could also include well deepening, well replacement, or the provision of alternate water supply if it is found that the groundwater levels or quality are substantially changed by the inspection and repair. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Town of Wawarsing Comprehensive Plan and would not result in significant adverse impacts to public policy within the Shaft 2A and Wawarsing Leak Repair study areas.

11.6.6 OPEN SPACE AND RECREATION

The potential for impacts to open space and recreation with the inspection and repair within this study area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for this analysis is the 0.25-mile radius area around the Shaft 2A site, as shown on **Figure 11.6-9**.

New York City owns approximately one acre of land over and around Shaft 2A, which is surrounded by lands of the Minnewaska State Park Preserve (Minnewaska). This is the only ~~One~~ open space resource that exists within the Shaft 2A Study Area~~, Minnewaska State Park Preserve (Minnewaska), which~~ and it is managed by Palisades Interstate Park Commission and NYSOPRHP. New York City has access through the park to the Shaft 2A site via an existing easement over an existing access road (Shaft 2A Road). With the exception of the Shaft 2A site and a low-density residential community within the northern portion of the study area, the majority of the study area consists of approximately 80 acres of Minnewaska. Minnewaska includes approximately 21,100 acres, and is used for outdoor recreation, such as hiking, picnicking, snowshoeing, and biking. While there are no NYSOPRHP-mapped hiking trails or designated recreational resources ~~are~~ situated within the portion of Minnewaska that is within the Shaft 2A Study Area, ~~recreational access to Stony Kill Falls is provided via Shaft 2A Road in proximity to the Shaft 2A site within the Shaft 2A Study Area.~~ the area is a popular hiking destination with access from Shaft 2A Road, a public road, to the Stony Kill Falls trailhead. The approximate location of Stony Kill Falls, a waterfall and secluded hiking destination, is shown on **Figure 11.6-9**, approximately 0.25 mile southeast of the Shaft 2A site. NYSOPRHP currently has no designated parking area for public access to the Stony Kill Falls trailhead. A gate at the end of Shaft 2A Road prevents unauthorized vehicular access resulting in pedestrians parking their vehicles along this narrow roadway to walk around the gate past the Shaft 2A site to reach the Stony Kill trailhead. This creates congestion along Shaft 2A Road, particularly in the summer and fall seasons.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no plans to expand or create new open space or recreational resources are anticipated within the Shaft 2A Study Area within the timeframe of the impact analysis. ~~However, as part of a separate effort, NYSOPRHP, granted funds to the Palisades Conservancy to provide for a new trailhead and parking area in the vicinity of the Shaft 2A site to improve recreational access to Stony Kill Falls.~~ Natural processes, such as changes in habitat due to natural vegetative succession, would continue. Therefore, in the future without the inspection and repair, it is assumed that open space and recreation within the study area would be the same as baseline conditions, although access to these resources would be improved.

In the future with the inspection and repair, construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site on DEP property, and would be minimal and temporary. The inspection and repair activities at the Shaft 2A site would be small-scale and short-term (i.e., approximately 8 months, with site preparation

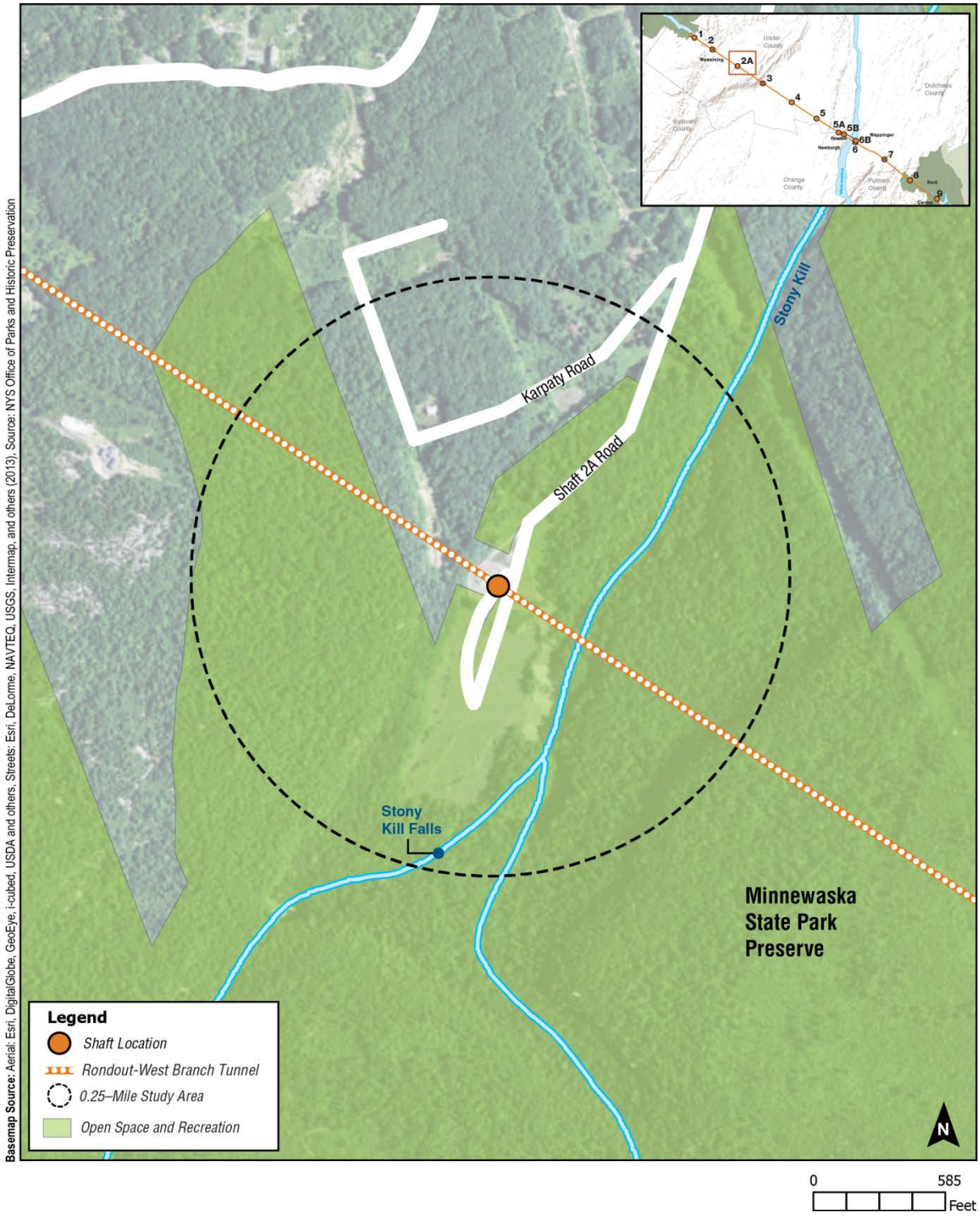


Figure 11.6-9: Open Space and Recreation – Shaft 2A Study Area

activities commencing up to 6 months in advance of the 8-month period). Site preparation activities would take place during weekdays when recreational use would be expected to be limited. NYSOPRHP lands surrounding NYC's Shaft 2A site will be used by DEP's contractor for construction parking and equipment laydown and a permanent easement is being sought from NYSOPRHP. During the RWBT shutdown, expected in fall 2022, DEP will be utilizing Shaft 2A as the primary entry point into the tunnel to conduct inspections and repair leaks in the vicinity of the Town of Wawarsing. Construction activities to support the internal repairs near Wawarsing could take place 24 hours per day, 7 days a week for the duration of the 8-month temporary shutdown. However, these activities would be temporary.

The current lack of formal public parking at the Stony Kill Falls trailhead would create a potential impediment for contractor vehicles accessing the Shaft 2A site during this work period. Therefore, as part of work at the Shaft 2A site, DEP plans to construct a trailhead parking lot on NYSOPRHP lands to the south. The intent of the parking lot is to direct park visitor parking from Shaft 2A road, thus eliminating the risk of conflicts during the RWBT shutdown period. In addition, the presence of a formalized parking area would reduce public presence around the shaft site and construction work areas.

DEP is working in partnership with NYSOPRHP, who have also indicated their desire for this public parking area to provide more controlled access to the park and eliminate or reduce the public nuisance parking along Shaft 2A Road. Therefore, the creation of a formal trailhead parking lot will not only reduce risk to DEP's planned activities at Shaft 2A prior to and during the temporary RWBT shutdown, but will be mutually beneficial to NYSOPRHP.

As discussed in the Section 11.6.13, "Noise," there may be temporary increases in noise levels at the Shaft 2A site, particularly for recreational users who park at the planned parking area, that may discourage hiking or other recreational uses within a small area of the Minnewaska State Park Preserve. Upon completion of the internal repairs, construction activities at the Shaft 2A site would be minimal and would not be anticipated to affect recreational uses. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions, and hiking and other recreational uses within the Minnewaska State Park Preserve would be unaffected.

As such, the inspection and repair would not impact the physical character of or affect views from the open space and recreation resources of the Minnewaska State Park Preserve. As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would not result in changes to open space and recreation.

Therefore, the inspection and repair would not result in significant adverse impacts to open space and recreation within the Shaft 2A Study Area.

11.6.7 HISTORIC AND CULTURAL RESOURCES

As described in Section 11.3.6, "Historic and Cultural Resources," a historic and cultural resources impact analysis for the inspection and repair associated with the surface construction activities at Shaft 2A is not warranted. Therefore, the analysis of the potential for impacts to historic and cultural resources focused on the Leak Repair Study Area. There is one site listed on the National Register of Historic Places, the O&W Railroad Station at Port Ben, located within the southeastern portion of the Leak Repair Study Area, as shown on **Figure 11.6-10**.

In the future without the inspection and repair, it is assumed that historic and cultural resources within the Leak Repair Study Area would be the same as baseline conditions.

The future with the inspection and repair would include the permanent cessation of RWBT leaks within the Leak Repair Study Area. The inspection and repair activities would not result in new structures, additions to existing structures, or ground disturbance within the study area. As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would not result in changes to historic and cultural resources within the Shaft 2A and Leak Repair Study Area.

Therefore, although there is one site within the Leak Repair Study Area listed on the National Register of Historic Places, the inspection and repair would not result in significant adverse impacts to historic and cultural resources within the Leak Repair Study Area.

11.6.8 VISUAL RESOURCES

Visual resources exist within this study area that have the potential to be impacted as a result of both the surface construction activities at the Shaft 2A site, as well as the area that would potentially be affected by reduced groundwater levels as a result of the permanent cessation of RWBT leaks. The study area for the visual resources analysis associated with surface construction at the Shaft 2A site is the area within 0.25 mile of the site, as shown on **Figure 11.6-11**. It also includes view corridors that extend beyond based on the locations that are publicly accessible, as required.

One visual resource exists within the Shaft 2A Study Area, Minnewaska State Park Preserve, which is identified as a State Park that is included within the Palisades Interstate Park Commission. With the exception of the Shaft 2A site and a small low-density residential area within the northern portion of the study area, the majority of the study area consists of the Minnewaska State Park Preserve. There are no view corridors specific to this study area.

The Leak Repair Study Area is based on data previously collected by the USGS, which show that the leaks from the RWBT influence local groundwater levels at various distances from the RWBT, dependent on local hydrology, as shown on **Figure 11.6-12**.

The visual resources identified within this study area consist of: one site on the State and/or National Register of Historic Places: the O&W Railroad Station at Port Ben; the Minnewaska

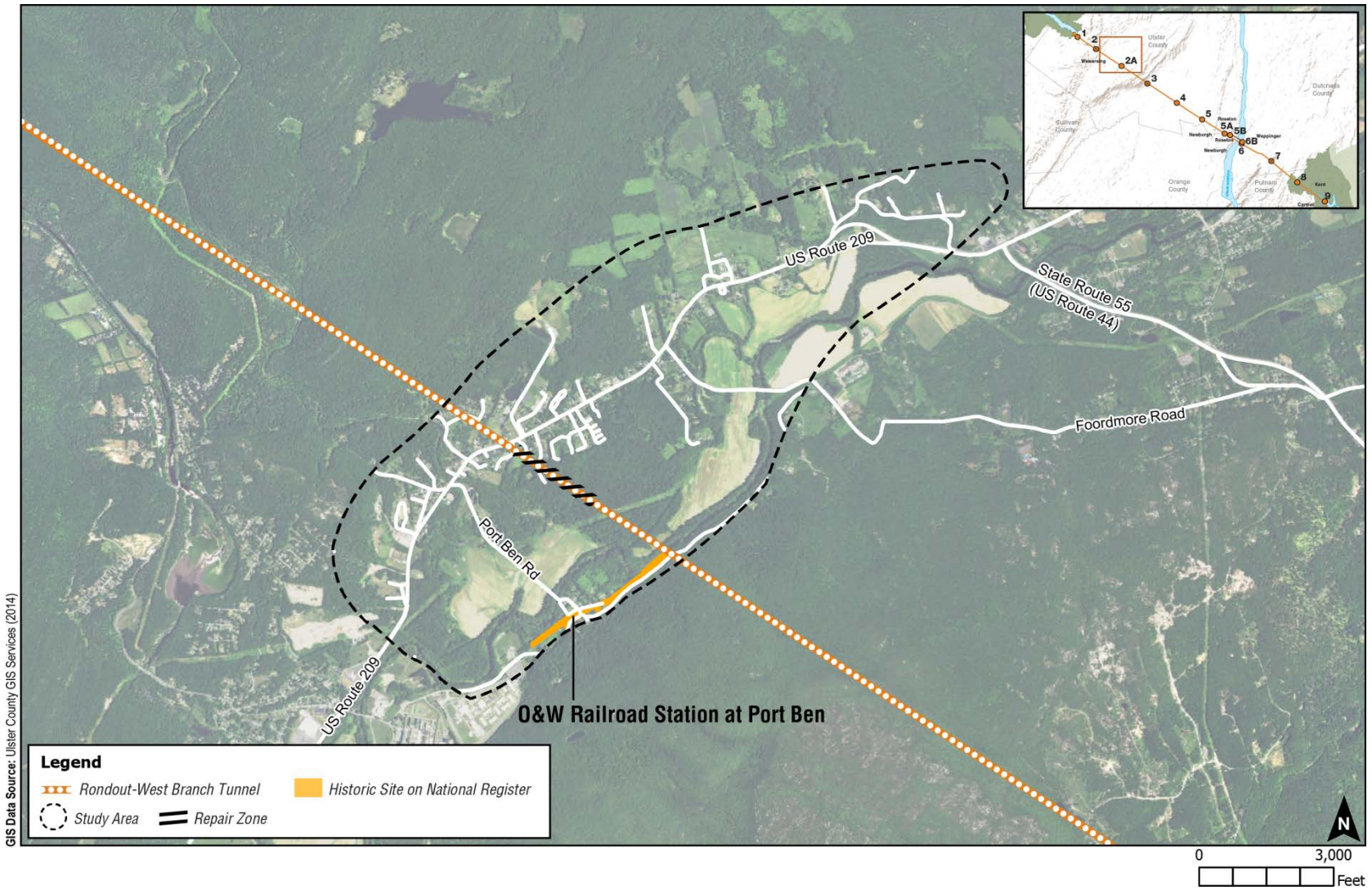


Figure 11.6-10: Historic and Cultural Resources – Leak Repair Study Area

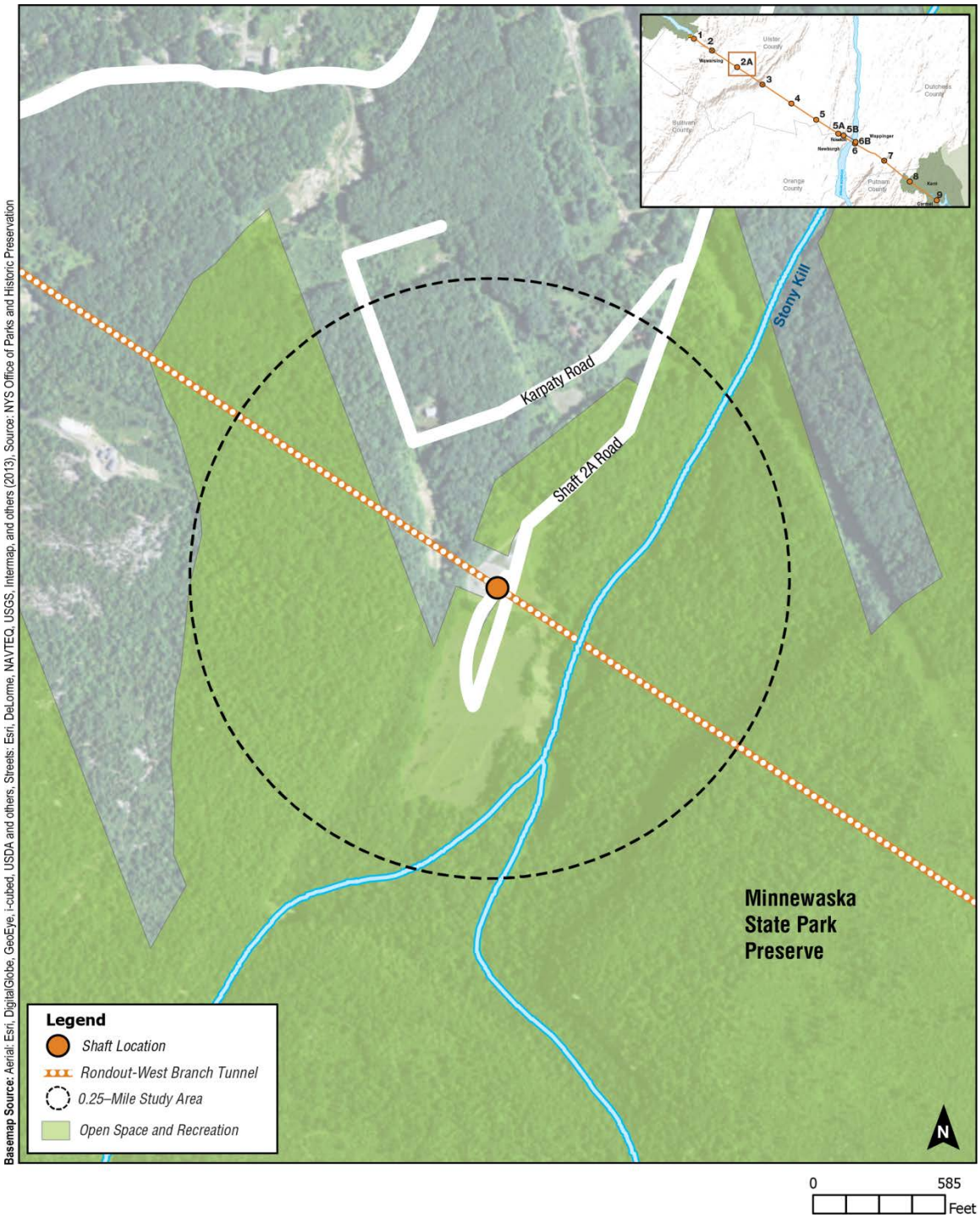


Figure 11.6-11: Visual Resources – Shaft 2A Study Area

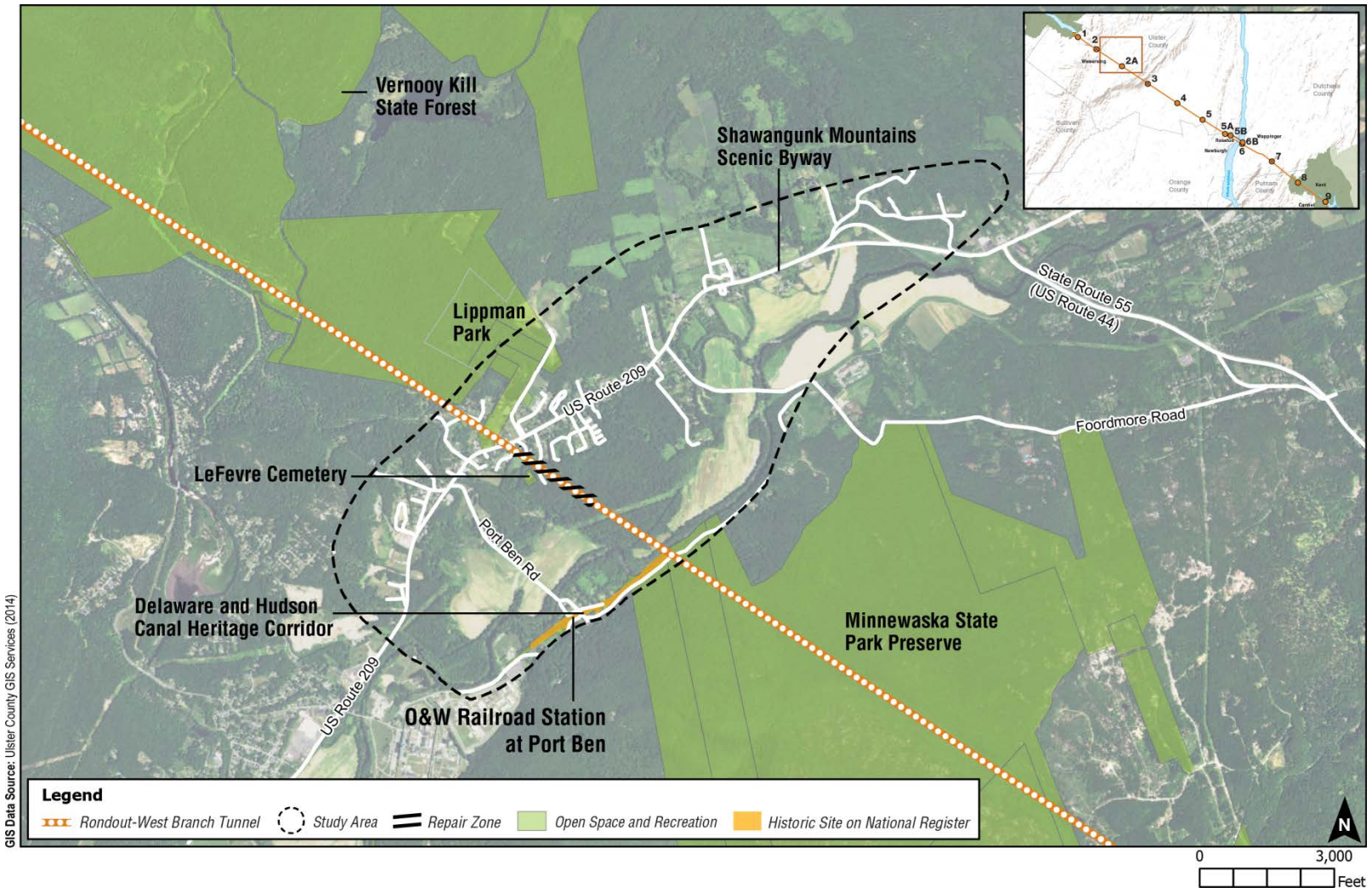


Figure 11.6-12: Visual Resources – Leak Repair Study Area

State Park Preserve, which is identified as a State Park that is included within the Palisades Interstate Park Commission, located within the southeastern portion of this study area; one State Forest: the Vernooy Kill State Forest (part of the larger Sundown Wild Forest), located within the northwestern portion of the study area; one State scenic byway: the Shawangunk Mountains Scenic Byway, which runs northeast to southwest along U.S. Route 209 through the central portion of the study area; and two locally significant visual resources: the Le Fevre Cemetery, located in the central portion of the study area, and the Delaware & Hudson Canal Heritage Corridor Rail Trail, located within the southeastern portion of the study area. These resources, along with their approximate total acreage and acreage within the study area, are shown in **Table 11.6-1**.

Table 11.6-1: Visual Resources within the Shaft 2A and Wawarsing Leak Repair Study Area

Visual Resource	Visual Resource Category	Address	Approximate Acreage (Total)	Approximate Acreage (Within the Study Area)
O&W Railroad Station at Port Ben	National/State Register of Historic Places	O&W at Tow Path Road, Wawarsing, NY	13.5	13.5
Minnewaska State Park Preserve	State Parks/Palisades Park	5281 U.S. Route 44/State Route 55, Kerhonkson, NY 12446	21,100	7 (Leak Repair) 100 (Shaft 2A)
Vernooy Kill State Forest	State Forest Preserve/ State Forests	Varies	3,600	4
Shawangunk Mountains Scenic Byway	Scenic site, area, lake, reservoir or highway	U.S. Route 209 within the Study Area	88 miles	3.3 miles
Le Fevre Cemetery	Local	Kelsey Lane, Napanoch, NY, 12458	1	1
Delaware & Hudson Canal Heritage Corridor Rail Trail	Local	108 Canal Street, Ellenville, NY, 12428	NA	11.8
Note: NA = Not applicable as trail is a 35-mile linear corridor.				

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no new projects or structures that would alter views from visual or aesthetic resources are anticipated within the Shaft 2A and Wawarsing Leak Repair Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that visual resources within the Shaft 2A and Wawarsing Leak Repair Study Area would be the same as baseline conditions.

The future with the inspection and repair would consist of the construction activities at the Shaft 2A site to support the internal repairs to the RWBT and permanent cessation of RWBT leaks within the Shaft 2A and Wawarsing Leak Repair Study Area. The construction activities would

occur at the existing Shaft 2A site, be minimal and temporary, take place on or adjacent to DEP property, and be confined to an area not accessible to the general public. These activities would be small-scale and short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period). The inspection and repair at the existing Shaft 2A site would not impact the physical character of or affect views from open space and recreation, including Minnewaska State Park Preserve. There are no view corridors specific to the Shaft 2A Study Area to Minnewaska State Park Preserve. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. As such, the inspection and repair would not result in changes to the future visual and aesthetic resource conditions of the views to the Minnewaska State Park Preserve.

Changes to groundwater levels as a result of the cessation of RWBT leaks within the Leak Repair Study Area would not result in new structures or additions to existing structures. As discussed in Section 11.3.8.1, "Water Resources," the cessation of RWBT leaks within the study area is not anticipated to result in measurable changes to water levels of surface water that would be visible within the study area. USGS studies measure surface water elevations at several locations throughout the study area and were unable to identify surface water elevation differences during previous depressurizations. As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would also not result in changes to visual resources within the Shaft 2A and Leak Repair Study Area. As such, the inspection and repair would not result in changes to the future visual and aesthetic resource conditions of the views to or from the O&W Railroad Station at Port Ben, the Minnewaska State Park Preserve, the Vernooy Kill State Forest (part of the larger Sundown Wild Forest), the Shawangunk Mountains Scenic Byway, the Le Fevre Cemetery, or the Delaware & Hudson Canal Heritage Corridor Rail Trail.

Therefore, the inspection and repair would not result in significant adverse impacts to visual resources within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.6.9 NATURAL RESOURCES

The study area for the natural resources analyses for the surface construction activities at the Shaft 2A site is the area within 400 feet of the Shaft 2A site (see **Figure 11.6-13**). These analyses include terrestrial resources, wildlife, and federal/State Threatened and Endangered Species. The study area for the natural resources analyses, including geology and soils and water resources that would potentially be affected by reduced groundwater levels as a result of the cessation of RWBT leaks is the Leak Repair Study Area (see **Figure 11.6-5** and Section 11.3.8.1, "Water Resources").

As described in Section 11.3.8, "Natural Resources," an impact analysis related to wetlands and aquatic and benthic resources is not warranted within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.6.9.1 Water Resources

As described in Section 11.3.8, "Natural Resources," surface water, wetlands, and floodplains associated with surface construction at the Shaft 2A Study Area do not warrant analysis. Surface construction activities within the Shaft 2A Study Area will also not impact groundwater

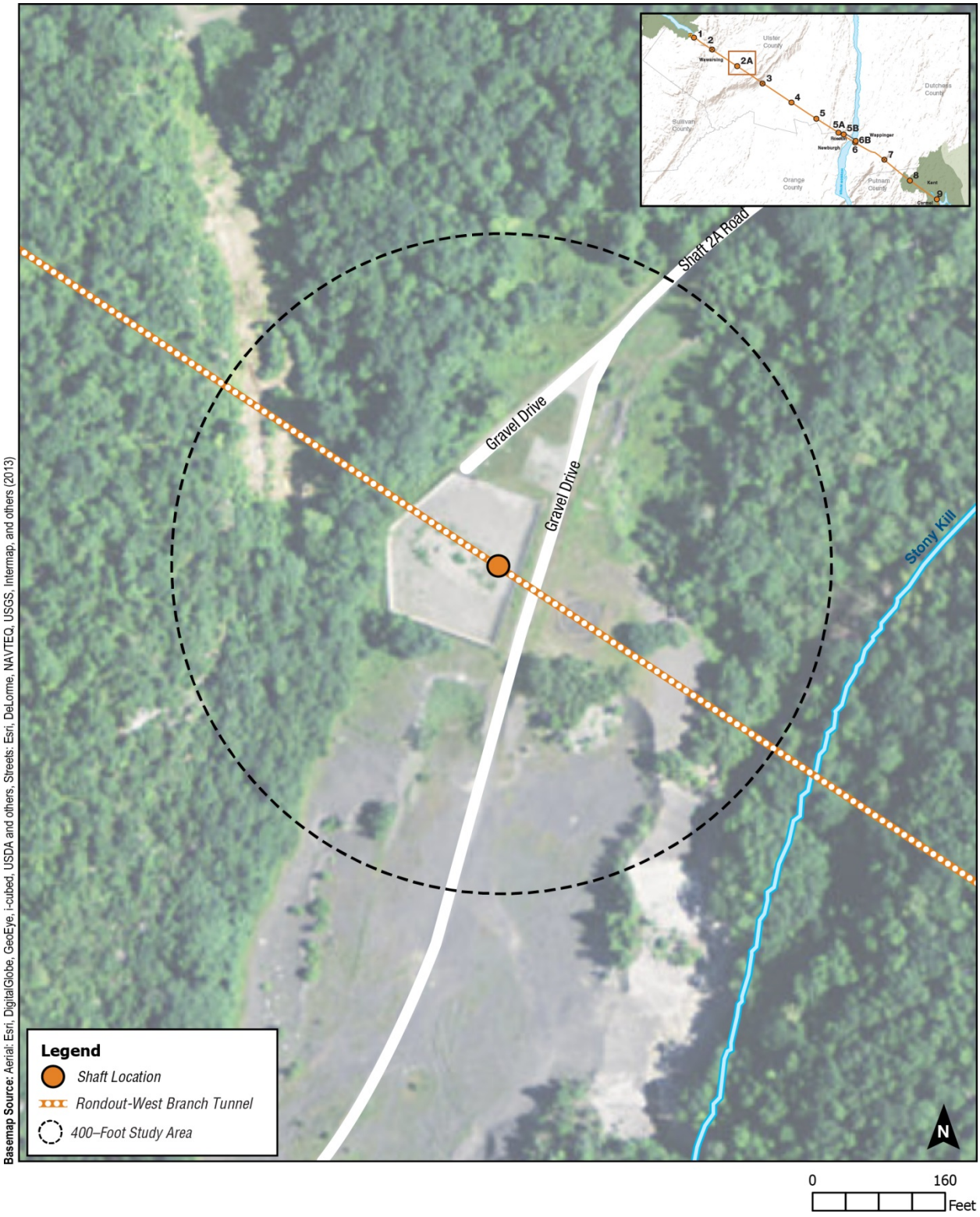


Figure 11.6-13: Natural Resources – Shaft 2A Study Area

resources. Therefore, a water resources impact analysis is not warranted for the Shaft 2A Study Area. This section includes an analysis of the potential for impacts to groundwater within the Leak Repair Study Area. Prior to the impact analysis, it also includes an analysis of published geologic and groundwater data (Stumm et al 2012; Brown et al. 2012), including:

- An overview of the geology of the Leak Repair Study Area to put groundwater within the study area into perspective within the geologic framework of the region (described further in Section 11.6.9.2, "Geology and Soils");

- An overview of the RWBT to put the leak from the RWBT into perspective with the groundwater description (described further in Section 11.2.1, "Overview of the Rondout-West Branch Tunnel Leaks");

- Background on groundwater and its interaction with the environment and in the Town of Wawarsing; and

- A summary of USGS Monitoring.

Geology

The Leak Repair Study Area is located within the Port Jervis Trough, a deep glaciated valley that separates the Shawangunk Mountains to the east and the Catskill Mountains to the west (Reynolds 2007).

The major geologic formations found within the study area include the Helderberg Group, Oneonta Formation, Hamilton Group, Bloomsburg Formation, Rondout Formation, and the Onondaga Limestone (see **Figure 11.6-14)**.The bedrock units shown on **Figure 11.6-14** generally follow a northeast direction and orientation (trend), parallel to the valley axis, and nearly perpendicular with the RWBT alignment, with an approximately 45-degree dip to the northwest. According to historic record drawings of the RWBT, these geologic units have substantial fracturing and faulting.

Limestone units such as the Onondaga Limestone and Manlius Limestone were reported as cavernous with clay-filled spaces. These features greatly increase the transmissivity of groundwater, as noted by the high volumes of inflow during RWBT construction. The Binnewater Sandstone and High Falls Shale were observed to be one of the most porous and permeable (transmissive) geologic units, especially along bedding planes.

A more detailed description of the geology of Wawarsing is located in Section 11.6.9.2, "Geology and Soils."

The surficial geology is heavily influenced by the recent the geologic history of the region. Approximately 20,000 years ago, the climate was much colder and glacial ice covered the region. As the climate warmed and the glacial ice began its retreat, a large deposit of sediment (terminal moraine) was deposited at Phillipsport, New York, forming a dam across the valley that created Glacial Lake Wawarsing. Coarse-grained sediments (sands and gravels) that flowed

into the lake formed deltas while finer-grain sediments (silt and clay) formed lake-bottom deposits. Coarse-grained glacial till and kame deposits ranging from approximately 40 to over 250 feet thick overlies bedrock over much of the study area. The coarse-grained till and kames were overlain by up to approximately 140 feet of lacustrine sand, silt and clay. The lacustrine deposits are overlain by alluvium that is generally less than 5 feet thick (see **Figure 11.6-15**).

Rondout-West Branch Tunnel

The RWBT underlies the central part of the Leak Repair Study Area at an average depth of approximately 710 feet below ground surface. At least five faults were identified in the bedrock in the study area. Sections of highly weathered rocks had been mechanically broken up, and crush zones and dissolution features were encountered. Steel reinforcements were required to stabilize the tunnel throughout roughly 1,300 feet of Rondout Valley.

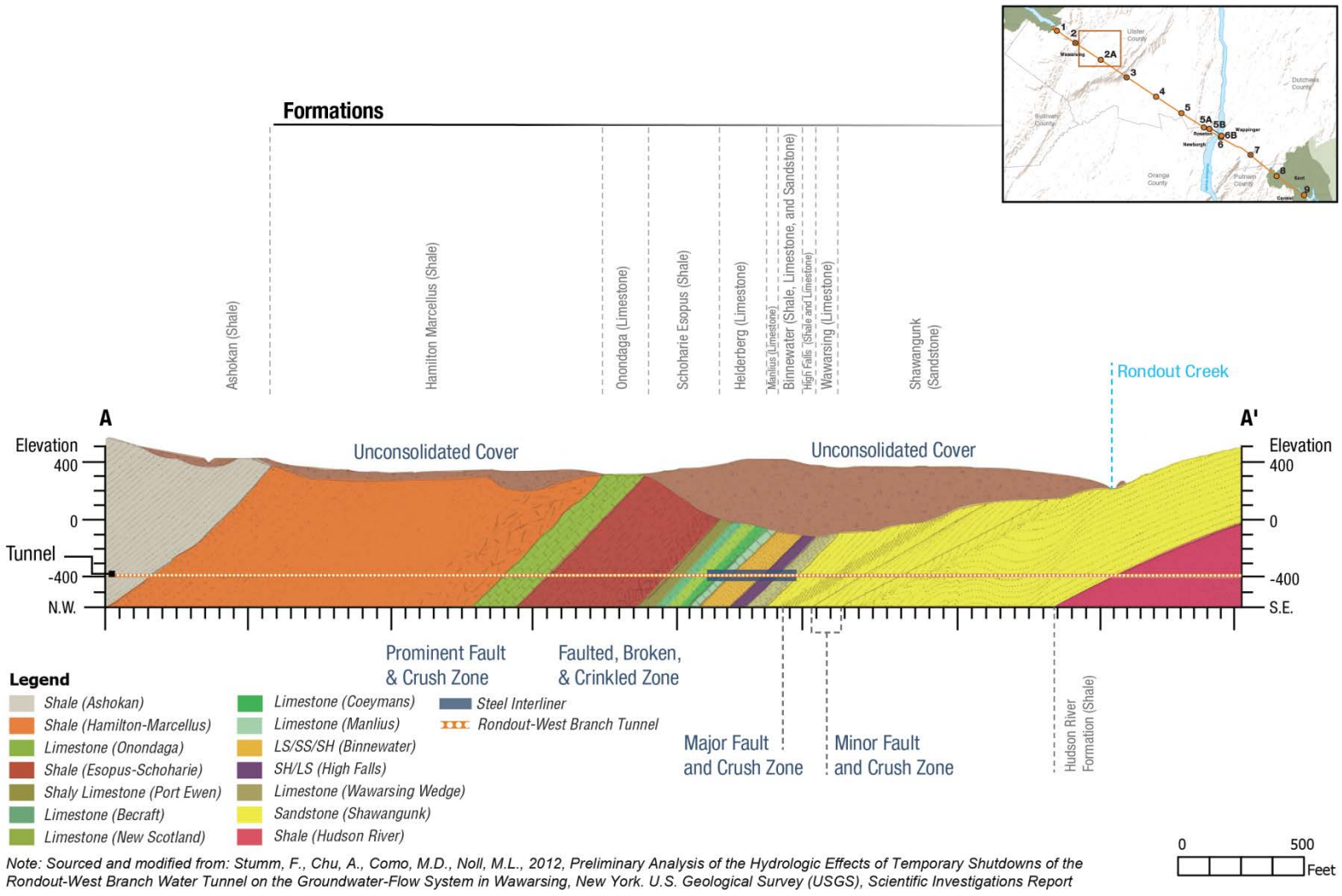
DEP deployed an AUV through the Rondout - West Branch Tunnel in November 2014, as described further in Section 11.2.1, "Overview of Rondout-West Branch Tunnel Leaks." The AUV passed through the RWBT between Shafts 2 and 2A located in the vicinity of the Town of Wawarsing while 20 mgd flowed through the RWBT. A numerical analysis of the data collected by the AUV indicated a distinct drop in velocity of tunnel water equivalent to the loss of approximately 1.0 mgd between Shafts 2 and 2A in the Town of Wawarsing.

Groundwater Background

Groundwater occurs in the unconsolidated soils and bedrock. Groundwater starts as precipitation. Precipitation falls on the ground surface and infiltrates into the small voids between grains of sand, silt, and clay in the glacial deposits, ultimately filling up the void spaces to create groundwater as shown on **Figure 11.6-16**. The surface of the water that fills up the void spaces between the soil grains is called the water table (see **Figure 11.6-17** and **Figure 11.6-18**). Sometimes the water table is called a phreatic or piezometric surface.

Groundwater generally moves downhill, from higher water elevations to lower water elevations as groundwater infiltrates into the unconsolidated aquifer at higher elevations, migrates through the aquifer, and ultimately discharges to surface water (see **Figure 11.6-19**) like Rondout Creek.

There are three types of aquifers in the Leak Repair Study Area. The shallow most aquifer is the unconsolidated unconfined aquifer. This aquifer extends from the water table to an unknown depth where the aquifer properties or the silt/clay layer several hundred feet below land surface create a confined hydrogeologic condition. The second aquifer is the unconsolidated confined aquifer. It extends from the bottom of the unconfined aquifer to the top of bedrock. The third aquifer in the Leak Repair Study Area is the consolidated confined aquifer. This aquifer extends from the top of bedrock to an unknown depth. A general description of the different types of aquifers is provided below.



Note: Sourced and modified from: Stumm, F., Chu, A., Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report

Figure 11.6-14: Geologic Cross Sections – Leak Repair Study Area

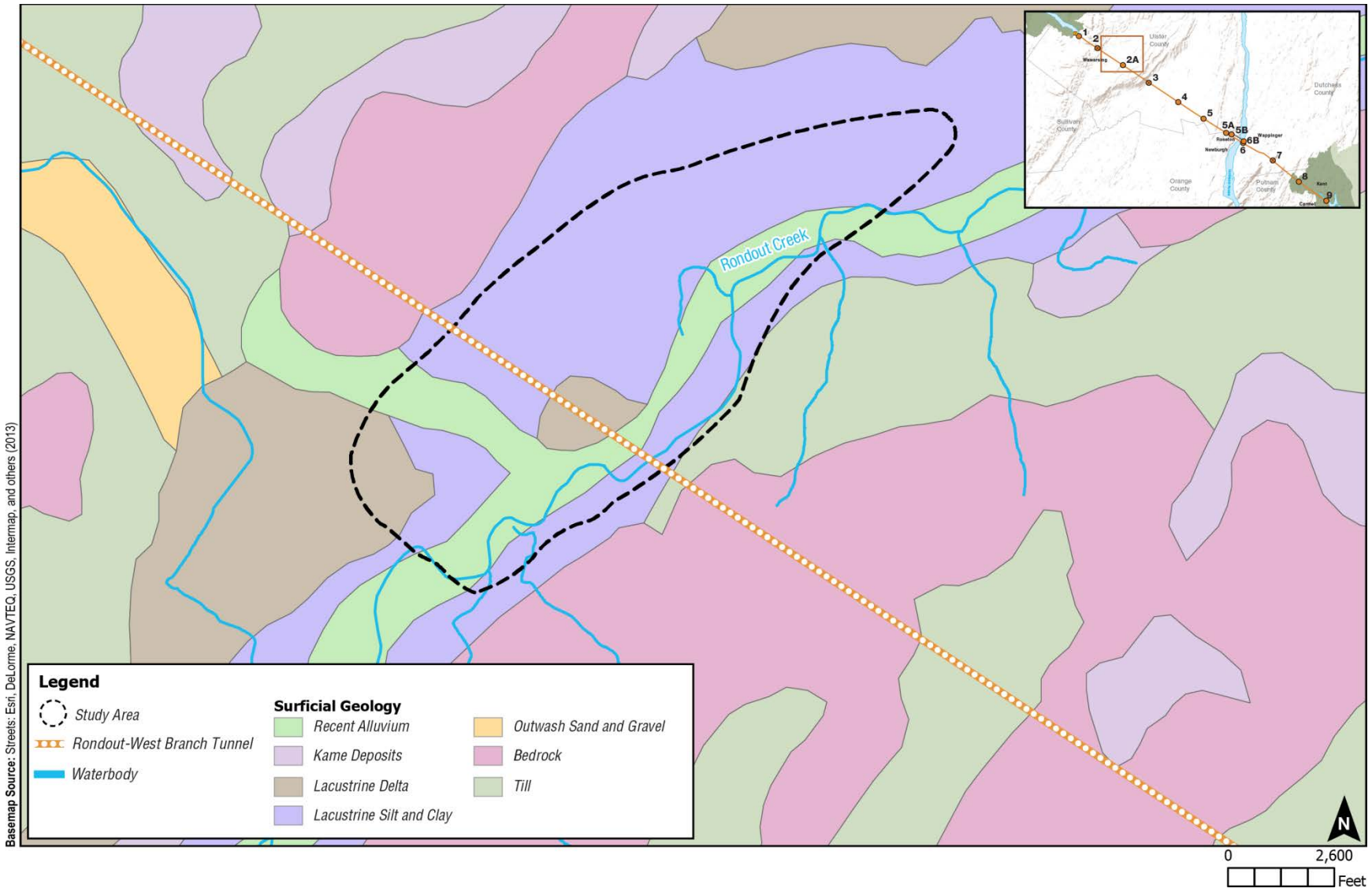


Figure 11.6-15: Surficial Geology – Leak Repair Study Area

Unconsolidated Aquifers

Groundwater in unconsolidated soils occurs under unconfined and confined aquifer conditions. Groundwater in the shallow unconsolidated soils (above the silt/clay lake-bottom deposits) occurs as an unconsolidated unconfined aquifer. The shallow portion of the unconsolidated aquifer is called an unconfined aquifer because the top of the aquifer (water table, phreatic, or piezometric surface) can freely move up and down filling and draining void spaces between grains of soil.

Groundwater in the unconsolidated unconfined aquifer occurs and moves in the same manner as described above. Precipitation falls on the ground surface and infiltrates into the unconsolidated unconfined aquifer filling the void spaces between the soil grains creating a water table. Groundwater flows from higher water level elevation along the valley walls to lower water level elevation (see **Figure 11.6-20**).

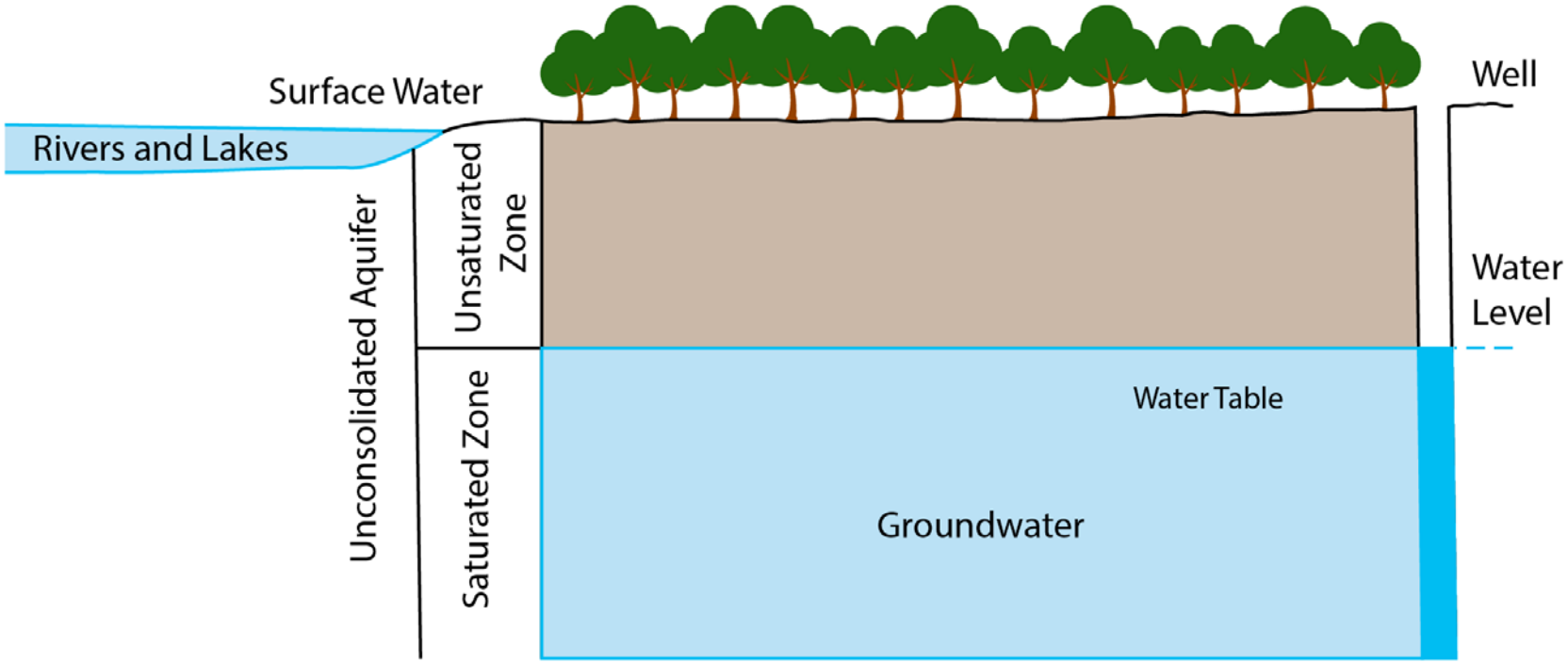
Groundwater in the deep unconsolidated soils and below the silt/clay occurs as an unconsolidated confined aquifer (see **Figure 11.6-18**). Like the unconsolidated unconfined aquifer, groundwater in the unconsolidated confined aquifer migrates from higher water level elevations to lower water level elevations ultimately migrating into the unconsolidated unconfined aquifer and discharging to surface water.

Bedrock Aquifers

Precipitation falling on bedrock does not migrate in void spaces between the soil grains as it does in unconsolidated aquifers. Instead, the bedrock aquifer contains a series of fractures, weathered segments, fault lines, and geologic beds that function as a connected but irregular network for groundwater movement in the rock (see **Figure 11.6-21**). Groundwater will move much easier along the network of fractures, in bedrock aquifer than it will within the void spaces between the soil grains of the unconsolidated aquifer.

Like the unconsolidated aquifer, groundwater generally moves downhill from higher water elevation to lower water elevation as groundwater infiltrates into the bedrock at higher elevations, migrates through the aquifer, and ultimately discharges to the unconsolidated aquifer and eventually to Rondout Creek.

Groundwater in bedrock aquifers will flow through a series of fractures, weathered segments, fault lines, and geologic beds that are oriented more in one direction. The bedrock aquifer that underlies the unconsolidated aquifers in the Leak Repair Study Area is called a confined aquifer. This aquifer is confined because the overlying unconsolidated aquifer will not allow the water in the deeper bedrock aquifer to freely move up and down filling and draining void spaces.



Source: USGS - Basic Groundwater Hydrology

Figure 11.6-16: Illustration of How Groundwater Saturates Soil

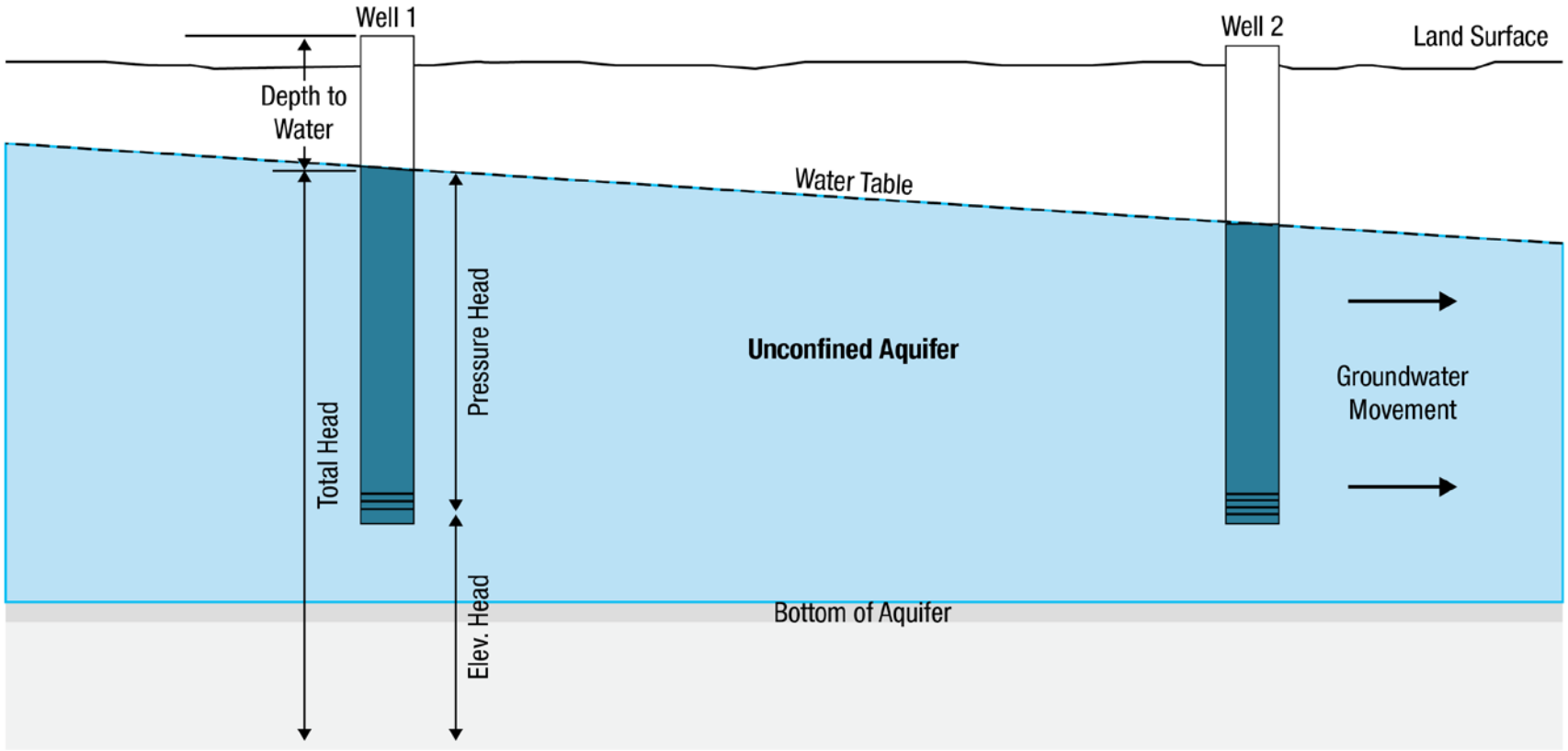


Figure 11.6-17: Illustration of the Water Table

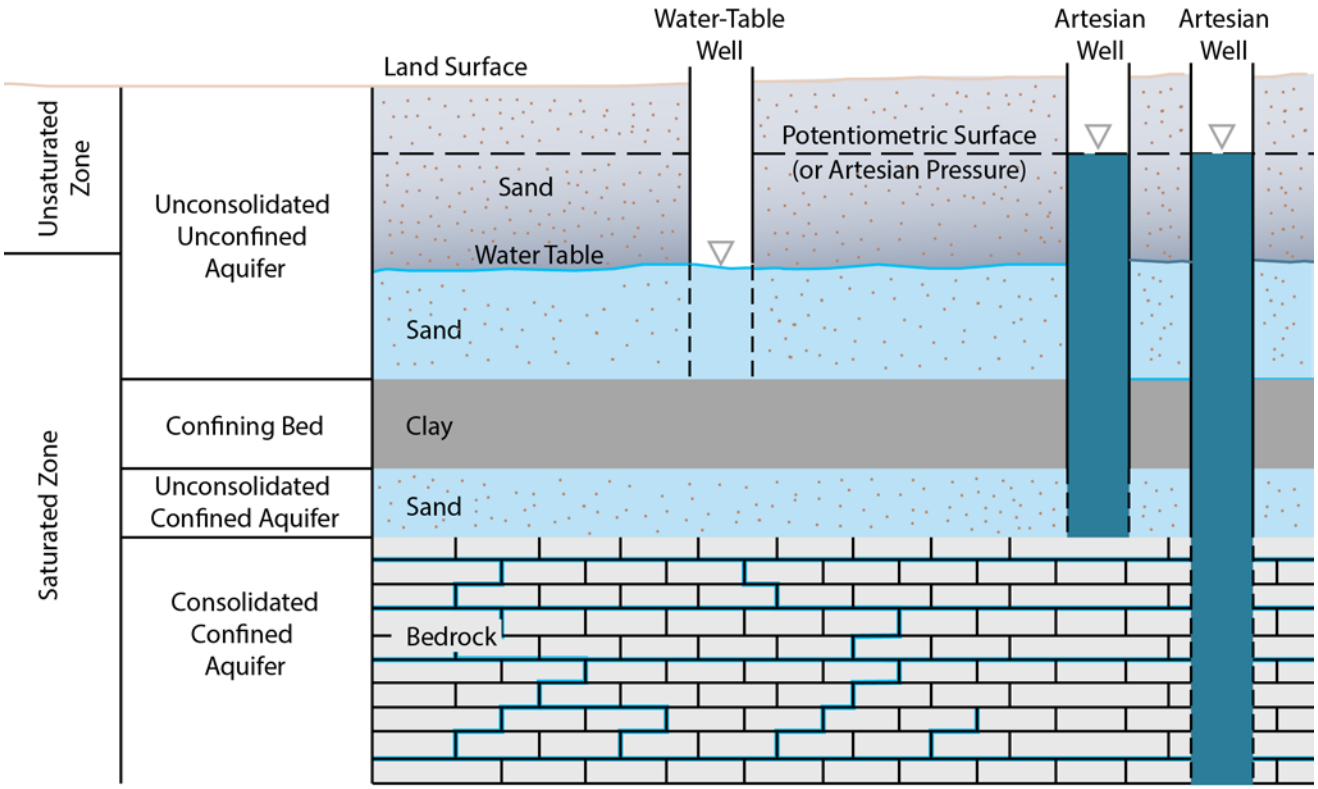


Figure 11.6-18: Illustration of Confined Aquifer, Potentiometric Surface, and Artesian Pressure

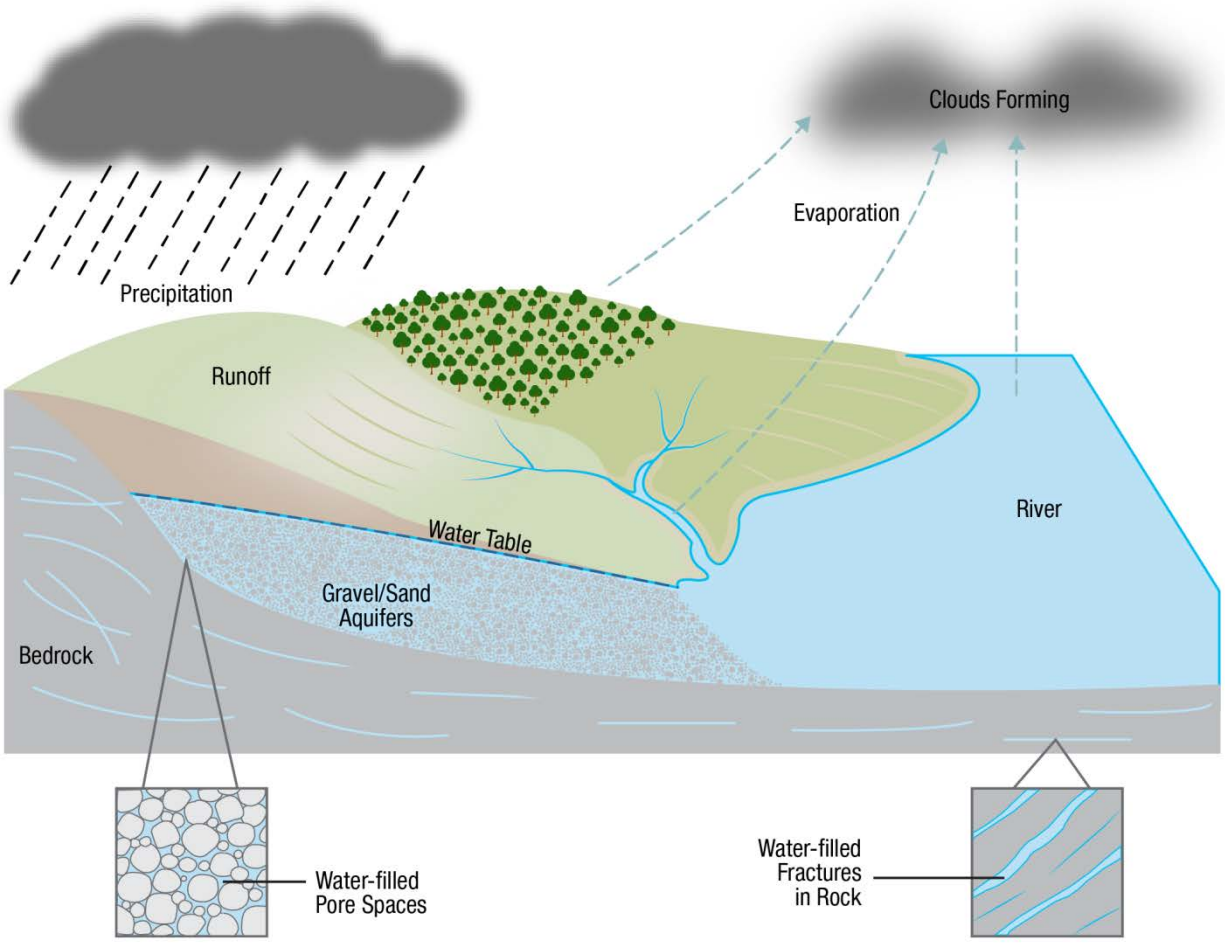
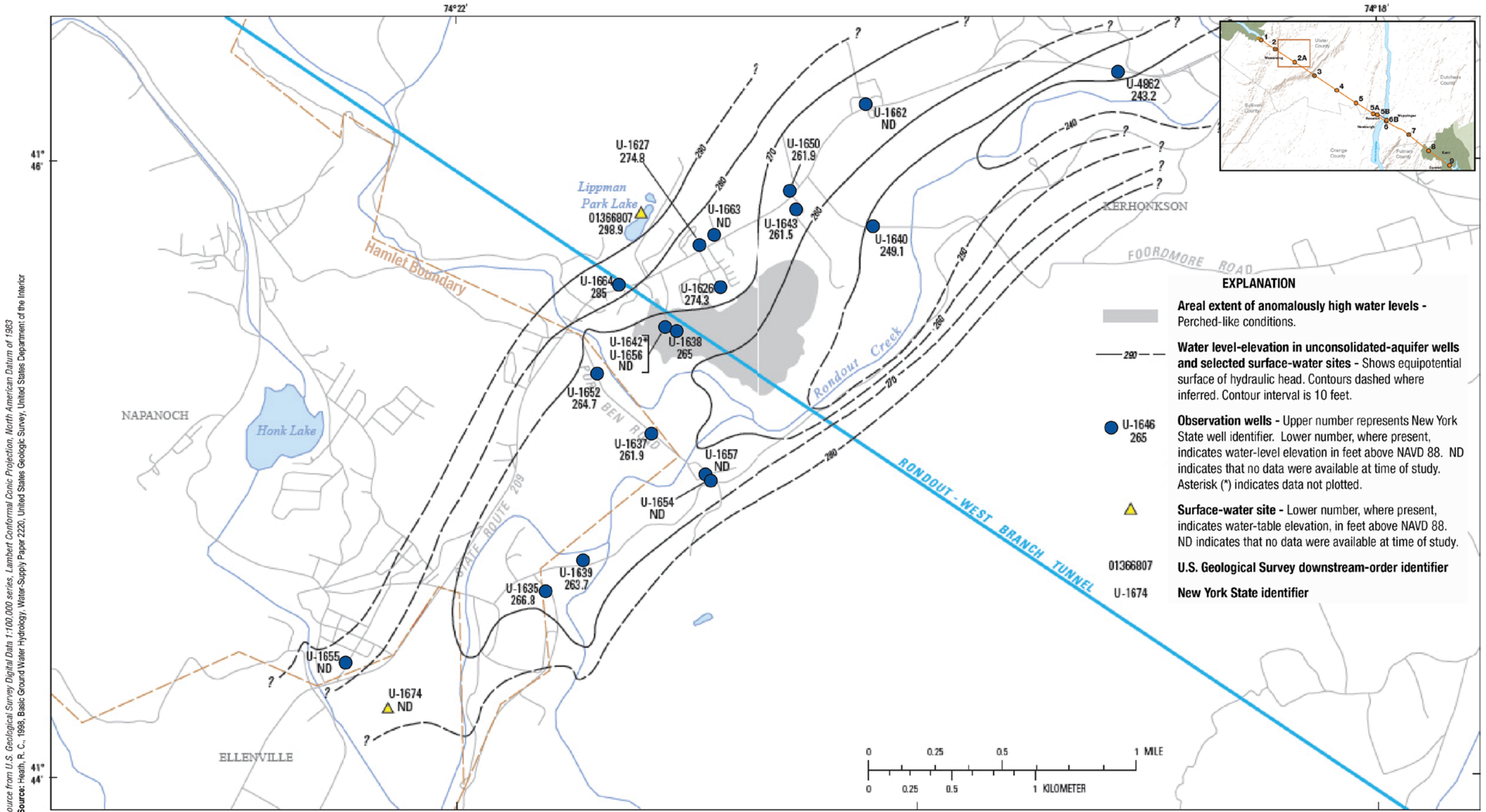


Figure 11.6-19: Illustration of Regional Groundwater Flow



Sourced and modified from: Stumm, F., Chu, A.,Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report 2012-2015, Figure 16

Figure 11.6-20: Rondout-West Branch Tunnel – Elevation of the Water Table in the Unconsolidated Aquifer

In the Leak Repair Study Area, the void spaces in bedrock are completely filled and stay completely filled with water beneath the unconsolidated aquifer. Groundwater in this confined aquifer is under pressure. In this case, the water level in a well installed in a confined aquifer will rise above the top of the aquifer (see **Figure 11.6-18**). This is often called a potentiometric surface or artesian pressure.

The difference between the water level in an unconfined aquifer (water table) and the water level in the unconsolidated confined aquifer and the confined bedrock aquifer (potentiometric surface) is that the water table would be visible in a hole in the ground, but the potentiometric surface would not be visible unless a well was installed in the confined aquifer.

Groundwater in the bedrock aquifer starts as precipitation falling on the ground surface where bedrock is near ground surface such as the upland areas of the Town of Wawarsing. As noted above, the USGS monitored groundwater between 2008 and 2010 in a 12-square-mile area within the Town of Wawarsing. These data show the depth to the potentiometric surface in bedrock monitoring wells ranges from a few feet above ground surface (where artesian pressure raises the potentiometric surface above ground surface causing water to flow out of the well) to roughly 50 feet below ground surface (see **Figure 11.6-22**). Groundwater flows from higher water level elevation along the valley walls to lower water level elevation as water in the bedrock aquifer discharges to the unconsolidated aquifer and ultimately to Rondout Creek.

USGS Monitoring

During monitoring between 2008 and 2010, USGS measured the water level in the aquifers in up to 41 wells and two surface water locations to document groundwater conditions in the Town of Wawarsing (including seasonal fluctuations in the water table), and to determine if groundwater and surface water in the Town of Wawarsing were affected by the RWBT. The depths of these monitoring wells ranged from approximately 10 feet to 500 feet with some wells drilled in the bedrock aquifer and other wells screened in the unconsolidated aquifer (see **Figure 11.6-23**).

USGS also collected and analyzed groundwater and surface water samples for temperature and selected chemistry parameters. These data were used with the water level data to determine if groundwater and surface water in the Town of Wawarsing were affected by the leaking RWBT.

The USGS monitoring approach, which is described further in the Stumm and Brown reports collectively, included the following:

- Develop a network of wells to monitor groundwater levels in the unconsolidated and bedrock aquifers below the Town of Wawarsing;

- Measure and record groundwater levels in the wells to document water level changes due to natural seasonal variations of the aquifers and to document water level changes due to the operation of the RWBT;

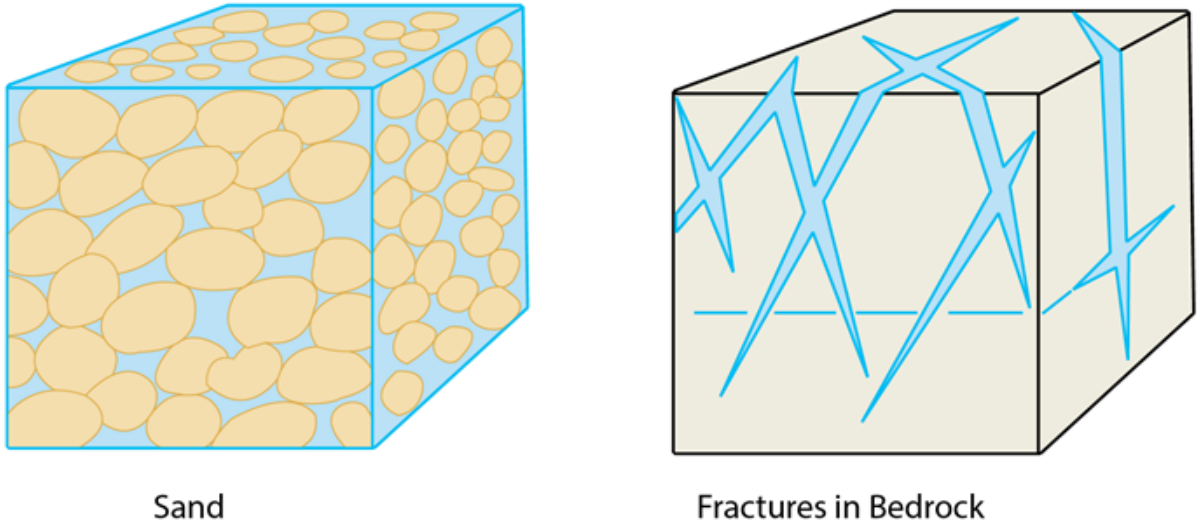
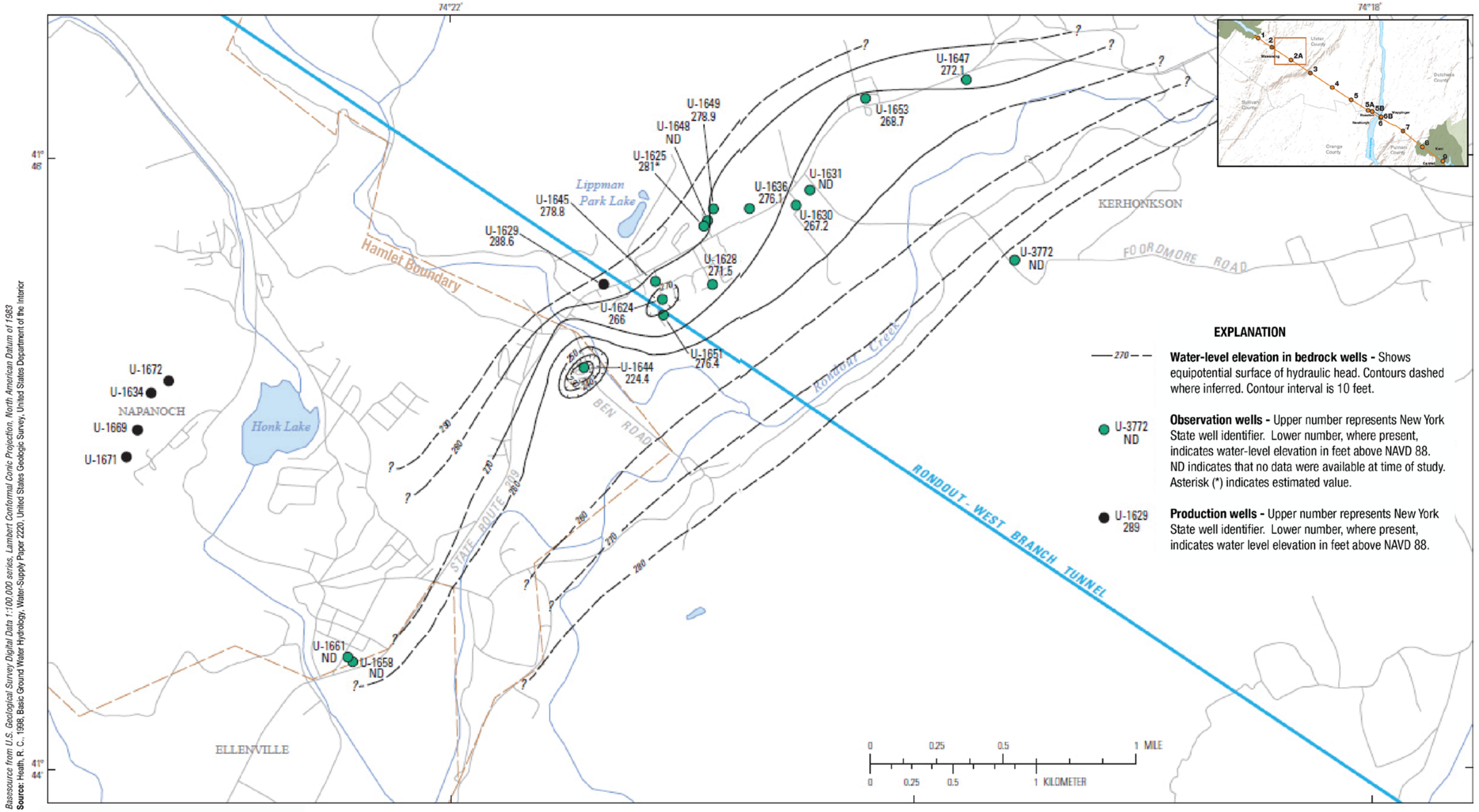


Figure 11.6-21: Illustration of Openings in Unconsolidated Soils and Bedrock



Sourced and modified from: Stumm, F., Chu, A.,Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report 2012-2015, Figure 16

Figure 11.6-22: Rondout-West Branch Tunnel - Elevation of the Potentiometric Surface in the Bedrock Aquifer

- Compile data from historical observations and USGS monitoring;
- Collect and analyze groundwater and surface water samples for temperature and selected chemical parameters; and
- Collect and analyze aquifer samples to characterize the physical properties of the surface soils and aquifers.

The Stumm report:

- Presents the characteristics of the aquifers that underlie the Town of Wawarsing;
- Compares the observed groundwater levels in the study's monitoring network to the changes in water level in the RWBT; and
- Analyzes the relationship between tunnel operations and the magnitude of groundwater level changes.

The Brown report describes and interprets water chemistry data. The differences in water chemistry between water that leaks from the RWBT and naturally occurring groundwater were used to evaluate the area affected by the leaks from the RWBT. The results of the USGS monitoring presented in the two reports are summarized below.

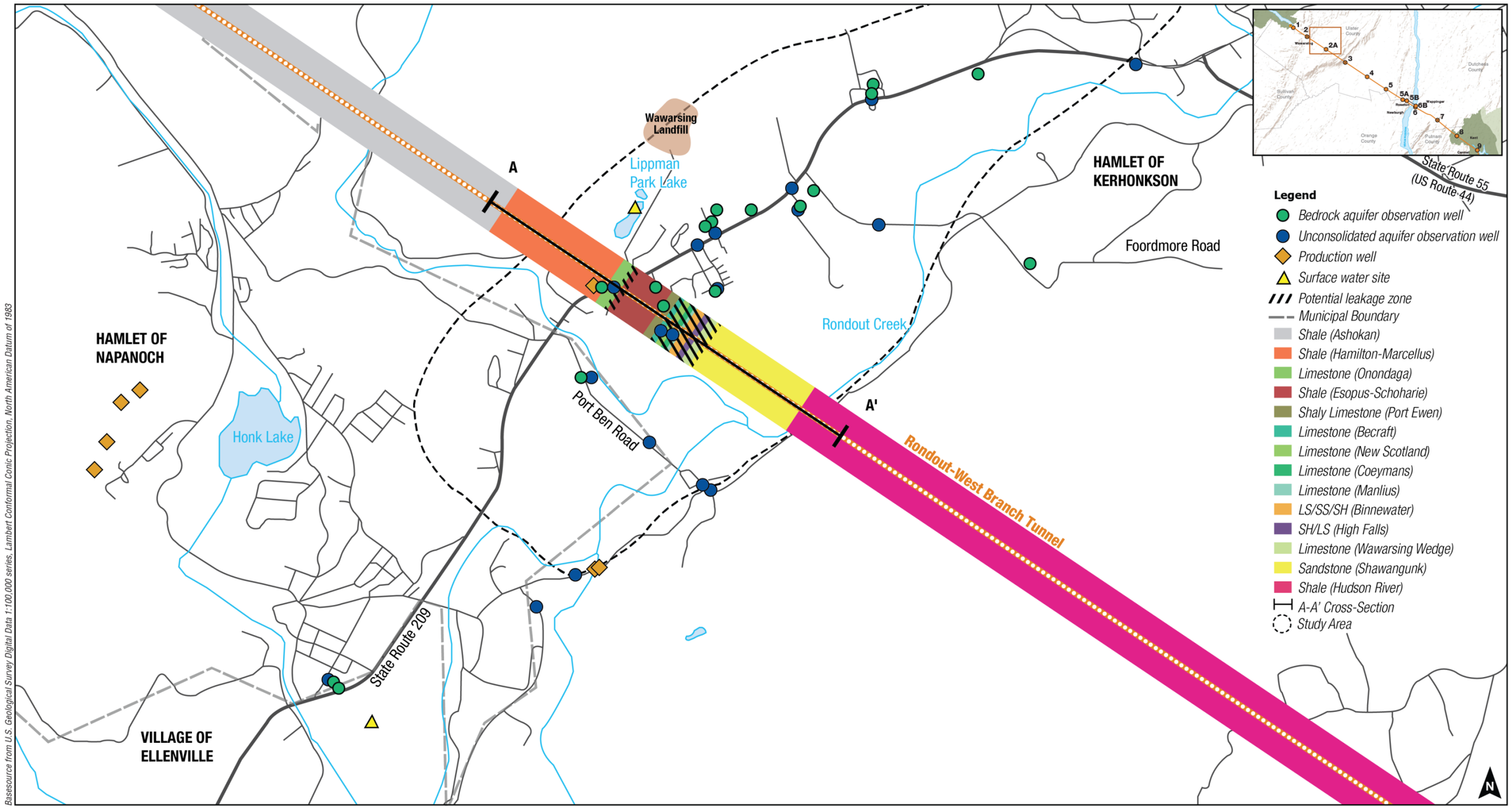
USGS Water Level Monitoring

The USGS:

- Monitored the water levels in the bedrock and unconsolidated aquifers and surface water in the Town of Wawarsing; and
- Documented groundwater conditions in the Town of Wawarsing including the seasonal variation of the depth to water in the unconsolidated and bedrock aquifers.

The USGS concluded the seasonal variation in the depth to groundwater in the Town of Wawarsing is attributed to the combination of precipitation variation in different seasons, increased water consumption in summer months, and transpiration rates from vegetation that is higher during the growing season than during the winter months. USGS reports indicated that these seasonal variations were found to cause the groundwater level to fluctuate by approximately 3.5 to 6.5 feet in wells in the unconsolidated aquifer and by approximately 1.5 to 9.5 feet in wells in the bedrock aquifer. The average seasonal difference in groundwater levels was approximately 5.0 and 5.3 feet in the unconsolidated and bedrock aquifers, respectively.

The USGS monitoring also showed that the bedrock aquifer and the unconsolidated aquifer are hydraulically connected, and that groundwater tends to move from the bedrock to the unconsolidated aquifer in most locations in the Town of Wawarsing.



Source: Stumm, F., Chu, A.,Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report 2012-2015, Figure 3A

Figure 11.6-23: United States Geological Survey Monitoring Locations

The USGS also monitored water levels in the bedrock and unconsolidated aquifers and surface water while DEP lowered the HGL (i.e., water level) in the RWBT four times to determine if groundwater in the Town of Wawarsing was affected by the RWBT. DEP lowered the HGL in the RWBT between approximately 500 and 600 feet during each depressurization. This is approximately half of the potentiometric water level in the RWBT in the Town of Wawarsing.

Unconsolidated Aquifer

The depth of the observation monitoring wells screened in the unconsolidated aquifer that were monitored ranged from 10 to 400 feet below the ground surface. There are 10 wells monitored by USGS that are installed in the unconsolidated aquifer. Water levels in five of those wells screened in the unconsolidated aquifer did not change as a result of lowering the water level in the tunnel. The water level in the other five wells changed as a result of changing the water level in the RWBT. The water level change ranged from approximately 0.1 to 2.5 feet as a result of lowering the HGL (i.e., water level) from 500 to 600 feet in the RWBT (see **Figure 11.6-24**). Most of these wells are located close to the RWBT alignment. The water level in these wells changed over a period of 18 to 54 hours after the depressurization of the RWBT.

The largest change in water level in the unconsolidated aquifer (2.5 feet) occurred in Well U-1641 that is 134 feet deep and is screened about 170 feet above the top of bedrock. This change in water level is likely due to the bedrock beneath this well containing highly permeable (transmissive) fractures or features that respond rapidly to changes in water level in the RWBT. The absence of a response indicates that the changes in water level in the RWBT changed the water level in the unconsolidated aquifer in isolated locations. However, the absence of wells in the eastern part of the study area limits the ability to determine the influences from the RWBT leaks in those areas.

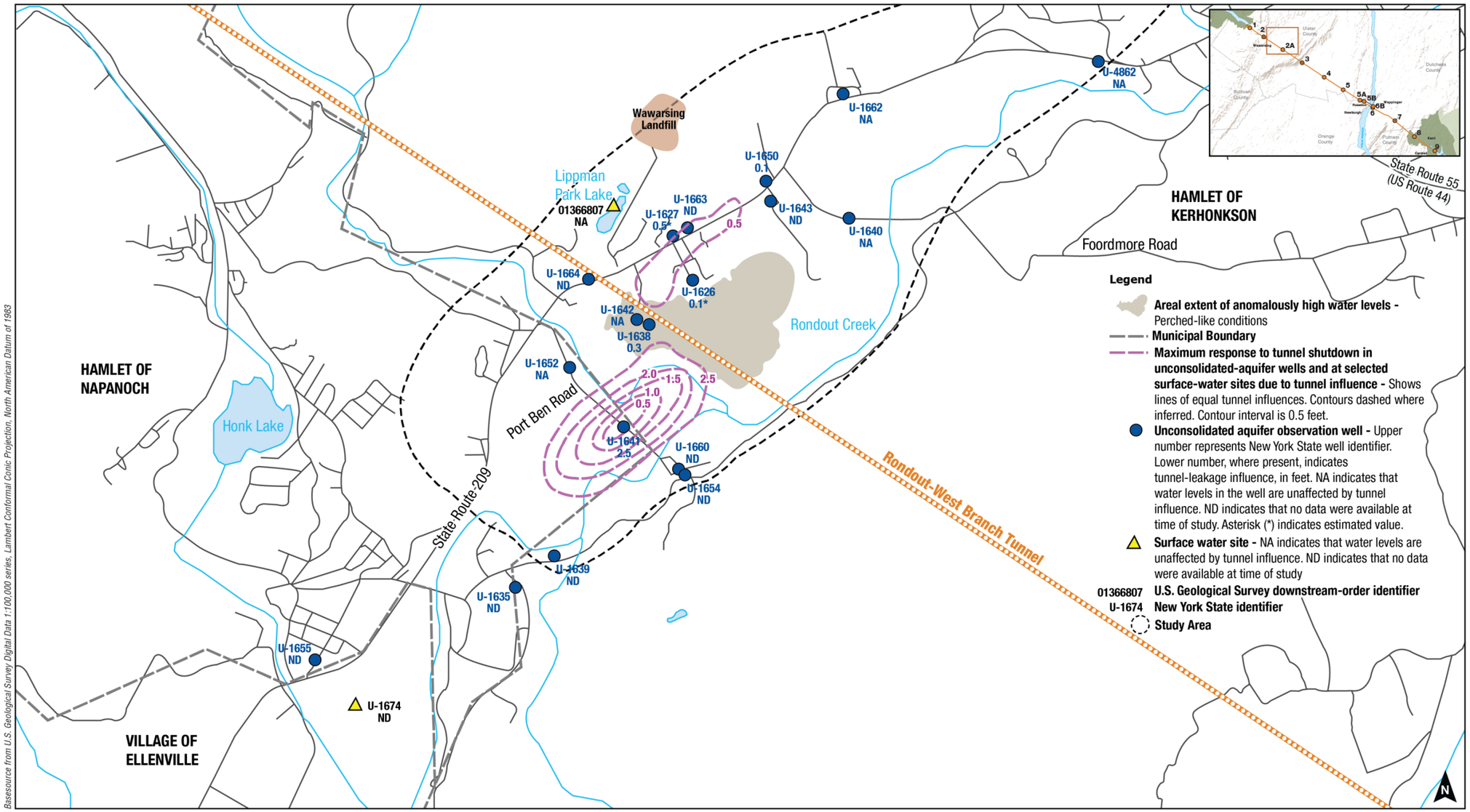
The largest changes in groundwater levels in the unconsolidated aquifer were recorded at wells that also experienced the shortest time between the change in RWBT pressure and the response of groundwater level changes in the wells (U-1641). In general, the shallower part of the unconsolidated aquifer experienced slower, smaller changes in groundwater levels from RWBT pressure changes than the deeper parts of the aquifer.

The USGS identified three primary factors that affected the location, magnitude, and timing of water level effects in monitoring wells from changes in the water level in the RWBT:

(1) The location and orientation of the most transmissive zones in the bedrock that function as pathways for rapid water movement;

(2) The location and positioning of less transmissive rock types, especially shale in the bedrock aquifer and clay in the unconsolidated aquifer; and

(3) The groundwater movement in the unconsolidated aquifer.



Sourced and modified from: Stumm, F., Chu, A.,Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report 2012-2015, Figure 16

Figure 11.6-24: Maximum Water Level Response in the Unconsolidated Aquifer during Depressurizations

The water fluctuation in the unconsolidated aquifer due to changing the HGL (i.e., water level) in the tunnel by 500 to 600 feet were compared to natural seasonal fluctuations to put the changes in water level in the unconsolidated aquifer caused by changes the water level in the RWBT into perspective. The water level in the unconsolidated aquifer fluctuated from 0 to 2.5 feet as a result of the depressurizations. The natural seasonal water level fluctuated from 3.5 to 6.5 feet. These data show that the water level fluctuation in the unconsolidated aquifer due to the depressurizations is within the same order of magnitude as naturally occurring seasonal water level fluctuations.

Upon completion of the depressurization events, groundwater levels returned to levels measured before the depressurization events.

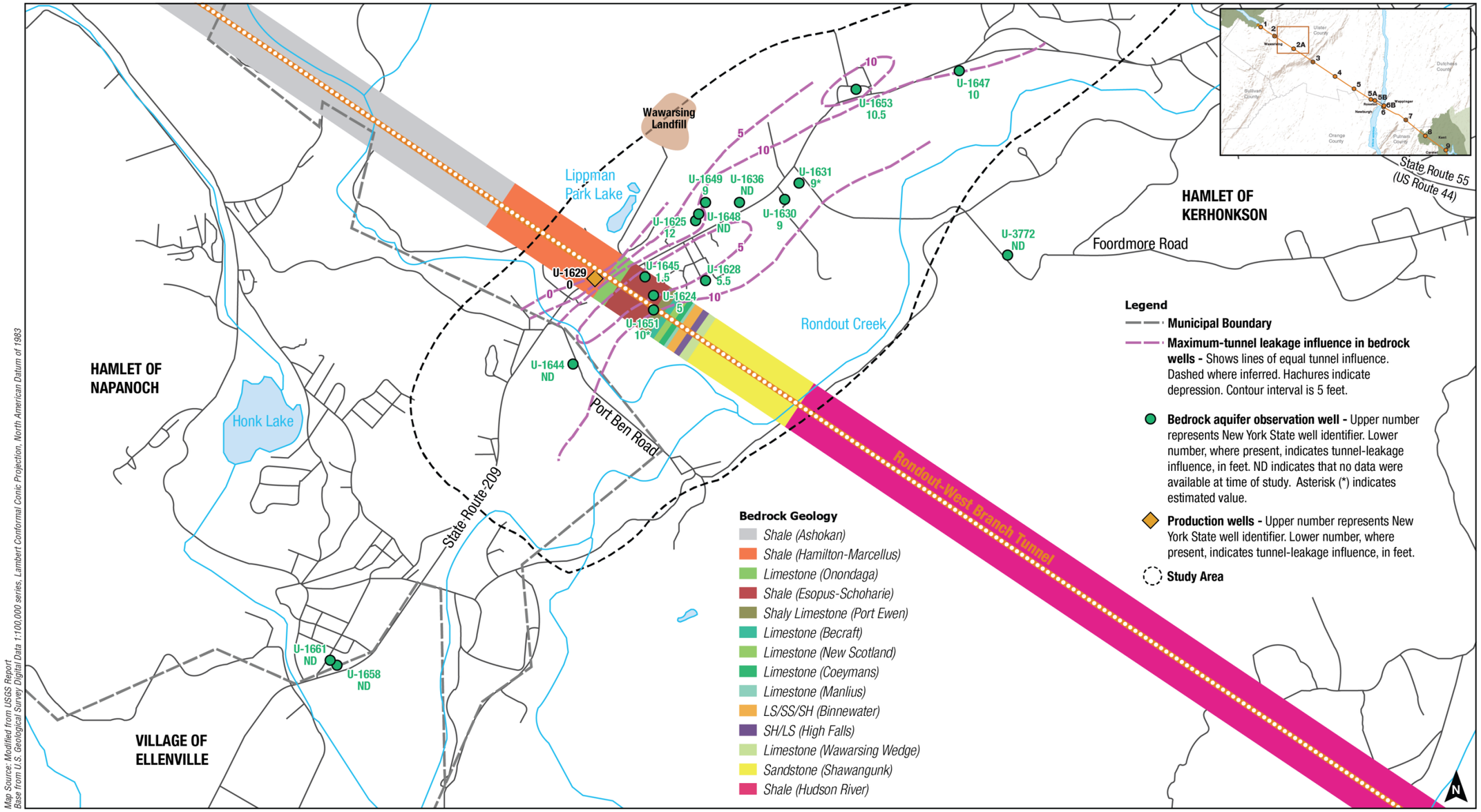
Bedrock Aquifer

The water level data collected from the bedrock monitoring wells show that the potentiometric water level in some portions of the bedrock aquifer monitored by the USGS was not affected by the leaks from the RWBT. These data show that the potentiometric water level in other portions of the bedrock aquifer decreased in elevation as much as 12 feet a result of changing the HGL (i.e., water level) in the RWBT from 500 to 600 feet (see **Figure 11.6-25**).

The greatest potentiometric water level changes occurred on either side of an area that contained a lower change in water level, at wells U-1645, U-1624, and U-1628. The larger water level changes on either side of these wells appear to correlate with the presence of limestone in contact with the shale. These data also show that the time for the water level changes in the RWBT to be measured in monitoring wells into the bedrock aquifer ranged from approximately 0.5 to 60 hours, although the majority of the affected bedrock wells experienced changes within approximately 20 to 35 hours.

The water level changes measured in the bedrock aquifer occurred as far as approximately 1.3 miles (7,000 feet) from the RWBT alignment (see **Figure 11.6-25**). The largest and fastest changes in water levels were not measured in wells located closest to the RWBT. In fact, the largest change in water level was measured at a well (U-1625) located approximately 0.34 mile (1,820 feet) to the northeast from the RWBT. This well also experienced the quickest response to the change in RWBT water level. Well U-1629 did not show a response to changing the water level in the RWBT even though this well was among those closest to the RWBT.

These data show that the majority of groundwater flow occurs in the more permeable (transmissive) portion of bedrock that contains a series of fractures, weathered segments, fault lines, and geologic beds that functions as a connected but irregular network for groundwater movement. This fracture system is aligned in a northeast-southwest direction that is consistent with the orientation of the bedrock formations.



Sourced and modified from: Stumm, F., Chu, A.,Como, M.D., Noll, M.L., 2012, 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. U.S. Geological Survey (USGS), Scientific Investigations Report 2012-2015, Figure 13

Figure 11.6-25: Maximum Water Level Response in the Bedrock Aquifer During Depressurizations

Wells encountering these fractures, weathered segments, fault lines, and geologic beds that function as a connected but irregular network for groundwater movement in the bedrock will tend to show a large response to changes in RWBT pressure even 1.3 miles (7,000 feet) from the RWBT. These data also show that there is very little flow in the less permeable portions of bedrock that do not contain a series of fractures, weathered segments, fault lines, and geologic beds. Also, the water level in wells near the RWBT that do not encounter these features in the bedrock will tend not to respond to changes in RWBT water level.

The water fluctuation in the bedrock aquifer due to changing the HGL (i.e., water level) in the tunnel by 500 to 600 feet was compared to natural seasonal fluctuations. This comparison was made to put the changes in water level in the bedrock caused by changes the water level in the RWBT into perspective. The water level in bedrock wells fluctuated from approximately 0 to 12 feet during a depressurization event that lowered the HGL from 500 to 600 feet in the RWBT. The natural seasonal water level fluctuated from approximately 1.5 to 9.5 feet. These data show that the water level fluctuation in bedrock due to changing the HGL (i.e., water level) in the RWBT 500 to 600 feet is within the same order of magnitude as naturally occurring seasonal water level fluctuations.

Upon completion of the depressurization events, groundwater levels returned to levels measured before the depressurization events.

USGS Temperature and Water Chemistry Monitoring

USGS also collected temperature and water chemistry data and hydrogeologic data to identify the source of water that may contribute to the elevated groundwater levels measured in the Town of Wawarsing. USGS compared the differences in water temperature between the colder water in the RWBT to warmer groundwater in monitored wells and surface water sites in the study area (Lippman Lake and Rondout Reservoir).

The results show:

- Water that experienced quicker water level elevation changes during the changes in RWBT water level also had anomalously colder temperatures when compared to other bedrock wells that had showed little to no water elevation changes during changes in RWBT water level. This indicated a leak of colder RWBT water into the surrounding bedrock; and

- There is no clear correlation between the temperature of RWBT water and the temperature of groundwater in the unconsolidated aquifer. Therefore, RWBT water was not detected in the unconsolidated aquifer.

In addition to temperature, groundwater chemistry was monitored to evaluate the influence of leaks on groundwater in the study area. Groundwater chemistry is primarily affected by deposition of air pollution in water (atmospheric deposition), weathering of soil and aquifer material, and man-made sources (e.g., landfills, leaching from septic systems).

Groundwater chemistry data were used to differentiate between surface water, groundwater, and water from the RWBT. Water in the RWBT comes from a surface water reservoir that exhibits very low concentrations of dissolved minerals in comparison to groundwater in the study area.

The water quality data show slight differences in water chemistry during the RWBT depressurizations indicated that water from the RWBT is present and mixing with water in the bedrock aquifer while water is leaking from the RWBT.

Summary

Based on the monitoring, USGS identified the following three primary factors that determined where and how quickly the effects of RWBT pressure changes were measureable in the monitored wells:

(1) Location and orientation of the highly transmissive zones in the bedrock;

(2) Location and orientation of the low transmissive zones in the bedrock and unconsolidated aquifer; and

(3) Pattern of groundwater movement in the unconsolidated aquifer.

As a result of these factors, USGS determined that groundwater levels in the bedrock aquifer were more affected by the RWBT leaks than the levels in the unconsolidated aquifer. Furthermore, USGS determined that shallower wells were less affected than deeper wells within the unconsolidated aquifer.

Some wells in the unconsolidated aquifer showed no measurable change in groundwater levels. The wells with no change were scattered within the USGS monitoring and are drilled to various depths in the aquifer. USGS reported that this pattern of groundwater level changes during depressurizations indicates that influences from leaks occur in isolated locations in the Town of Wawarsing.

Baseline Conditions

Baseline conditions of groundwater in the Leak Repair Study Area are described below.

The USGS monitoring data were used to help define the Leak Repair Study Area boundary and to establish the baseline conditions for the groundwater analysis. USGS monitoring results identified typical groundwater levels and water quality over a 4-year period. The data shows the natural seasonal water level fluctuated from approximately 3.5 to 6.5 feet.

The USGS monitoring shows that the unconsolidated aquifer and the bedrock aquifer are hydraulically connected, and that groundwater tends to move from the bedrock to the unconsolidated aquifer in the Rondout Valley as groundwater in the bedrock migrates towards and discharges to Rondout Creek. This connection provides a means of dispersing the influence of the leaks to other areas of the bedrock aquifer and the unconsolidated aquifer.

The USGS monitoring data also showed that:

- Changes in the RWBT water level influence groundwater levels in wells in some sections of the study area;
- Water level in some portions of the bedrock aquifer monitored by the USGS was not affected by the leaks from the RWBT;
- Water level in some portions of the bedrock aquifer changed as much as 12 feet a result of changing the HGL (i.e., water level) in the RWBT from 500 to 600 feet;
- The greatest potentiometric water level changes occurred on either side of an area that contained a lower change in water level, at wells U-1645, U-1624, and U-1628;
- Larger water level changes on either side of these wells appear to correlate with the presence of limestone in contact with the shale; and
- The time for the water level changes in the RWBT to be measured in monitoring wells into the bedrock aquifer ranged from approximately 0.5 to 60 hours, although the majority of the affected bedrock wells experienced changes within approximately 21 to 33 hours.

The water level changes measured in the bedrock aquifer occurred as far as approximately 1.3 miles (7,000 feet) from the RWBT alignment (see **Figure 11.6-25**). The largest and fastest changes in water levels were not measured in wells located closest to the RWBT. In fact, the largest change in water level was measured at a well (U-1625) approximately 0.34 mile (1,820 feet) to the northeast from the RWBT. This well also experienced the quickest response to the change in RWBT water level. Well U-1629 did not show a response to changing the water level in the RWBT even though this well was among those closest to the RWBT.

These data show the majority of groundwater flow occurs in the more permeable (transmissive) portion of bedrock that contains a series of fractures, weathered segments, fault lines, and geologic beds that functions as a connected but irregular network for groundwater movement. This fracture system is aligned in a northeast-southwest direction that is consistent with the orientation of the bedrock formations. Wells encountering these fractures, weathered segments, fault lines, and geologic beds that function as a connected but irregular network for groundwater movement in the bedrock will tend to show a large response the changes in RWBT pressure.

These data also show that there is very little flow in the less permeable portions of bedrock that do not contain a series of fractures, weathered segments, fault lines, and geologic beds. In addition, the water level in wells near the RWBT that do not encounter the same series of interconnected fractures, weathered segments, fault lines, and geologic beds in the bedrock do not respond to changes in RWBT water level.

The water fluctuation in the bedrock aquifer due to changing the HGL (i.e., water level) in the tunnel by 500 to 600 feet was compared to natural seasonal fluctuations. The water level in bedrock wells fluctuated from 0 to 12 feet. The natural seasonal water level fluctuated from 1.5 to 9.5 feet. These data show that the water level fluctuation in bedrock due to changing the

HGL in the RWBT 500 to 600 feet is within the same order of magnitude as naturally occurring seasonal water level fluctuations.

Upon completion of the depressurization events, groundwater levels returned to levels measured before the depressurization events.

The changes in water level in RWBT affected the groundwater level of the unconsolidated aquifer differently than it affected the bedrock aquifer. The depth of the unconsolidated wells that were monitored ranged from 10 to 400 feet below the ground surface. There are 10 wells monitored by USGS that are screened in the unconsolidated aquifer. The water level in five wells screened in the unconsolidated aquifer did not change as a result of lowering the water level in the tunnel (see **Figure 11.6-24**). The water level in five wells did change as a result of changing RWBT water levels. The water level change ranged from 0.1 to 2.5 feet as a result of lowering the HGL (i.e., water level) from 500 to 600 feet in the RWBT. Most of these five wells are located close to the RWBT alignment. The water level in these wells changed over a period of 18 to 54 hours from the depressurization of the RWBT.

The largest change in water level in the unconsolidated aquifer occurred in Well U-1641 that is 134 feet deep and is screened about 170 feet above the top of bedrock. This change in water level is likely due to the bedrock beneath this well containing highly permeable (transmissive) fractures or features that respond rapidly to changes in water level in the RWBT. The absence of response indicates that the changes in water level in the RWBT changed the water level in the unconsolidated aquifer in isolated locations. However, the absence of wells in the eastern part of the study area limits the ability to determine the influences from tunnel leakage in this area.

The water fluctuation in the unconsolidated aquifer due to changing the HGL (i.e., water level) in the RWBT by 500 to 600 feet was compared to natural seasonal fluctuations. This comparison was made to put the changes in water level in the unconsolidated aquifer caused by changes of the water level in the RWBT into perspective. The water level in the unconsolidated aquifer fluctuated from 0 to 2.5 feet as a result of changing the HGL 500 to 600 feet in the RWBT. The natural seasonal water level fluctuated from 3.5 to 6.5 feet. These data show that the water level fluctuation in the unconsolidated aquifer due to changing the HGL in the RWBT 500 to 600 feet is within the same order of magnitude as naturally occurring seasonal water level fluctuations.

Upon completion of the depressurization events, groundwater levels returned to levels measured before the depressurization events.

As noted above, USGS also interpreted water chemistry data and hydrogeologic data to help identify and distinguish between the sources of water that may contribute to elevated groundwater levels measured in the Town of Wawarsing, and in support of the conclusion that leak water is present in the water of the bedrock aquifer under current RWBT conditions.

A review of monitoring data associated with to the Town of Wawarsing landfill was also conducted to determine if groundwater at the landfill is affected by the RWBT. The landfill is partially located within the limits of the Leak Repair Study Area approximately 0.43 mile (2,300 feet) from the RWBT. It was closed in 1997 and subsequently capped with a protective layer in 1998 in accordance with NYSDEC requirements. Groundwater samples are collected on

a routine basis as part of the post-closure monitoring program required by NYSDEC. Groundwater samples collected from three down-gradient monitoring wells screened in the unconsolidated aquifer located within 25 feet of the landfill contained contaminants associated with the landfill. Given the hydrogeologic conditions in the area (see **Figure 11.6-24**), groundwater in the unconsolidated aquifer at the landfill is not affected by the RWBT.

Future Conditions Without the Inspection and Repair

In the future without the inspection and repair, the RWBT would continue to leak water into the bedrock aquifer and this water would continue to be transmitted through the bedrock aquifer into the unconsolidated aquifer.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes to the water infrastructure are currently approved within the Leak Repair Study Area within the timeframe of the impact analysis. However, the Town of Wawarsing has initiated planning studies for the formation of a municipal water supply district that would provide a public water supply for local residents currently using groundwater resources in the Leak Repair Study Area. The formation and implementation of the water district would be subject to local approval. If implemented, future conditions without the inspection and repair would be continued use of groundwater as a source of supply, but the individual water supply wells would be replaced by public supply.

Therefore, in the future without the inspection and repair, it is assumed that the features characterizing groundwater resources (i.e., groundwater levels, extent of, and connectivity between the aquifers, and groundwater quantity) would be the same as baseline conditions.

Probable Impacts With the Inspection and Repair

Repairs to the RWBT would result in the cessation of leaks that contribute groundwater to the unconsolidated and bedrock aquifers, estimated to be 1 mgd based upon the AUV results. The repairs of the RWBT could affect the local groundwater resources within the Leak Repair Study Area. Potential impacts could occur at the start of the temporary shutdown when the RWBT would be unwatered to allow for the internal inspection and repair. Potentiometric water levels in the aquifers would begin to decline when the RWBT is unwatered.

The USGS data were used to estimate the area within the Leak Repair Study Area that could potentially be affected during the temporary shutdown and after the inspection and repair is complete. This area, referred to as the Estimated Groundwater Influence Area, is shown on **Figure 11.6-26** and **Figure 11.6-27** for the bedrock and unconsolidated aquifers. The USGS data were also used to estimate the water level change that could result from the temporary shutdown. The water level change in the bedrock and unconsolidated aquifer resulting from reducing the HGL (i.e., water level) in the tunnel by 500 to 600 feet was extrapolated using a linear interpolation. The USGS results show a maximum of 12 feet of water level change in the bedrock aquifer as a result of decreasing the HGL in the RWBT by 500 to 600 feet.

Therefore, using a linear interpolation, the water level in the RWBT could be reduced to up to 1,000 feet, and the water level in the bedrock could decrease up to 24 feet in the Estimated

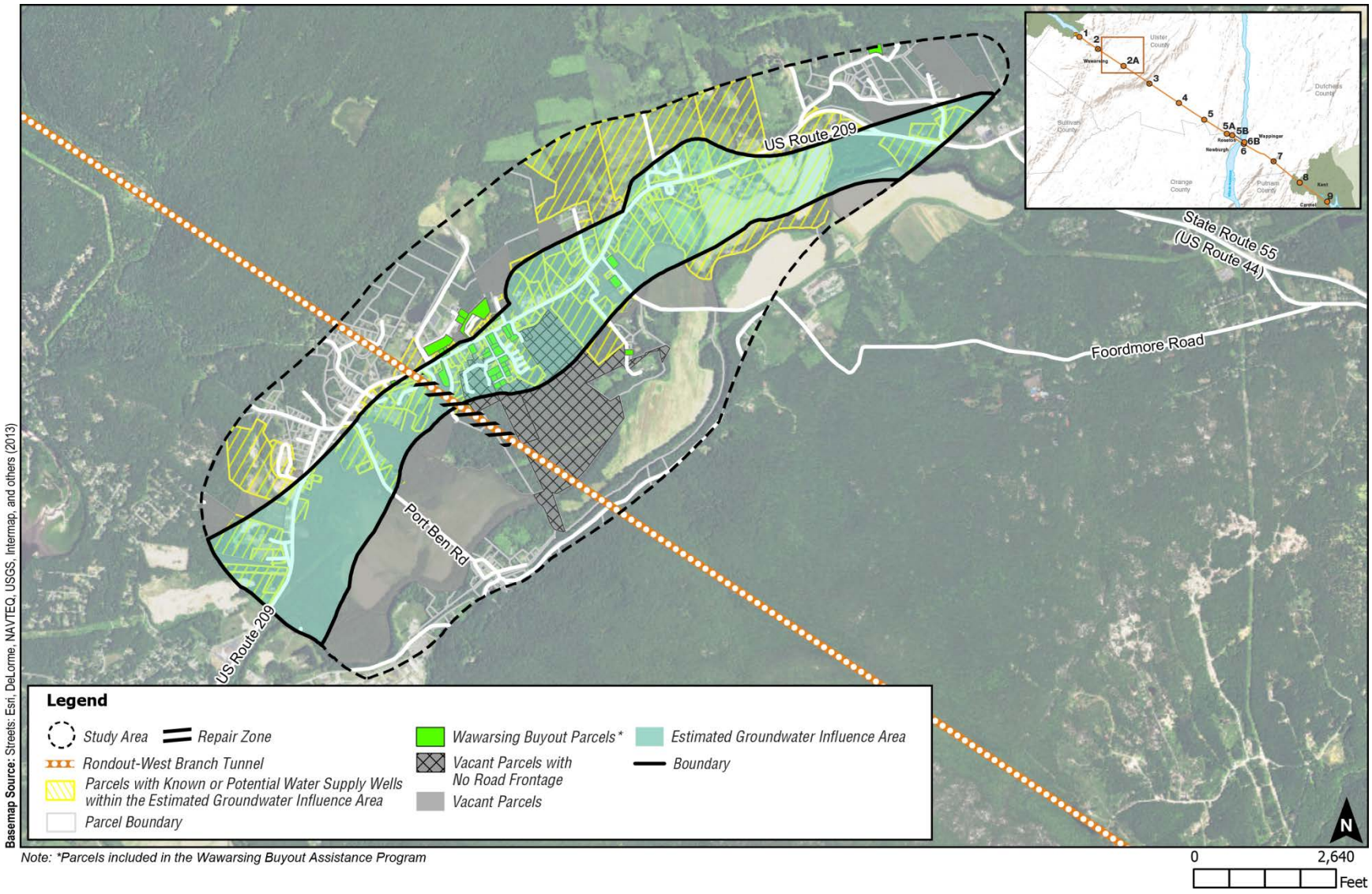
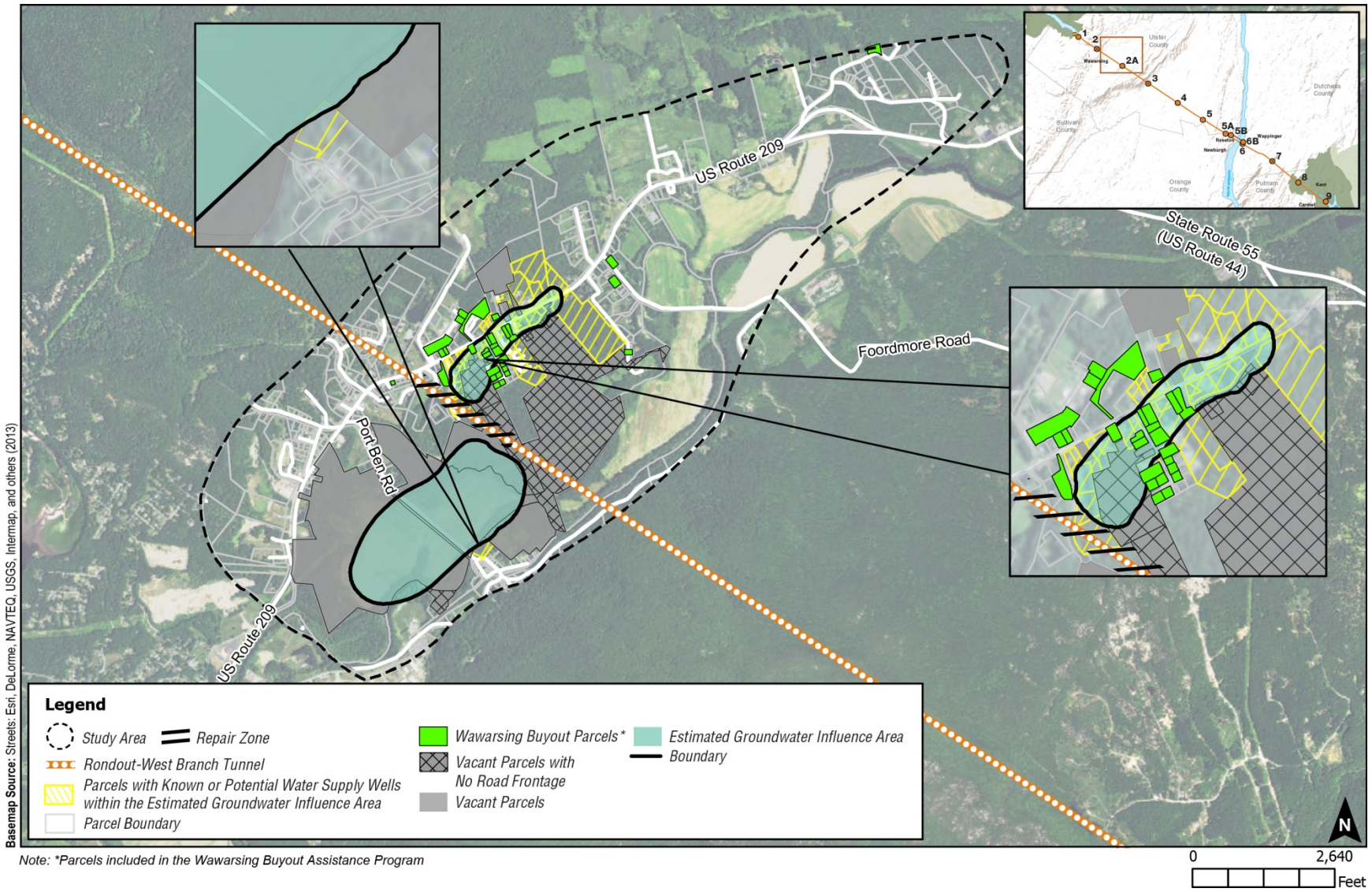


Figure 11.6-26: Estimated Groundwater Influence Area in the Bedrock Aquifer – Leak Repair Study Area



*Note: *Parcels included in the Wawarsing Buyout Assistance Program*

Figure 11.6-27: Estimated Groundwater Influence Area in the Unconsolidated Aquifer – Leak Repair Study Area

Groundwater Influence Area within the Leak Repair Study Area during the temporary shutdown. Using a linear interpolation is considered to be conservative, as the rate of water entering the tunnel would be reduced as the hydrostatic pressure changes (difference between the potentiometric water level in the bedrock aquifer and the water level in the RWBT). This would reduce the size, width, and flow rate of water through of the cracks in the RWBT.

The USGS data show that a maximum of 2.5 feet of water level change in the unconsolidated aquifer as a result of decreasing the HGL (i.e., water level) in the RWBT by 500 to 600 feet. Therefore, also using a linear interpolation, the water level in the tunnel could be reduced to up to 1,000 feet, and the water level in the unconsolidated aquifer could decrease up to 5 feet in the Estimated Groundwater Influence Area during the temporary shutdown. As noted above, using a linear interpolation is considered to be conservative.

Once the temporary shutdown is complete, the water levels in the aquifers would stabilize at a level that balances groundwater recharge, the physical properties of the aquifer, and groundwater discharge. The overall quantity of groundwater is expected to decrease proportionally to the volume of water leaking from the RWBT, which is estimated to be 1 mgd. The effect is anticipated to vary throughout the Leak Repair Study Area, and to be similar to the distribution of drawdown observed by the USGS when the HGL (i.e., water level) in the RWBT was reduced by 500 to 600 feet.

However, within the majority of the study area, groundwater level decline is expected to be relatively minimal, and, although measureable, is not expected to affect the local groundwater resources.

The potentiometric water level in many areas of the Leak Repair Study Area would not change. Some isolated areas of the bedrock aquifer could experience a decrease in the potentiometric water level. However, the amount of water level decline is likely to be less than 12 feet. These potential changes can be compared to natural seasonal fluctuations. The natural seasonal water level fluctuated from approximately 1.5 to 9.5 feet. These data show that the decline in the potentiometric water level in the bedrock after the RWBT has been repaired would be within the same order of magnitude as naturally occurring seasonal water level fluctuations.

The water table in many areas of the Leak Repair Study Area would not change. Some isolated areas of the unconsolidated aquifer that correspond to the areas shown on **Figure 11.6-27** could experience a decrease in the water table. However, the amount of water table decline is likely to be less than 2.5 feet. The natural seasonal water level fluctuated from approximately 3.5 to 6.5 feet.

These data show that:

- Water level fluctuation in the unconsolidated aquifer due to changing the HGL (i.e., water level) in the RWBT 500 to 600 feet is within the same order of magnitude as naturally occurring seasonal water level fluctuations; and

- The decline in the water table in the unconsolidated aquifer after the RWBT has been repaired is expected to be less than the naturally occurring seasonal water level fluctuations.

Based on the above, the anticipated decrease in water level from the inspection and repair is not expected to affect groundwater resources in the study area. Local groundwater resources would remain sustainable as a result of the natural groundwater recharge that occurs in the Leak Repair Study Area.

Therefore, while there may be some changes to groundwater levels and groundwater discharge, the inspection and repair would not result in significant adverse impacts to groundwater resources within the Leak Repair Study Area.

A discussion of the potential impacts from changes in water levels on geology and soils that may be influenced by the leaks is included in Section 11.6.9.2, "Geology and Soils." A discussion of the potential impacts from changes water levels on water supply that may be influenced by the leaks is included in Section 11.6.11, "Water and Sewer Infrastructure." Finally, a discussion of the potential impacts from changes in water levels on water quality is included in Section 11.6.15, "Public Health."

11.6.9.2 Geology and Soils

Baseline Conditions

Baseline conditions of geology, surficial geology, and surficial soils in the Leak Repair Study Area are described below.

Geology

The Leak Repair Study Area is located within the Port Jervis Trough, a deep glaciated valley that separates the Shawangunk Mountains to the east and the Catskill Mountains to the west (Reynolds 2007). The major geologic formations (as shown on **Figure 11.6-28**) found within the study area include the Helderberg Group, Oneonta Formation, Hamilton Group, Bloomsburg Formation, Rondout Formation, and the Onondaga Limestone.

As shown on **Figure 11.6-28**, the New York State Bedrock Geologic Map shows major formations, but does not differentiate between the smaller secondary bedrock units. For example, the map displays the entire Rondout Formation but does not show divisions between its secondary units such as the Binnewater Sandstone, High Falls Shale, and the Wawarsing Limestone. Geologic observations made during the construction of the RWBT provide a more in-depth description of the bedrock geology, particularly those units that are found only at the depth of the RWBT (i.e., Hudson Creek Formation/Shale) within the study area (see **Figure 11.6-14**).

As shown on **Figure 11.6-28**, these bedrock formations generally follow a northeast direction and orientation (trend), parallel to the valley axis, and nearly perpendicular with the RWBT alignment, with an approximately 45-degree dip to the northwest.

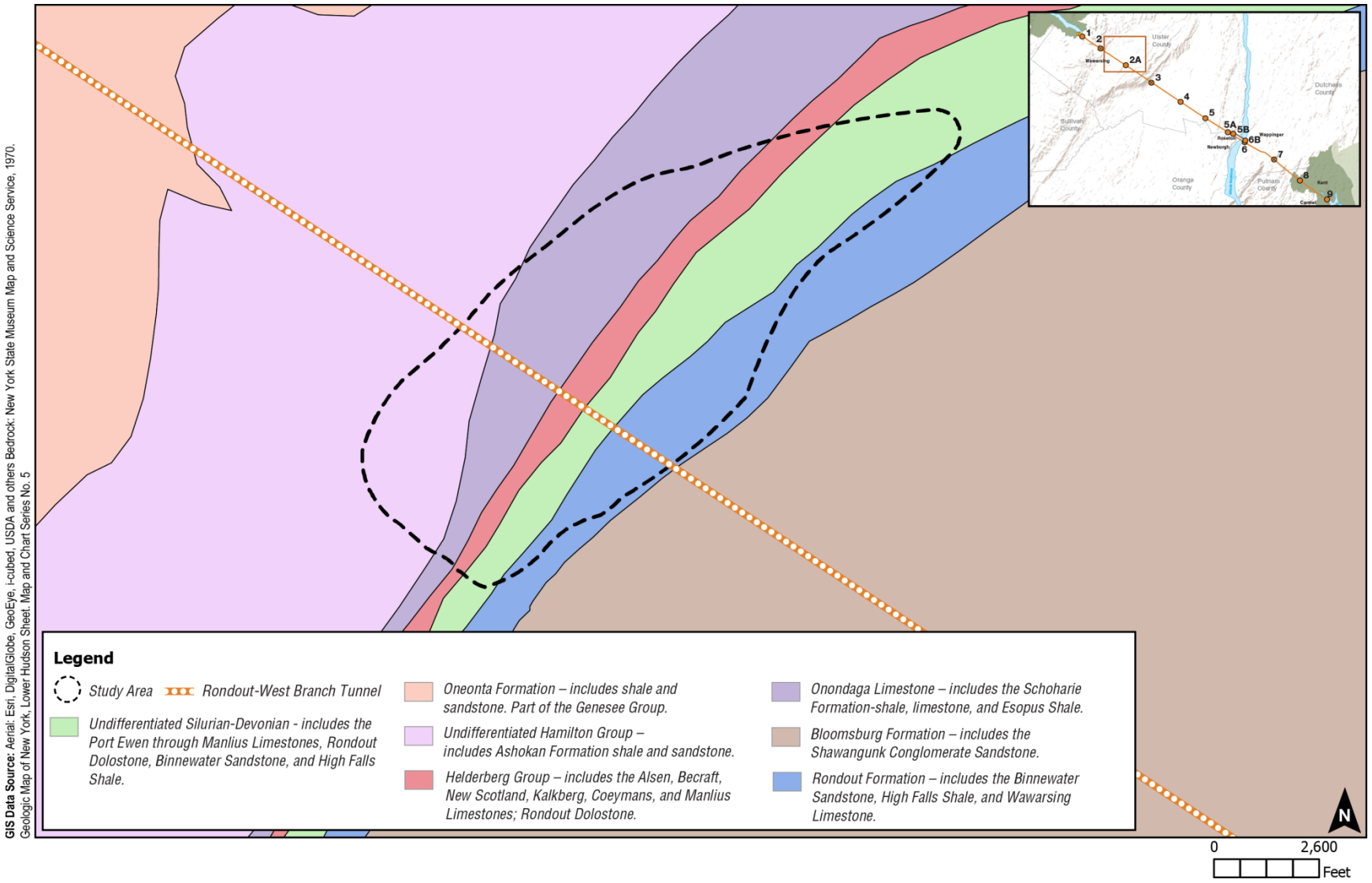


Figure 11.6-28: Bedrock Geology – Leak Repair Study Area

According to historic record drawings of the RWBT, these geologic units have substantial fracturing and faulting. Limestone units such as the Onondaga Limestone and Manlius Limestone were reported as cavernous with clay-filled spaces. These features greatly increase the transmissivity of groundwater, as noted by the high volumes of inflow during RWBT construction. The Binnewater Sandstone and High Falls Shale were observed to be one of the most porous and transmissive geologic units, especially along bedding planes.

Surficial Geology

The surficial geology is heavily influenced by the recent the geologic history of the region. Approximately 20,000 years ago, the climate was much colder and glacial ice covered the landscape. As the climate warmed and glacial ice began its retreat, material was deposited at Phillipsport, New York, forming a dam across the valley that created Glacial Lake Wawarsing.

Multiple tributary streams on the west side of the lake carried large amounts of glacial meltwater and sediment into this lake (Reynolds 2007). The larger sediments (sands and gravels) formed deltas, while finer-grain sediments (silt and clay) remained suspended in the water beyond the deltas and finally settled, forming lake-bottom deposits.

Glacial Lake Wawarsing eventually drained into the Wallkill Valley through drainage channels that were exposed when the glacial ice retreated. The resulting unconsolidated deposits within the study area include recent alluvium, glacial outwash, lacustrine deposits, and kame and till (see **Figure 11.6-15**). Bedrock is exposed at or near the ground surface where the unconsolidated deposits are very thin or absent. From the northeast to the southwest of the Leak Repair Study Area, lacustrine silt and clay comprise the most prominent unconsolidated deposit, with a thickness of approximately 140 feet at approximately 4,000 feet north-northeast of the RWBT to just approximately 30 feet along the RWBT alignment itself.

Glacial till and kame material ranging from approximately 40 feet to over approximately 250 feet thick underlies the lacustrine deposit over much of the study area, which is further underlain by bedrock. Recent alluvium generally follows the trend of Rondout Creek and its tributary within the Leak Repair Study Area. These deposits are generally less than approximately 5 feet thick and are typically found only in close proximity to the current or former channel of the creek.

A general description of the unconsolidated deposits within the Leak Repair Study Area, including those from two geotechnical borings advanced by DEP within the study area, is provided below:

- **Recent Alluvium**: Recent alluvium, in the form of floodplain deposits, consists of silty sand and gravel with a thickness of less than 5 feet. This type of deposit is typically found near streams and creeks that have eroded and re-deposited the glacial deposits.

- **Glacial Outwash:** Glacial outwash material was deposited by meltwater streams near the front of the glacier. This material contains mostly sand and gravel deposits with some silt. The extent of the glacial outwash within the study area is limited.

- **Lacustrine Deposits:** The lacustrine deposits were deposited as lake-bottom sediments or deltas in Glacial Lake Wawarsing. This layer was encountered in the borings from depths

of approximately 14 feet below ground surface to approximately 51 feet below ground surface in boring WA-01, and from depths of approximately 20 feet below ground surface to approximately 160 feet below ground surface in boring WA-02 (see **Figure 11.3-4**). The lake-bottom deposits are predominantly layers of clay with little silt and sand while the deltaic deposits are sand and silt with clay. Lacustrine deposits are the predominant type of unconsolidated material within the study area.

- **Kame and Till:** The kame and till material was deposited by stagnant glacial ice during a temporary pause in ice retreat. This material is exposed in only limited areas within the study area but is found underlying the lacustrine deposits above the bedrock surface. In the Wawarsing borings, this material was described as silty sand with gravel, with occasional occurrences of clay. For boring WA-02, which was terminated at bedrock, the thickness of this layer was measured as approximately 53 feet. In the RWBT borings, this layer was described as fine sand with boulders and stones, and fine sand with clay, and ranged in thickness from approximately 15 to 250 feet.

- **Bedrock:** The depth to bedrock changes abruptly across the study area, with depths ranging from 0 feet (exposed at the ground surface) at Smith Lane south of Route 209 to approximately 500 feet below ground surface near the leaking section of the RWBT approximately 1,000 feet north-northwest of where the Vernooy Kill and Rondout Creek join, and north of the high-voltage power line right-of-way.

Surficial Soils

The majority of the surficial soils in the study area are loams that consist of a mixture of sand, silt, and clay according to the USDA Natural Resources Conservation Service. The dominant soils, each extending over more than 3 percent of the study area, are shown in **Table 11.6-2**. Soils identified within the study area are shown on **Figure 11.6-29**.

As discussed in Section 11.3.8.2, "Geology and Soils," settlement could result from lowering of the groundwater table during the temporary shutdown and from cessation of leaks due to the inspection and repair. Lowering the water table would increase the stress on the compressible lacustrine soils overlying the bedrock, potentially causing them to consolidate.

Typically, settlement could occur in low-permeability soils such as silts and clays. Therefore, some of the soils in the study area could have the potential to settle from stress due to groundwater changes. The stress on the material would decrease as the water level returns to a new equilibrium reflecting more natural conditions in the aquifers and the stresses created by the lowered groundwater table dissipates.

After the internal repairs are complete, the water level in the unconsolidated soils would rise and stabilize at a level that would be similar to the water level in the unconsolidated aquifer before construction of the RWBT in a hydrostatic condition.

Table 11.6-2: Leak Repair Study Area Soil Series

Soil Series Name	Soil Series Description
Chenango gravelly silt loam, 3 to 8% slopes (CnB)	Deep, well-drained to somewhat excessively drained, gently sloping soil formed in glacial outwash deposits that have high gravel content.
Hoosic Gravely loam, 0 to 3% slopes (HgA)	Deep, somewhat excessively drained, nearly level soil formed in glacial outwash deposits that have high gravel content.
Hoosic Gravely loam, 3 to 8% slopes (HgB)	Deep, gently sloping, somewhat excessively drained soil formed in glacial outwash deposits that have high gravel content.
Hoosic gravelly loam, rolling (HgC)	Deep, somewhat excessively drained soil formed in glacial outwash deposits that have high gravel content. Variable and complex slopes.
Hoosic soils, very steep (HSF)	Deep, somewhat excessively drained soils formed in glacial outwash deposits. Slopes are short and range between 35 to 55%. High gravel content.
Hudson and Schoharie soils, 15 to 25% slopes (HwD)	Deep, moderately steep, moderately well-drained soils formed in lacustrine deposits of clay and silt.
Hudson and Schoarie soils, steep (HXE)	Deep, steep, moderately well-drained soils formed in lacustrine deposits of clay and silt.
Schoharie silt loam, 8 to 15% slopes (SaC)	Deep, moderately well-drained, sloping soil formed in lacustrine deposits of clay and silt.
Scio silt loam (Sc)	Deep, nearly level, moderately well-drained soil formed in gravel-free, water-deposited material. High in silt and fine sand.
Suncook loamy fine sand (Su)	Deep, nearly level, excessively drained soil formed on sandy alluvial deposits.
Tioga fine sandy loam (Tg)	Deep, nearly level, well-drained soil formed in alluvium derived from sandstone, siltstone and shale.
Unadilla silt loam (Un)	Deep, nearly level, well-drained soil formed in gravel-free, water-deposited material. High in silt and very fine sand.

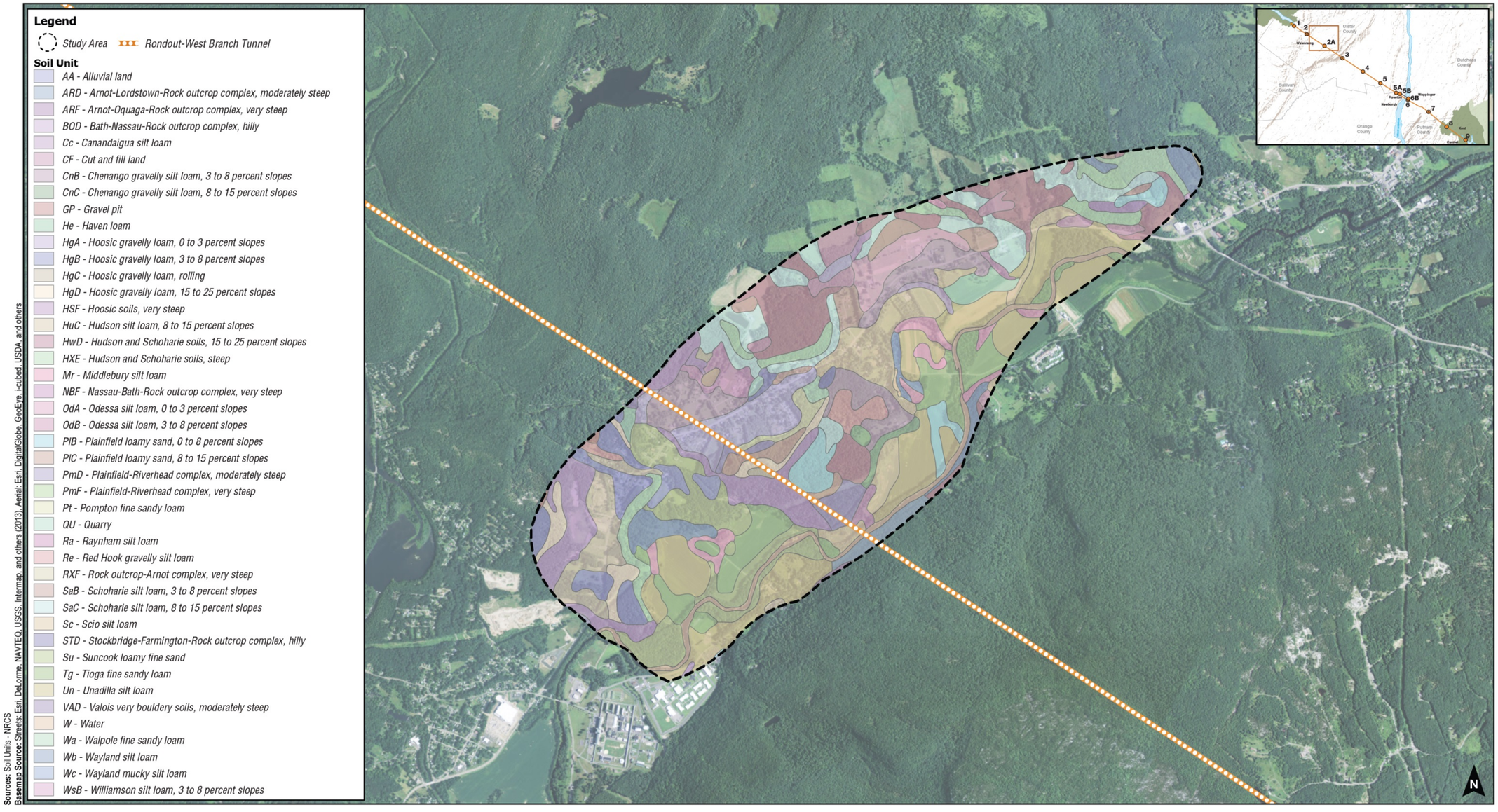


Figure 11.6-29: Soils Map – Leak Repair Study Area

Future Conditions Without the Inspection and Repair

In the future without the inspection and repair, the RWBT would continue to leak water into the surrounding bedrock. DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no plans are currently anticipated that would affect geology and soils in the Leak Repair Study Area within the timeframe of the impact analysis. In addition, no settlement of soils in unconsolidated deposits would be expected within the study area because water levels would remain elevated from leak water.

Therefore, it is assumed that the geology and soils within the Leak Repair Study Area would be the same as baseline conditions in the future without the inspection and repair.

Probable Impacts With the Inspection and Repair

Internal repairs to the RWBT would affect the potentiometric water level in the surrounding confined bedrock aquifer and the deep confined portions of the unconsolidated aquifer. As the water level in the deep unconsolidated confined aquifer begins to lower, the pressure or stress on the unconsolidated aquifer (soils) would be increased from baseline conditions.

After the internal repairs are complete, the water level in the soils would stabilize at a level that would be similar to the water level in the unconsolidated aquifer before construction of the RWBT.

Changes to groundwater levels from repair of the leaks were compared to the geology and soils encountered in two boreholes drilled within the Leak Repair Study Area, as summarized in Section 11.6.9.2, "Geology and Soils." The geology and soils, as they relate to the potential for settlement from lower groundwater levels, are described as follows:

- **Recent Alluvium**: Although these materials may exhibit moderate to high compressibility, the minimal potential change in water level and their limited thickness would result in no settlement.

- **Glacial Outwash:** The glacial outwash material has very high permeability (Reynolds 2007) and a low compressibility resulting in no settlement.

- **Lacustrine Deposit:** The lacustrine deposit is predominantly layers of compressible clay with little silt and sand interbeds. The clay has low permeability as a result of the fine particle size. Therefore, any settlement would be negligible.

- **Kame and Till:** The grain size of till can be highly variable but it generally has a low permeability because of highly varied and mixed grain sizes found in these deposits (Reynolds 2007) Although permeability is low, it also has low compressibility, resulting in no settlement.

- **Bedrock:** Due to its solid matrix (i.e., structurally rigid and resistant to changes in volume), the bedrock is considered incompressible resulting in no settlement.

Based on the geology and soils in the Leak Repair Study Area, only areas with lacustrine deposits could be subject to potential settlement due to lower water levels. Any potential for settlement from these stress increases would be expected to occur slowly over time (e.g., up to decades). The potential stress-induced settlement of soil was analyzed based on estimated groundwater level changes for two conditions: during the temporary shutdown, and after the inspection and repair when the majority of settlement could occur.

Based on USGS data, the groundwater level was estimated to decline up to 5 feet below the baseline water levels in the unconsolidated deposits during the temporary shutdown.

The compressible lacustrine layers are generally unaffected by the minimal decline in groundwater levels, as these minimal, short duration water level changes are not expected to add significant increased stress to the lacustrine clays and silts. Furthermore, these water level changes and the resultant stresses on the lacustrine clays and silts are potentially less than or equal to what was experienced (pre-stressed or preconsolidated) during the construction of the RWBT. These can be called pre-stressed or preconsolidated soils because the maximum effective stress on the lacustrine clays and silts would have occurred during the construction of the RWBT and any effective stress that would occur during decommissioning would be less. Based on the water level decline estimates, the 8 month duration, and pre-stressed soils, there would be no areas with the potential for stressed-induced settlement during the temporary shutdown.

The potential stressed-induced settlement after the inspection and repair was also assessed using USGS data. Based on the USGS data, the groundwater level was estimated to decline approximately 2.5 feet below the baseline water levels in the unconsolidated deposits after the inspection and repair. This decline in groundwater level would be in addition to the 3.5 feet to 6.5 feet seasonal groundwater level fluctuations in the unconsolidated aquifer measured by the USGS. It is also expected to be representative of the water level in the aquifer before the construction of the RWBT where the soils have also been pre-stressed. Any changes to soils from this groundwater decline would also be expected to occur over an extended time (e.g., up to decades). Therefore, the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and is not expected to affect structures or underground utilities in the study area.

Therefore, the inspection and repair would not result in significant adverse impacts to geology and soils within the Leak Repair Study Area.

11.6.9.3 Terrestrial Resources and Wildlife

As described above, the potential for impacts to terrestrial resources and wildlife associated with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for this analysis is the 400-foot radius around the Shaft 2A site, as shown on **Figure 11.6-13**.

The study area is forested primarily with mowed lawn and paved road/path terrestrial cultural systems in the cleared area where the Shaft 2A site is located (Edinger et al. 2014). At the southern end of the study area, there is a large, unforested, and mostly unvegetated area covered in gravel. Consultation with the NYNHP database identified one ecological community of

significance: a chestnut oak forest. This chestnut oak forest is a diverse, matrix-forming forest with excellent landscape context, high species diversity, and low exotic species presence. The known primary threats to chestnut oak forest are defoliation from gypsy moth infestations, fragmentation resulting from development, fire suppression, and invasive species. The portion of the study area south and east of the Shaft 2A site consists of Minnewaska State Park Preserve. Much of the Minnewaska State Park Preserve is composed of this chestnut oak forest.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no new initiatives that would affect terrestrial resources are anticipated within the Shaft 2A Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession are anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that terrestrial resources and wildlife within the Shaft 2A Study Area would be the same as baseline conditions.

The inspection and repair activities at the Shaft 2A site would be minimal and temporary. The limits of disturbance for the inspection and repair activities would be temporary and confined to the previously disturbed Shaft 2A site. There would be no tree clearing as part of the inspection and repair. There would be no threats to the chestnut oak forest associated with the inspection and repair within the study area.

There may be temporary increases in noise levels at the Shaft 2A site that may discourage wildlife from inhabiting areas adjacent to the site. Upon completion of the inspection and repair, the wildlife would be expected to return to baseline habitats and to be unaffected. The inspection and repair activities at the Shaft 2A site would be small in scale and short in duration (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period). Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. There would be no disturbance to the significant ecological community of the chestnut oak forest associated with the inspection and repair within the Shaft 2A Study Area.

As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would not result in changes to terrestrial resources and wildlife.

Therefore, the inspection and repair would not result in significant adverse impacts to terrestrial resources or wildlife within the Shaft 2A Study Area.

11.6.9.4 Federal/State Threatened and Endangered Species

As described above, the potential for impacts to federal/State Threatened and Endangered Species associated with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for this analysis is the 400-foot radius around the Shaft 2A site, as shown on **Figure 11.6-13**.

Federal/State Threatened and Endangered Species that are protected under federal or State law and that have the potential to occur within the Shaft 2A Study Area are shown in **Table 11.6-3**. As described in Section 11.3.8, "Natural Resources," these species were identified by performing a review of the USFWS Official Species Lists and NYNHP database results, as well as data from the NYSDEC Nature Explorer, NYSDEC Breeding Bird Atlas, and Herp Atlas.

Table 11.6-3: Federal/State Threatened and Endangered Species, and Habitat Potentially within the Shaft 2A Study Area

Common Name	Scientific Name	Federal Listing	State Listing	Potential for Habitat	Potential for Species
Amphibians and Reptiles					
Timber Rattlesnake	*Crotalus horridus*	--	T	Yes	Not Anticipated
Mammals					
Allegheny Woodrat	*Neotoma magister*	--	E	Yes	Not Anticipated
Plants					
Northern Wild Monkshood	*Aconitum noveboracense*	T	E	Yes	Not Anticipated

Notes:
E: Endangered
T: Threatened
Source: USFWS Official Species List for Ulster and Putnam Counties; NYSDEC-NYNHP Database Consultation; NYSDEC Nature Explorer; Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the Shaft 2A Study Area would largely be the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

Timber Rattlesnake (Crotalus horridus)

As noted in Section 11.3.8, "Natural Resources," populations of timber rattlesnakes (*Crotalus horridus*) have been documented in the region proximate to the Shaft 2A Study Area, and suitable habitat for this species is known to exist in this area of Ulster County. According to records received from the NYNHP, there is a timber rattlesnake hibernaculum located within 1.5 miles of the Shaft 2A site. Timber rattlesnakes inhabit primarily deciduous forests in mountainous terrain. However, in summer, they can be found in coniferous forests, mixed forests, old fields, and near wetlands. With the exception of the Shaft 2A site, the remainder of the natural resources study area consists of Minnewaska State Park Preserve. Much of the Minnewaska State Park Preserve is composed of a chestnut oak forest, which is a diverse, matrix-forming forest. Wetlands were not identified within this study area.

In the future with the inspection and repair, construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site on DEP property,

and would be minimal and temporary. The limits of disturbance for the inspection and repair would be confined to the previously disturbed, fenced-in Shaft 2A site. The inspection and repair activities at the Shaft 2A site would be small-scale and short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance). Prior to commencement of work, any timber rattlesnakes occurring within the site would be relocated by a DEP Wildlife Specialist, and perimeter soil and erosion control measures would be erected to help prevent additional individuals from entering the site. Vehicles entering and exiting the site would take precautions to avoid any timber rattlesnakes that could be basking on or traveling across the road. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. As such, the inspection and repair would not disturb timber rattlesnakes. Therefore, the inspection and repair may affect, but is not likely to adversely affect timber rattlesnakes within the Shaft 2A Study Area.

Alleghany Woodrat (Neotoma magister)

Populations of Alleghany woodrats (*Neotoma magister*) have been documented in the regions proximate to the Shaft 2A Study Area. Based on review of available aerial imagery and USGS topographic quadrangles, suitable rocky habitat adjacent to a slope exists within the study area. However, it is unknown if the rock outcropping present on the steep slopes on the west side of the study area has the talus and boulder attributes required for Allegheny woodrat habitat. Additionally, the large, open area south of Shaft 2A is an abandoned gravel pit that may exhibit characteristics suitable for Allegheny woodrat habitat.

In the future with the inspection and repair, construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site on DEP property, and would be minimal and temporary. The limits of disturbance for the inspection and repair would be confined to the previously disturbed, fenced-in Shaft 2A site. The inspection and repair activities at the Shaft 2A site would be small-scale and short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period). The area that may support Allegheny woodrat would not be disturbed as part of the inspection and repair. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. Therefore, no effects to Alleghany woodrats are anticipated from the inspection and repair within the Shaft 2A Study Area.

Northern Wild Monkshood (Aconitum noveboracense)

The Shaft 2A site occurs within the elevation range of known occurrences of northern wild monkshood (*Aconitum noveboracense*) in New York State. The site is covered with gravel and is not shaded, and there are no cold-water seeps or streams on the site. Therefore, there is no suitable habitat for northern wild monkshood within the Shaft 2A Study Area.

In the future with the inspection and repair, construction activities would be confined to an area not accessible to the general public at the existing DEP-owned Shaft 2A site on DEP property, and would be minimal and temporary. The limits of disturbance for the inspection and repair would be confined to the previously disturbed, fenced-in Shaft 2A site. The inspection and repair activities at the Shaft 2A site would be small in scale and short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month

period). Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. As such, the inspection and repair would not disturb northern wild monkshood. Therefore, no effects to northern wild monkshood are anticipated within the Shaft 2A Study Area.

Federal/State Threatened and Endangered Species Conclusions

Based on the impact analysis, no take is anticipated. Inspection and repair would have no effects to Alleghany woodrats or northern wild monkshood may affect, but is not likely to adversely affect, timber rattlesnakes. Therefore, the inspection and repair would not result in significant adverse impacts to federal/State Threatened and Endangered Species within the Shaft 2A Study Area.

11.6.10 HAZARDOUS MATERIALS

As described in Section 11.3.9, "Hazardous Materials," the potential for impacts from hazardous materials with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for this analysis is the 0.25-mile radius around the Shaft 2A site (see **Figure 11.6-2**).

As described in Section 11.3.9, "Hazardous Materials," the permanent cessation of RWBT leaks, potentially resulting in reduced groundwater levels within the Shaft 2A and Wawarsing Leak Repair Study Area, is not expected to result in changes in exposure to hazardous materials within the study area, including to leachate from a landfill within the study area, as assessed in Section 11.3.8.1, "Water Resources." The Shaft 2A Study Area and adjacent Minnewaska State Park Preserve parcel are located in an area that was previously impacted by mining activities, and the surface substrate consists primarily of broken shale and slate and unearthed bedrock. As described in Section 11.3.9, "Hazardous Materials," a hazardous waste and contaminated materials screening was performed in 2015. The environmental database searches performed at that time resulted in no identifiable hazardous materials, hazardous and non-hazardous treatment and storage facilities, and/or air and wastewater discharges within the study area. The database searches provided no documentation or indication of current contamination at the Shaft 2A site, in the surrounding area, or from surrounding properties.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no developments or structures that would introduce hazardous materials to the environment are anticipated within the Shaft 2A Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that the presence of hazardous materials within the Shaft 2A Study Area would be the same as baseline conditions.

The inspection and repair at the Shaft 2A site would involve minor site preparation activities (i.e., grading and excavation), but would not require soil removal from the Shaft 2A site. All grading and excavated material would be stockpiled on site and reused for backfill. Inspection and repair activities at the Shaft 2A site would include site preparation, installation/operation of the hoisting and communication systems, safety and condition assessments, as well as the inspection and repair work within the RWBT segments, and site restoration. The types of

equipment that would be used at the Shaft 2A site may include construction vehicles, such as pickup trucks, flat trucks, wheel loaders, bulldozers, and excavators. Additionally, construction vehicles used to perform the inspection and repair in the tunnel would be lowered into the RWBT without fuel. These vehicles would be refueled within the RWBT as necessary during the inspection and repair.

The inspection and repair activities at the Shaft 2A site would require the use of a variety of petroleum and other chemical products (e.g., diesel fuel for vehicles, generators, and back-up power; lubricating oil for construction vehicles; and miscellaneous cleaning and maintenance chemicals). Construction equipment and materials required for the inspection and repair would be trucked to the Shaft 2A site when needed. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements. Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements. As such, the inspection and repair would not result in significant increases to the public's or environment's exposure to hazardous materials within the study area.

As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would not result in changes to hazardous materials.

Therefore, the inspection and repair would not result in significant adverse impacts from the presence or disturbance of hazardous materials within the Shaft 2A Study Area.

11.6.11 WATER AND SEWER INFRASTRUCTURE

As discussed in Section 11.3.10, "Water and Sewer Infrastructure," there would be no potential impacts to sewer infrastructure due to the inspection and repair. Specifically, the analysis includes potential impacts to water infrastructure associated with lower water levels due to internal leak repairs within the Estimated Groundwater Influence Area of the Leak Repair Study Area (see Section 11.6.9.1, "Water Resources").

11.6.11.1 Baseline Conditions

Groundwater supplied by individual water supply wells tapping the unconsolidated or bedrock aquifers is the primary source of drinking water within the Leak Repair Study Area. Although less common, shallow dug wells, shallow well points, or springs can be used as sources of drinking water in older homes in rural areas. Outside the Leak Repair Study Area, water supplies are provided by the Napanoch Water District for areas south and the Kerkhonkson Water District for areas north.

Based on the area well inventory described in Section 11.3.10, "Water and Sewer Infrastructure," there are approximately 237 parcels within the Leak Repair Study Area that likely rely on water supply wells (see **Figure 11.6-30**), including residential, commercial, industrial, public services, and community. This total does not include parcels included in the Wawarsing Buyout Assistance Program. The Wawarsing Buyout Assistance Program was a program in which Ulster

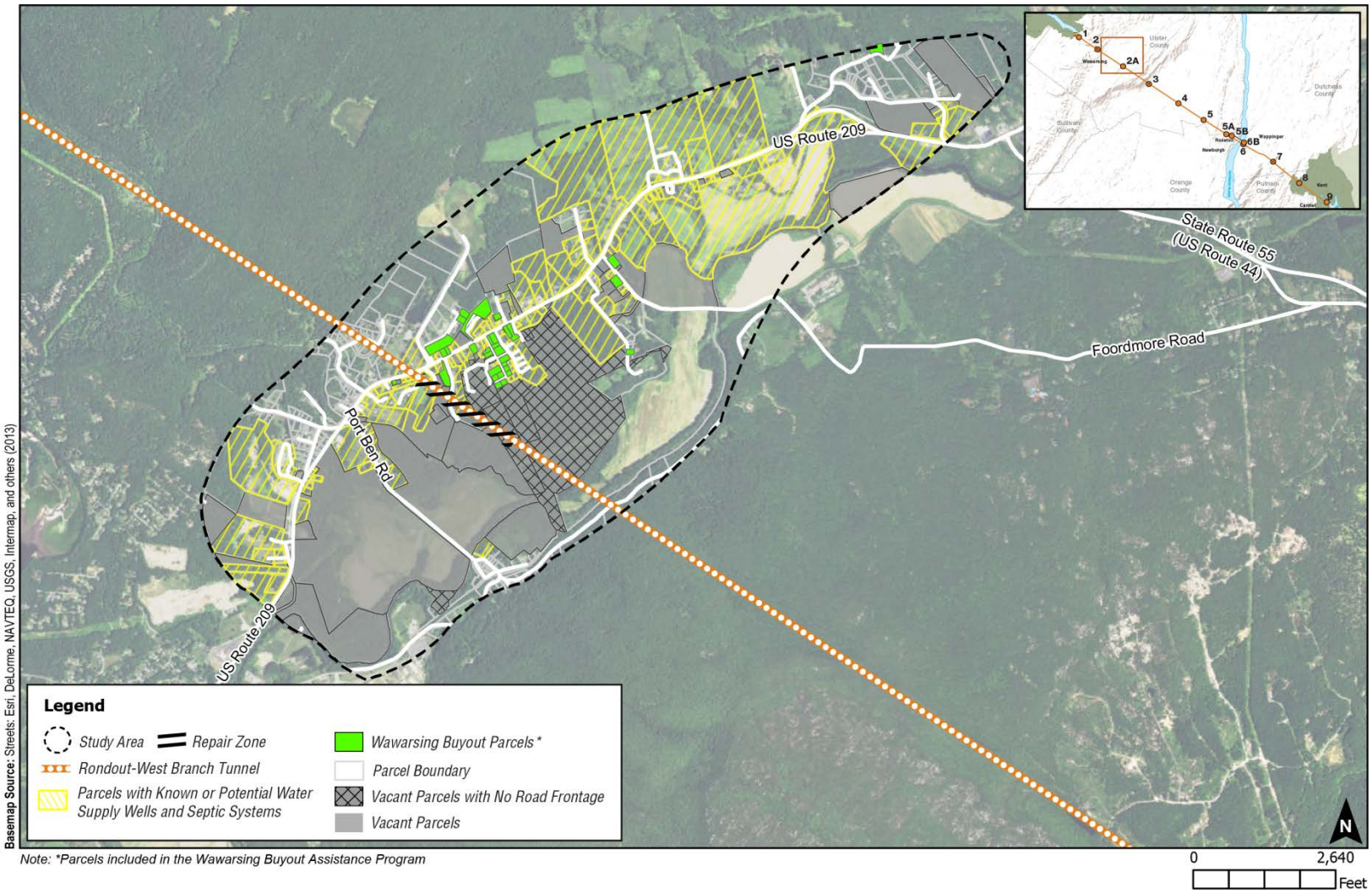


Figure 11.6-30: Parcels with Known or Potential Water Supply Wells – Leak Repair Study Area

County and DEP purchased 40 parcels that will no longer be used for residential purposes and would, therefore, no longer require a water supply.

The USGS data were used to establish baseline hydrogeologic conditions and to identify parcels with wells (including undeveloped parcels that could have a well in the future) in the Leak Repair Study Area. The USGS data were collected from a monitoring well network that includes wells completed in the unconsolidated and bedrock aquifers that underlie the Leak Repair Study Area. The USGS data were also used measure the seasonal variation in groundwater levels in wells. These data show the water level fluctuated from approximately 3.5 to 6.5 feet in the unconsolidated aquifer. These data also show the seasonal water level fluctuated from approximately 1.5 to 9.5 feet in wells in the bedrock aquifer. The natural seasonal variation of groundwater levels is normal when compared to other areas within the State and typically does not result in a reduction or loss of water supply.

As noted in Section 11.6.9.1, "Water Resources," USGS reports also identify the areas in the Town of Wawarsing where groundwater levels are influenced by the RWBT. The reports present the estimated maximum influence of the RWBT on both the unconsolidated and bedrock aquifers during the depressurization events while reducing the HGL (i.e., water level) in the RWBT 500 to 600 feet. The maximum change measured during USGS monitoring was approximately 2.5 feet in wells screened in the unconsolidated aquifer and 12 feet in wells drilled into the bedrock aquifer when reducing the HGL above the tunnel by 500 to 600 feet.

11.6.11.2 Future Conditions Without the Inspection and Repair

In the future without the inspection and repair, there would also be no temporary shutdown and the RWBT would continue to leak water into the bedrock and unconsolidated aquifers. DEP has consulted with the Town of Wawarsing and Ulster County, and no changes to the water and sewer infrastructure are currently approved within the Leak Repair Study Area. However, the Town of Wawarsing has started a planning study for the formation of a municipal water supply district that would provide a public water supply for local residents currently using groundwater resources within the Leak Repair Study Area.

The formation of the water district would be subject to local approval. If implemented, future conditions without the inspection and repair would include the use of a new water supply source. The individual water supply wells in the study area would be replaced by public supply groundwater supply well(s).

For purposes of this assessment, in the future without the inspection and repair, it is assumed that the water and sewer infrastructure within the study area would be the same as baseline conditions.

11.6.11.3 Probable Impacts With the Inspection and Repair

Water Infrastructure

Internal repairs to the RWBT within the Leak Repair Study Area would stop water from leaking from the RWBT into groundwater in the bedrock and unconsolidated aquifers. This could reduce the recharge to the bedrock and unconsolidated aquifers that could affect groundwater resources

within the Leak Repair Study Area. This could reduce the water level in bedrock and unconsolidated wells thereby reducing the amount of water stored in the well. Reduced water storage in a well could affect a well's ability to meet the water demand of the home depending on the yield of the well.

As discussed in Section 11.6.9.1, "Groundwater Background," results of the USGS monitoring show the area where the potentiometric water level in the bedrock and the water table could be lowered as a result of completing the internal repairs to the RWBT. The majority of parcels in the Leak Repair Study Area would not be affected by the internal repairs to the RWBT. However, some parcels within the Estimated Groundwater Influence Area of the Leak Repair Study Area could be affected by the internal repairs to the RWBT (see Section 11.6.9.1, "Water Resources"). The Estimated Groundwater Influence Area was overlain with maps that show the parcels with possible water supply wells, as shown **Figure 11.6-31** and **Figure 11.6-32**.

Figure 11.6-31 and **Figure 11.6-32** show the boundary of the area in the unconsolidated and bedrock aquifers, respectively, where groundwater level could decline during the temporary shutdown and once inspection and repair is complete based on the evaluation criteria below. This is the area where groundwater levels could decline during the temporary shutdown and when inspection and repair is complete. Potential impacts to users within the Estimated Groundwater Influence Area are based on the evaluation criteria below.

The evaluation criteria for impacts due to groundwater change in the aquifers were selected based on the following:

- A shallow well's ability to supply a home with water could be affected by a water level change of 0.5 feet depending on the well yield and depth, and the seasonal fluctuation of the water level in the well as some wells in the unconsolidated aquifer could be as shallow at 10 feet deep. This value was selected based on the following rationale:

  - A 0.5 foot water level change (equates to 0.75 gallon in a typical 6-inch diameter unconsolidated well);

  - A maximum 6.5 foot seasonal water level fluctuation as documented by the USGS (equates to 9.75 gallons in a typical 6-inch diameter unconsolidated well);

  Considering that some unconsolidated wells in the Town of Wawarsing are very old and are often hand dug wells that can be as shallow as 10 feet deep, changing the water level by a total of up to 7 feet (10.5 gallons) could affect a well's ability to supply a home with water. Many shallow wells do not meet New York State Department of Health recommendations.

- A bedrock well's ability to supply a home with water could be affected with a water level change of 10 feet or more depending on the well yield and depth and the seasonal fluctuation of the potentiometric water level in the well. This value was selected based on the following rationale:

  - A 10 foot water level change (equates to 15 gallons in a typical 6-inch diameter bedrock well);

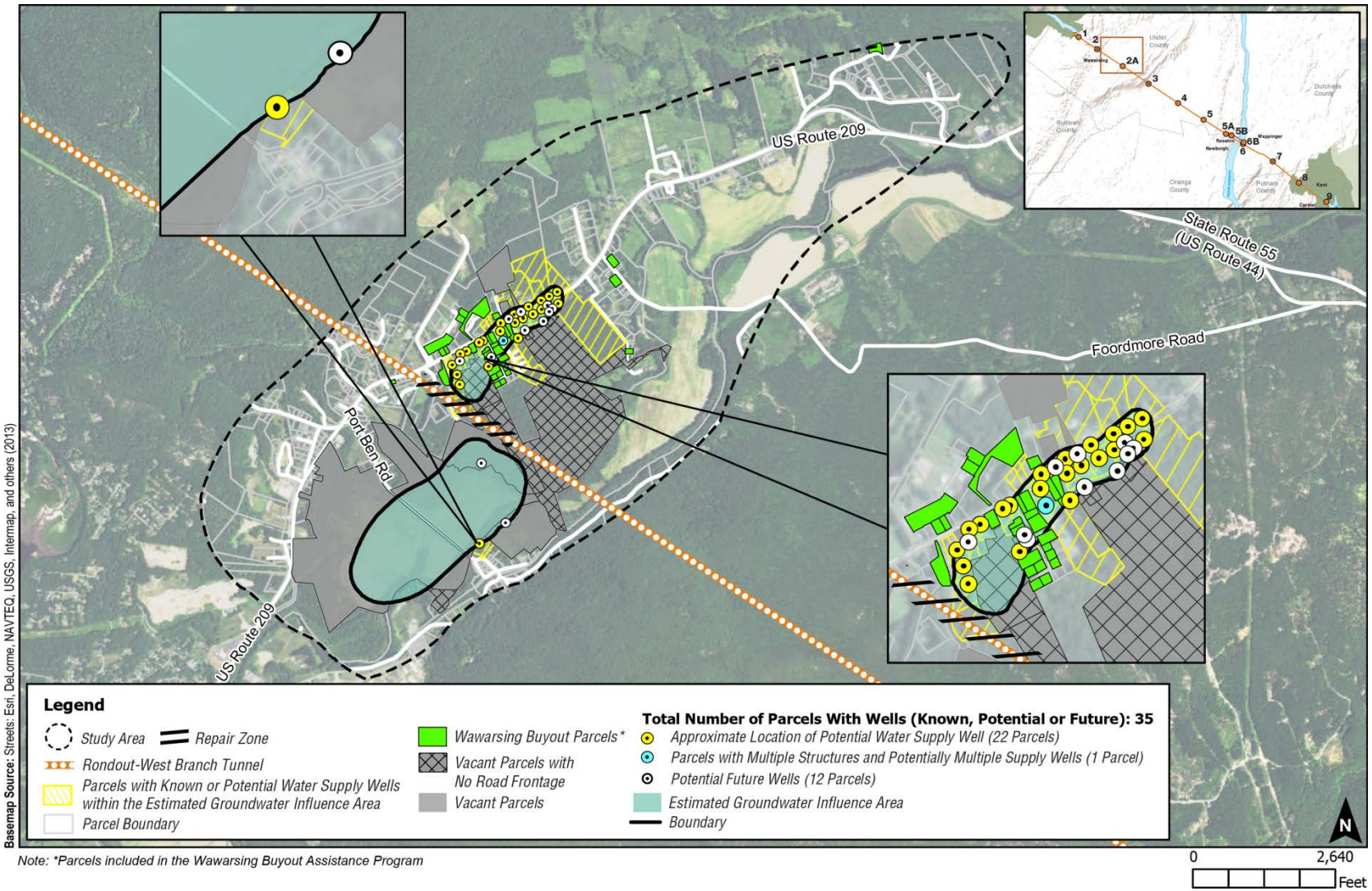


Figure 11.6-31: Estimated Groundwater Influence Area - Parcels With Known, Potential, or Future Wells in the Unconsolidated Aquifer – Leak Repair Study Area

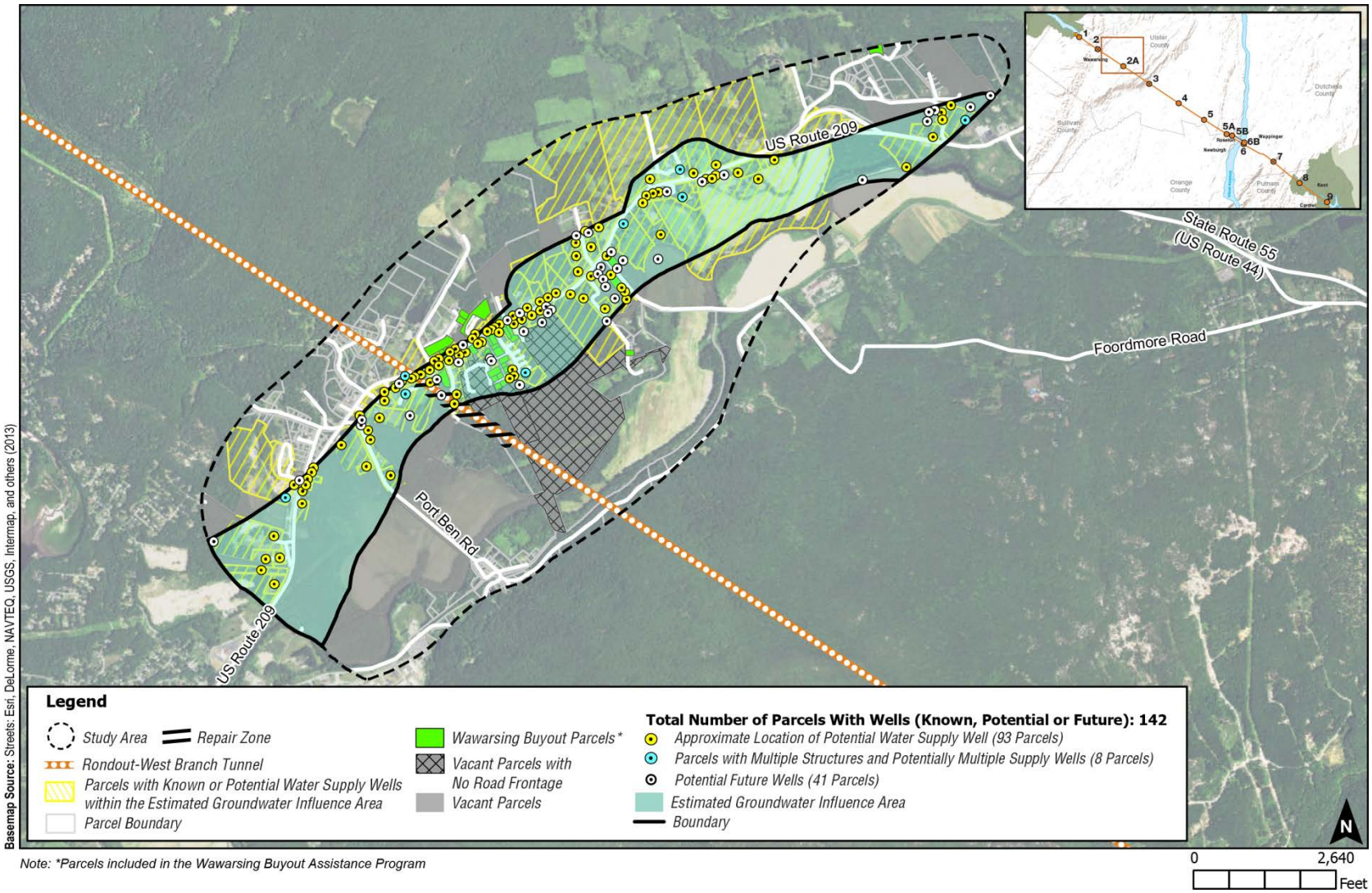


Figure 11.6-32: Estimated Groundwater Influence Area - Parcels With Known, Potential, or Future Wells in the Bedrock Aquifer – Leak Repair Study Area

- A maximum 9.5 foot seasonal water level fluctuation as documented by the USGS (equates to 14.25 gallons in a typical 6-inch diameter bedrock well);

Combining these effects could result in a water storage change (up to 29.25 gallons) that is greater than a 10 percent of the NYSDOH recommendations for a well with a yield from 0.5 and 1 gpm that is supplying water to a 3 bedroom home (250 gallons of storage).

There are 35 and 142 parcels within the Estimated Groundwater Influence Area with known, potential or future potential private drinking water supply wells in the unconsolidated and bedrock aquifers, respectively (see **Figure 11.6-31** and **Figure 11.6-32)**.

Most of these parcels are within the Estimated Groundwater Influence Area of both the unconsolidated and bedrock aquifers. Only three of parcels in the Estimated Groundwater Influence Area of the unconsolidated aquifer do not overlap with the 142 parcels in the Estimated Groundwater Influence Area of the bedrock aquifer. Therefore, a collective total of 145 parcels within the Leak Repair Study Area with known, potential, or future potential private drinking water supply wells were identified in the Estimated Groundwater Influence Area of the unconsolidated and bedrock aquifers. One hundred and two (102) of these parcels currently have structures with known or potential wells. Forty three (43) of these parcels are vacant parcels that may be developed in the future and could require a private drinking water supply well.

DEP is committed to implementing a Well Action Plan for property owners with wells in these 145 parcels that meet the combination of well characteristics described below. As part of the Action Plan, DEP would assess the potential changes in water levels and the overall ability of a well to meet the water supply needs of each home. The Well Action Plans are described further in Section 11.10, "Commitments." They include identifying well characteristics and monitoring or providing alternate water supply, as required.

Therefore, there would be no significant adverse impacts to water infrastructure within the Leak Repair Study Area from to changes in groundwater levels during the temporary shutdown and due to leak repair.

The Town of Wawarsing has initiated the planning studies for the formation of a municipal water supply district that would provide a public water supply for the local residents, should it be constructed. For those properties that connect to the water district, this would result in the abandonment of the existing water supply wells, and the need for a Well Action Plan would no longer be necessary for these parcels.

11.6.12 TRANSPORTATION

As described in Section 11.3.12, "Transportation," the potential for impacts to transportation with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for this analysis is the 0.25-mile radius around the Shaft 2A site, as shown on **Figure 11.6-33**.

Figure 11.6-33: Transportation – Shaft 2A Study Area

The Shaft 2A site is served by a gravel access road that connects to Shaft 2A Road. The Shaft 2A site is accessed via State Route 55 to Minnewaska Trail to Rock Haven Road to Shaft 2A Road. Rock Haven Road is an approximately 18-foot wide, paved, local road that terminates at Minnewaska Trail to the north. Shaft 2A Road is an approximately 15-foot-wide, paved, local road that begins at Rock Haven Road and runs south to the Shaft 2A site. Though no recent traffic counts are available, the daily volume for Rock Haven Road and Shaft 2A Road is estimated to be less than 500 vehicles per day. This daily traffic volume estimate was based on the rural nature of the Shaft 2A Study Area, the small number of homes with access to these roadways, and the limited traffic to the Shaft 2A site.

Minnewaska Trail is a two-lane, paved, local road that is approximately 20 feet wide. There are no major roadways or intersections within the Shaft 2A Study Area. The traffic volume on Minnewaska Trail north of Foordmore Road was approximately 2,800 vehicles per day in 2006. State Route 55/US-44 (Main Street) is a two-lane, paved, rural principal arterial that carries approximately 2,500 vehicles per day in the vicinity of the Minnewaska Trail, based on 2011 traffic counts. No DEP employees work at or visit the Shaft 2A site on a daily basis. There is no public transportation to or from the Shaft 2A Study Area. While there is some pedestrian activity to and from the trails within the Minnewaska State Park Preserve, there is little to no pedestrian activity in the immediate vicinity of the study area.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use or an increase in traffic are anticipated within the Shaft 2A Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that traffic, public transportation, and pedestrian activities within the study area would be similar to baseline conditions.

The Shaft 2A site would be used as the primary access point for personnel and equipment that would enter the RWBT to complete the inspection and repair for the segment of the tunnel west of the Hudson River. The inspection and repair would occur at the DEP-owned Shaft 2A site and would result in vehicle trips for the transportation of crews and materials to and from the Shaft 2A site 24 hours per day, 7 days a week, including during peak existing traffic hours.

For the purposes of this analysis, the peak project-generated traffic hour is assumed to coincide with typical construction hours for employee vehicles entering the site from 6 AM to 7 AM and, as a result, is unlikely to coincide with the peak hour for existing traffic. Moreover, this peak number of vehicle trips to and from the Shaft 2A site would only occur during a short period (8 months). To the extent available, the inspection and repair trucks would travel on truck-permitted roadways directly to and from the Shaft 2A site.

The majority of the inspection and repair traffic is expected to arrive and depart via State Route 55 to the south (80 percent), with the remaining traffic traveling to and from State Route 55 to the north (20 percent). The estimated number of the inspection and repair peak-day one-way vehicle trips to the Shaft 2A site is 60 vehicles, approximately 120 peak-day vehicle round trips to and from the Shaft 2A site. Of these peak-day vehicle round trips, up to 33 vehicle trips ends (74 PCEs) could occur during the peak hour based on the assumption that 90 percent of inspection and repair worker vehicles and 50 percent of the inspection and repair trucks would arrive or depart during the peak hour. On an average day, the estimated number of the inspection

and repair vehicle round trips would be approximately 98 vehicle round trips with 27 vehicle trip ends that would occur during the peak hour.

Inspection and repair trucks for the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would travel along on State Route 55 to reach their respective sites. Assuming that separate construction crews would be used for each site for the inspection and repair activities, the trucks would converge on State Route 55 and result in 82 maximum daily one-way vehicle trips, or approximately 164 peak-day vehicle round trips, with approximately 67 vehicle trip ends (123 PCEs) during the peak hour of construction.

The inspection and repair at the Rondout Effluent Chamber, Shaft 1, and Shaft 2A sites would result in 67 peak-hour vehicle trip ends along State Route 55, which is above the *CEQR Technical Manual* screening threshold of 50 peak-hour vehicle trip ends as described in Section 11.3.12, "Transportation." However, the inspection and repair activities at the Shaft 2A Study Area would be short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period). The peak activities at the site would occur during the internal repairs, which together would take place once the tunnel is drained over the course of the remainder of the 8-month temporary shutdown beginning in mid-October 2022.

The inspection and repair would not generate demands for public parking or transportation or an increase in pedestrian activity within the Shaft 2A Study Area. As described in Section 11.6.6, "Open Space and Recreation," DEP plans to construct a trailhead parking lot to the south of the construction site to direct park visitor parking off Shaft 2A Road. DEP is working in partnership with NYSOPRHP to create an overall parking and pedestrian benefit for the site and surrounding area. Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions.

As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible, and would not result in changes to transportation infrastructure.

Therefore, although there would be a minor temporary increase in traffic, the inspection and repair would not result in significant adverse impacts to transportation within the Shaft 2A Study Area.

11.6.13 NOISE

As described in Section 11.3.14, "Noise," mobile noise associated with the inspection and repair within the Shaft 2A Study Area does not warrant analysis. This section includes an analysis of potential impacts from stationary noise associated with the inspection and repair to sensitive receptors within the Shaft 2A Study Area. As described in Section 11.3.14, "Noise," the potential for noise impacts with the inspection and repair within the Shaft 2A and Wawarsing Leak Repair Study Area would be limited to the surface construction at the Shaft 2A site. Therefore, the study area for the noise analysis is the area within 1,500 feet of the Shaft 2A site, as shown on **Figure 11.6-34**.

The study area includes four residential properties and the Minnewaska State Park Preserve. Peak construction activities at the Shaft 2A site would occur once the tunnel is drained during the remainder of the 8-month temporary shutdown beginning in mid-October 2022. As noted in

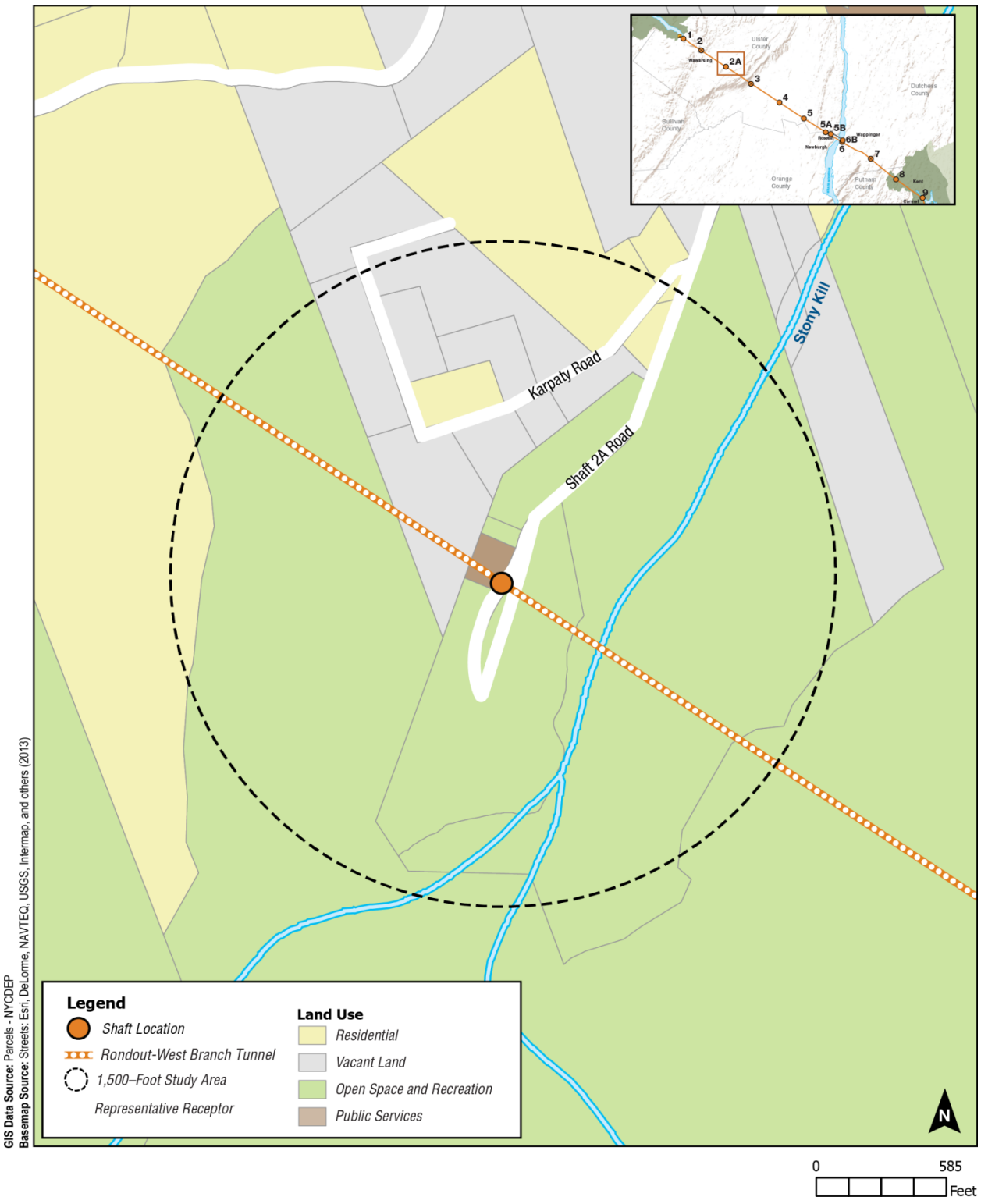


Figure 11.6-34: Noise – Shaft 2A Study Area

Section 11.3.14.1, "Screening Assessment," the temporary construction activities were evaluated to determine compliance with local noise codes. The inspection and repair is subject to the Town of Wawarsing Noise Control Law. The Town of Wawarsing Noise Control Law (§78-4) prohibits "the operation of any source of sound" that exceeds the sound level limit of 73 dBA between the hours of 6 AM and 10 PM and 63 dBA between the hours of 10 PM and 6 AM "when determined by a sound-level measure at the adjoining property line nearest to the sound source." The property line of the Minnewaska State Park Preserve, as the nearest adjoining property line, was used to evaluate compliance with applicable local noise regulations in the Town of Wawarsing. In addition, the temporary construction activities were evaluated to disclose potential noise levels at the nearest residential parcel.

Existing ambient noise levels within the Shaft 2A Study Area are influenced by vehicular traffic on nearby local roads. The existing noise levels within the study area are comparable to a very quiet suburban and rural residential environment based on proximity to major transportation corridors, population density of the area, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA Leq during the day and 34 dBA Leq at night.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no major projects that would result in a change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels, are anticipated within the Shaft 2A Study Area within the time frame of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that ambient noise levels within the Shaft 2A Study Area would be similar to baseline conditions.

In the future with inspection and repair, stationary noise-producing activities would occur on approximately 0.9 acre of DEP-owned land surrounding the Shaft 2A site, and would include site preparation and operation of equipment for personnel and equipment entering and existing the tunnel. Peak inspection and repair activities at Shaft 2A would occur 24 hours per day, 7 days a week for the duration of the 8-month temporary shutdown. All construction would occur on DEP property.

The noise analysis focused on stationary noise-generating equipment expected to operate constantly at the Shaft 2A site. The equipment types included in the stationary noise analysis and their reference noise levels are shown in **Table 11.6-4**. The number and types of noise-generating equipment analyzed were based conservatively on peak construction operating conditions.

Table 11.6-4: Stationary Source Construction Equipment Modeled at the Shaft 2A Site and Reference Noise Levels (L_{eq})

Equipment Type (Quantity)	Reference Noise Level (L_{eq}) at 50 feet (dBA)	Source
Crane (1)	85	CEQR[1]
Generator (2)	75	Caterpillar[2]
Compressor (1)	80	CEQR[1]

Notes:
[1] *City Environmental Quality Review (CEQR) Technical Manual,* Chapter 22.
[2] Caterpillar Weather Protective and Sound Attenuated Enclosures (2014).

No tree zone attenuation was applied for the Minnewaska State Park Preserve boundary because of the short distance from the Shaft 2A site to the Park Preserve boundary. A wide section of dense trees is located between the Shaft 2A site and the residential receptor. Therefore, the maximum tree zone attenuation of 10 dB was applied for the residential receptor. The results of the stationary noise analysis are shown in **Table 11.6-5**.

Table 11.6-5: Stationary Noise Analysis Results (L_{eq}) at the Nearest Noise-Sensitive Receptors within the Shaft 2A Study Area

Nearest Noise-Sensitive Receptor	Distance from Site (feet)	Conditions Analyzed	Predicted Stationary Noise Level at Noise-Sensitive Receptor (dBA)	Town of Wawarsing Noise Limit (dBA)	Potential for Exceedance (Yes or No)
Nearest Adjoining Property Line (Park)	25	Daytime	93	73[1]	Yes
		Nighttime	93	63[2]	Yes
Nearest Residential Property Line	755	Daytime	53	NA	NA
		Nighttime	53	NA	NA

Notes:
NA = Not Applicable
[1] Noise limit between the hours of 6 AM and 10 PM.
[2] Noise limit between the hours of 10 PM and 6 AM.

As shown in **Table 11.6-5**, the inspection and repair activities at the Shaft 2A site would exceed the daytime and nighttime noise limits of Town of Wawarsing Noise Control Law at the nearest adjoining property line (Minnewaska State Park Preserve). Therefore, DEP would work with the Town of Wawarsing, as appropriate.

While there are no NYSOPRHP-mapped hiking trails or designated recreational resources situated within the portion of Minnewaska that is within the Shaft 2A Study Area, recreational

access to Stony Kill Falls, a waterfall and secluded hiking destination, is provided via Shaft 2A Road in proximity to the Shaft 2A site within the study area. In addition, as part of a separate effort, NYSOPRHP granted funds to the Palisades Conservancy to provide for a new trailhead and parking area in the vicinity of the Shaft 2A site to improve recreational access to Stony Kill Falls. The nearest mapped footpath within Minnewaska State Park Preserve is approximately 0.50 mile south of the Shaft 2A site. Noise levels would be lower at the hiking and sight-seeing areas farther from the boundary of the Minnewaska State Park Preserve (farther from the noise-generating sources proposed at the Shaft 2A site). Not accounting for tree zone attenuation, the daytime noise limit would be exceeded out to 356 feet from the shaft site and the nighttime limit would be exceeded out to approximately 1,126 feet from the shaft site. However, the park closes at 9:00 PM during the summer, so primary noise-sensitivity occurs during the day. These increases in noise levels at the Shaft 2A site may discourage hiking or other recreational uses within the Minnewaska State Park Preserve, but would be temporary. However, upon completion of the inspection and repair, the hiking and other recreational uses within the Minnewaska State Park Preserve would be unaffected.

Following completion of the inspection and repair, the Shaft 2A site would be restored to baseline conditions. The inspection and repair activities would be temporary with the peak construction activities occurring during the 8-month temporary shutdown.

Therefore, although there would be a temporary increase in noise, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the within the Shaft 2A Study Area.

11.6.14 NEIGHBORHOOD CHARACTER

The character of the Shaft 2A and Wawarsing Leak Repair Study Area is largely defined by a mix of agricultural, residential, commercial, industrial, community facilities, vacant land, open space, and public service land uses as well as its physical setting within a rural location (see **Figure 11.6-6**). The study area encompasses approximately 1,710 acres of publicly and privately owned land and is located in the Town of Wawarsing. The work site at Shaft 2A is located within a public services parcel owned and maintained by DEP. Access to both sites would be from Shaft 2A Road onto DEP driveways.

DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes in land use and no new projects or structures are anticipated within the Shaft 2A and Wawarsing Leak Repair Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that neighborhood character within the study area would be similar to baseline conditions.

As described in Section 11.3.15, "Neighborhood Character," there would be no potential for the inspection and repair to shadows or urban design. In addition, based on the screening assessment for land use and zoning, and socioeconomic conditions, an impact analysis for the Shaft 2A and Wawarsing Leak Repair Study Area are not warranted, as discussed in the following sections: Section 11.3.2, "Land Use, Zoning, and Public Policy," and Section 11.3.3, "Socioeconomic Conditions." As described in Section 11.7.3, "Open Space and Recreation," Section 11.6.7, "Historic and Cultural Resources," and Section 11.6.8, "Visual Resources," the work activities

would not affect open space and recreation, historic and cultural resources, or visual resources in the Shaft 2A and Wawarsing Leak Repair Study Area. Furthermore, the public policy impact analysis provided in Section 11.6.5, "Public Policy," concluded the work activities were consistent with applicable plans.

The work activities in the Shaft 2A and Wawarsing Leak Repair Study Area would be short-term (approximately 6 months before and approximately 3 months during the temporary shutdown) and would result in a temporary increase in traffic and noise. Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area and traffic patterns would return to baseline conditions. These temporary increases in traffic and noise levels would not result in a density of activity or service conditions that would affect the overall character of the study area. The inspection and repair would not generate significant adverse effects on land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to neighborhood character within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.6.15 PUBLIC HEALTH

Based on the environmental investigations completed within the Shaft 2A Study Area, results of testing conducted on soils support the reuse of excavated materials as backfill and do not suggest the need for special management, handling, or health and safety measures at this time. The work activities at the study area would be short-term (approximately 6 months before and approximately 3 months during the temporary shutdown) and would result in a temporary increase in noise.

Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area, and operation of the Delaware Aqueduct would be consistent with baseline conditions.

The inspection and repair activities at the Shaft 2A site would require the use of a variety of petroleum and other chemical products (e.g., diesel fuel for vehicles, generators, and back-up power; lubricating oil for construction vehicles; and miscellaneous cleaning and maintenance chemicals). Construction equipment and materials required for the inspection and repair would be trucked to the Shaft 2A site when needed. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements.

Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements. As such, the inspection and repair would not result in increases to public or environmental exposure to hazardous materials within the study area.

Water supply and, in particular, the community users drawing water from the Delaware Aqueduct, would not be significantly affected by the inspection and repair within the Shaft 2A Study Area. DEP has developed an ongoing program to work with these communities, including reviewing the availability of back-up water supplies and analyzing the ability of these users to accommodate reduced access to the Delaware Aqueduct during the 8-month shutdown, as appropriate and to meet all applicable drinking water standards. As described above in Section 11.6.9.1, "Water Resources," and Section 11.6.11, "Water and Sewer Infrastructure," the inspection and repair would have no significant adverse impacts on water levels and water quantity in the Shaft 2A Study Area.

As also described above in Section 11.6.9.1, "Water Resources," and Section 11.6.11, "Water and Sewer Infrastructure," only specific areas in the bedrock and unconsolidated aquifers in the Leak Repair Study Area are influenced by the leaks.

Therefore, a public health impact analysis is warranted only for those locations. An analysis of the potential for changes to water quality that could impact public health is presented below.

As described in Section 11.6.11, "Water and Sewer Infrastructure," the primary source of drinking water within the Leak Repair Study Area is groundwater. A typical home in the State using an individual supply well typically has a drilled well in either the unconsolidated or bedrock aquifer. Although less common, it is not unusual to find shallow dug wells, shallow well points, or springs at older homes in rural areas. As also described in Section 11.6.11, "Water and Sewer Infrastructure," there are approximately 237 parcels within the Leak Repair Study Area that likely rely on water supply wells (see **Figure 11.6-30**) including residential, commercial, industrial, public services and community facilities, and the Eastern New York Correctional Facility and the Ulster Correctional Facility.

As described in Section 11.6.9.1, "Water Resources," groundwater temperature and chemistry were monitored by USGS to evaluate the influence of leaks on groundwater in the study area. USGS collected and interpreted groundwater chemistry data, along with geologic and groundwater level data, to help distinguish between water from the RWBT and groundwater in the Town of Wawarsing.

The USGS observations of the chemistry of groundwater from the bedrock aquifer indicated that leak water is present in the water of the bedrock aquifer under normal RWBT conditions. The USGS water chemistry in the unconsolidated and bedrock aquifers was identified in the Brown et al. (Brown et al. 2012) report. The results show higher levels of bicarbonate, carbonate, and calcium were detected in the unconsolidated aquifer wells and higher concentrations of sulfate and metals were detected in the bedrock aquifer wells.

However, as discussed by Frimpter (Frimpter 1972) and Nystrom (Nystrom 2010), groundwater quality in the vicinity of the Town of Wawarsing is suitable for drinking purposes and meets applicable standards for public health.

11.6.15.1 Future Conditions Without the Inspection and Repair

In the future without the inspection and repair, the RWBT would continue to leak water into the bedrock aquifer and leak water would continue to be transmitted through the bedrock aquifer into the unconsolidated aquifer. DEP has consulted with the Town of Wawarsing and Ulster County, and it is DEP's understanding that no changes to the water and sewer infrastructure are currently approved within the Leak Repair Study Area within the timeframe of the impact analysis.

However, the Town of Wawarsing has initiated planning studies for the formation of a municipal water supply district that would provide a public water supply for local residents currently utilizing groundwater resources. The formation and implementation of the water district would be subject to local approval. If implemented, future conditions without the inspection and repair would include continued use of groundwater as a source of supply, but the individual water supply wells would be replaced by public water supply well(s).

Changes to water infrastructure that could affect water quality and its contribution to public health are not anticipated within the Leak Repair Study Area within the timeframe of the impact analysis.

Therefore, in the future without the inspection and repair, it is assumed that the quality of water within the Leak Repair Study Area would be the same as baseline conditions.

11.6.15.2 Probable Impacts With the Inspection and Repair

As discussed above, the permanent cessation of leaks within the Leak Repair Study Area has the potential to change the existing groundwater levels. Based on the impact analysis of the changes in groundwater levels described in Section 11.6.11, "Water and Sewer Infrastructure," water supply wells in 145 of the 237 parcels within the Leak Repair Study Area could exhibit a change in groundwater levels from the inspection and repair. As groundwater levels begin to decline, the quality of groundwater in the Leak Repair Study Area could change. However, as discussed further in Section 11.6.11, "Water and Sewer Infrastructure," DEP commits to implementing Well Action Plans to monitor eligible wells and to treat wells that experience changes in water quality from the decline in groundwater levels.

It is also anticipated that groundwater in the Leak Repair Study Area would reach a new equilibrium condition that reflects groundwater quality typical for this area of Ulster County. Groundwater quality in Ulster County was identified as generally suitable for domestic use without treatment (Frimpter 1972). When accounting for population growth since 1972, groundwater quality remains relatively unchanged.

In certain geologic settings in Ulster County, groundwater may be mineralized and exhibit elevated concentrations of iron, manganese, or sodium. By comparison, the source of water currently leaking from the RWBT is a surface water reservoir that exhibits very low concentrations of minerals. As a result, the leak water dilutes these dissolved compounds (e.g., minerals) naturally occurring in the aquifers. Any noticeable water quality changes from removal of the diluting effect of leaks would likely be limited to aesthetic changes, including a

change in taste, odor, and appearance. All applicable drinking water standards for public health would continue to be met.

In summary, the effect of the leak repairs on groundwater quality would be minor to negligible, as the volume of water leaking from the RWBT is minimal compared to the volume of groundwater derived from sources other than leak in the study area. Also, groundwater quality is expected to revert to a condition that is similar to adjacent areas in Ulster County that are unaffected by the leaks and meet applicable drinking water standards.

Therefore, there would be no significant adverse impacts to public health from changes to water quality due to the inspection and repair.

As discussed in Section 11.6.9.2, "Geology and Soils," the potential for settlement in the Leak Repair Study Area from the inspection and repair would be negligible. It would not affect structures or underground utilities in the Leak Repair Study Area and, therefore, would not result in changes to public health.

Based on the analyses above, the inspection and repair would not result in significant adverse impacts to groundwater or any of the impact categories related to public health: air quality, water supply (quantity or quality), hazardous materials, or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to public health within the Shaft 2A and Wawarsing Leak Repair Study Area.

11.7 SHAFT 8 STUDY AREA IMPACT ANALYSIS

The Shaft 8 site is located along the RWBT in the Town of Putnam Valley, Putnam County, New York. As described in Section 11.2, "Project Description," the Shaft 8 site would be the primary entry and exit point for personnel and equipment to support the proposed inspection of the RWBT segments east of the Hudson River. Once the inspection and repair has begun, the condition assessment for the RWBT segments east of the Hudson River is expected to last approximately 2 weeks, following the condition assessment for the RWBT west of the Hudson River. The sections below provide further description of the existing Shaft 8 site and study area conditions, as well as the inspection and repair activities that would be performed at the Shaft 8 site.

The potential for impacts to public policy; open space and recreation; natural resources, consisting of federal/State Threatened and Endangered Species; hazardous materials; transportation; noise; neighborhood character; and public health associated with the inspection and repair within the Shaft 8 Study Area are discussed below. As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," an impact analysis related to land use and zoning; socioeconomic conditions; community facilities and services; historic and cultural resources; visual resources; other natural resources subcategories including water resources, geology and soils, aquatic and benthic resources, terrestrial resources, wildlife, and federal/State Candidate Species, State Species of Special Concern, and unlisted rare and vulnerable species; water and sewer infrastructure; energy; and air quality within the Shaft 8 Study Area is not warranted.

11.7.1 SHAFT 8 STUDY AREA PROJECT DESCRIPTION

11.7.1.1 Description of Existing Site and Study Area

The Shaft 8 site is an approximately 0.9-acre property owned by DEP located along the RWBT in the Town of Putnam Valley (Tax ID 19.-2-16, Block 3, Lot 16). The site is generally bounded by State Route 301 (Cold Spring Turnpike) to the north and wooded areas to the east, south, and west, as shown on **Figure 11.7-1**. The site is accessible from State Route 301 via an asphalt drive, which crosses a privately owned parcel and transitions to a gravel drive with a swing gate. The Shaft 8 Study Area encompasses a portion of the Town of Putnam Valley, including the Shaft 8 site, as well as a portion of the Town of Kent, Putnam County. The town limits follow State Route 301 in the vicinity of the study area. The existing land uses within the 0.25-mile radius study area include vacant land, single-family residential, public services, and community facilities as shown on **Figure 11.7-2**.

The Shaft 8 site is located in a planned commercial park (PC) zoning district within the Town of Putnam Valley, as shown on **Figure 11.7-3**. A planned commercial park (PC) zoning district, would allow more intensive commercial development than allowed in the Town's other commercial zones. Other zoning districts within the Shaft 8 Study Area include a Town of Putnam Valley conservation district (CD) and preservation district (PD) and a Town of Kent single-family residential (R-80) zoning district. The Shaft 8 site constitutes a public utility and domestic service use, which is a permitted use within the planned commercial (PC) zoning district.

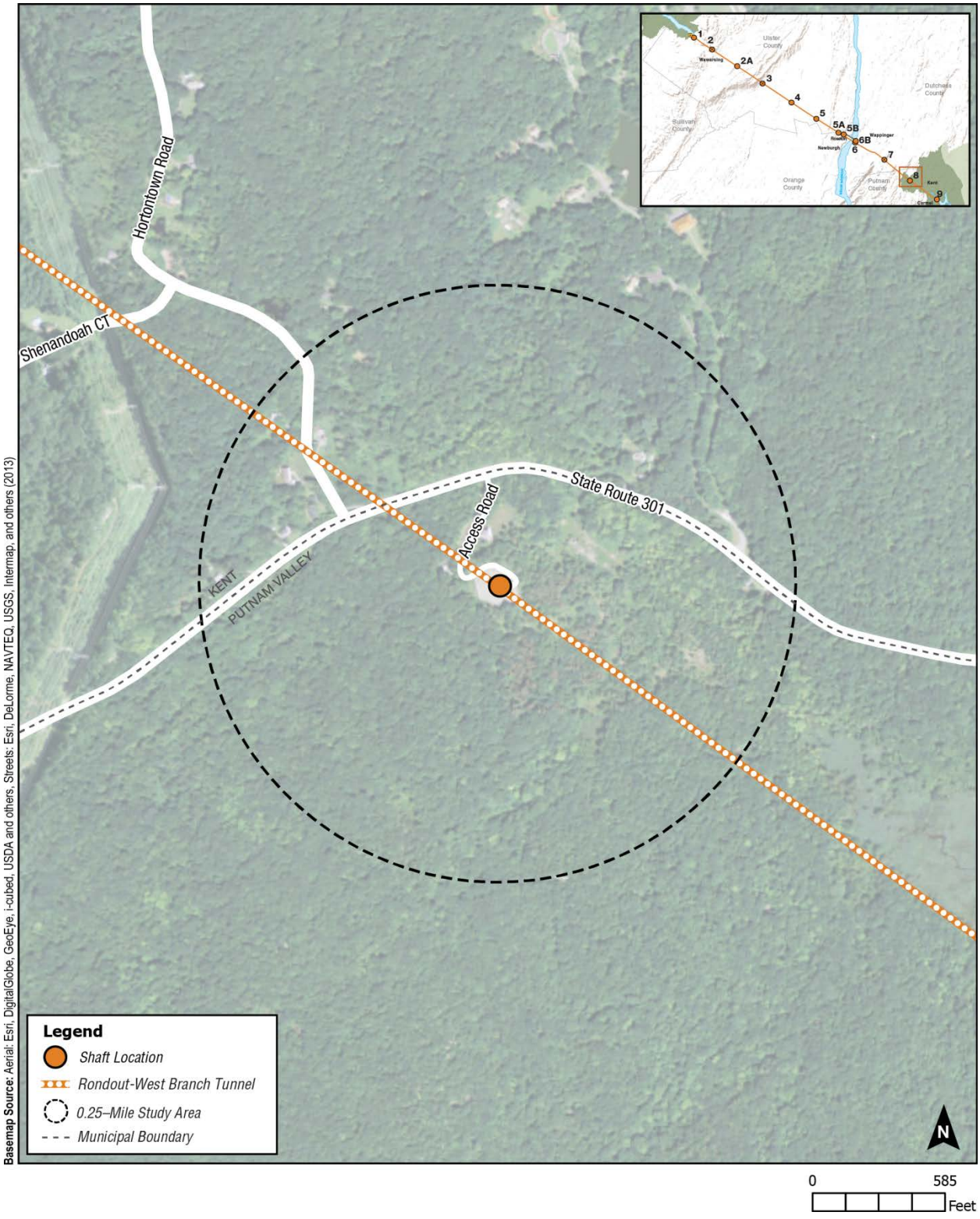


Figure 11.7-1: Site Location – Shaft 8 Study Area

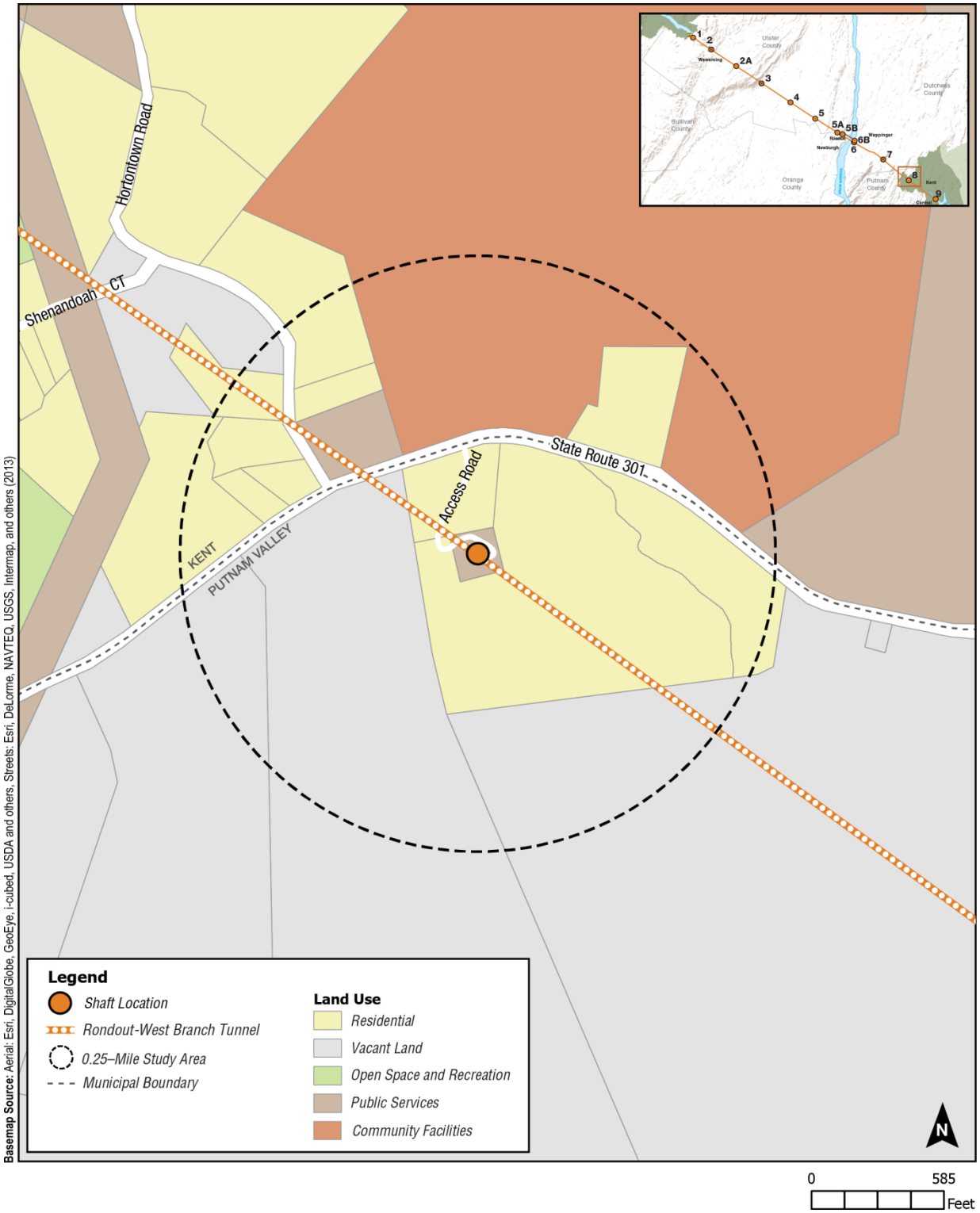


Figure 11.7-2: Land Use – Shaft 8 Study Area

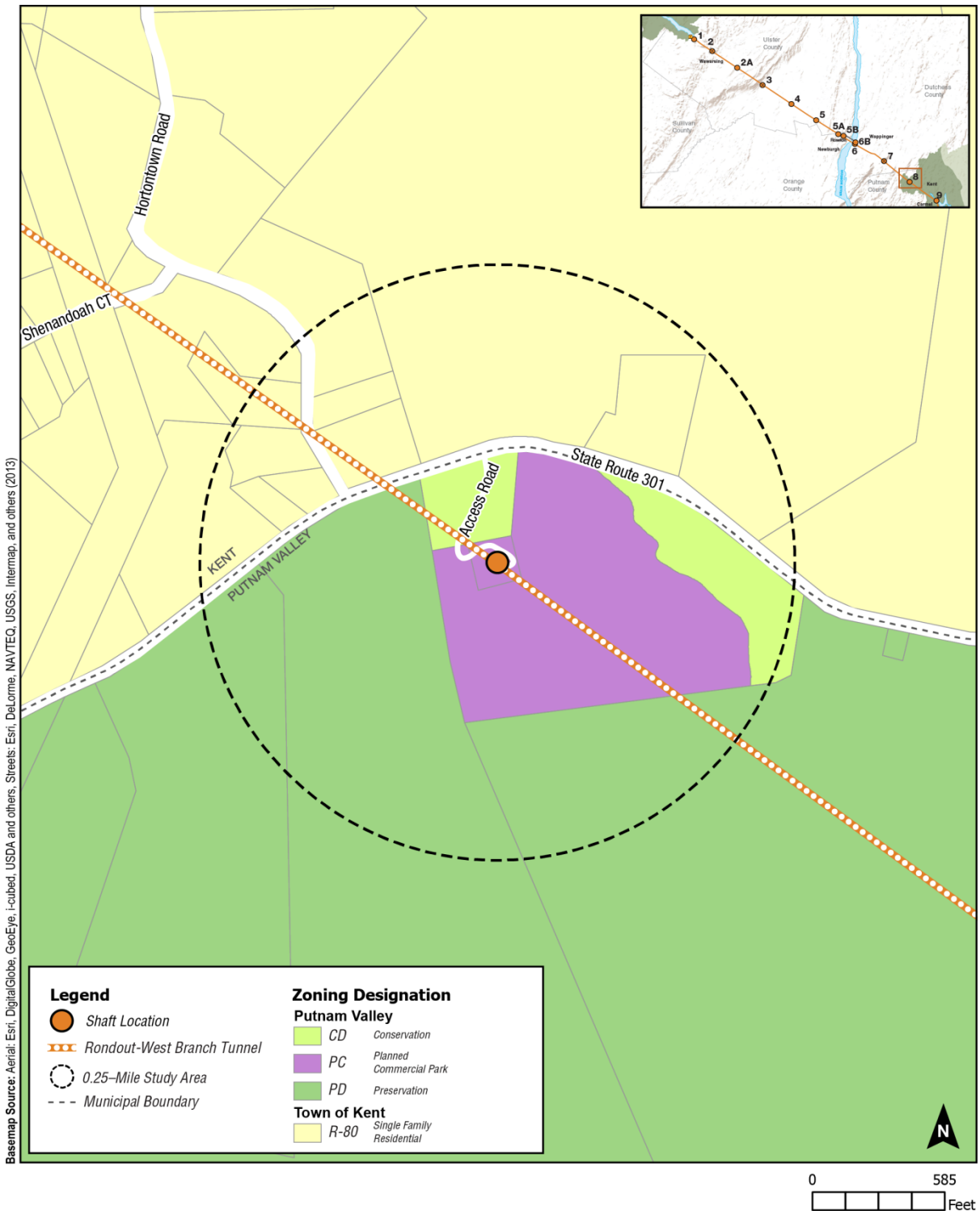


Figure 11.7-3: Zoning – Shaft 8 Study Area

11.7.1.2 Proposed Activities at the Shaft 8 Site

As previously described, the Shaft 8 site would be the primary entry and exit point for personnel and equipment to support the inspection for the RWBT east of the Hudson River. Access to the site would be provided via the existing gravel road, which connects State Route 301 to the Shaft 8 site across private property, including a private driveway. The inspection and repair activities anticipated at the Shaft 8 site would include site preparation of support equipment, beginning up to 6 months before the temporary shutdown; installation and operation of communication and hoisting systems; condition assessment support; and demobilization and site restoration. As shown on **Figure 11.7-4**, all disturbance and activities would occur within the Shaft 8 site. The entirety of the 0.9-acre property would be used during the inspection and repair.

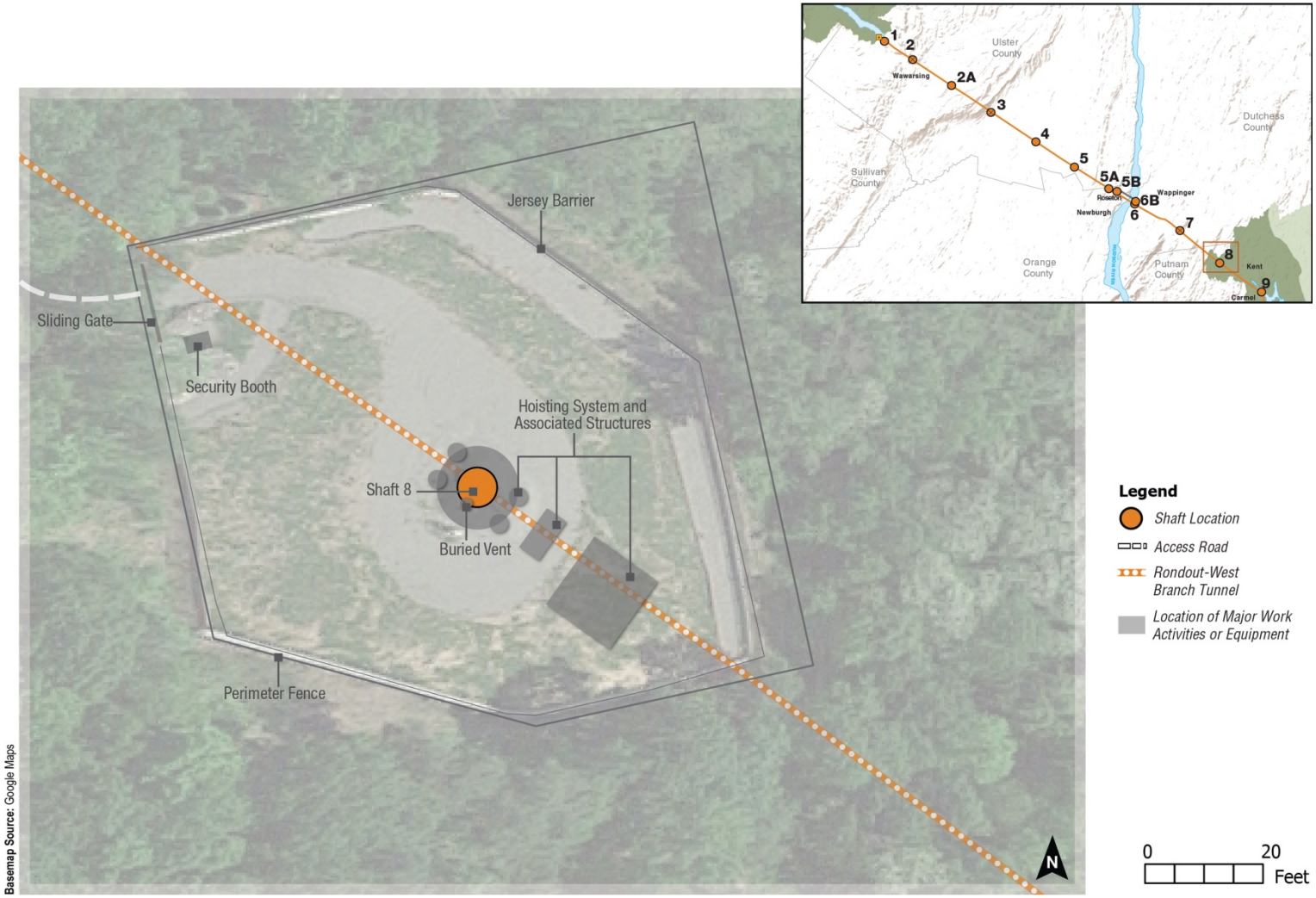
Site preparation at the Shaft 8 site would begin up to 6 months before the planned shutdown of the RWBT and would occur only Monday through Friday between 8 AM and 5 PM. Activities would include the installation of soil and erosion control measures and a tire washing system on the inside of the existing perimeter fence. Limited excavation and grading would be required on site to access the shaft. Barriers would be installed on the inside of the existing perimeter fence to protect personnel and retain debris during the inspection and repair work. Noise and vibration barriers would also be installed, as necessary. The addition of a sliding gate at the perimeter fence and a security booth that would be manned 24 hours per day during the inspection and repair would serve as a temporary security measure.

During site preparation, minor grading would be carried out to uncover existing hoisting foundations for the hoisting system. The hoisting system, which would be transported via truck to the Shaft 8 site once the inspection and repair begins, would allow for the installation of the ventilation and communication systems. The hoisting system would also support the entrance and exit of personnel and the requisite inspection equipment (e.g., vehicles, communication) and materials used during the course of the work. A construction platform would also be erected to support inspection of the inclined tunnel. Communication systems would also be installed to allow for continuous tunnel-to-surface communication.

Construction equipment and materials required for site preparation would be brought to the site by truck, when needed, via the existing access road. This equipment and materials would include construction vehicles (e.g., pickup trucks, flat trucks, wheel loaders, and a small excavator), cranes/hoists, 220-kilowatt generators, compressors, and utility vehicles.

Once the inspection and repair begins, work at the Shaft 8 site would occur 7 days a week from 8 AM to 5 PM. At this time, the RWBT would be drained, over approximately 20 days. Simultaneously, the existing shaft cap would be demolished to allow equipment, materials, and personnel to enter or exit the shaft.

After preparation at the bottom of Shaft 8 is complete, the condition assessment would begin in mid to late October, following completion of the inspection of the RWBT west of the Hudson River. The peak activities at the site would occur during the condition assessment, which would be performed by approximately 8 to 12 workers. The condition assessment is expected to last approximately 2 weeks beginning in November 2022, approximately 4 weeks after the temporary shutdown has begun, and the condition assessment for the RWBT segments west of the Hudson River are complete.



Note: The gray lines show the edge of the work area/site and outline other features of the existing shaft site.

Figure 11.7-4: Shaft 8

After the RWBT Bypass is connected and the inspection and repair activities are completed, demobilization from the Shaft 8 site would commence, including removal of all equipment and materials. The site would be restored to baseline conditions by September 2023.

11.7.2 PUBLIC POLICY

As described in Section 11.3.2, "Land Use, Zoning, and Public Policy," a land use and zoning impact analysis for the inspection and repair within the Shaft 8 Study Area is not warranted.

The study area for the public policy analysis is the area within 0.25 mile of the Shaft 8 site, as shown on **Figure 11.7-1**. The Shaft 8 site is located in the Town of Putnam Valley, Putnam County. The Shaft 8 Study Area is located along the RWBT in the Towns of Putnam Valley and Kent.

As discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," the inspection and repair's consistency with the applicable policies of the Town of Kent Comprehensive Plan within the Shaft 8 Study Area is analyzed as follows.

11.7.2.1 Town of Kent Comprehensive Plan (2008)

Recommendations found in the Town of Kent Comprehensive Plan (Town of Kent 2008) broadly address topics related, but not limited to, environmental protection, open space, historic and scenic assets, transportation, economic development, housing development and residential zoning, public services, and facilities. The Comprehensive Plan is intended to be reviewed and updated every 10 years. No goals or recommended actions within the Comprehensive Plan pertain specifically to the inspection and repair. However, the Comprehensive Plan does contain the following recommendation potentially relevant to effects of the inspection and repair in proximity to West Branch Reservoir only:

- *Environmental Protection*
  - *Groundwater and Surface Water Protection: Implement stormwater management processes to limit peak runoff flows and to limit turbidity discharges.*

Under this principle, the Town of Kent Comprehensive Plan recommends the implementation of stormwater Best Management Practices in order to protect the health of aquatic and drinking water systems. This principle was analyzed for inspection and repair as work in the study area would potentially impact existing natural resources directly or indirectly.

Inspection and repair activities at the Shaft 8 site would take place on DEP land, would be contained within the site, and would be temporary. Stormwater would be managed on site by installing and maintaining erosion and sediment control practices, such as silt fencing and hay bales, and turbidity barriers, for the duration of construction. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Town of Kent Comprehensive Plan and would not result in significant adverse impacts to public policy within Shaft 8 Study Area.

11.7.3 OPEN SPACE AND RECREATION

The study area for the open space and recreation analysis is the area within 0.25 mile of the Shaft 8 site and is shown on **Figure 11.7-5**.

One open space resource exists within the Shaft 8 Study Area: the Chuang Yen Monastery. A portion (approximately 18 acres) of the Chuang Yen Monastery is located within the Shaft 8 Study Area. The Chuang Yen Monastery is an open space resource consisting of a 125-acre lot that includes a Buddhist Temple that contains a library and meditation center and hosts religious services and festivals. The entrance to the Monastery is approximately 0.20 mile from the Shaft 8 site access road entrance on State Route 301. The portion of the Chuang Yen Monastery property within the Shaft 8 Study Area is forested and provides a barrier between State Route 301 and the Monastery structures. Areas of the Chuang Yen Monastery property that contain recreational resources are located outside of the Shaft 8 Study Area. The Chuang Yen Monastery is privately owned and is open to the public daily from 9 AM to 5 PM, except during the winter months (January to March).

DEP has consulted with the Towns of Putnam Valley and Kent and Putnam County, and it is DEP's understanding that no plans to expand or create new open space or recreational resources are anticipated within the Shaft 8 Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, are anticipated to continue. Use of the identified open space is anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that open space and recreation within the Shaft 8 Study Area would be the same as baseline conditions.

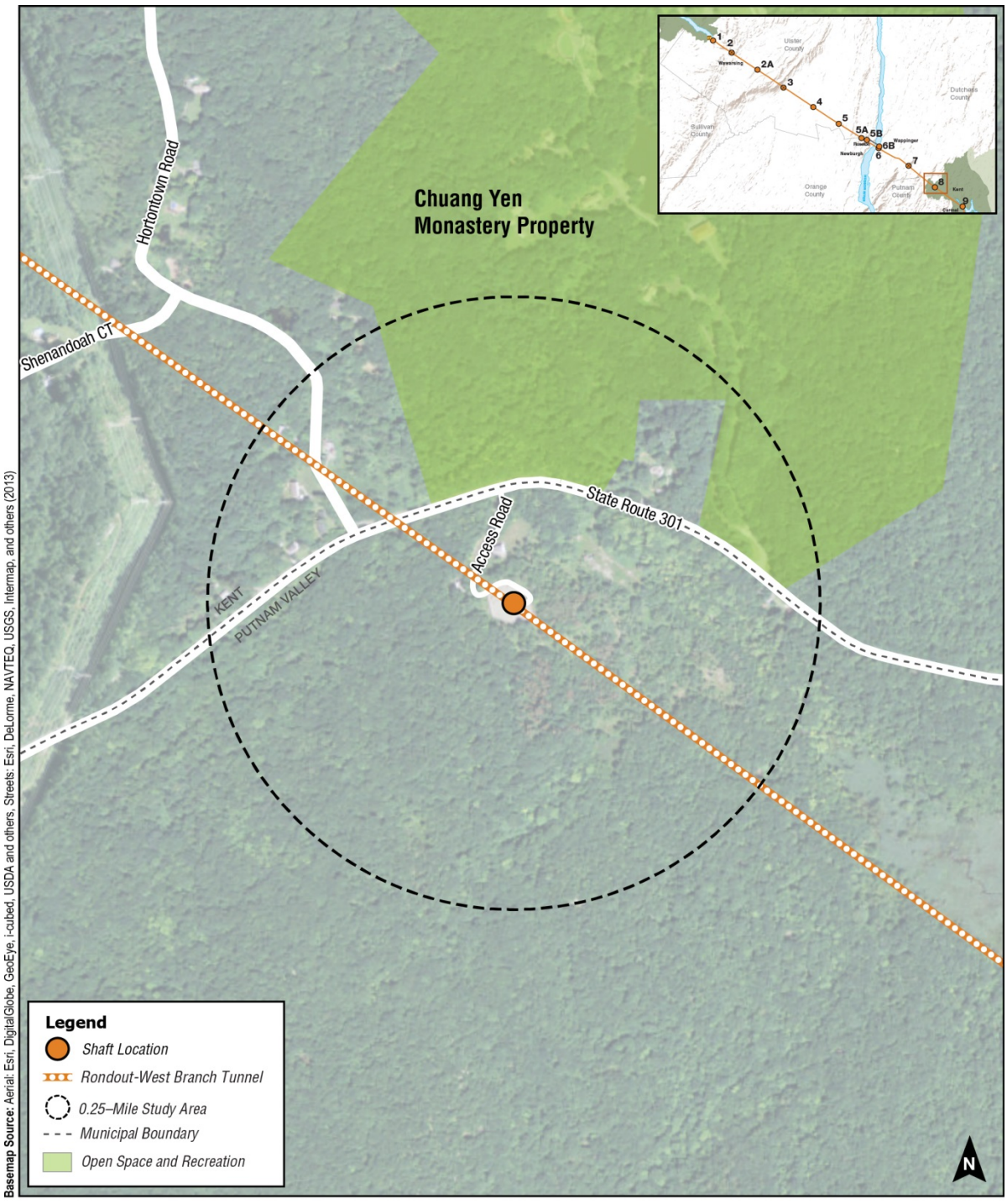
Inspection and repair activities at the Shaft 8 site would be temporary and would occur on DEP property within an area not accessible to the general public. The inspection and repair would not affect views from the Chuang Yen Monastery because its appearance and placement would be located behind a buffer of existing trees. In addition, recreation and religious items that would interest visitors at the Chuang Yen Monastery are located outside of the Shaft 8 Study Area. Following completion of the inspection and repair, the Shaft 8 site would be restored to baseline conditions. As such, the inspection and repair would not encroach upon, cause a loss of, impact the physical character of, or affect views from the open space and recreation near the Shaft 8 site.

Therefore, the inspection and repair would not result in significant adverse impacts to open space and recreation within the Shaft 8 Study Area.

11.7.4 NATURAL RESOURCES

The study area for the natural resources analysis is the area within 400 feet of the Shaft 8 site and is shown on **Figure 11.7-6**.

As described in Section 11.3.8, "Natural Resources," an impact analysis related to geology and soils, water resources (including groundwater, surface water, wetlands, and floodplains), aquatic and benthic resources, terrestrial resources, and wildlife within the Shaft 8 Study Area is not warranted.



Note: Per New York State Tax Parcel data, Chuang Yen Monastery Property is classified as a community facility. It is also identified and analyzed as an open space within this DEIS.

Figure 11.7-5: Open Space and Recreation – Shaft 8 Study Area

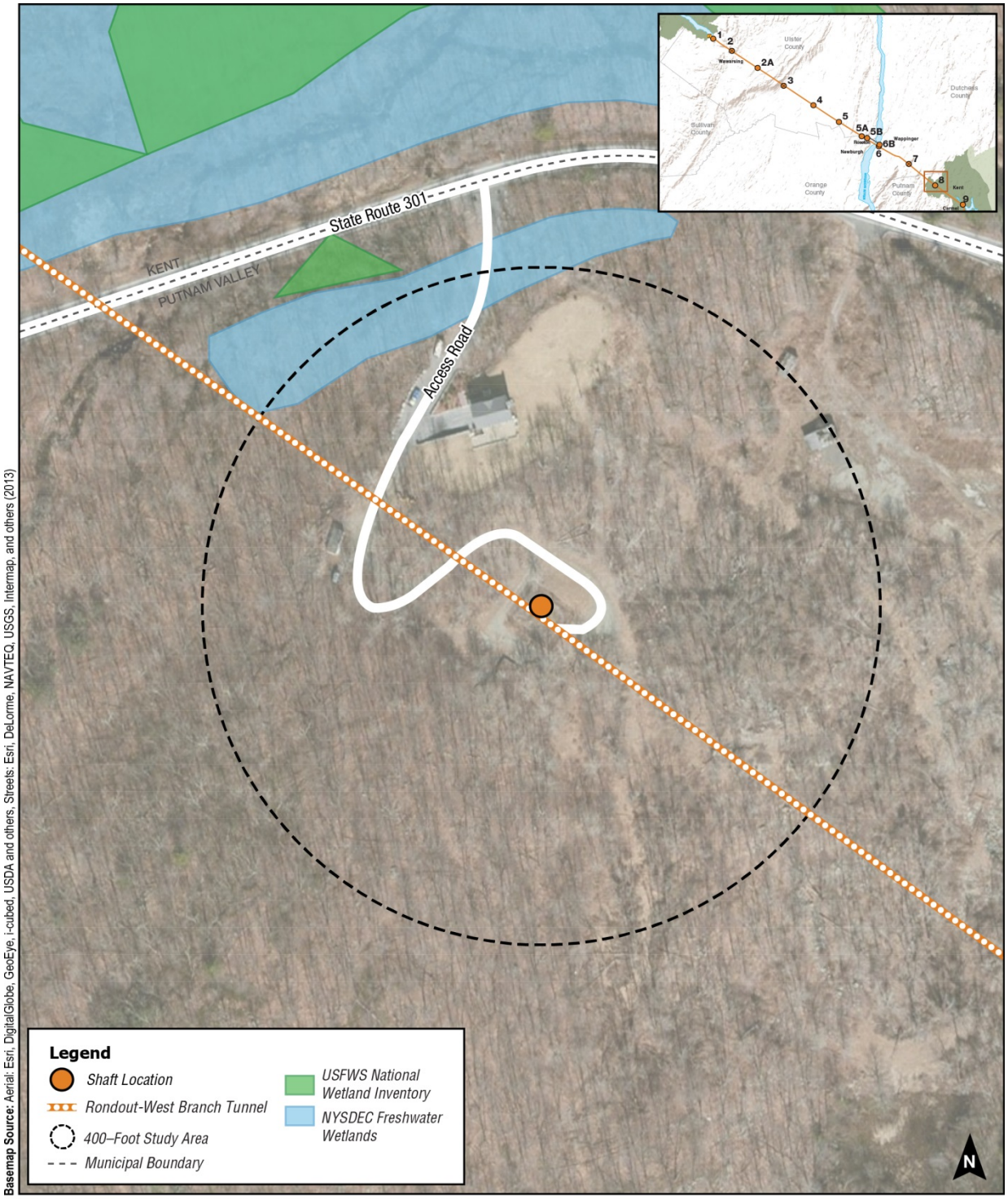


Figure 11.7-6: Natural Resources – Shaft 8 Study Area

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the Shaft 8 Study Area would largely be the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

11.7.4.1 Federal/State Threatened and Endangered Species

Federal/State Threatened and Endangered Species that have the potential to occur within the Shaft 8 Study Area are shown in **Table 11.7-1**. As described in Section 11.3.8, "Natural Resources," these species were identified by reviewing the USFWS Official Species Lists and NYNHP database results, as well as data from the NYSDEC Nature Explorer, NYSDEC Breeding Bird Atlas, and Herp Atlas.

Table 11.7-1: Federal/State Threatened and Endangered Species, and Habitat Potentially within the Shaft 8 Study Area

Common Name	Scientific Name	Federal Listing	State Listing	Potential for Habitat	Potential for Species
Amphibians and Reptiles					
Bog Turtle	*Clemmys [=Glyptemys] muhlenbergii*	T	E	Yes	No
Notes: E: Endangered T: Threatened **Source:** USFWS Official Species List for Ulster and Putnam Counties; NYSDEC-NYNHP Database Consultation; NYSDEC Nature Explorer; Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.					

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the Shaft 8 Study Area would largely be the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

Bog Turtle *(Clemmys [=Glyptemys] muhlenbergii)*

As noted in Section 11.3.8, "Natural Resources," bog turtle (*Clemmys [=Glyptemys] muhlenbergii*) habitat consists of open wetland areas with cool, shallow, slow-moving water, deep soft muck soils, and tussock-forming herbaceous vegetation. One NYSDEC-regulated freshwater/forested wetland, Wetland OL-58, is identified as occurring within the Shaft 8 Study Area.

Wetland OL-58 is made up of two areas separated by State Route 301; the area north of State Route 301 is approximately 12.9 acres, and the area south of State Route 301 is approximately 1.7 acres. The southern, smaller area is partly within the Shaft 8 Study Area. This wetland is likely not suitable bog turtle habitat, as it is a forested wetland with hydrology likely to be influenced by the unnamed streams adjacent to the wetland. Although bog turtles may utilize forested wetlands such as Wetland OL-58 while migrating between habitat patches, forested wetlands do not typically provide suitable bog turtle habitat.

Furthermore, the inspection and repair activities at the Shaft 8 site would be confined to the Shaft 8 site, and protective measures (i.e., silt fencing) would be installed around the activities at the Shaft 8 site to prevent indirect disturbance to the wetland. Following completion of the inspection and repair, the Shaft 8 site would be restored to baseline conditions. Therefore, since there would be no disturbance associated with the inspection and repair to bog turtles or their habitat, the inspection and repair would not result in significant adverse impacts to bog turtles within the Shaft 8 Study Area. No effects to bog turtle are anticipated as a result of the inspection and repair within the Shaft 8 Study Area.

Federal/State Threatened and Endangered Species Conclusions

Based on the impact analysis, no take is anticipated. Inspection and repair would have no effects to bog turtles. Therefore, the inspection and repair would not result in significant adverse impacts to federal/State Threatened and Endangered Species within the Shaft 8 Study Area.

11.7.5 HAZARDOUS MATERIALS

The study area for the hazardous materials analysis is the area within 0.25 mile of the Shaft 8 site (see **Figure 11.7-1**).

The Shaft 8 Study Area is generally bounded by State Route 301 to the north and wooded areas to the east, south, and west. Shaft 8 would be the primary entry and exit point for the proposed inspection of the East of Hudson portion of the RWBT. As described in Section 11.3.9, "Hazardous Materials," a hazardous waste and contaminated materials screening was performed in 2015. Environmental database searches identified reported incidents and/or facilities within the Shaft 8 Study Area. The New York State Spills database search revealed an incident within the Shaft 8 Study Area, but down-gradient from the Shaft 8 site. The database search revealed one historic spill of fuel oil. This case was reported closed with corrective action taken.

DEP has consulted with the Towns of Putnam Valley and Kent and Putnam County, and it is DEP's understanding that no developments or structures that would introduce hazardous materials to the environment are anticipated within the Shaft 8 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that the presence of hazardous materials within the Shaft 8 Study Area would be the same as baseline conditions.

The inspection and repair at the Shaft 8 site would involve minor site preparation activities (i.e., grading and excavation) but would not require soil removal from the Shaft 8 site. All graded and excavated material would be stockpiled on site and reused for backfill. Once site preparation is complete, a communications system would be installed, and the condition assessment would be conducted. The types of equipment to be used at the Shaft 8 site during construction may include construction vehicles such as pickup trucks, flat trucks, wheel loaders, and bulldozers. Additionally, construction vehicles used to perform the inspection and repair in the tunnel would be lowered into the RWBT without fuel. These vehicles would then be fueled within the RWBT when necessary during the inspection and repair.

These activities would require the use of a variety of petroleum and other chemical products (e.g., diesel fuel for vehicle, generators, and back-up power; lubricating oil for construction vehicles; and miscellaneous cleaning and maintenance chemicals). Construction equipment and materials required for site preparation would be trucked to the Shaft 8 site when needed. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements. Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements.

Following completion of the inspection and repair, the Shaft 8 site would be restored to baseline conditions. As such, the inspection and repair would not result in significant increases to the public's or environment's exposure to hazardous materials within study area.

Therefore, the inspection and repair would not result in significant adverse impacts from the presence or disturbance of hazardous materials within the Shaft 8 Study Area.

11.7.6 TRANSPORTATION

The study area for the transportation analysis is the area within 0.25 mile of the Shaft 8 site, as shown on **Figure 11.7-7**.

The Shaft 8 site is served by an access road via State Route 301. The access road between State Route 301 and the Shaft 8 site is an approximately 15-foot wide, partially-paved private road. State Route 301 is a two-lane, paved, rural principal arterial that carries approximately 1,500 vehicles per day. No DEP employees work at or visit the Shaft 8 site on a daily basis. There is no public transportation to or from the Shaft 8 Study Area. There is little to no pedestrian activity in the immediate vicinity of the Shaft 8 Study Area.

DEP has consulted with the Towns of Putnam Valley and Kent and Putnam County, and it is DEP's understanding that no changes in land use or an increase in traffic due to outside developments are anticipated within the Shaft 8 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that traffic, public transportation, and pedestrian activities within the study area would be similar to baseline conditions.

The inspection and repair would occur at the DEP-owned Shaft 8 site and would result in vehicle trips for the transportation of crews and materials to and from the Shaft 8 site during the day and during peak existing traffic hours. The majority of this traffic is expected to arrive and depart the Shaft 8 site via U.S. Route 9 and State Route 301 to the west (80 percent), with the remaining traffic traveling to and from the site from the east via I-84, U.S. Route 6, and State Route 301 (20 percent). The estimated number of the inspection and repair peak-day one-way vehicle trips to the Shaft 8 site is 30 vehicles, approximately 60 peak-day vehicle round trips to and from the Shaft 8 site. Of these peak-day vehicle round trips, up to 25 vehicle trip ends (45 PCEs) could occur during the peak hour, based on the assumption that 90 percent of the inspection and repair worker vehicles and 75 percent of the inspection and repair trucks would arrive or depart during the peak hour

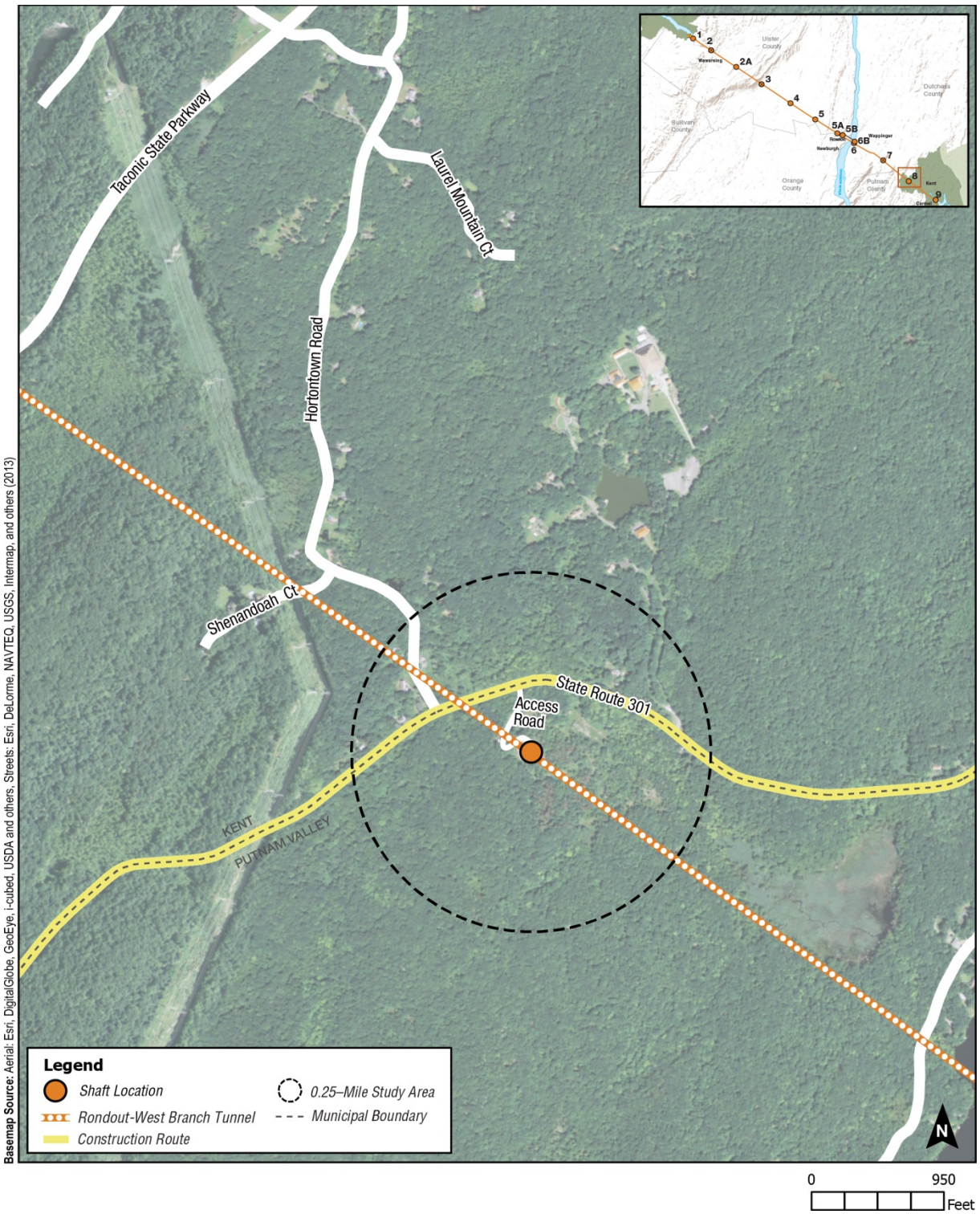


Figure 11.7-7: Transportation – Shaft 8 Study Area

on an average day, the estimated number of the inspection and repair vehicle round trips would be approximately 40 vehicle round trips with 17 vehicle trip ends that would occur during the peak hour.

For the purposes of this analysis, the peak project-generated traffic hour is assumed to coincide with typical construction hours for employee vehicles entering the site, from 7 AM to 8 AM and, as a result, is unlikely to coincide with the peak hour for existing traffic. Moreover, this peak number of vehicle trips to and from the site would occur only during a limited period (approximately 4 weeks) during the inspection and repair activities at the Shaft 8 Study Area. To the extent available, the inspection and repair trucks would travel on truck-permitted roadways directly to and from the Shaft 8 site.

The inspection and repair would result in 25 peak-hour vehicle trip ends within the Shaft 8 Study Area, which is below the *CEQR Technical Manual* screening threshold of 50 peak-hour vehicle trip ends as described in Section 11.3.12, "Transportation." In addition, the inspection and repair activities at the Shaft 8 Study Area would be short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period).

The inspection and repair activities at the Shaft 8 site would not generate demands for public parking or transportation or spur an increase in pedestrian activity within the Shaft 8 Study Area. Following completion of the inspection and repair, the Shaft 8 site would be restored to baseline conditions.

Therefore, although there would be a minor temporary increase in traffic, the inspection and repair would not result in significant adverse impacts to transportation within the Shaft 8 Study Area.

11.7.7 NOISE

As described in Section 11.3.14, "Noise," mobile noise associated with the inspection and repair within the Shaft 8 Study Area does not warrant analysis. This section includes an analysis of potential impacts from stationary noise associated with the inspection and repair to sensitive receptors within the Shaft 8 Study Area. The study area for the noise analysis is the area within 1,500 feet of the Shaft 8 site, as shown on **Figure 11.7-8**.

The Shaft 8 Study Area includes 11 residential properties and one house of worship property, as shown on **Figure 11.7-8**. Peak construction activities at the Shaft 8 Study Area would occur for approximately 2 weeks during the condition assessment. As noted in Section 11.3.14.1, "Screening Assessment," the temporary construction activities were evaluated to determine compliance with local noise codes. The Shaft 8 site is located in the Town of Putnam Valley. The 1,500-foot noise study area also includes the Town of Kent, as the town boundary is located approximately 500 feet from the Shaft 8 site; therefore, the inspection and repair activities at the Shaft 8 site would be subject to the local noise regulations of both towns.

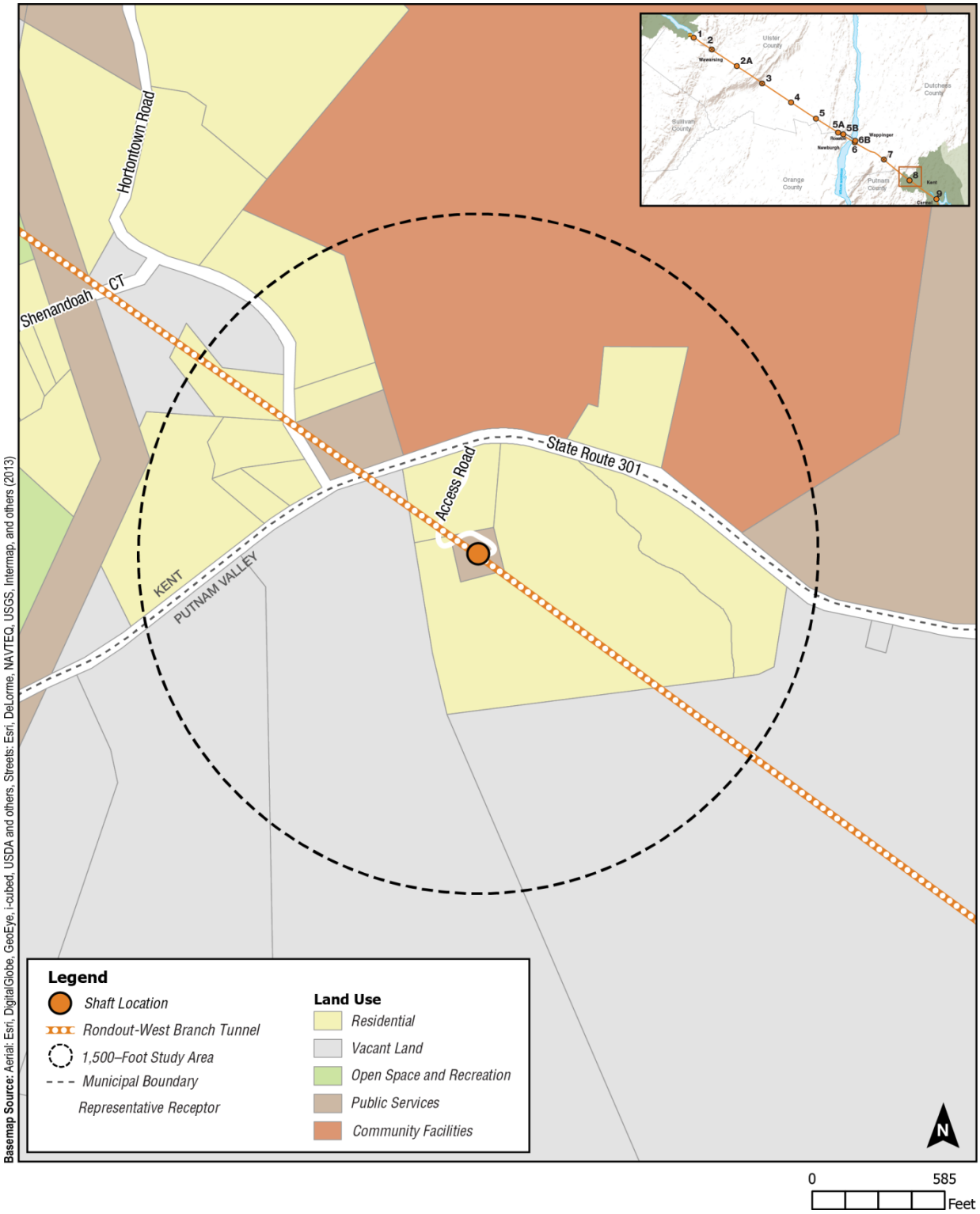


Figure 11.7-8: Noise – Shaft 8 Study Area

The Town of Putnam Valley Noise Law (§82-5) prohibits the use of noise-making equipment and the operation of engines in residential zones outdoors between the hours of 8 PM and 8 AM on weekdays and 7 PM and 9 AM on weekends and holidays. However, §82-7 states that noise generated by a municipality during any emergency repair and maintenance or any other repair or maintenance undertaken by the municipality would not be in violation of Chapter 82 – Noise. The Town of Kent noise code (§48-6) also prohibits noise emitted from construction between the hours of 9 PM to 7 AM and 9 PM Saturday to 8 AM Sunday. The Town of Kent noise code also prohibits the creation of noise in connection with the loading or unloading of any vehicle between 7 PM and 7 AM and any time on Sunday. However, the Town of Putnam Valley and the Town of Kent do not have quantitative noise limits applicable to the inspection and repair. Therefore, the temporary construction activities were evaluated to disclose potential noise levels at the nearest residence.

Existing ambient noise levels within the Shaft 8 Study Area are influenced by vehicular traffic on State Route 301. The existing noise levels within the study area are comparable to a very quiet suburban and rural residential environment, based on proximity to major transportation corridors, population density of the area, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA L_{eq} during the day and 34 dBA L_{eq} at night.

DEP has consulted with the Towns of Putnam Valley and Kent and Putnam County, and it is DEP's understanding that no major projects that would result in a change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels, are anticipated within the Shaft 8 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that ambient noise levels within the Shaft 8 Study Area would be similar to baseline conditions.

In the future with the inspection and repair, stationary noise-producing activities would occur on the approximately 0.9-acre property of DEP-owned land surrounding Shaft 8, and would include site preparation and operation of equipment for personnel and equipment entering and exiting the tunnel. Peak inspection and repair activities at Shaft 8 would occur between 8 AM and 5 PM, 7 days a week for approximately 2 weeks. All construction would occur on DEP property.

The noise analysis focused on stationary noise-generating equipment expected to operate constantly at the Shaft 8 site. The equipment types included in the stationary noise analysis and their reference noise levels are shown in **Table 11.7-2**. The number and types of noise-generating equipment analyzed were based conservatively on peak construction operating conditions.

The results of the stationary noise analysis are shown in **Table 11.7-3**. As shown in **Table 11.7-3**, inspection and repair activities at the Shaft 8 site would comply with the Town of Putnam Valley and the Town of Kent noise codes.

Following completion of the inspection and repair, the Shaft 8 site would be restored to baseline conditions. The inspection and repair activities would be temporary with the peak construction activities occurring during a limited period (approximately 2 weeks).

Table 11.7-2: Stationary Source Construction Equipment Modeled at the Shaft 8 Site and Reference Noise Levels (L_{eq})

Equipment Type (Quantity)	Reference Noise Level (L_{eq}) at 50 feet (dBA)	Source
Crane (1)	85	CEQR[1]
Generator (2)	75	Caterpillar[2]
Compressor (1)	80	CEQR[1]

Notes:
[1] *City Environmental Quality Review (CEQR) Technical Manual,* Chapter 22 (2014).
[2] Caterpillar Weather Protective and Sound Attenuated Enclosures (2014).

Table 11.7-3: Stationary Noise Analysis Results (L_{eq}) at the Nearest Noise-Sensitive Receptors within the Shaft 8 Study Area

Nearest Noise-Sensitive Receptor	Distance from Site (feet)	Conditions Analyzed	Predicted Stationary Noise Level at Noise-Sensitive Receptor (dBA)	Town of Putnam Valley and Town of Kent Noise Limits (dBA)	Potential for Exceedance (Yes or No)
Nearest Residence	234	Daytime	73	NA	No
		Nighttime	NA[1]	Prohibited	No

Notes:
NA = Not Applicable
[1] Construction operations at Shaft 8 would occur during daytime hours only, 8 AM to 5 PM.

Therefore, although there would be a temporary increase in noise, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the Shaft 8 Study Area.

11.7.8 NEIGHBORHOOD CHARACTER

The character of the Shaft 8 Study Area is largely defined by a mix of public utility and domestic service land uses as well as its physical setting within a rural location (see **Figure 11.7-2**). The site is generally bounded by State Route 301 to the north and wooded areas to the east, south, and west. The work site is located within a public services parcel owned and maintained by DEP. Access to the site would be provided via the existing gravel road, which connects State Route 301 to the Shaft 8 site.

DEP has consulted with the Towns of Putnam Valley and Kent and Putnam County, and it is DEP's understanding that no changes in land use or new projects or structures are anticipated within the Shaft 1 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that neighborhood character within the study area would be similar to baseline conditions.

As described in Section 11.3.15, "Neighborhood Character," there would be no potential for the inspection and repair to affect shadows or urban design. In addition, based on the screening assessment for land use and zoning, socioeconomic conditions, historic and cultural resources and visual resources, an impact analysis for the Shaft 8 Study Area are not warranted, as discussed in the following sections: Section 11.3.2, "Land Use, Zoning, and Public Policy," Section 11.3.3, "Socioeconomic Conditions," Section 11.3.6, "Historic and Cultural Resources," and Section 11.3.7, "Visual Resources." As described in Section 11.7.3, "Open Space and Recreation," the work activities would not affect open space and recreation in the Shaft 8 Study Area. Furthermore, the public policy impact analysis provided in Section 11.7.2, "Public Policy," concluded the work activities were consistent with applicable plans.

The work activities in the Shaft 8 Study Area would be short-term (approximately 6 months before and approximately 4 weeks during the temporary shutdown) and would result in a temporary increase in traffic and noise. Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area and traffic patterns would return to baseline conditions. These temporary increases in traffic and noise levels would not result in a density of activity or service conditions that would affect the overall character of the study area. The inspection and repair would not generate significant adverse effects or land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to neighborhood character within the Shaft 8 Study Area.

11.7.9 PUBLIC HEALTH

Water supply and in particular, the community users drawing water from the Delaware Aqueduct, would not be significantly affected by the inspection and repair within the Shaft 8 Study Area. DEP has developed an ongoing program to work with these communities, including reviewing the availability of back-up water supplies and analyzing the ability of these users to accommodate reduced limited access to the Delaware Aqueduct during the temporary shutdown, as appropriate and to meet all applicable drinking water standards.

Based on the environmental investigations completed within the Shaft 8 Study Area, results of testing conducted on soils support the reuse of excavated materials as backfill and do not suggest the need for special management, handling, or health and safety measures at this time. Inspection and repair work activities would require the potential storage and use of a variety of petroleum and other chemical products, such as diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals during construction. DEP would handle all materials in accordance with applicable federal, State, and local regulations and guidelines. The work activities at the study area would be short-term (approximately 6 months before and approximately 4 weeks during the temporary shutdown) and would result in a temporary increase in noise. Following construction of the inspection and repair, the construction equipment, vehicles, and chemical storage would be removed from the study area, and operation of the Delaware Aqueduct would be consistent with baseline conditions.

Based on the analyses above, the inspection and repair would not result in significant adverse impacts in any of the technical areas related to public health: air quality, water supply (quantity or quality), hazardous materials, or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to public health within the Shaft 8 Study Area.

11.8 SHAFT 9 STUDY AREA IMPACT ANALYSIS

The Shaft 9 site is located along the RWBT in the Town of Kent, Putnam County, New York. As described in Section 11.2, "Project Description," the Shaft 9 site would be a primary ventilation supply location during the inspection and repair. Activities to ready the site to serve as a primary ventilation location would begin up to 6 months before the temporary shutdown of the RWBT. The sections below provide a description of the existing Shaft 9 site and study area conditions, as well as the inspection and repair activities that would be performed at the Shaft 9 site.

The potential for impacts to public policy; open space and recreation; visual resources; natural resources, consisting of federal/State Threatened and Endangered Species; hazardous materials; transportation; noise; neighborhood character; and public health associated with the inspection and repair within the Shaft 9 Study Area are discussed below. As described in Section 11.3, "Screening Assessment and Impact Analysis Methodology," an impact analysis related to land use and zoning; socioeconomic conditions; community facilities and services; historic and cultural resources; other natural resources subcategories including water resources, geology and soils, aquatic and benthic resources, terrestrial resources, wildlife, and federal/State Candidate Species, State Species of Special Concern, and unlisted rare and vulnerable species; water and sewer infrastructure; energy; and air quality within the Shaft 9 Study Area is not warranted.

11.8.1 SHAFT 9 STUDY AREA PROJECT DESCRIPTION

11.8.1.1 Description of Existing Site and Study Area

The Shaft 9 site is approximately 2 acres of an approximately 90-acre property owned by DEP located along the RWBT in the Town of Kent (Tax ID 43-2-64, Block 2, Lot 64). The site is generally bounded by Dixon Road and Reservoir View Court to the west, wooded area to the south and west, and West Branch Reservoir to the north and east, as shown on **Figure 11.8-1**. The site is accessible via the existing asphalt access road connected to Dixon Road. The Shaft 9 Study Area encompasses a portion of the Town of Kent, including the Shaft 9 site, as well as a portion of the Town of Carmel, Putnam County. The existing land uses within the 0.25-mile study area include public services (including the DEP-owned Shaft 9 site), single-family residential, and vacant land, as well as the West Branch Reservoir, as shown on **Figure 11.8-2**.

All properties within the Shaft 9 Study Area are composed of the single-family residential (R-80) zoning district (see **Figure 11.8-3**). Single-family residential (R-80) zoning districts are intended to promote a balance of open space and low-density, single-family residential uses. Permitted uses vary, but may include public utility structures, cemeteries, single-family homes, and public parks. The Shaft 9 site constitutes a public utility, which is a permitted use within the single-family residential (R-80) zoning district.

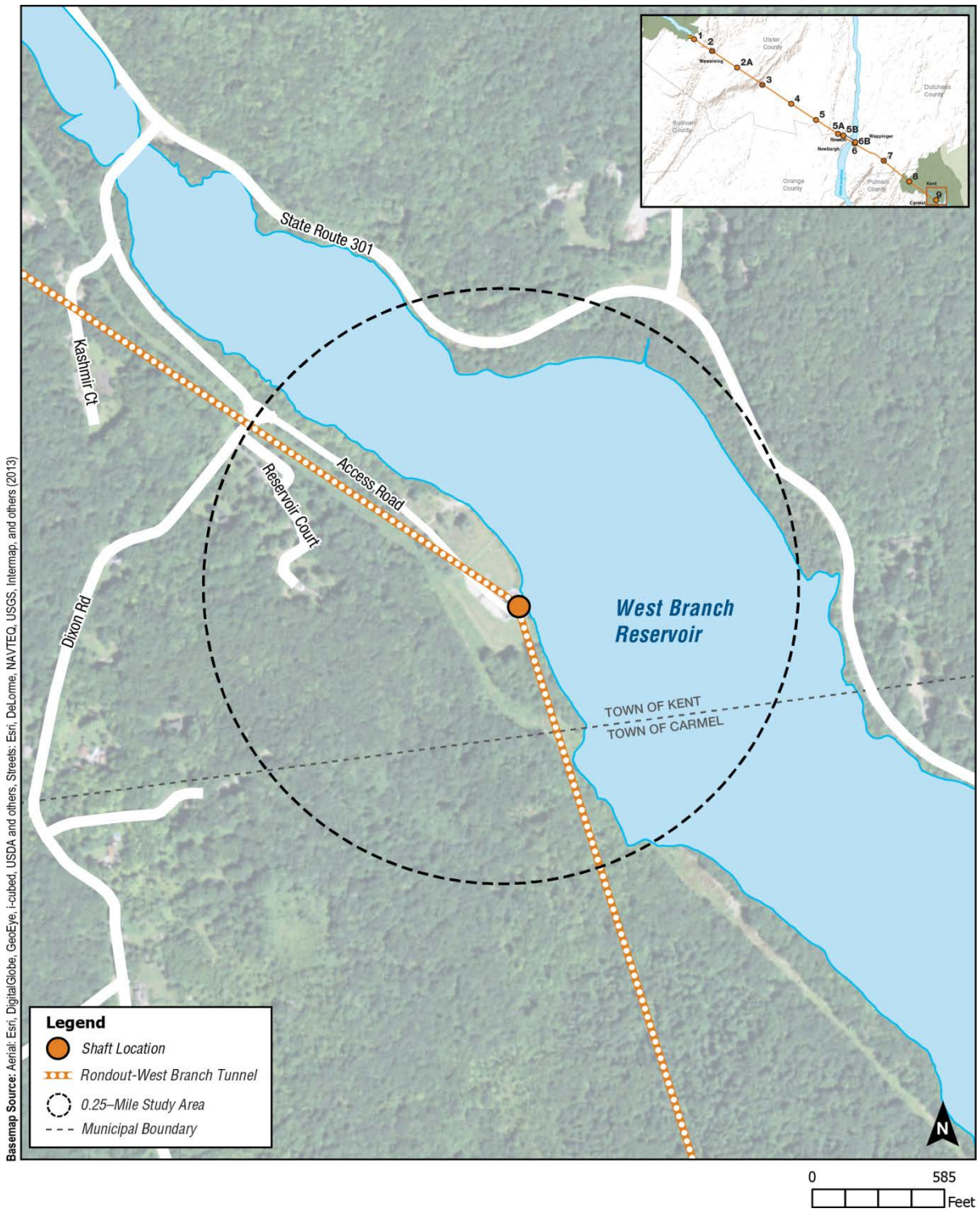


Figure 11.8-1: Site Location – Shaft 9 Study Area

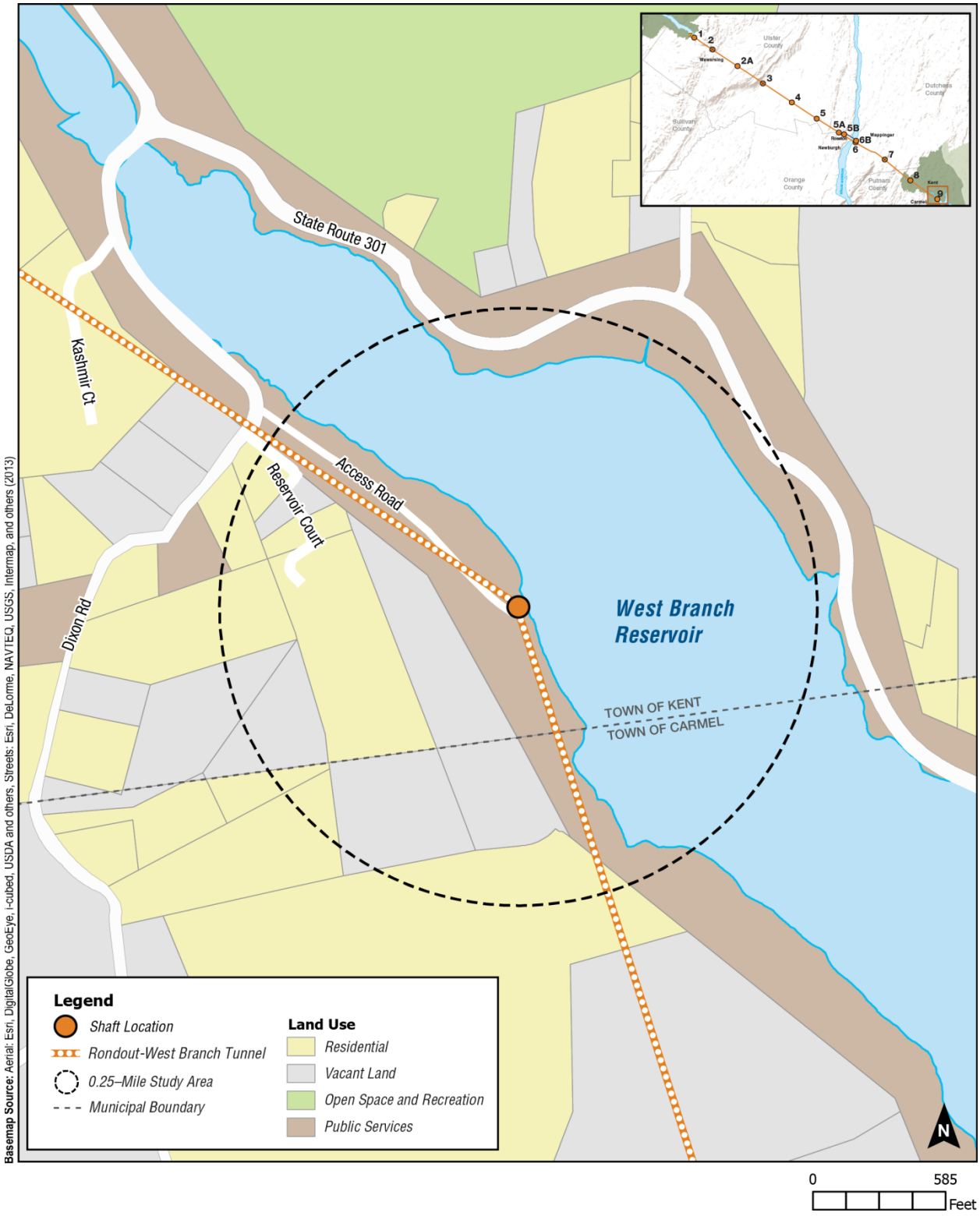


Figure 11.8-2: Land Use – Shaft 9 Study Area

Figure 11.8-3: Zoning – Shaft 9 Study Area

11.8.1.2 Proposed Activities at the Shaft 9 Site

As described above, the Shaft 9 site would be a primary ventilation location during the inspection and repair. Access to the site would be provided via the existing asphalt access road. The inspection and repair activities anticipated at the Shaft 9 site would include site preparation of support equipment beginning up to 6 months before the RWBT temporary shutdown; installation and operation of ventilation and communication systems; and demobilization and site restoration. All disturbance and activities would occur within the Shaft 9 site (see **Figure 11.8-4**).

Although the property is approximately 90 acres, only approximately 2 acres would be used during the inspection and repair.

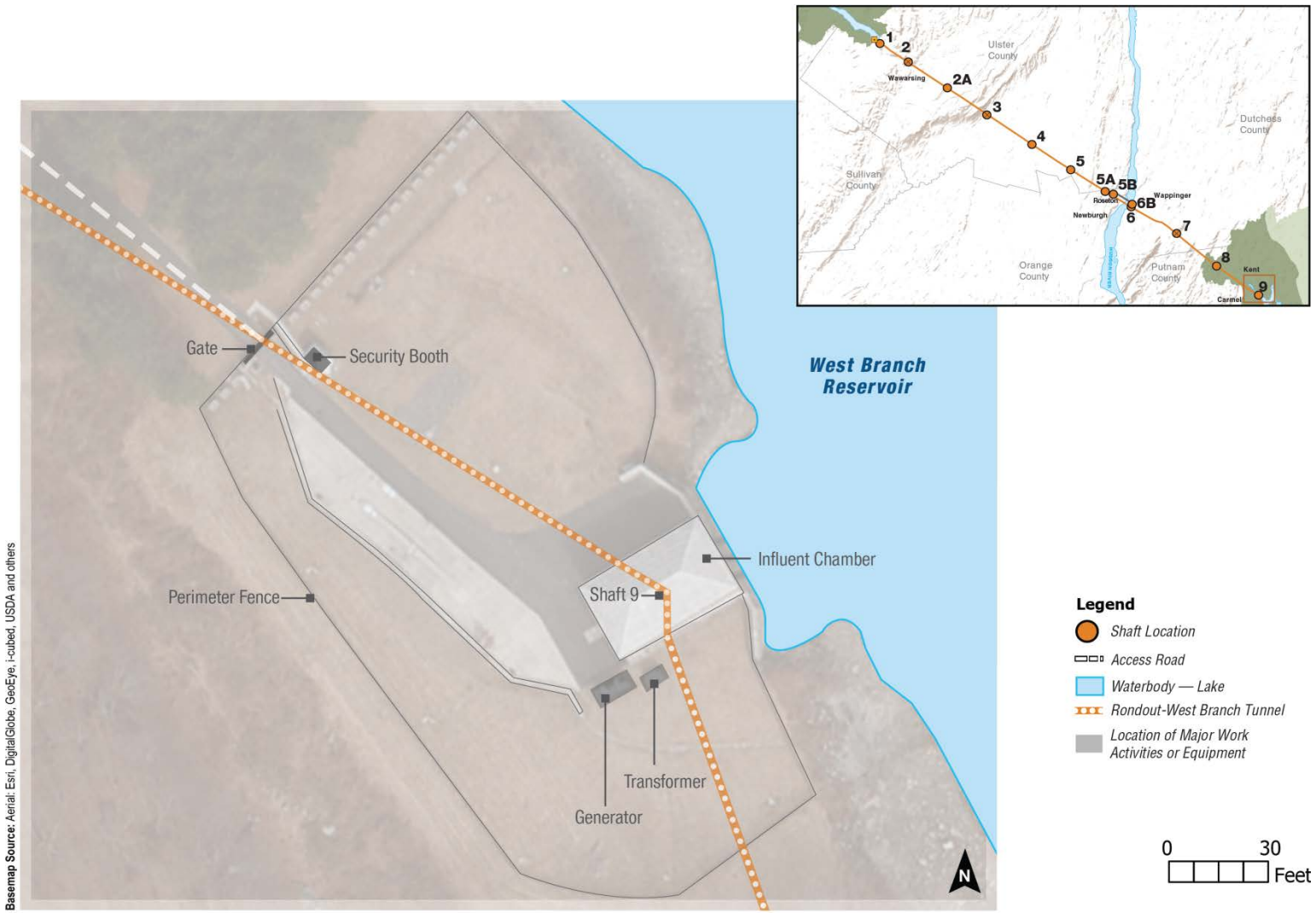
Site preparation at the Shaft 9 site would begin up to 6 months before the planned shutdown of the RWBT and would occur only Monday through Friday from 7 AM to 7 PM. Activities would include the installation of soil and erosion control measures and a tire washing system on the inside of the existing perimeter fence. Barriers would be installed on the inside of the existing perimeter fence to protect personnel and retain debris during the inspection and repair work. Noise and vibration barriers would also be installed, as necessary. In addition, temporary security measures would be installed, including jersey barriers, a security booth, and security cameras.

Prior to the proposed inspection, a ventilation fan would be installed at Shaft 9 to supply air to the RWBT, providing adequate air supply for personnel performing work within the RWBT. In addition, a hoisting system would be provided for installation of the ventilation and communication systems and to support the emergency entrance and exit of personnel and the requisite inspection equipment (e.g., vehicles, communication) and materials used during the course of the work. Similar to the other equipment, the hoisting system would be transported via truck to the Shaft 9 site when required. Communication systems would also be installed to allow for continuous tunnel-to-surface communication. Construction equipment and materials required for site preparation would be brought to the site by truck via the existing access road. This equipment and materials would include construction vehicles (e.g., pickup trucks, flat truck), 100-horsepower fans, cranes/hoists, 220-kilowatt generators, compressors, and a trailer.

Once the inspection and repair begins, work at the Shaft 9 site would occur 7 days a week from 7 AM to 7 PM. At this time, the RWBT would be drained over approximately 20 days. Simultaneously, the existing shaft cap, which is located within the existing building, would be removed.

Construction activities at the Shaft 9 site would peak during demolition of the existing shaft cap and installation of the ventilation and communication systems.

After site preparation is complete, starting in mid-October 2022, the ventilation would begin and would operate 24 hours per day, 7 days a week, for up to 8 months. Once the RWBT Bypass is connected, and the inspection and repair activities are completed, demobilization from the Shaft 9 site would commence, including removal of all equipment and materials. The site would be restored to baseline conditions by September 2023.



Note: The gray lines show the edge of the work area/site and outline other features of the existing shaft site.

Figure 11.8-4: Shaft 9

11.8.2 PUBLIC POLICY

As described in Section 11.3.2, "Land Use, Zoning, and Public Policy," a land use and zoning impact analysis for the inspection and repair within the Shaft 9 Study Area is not warranted.

The study area for the public policy analysis is the area within 0.25 mile of the Shaft 9 site, as shown on **Figure 11.8-1**. Although the Shaft 9 site is located in the Town of Kent, the Shaft 9 Study Area is located along the RWBT in the Towns of Kent and Carmel.

As discussed in Section 11.3.2, "Land Use, Zoning, and Public Policy," the inspection and repair's consistency with the applicable policies of the Town of Kent Comprehensive Plan within the Shaft 9 Study Area is analyzed as follows.

11.8.2.1 Town of Kent Comprehensive Plan (2008)

Recommendations found in the Town of Kent Comprehensive Plan (Town of Kent 2008) broadly address topics related, but not limited, to environmental protection, open space, historic and scenic assets, transportation, economic development, housing development and residential zoning, public services, and facilities. The Comprehensive Plan is intended to be reviewed and updated every 10 years. No goals or recommended actions within the Comprehensive Plan specifically pertain to the inspection and repair. However, the Comprehensive Plan does contain the following recommendation potentially relevant to effects of the inspection and repair in proximity to the West Branch Reservoir only:

- *Environmental Protection*
  - *Groundwater and Surface Water Protection: Implement stormwater management processes to limit peak runoff flows and to limit turbidity discharges.*

Under this principle, the Comprehensive Plan recommends the implementation of stormwater Best Management Practices in order to protect the health of aquatic and drinking water systems. This principle was analyzed for inspection and repair as work in the study area would potentially impact existing natural resources directly or indirectly.

The inspection and repair at the Shaft 9 site would take place on DEP land, be temporary, and be contained within the site. Stormwater would be managed on site by installing and maintaining erosion and sediment control practices, such as silt fencing and hay bales, and turbidity barriers, for the duration of construction. Therefore, the inspection and repair would be consistent with this principle.

Inspection and repair would therefore be consistent with the Town of Kent Comprehensive Plan and would not result in significant adverse impacts to public policy within Shaft 9 Study Area.

11.8.3 OPEN SPACE AND RECREATION

The study area for the open space analysis is the area within 0.25 mile of the Shaft 9 site and is shown on **Figure 11.8-5**.

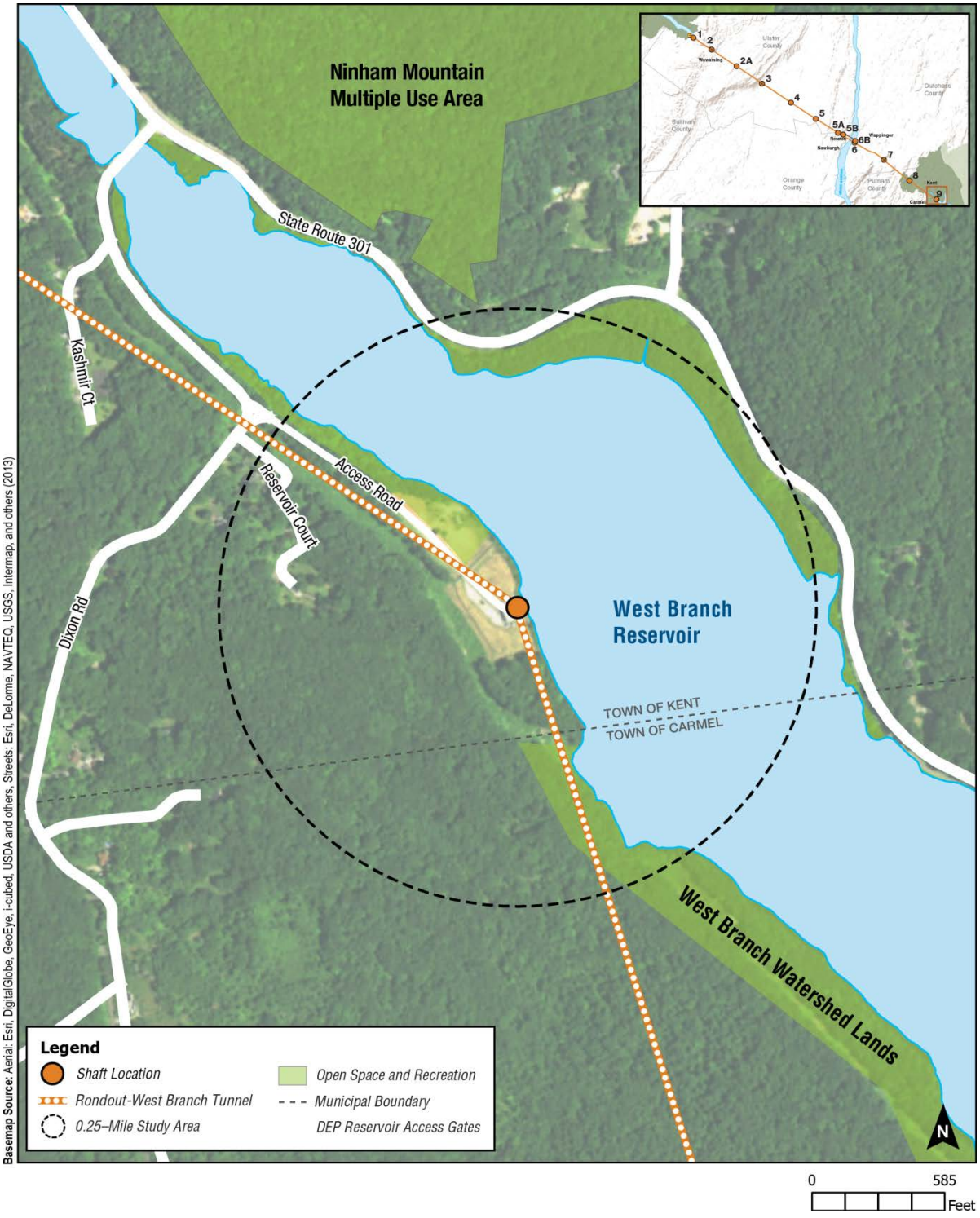


Figure 11.8-5: Open Space and Visual Resources – Shaft 9 Study Area

Approximately 48 acres of the West Branch Reservoir lies within the Shaft 9 Study Area. West Branch Reservoir, an open space resource approximately 1,050 acres in size, is stocked annually with fish and provides anglers with recreation opportunities such as offshore and non-motorized boat fishing and ice fishing with a DEP watershed access permit and fishing license. DEP provides site access via 16 gates surrounding the West Branch Reservoir. One of these access gates is located within the Shaft 9 Study Area across the reservoir from the Shaft 9 site. However, DEP Recreation Rules restrict access within 500 feet of any dikes, dams, tunnel outlets, spillways, buildings, and other significant water supply structures (Watershed Rules and Regulations Part 16-15(b)(1)).

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no plans to expand or create a new open space or recreational resources are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, would continue. Use of the identified open space is anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that open space and recreation within the Shaft 9 Study Area would be the same as baseline conditions.

Inspection and repair activities at the Shaft 9 site would be temporary, occur on DEP property, and be confined to an area not accessible to the general public. DEP would not limit the use of West Branch Reservoir for boaters and anglers as a result of the inspection and repair beyond the 500-foot restricted access area. As discussed in Section 11.8.8, "Noise," temporary increases in noise levels at the Shaft 9 site may discourage boating at West Branch Reservoir or other recreational uses of West Branch Reservoir. However, these activities are temporary, and upon completion of the inspection and repair, the recreational uses within West Branch Reservoir would return to baseline conditions.

As such, the inspection and repair would not encroach upon, cause a loss of, impact the physical character of, or affect views from the open space and recreational uses of West Branch Reservoir.

Therefore, the inspection and repair would not result in significant adverse impacts to open space and recreation within the Shaft 9 Study Area.

11.8.4 VISUAL RESOURCES

The study area for the visual resources analysis is the area within 0.25 mile of the Shaft 9 site. It also includes view corridors that extend beyond based on the locations that are publicly accessible, as required.

As shown on **Figure 11.8-5**, one visual resource exists within the Shaft 9 Study Area: West Branch Reservoir with its surrounding watershed lands, which is identified as a local resource. Approximately 48 acres of the approximately 1,050-acre West Branch Reservoir is located within the study area. Shaft 9 is located on the west side of a small portion of the reservoir, and is not visible from most of the reservoir. There is limited shoreline access surrounding Shaft 9, as DEP Recreation Rules state no access is permitted within 500 feet of any dikes, dams, tunnel outlets, spillways, buildings, and other significant water supply structures (Part 16-15(b)(1)).

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no new projects or structures that would alter views from visual or aesthetic resources are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Natural processes, such as changes in habitat due to natural vegetative succession, are anticipated to continue. Therefore, in the future without the inspection and repair, it is assumed that visual resources within the study area would be the same as baseline conditions.

The inspection and repair at the Shaft 9 site would occur on DEP property and would be temporary. Given the security restrictions at the site, there would be limited views of these work activities at Shaft 9 and within the reservoir from the nearest vantage point, and following completion of the inspection and repair, the Shaft 9 site would be restored to baseline conditions. As such, the inspection and repair would not result in changes to the future visual and aesthetic resource conditions of the views of the West Branch Reservoir.

Therefore, the inspection and repair would not result in significant adverse impacts to visual resources within the Shaft 9 Study Area.

11.8.5 NATURAL RESOURCES

The study area for the natural resources analysis is the area within 400 feet of the Shaft 9 site, as shown on **Figure 11.8-6.**

As described in Section 11.3.8, "Natural Resources," an impact analysis related to geology and soils, water resources (including groundwater, surface water, wetlands, and floodplains), aquatic and benthic resources, terrestrial resources, and wildlife within the Shaft 9 Study Area is not warranted.

11.8.5.1 Federal/State Threatened and Endangered Species

Federal/State Threatened and Endangered Species that have the potential to occur within the Shaft 9 Study Area are shown in **Table 11.8-1**. As described in Section 11.3.8, "Natural Resources," these species were identified by performing a review of the USFWS Official Species Lists and NYNHP database results, as well as data from the NYSDEC Nature Explorer, NYSDEC Breeding Bird Atlas, and Herp Atlas.

Table 11.8-1: Federal/State Threatened and Endangered Species, and Habitat Potentially within the Shaft 9 Study Area

Common Name	Scientific Name	Federal Listing	State Listing	Potential for Habitat	Potential for Species
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	BGPA	T	Yes	Yes

Notes:
BGPA: Bald and Golden Eagle Protection Act
T: Threatened
Source: USFWS Official Species List for Ulster and Putnam Counties; NYSDEC-NYNHP Database Consultation; NYSDEC Nature Explorer; Herp Atlas; 2000-2005 New York State Breeding Bird Atlas.

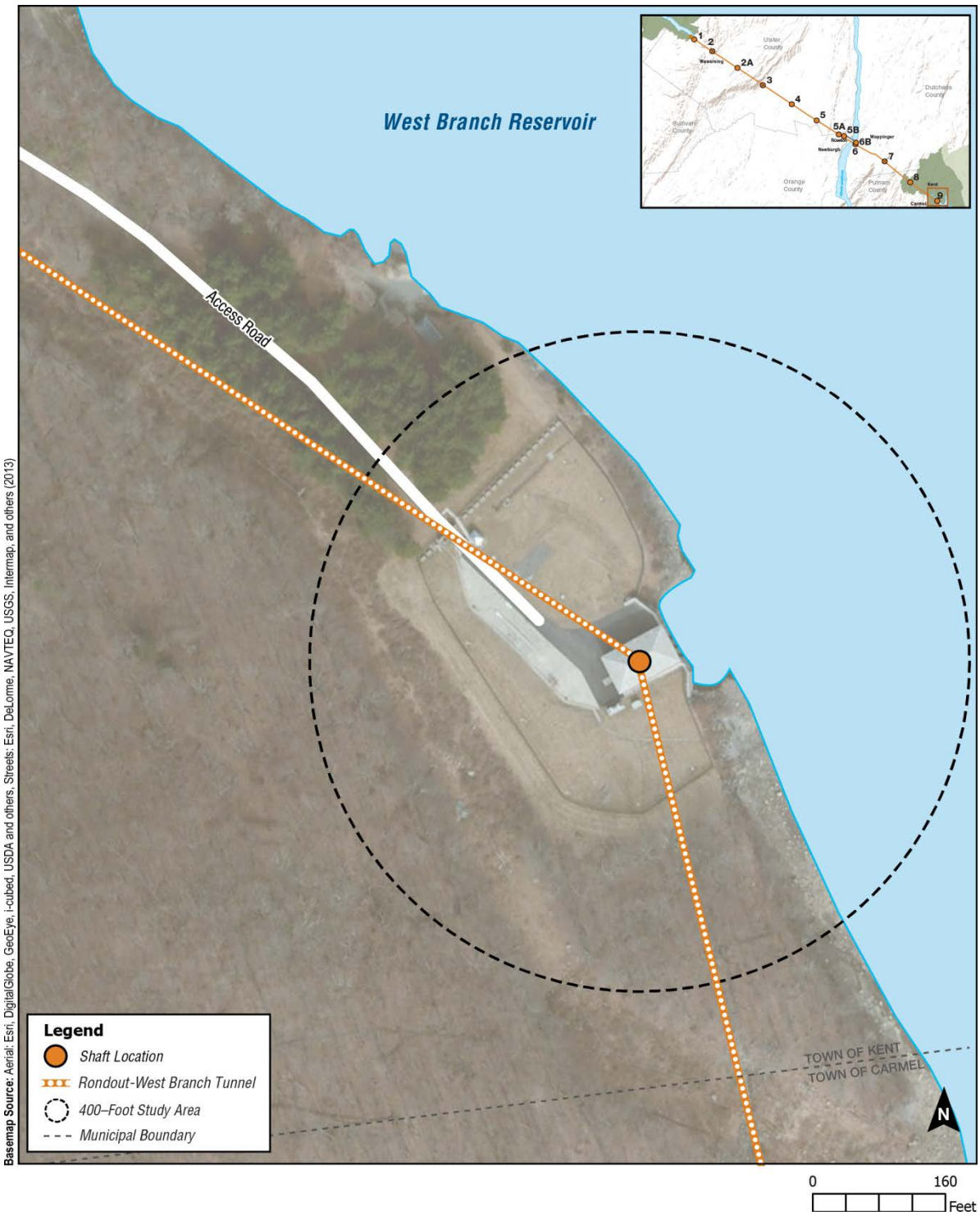


Figure 11.8-6: Natural Resources – Shaft 9 Study Area

In the future without the inspection and repair, it is assumed that federal/State Threatened and Endangered Species within the study area would be largely the same as baseline conditions, other than possible changes in habitat due to natural vegetative succession and general anthropogenic influences.

Bald Eagle (Haliaeetus leucocephalus)

As noted in Section 11.3.8, "Natural Resources," populations of Bald Eagles (*Haliaeetus leucocephalus*) have been documented in the region proximate to the study area, and suitable habitat for this species is known to exist in this area of Putnam County. A consultation with NYNHP indicated that a pair of breeding Bald Eagles nest at West Branch Reservoir. This Bald Eagle nest is located approximately 3,500 feet from the Shaft 9 site, well beyond the recommended buffer restrictions of 330 and 660 feet outlined by USFWS guidelines (USFWS 2007b). Inspection and repair activities at the Shaft 9 site, including any temporary noise, are not anticipated to disturb the Bald Eagles because of the distance between the nest and the work area. Further, the proposed activities would not affect West Branch Reservoir or the area within the 330- or 660-foot buffer surrounding the Bald Eagles' nest. Bald Eagles may still utilize the reservoir within the study area for other activities such as foraging or perching.

Following completion of the inspection and repair, the Shaft 9 site would be restored to baseline conditions. Based on this, there would be no disturbance associated with the inspection and repair to Bald Eagles or their habitat within the study area. Therefore, the inspection and repair at the Shaft 9 site may affect, but is not likely to adversely affect Bald Eagles.

Federal/State Threatened and Endangered Species Conclusions

Based on the impact analysis, no take is anticipated. Inspection and repair may affect, but is not likely to adversely affect, Bald Eagles. Therefore, the inspection and repair would not result in significant adverse impacts to federal/State Threatened and Endangered Species within the Shaft 9 Study Area.

11.8.6 HAZARDOUS MATERIALS

The study area for the hazardous materials analysis is the area within 0.25 mile of the Shaft 9 site (see **Figure 11.8-1**).

The Shaft 9 site is located off Dixon Road in the Town of Carmel, Putnam County. The Shaft 9 site, which is accessible via an access road connected to Dixon Road, is bounded by Dixon Road and Reservoir View Court to the west, a wooded area to the south, and the West Branch Reservoir to the north and east. As described in Section 11.3.9, "Hazardous Materials," a hazardous waste and contaminated materials screening was performed in 2015. Environmental database searches identified reported incidents and/or facilities within the Shaft 9 Study Area. The RCRA Generators database search identified three classifications of RCRA generators at the Shaft 9 site with an operator start date in 1941. The database identifies the current status, dated as of 2012, as a conditionally exempt small-quantity generator. The Resource Conservation and Recovery Act generator status at the site was as a small-quantity generator in 2000 and as a large quantity generator between 2008 and 2010. This site received a notice of violation in 1999. However, the 1999 inspection achieved compliance in 2010. Based

on additional research at the EPA's Enforcement and Compliance History website, RCRA and Clean Water Act inspections dated October 21, 2010 and February 8, 2012 identified a "No Violation" status in connection with Shaft 9.

In addition to the database above, The New York State Hazardous Waste Manifest System identified three manifest listings occurring between 2002 and 2009 at Shaft 9. This system tracks hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the off-site waste management facility. Based on a review of the database, several manifests associated with lead (D008), non-hazardous solids and/or debris, as well as unknown wastes, were handled at Shaft 9. No additional information was provided in the database in connection with these manifests.

The NYSDEC's Spill Database revealed six reported spills at the Shaft 9 site and one Leaking Storage Tank (LTANK) site approximately 1,100 feet west-northwest of Shaft 9. The tank was removed along with approximately 12 yards of soil and closed on May 22, 1991. All incidents identified at the Shaft 9 site were "closed" the same day or the day after they were reported, indicating that the incidents have been remediated to the satisfaction of the NYSDEC.

There is minimal potential for fire or hazards associated with the inspection and repair at the Shaft 9 site. In addition, the proposed activities do not involve soil removal and are therefore unlikely to encounter groundwater. Based on this information and the regulatory case "closed" status of the spills, the identified spills/LTANK sites would pose no hazardous risk to the environment or humans as a result of the inspection and repair.

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no developments or structures that would introduce hazardous materials to the environment are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that the presence of hazardous materials within the Shaft 9 Study Area would be the same as baseline conditions.

The inspection and repair at the Shaft 9 site would not require grading at or soil removal from the Shaft 9 site. Activities at the Shaft 9 site include site preparation; installation and operation of the ventilation, hoisting, and communication systems; and site restoration. The types of equipment to be used include construction vehicles (e.g., pickup trucks, flat trucks), cranes/hoists, 100-horsepower fans, 200-kilowatt generators, a compressor, and a trailer. These activities would require the use of a variety of petroleum and other chemical products (e.g., diesel fuel for vehicle, generators, and back-up power; lubricating oil for construction vehicles; and miscellaneous cleaning and maintenance chemicals). Construction equipment and materials required for the inspection and repair would be trucked to the Shaft 9 site when needed. The use and storage of petroleum and chemical products during the inspection and repair would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures requirements and State petroleum bulk storage, chemical bulk storage, and spill reporting requirements. Should any recognized environmental conditions be identified in advance of or during construction, DEP would be responsible for complying with applicable regulatory requirements.

Following completion of the inspection and repair, the Shaft 9 site would be restored to baseline conditions. As such, the inspection and repair would not result in significant increases to the public's or environment's exposure to hazardous materials.

Therefore, the inspection and repair would not result in significant adverse impacts from the presence or disturbance of hazardous materials within the Shaft 9 Study Area.

11.8.7 TRANSPORTATION

The study area for the transportation analysis is the area within 0.25 mile of the Shaft 9 site, as shown on **Figure 11.8-7**.

The Shaft 9 site is served by an access road via State Route 301 to Dixon Road. There are no major roadways or intersections within the Shaft 9 Study Area. The site driveway is an approximately 12-foot-wide, paved road running northwest from the Shaft 9 site that terminates at Dixon Road, a two-lane local collector with no recent traffic counts. Dixon Road continues northward from the site driveway, crosses West Branch Reservoir, and terminates at State Route 301 on the north side of the reservoir. In the vicinity of Dixon Road, State Route 301/ Carmel-Kent Cliffs Road is a two-lane, paved, rural principal arterial located on the northeast side of West Branch Reservoir that carries approximately 3,600 vehicles per day.

Several DEP employees may occupy the Shaft 9 site at a given time. The small number of DEP employee vehicles has little to no effect on traffic conditions within the Shaft 9 Study Area. There is no public transportation to or from the Shaft 9 Study Area and little to no pedestrian activity in the immediate vicinity of the Shaft 9 Study Area.

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no changes in land use or increases in traffic due to outside developments are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that traffic, public transportation, and pedestrian activities within the study area would be similar to baseline conditions.

The inspection and repair would occur at the DEP-owned Shaft 9 site and would result in vehicle trips for the transportation of crews and materials to and from the Shaft 9 site during the day and during peak existing traffic hours. All inspection and repair traffic is expected to arrive and depart the Shaft 9 site via State Route 301/Carmel-Kent Cliffs Road and Dixon Road to the northwest of the site. The estimated number of the inspection and repair peak-day one-way vehicle trips to the Shaft 9 site is 30 vehicles, approximately 60 peak-day vehicle round trips to and from the Shaft 9 site. Of these peak-day vehicle round trips, up to 25 vehicle trip ends (45 PCEs) could occur during the peak hour based on the assumption that 90 percent of the inspection and repair worker vehicles and 75 percent of the inspection and repair trucks would arrive or depart during the peak hour. On an average day, the estimated number of the inspection and repair vehicle round trips would be 40 vehicle round trips, with 17 vehicle trip ends that would occur during the peak hour.

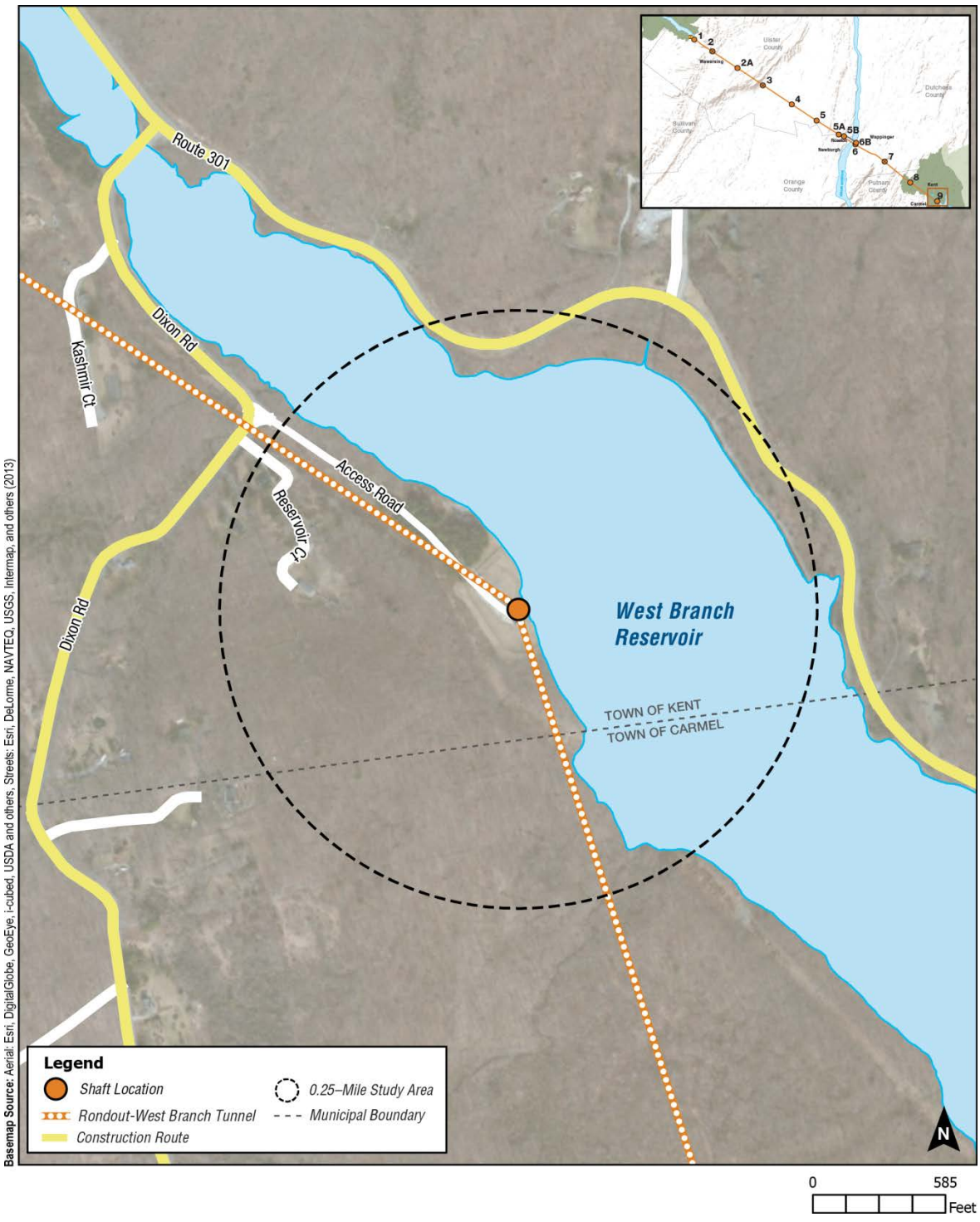


Figure 11.8-7: Transportation – Shaft 9 Study Area

For the purposes of this analysis, the peak project-generated traffic hour is assumed to coincide with typical construction hours for employee vehicles entering the site, from 6 AM to 7 AM and, as a result, is unlikely to coincide with the peak hour for existing traffic. Moreover, this peak number of vehicle trips to and from the site would occur only during a limited period during the inspection and repair activities at the Shaft 9 Study Area (i.e., no more than 4 weeks). To the extent available, the inspection and repair trucks would travel on truck-permitted roadways directly to and from the Shaft 9 site. The inspection and repair would result in 25 peak-hour vehicle trip ends within the Shaft 9 Study Area, which is less than the *CEQR Technical Manual* screening threshold of 50 peak-hour vehicle trip ends as described in Section 11.3.12, "Transportation." In addition, the inspection and repair activities at the Shaft 9 Study Area would be short-term (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the 8-month period).

The inspection and repair activities at the Shaft 9 site would not generate demands for public parking or transportation or an increase in pedestrian activity within the Shaft 9 Study Area. Following completion of the inspection and repair, the Shaft 9 site would be restored to baseline conditions.

Therefore, although there would be a minor temporary increase in traffic, the inspection and repair would not result in significant adverse impacts to transportation within the Shaft 9 Study Area.

11.8.8 NOISE

As described in Section 11.3.14, "Noise," mobile noise associated with the inspection and repair within the Shaft 9 Study Area does not warrant analysis. This section includes an analysis of potential impacts from stationary noise associated with the inspection and repair to sensitive receptors within the Shaft 9 Study Area.

The study area for the noise analysis is the area within 1,500 feet of the Shaft 9 site, as shown on **Figure 11.8-8**. The Shaft 9 Study Area includes all or part of nine residential properties.

Peak construction activities at the Shaft 9 Study Area would occur for approximately 2 weeks. As noted in Section 11.3.14.1, "Screening Assessment," the temporary construction activities were evaluated to determine compliance with local noise codes. The Shaft 9 site is located in the Town of Kent. The 1,500 feet study area also includes the Town of Carmel, as the town boundary is located approximately 700 feet from the Shaft 9 site; therefore, the inspection and repair activities at the Shaft 9 site are subject to the local noise regulations of both towns.

The Town of Kent noise code (§48-6) prohibits noise emitted from construction from 9 PM to 7 AM and 9 PM Saturday to 8 AM Sunday. The Town of Kent noise code (§48-6) also prohibits the creation of noise in connection with the loading or unloading of any vehicle between 7 PM and 7 AM and any time on Sunday. The Town of Kent does not have quantitative noise limits applicable to inspection and repair. The Town of Carmel noise code (§104-14) states that construction activities must comply with an L_{10} of 70 dBA during the hours of 8 AM to 6 PM and an L_{10} of 55 dBA from 6 PM to 8 AM, both at a distance of 400 feet from the construction site in residential-zoned districts. Construction activities would occur on site within the Town of Kent. These activities would take place 700 feet from the Town of Carmel, which exceeds the

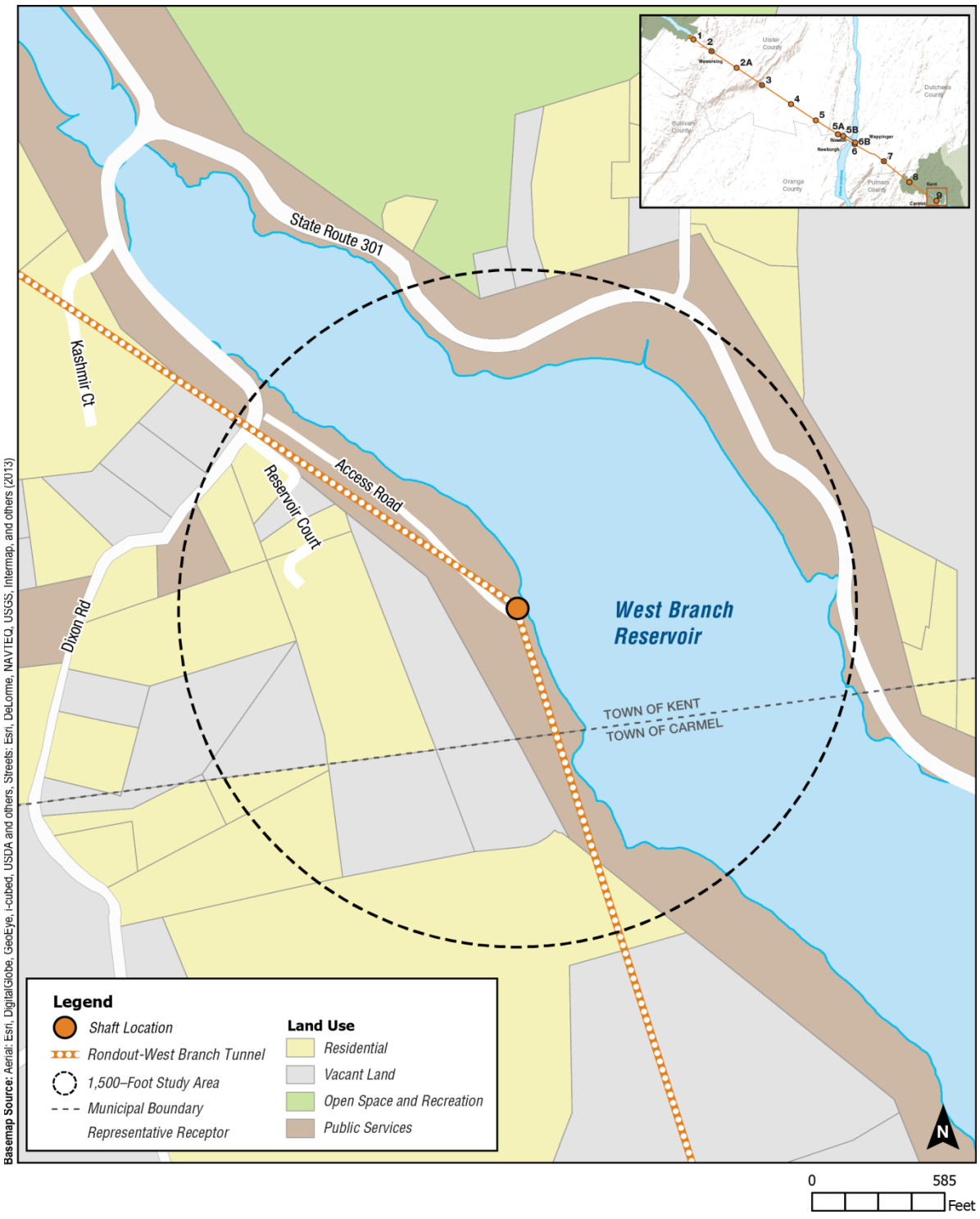


Figure 11.8-8: Noise – Shaft 9 Study Area

400-foot town code restriction. As such, the Town of Carmel noise code would not apply. However, the temporary construction activities were evaluated to disclose potential noise levels at the nearest residence.

Existing ambient noise levels within the Shaft 9 Study Area are influenced by vehicular traffic on State Route 301. The existing noise levels within the study area are comparable to a very quiet suburban and rural residential environment, based on proximity to major transportation corridors, population density of the area, and other noise-producing elements. Typical noise levels for very quiet suburban and rural communities are 40 dBA L_{eq} during the day and 34 dBA L_{eq} at night.

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no major projects that would result in a change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels, are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that ambient noise levels within the Shaft 9 Study Area would be similar to baseline conditions.

In the future with inspection and repair, stationary noise-producing activities would occur on 2 acres of DEP-owned land surrounding Shaft 9 and would include site preparation and operation of primary ventilation systems. Peak inspection and repair activities at the Shaft 9 site would occur between 7 AM and 7 PM, 7 days a week for approximately 2 to 3 weeks. However, the ventilation systems would operate 24 hours per day, 7 days a week for up to 8 months.

The noise analysis focused on stationary noise-generating equipment expected to operate constantly at the Shaft 9 site. The equipment types included in the stationary noise analysis for the Shaft 9 site and their reference noise levels are shown on **Table 11.8-2**. The number and types of noise-generating equipment analyzed were based conservatively on peak construction operating conditions.

Table 11.8-2: Stationary Source Construction Equipment Modeled at the Shaft 9 Site and Reference Noise Levels (L_{eq})

Equipment Type (Quantity)	Reference Noise Level (L_{eq}) at 50 feet (dBA)	Source
Generator (2)	75	Caterpillar[1]
Ventilation Fan(2)	51	Clarage[2]
Compressor (1)	80	CEQR[3]

Notes:
[1] Caterpillar Weather Protective and Sound Attenuated Enclosures (2014).
[2] Clarage 5155 AF – SWSI manufacturer sound pressure level estimate (2014).
[3] *City Environmental Quality Review (CEQR) Technical Manual,* Chapter 22 (2014).

The results of the stationary noise analysis are shown on **Table 11.8-3**. As shown in **Table 11.8-3**, the inspection and repair activities at the Shaft 9 site would not comply with the Town of Kent construction schedule requirements. Therefore, DEP would work with the Town of Kent, as appropriate. Although there would be an increase in stationary noise levels during

Table 11.8-3: Stationary Noise Analysis Results (L_{eq}) at the Nearest Noise-Sensitive Receptors within the Shaft 9 Study Area

Nearest Noise-Sensitive Receptor	Distance from Site (feet)	Conditions Analyzed	Predicted Stationary Noise Level at Noise-Sensitive Receptor (dBA)	Town of Kent Noise Limits (dBA)	Potential for Exceedance (Yes or No)
Nearest Residence	872	Daytime	57	NA	No
		Nighttime	57	Prohibited	Yes
Note: NA = Not Applicable					

24-hour construction, work would take place in the fall and winter months when residents typically have windows closed, and noise levels inside would be further reduced at the nearest residence to approximately 33 dBA during the daytime and nighttime hours.[6]

Following completion of the inspection and repair, the Shaft 9 site would be restored to baseline conditions. The inspection and repair activities would be temporary (i.e., approximately 8 months, with site preparation activities commencing up to 6 months in advance of the temporary shutdown).

Therefore, although there would be a temporary increase in noise, noise from the inspection and repair would not result in significant adverse impacts to sensitive receptors within the Shaft 9 Study Area.

11.8.9 NEIGHBORHOOD CHARACTER

The character of the Shaft 9 Study Area is largely defined by single-family residential and vacant land uses as well as its physical setting within a rural location (see **Figure 11.8-2**). The site is generally bounded by Dixon Road and Reservoir View Court to the west, wooded areas to the south and west, and West Branch Reservoir to the north and east. The work sites are located within a public services parcel owned and maintained by DEP. Access to the work site would be from an existing asphalt access road connected to Dixon Road.

DEP has consulted with the Towns of Kent and Carmel and Putnam County, and it is DEP's understanding that no changes in land use and no new projects or structures are anticipated within the Shaft 9 Study Area within the timeframe of the impact analysis. Therefore, in the future without the inspection and repair, it is assumed that neighborhood character within the study area would be similar to baseline conditions.

As described in Section 11.3.15, "Neighborhood Character," there would be no potential for the inspection and repair to affect shadows and urban design. In addition, based on the screening

[6] Calculated assuming a 24 dBA reduction from the predicted exterior noise levels for a closed window condition (with at least a single pane and storm window, or double pane window).

assessment for land use and zoning, socioeconomic conditions, historic and cultural resources, an impact analysis for the Shaft 9 Study Area are not warranted, as discussed in the following sections: Section 11.3.2, "Land Use, Zoning, and Public Policy," Section 11.3.3, "Socioeconomic Conditions," and Section 11.3.6, "Historic and Cultural Resources." As described in Section 11.8.3, "Open Space and Recreation," and Section 11.8.4, "Visual Resources," the work activities would not affect open space and recreation and visual resources in the Shaft 9 Study Area. Furthermore, the public policy impact analysis provided in Section 11.5.2, "Public Policy," concluded the work activities were consistent with applicable plans.

The work activities in the Shaft 9 Study Area would be short-term (approximately 6 months before and approximately 20 days during the temporary shutdown) and would result in a temporary increase in traffic and noise. Following completion of the inspection and repair, the construction equipment and vehicles would be removed from the study area and traffic patterns would return to baseline conditions. These temporary increases in traffic and noise levels would not result in a density of activity or service conditions that would affect the overall character of the study area. The inspection and repair would not generate significant adverse effects on land use, zoning, and public policy; socioeconomic conditions; open space and recreation; shadows; historic and cultural resources; urban design and visual resources; transportation; or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to neighborhood character within the Shaft 9 Study Area.

11.8.10 PUBLIC HEALTH

Water supply and in particular, the community users drawing water from the Delaware Aqueduct, would not be significantly affected by the inspection and repair within the Shaft 9 Study Area. DEP has developed an ongoing program to work with these communities, including reviewing the availability of back-up water supplies and analyzing the ability of these users to accommodate reduced access to the Delaware Aqueduct during the temporary shutdown, as appropriate and to meet all applicable drinking water standards.

Based on the environmental investigations completed within the Shaft 9 Study Area, results of testing conducted on soils support the reuse of excavated materials as backfill and do not suggest the need for special management, handling, or health and safety measures at this time. Inspection and repair work activities would require the potential storage and use of a variety of petroleum and other chemical products, such as diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals during construction. DEP would handle all materials in accordance with applicable federal, State, and local regulations and guidelines.

The work activities at the study area would be short-term (approximately 6 months before and approximately 20 days during the temporary shutdown) and would result in a temporary increase in noise. Following construction of the inspection and repair, the construction equipment, vehicles, and chemical storage would be removed from the study area, and operation of the Delaware Aqueduct would be consistent with baseline conditions.

Based on the above, the inspection and repair would not result in significant adverse impacts in any of the technical areas related to public health: air quality, water supply (quantity or quality), hazardous materials, or noise.

Therefore, the inspection and repair would not result in significant adverse impacts to public health within the Shaft 9 Study Area.