## 2.8-1 INTRODUCTION

This section of Chapter 2 examines the potential impacts from Project 1, Shaft and Bypass Tunnel Construction on terrestrial and aquatic natural resources[1] and floodplains, groundwater, and soils in the west of Hudson and east of Hudson study areas (described below) during construction.

This section is organized as follows:

- Section 2.8-2, "Methodology," describes the methodology for assessing impacts to natural resources within the study areas and discusses the regulatory programs that protect floodplains, groundwater, wildlife, threatened or endangered species, aquatic resources, or other natural resources within the study areas;
- Sections 2.8-3.1 and 2.8-4.1 describe the current condition of the floodplain, groundwater, and natural resources within the west of Hudson and east of Hudson study areas, respectively, including water quality, aquatic and terrestrial biota, and threatened or endangered species and species of special concern;
- Sections 2.8-3.2 and 2.8-4.2 describe the floodplain, groundwater, water quality, and natural resources conditions in the future without Project 1 (i.e., No Build) within the west of Hudson and east of Hudson study areas, respectively;
- Sections 2.8-3.3 and 2.8-3.4 describe the potential impacts of Project 1 on the floodplain, groundwater, and natural resources within the west of Hudson and east of Hudson study areas, respectively; and
- Section 2.8-5 presents conclusions.
- Section 2.8-6 provides a detailed list of references cited in this chapter.

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[1] The *CEQR Technical Manual* defines natural resources as "(1) the City's biodiversity (plants, wildlife and other organisms); (2) any aquatic or terrestrial areas capable of providing suitable habitat to sustain the life processes of plants, wildlife, and other organisms; and (3) any areas capable of functioning in support of the ecological systems that maintain the City's environmental stability."

## 2.8-2 METHODOLOGY

### 2.8-2.1 STUDY AREA

As presented in Chapter 1, "Program Description," construction activity for Project 1 would take place on both sides of the Hudson River. The study area for the natural resources assessment of potential impacts from the construction of Project 1 includes the components that would be constructed on both sides of the Hudson River, as well as the segment of the Hudson River within the vicinity of the east connection site (Shaft 6), as described below.

***WEST OF HUDSON***

The west of Hudson study area comprises the following:

- West connection site—Because Project 1 would not affect the surrounding terrestrial resources or the floodplain either directly or indirectly during construction of Project 1 at the west connection site, the assessment area is limited to the boundaries of the west connection site, as shown in **Figure 2.8-1**. An exception was made for the identification of threatened or endangered species, which were evaluated for a distance of at least 0.5 miles from this component of Project 1.
- Dewatering pipeline—As discussed in Chapter 1, two potential dewatering pipeline routes ~~are being~~ were considered (see Figure 2.8-1). Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline, selecting one potential dewatering pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS. The potential pipeline routes extend along existing rights-of-way and through some private property before reaching the new outfall. Because the exact alignment for the dewatering pipeline has not been determined, the assessment area for this component of Project 1 includes an approximately 6.5-foot-wide trench for the installation of the up to 30-inch-diameter dewatering pipeline and area immediately adjacent to it that could be located on either side of existing rights-of-way.
- Roseton stream study site—Project 1 would have the potential to impact an unnamed Class C stream (New York State Waters Index # H-100 and P364) (see Figure 2.8-1), the Roseton stream, and the riparian habitats associated with this stream as a result of the dewatering pipeline. The stream is a tributary to the Hudson River, with its confluence located near Hudson River Mile 66, and is designated as Class A in the tidal portion, which is the same use classification as the Hudson River in this location. This stream and habitats could also be affected by Project 2B, Bypass Tunnel Connection and RWBT Inspection and Repair, including Wawarsing, as described in Chapter 1; this potential is described generically in Chapter 4, Probable Impacts of Project 2B: Bypass Tunnel Connection and RWBT Inspection and Repair, Including Wawarsing. Potential impacts will be evaluated in detail in the second EIS or a subsequent environmental review, as appropriate.


Figure 2.8-1
**West of Hudson Study Area**

### *EAST OF HUDSON*

The only component of Project 1 in the east of Hudson study area is the east connection site (Shaft 6 site). The assessment area is limited to the boundary of the east connection site (as shown in Figure 1-12 in Chapter 1, "Program Description," as well as in **Figure 2.8-2**) and the segment of the Hudson River from the east connection site south to the confluence of the ~~Class C~~stream within the Roseton stream study site with the Hudson River. The identification of threatened or endangered species was evaluated for a distance of at least 0.5 miles from the east connection site.

## 2.8-2.2 EXISTING CONDITIONS METHODOLOGY

Existing conditions for floodplains, groundwater, wetlands, soils, and terrestrial and aquatic resources within the study areas were summarized from the following sources:

- Existing information identified in literature and obtained from governmental and non-governmental agencies, such as the Federal Emergency Management Agency (FEMA) flood insurance rate maps; Natural Resources Conservation Service (NRCS) National List of Hydric Soils and Web Soil Survey; data from U.S. Geological Survey (USGS) streamgage 01372058—Hudson River Below Poughkeepsie, NY; data from New York State Department of Environmental Conservation (NYSDEC) monitoring station 13010077—Hudson River (Lower) in Poughkeepsie; U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and federally listed threatened or endangered species for Orange and Dutchess Counties, NY; NYSDEC tidal and freshwater wetlands maps; National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Essential Fish Habitat designations; 2000-2005 New York State Breeding Bird Atlas; NYSDEC Herp Atlas Project; Ecological Communities of New York State (Edinger et al. 2002); 2010 National Audubon Society Christmas Bird Count; NYSDEC Bureau of Fisheries, and the Orange County Water Authority.
- Responses to requests for information on rare, threatened, or endangered species in the vicinity of the west of Hudson and east of Hudson study areas. These requests were submitted to the NMFS and the NYSDEC New York Natural Heritage Program (NYNHP).
- On-site wildlife observations—Observations included daytime visual surveys of birds, mammals, and reptiles and amphibians conducted in accordance with Manley et al. (2006). Birds that were heard but not seen were identified by their call. Reptile and amphibian observations included investigating under cover items, such as leaf litter, rocks, logs, and bark, in temporary pools and seeps, and along permanent water sources as described by Parris (1999) and Ryan et al. (2002), and evening frog call surveys of vernal pools[2] observed at the west connection site (Manley et al. 2006). Winter reconnaissance was conducted at the east connection site to record observations of

[2] Temporary isolated ponds that form as shallow depressions in forests, floodplains, and meadows fill water from rain, snowmelt, or groundwater.

12.16.11

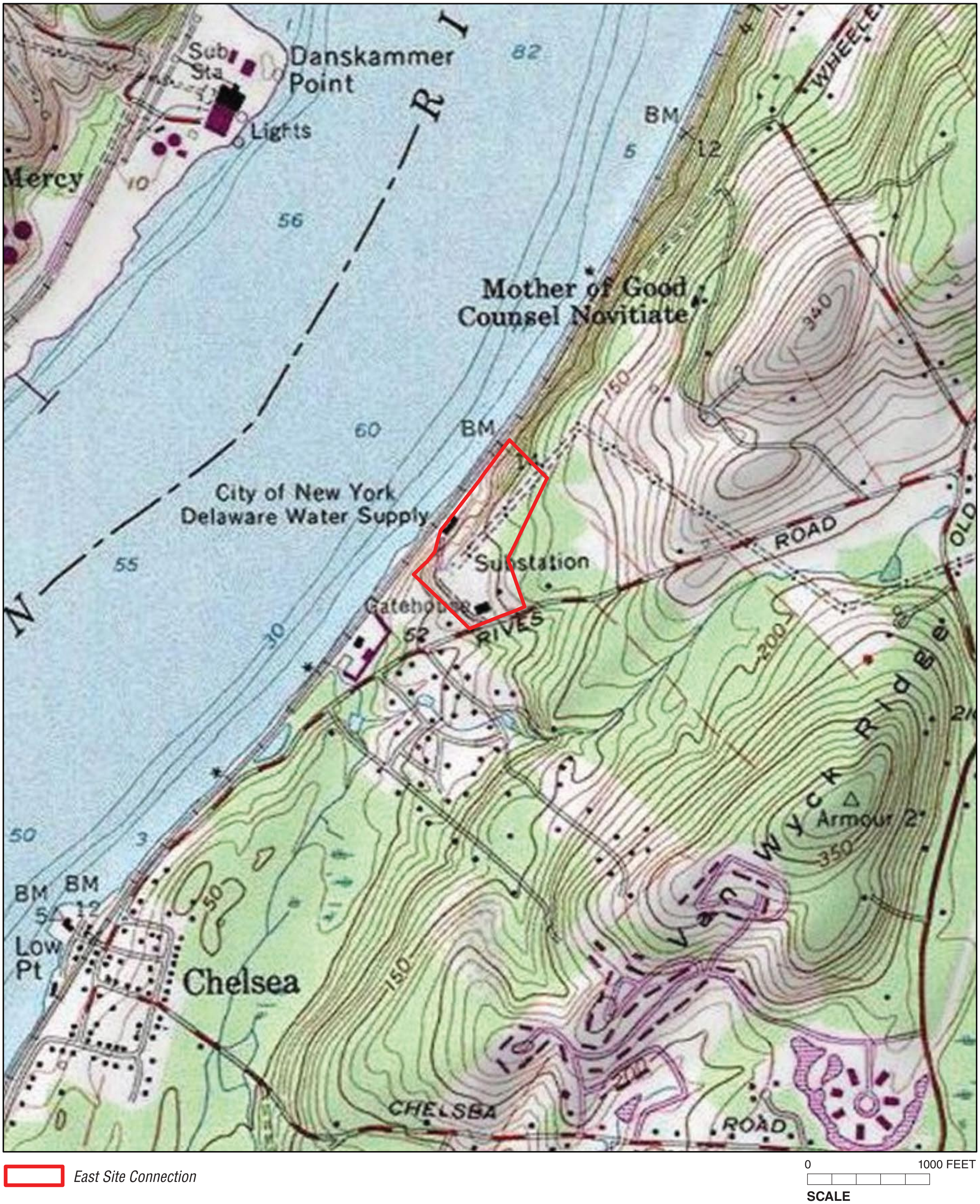


Figure 2.8-2

**East Connection Site: USGS Map**

Hudson River wintering bald eagle and waterfowl activity on the Hudson River. Incidental observations of wildlife were also recorded during other field studies, including wetlands assessments, tree surveys, and the fish and benthic macroinvertebrate survey of the Roseton stream study site.

- Results of wetland delineation conducted on the west connection site—A wetlands delineation was conducted on June 10, 2011, in accordance with the U.S. Army Corps of Engineers (USACE) three parameter approach.[3] The boundaries of each wetland were flagged in the field and surveyed.
- Results of the fish and benthic macroinvertebrate surveys of the Roseton stream study site—Fish were sampled by electrofishing, and benthic macroinvertebrates were sampled using a D-frame dip net in accordance with the U.S. Environmental Protection Agency's (EPA) Rapid Bioassessment Protocols[4] within the four stream segments identified in Figure 2.8-1 (see Appendix 2.8-1, "Roseton Stream Study Methodology," for detailed discussion of the stream survey methodology).
- Results of Roseton stream study site wetlands assessment—This screening level assessment was conducted in accordance with the 2010 *New York City Environmental Quality Review (CEQR) Technical Manual* (January 2012) to identify the approximate areal extent and characteristics of wetlands within the assessment area for the stream, and identify other potential wetland areas not identified by the NWI. It included examination of recent aerial images, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service soils information to identify hydric soils within this assessment area, topographic information, and NWI maps to identify approximate location and size of wetland areas prior to site reconnaissance. During site reconnaissance of the Roseton stream study site, approximate wetland boundaries were described using federal criteria for determining hydrophytic vegetation and wetland hydrology and noted on field maps.
- Tree surveys—In accordance with the Town of Newburgh Zoning Code §185-57.D(13) at the west connection site trees equal to or greater than 8 inches diameter at breast height (dbh) were identified to genus and/or species, measured with a dbh tape or Biltmore stick, and tagged for surveying by land surveyor. In accordance with the Town of Wappinger

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[3] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.; U.S. Army Corps of Engineers. 2009, http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf, Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-09-19. Vicksburg, MS: U.S. Army Engineer Research and Development Center, http://www.usace.army.mil/CECW/Documents/cecwo/reg/trel09-19.pdf.

[4] http://water.epa.gov/scitech/monitoring/rsl/bioassessment/index.cfm Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Zoning Code §240-84.B(12), at the east connection site trees equal to or greater than 12 inches dbh were identified and tagged for surveying by land surveyor.

- Results of potential Indiana bat (*Myotis sodalis*) summer roosting tree habitat assessment—At the west and east connection sites, trees were identified that met the general morphological characteristics of appropriate summer roosting habitat as outlined in the USFWS guidance documents.[5] The locations of these potential roost trees were recorded with a hand-held GPS unit and representative photographs taken. Documentation of these assessments was submitted to the NYSDEC and the USFWS for review.
- Results of vegetation surveys—Dominant ecological communities were characterized according to Edinger et al. (2002) "Ecological Communities of New York State" during a meandering survey of the west and east connection sites.

**Table 2.8-1** summarizes the field efforts conducted within the study areas for the natural resources assessment.

**Table 2.8-1**
**Summary of Field Efforts Conducted Within the Study Areas for the Natural Resources Assessment**

| Project Component | Date | Field Effort |
|---|---|---|
| **West connection site** | March 3, 25, 29, and 30, 2011 | Tree survey/potential Indiana bat habitat assessment |
| | May 20, 2011 | Evening frog call survey |
| | May 25, 2011 | Wildlife visual survey |
| | June 10, 2011 | Wetland delineation and vegetation survey |
| | June 25, 2011 | Wildlife visual survey |
| | June 29 and July 19, 2011 | Vegetation and tree survey/potential Indiana bat habitat assessment |
| **Roseton stream study site** | June 13, 2011 | Wildlife visual survey |
| | June 14, 2011 | Fish and benthic macroinvertebrate sampling |
| | June 21 and 29, 2011 | Wetland assessment |
| | July 18, 2011 | Fish and benthic macroinvertebrate sampling |
| | July 19, 2011 | Vegetation survey |
| | September 13, 2011 | Fish and benthic macroinvertebrate sampling |
| | December 1, 2011 | Fish sampling |
| **East connection site** | July 20, 2010 | Vegetation survey and wildlife visual survey |
| | September 29, 2010 | Wildlife visual survey; tree survey/potential Indiana bat habitat assessment; vegetation survey |
| | October 22, 2010 | Wildlife visual survey; tree survey/potential Indiana bat habitat assessment |
| | December 29, 2010, January 25, February 22, and March 20, 2011 | Hudson River wintering bald eagle and waterfowl reconnaissance |
| | March 30, 2011 | Wildlife visual survey; tree survey/potential Indiana bat habitat assessment |
| | May 25 and June 22, 2011 | Wildlife visual survey |
| **Note:** The Roseton stream study site includes the dewatering pipeline route. | | |

[5] http://www.mcrcc.osmre.gov/MCR/Resources/bats/pdf/IN%20BAT%20DRAFT%20PLAN%20apr07.pdf and http://www.fws.gov/northeast/nyfo/es/Ibat%20fact%20Sheet%20Sept%202010%20final.pdf

### 2.8-2.3 FUTURE WITHOUT PROJECT 1 METHODOLOGY

The assessment of floodplain, groundwater, and terrestrial and aquatic natural resources in the future without Project 1 (the No Build condition) considers these resources in the 2020 analysis year without Project 1. In the future without Project 1 in the west of Hudson study area, the Town of Newburgh has identified the Orchard Hill residential development and a small convenience store/gas station on Route 9W aspending projects in the vicinity of the Roseton stream study site. No other projects have been identified. The Orchard Hill development has the potential to affect natural resources of this portion of the natural resources study area. No other significant changes in land use that would affect natural resources are anticipated in the west of Hudson study area. In the east of Hudson study area, no significant changes are expected in the floodplain, groundwater, and natural resources, including the Hudson River.

### 2.8-2.4 FUTURE WITH PROJECT 1 METHODOLOGY

Potential impacts on the floodplain, groundwater, aquatic, and terrestrial resources from construction of Project 1 were assessed by considering the following:

- The existing water quality and natural resources of the Hudson River in the vicinity of the study areas.
- The potential for construction of one in-water componen~~ts~~, ~~such as~~ the construction of a new outfall within the tidal portion of the ~~in the~~ unnamed ~~Class C~~ stream within the Roseton stream study site, just upstream of its confluence with the Hudson River where it is a Class A water,~~ or on the Hudson River,~~ to result in temporary impacts to water quality and aquatic organisms due to temporary increases in suspended sediment during sediment disturbance.
- The potential for discharge of stormwater from the west and east connection sites during construction of Project 1 to affect water quality and aquatic biota of the unnamed Class C stream within the west connection site, and the Hudson River, respectively.
- The potential for the discharge of groundwater recovered during dewatering of the shafts (during construction on the west and east connection sites) to affect water quality and aquatic biota of the unnamed Class C stream within the west connection site or the Hudson River, respectively.
- The potential for discharge of groundwater recovered during dewatering of the bypass tunnel during construction to adversely affect water quality and aquatic biota of the tidal portion (Use Class A) of the ~~unnamed Class C~~ stream within the Roseton stream study site or the Hudson River.
- Direct impacts to vegetative resources and wetlands due to land clearing, grading, and other construction activities on the west and east connection sites, and construction of the dewatering pipeline.

- Direct impacts to wildlife individuals and regional wildlife populations due to the loss of habitat resulting from land clearing on the west and east connection sites, and any clearing required for the installation of the dewatering pipeline. Impacts to wildlife at the west connection site due to land clearing were assessed under two scenarios. Under the first scenario, all clearing and grading would ~~be limited, and would~~ occur between October 1 and March 31. Under the second scenario, removal of trees identified as potential Indiana bat summer roost sites (see section 2.8-3.1, "Existing Conditions—West of Hudson") would be limited to October 1 to March 31. Thereafter, clearing of all other vegetation could occur from April 1 through September 30. This second scenario was developed to assess a potential delay in the currently planned start date of early 2013.
- Indirect impacts to wildlife individuals and regional wildlife populations, such as avoidance of certain habitat areas due to increased human activity, blasting and other construction noise, movement of construction equipment, and nighttime lighting on the connection sites.

### 2.8-2.5 REGULATORY CONTEXT

Activities associated with Project 1—such as work in and adjacent to wetlands and surface waters, bypass tunnel construction under the Hudson River, discharge of groundwater recovered during dewatering and stormwater, clearing of trees, and activities within the New York State Coastal Zone—must comply with federal, state, and local legislation and regulatory programs that pertain to activities in coastal areas, surface waters, floodplains, wetlands, and the protection of threatened or endangered species.

#### *FEDERAL*

#### *Clean Water Act (33 USC §§ 1251 to 1387)*

The objective of the Clean Water Act, also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, groundwater recovered during dewatering, and stormwater, the discharge of dredged or fill material into navigable waters and other waters; and non-point source pollution, such as runoff from streets, agricultural fields, construction sites, and mining that enter water bodies from other than the end of a pipe.

Section 404 of the Act requires authorization from the Secretary of the Army, acting through USACE, for the permanent or temporary discharge of dredged or fill material into navigable waters and other waters of the United States. Waters of the United States is defined in 33 CFR 328.3 and includes wetlands, mudflats, and sandflats that meet the specified requirements, in addition to streams and rivers that meet the specified requirements. Activities authorized under Section 404 must comply with Section 401 of the Act.

Under Section 401 of the Act, any applicant for a federal permit or license for an activity that may result in a discharge to navigable waters must provide to the federal agency issuing a permit a certificate, either from the state where the discharge would occur or from an interstate water pollution control agency, that the discharge would comply with Sections 301, 302, 303, 306, 307, and 316 (b) of the Clean Water Act. Applicants for discharges to navigable waters in New York must obtain a Water Quality Certification from NYSDEC.

***Rivers and Harbors Act of 1899***

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through USACE, for the construction of any structure in or over any navigable water of the United States, the excavation from or deposition of material in these waters, or any obstruction or alteration in navigable waters of the United States. The purpose of this Act is to protect navigation and navigable channels. Any structures placed in or over navigable waters, such as pilings, piers, or bridge abutments up to the mean high water line, are regulated pursuant to this Act.

***Magnuson-Stevens Act (16 USC §§ 1801 to 1883)***

Section 305(b)(2)-(4) of the Magnuson-Stevens Act outlines the process for the NMFS and the Regional Fishery Management Councils (in this case, the Mid-Atlantic Fishery Management Council) to comment on activities proposed by federal agencies (issuing permits or funding projects) that may adversely impact areas designated as essential fish habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC §1802(10)).

Adverse impacts on EFH, as defined in 50 CFR 600.910(A), include any impact that reduces the quality and/or quantity of EFH. Adverse impacts may include:

- Direct impacts, such as physical disruption or the release of contaminants;
- Indirect impacts, such as the loss of prey or reduction in the fecundity (number of offspring produced) of a managed species; and
- Site-specific or habitat-wide impacts that may include individual, cumulative, or synergetic consequences of a federal action.

***Endangered Species Act of 1973 (16 USC §§ 1531 to 1544)***

The Endangered Species Act of 1973 recognizes that endangered species of wildlife and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people. The Act prohibits the importation, exportation, taking, possession, and other activities involving illegally taken species covered under the Act, and interstate or foreign commercial activities. The Act also provides for the protection of critical habitats on which endangered or threatened species depend for survival.

### *Fish and Wildlife Coordination Act (PL 85-624; 16 USC 661-667d)*

The Fish and Wildlife Coordination Act entrusts the Secretary of the Interior with providing assistance to, and cooperation with, federal, state, and public or private agencies and organizations to ensure that wildlife conservation receives equal consideration and coordination with other water-resource development programs. These programs can include the control (such as a diversion), modification (such as channel deepening), or impoundment (dam) of a body of water.

### *Migratory Bird Treaty Act (16 USC §§703-712)*

The Migratory Bird Treaty Act implements the United States' commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. Each of the treaties protects selected species of birds and specifies basic closed and open seasons for hunting game birds. The Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Title 50, Section 10.13, of the Code of Federal Regulations (50 CFR 10.13) lists the bird species protected under the Act.

### *Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c)*

The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Disturbing means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

## *NEW YORK*

### *Protection of Waters, Article 15, Title 5, Environmental Conservation Law [ECL], Implementing Regulations 6 NYCRR Part 608.*

NYSDEC is responsible for administering the Protection of Waters Act and regulations to govern activities on surface waters (i.e., rivers, streams, lakes, and ponds). The Protection of Waters Permit Program regulates five different categories of activities: disturbance of stream beds or banks of a protected stream or other watercourse; construction, reconstruction, or repair of dams and other impoundment structures; construction, reconstruction, or expansion of docking and mooring facilities; excavation or placement of fill in navigable waters and their adjacent and contiguous wetlands; and Water Quality Certification for placing fill or other activities that result in a discharge to waters of the United States in accordance with Section 401 of the Clean Water Act.

***Freshwater Wetlands Act, Article 24, Environmental Conservation Law [ECL], Implementing Regulations 6 NYCRR Part 662***

The Freshwater Wetlands Act requires NYSDEC to map freshwater wetlands protected by the Act (12.4 acres or greater in size or of "unusual local importance" containing wetland vegetation characteristic of freshwater wetlands as specified in the Act). Around each mapped wetland is a protected 100-foot adjacent area that serves as a buffer. In accordance with the Act, the NYSDEC ranks wetlands in one of four classes that range from Class I, which represents the greatest benefits and is the most restrictive, to Class IV. The permit requirements are more stringent for a Class I wetland than for a Class IV wetland. Certain activities (e.g., normal agricultural activities, fishing, hunting, hiking, swimming, camping or picnicking, routine maintenance of structures and lawns, and selective cutting of trees and harvesting fuel wood) are exempt from regulation. Activities that could have negative impact on wetlands are regulated and require a permit if conducted in a protected wetland or its adjacent area. There are no mapped state freshwater wetlands in the study areas.

***State Pollutant Discharge Elimination System (SPDES) (N.Y. Environmental Conservation Law [ECL] Article 3, Title 3; Article 15; Article 17, Titles 3, 5, 7, and 8; Article 21; Article 70, Title 1; Article 71, Title 19; Implementing Regulations 6 NYCRR Articles 2 and 3)***

Title 8 of Article 17, ECL, Water Pollution Control, authorized the creation of the State Pollutant Discharge Elimination System (SPDES) to regulate discharges to New York State's waters. Activities requiring a SPDES permit include point source discharges of wastewater into surface or groundwaters of the state, including the intake and discharge of water for cooling purposes, constructing or operating a disposal system (i.e., sewage treatment plant), discharge of groundwater recovered during dewatering, and discharge of stormwater from construction activities that disturb one or more acres.

***Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (Environmental Conservation Law [ECL], Sections 11-0535[1]-[2], 11-0536[2], [4], Implementing Regulations 6 NYCRR Part 182)***

The Endangered and Threatened Species of Fish and Wildlife, Species of Special Concern Regulations prohibit the taking, import, transport, possession, or selling of any endangered or threatened species of fish or wildlife, or any hide, or other part of these species as listed in 6 NYCRR §182.6.

***Endangered, Threatened, Rare, and Exploitably Vulnerable Species of Plants; § 9-1503. Removal of Protected Plants. (Environmental Conservation Law [ECL], Sections 9-1503[1-3], Implementing Regulations 6 NYCRR Part 193.3)***

No person shall "pick, pluck, sever, remove, damage by the application of herbicides or defoliants or carry away, without the consent of the owner thereof, any protected plant" as listed in 6 NYCRR §193.3.

### *LOCAL*

#### *Town of Newburgh*

Wetlands are discussed in the following sections of the Town of Newburgh Town Code:

- Town Code Chapter 83 – Clearing and Grading—Wetland is defined as “Areas of aquatic or semiaquatic vegetation or any areas which have been mapped as such by the County Soil and Water Conservation District or the New York State Department of Environmental Conservation under the Freshwater Wetlands Act. Editor's Note: See Environmental Conservation Law § 24-0101 et seq.” Watercourse is defined as “Any natural or artificial stream, river, creek, channel, canal, conduit, culvert, drainageway, gully, ravine or wash in which water flows in a definite direction or course, either continuously or intermittently, and which has a definite channel, bed and banks.” A permit must be obtained prior to conducting “[s]ite preparation within wetlands or within a one-hundred-foot buffer strip of a wetland.” Site preparation activities include excavation, clearing, grading, filling, and timber harvesting. The following activity is exempt from permit requirements: “Clearing or grading which affects less than ten thousand (10,000) square feet of ground surface, except where said clearing or grading occurs within wetlands, within a one-hundred-foot buffer strip of a wetland or within the one-hundred-year floodplain of any watercourse or within a critical environmental area.”
- Chapter 185 – Zoning—Wetland, Protected is defined as “An area subject to continued marginal inundation or saturation of soil such that it contains specific indicator vegetation types as defined on a map prepared by the New York State Department of Environmental Conservation (DEC) in March 1987, and as subsequently amended by the DEC, and all land within 100 feet of such wetland boundary; or all lands subject to federal wetland regulation or jurisdiction; and either federal or state land which has not been granted a permit for development by either the federal or state agency(ies) having jurisdiction.” Unless a permit is obtained from the applicable regulatory agencies, protected wetlands are subject to regulations, including those listed below.
  - No structure or filling of land shall be permitted within a protected wetland that will result in a reduction of the runoff storage capacity of the wetland or the elimination of any indicator vegetation association from the protected wetland.
  - Any use conducted within or adjacent to a protected wetland shall make long-term provisions for the control of erosion and the transport of silt and debris to the protected wetland so that said wetland will not be subjected to unnecessary accretion of sediments.
- Chapter 157 Stormwater Management—Wetland is defined as “Any area meeting the requirements of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (latest edition), and/or any area identified by the New York State Department of Environmental Conservation (NYSDEC) as being a state-protected wetland.” Watercourse is defined as “A permanent or intermittent stream or other body of water,

> either natural or man-made, which gathers or carries surface water." Stormwater Management Plans must include "[a] description of all watercourses, water bodies and wetlands on or adjacent to the site or into which the stormwater flows." Furthermore, without the appropriate permits or a letter from the applicable regulatory agencies, "[s]tormwater management facilities shall not be constructed within or discharge directly to wetland areas, wetland buffer areas or existing water bodies."

Streams are protected under Chapter 83 – Clearing and Grading. This chapter states that site preparation activity, when feasible, shall be avoided within fifty feet of a stream, and all clearing or other debris shall be removed from watercourses.

## 2.8-3 WEST OF HUDSON

### 2.8-3.1 EXISTING CONDITIONS—WEST OF HUDSON

***WEST CONNECTION SITE***

The approximately 32.9-acre west connection site is located in the Town of Newburgh, Orange County, NY, on the west side of Route 9W. The majority of the site is wooded and undeveloped. The site is bordered on the north and west by other undeveloped, wooded properties. A narrow gravel access road reaches to the western border of the site. The site is steeply sloped (see **Figure 2.8-3**), with a 200-foot elevation change from Route 9W to the western boundary. A NYSDEC Use Class C stream (New York State Waters Index #H-103-1-3, which is a third order tributary to Lattintown Creek) runs through the southeastern portion of the site (see Figure 2.8-1).

The eastern portion of the site, which is commercial, has a road frontage on Route 9W and several vacant buildings, including a former restaurant and bar, and a single-family home with a barn, a cinderblock outbuilding, and several trailers. The western portion of the site contains a vacant single-family home and a shed. The following sections describe the geology and soils, groundwater, floodplain and aquatic and terrestrial resources of the west connection site.

***Geology and Soils***

The west connection site is located in the Hudson Highland, part of the Reading Prong geologic province that ranges from Pennsylvania to Connecticut.[6] This province is composed of Mesoproterozoic-aged[7] metamorphic rocks that were further deformed[8] during a long period of

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[6] 2000. Chapter 5: Collision! Hudson Highlands and Manhattan Prong. in Isachsen, Y.W., Landing, E., Lauber, J.M., Rickard, L.V., Rogers, W.B., eds. Geology of New York: A Simplified Account (second edition). New York State Museum, Albany, NY. 294pp.

[7] A geologic era that occurred between 1,600 and 1,000 million years ago.

[8] Deformation is any change in the original shape or volume of rock masses, produced by mountain-building forces. Folding, gaulting, and plastic flow are common modes of rock deformation.


Figure 2.8-3

**West Connection Site and Stream Study Area USGS Map**

mountain building that occurred during this geologic era[9] which resulted in numerous folds and faults. The shapes of valleys in the region often follow the trend of the faults. Subsequent mountain-building events during the Paleozoic Era[10] served to further metamorphose the rock. The basement metamorphic rock is overlain in the west of Hudson study area by sedimentary rock groups that were deposited from the Cambrian through the Middle Ordovician (approximately 515 to 468 million years ago). The depositional groups include the carbonate deposits of the Wappinger Group, the Normanskill Shale, and Mount Merino and Indian River Shale Formations. These sedimentary rock groups that comprise the study area are directly overlain by a varying thickness of overburden material deposited during the Pleistocene[11] Epoch. This overburden material, and the soils that formed from it, was shaped primarily by glacial and glacial melt water erosion of the Hudson River valley during the Wisconsin-aged glaciation between 90,000 and 18,000 years ago. During this period, ice sheets extended as far south as northern Pennsylvania, leaving the study area buried underneath ice. This ice sheet would have scoured the landscape during its advance, and released collected materials ("till") as it retreated during the melt period. The till layer present within the study area varies in thickness and is inconsistent—as bedrock outcrops are visible throughout the area.

The west connection site is mapped by the Surficial Geology Map of New York[12] as containing glacial till. This variable textured deposit contains a poorly sorted mixture of clay, silt, sand, and boulders, and was deposited beneath glacier ice. These surficial deposits overlying bedrock are thin and have low permeability. Bedrock under the west connection site is the Normanskill Formation, which consists of sedimentary rocks deposited during the Middle Ordovician Period (about 471 to 460 million years ago) of the Paleozoic Era. The primary rock type of the Normanskill Formation is shale, which is a compressed mud mixture consisting primarily of clay minerals and silt-sized particles of quartz and calcite. Shale is characterized by fissility, or breaks along thin laminar planes that show layering. Secondary rock types in the Normanskill Formation include mudstone and sandstone. Mudstone is similar to shale, but lacks the fissility seen in shale deposits. The historic mountain building events have resulted in significant folding and faulting, with beds transferring from horizontal to vertical along the bedding plane. As the formation was twisted and folded during the historic periods of uplift, the shale beds became jointed and blocky, with minor and major fracturing and prominent fault zones. The faults zones are characterized by shale that is crushed, ground up, and soft. The top of Normanskill Formation

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[9] A long-lived mountain-building event, called the Grenville Orogeny, associated with the assembly of the supercontinent Rodinia, occurred during the Mesoproterozoic era.

[10] Geologic era that occurred between 542 and 251 million years ago, which is marked by the presence of marine invertebrates, fish, amphibians, insects, and land plants.

[11] Geologic epoch from 2,588,000 to 11,700 years ago that spans the world's recent period of repeated glaciations, most noticeably glacial sediments.

[12] Surficial Geology Map of New York, Lower Hudson Sheet, New York State Geological Survey, Cadwell et al, 1989.

is locally variable in elevation, but outcrops are common and it is generally less than 100 feet below the ground surface.

The majority of the soils in the west of Hudson study area are loams—a mixture of sand, silt, and clay. According to the NRCS, USDA (http://websoilsurvey.nrcs.usda.gov/app/), nine soil series are present on the west connection site (see **Figure 2.8-4**), none of which has been classified as hydric.[13] The soil series include:

- Bath-Nassau channery silt loams, 3 to 8 percent (BnB) and 8 to 15 percent slope (MnC)—The Bath series consists of very deep, well drained soils formed in till. They are nearly level to steep soils on uplands. The Nassau series consists of shallow, somewhat excessively drained soils formed in till. They are nearly level to very steep soils on bedrock controlled glacially modified landforms. Bedrock is at a depth of 10 to 20 inches and slopes range from 0 to 70 percent.
- Chenango gravelly silt loam, 0 to 3 percent slope (CnA)—The Chenango series consists of very deep, well and somewhat excessively drained soils formed in water-sorted material on outwash plains, kames, eskers, terraces, and alluvial fans.
- Mardin gravelly silt loam, 3 to 8 percent slope (MdB)—The Mardin series consists of very deep, moderately well drained soils formed in loamy till. They are formed on glaciated uplands, mostly on broad hilltops, shoulder slopes, and back slopes. The Mardin soils have a dense fragipan (a soil layer that restricts root penetration and water flow) that starts at a depth of 14 through 26 inches below the soil surface.
- Middlebury silt loam (My)—The Middlebury series consists of very deep, moderately well drained nearly level soils formed in recent alluvium. These soils are on floodplains. Permeability is moderate in the surface layer, subsoil and upper part of the substratum, and rapid or moderately rapid in the lower part of the substratum.
- Nassau channery silt loam 15 to 25 percent slopes (NaD)—As described above, the Nassau series consists of shallow, somewhat excessively drained soils formed in till.
- Rock outcrop-Nassau complex, undulating (RSB) and hilly (RSD)—these are Nassau series soils with exposed bedrock.
- Swartswood and Mardin very stony soils, moderately steep (SXD)—The Swartswood series consists of deep and very deep, well drained and moderately well drained soils formed in till derived primarily from gray and brown quartzite, conglomerate, and sandstone. Slope ranges from 0 to 35 percent. Saturated hydraulic conductivity is

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[13] National List of Hydric Soils Hydric Classification, Natural Resources Conservation Service, U.S. Department of Agriculture http://soils.usda.gov/use/hydric/ (accessed April 15, 2011). Hydric soils are defined as a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part (http://soils.usda.gov/use/hydric/intro.html).

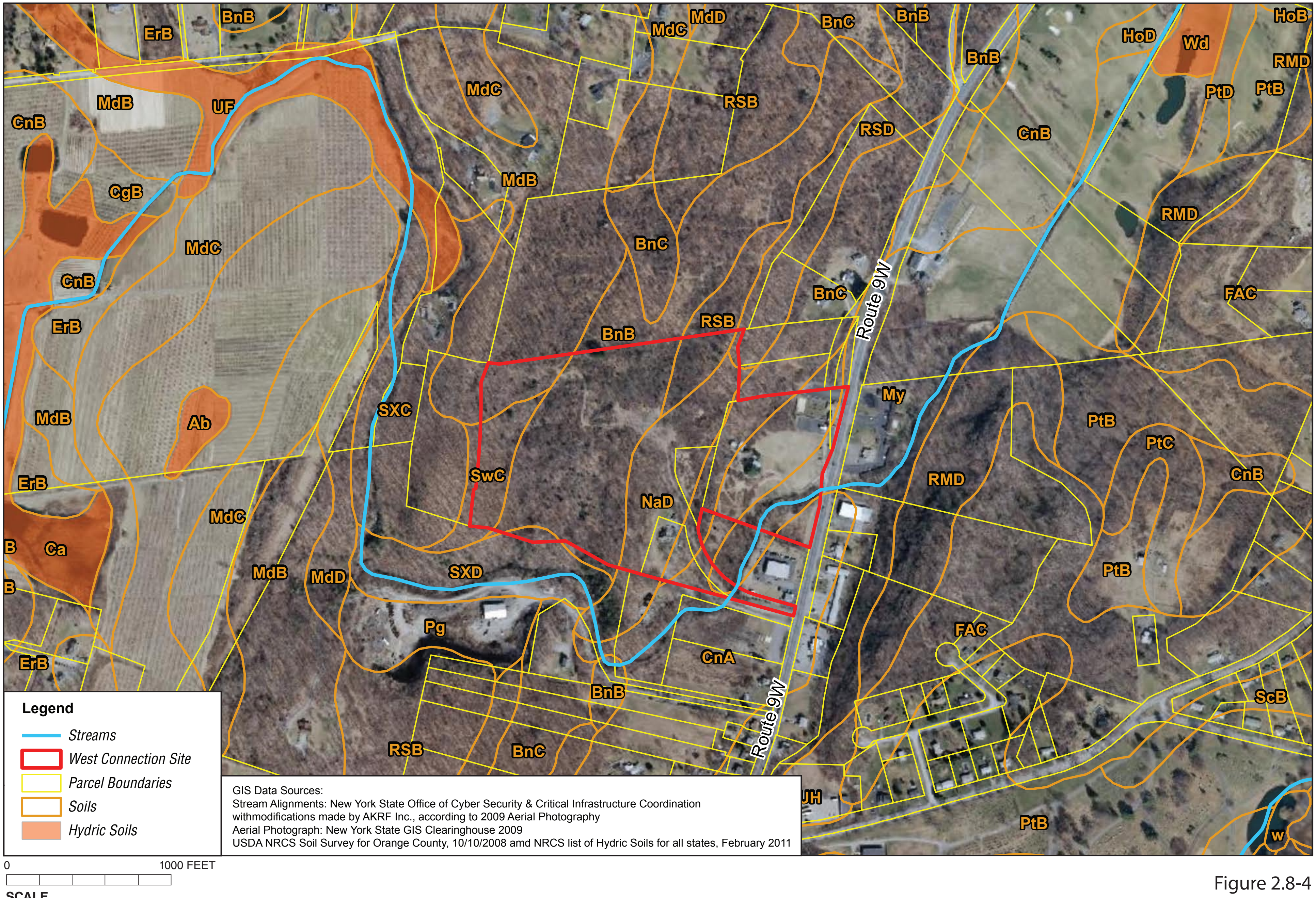


Figure 2.8-4

**West Connection Site: Soil Boundaries**

moderately high or high in the mineral soil above the fragipan and moderately low or moderately high in the fragipan. Mardin series soils are as described above.

- Bath-Nassau shaly silt loams (BnC)—The Bath-Nassau complex consists of deep, well drained soils and shallow, somewhat excessively drained soils that formed in glacial till deposits derived from shale and slate. They are found on hillsides and ridges in uplands. Slope ranges from 8 to 15 percent.
- Swartswood gravelly loam (SwC)—The Swartswood series consists of deep, well drained and moderately well drained, sloping soil formed in glacial till deposits derived from gray and brown conglomerate and sandstone. It has a fragipan in the lower part of the subsoil, which is an altered subsurface soil layer that restricts water flow and root penetration. This series is found on convex hillcrests, hillsides, and ridges in uplands. Slope ranges from 8 to 15 percent.

***Groundwater***

The geology in and around the west connection site is characterized by bedrock formations overlain by varying thicknesses of overburden deposits. As described above under "Geology and Soils," the overburden materials generally consist of glacial till. This variable textured deposit contains a poorly sorted mixture of clay, silt, sand, and boulders, and was deposited beneath glacier ice. Groundwater in the study area is present in pore spaces within the overburden deposits, and in the fracture network within the bedrock formations. Groundwater aquifers suitable for domestic uses are generally developed from two aquifer types: sand and gravel aquifers within a stratified drift deposit, and bedrock aquifers. Till, comprising the overburden within the west connection site, is typically low in permeability and is considered a poor aquifer source due to low yields, even for private use.

The Normanskill Shale Formation[14] underlying the till is a fine-grained sedimentary rock known for laminar bedding along consistent planes. Due to its thin laminae, or parallel layering, the rock tends to fracture along parallel planes and limit the permeability of the rock. Bedrock units can become high-yielding aquifers as groundwater travels through secondary porosity, such as pores, joints, fractures, cavities, and faults. Groundwater yields depend on the occurrence and the degree of interconnection of the secondary openings. Normanskill shale zones capable of producing viable water supply resources are located in areas with moderate to high fracturing and a high degree of fracture interconnectivity. Although not as prolific as sand and gravel aquifers, the bedrock aquifers in the vicinity of the west connection site are typically used for development of private and public water supply systems. Wells located in the Normanskill shale have been documented to produce 3 to 225 gallons per minute (gpm) (0.004 to 0.324 million gallons per day (mgd)) with a median yield of 30 gpm (0.043 mgd) (Orange County Water Authority 1995). The tunnel survey completed by ~~the~~ DEP, which included the tunnel area

[14] Bedrock Geology Map of New York, Lower Hudson Sheet, New York State Museum, Fisher et al, 1970, reprinted 1995.

beneath the mapped location of the west connection site, indicate that the shale formation beneath the west connection site is limited in fracturing, and water yields of 2 to 4 gpm (0.003 to 0.006 mgd) were observed (DEP 2004).

Groundwater quality within the overburden (till) and bedrock aquifers is generally considered suitable for domestic use. Almost all of the water supply systems in Orange County currently meet water quality standards promulgated by the New York State Department of Health (NYSDOH), Title 10 NYCRR Chapter 1 State Sanitary Code, Subpart 5-1.50. The groundwater beneath more than 90 percent of the land in Orange County is considered suitable for drinking without significant treatment (Orange County Water Authority 1995). Groundwater in certain localized areas in the vicinity of the west connection site has the potential to have been affected by human activities, such as improper waste disposal, leaks, spills, and storage of rock salt.

***Floodplains***

A small area of 100-year floodplain (the area with a 1 percent chance of flooding each year) borders both sides of the unnamed Class C Stream (New York State Waters Index #H-103-1-3, which is a third order tributary to Lattintown Creek) where it crosses the southeastern corner of the west connection site (see **Figure 2.8-5**). The remaining portion of the west connection site is outside of the 100-year floodplain, and the entire west connection site is outside the 500-year floodplain (the area with a 0.2 percent chance of flooding each year).

***Wetlands***

No freshwater wetlands mapped by the NWI or by NYSDEC are present within the west connection site (see **Figure 2.8-6**), nor are there any hydric soils mapped by NRCS (see Figure 2.8-4). However, three wetlands, inlcuding two small depressional wetlands and one fringe wetland associated with the NYSDEC Class C stream (third order tributary to Lattintown Creek) that crosses through the southeast corner of the west connection site, were identified on the west connection site and delineated using the USACE three parameter approach[15] (see Figure 2.8-6). These wetlands, totaling approximately 16,831 square feet (sf) (0.4 acre), are located in the western, central, and eastern portions of the site as described below. **Table 2.8-2** lists the scientific name and wetland indicator status of each observed species within these wetlands areas.

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[15] Environmental Laboratory. 1987. “Corps of Engineers Wetlands Delineation Manual,” Technical Report-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.; U.S. Army Corps of Engineers. 2009. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-09-19. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf,

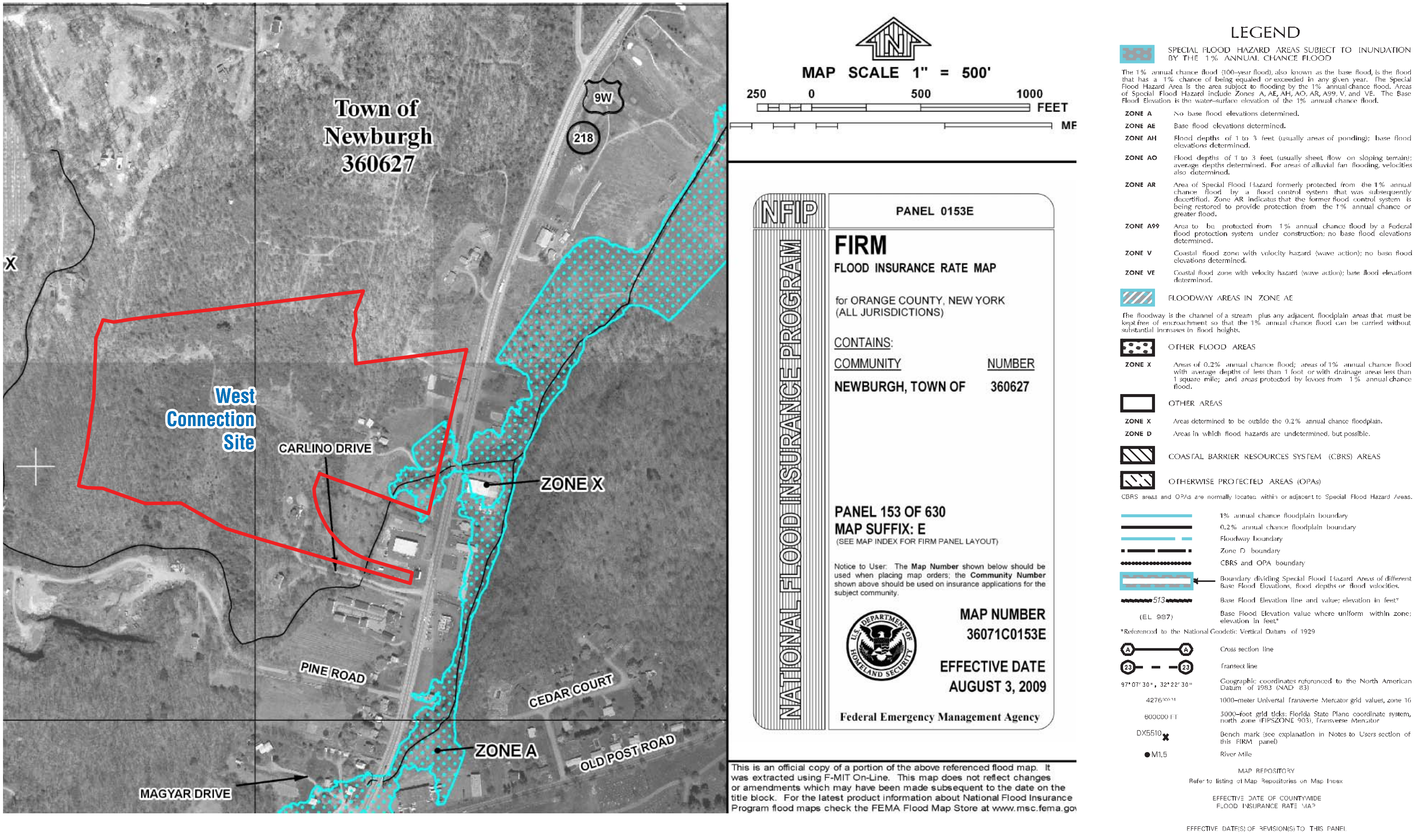


Figure 2.8-5

**West Connection Site: FEMA Floodplains**


This Figure Has Been Modified Since the DEIS

Figure 2.8-6
**West Connection Site: Flagged Wetlands**

**Table 2.8-2**
**Wetland Vegetation Observed within the Western, Central, and Eastern Wetlands within the West Connection Site**

| Common Name | Scientific Name | Indicator Status |
|---|---|---|
| Spicebush | *Lindera benzoin* | FACW- |
| Jewelweed | *Impatiens capensis* | FACW |
| Multiflora rose | *Rosa multiflora* | FACU |
| Japanese honesuckle | *Lonicera japonica* | FAC- |
| Slippery elm | *Ulmus rubra* | FAC |
| Northern catalpa | *Catalpa speciosa* | FAC |
| Small water plantain | *Alisma subcordatum* | OBL |
| Pussy willow | *Salix discolor* | FACW |
| Black willow | *Salix nigra* | FACW+ |
| Pondweed | *Potamogeton nodosus* | OBL |
| Red osier dogwood | *Cornus sericea* | FACW+ |
| Common rush | *Juncus effuses* | FACW+ |
| Arrowwood | *Viburnum dentatum* | FAC |
| Poison ivy | *Rhus radicans* | FAC |
| Kentucky bluegrass | *Poa pratensis* | FACU |
| Sweet vernal grass | *Anthoxanthum odoratum* | FACU |
| Silky dogwood | *Cornus amomum* | FACW |
| Skunk cabbage | *Symplocarpus foetidus* | OBL |
| Jack-in-the-pulpit | *Arisaema triphyllum* | FACW- |
| Red maple | *Acer rubrum* | FAC |

**Notes:**
OBL (almost always occurs in wetlands)
FACW (occurs in wetlands 67 to 99 percent of the time)
FACU (typically occurring in uplands 66 to 99 percent of the time)
FAC (similar likelihood of occurring in wetlands and non-wetlands)
A positive (+) or negative (-) sign was used to more specifically define the regional frequency of occurrence in wetlands. The positive sign indicates a frequency toward the higher end of the category (more frequently found in wetlands), and a negative sign indicates a frequency toward the lower end of the category (less frequently found in wetlands).
**Sources:**
http://plants.usda.gov/wetinfo.html

- Western wetland, 0.06 acre (2,646 sf)—This depressional wetland consists of a groundwater seep (area of groundwater discharge) that enters a small pond/vernal pool at the top of slope along the southern edge of the west connection site (see Figure 2.8-6). The pond then discharges water downslope toward ~~to~~ the Class C unnamed tributary that runs through the west connection site but shows no perennial or intermittent connection to the stream~~to Lattintown Creek~~. The groundwater seep and pond were flooded and flowing during field investigations conducted from May 5 through June 11, 2011 (see photographs in **Figures 2.8-7a through 2.8-7c**). Dominant hydrophytic vegetation observed in this wetland includes spicebush and jewelweed. However, multiflora rose and Japanese honeysuckle with slippery elm, a non-dominant overstory species nearby, are also present. The plant species assemblage in the wooded depression north of this wetland is dominated by facultative plants, with an overstory of northern catalpa. However, it is only at the southernmost extent that all three parameters (i.e., vegetation,

Ponded area facing north west taken 5.5.11 **1**

Seep northwest of ponded area facing south 5.5.11 **2**

Figure 2.8.-7a

**Western Wetland Delineation Photographs**

Seep discharging to wetland 5.13.11 **3**

Flow from groundwater seep entering ponded portion 5.25.11 **4**

Figure 2.8-7b

## Western Wetland Delineation Photographs

Ponded portion of wetland 5.25.11 **5**

Figure 2.8-7c

**Western Wetland Delineation Photographs**

soils, and hydrology) mutually occur. Surface soils met the depleted matrix indicator for hydric soils.

- Central wetland, 0.09 acre (3,999 sf)—This depressional wetland consists of a hillside seep and associated vernal pool (see Figure 2.8-6 and site photographs in **Figures 2.8-8a through 2.8-8h**). Adjacent to this wetland, approximately 10 feet to the west, is a secondary groundwater upwelling. Persistent vegetation, hydrology, and soil indicators within the hillside seep/pond complex meet all federal wetland criteria. Dominant hydrophytic vegetation observed within and bordering the vernal pool and groundwater seep include small water plantain, pussy willow, black willow, pondweed, red osier dogwood, common rush, arrowwood, and poison ivy. Non-dominant, commonly occurring upland plants, including Kentucky bluegrass and sweet vernal grass, were observed with poison ivy along the wetland periphery. Hydrology indicators include surface water, saturation, sparsely vegetation concave surface, and drainage patterns. Surface soils meet the depleted matrix hydric soil indicator (see Figure 2.8-4). At the time of the June 10, 2011, wetland investigation, groundwater was observed upwelling immediately adjacent to the vernal pool within narrow band of vegetation, soils, and hydrology meeting the federal wetland criteria. Once this discharge meets the dirt road, wetland soil and vegetation are lacking. The discharge then runs down the existing dirt access road in a shallow channel consisting of the wheel track created by vehicle traffic and dissipates in a wooded area before reaching the stream within the west connection site. The channel was observed to be approximately 1 to 2 inches deep and varying in width from 12 to 24 inches during most site visits during winter/spring 2011. ~~It eventually enters the Class C stream at the southeast corner of the west connection site.~~
- Eastern wetland, 0.2 acre (10,186 sf)—The eastern wetland is a fringe wetland associated with the NYSDEC Class C stream within the west connection site (see Figure 2.8-6 and site photographs in **Figures 2.8-9a through 2.8-9c**). It is an approximately 25-foot wide band of hydrophytic vegetation along both banks of the stream. Dominant hydrophytic vegetation includes jewelweed, silky dogwood, skunk cabbage, jack-in-the-pulpit, and spicebush. Red maple and multiflora rose are also present. Hydrology indicators include sediment and drift deposits. Soils meet the Depleted Matrix and Fluvial Deposits within Floodplains as defined for Problematic Hydric Soils indicators (see **Figure 2.8-4**).

***Aquatic Resources***

As described above, a NYSDEC Class C stream runs through the southeast portion of the west connection site (see Figures 2.8-4 and 2.8-6), which then flows under Route 9W and ultimately into Lattintown Creek just upstream of its confluence with the Hudson River. The best usage of Class C waters is fishing. These waters should be suitable for fish propagation and survival and the water quality suitable for primary and secondary contact recreation. **Table 2.8-3** presents the water quality standards for Class C waters (6 NYCRR Part 703).

12.20.11

Facing north 6.21.11 **1**

Facing south 6.21.11 **2**

Figure 2.8-8a

## Central Wetland Delineation Photographs

During low water period, facing southeast 6.10.11 **3**

Early spring 3.17.11 **4**

Figure 2.8-8b

## Central Wetland Delineation Photographs

Late spring facing west 6.29.11 **5**

Early spring 5.25.11 **6**

Figure 2.8-8c

## Central Wetland Delineation Photographs

Water flowing from the vernal pool facing northeast 5.5.11 **7**

Water flowing from spring immediately west of vernal pool 5.5.11 **8**

Figure 2.8-8d
**Central Wetland Delineation Photographs**

Water flowing from spring in dirt access facing down slope 6.29.11 **9**

Water flowing off of the drive and to the east facing south 5.5.11 **10**

Figure 2.8-8e
**Central Wetland Delineation Photographs**

Discharge down access drive from spring in early part of season 3.2.11 **11**

Wood frog egg mass in vernal pool (ponded) portion of wetland 3.17.11 **12**

Figure 2.8-8f

## Central Wetland Delineation Photographs

Wood frog egg masses in vernal pool portion of wetland 3.25.11 **13**

Wood frog in wetland 3.17.11 **14**

Figure 2.8-8g

## Central Wetland Delineation Photographs

Wood frog tadpoles in ponded, vernal pool portion of wetland 5.5.11 **15**

Figure 2.8-8h
**Central Wetland Delineation Photographs**

Culvert under 9W 6.10.11 **1**

Stream facing upstream from flag S-25 6.10.11 **2**

Figure 2.8-9a

**Eastern Wetland Delineation Photographs**

Stream facing upstream from flag S-27 6.10.11 **3**

Stream main channel near flag S-9 6.10.11 **4**

Figure 2.8-9b

## Eastern Wetland Delineation Photographs

Stream sediment deposition and erosion near flags S-27 and S-28 6.10.11 **5**

Figure 2.8-9c

**Eastern Wetland Delineation Photographs**

**Table 2.8-3**
**Water Quality Standards for NYSDEC Class C Waters**

| Parameter | Standard |
|---|---|
| Taste-, color-, and odor-producing, toxic and other deleterious substances | None in amounts that will adversely affect the taste, color, or odor thereof, or impair the waters for their best usages. |
| Turbidity | No increase that will cause a substantial visible contrast to natural conditions. |
| Suspended, colloidal, and settleable solids | None from sewage, industrial wastes, or other wastes that will cause deposition or impair the waters for their best usages. |
| Oil and floating substances | No residue attributable to sewage, industrial wastes, or other wastes, nor visible oil film nor globules of grease. |
| Phosphorus and nitrogen | None in amounts that will result in growths of algae, weeds, and slimes that will impair the waters for their best usages. |
| Thermal discharges | See 6 NYCRR Part 704 of this Title. |
| Flow | No alteration that will impair the waters for their best usages. |
| pH | Shall not be less than 6.5 nor more than 8.5. |
| Dissolved oxygen (DO) | For trout spawning waters (TS), the DO concentration shall not be less than 7.0 mg/L from other than natural conditions. For trout waters (T), the minimum daily average shall not be less than 6.0 mg/L, and at no time shall the concentration be less than 5.0 mg/L. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO concentration be less than 4.0 mg/L. |
| Dissolved solids | Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L. |
| Total coliforms (number per 100 ml) | The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively. |
| Fecal coliforms (number per 100 ml) | The monthly geometric mean, from a minimum of five examinations, shall not exceed 200. |

**Source:** 6 NYCRR §703

Within the vicinity of the west connection site, the stream is about 10 to 20 feet wide with a substrate comprising a mix of boulders, cobbles, gravel, and medium to coarse sand. Tree canopy cover over the creek ranges from about 50 to 100 percent.

The Lattintown Creek itself is slightly impacted by nonpoint source nutrient enrichment (Bode et al. 2004). Fish with the potential to occur in this tributary to Lattintown Creek would be expected to include species found in Lattintown Creek, such as fathead minnows (*Pimephales promelas*) (Levinton and Waldman 2006; Schmidt and Lake 2000). Other fish species with the potential to occur in this creek include blacknose dace (*Rhinichthys atratulus*), white suckers (*Catostomus commersonii*), common shiners (*Luxilus cornutus*), tesselated darter (*Etheostoma olmstedi*), cutlips minnow (*Exoglossum maxillingua*), brown bullhead (*Ameiurus nebulosus*), creek chub (*Semotilus atromaculatus)*, and golden shiner (*Notemigonus crysoleucas*). Fish species collected from this stream in 1936 during an assessment of suitability for fish stocking included Ŧ spottail shiner (*Notropis hudsonius*), killifish (*Fundulus diaphanus*), blacknose dace, golden shiner, pumpkinseed (*Lepomis gibbosus*), and redbreast sunfish (*Lepomis auritus*). Following this 1936 survey, the stream was stocked with brown trout up through 1950 when it was discontinued due to high water temperatures (between 75°F and 83°F during June 1951) and pollution (NYSDEC 1951). Results of fish sampling conducted during 1960 indicate a predominantly warm-water fish community that included blacknose dace, white sucker, creek chub, common shiner, and bluegill (NYSDEC 1960).

Macroinvertebrates with the potential to occur in this Class C stream would be expected to be similar to those collected within Lattintown Creek. Macroinvertebrate sampling of Lattintown Creek in 2002 determined that the fauna of the Lattintown Creek (and presumably its tributaries) was heavily dominated by caddisflies (Order Trichoptera), with a few mayflies (Order Ephemeroptera) (Bode et al. 2004). Subsequent sampling of other Orange County tributaries to the Hudson River by the Orange County Water Authority generally found similar results for those Hudson River tributaries sampled in the eastern portion of the county (Orange County Water Authority 2011), with caddisflies (*Hydropsyche betteni*, *Chimarra aterrima*, *Cheumatopsyche* sp. and *Chimarra obscura*), mayflies (*Baetis interclaris*), and water pennies (*Psephenus herricki*), as well as the freshwater worm *Prostoma* sp., and crustacean *Gammarus* sp., collected from these streams.

***Terrestrial Resources***

*Ecological Communities*

As shown on **Figure 2.8-10**, three primary ecological communities occur on the west connection site: Appalachian oak-hickory forest, successional forest, and successional old field. Although most of the tree species present on the site occur in each of these communities, there are distinct differences in the composition of the dominant canopy trees and understory species that distinguishes these three communities, as described below. Additional ecological communities on the west connection site that are concentrated close to Route 9W are associated with human development, comprising the two single-family homes, roads, and parking areas.

*Appalachian Oak-Hickory Forest.* The rocky, eastern-facing ridgeline, far western and southern property boundaries, and northeast corner of the west connection site are best described as an early to mature Appalachian oak-hickory forest (see Figure 2.8-10). Edinger et al. (2002) describes the Appalachian oak-hickory forest as:

> “a hardwood forest that occurs on well-drained sites, usually on ridgetops, upper slopes, or south- and west-facing slopes. The soils are usually loams or sandy loams. This is a broadly defined forest community with several regional and edaphic variants. The dominant trees include one or more of the following oaks: red oak (*Quercus rubra*), white oak (*Q. alba*), and black oak (*Q. velutina*). Mixed with the oaks, usually at lower densities, are one or more of the following hickories: pignut (*Carya glabra*), shagbark (*C. ovata*), and sweet pignut (*C. ovalis*). Common associates are white ash (*Fraxinus americana*), red maple, and Eastern hop hornbeam (*Ostrya virginiana*). There is typically a subcanopy stratum of small trees and tall shrubs including flowering dogwood (*Cornus florida*), witch hazel (*Hamamelis virginiana*), shadbush (*Amelanchier arborea*), and choke cherry (*Prunus virginiana*). Common low shrubs include maple-leaf viburnum (*Viburnum acerifolium*), blueberries (*Vaccinium angustifolium, V. pallidum*), red raspberry (*Rubus idaeus*), gray dogwood (*Cornus foemina* ssp. *racemosa*), and beaked hazelnut (*Corylus cornuta*). The shrublayer and groundlayer

10.27.11

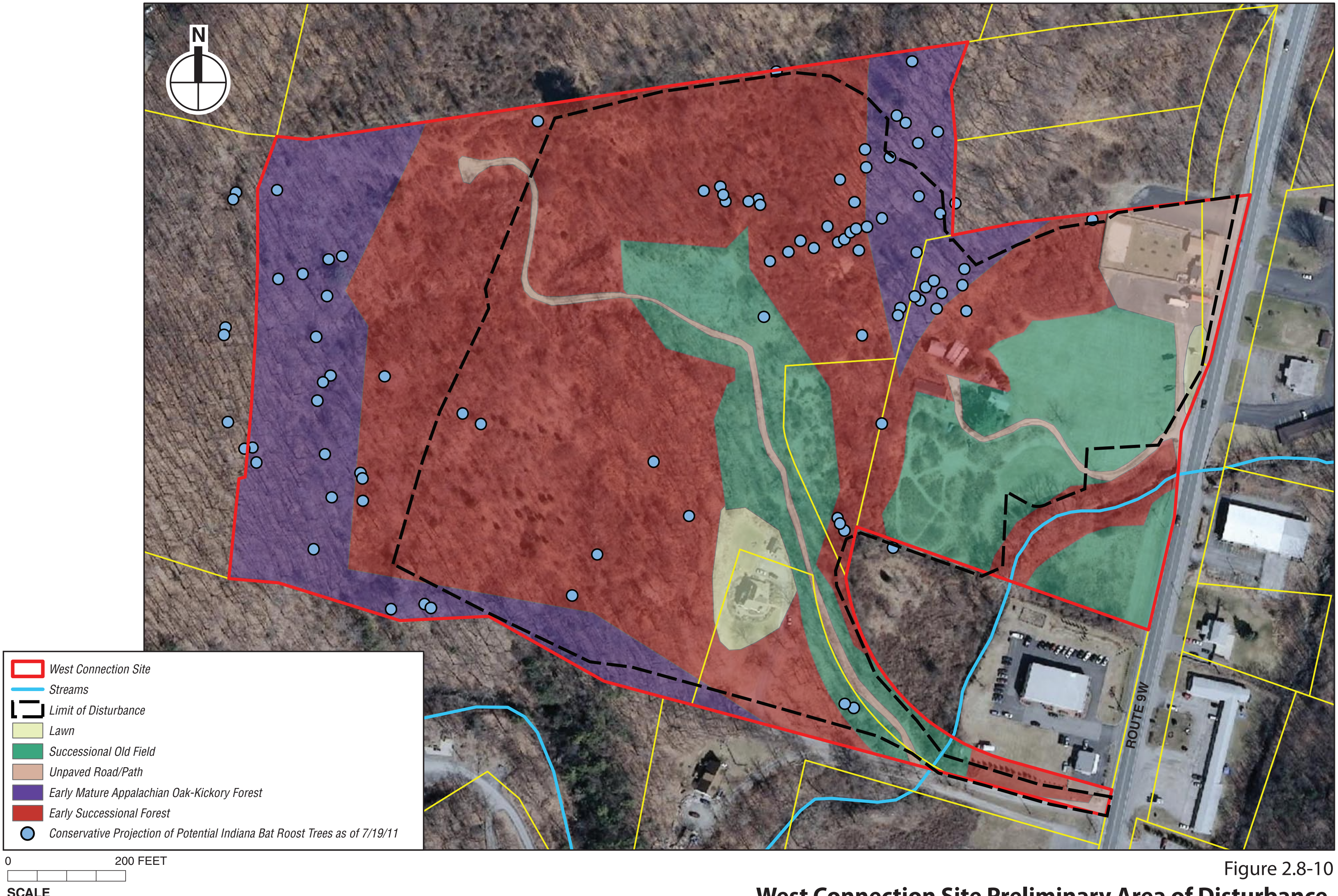


Figure 2.8-10

**West Connection Site Preliminary Area of Disturbance, Existing Habitats and Potential Indiana Bat Roost Trees**

> flora may be diverse. Characteristic groundlayer herbs are wild sarsaparilla (*Aralia nudicaulis*), false Solomon's seal (*Smilacina racemosa*), Pennsylvania sedge (*Carex pensylvanica*), tick-trefoil (*Desmodium glutinosum, D. paniculatum*), black cohosh (*Cimicifuga racemosa*), rattlesnake root (*Prenanthes alba*), white goldenrod (*Solidago bicolor*), and hepatica (*Hepatica americana*)."

This community is well represented within the lower Hudson Valley. It is one of three dominant forest types of the Hudson Highlands, a relatively undeveloped 405,300-acre corridor spanning Dutchess, Putnam, and Westchester Counties on the east side of the river and Orange and Rockland Counties on the west side of the river (NYSDEC 2011c). Storm King Mountain, located within Orange County, has been identified as a prime example of this community type within the state (Edinger et al. 2002).

Within the west connection site, the Appalachian oak-hickory forest community exhibits early to mature forest development and covers approximately 6 acres. This community type extends into the forested properties immediately off-site. Black oak and red oak are dominant in the canopy and generally range in size from 15 to 20 inches dbh. Additional oak species, including white, pin (*Quercus palustris*), and chestnut (*Quercus prinus*) occur at low densities. A small number of black birch (*Betula lenta*), sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*), and hickory are also present in the canopy. Subcanopy species include saplings of the same canopy species, along with flowering dogwood (*Cornus florida*), American beech (*Fagus grandifolia*), red maple, white ash, and sassafras (*Sassafras albidum*). The understory of this forest is somewhat open, suggestive of heavy deer browse, although regeneration of the canopy species occurs in the shrub and herbaceous strata. Native shrubs, including spicebush, smooth blackhaw (*Viburnum prunifolium*), and maple-leaf viburnum, form pockets throughout this community. The invasive sub-shrub multiflora rose is present but at low densities, as is Japanese barberry (*Berberis thunbergii*). Although the herbaceous layer is open in many locations, white-wood aster (*Eurybia divaricata*), white goldenrod, blackberries (*Rubus* spp.), Canada mayflower (*Maianthemum canadense*), hayscented fern (*Dennstaedtia punctilobula*), and striped wintergreen (*Chimaphila maculata*) occur in low densities, while woody vines such as Virginia creeper (*Parthenocissus quinquefolia)* and poison ivy occur at higher densities. Two state-listed "Exploitably Vulnerable" species, the spinulose wood fern (*Dryopteris carthusiana*) and squawroot (*Conopholis americana*), also occur in this community. These species are described in more detail below.

In general, this community is in fair condition with native species composition and structure (i.e., regeneration in the understory), although the open nature of the understory suggests heavy browsing by deer. However, invasive species, specifically multi-flora rose and black swallow-wort (*Cynanchum nigrum*), which have become dominant in other ecological communities of the west connection site present a potential threat to this ecological community.

*Early Successional Forest.* The central and southern portions of the west connection site contain scrub/shrub and early successional forest habitat that occupies about 17 acres. Successional forests are those that develop on sites that have been cleared or otherwise disturbed (Edinger et al. 2002). These forests are broadly defined, and several regional variants are known. Within the west connection site, this community displays a cross between the successional southern hardwoods community, which occurs north of the Coastal Lowlands ecozone, and the successional northern hardwoods community, which occurs in the southern portion of New York south of the Adirondacks (Edinger et al. 2002). Edinger et al. (2002) describes these communities as follows:

- A "successional southern hardwoods community contains the following characteristic species: "American elm (*Ulmus americana*), slippery elm (*U. rubra*), white ash (*Fraxinus americana*), red maple, box elder (*Acer negundo*), silver maple (*A. saccharinum*), sassafras (*Sassafras albidum*), gray birch (*Betula populifolia*), hawthorns (*Crataegus* spp.), eastern red cedar (*Juniperus virginiana*), and choke-cherry (*Prunus virginiana*). Certain introduced species are commonly found in successional forests, including black locust (Robinia pseudo-acacia), tree-of-heaven (*Ailanthus altissima*), and buckthorn (*Rhamnus cathartica*)."
- A "successional northern hardwoods community may include any of the following characteristic trees and shrubs: quaking aspen (*Populus tremuloides*), bigtooth aspen (*P. grandidentata*), balsam poplar (*P. balsamifera)*, paper birch (*Betula papyrifera)*, or gray birch (*B. populifolia*), pin cherry (*Prunus pensylvanica*), black cherry (*P. serotina*), red maple, white pine (*Pinus strobus*), with lesser amounts of white ash (*Fraxinus americana*), green ash (*F. pensylvanica*), and American elm (*Ulmus americana*). Northern indicators include aspens, birches, and pin cherry."

Within the west connection site, this community has a dense understory consisting of young trees and saplings measuring less than 6 inches in diameter. Wind disseminated trees, such as cottonwood (*Populus deltoides*), big-tooth aspen, quaking aspen, and tulip tree (*Liriodendron tulipifera*), are dominant and form uniform stands in the northwestern and northeastern portions of this site in proximity to the east-west trending dirt road that bisects the site and the power line corridor. Eastern red cedar is present in the drier areas along the ridgeline. Within the central and eastern portions of this community, there are two distinct topographic depressions that are dominated by catalpa (*Catalpa speciosa*), red maple, and black cherry. Additional early successional species occur within these hydric portions of the west connection site, of which many are non-native, such as tree-of-heaven. Tree-of-heaven also forms dense stands in the southeastern portions of the west connection site in the vicinity of the house and outbuildings. Understory shrubs, principally multiflora rose, Tartarian and Morowii honeysuckles (*Lonicera* spp.), blackberries, and a variety of vines (i.e., poison ivy, Japanese honeysuckle [*Lonicera japonica*], Asiatic bittersweet [*Celastrus orbiculatus*], grapes, and Virginia creeper) are prevalent and form dense thickets throughout this community. Staghorn sumac (*Rhus typhina*) and tree-of-heaven are dominant canopy trees above and around these dense thickets. In open areas and gaps in the canopy, particularly where multiflora rose is dominant, goldenrods (*Solidago* and

*Euthamia* spp.) also form stands in the herbaceous layer with wild strawberry (*Fragaria* sp.), cinquefoils (*Potentilla* spp.), and rough avens (*Geum laciniatum*). Flowering dogwood and oak saplings are present in small numbers. Black swallow-wort pockets are present in areas with dense canopy cover.

Although portions of this community contain native species in the canopy, subcanopy, shrub, and herbaceous strata, non-native invasive species are widespread and dominant in all strata in some locations of this community.

*Successional Old Field.* A successional old field (approximately 6 acres) is present adjacent the dirt road that provides access to the central portion of the west connection site and the open areas adjacent to Route 9W in the eastern portions of the site. Edinger et al. (2002) describes successional old field as:

> "a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. Characteristic herbs include goldenrods (*Solidago altissima, S. nemoralis, S. rugosa, S. juncea, S. canadensis, and Euthamia graminifolia*), bluegrasses (*Poa pratensis, P. compressa*), timothy (*Phleum pratense*), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), old field cinquefoil (*Potentilla simplex*), calico aster (*Aster lateriflorus*), New England aster (*Aster novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen-Anne's lace (*Daucus corota*), ragweed (*Ambrosia artemisiifolia*), hawkweeds (*Hieracium* spp.), dandelion (*Taraxacum officinale*), and ox-tongue (*Picris hieracioides*). Shrubs may be present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), silky dogwood (*Cornus amomum*), arrowwood (*Viburnum recognitum*), raspberries (*Rubus* spp.), sumac (*Rhus typhina, R. glabra*), and eastern red cedar (*Juniperus virginiana*)."

Dominant grass species observed within this community include grasses—smooth brome grass, orchard grass, bluegrasses, timothy, and English rye (*Lolium perenne*). Herbaceous species include daisy fleabane (*Erigeron strigosus*), goldenrods, butter and eggs (*Linaria vulgaris*), wild basil (*Clinipodium vulgare*), wild strawberry, and cinquefoils. Pockets of multi-flora rose, staghorn sumac, tree-of-heaven, and gray birch are scattered through this community. Vines, including poison ivy, Virginia creeper, Japanese honeysuckle, grapes, and Asiatic bittersweet, are also present.

*Terrestrial Cultural Communities.* Within the west connection site, there are communities that would be defined by Edinger et al. (2002) as "Terrestrial Cultural Communities," which are "communities that are either created and maintained by human activities, or are modified 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 from the character of the substrate of community as it existed prior to human influence." These communities include mowed lawns, flower/herb gardens, and unpaved road/path and are mostly associated with the two single-family houses on site and occupy about 2 acres.

Landscaped areas of the single-family home located in the eastern portion of the west connection site that has been vacated are overgrown. Ornamental species observed around the house include magnolia (*Magnolia* sp.) and blue spruce (*Picea pungens*). Because this community is overgrown, and several successional species are now present around the house, the house and landscaping were defined as early successional forest.

The single-family home located at the southern end of the west connection site was occupied until recently, and the lawn and gardens had been maintained. The lawn area would be defined as "mowed lawn," and the landscaping around the house would be defined as flower herb/garden. A flower herb/garden is defined as "residential, commercial, or horticultural land cultivated for the production of ornamental herbs and shrubs." Associated species include hosta (*Hosta* spp.), spirea (*Spirea* sp.), holly (*Illex* sp.), lavender (*Lavadula* sp.), and hydrangeas (*Hydrangea* spp.). This community is of low ecological value.

Paths, roads, and driveways throughout the west connection site are unpaved. This community is defined by Edinger et al. (2002) as a sparsely vegetated road or pathway of gravel, bare soil, or bedrock outcrop. These roads or pathways are maintained by regular trampling or scraping of the land surface. The substrate consists of the soil or parent material at the site, which may be modified by the addition of local organic material (woodchips, logs, etc.), or sand and gravel. As one might expect, this community is of low ecological value.

*Wildlife*

While the forested habitat present within the west connection site extends off-site to adjacent properties, the wooded area of which it is a part is surrounded by non-woodland land cover such as agricultural land, transmission line right-of-way, roadways and residential areas (see Figure 2.8-6) and would be considered fragmented secondary growth forest for wildlife habitat. As a result of this fragmentation, the west connection site offers no forest interior habitat that would support wildlife species dependent on these areas. Much of the Appalachian oak-hickory forest present on the west connection site has an open understory, likely due to heavy browsing by white-tailed deer (*Odocoileus virginianus*), which offers limited habitat to woodland ground nesting birds. The west connection site also contains small areas of old field and early successional forest, which attract some wildlife species that are typically associated with these habitat types.

*Birds.* Over 200 species of birds occur in the lower Hudson Valley, owing to the region's geographical position and habitat diversity. Some are present year-round, whereas others only nest in, overwinter in, or migrate through the area (DeOrsey and Butler 2006, Bochnick 2011). These species are listed in Appendix 2.8-2, Table 1 along with the seasons in which they occur and their relative abundance in the region. Appendix 2.8-2, Table 2, identifies the birds expected to occur in the west connection site.

The 2000-2005 Breeding Bird Atlas lists 60 species nesting in Block 5760D, in which the west connection site is located. Considering the habitat requirements and relative commonality of each of these species, only some of these are expected to breed in the west connection site (see Appendix 2.8-2, Table 2). Due to the fragmented nature of the woodland on the west connection site, the woodlands on the site represent marginal nesting habitat for most woodland birds, particularly forest interior species. This is reflected by the low number of woodland birds observed breeding at the site during AKRF summer field surveys (see Appendix 2.8-2, Table 2). The understory of the forested area has been heavily browsed by white-tailed deer in many places, leaving behind limited ground cover other than non-native multiflora rose and Japanese barberry (Ehrenfeld 1997, Silander and Klepeis 1999). The resulting degradation is evidenced by the lack of ground- and understory-nesting birds (McShea and Rappole 1999), such as the ovenbird (*Seiurus aurocapilla*) and veery (*Catharus fuscescens*), that otherwise would be expected to be there. Woodland bird species nesting in the site are primarily disturbance-tolerant, generalist species that have small area requirements and are commonly associated with suburban areas and other developed landscapes, including American robin (*Turdus migratorius*), black-capped chickadee (*Poecile atricapillus*), cedar waxwing (*Bombycilla cedrorum*), eastern wood peewee (*Contopus virens*), red-bellied woodpecker (*Melanerpes carolinus*), red-eyed vireo (*Vireo olivaceus*), tufted titmouse (*Baeolophus bicolor*), and wood thrush (*Hylocichla mustelina*).The wood thrush is sometimes thought of as an area-sensitive, forest interior species, but wood thrushes readily nest along edges and in small, disturbed forest fragments (Fowle and Kerlinger 2001, Evans et al. 2011).

The successional old field and early successional forest communities on the west connection site provide nesting habitat for a different suite of bird species and a greater number of nesting species than are supported by the Appalachian oak-hickory forest. Early successional habitats can be of value to mature-forest birds as well during the post-breeding period (e.g., Vitz and Rodewald 2006). Birds observed in these areas during summer field surveys include rose-breasted grosbeak (*Pheucticus ludovicianus*), brown thrasher (*Toxostoma rufum*), blue-winged warbler (*Vermivora pinus*), indigo bunting (*Passerina cyanea*), eastern towhee (*Pipilo erythrophthalmus*), wild turkey (*Meleagris gallopavo*), gray catbird (*Dumetella carolinensis*), orchard oriole (*Icterus spurius*), ruby-throated hummingbird (*Archilochus colubris*), and prairie warbler (*Dendroica discolor*).

The National Audubon Society's 2010 Christmas Bird Count in eastern Orange County documented 81 species wintering in the county (see Appendix 2.8-2, Table 2). Considering the habitat requirements of these species, many would not occur at the west connection site during winter (e.g., waterfowl). The bird species present at the site during winter are expected to be limited to primarily disturbance-tolerant, terrestrial species associated with residential areas. The following birds were observed at the west connection site during winter field surveys: American crow (*Corvus brachyrhynchos*), American robin, blue jay (*Cyanocitta cristata*), brown creeper (*Certhia americana*), downy woodpecker (*Picoides pubescens*), house wren (*Troglodytes aedon*), mourning dove (*Zenaida macroura*), northern cardinal (*Cardinalis cardinalis*), northern mockingbird (*Mimus polyglottos*), red-bellied woodpecker, and red-tailed hawk (*Buteo jamaicensis)*.

Although the west connection site offers breeding and wintering habitat for a limited number of bird species, it may represent suitable stopover habitats for numerous migratory land birds passing through the area during spring and autumn. Most species are more generalistic in their habitat preferences during migration than during the non-migratory periods, and thus, far more species are likely to occur at the site during spring and autumn than at other times of year. The species observed on the west connection site during migration were among the more common migratory land birds found in New York, such as Baltimore oriole (*Icterus galbula*), common yellowthroat (*Geothlypis trichas*), red-eyed vireo, wood thrush, and yellow warbler (*Dendroica petechia*). Additional species expected to use the site during migration include American redstart (*Setophaga ruticilla*), black-throated blue warbler (*Dendroica caerulescens*), black-throated green warbler (*Dendroica virens*), magnolia warbler (*Dendroica magnolia*), northern parula (*Parula americana*), ovenbird, Swainson’s thrush (*Catharus ustulatus*), and yellow-rumped warbler (*Dendroica coronata*), among others, and are listed in Appendix 2.8-2, Table 2.

*Reptiles and Amphibians.* Reptile and amphibian species richness and diversity are particularly high in the lower Hudson Valley, where the range limits of many northern and southern species converge upon each other (Gibbs et al. 2007). The habitats present within the west connection site have the potential to support several reptile and amphibian species. Most notably, the site contains cold water seeps and two vernal pools. Appendix 2.8, Table 3 lists reptiles and amphibians with the potential to occur on the west connection site on the basis of their habitat preferences and distribution within New York (Mitchell et al. 2006, Gibbs et al. 2007), and their presence or absence within the NYSDEC Herp Atlas Project blocks encompassing the site.

Visual surveys conducted during May and June 2011 documented red-backed salamander (*Plethodon cinereus*), northern two-lined salamander (*Eurycea bislineata*), American toad (*Bufo americanus*), green frog (*Rana clamitans*), bullfrog (*Rana catesbeiana*), wood frog tadpoles (*Rana sylvatica*), black rat snake (*Elaphe obsoleta*), common garter snake (*Thamnophis sirtalis*), and eastern ribbon snake (*Thamnophis sauritus sauritus*) at the west connection site. In addition to these surveys, incidental observations of reptiles and amphibians during visits to the site for other purposes (e.g., tree tagging, wetland delineation) were also recorded. These observations included wood frogs and wood frog egg masses within the central wetland, a spring peeper (*Pseudacris crucifer*) along the unnamed tributary to Lattintown Creek, and box turtles (*Terrapene carolina*) within the early successional woodland and Appalachian oak-hickory forest.

*Mammals*. Similar to the bird community, the degree of forest fragmentation and extent of non-woodland development surrounding the west connection site limit the mammal community to species associated with disturbed habitats within agricultural or residential areas. Examples include white-tailed deer, striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), white-footed mouse (*Peromyscus leucopus*), house mouse (*Mus musculus*), moles (*Scalopus* spp.), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), and Virginia opossum (*Didelphis virginiana*). In additional to these species, eastern coyote (*Canis latrans*), red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cenerius*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), and Indiana bat (*Myotis sodalis*) also have the potential to occur on the site. Little brown bat and hoary bat are the most common bat species along the Hudson River in New York during summer (Dzal et al. 2011) and therefore may be the most common bats to occur at the site. Mammals observed during field surveys include eastern chipmunk, white-tailed deer, eastern cottontail, gray squirrel, raccoon, and an unidentified mole or vole species.

### *Threatened, Endangered, Special Concern, Rare, or Exploitably Vulnerable Species*

#### *Overview*

Appendix 2.8-2, Table 4 lists the threatened or endangered species and species of special concern with the potential to occur within the west and east of Hudson study areas. The USFWS list of federally Threatened, Endangered, Candidate, and Proposed species for Orange County includes Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*; ~~Proposed listing~~Endangered), shortnose sturgeon (*Acipenser brevirostrum*; Endangered), dwarf wedgemussel (*Alasmidonta heterodon*; Endangered [Housatonic River drainage only]), bog turtle (*Clemmys* [*Glyptemys*] *muhlenbergii*; Threatened), Indiana bat (Endangered), and small whorled pogonia (*Isotria medeoloides*; Threatened). NYNHP records of state and federally listed species in the vicinity of the west connection site include Indiana bat (Endangered), bald eagle (*Haliaeetus leucocephalus*; Threatened), and shortnose sturgeon (Endangered) (NYSDEC 2011e, see Appendix 2.8-3). Although shortnose and Atlantic sturgeon and dwarf wedge mussel are listed as occurring in the vicinity of the site, the Atlantic and shortnose sturgeon are restricted to the Hudson River and dwarf wedge mussel is restricted to the Lower Neversink River. None of these species would occur on the west connection site and are not discussed further with respect to the west of Hudson study area. Shortnose sturgeon and Atlantic sturgeon are discussed with respect to the east of Hudson study area.

Threatened, Endangered, and New York State Special Concern reptile and amphibian species documented during the NYSDEC Herp Atlas Project in the survey blocks containing the west connection site include Jefferson salamander (*Ambystoma jeffersonianum*; Special Concern) and wood turtle (*Glyptemys insculpta*; Special Concern). The marbled salamander (*Ambystoma opacum*) is a Special Concern species that was not documented by the Herp Atlas Project near the west connection site, but it is considered to have the potential to occur based on its geographic range and habitat associations (Mitchell et al. 2006, Gibbs et al. 2007). The eastern box turtle is a Special Concern species that was not documented by the Herp Atlas Project near the west connection site, but it was observed on the site during field surveys.

Peregrine falcon (*Falco peregrinus*; NYS Endangered) was the only state- or federally listed bird species documented during the 2000-2005 Breeding Bird Atlas in the survey block encompassing the west connection site (Block 5760D). Threatened, Endangered, and Special Concern species documented during the National Audubon Society's Christmas Bird Count in eastern Orange County in 2010 include bald eagle, sharp-shinned hawk (*Accipiter striatus*; Special Concern), Cooper's hawk (*Accipiter cooperii*; Special Concern), red-shouldered hawk (*Buteo lineatus*; Special Concern), northern harrier (*Circus cyaneus*; Threatened), and horned lark (*Eremophila alpestris*; Special Concern).

Of these species above, the eastern box turtle was the only species observed during field surveys.

*Federally Listed Species*

*Bog Turtle.* The bog turtle is a federally threatened and New York State endangered species listed by the USFWS as occurring in Orange County, but it was not documented by the NYSDEC Herp Atlas Project in any survey blocks near the west of Hudson study area. On the basis of a survey conducted on March 2, 2011, and confirmed by the USFWS (2011b), the west connection site does not contain appropriate habitat for bog turtles (open areas with cool, shallow, slow-moving water, deep soft muck soils, and tussock-forming herbaceous vegetation), and their occurrence at the site is highly improbable.

*Indiana Bat.* The Indiana bat is a temperate, insectivorous bat that is a New York State and federal endangered species, and known to have maternity colonies east of the west connection site in Dutchess County (NYSDEC 2011d). The Indiana bat's life cycle can be coarsely divided into two primary phases- reproduction and hibernation. Indiana bats emerge from the caves in which they hibernate (i.e., hibernacula) in early spring. Males disperse and remain solitary until mating season at the end of the summer. Pregnant females form maternity colonies in which to rear the young. Energy demands for females increase throughout the gestation period, with peak energy demand occurring during lactation (Kurta et al. 1989). Maternity roosts, roosting sites of post-lactating females, and roosting sites of solitary males are usually under loose bark or in the crevices of trees. Indiana bat roosting sites have been documented in numerous species of deciduous trees. Tree availability, diameter, altitude, bark characteristics, and sun exposure appear to be more important factors in roost site selection than tree species (Kurta 2004, USFWS 2007). Roost trees in New York (Britzke et al. 2006) and elsewhere (USFWS 2007) are typically in trees with a diameter greater than 16 inches and a height taller than 52 feet, but roosts in much smaller trees are not uncommon (USFWS 2007). Trees are usually dead or nearly dead and decayed (Menzel et al. 2001, Kitchell 2008).

Indiana bats often roost near forest gaps or edges where trees receive direct sunlight for much of the day (Callahan et al. 1997, Menzel et al. 2001). Habitats used by Indiana bats during summer are varied and include riparian, bottomland/floodplain, and upland forests (Humphrey et al.

1977, Britzke et al. 2006, Watrous et al. 2006) often within highly fragmented agricultural landscapes (Murray and Kurta 2004, Watrous et al. 2006, USFWS 2007, and references within). Maternity colonies are typically located in areas with abundant natural or artificial freshwater sources (Carter et al. 2002, Kurta et al. 2002, Watrous et al. 2006, and USFWS 2007). Spring and autumn habitats of Indiana bats have not been well described, but appear to be largely similar to their summer habitat (Britzke et al. 2006, USFWS 2007).

During autumn, Indiana bats mate and deposit fat stores in preparation for winter hibernation. Hibernacula are typically in caves or abandoned mines where ambient temperatures remain above freezing (USFWS 2007). Wintering bats are highly sensitive to disturbances and easily aroused (Thomas 1995). Because arousal is energetically costly (Thomas et al. 1990, Speakman et al. 1991), increased arousal frequency due to human disturbances can significantly reduce winter survival rates (Boyles and Brack 2009). Only eight Indiana bat hibernacula are currently known in New York State, none of which are located within the study area (NYSDEC 2011d).

On the west connection site, surveys for potential Indiana bat summer roosting trees identified 90 trees as meeting the general morphological characteristics of appropriate summer roosting habitat as outlined in the USFWS guidance documents (see representative photographs in **Figure 2.8-11**). The locations of these potential roost trees were recorded with a hand-held GPS unit. Figure 2.8-10 indicates the approximate location of these potential Indiana bat roost trees.

The vast majority of trees within the west connection site do not appear to have the potential to provide summer Indiana bat roosting habitat. As described in detail below, vegetative cover on the west connection site comprises primarily black/red oak forest and areas dominated by aspen and tulip tree—these species generally have a low potential for providing roosting habitat unless of an advanced age. The majority of the individuals of these species observed on the west connection site did not exhibit the characteristics required to provide potential Indiana bat roosting habitat. There are nearly 1,300 trees on the west connection site, only 90 of which were potential Indiana bat summer roost trees. Most of the trees identified as having the potential to provide Indiana bat summer roosting habitat on the west connection site were black cherry (i.e., 49 out of 90 trees), many of which were dead or dying. Black cherry is not preferred by the Indiana bat but can be used on rare occasions.[16] Those black cherry trees identified as potential habitat exhibited characteristics capable of supporting Indiana bat—i.e., loose bark, dead or dying limbs, equal to or greater than 4 inches in diameter. Tree species that more commonly exhibit the morphological features suitable for providing Indiana bat summer roosting habitat (e.g., shagbark hickory, white oak, and other species) were present in limited number at the west connection site. **Table 2.8-4** lists the tree species identified as having the potential to provide suitable summer roosting habitat for Indiana bat and the number observed on the west connection site.

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[16] U.S. Fish and Wildlife Service (USFWS). 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, MN. p.56. http://www.mcrcc.osmre.gov/MCR/Resources/bats/pdf/IN%20BAT%20DRAFT%20PLAN%20apr07.pdf

Black cherry (Prunus serotina) exhibiting loose bark and dead branches – typical **1**

Hickory – mockernut/pignut (Carya sp.) **2**

Figure 2.8-11a
## West Connection Site
## Potentail Indiana Bat Roost and Habitat Photographs

Dead black cherry exhibiting loose bark **3**

Black cherry (Prunus serotina), 9” dbh, typical **4**

Figure 2.8-11b

**West Connection Site**
**Indiana Bat Roost and Habitat Photogrphs**

9.23.11

White oak (Quercus alba) **5**

Shagbark hickory (Carya ovata), 10” dbh **6**

Figure 2.8-11c

**West Connection Site**

**Potential Indiana Bat Roost and Habitat Photographs**

Sugar maple (Acer saccharum), 22" dbh **7**

Dead black cherry, showing vine coverage, typical **8**

Figure 2.8-11d

**West Connection Site**
**Potential Indiana Bat Roost and Habitat Photographs**

**Table 2.8-4**
**Potential Indiana Bat Summer Roosting Habitat Trees Observed on West Connection Site**

| Species | Number of Individuals |
|---|---|
| Black cherry (*Prunus serotina*) | 49 |
| Cherry sp, (*Prunus sp.*) | 1 |
| Dead/Snag/Unknown | 9 |
| Shagbark hickory (*Carya ovata*) | 10 |
| White oak (*Quercus alba*) | 7 |
| Black birch (*Betula lenta*) | 2 |
| Sugar maple (*Acer saccharum*) | 4 |
| Black oak (*Quercus velutina*) | 1 |
| Red oak (*Quercus rubra*) | 1 |
| Pignut/mockernut hickory (*Carya* sp.) | 1 |
| American sycamore (*Platanus occidentalis*) | 2 |
| Common catalpa (*Catalpa bignonioides*) | 1 |
| Elm sp. (*Ulmus sp.*) | 1 |
| Red Maple (*Acer rubrum*) | 1 |
| **TOTAL** | **90** |

Four of these potential bat summer roosting habitat trees were removed as a result of the tree cutting in March 2011, in accordance with the Indiana bat tree cutting restriction period (April 1 – September 30), in preparation for the geotechnical boring program.

*Small Whorled Pogonia.* The small whorled pogonia (*Isotria medeoloides*) is a federally threatened and state endangered plant of the orchid family. It is widely distributed, but rare, throughout North America and is known to occur in 17 eastern states and in Ontario, Canada. The species had been declared extirpated from New York (USFWS 2008), but it was recently rediscovered in an undisclosed location in Orange County in 2010 (NYSDEC 2010). Small whorled pogonia prefers acidic soils and a thick layer of decaying leaf matter, and often occurs on slopes that border small streams (USFWS 2008). Sites are usually predominantly second-growth deciduous or mixed forest with an open herb layer, low shrub density, and breaks in the tree canopy (Mehrhoff 1989). The habitat and soils present at the west connection site loosely meet these conditions, and, therefore, the small whorled pogonia is considered to have the potential to occur at the site. No individuals of this species were observed during vegetative surveys.

*New York State Listed Species*

*Bald Eagle.* The bald eagle was delisted from the federal Endangered Species Act in 2007, but bald eagles and their critical habitat remain federally protected under the Bald and Golden Eagle Protection Act. The bald eagle is listed as Threatened in New York State.

Bald eagle populations in New York have grown dramatically over the past few decades (Nye 2008). There were 173 breeding pairs in the state as of 2010 (NYSDEC 2011a), some of which have nested along the Hudson River in recent years (NYSDEC 2011b; Bochnik 2006, 2009).

Bald eagles also overwinter along the lower Hudson River, where they can be commonly found sitting on ice flows amidst areas with open water. Overwintering eagles often congregate in roost trees along the river when they are not actively hunting for fish. Eagles generally perch in older, dominant trees with open flight paths and clear views of the surroundings (Thompson and McGarigal 2002). Bald eagles have recently been overwintering near the Delaware Aqueduct crossing in Orange and Dutchess Counties (T. Salerno, NYSDEC NHP, pers. comm.) and were observed in this area during winter field surveys at the east connection site.

In New York, bald eagles engage in courtship and nest-building between December and March (USFWS 2007). Nests are typically several feet wide and located in tall, living trees near water (NYSDEC 2011a). Eagles breeding in the Orange County section of the Hudson River often nest near large areas of tidal mud flat (Thompson et al. 2005) and away from areas with moderate to heavy levels of human activity (e.g., boating, fishing, camping) and shoreline development (Thompson and McGarigal 2002). They primarily forage in bays, intertidal marshes, and nonvegetated tidal mudflats that become exposed at low tide and trap fish in drainage channels and pools (Thompson and McGarigal 2002, Thompson et al. 2005). Nonbreeding eagles forage in shoreline areas less often than breeding eagles and instead primarily take fish from open water (Thompson et al. 2005). The nearest active eagle nest to the west connection site is approximately 2 miles north, in Bowdoin Park. A nest location used in previous years is located on the east side of the Hudson River about 1 mile upriver from the east connection site.

*Peregrine Falcon.* The peregrine falcon is globally widespread and common in many areas (White et al. 2002). Populations in New York have grown dramatically since the 1980s, and the species' status is expected to be downgraded from endangered to threatened in the next revision of the state list (Loucks 2008).

Peregrine falcons traditionally nest on cliff ledges, but they will also commonly nest on bridges, buildings, and other tall artificial structures, often in cities. Peregrine falcons generally prefer open landscapes, particularly for foraging, and occupy similar areas during the breeding and non-breeding periods (White et al. 2002). During the 2000-2005 NYS Breeding Bird Atlas, the peregrine falcon was documented breeding in the atlas block in which the west connection site is located (Block 5760D), but the exact location within the block is unknown. Peregrine falcons are not expected to breed at the west connection site, as it is primarily forested with little open space, and lacks appropriate nesting structures. No peregrine falcons were observed at the site.

*Sharp-shinned Hawk.* The sharp-shinned hawk is a small, migratory raptor that is common and widely distributed across North America (Bildstein and Meyer 2000), but listed as a Species of Special Concern in New York State. Sharp-shinned hawk was documented during the 2000-2005 NYS Breeding Bird Atlas in the block encompassing the west connection site. However, the site and its immediate surroundings lack appropriate breeding habitat for sharp-shinned hawks, which typically nest in large, dense stands of deciduous, coniferous, or mixed forests, and pine plantations (Bildstein and Meyer 2000). Sharp-shinned hawks were not observed at the site during any summer field surveys.

Sharp-shinned hawks are most common in the lower Hudson Valley during the spring and autumn migration periods (DeOrsey and Butler 2006, Bochnick 2011). Although the west connection site does not represent appropriate breeding habitat, it may provide stopover habitat for hawks migrating through the area. The site may also represent suitable overwintering habitat, as sharp-shinned hawks are least selective during winter and will use a variety of habitat types. Sharp-shinned hawk was documented during the Orange County Christmas Bird Count, but was not observed on the west connection site during any winter visits.

*Cooper's Hawk.* Similar to the sharp-shinned hawk, the closely related Cooper's hawk is one of North America's most widespread and common raptors. Cooper's hawk populations in the eastern U.S. appear to have fully recovered from population declines experienced in the mid-1900s (Curtis et al. 2006). In New York State specifically, the density and range of both breeding and overwintering Cooper's hawks have increased markedly in recent decades (Curtis et al. 2006, Hames and Lowe 2008), but the species remains a Species of Special Concern. Cooper's hawk was documented in the atlas block encompassing the west connection site during the 2000-2005 Breeding Bird Atlas and documented during the 2010 Christmas Bird Count in Orange County.

Cooper's hawks generally nest in deep interior deciduous and mixed forests, but they are considered relatively tolerant of human disturbance and fragmentation, and are occasionally found nesting in small woodlots and even urban parks (DeCandido and Allen 2005, Curtis et al. 2006). During migration and winter, Cooper's hawks will utilize a variety of forest habitats, ranging from large woodland tracts to agricultural shelter belts and small parks. The west connection site does not contain deep interior forest that is preferred by Cooper's hawks for nesting, and no Cooper's hawks were observed during summer field surveys. The site may offer suitable stopover and wintering habitat for Cooper's hawks, although none were observed during visits to the site during the migration and wintering periods.

*Red-shouldered Hawk.* The red-shouldered hawk is regionally uncommon in many areas and listed as a Species of Special Concern in New York. This species favors large tracts of mature (especially old growth) deciduous and mixed forest in riparian areas or flooded swamps (Dykstra et al. 2008). Breeding Bird Atlas data show a steady increase in red-shouldered hawk populations in New York since the 1980s, particularly in the Hudson River Valley, as reversion of farmland back to forest has likely increased habitat availability for the species (Crocoll 2008, Dykstra et al. 2008). Red-shouldered hawks now also occasionally nest in suburban areas where forest cover is less contiguous than the species was previously thought to need (Dykstra et al. 2000, 2008). Migration and wintering habitats are similar to breeding habitat preferences, although non-breeding birds occur in fragmented landscapes and open areas more frequently than they do when nesting (Dykstra et al. 2008).

Red-shouldered hawk was not documented in the Breeding Bird Atlas block in which the west connection site is located, nor was it observed during field surveys during the breeding season.

The species was documented during 2010 Christmas Bird Count in Orange County, but it was not observed during winter field surveys.

*Northern Harrier.* The Northern harrier (*Circus cyaneus*) is listed as Special Concern in New York. Local populations have gradually declined in recent decades (Smith et al. 1993, Sauer et al. 2005), likely in response to habitat development and reversion of much of the state's former farmland into forest. Northern harriers primarily occupy open areas such as grasslands, old fields, pastures, croplands, and salt marshes during both the breeding and non-breeding periods (MacWhirter and Bildstein 1996). They are present in New York year-round, but are primarily winter residents in the lower Hudson Valley (DeOrsey and Butler 2006). Northern harrier was not documented near the west connection site during the 2000-2005 Breeding Bird Atlas, but it was documented during the 2010 Christmas Bird Count in Orange County. However, the largely forested project site does not offer suitable wintering habitat for harriers, and no harriers were observed at the site during field surveys.

*Horned Lark.* Historically, the horned lark's (*Ermophila alpestris*) range was largely limited to the mid-western prairie region, and it was uncommon in the East. A dramatic eastward expansion of the species occurred throughout the 19th and 20th centuries, coinciding with the clearing of eastern forests for agriculture, which provided surrogate habitat for larks and other grassland birds (Beason 1995). Now that much of this farmland has reverted back to forest, horned lark populations in New York and other Northeastern states have significantly declined (Sauer et al. 2005, Smith 2008), and the species is listed as Special Concern in New York.

Horned lark was not documented near the west connection site during the 2000-2005 Breeding Bird Atlas, but it was documented during the 2010 Christmas Bird Count in Orange County. As a grassland obligate species during both breeding and non-breeding seasons, the largely forested west connection site does not represent suitable wintering locations for horned larks. No horned larks were observed during field surveys.

*Jefferson Salamander.* The Jefferson salamander (*Ambystoma jeffersonianum*) is a New York State Species of Special Concern. This species primarily inhabits upland deciduous and mixed deciduous-coniferous forests; however, individuals have been found in bottomland forests adjacent to disturbed and agricultural areas (Thompson et al. 1980). Jefferson salamanders are generally subterranean, burying in small mammal burrows, under leaf litter, and decaying logs (Faccio 2003). Breeding occurs in early spring in ephemeral pools and semi-permanent wetlands with emergent vegetation (Thompson et al. 1980). The Jefferson salamander is vulnerable to several threats, including habitat destruction (as a result of residential development and timber harvest), road mortality, and acidification of surface water bodies. The west connection site may provide suitable habitat for this species, and its occurrence at the site is possible. Jefferson salamander was documented near the west connection site during the NYSDEC Herp Atlas Project, but it was not documented at the site during field surveys.

*Marbled Salamander.* The marbled salamander (*Ambystoma opacum*), a New York State Species of Special Concern, has experienced population declines due to a variety of threats, including habitat destruction, degradation, and fragmentation of breeding sites and upland habitat for development. The marbled salamander is a habitat specialist, primarily inhabiting upland and floodplain, deciduous forests. This species prefers dry, friable soils and well-drained slopes (Gibbs et al. 2007). Marbled salamanders breed in fall, making this species unique among other salamanders within the *Ambystoma* genus (Gibbs et al. 2007). Breeding occurs in ephemeral pools and at the edges of permanent surface water bodies (such as wetlands) and slow-moving streams (NatureServe 2010). Although no marbled salamanders were observed during field surveys or during the NYSDEC Herp Atlas Project, marginally suitable habitat for the marbled salamander is considered to be present at the west connection site.

*Wood Turtle.* The wood turtle (*Glyptemys insculpta*) has been threatened by illegal collection for the pet trade and is currently listed as a New York State Species of Special Concern. Wood turtles have large home ranges and typically inhabit riverside or streamside environments bordered by woodlands or meadows (Compton et al. 2002, Arvisais et al. 2002, 2004). Activity areas comprise open sites close to water with low canopy cover (Compton et al. 2002 in Gibbs et al. 2007). Individuals bask along stream banks and hibernate in creeks (Kaufmann 1992 in Gibbs et al. 2007).Wood turtles are considered relatively tolerant of moderate habitat alterations and human disturbance, but habitat destruction and fragmentation are acute threats to their populations (NatureServe 2010). On the west connection site, the Class C stream and its vegetated riparian corridor and adjacent old field and successional woodland, have the potential to provide habitat for the wood turtle. The portion of the Class C stream and riparian corridor outside the west connection site also has a potential for providing habitat for this species. No wood turtles were observed during natural resource surveys.

*Eastern Box Turtle.* The eastern box turtle (*Terrapene carolina*), a New York State Species of Special Concern, prefers a variety of open woodland-type habitats with sandy, well-drained soils (Gibbs et al. 2007). Eastern box turtles can be found in meadows, pastures, open fields, and power line corridors (Gibbs et al. 2007). Their home range typically encompasses a small area, especially if habitat conditions are stable (Stickel 1950). During natural resource surveys at the west connection site, one box turtle was found on the access road within the recently cleared, early successional habitat, and another was found in the wooded area toward the western property boundary.

*Exploitably Vulnerable Plant Species.* All ferns in New York State, with the exception of hayscented, bracken, and sensitive, are listed as state-listed “exploitably vulnerable.” Exploitably vulnerable plants are “those species plants that are likely to become threatened in the near future throughout all or a significant portion of their ranges within the state if causal factors continue unchecked.” As stated above, all three of the unlisted ferns were observed on the west connection site in addition to six commonly occurring “exploitably vulnerable” ferns. In addition, two "exploitably vulnerable" herbaceous plants were observed in the Appalachian oak-hickory forest. Descriptions of these species are provided below:

- Ebony spleenwort (*Asplenium platyneuron*) occurs in all counties of the Hudson Valley, New York City, and Long Island, and much of New York State (USDA 2011). This species occurs in a wide-range of habitats, including shaded woods, fields, talus slopes, banks, bases of rocky ledges, walls, fences, a wide-range of well-drained rocky soils or hummocks of humus, and sometimes in moist, not wet, soils in sunny areas. This species has a higher tolerance to disturbed sites than other spleenworts (Cobb et al. 2005). Ebony spleenwort was noted in the successional forest community at the base of a tree-of-heaven individual. Due its tolerance to a wide range of habitats and disturbance, this species has the potential to occur within all habitats of the west connection site.
- Rattlesnake fern (*Botrychium virginianum*) is the most commonly occurring Botrychium in the Northeast (Cobb et al. 2005) and within New York. This species occurs in all counties of the Hudson Valley, New York City, and Long Island, and most northern and western counties (USDA 2011). This species occurs in rich, moist or dry woodlands and wet thickets on subacidic soil, mostly in shade, but occasionally in sunny openings in neutral to subacid soil (Gleason and Cronquist 1963). Rattlesnake fern was observed at the border between the Appalachian oak-hickory forest and the early successional forest communities of the west connection site.
- Spinulose wood fern (*Dryopteris carthusiana*) occurs in all counties of the Hudson Valley, New York City, and Long Island, and most of New York State (USDA 2011). This species occurs in swamps, moist to wet woods, stream banks, and moist wooded slopes in soils that are mostly subacid (Cobb et al. 2005). This species was observed throughout the successional forest community of the west connection site.
- Evergreen wood fern (*Dryopteris intermedia*) occurs in all counties of New York State (USDA 2011).This species occurs on moist or dry rocky woods, particularly in hemlock-hardwood forests, ravines, rock ledges, and edges of wetlands in soils that are rich in humus with subacid to almost neutral pH. This fern was observed throughout the successional forest and Appalachian oak-hickory forest of the west connection site.
- Christmas fern (*Polystichum acrostichoides*) occurs in all counties of the Hudson Valley, New York City, and Long Island, and most of New York State (USDA 2011). This is an evergreen fern that occurs in woodlands on shady, rocky slopes in moist to moderately dry soils (Cobb et al. 2005) and open thickets (Gleason and Cronquist 1963). Christmas fern was observed occasionally throughout the Appalachian oak-hickory forest and successional forest communities of the west connection site.
- Cinnamon fern (*Osmunda cinnamomea*) occurs in all counties of the Hudson Valley, New York City, and Long Island, and most of New York State (USDA 2011). This species is widespread in swamps, wet woods, wet meadows (Cobb et al. 2005), stream banks, and other moist places in subacid soil (Gleason and Cronquist et al. 2005).

Cinnamon fern was observed in a low-lying depression within the successional forest community of the west connection site.

- Squawroot (*Conopholis americana*) has a patchy distribution throughout the state, but it is known to occur in a number of counties within the Hudson Valley, including Orange County. Squawroot is a parasite of tree roots, particularly on oaks (Newcomb 1977) in rich woods (Clemants and Gracie 2006; Gleason and Cronquist 1963). This species was observed throughout the Appalachian oak-hickory forest of the west connection site.
- Striped wintergreen (*Chimaphila maculata*) has a patchy distribution throughout the state, but it is known to occur in all counties of the southern Hudson Valley, New York City, and Long Island. Striped wintergreen is an evergreen subshrub found in dry woods (Newcomb 1977; Clemants and Gracie 2006) and sandy soil (Clemants and Gracie 2006). This species was observed throughout the Appalachian oak-hickory forest of the west connection site.

### *ROSETON STREAM STUDY SITE AND DEWATERING PIPELINE*

#### *Site Description*

The Roseton stream study site (see Figure 2.8-1) comprises an unnamed Class C tributary of the Hudson River that is Class A within the tidal segment at its confluence with the Hudson River. It is located to the southeast of the west connection site in the Roseton area of the Town of Newburgh. A portion of this stream receives discharge from surface expressions of the Rondout-West Branch Tunnel (RWBT) leak (see Figure 2.8-1). The dewatering pipeline options parallel portions of this stream and may also require the construction of stream crossings across this water course. For this reason, dewatering pipeline component for the west of Hudson study area is considered with the Roseton stream study site. As described in Section 2.2, “Land Use, Zoning, Public Policy, and Open Space,” and in Chapter 1, two dewatering pipeline options are being considered, both of which follow Route 9W from the west connection site south to Old Post Road and then follow River Road parallel to the ~~unnamed~~ Class C portion of the stream ~~that comprises the Roseton stream study site~~. Before River Road, the pipeline would cross through residential areas, commercial properties, an apartment complex, and Cedar Hill Cemetery. Along River Road, the pipeline would cross through cemetery property, residential property, and utility property associated with a power plant and high-voltage electrical transmission lines. Where River Road bends to the south, Option 1 would extend east across privately owned utility property before outfalling to the Hudson River. Where River Road bends south, Option 2 would parallel River Road and the ~~unnamed~~ Class C portion of the stream that is a tributary of the Hudson River before outfalling in the stream close to its confluence with the Hudson River. As discussed in Chapter 1, “Program Description,” subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline and selected one potential dewatering pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS.

For the purposes of allocating sampling effort for aquatic biota, the Roseton study stream was partitioned into Segments 1 through 4 (see Figure 2.8-1), as described below.

- Segment 1—This segment comprises the headwater of the stream down to the southeastern boundary of Cedar Hill Cemetery, crossing through wooded residential and agricultural areas until reaching the grass-covered cemetery. On the cemetery property, the stream is underground for about 574 feet before discharging to the Cemetery Pond. This segment of the stream is generally shallow (less than 4 inches deep and narrow (less than 3 feet), with low base flow. Bottom substrate is muddy, with substantial areas of emergent wetland vegetation and submerged macrophytes occurring throughout (**Figure 2.8-12a, Photograph 1**). The stream channel is deeply incised in most areas, although some portions of Segment 1 widen through areas of forested wetlands.
- Segment 2—This segment begins at the outfall of the Cemetery Pond near River Road. The pond discharges over a low-head weir before flowing parallel to River Road in an underground culvert for approximately 367 feet. Upon daylighting, the stream runs parallel to the southern shoulder of River Road through woodlands until reaching the clearing associated with electrical transmission lines originating at the Roseton/Danskammer Generating Station. At the transmission line, it plunges rapidly within the cleared transmission line right-of-way, dropping approximately 92 feet in elevation over an approximately 466-foot horizontal distance (**Figure 2.8-12a, Photograph 2**). This segment is also shallow (less than 4 inches deep) and narrow (less than 3 feet), with relatively low base flow. The channel is relatively incised, and the channel bottom appears to consist of bedrock and/or cobble over the upper part of the segment, becoming mud and fine silt below the steep drop. Segment 2 terminates near the main entrance to the Roseton/Danskammer Generating Station after crossing under River Road via a box culvert. At this point, the stream converges with Segment 3, which flows from the north.
- Segment 3—This segment originates within a wooded area about 900 feet north of the clear-cut transmission line right-of-way. The primary source of flow for Segment 3 appears to be surface expressions (one large and several smaller expressions) of the leak south of the transmission line right-of-way at a rock outcrop (**Figure 2.8-12b Photograph 3**). The portion of the Segment 3 stream downstream of the transmission line right-of-way which receives the surface expression is wider than Segments 1 and 2 (approximately 3 to 13 feet), and also deeper (about 1.5 to 5 feet), with noticeably higher base flow. The water is clear, and the bottom substrate includes cobble, sand, brick, and terracotta rubble (**Figure 2.8-12b, Photograph 4**), with mud occurring upstream of woody snags. The channel of Segment 3 is somewhat incised; however, substantial emergent wetland vegetation also occurs along both stream banks (i.e., in the floodplain) and in association with various minor surface expressions from the leak. Periodic woody snags occur at intervals along this segment, and some snags exhibit signs of past beaver

Typical stream reach of Segment 1 during spring 2011 field sampling. The clearing in the background is Cedar Hill Cemetery **1**

Segment 2 near the upper portion of dramatic plunge, looking downhill. The narrow, incised stream channel runs beneath the vegetation in the foreground, and the stream drops approximately 28 meters (91 feet) in elevation between this location and River Road (adjacent to the power plant at left) **2**

Figure 2.8-12a

## Roseton Stream Study Site Representative Photographs

Primary surface expression near the headwaters of Segment 3 **3**

Terracotta rubble from the substrate of Segment 3. The pebbly nature of the stream bottom in this Segment can be seen in the background **4**

Figure 2.8-12b

## Roseton Stream Study Site Representative Photographs

(*Castor canadensis*) activity (**Figure 2.8-12c, Photograph 5**). The portion of Segment 3 north of the southern edge of the transmission line that does not appear to be affected by surface expression of the RWBT leak has minimal flow and is largely filled in with wetland vegetation from Wetland 8 (described below). This portion of Segment 3 probably represents the original natural stream channel that has intercepted the water flowing from the surface expressions and that has been subsequently been enlarged by artificial base flow downstream of this confluence. In the lower reach of Segment 3, the stream passes over an artificial weir immediately north of River Road (**Figure 2.8-12c, Photograph 6**). South of River Road, Segment 3 passes into an underground culvert and then parallels River Road within the property of the Roseton/Danskammer Generating Station. It emerges from the culvert after approximately 442 feet, near the confluence with Segment 2. Downstream of this confluence, the combined flows of Segments 1, 2, and 3 comprise the flows observed in Segment 4.

- Segment 4—This segment flows south from the confluence of Segments 2 and 3 along the western boundary of the Roseton/Danskammer Generating Station before turning sharply east toward the Hudson River at a point just south of the power plant property. The reach of Segment 4 upstream of this sharp bend is relatively narrow (less than 7 feet and greater than 3 feet deep with significant current velocity. The bottom substrate is bedrock and/or cobble. This segment of Segment 4 follows River Road and the Roseton/Danskammer property line fence for over 1,000 feet. Both banks are vegetated with large trees. Downstream of the sharp bend, Segment 4 meets the fall line at the Hudson River and is tidal for the remaining approximately 900 feet before its confluence with the western shore of the Hudson (**Figure 2.8-12d, Photograph 7**). As an extension of the Hudson River, the tidal portion of this segment is designated as Class A. The tidal portion is significantly wider than the upper portion of this segment (greater than 16 feet), and exhibits variable depth based on tide stage. The mean tide range in this portion of the Hudson River is approximately 3 feet (NOAA Tidal Benchmark Data Sheet for Haverstraw Bay, NY, Station ID: 8518924). The bottom substrate of the tidal portion of Segment 4 is muddy. The banks generally consist of emergent wetland vegetation and forest; however, significant portions of the banks in this section are armored with wooden cribbing or abandoned wooden barge hulls (**Figure 2.8-12d, Photograph 8**). Segment 4 terminates at the Hudson River immediately east of the railroad trestle.

***Geology and Soils***

The Roseton stream study site is also located in the Hudson Highland part of the Reading Prong geologic province discussed for the west connection site. This province is composed of metamorphic rocks that were further deformed during a long period of mountain building that occurred during this geologic era which resulted in numerous folds and faults. The shapes of valleys in the region often follow the trend of the faults. Subsequent mountain-building events

Woody snags in Segment 3. This image was taken looking upstream toward the primary surface expression **5**

Weir in Segment 3 located upstream of the intersection of River Road and the Roseton/Danskammer transmission line access road **6**

Figure 2.8-12c

## Roseton Stream Study Site Representative Photographs

The tidal portion of Segment 4 at low tide. The Hudson River is visible beyond the railroad bridge **7**

The tidal portion of Segment 4 at low tide. This image was taken looking upstream. Wooden cribbing is visible on the near bank, and an old wooden barge is visible on the far shoreline **8**

Figure 2.8-12d

## Roseton Stream Study Site Representative Photographs

served to further metamorphose the rock. Within the Roseton stream study site the basement metamorphic rock is overlain by carbonate sedimentary rock of the Wappinger Group[17] that was deposited from the Cambrian through the Middle Ordovician (approximately 515 to 468 million years ago). This limestone of the Wappinger Group was deposited in a shallow ocean (Iapetus Ocean) during the Cambrian—Lower Ordovician Period (about 515 to 488 million years ago) of the Paleozoic Era. The Wappinger Limestone consists of folded and faulted competent limestone beds, with the fold and fault lines being characterized by broken and weathered zones of rock. The major fault lines include crush zones where the limestone beds have been pulverized by the displacement along the fault line. Some faults and fractures also include staining and weathering due to the flow of groundwater through the void space. Secondary rock types in the Wappinger Group include dolomite, shale, and chert. Dolomite is a carbonate rock with similar characteristics as limestone, whereas chert is a fine-grained, silica rich crystalline rock that exists as nodules or bands within the limestone bed. The top of limestone is locally variable in elevation, but outcrops are common and it is generally less than 100 feet below the ground surface.

The Wappinger Limestone is directly overlain by a varying thickness of overburden material deposited during the Pleistocene[18] Epoch. This overburden material, and the soils that formed from it, was shaped primarily by glacial and glacial melt water erosion of the Hudson River valley during the Wisconsin-aged glaciation between 90,000 and 18,000 years ago, during which this study area was buried underneath ice. This ice sheet would have scoured the landscape during its advance, and released till as it retreated during the melt period.

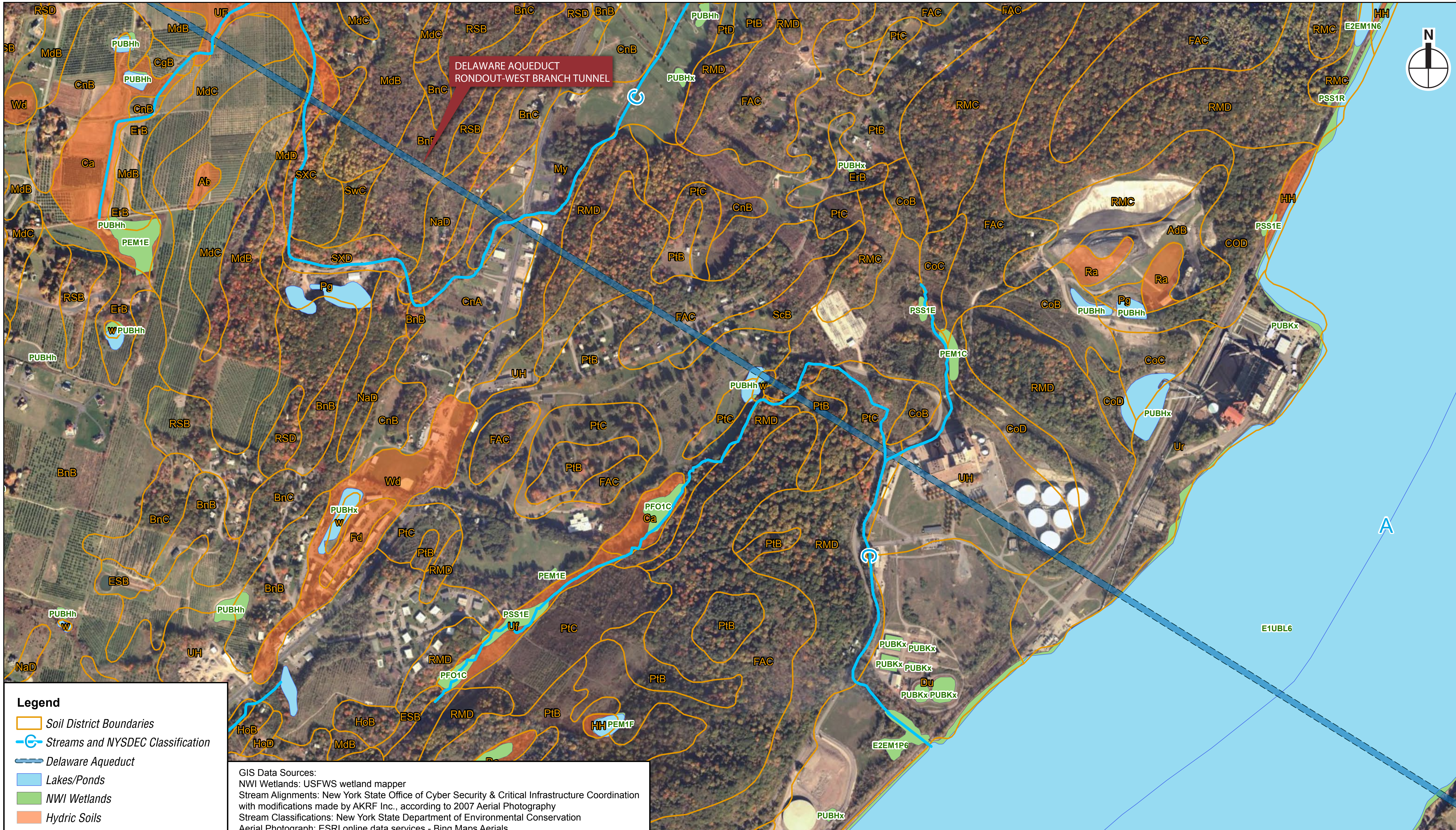
The Roseton stream study site is mapped by the Surficial Geology Map of New York as containing glacial till. This variable textured deposit contains a poorly sorted mixture of clay, silt, sand, and boulders, and was deposited beneath glacier ice. These surficial deposits overlying bedrock are thin and have low permeability. The till layer varies in thickness and is inconsistent—as bedrock outcrops are visible throughout the area.

The Roseton stream study site is composed of a variety of soils (see **Figure 2.8-13**), ranging from silt loams and complex formations at the headwaters to manmade series near the confluence with the Hudson River. According to the NRCS, USDA (http://websoilsurvey.nrcs.usda.gov/app/), 10 soil series are present on the Roseton stream study site, two of which are classified as hydric. The soil series include:

- Udifluvents-Fluvaquents complex (Uf)—The Udifluvents-Fluvaquents complex is commonly referred to as alluvial land and is classified as hydric. It consists of deep, well drained to very poorly drained, nearly level to gently sloping soils that formed in recent

[17] Bedrock Geology Map of New York, Lower Hudson Sheet, New York State Museum, Fisher et al, 1970, reprinted 1995.

[18] Geologic epoch from 2,588,000 to 11,700 years ago that spans the world's recent period of repeated glaciations, most noticeably glacial sediments.




0 1000 FEET
SCALE

Figure 2.8-13

## Roseton Stream Study Site Soils and Natural Features

alluvial deposits. This soil complex is subject to frequent flooding. Slope ranges from 0 to 5 percent.

- Canandaigua silt loams (Ca)—The Canandaigua series is classified as hydric, and consists of very deep, poorly and very poorly drained soils formed in silty glaciolacustrine sediments. These soils are on lowland and lake plains and in depressional areas on glaciated uplands. Slope ranges from 0 to 3 percent.
- Pittsfield gravelly loams, 3 to 8 percent (PtB) and 8 to 15 percent (PtC)—The Pittsfield series consists of very deep, well drained, sloping soils formed in glacial till deposits derived from limestone and schist. They are found on hilltops, ridges, and knolls in uplands.
- Rock outcrop-Farmington complex (RMD)—This complex is composed of about 60 percent exposed bedrock, 30 percent shallow, somewhat excessively drained to well drained Farmington soil, and 10 percent other soils. The Farmington soil formed in a thin mantle of glacial till deposits over limestone or limy shale. It is found on hillsides, ridges, and mountainsides in uplands, and slope ranges from 15 to 35 percent.
- Collamer silt loams, 3 to 8 percent (CoB), 8 to 15 percent (CoC) and 15 to 25 percent (CoD)—The Collamer series consists of deep, moderately well drained, gently sloping soils formed in glacial lake deposits that have a high content of silt and very fine sand. They are on benches, ridges, and undulating areas on lowland plains and in some valleys.
- Udorthents (UH)—These excessively drained to moderately well drained soils consist of excavated earthy material that has been stockpiled for eventual use as fill or topdressing; soil and rock material that has been trucked from other areas and leveled; or soil left in areas that have been excavated. They formed in manmade cut and till areas, which are generally near industrial sites, urban developments, or other construction sites.
- Dumps (Du)—These miscellaneous areas consist mostly of excavations that have been filled or are being filled with refuse and trash. The refuse varies widely in degree of decomposition, and in some places the soil material covering the debris is up to 5 feet thick.

***Groundwater***

As discussed above under “Geology and Soils,” the Roseton stream study site is mapped by the Surficial Geology Map of New York as containing glacial till. This variable textured deposit contains a poorly sorted mixture of clay, silt, sand, and boulders, which was deposited beneath glacier ice. It is thin and has low permeability. Till is considered a poor aquifer due to low yields, even for private use. The glacial till is underlain by the Wappinger Formation, which consists of a dark grey to black limestone and dolomite units. These carbonate rock units are known to be relatively brittle and contain significant fracturing along crush zones and fault lines. In addition, the carbonate units are relatively soluble and some fractures have been widened by dissolution. Wells inventoried in the Wappinger Limestone have a median yield rate of 80 gpm (0.115 mgd), and wells in favorable locations produce upwards of 300 gpm (0.432 mgd) (Orange County Water Authority 1995). The permeability can be high, especially in major fault zones, and the tunnels survey completed by DEP, which was conducted when the tunnel was out of service, indicated that the water yields of 50 to 300 gpm (0.072 to 0.432 mgd) leaking into the tunnel were observed (DEP 2004).

As with most of Orange County, the groundwater within the vicinity of the Roseton stream study site would be expected to meet water quality standards promulgated by the NYSDOH, Title 10 NYCRR Chapter 1 State Sanitary Code, Subpart 5-1.50 (Orange County Water Authority 1995). The groundwater beneath more than 90 percent of the land in Orange County is considered suitable for drinking without significant treatment (Orange County Water Authority 1995).

### *Floodplains*

The only area of 100-year floodplain (indicated as the Special Flood Hazard Area Subject to Inundation by the 1 percent Annual Chance Flood Zone in **Figure 2.8-14**) within the Roseton stream study site is within the tidal portion of the ~~Class C~~ stream at its confluence with the Hudson River. An additional area within the 500-year floodplain surrounds this tidal portion of the stream. A narrow zone of 500-year floodplain (indicated as Zone X in Figure 2.8-14) lines the western bank of the Hudson River and surrounds the tidal section of stream Segment 4.

~~Under~~ Both dewatering pipeline options would cross two small areas of 100-year floodplain (see Figure 2.8-5) that span Route 9W near the west connection site’s eastern boundary and at the intersection with Old Post Road. Neither dewatering pipeline option would pass through 100-year floodplain from this point to the proposed outfall locations. Option 1 would cross through a narrow band of 500-year floodplain on the western edge of the Hudson River where the pipeline would outfall. Option 2 would cross through a narrow band of 500-year floodplain and the 100-year floodplain where it outfalls in the tidal section of stream Segment 4.

### *Wetlands*

No NYSDEC freshwater wetlands were mapped within the Roseton stream study site. The USFWS NWI mapped eight freshwater wetland areas comprising approximately 9 acres as occurring along or adjacent to the Class C ~~stream~~ and Class A portions of the stream within the Roseton stream study site (see Figure 2.8-1).

As discussed in section 2.8-2, “Methodology,” a screening level assessment was conducted within the Roseton stream study site to identify the approximate areal extent and characteristics of wetlands within the assessment area for the stream, and identify other potential wetland areas not identified by the NWI. During site reconnaissance of the Roseton stream study site, approximate wetland boundaries were described using federal criteria for determining hydrophytic vegetation and wetland hydrology and noted on field maps, and the wetlands characterized.

**Figure 2.8-15** presents the approximate boundaries of freshwater wetlands mapped by the NWI and through the screening level assessment and site reconnaissance. As indicated in Figure 2.8-15, the results of the screening level assessment and site reconnaissance indicate the wetlands to be more extensive than as mapped by the NWI. The four NWI mapped wetlands in the headwater of the stream (i.e., PFO1C, PSS1E, PEM1E, and PFO1C) appear to form one hydrologically connected


Figure 2.8-14
**Roseton Stream Study Site FEMA Floodplains**

12.16.11

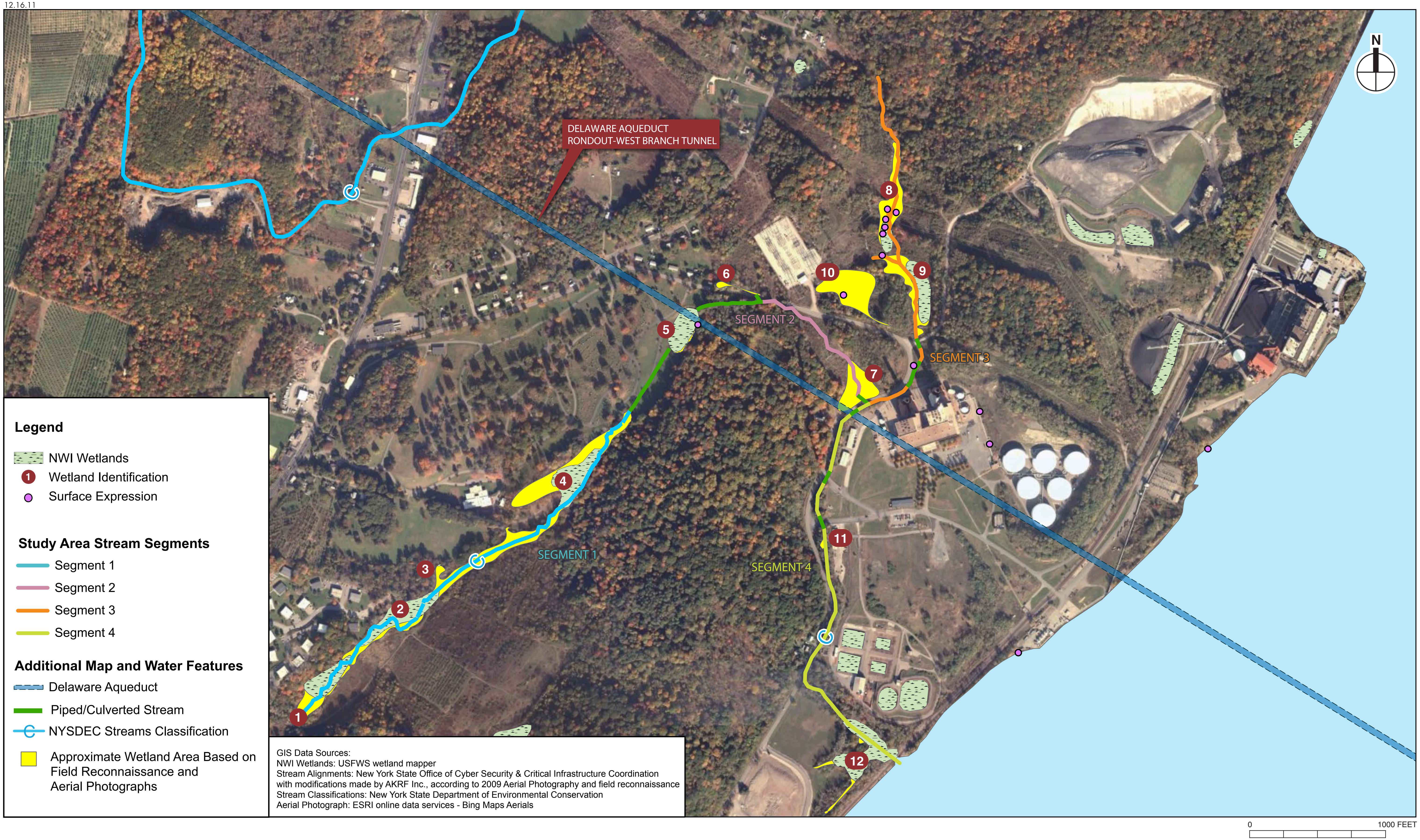



Figure 2.8-15

**Roseton Stream Study Area Surface Waters on Basis of Field Reconnaissance**

wetland system, indicated as wetlands 1 through 4 on Figure 2.8-15, and roughly coincide with the hydric soil units shown in Figure 2.8-13. The wetland community within each of the four wetlands reflected the NWI wetland category, as described briefly below. **Table 2.8-5** lists the scientific name and wetland indicator status of each observed species within these wetlands areas.

- Wetland 1/PFO1C—Hydrology appears to be due to surface runoff and groundwater. Soils are mucky. Vegetation observed within the wetland includes spicebush, skunk cabbage, jack-in-the-pulpit, red maple, American sycamore, and American hornbeam. Common reed was observed through the forested portion along the wetland's eastern edge.
- Wetland 2/PSS1E—This wetland contains areas of palustrine emergent vegetation in addition to the scrub/shrub vegetation indicated by the NWI. Hydrology appears to be from the stream, with additional contributions from groundwater and surface runoff. This portion of the wetland complex supports a dense community of common reed.
- Wetland 3/PEM1E—This wetland contains significant open water area. As indicated in Figure 2.8-15, it is contiguous with the stream. Spicebush, jewelweed, willow species, and dogwood species line the open water, with common reed and an iris species within the open water and channel. This wetland includes a palustrine forested riparian wetland corridor that borders the stream between the emergent wetland area and the downstream wetland area Wetland 4. Interspersed with the forested wetlands are areas with scrub-shrub and emergent wetlands.
- Wetland 4/PFO1C—This wetland is palustrine forested wetland as indicated on the NWI although of larger extent with the exception of the emergent marsh/mudflat area next to the culvert that undergrounds the stream and conveys the surface water to the Cemetery Pond. Hydrology appears to be due to the stream, with possible contribution from surface runoff and groundwater. Mucky soils were observed in some areas, with more solid soil covering much of the wetland; subsurface investigations were not conducted. The vegetative community in the forested portion includes red maple, green ash, silky dogwood, spicebush, poison ivy, jewelweed, skunk cabbage, and arrowwood. The mudflat/emergent marsh area at the north end of this wetland supports sporadic cattail, jewelweed, spicebush, red-osier dogwood, and clearweed.
- Wetland 5/PUBHh/Cemetery Pond—The impounded pond on the cemetery property is as characterized on the NWI. The inlet to the pond is the terminus of the culvert carrying the undergrounded flow from Wetland 4. Water also appears to be contributed through an approximately 12-inch-diameter corrugated metal pipe located at the pond's northwest section. A groundwater contribution to the pond is also possible. Vegetation along the shore of the pond is a mix of wetland and upland species, including common reed, weeping willow, horsetail species, garlic mustard, sumac species, jewelweed, grape vines, Virginia creeper, and aster species, among others. Water flowing from this pond enters a pipe within a few feet of the spillway and travels underground until it is discharged into Stream Segment 2, to the east and just south of River Road.

**Table 2.8-5**
**Wetland Vegetation Observed Within the Wetlands Within the Roseton Stream Study Site**

| Common Name | Scientific Name | Indicator Status |
|---|---|---|
| Spicebush | *Lindera benzoin* | FACW- |
| Skunk cabbage | *Symplocarpus foetidus* | OBL |
| Jack-in-the-pulpit | *Arisaema triphyllum* | FACW- |
| Red maple | *Acer rubrum* | FAC |
| American sycamore | *Platanus occidentalis* | FACW- |
| American hornbeam | *Carpinus caroliniana* | FAC |
| Common reed | *Phragmites australis* | FACW |
| Jewelweed | *Impatiens capensis* | FACW |
| Willow | *Salix* sp. | |
| Dogwood | *Cornus* sp. | |
| Iris | *Iris* sp. | |
| Green ash | *Fraxinus pennsylvanica* | FACW |
| Silky dogwood | *Cornus amomum* | FACW |
| Poison ivy | *Rhus radicans* | FAC |
| Arrowwood | *Viburnum dentatum* | FAC |
| Red-osier dogwood | *Cornus stolonifera* | FACW+ |
| Clearweed | *Pilea pumila* | FACW |
| Weeping willow | *Salix babylonica* | FACW- |
| Horsetail | *Equisetum* sp. | |
| Garlic mustard | *Alliaria petiolata* | FACU- |
| Sumac | *Rhus* sp. | |
| Grape vines | *Vitus* sp. | |
| Virginia creeper | *Parthenocissus quinquefolia* | FACU |
| Aster | *Aster* sp. | |
| Cut grass | *Leersia* sp. | |
| Purple loosestrife | *Lythrum salicaria* | FACW+ |
| European black alder | *Alnus glutinosa* | FACW- |
| Sensitive fern | *Onoclea sensibilis* | FACW |
| Soft rush | *Juncus effuses* | FACW+ |
| Smartweed | *Polygonum* sp. | |
| Wool-grass | *Scirpus cyperinus* | FACW+ |
| Eastern cottonwood | *Populus deltoids* | FAC |
| Broadleaved cattail | *Typha latifolia* | OBL |
| Multiflora rose | *Rosa multiflora* | FACU |
| White willow | *Salix alba* | FACW |
| False indigo | *Amorpha fruticosa* | FACW |
| Spotted joe-pye weed | *Eupatorium maculatum* | FACW |
| Arrow arum | *Peltranda virginica* | OBL |
| Cattail | *Typha* sp. | |
| Duck weed | *Lemna* sp. | |
| Elm | *Ulmus* sp. | |

**Notes:**
OBL (almost always occurs in wetlands)
FACW (occurs in wetlands 67 to 99 percent of the time)
FACU (typically occurring in uplands 66 to 99 percent of the time)
FAC (similar likelihood of occurring in wetlands and non-wetlands)
A positive (+) or negative (-) sign was used to more specifically define the regional frequency of occurrence in wetlands. The positive sign indicates a frequency toward the higher end of the category (more frequently found in wetlands), and a negative sign indicates a frequency toward the lower end of the category (less frequently found in wetlands).
**Sources:**
http://plants.usda.gov/wetinfo.html

- Wetland 6—This wetland area is not a mapped NWI wetland. Located north of River Road and the Cemetery Pond within the northeastern corner of the cemetery property, it originates as a groundwater seep at the toe of the slopes created by the construction of River Road and flows to the south within a swale between 5 and 20 feet wide for approximately 200 feet before being entering a culvert under River Road that discharges to stream Segment 2. Within the area of the seep, Wetland 6 is small (approximately 20 feet by 30 feet). Vegetation within the swale comprises common reed and silky dogwood, both of which are indicators of wet soil conditions. This strip, which appears to extend to the seep, may also meet the definition of a federally regulated wetland and could be categorized as palustrine forested or scrub/shrub.
- Wetland 7—This wetland would be best classified as a palustrine, emergent marsh, persistent marsh with a water regime that would likely meet the "seasonally flooded/saturated" modifier (PEM1E). It occurs at the lower portion of stream Segment 2 just before the stream enters a culvert under River Road, within the power line right-of-way. Hydrology for this wetland is from stream Segment 2, with possible additional contributions from groundwater and road runoff. Soils at the downstream (south) end of the wetland are mucky. Vegetation includes common reed, skunk cabbage, cattail species, poison ivy, jewelweed, clearweed, cut grass, purple loosestrife, and European black alder.
- Wetland 8/PSS1E—This wetland comprises a portion of the stream Segment 3 and would be more accurately classified as palustrine, emergent, seasonally flooded/saturated (PEM1E) due to the lack of dominant woody vegetation. Located at the toe of two slopes, hydrology is contributed by the headwater portion of stream Segment 3 and surface expressions of the RWBT leak. Wetlands were also observed extending north along the headwater portion of the stream. A second stream channel that begins upslope from, and to the west of, the main channel also flows into this wetland. The confluence of the two streams is within Wetland 8. This wetland contains areas of standing water comprising the stream channel and depressional areas outside the channel supporting duck weed, and has signs of past beaver activity (i.e., old felled trees and dam remnants). Skunk cabbage, cattail species, common reed, clearweed, jewelweed, the invasive species purple loosestrife, sensitive fern, soft rush, and a smartweed species comprise the vegetation present in this area. Wetland 8 is contiguous with the downstream wetland, Wetland 9 (see Figure 2.8-15), separated only by a culvert (approximately 36-inch diameter) supporting an 18-foot-wide dirt access road.
- Wetland 9/PEM1C—This "continuation" of Wetland 8 is accurately classified as palustrine, emergent, persistent, seasonally flooded (PEM1C). Similar to Wetland 8, this wetland extends from the stream edge to the toe of the slope. Areas filled for the installation of the transmission line pole foundations carve out upland areas along the edge of Wetland 9. The vegetative community within this wetland is roughly the same as that observed in Wetland 8 with the addition of wool-grass. The source of hydrology for

Wetland 9 comprises the surface expressions of the RWBT leak, flow from the headwater portion of stream Segment 3, and a small tributary that discharges from the west below the culvert. This stream supports one relatively small wetland on its southern bank of similar vegetative composition to Wetland 8 and the other areas of Wetland 9. Farther downstream and also on the west is a finger of a wetland seep approximately 25 feet wide and 80 feet long. This seep is connected to Wetland 9 just to the south of the southernmost east-west power line crossing (see Figure 2.8-15). Vegetation observed in this seep wetland is also a subset of that observed with the main wetland.

- Wetland 10—This wetland is not mapped by the NWI. It extends from the toe of the slopes associated with River Road and the substation and drains southeast within a channel toward River Road and ends at a pipe located approximately 125 feet west of the culvert that conveys stream Segment 3 under Danskammer Road. This wetland is a palustrine, forested system with scrub-shrub and emergent components. Sources of hydrology associated with this wetland may include runoff from River Road and the substation, in addition to groundwater and surface expression of the RWBT leak. A small ponded area (15-foot diameter) is present along the channel portion before River Road. A length of pipe, installed vertically, and a staff gauge were observed in this pool. The water in the last 300 feet of this stream segment flows within a defined channel/drainage swale at the toe of the River Road embankment before entering the culvert. The location of the culvert's outlet is unknown. Hydrophytic vegetation observed along the channel include skunk cabbage, jewelweed, clearweed, polygonum species, spicebush, common reed, horsetail, European black alder, weeping willow and elm species.
- Wetland 11—This relatively small (approximately 50 by 20 feet), unmapped palustrine, forested wetland is located within the fenced-off Roseton/Danskammer power generating facility just south of the visitor entrance. It is located in the floodplain to the west of stream Segment 4, the source of hydrology for the wetland. Vegetation observed through the fence includes spicebush, European black alder, skunk cabbage, jewelweed, and dogwood species. Standing water was observed in the wetland.
- Wetland 12/E2EM1P6—This wetland is accurately classified by the NWI as an estuarine intertidal emergent irregularly flooded oligohaline wetland but is larger in extent than mapped by the NWI. It is located at the end of stream Segment 4 at, and to the west of, its confluence with the Hudson River. The hydrology of this wetland is driven by the tidal fluctuations of the Hudson River, discharge from the Class C portion of the stream, discharge from two drainage features that discharge to the southern end of the wetland, and road runoff from River Road and the access road on the Hess facility. Vegetation within these drainage features includes horsetail, common reed, poison ivy, spicebush, eastern cottonwood, silky dogwood, and European black alder. The majority of Wetland 12 is open tidal mudflat with little vegetation. Species observed along the edge of the wetland (in addition to those noted along the tidal channel to which it is connected) include jewelweed, jack-in-the-pulpit, weeping willow, American sycamore, broadleaved

cattail, multiflora rose, white willow, false indigo, European black alder, silky dogwood, spotted joe-pye weed, and arrow arum.

There were no threatened or endangered wetland species identified within the wetlands at the Roseton stream study site.

***Aquatic Resources***

As discussed previously, the unnamed tributary to the Hudson River within the Roseton stream study site is a NYSDEC Class C water within the nontidal portion, and a Class A water within the tidal portion of the stream. The best usage of Class C waters is fishing. These waters should be suitable for fish propagation and survival and the water quality suitable for primary and secondary contact recreation. The water quality standards for Class C waters were presented previously in Table 2.8-3 for the west connection site. The best usages of Class A waters are: a source of potable water supply, primary and secondary contact recreation, and fishing. The water quality standards for Class A waters are presented in Table 2.8-6.

The Class C stream was sampled for selected physiochemical parameters, benthic macroinvertebrates, and fish during the spring (June 14, 2011), summer (July 18, 2011), and early fall (September 13, 2011) sampling events. Additional fish sampling was conducted in late fall (December 1, 2011) in Segments 3 and 4. During the early fall sampling event, Segment 1 was too shallow to measure physiochemical parameters. During the spring and summer sampling events, the water temperatures recorded in Segments 1 and 2 were significantly warmer than those recorded and in Segments 3 and 4 (see Figure 2.8-15). Spring and summer water temperatures in Segments 1 and 2 ranged from 65°F to 69°F and 77°F and 78°F, respectively. The early fall water temperature in Segment 2 was 69°F. The water temperature of Segment 3, the segment that receives the discharge from the surface expressions of the RWBT leak, ranged from 54°F to 55°F in the spring, was recorded as 58°F in the summer, 53°F in the early fall, and 52°F in the late fall. Water temperatures in Segment 4 ranged from 56°F to 58°F in the spring and from 59°F to 62°F in the summer. Segment 4 water temperatures in the early fall ranged from 54°F to 58°F and was recorded as 54°F in the late fall. These temperatures suggest that flow from Segment 3, with its contribution from the surface expressions of the leak, have a greater influence over the conditions in Segment 4 than does the flow contributed from Segments 1 and 2.

Conductivity/total dissolved salt (TDS) concentrations were not measured during the spring sampling effort due to a malfunctioning water quality meter. During the summer sampling event, the TDS concentrations for Segment 1 ranged from 194 parts per million (ppm) to 198 ppm. For Segment 2, TDS concentrations ranged from 180 ppm to 189 ppm. The TDS concentrations for Segment 3 were significantly lower, ranging from 33 ppm to 35 ppm, with the lower value occurring closer to the main surface expression. The TDS concentrations for Segment 4 ranged from 120 ppm to 167 ppm. The TDS sampling in the tidal portion of Segment 4 coincided with low tide; therefore, most of the water present represented stream water rather than Hudson River water. During the early fall sampling event, the Segment 2 TDS concentration was 500 ppm, whereas Segment 3 ranged from 118 ppm to 120 ppm, and Segment 4 ranged from 119 ppm to

120 ppm. TDS concentrations in Segment 4 coincided with high tide during the early fall sampling. The early fall sampling event occurred approximately two weeks after Hurricane Irene, which may have contributed to higher TDS concentrations. TDS concentrations were not measured during the late fall sampling.

Dissolved oxygen (DO) concentrations recorded during the spring sampling event were 8.6 milligrams per liter (mg/l) for Segments 1 and 2, 8.9 mg/l to 9.8 mg/l for Segment 3, and 8.9 mg/l to 9.3 mg/l for Segment 4. It is notable that sampling in the tidal portion of Segment 4 occurred at or near high tide, and the lower dissolved oxygen concentration and higher temperature recorded for this portion of Segment 4 likely reflect mixing with water from the Hudson River. DO concentrations were not recorded during the summer sampling event due to a malfunctioning water quality meter; however, the cooler temperatures and high flows associated with Segments 3 and 4 suggest that oxygen concentrations would be near saturation. The DO reading during the early fall sampling event in Segment 2 was 11 mg/L, whereas Segment 3 ranged from 17 mg/L to 17.8 mg/L. The early fall Segment 4 DO reading, which coincided with high tide, was 12.6 mg/L. These DO readings for both spring and early fall sampling are well above the DO standard for both Class C and Class A waters. DO concentrations were not measured during the late fall sampling.

The pH values recorded during the summer sampling event were within both the Class C and Class A standards, ranging from 7.7 to 7.8 for Segments 1 and 2, 7.1 to 7.4 for Segment 3, and 7.4 to 7.5 for Segment 4. The pH values were not recorded during the early fall sampling event due to a malfunctioning water quality meter, and were not measured during the late fall sampling event.

Appendix 2.8-2, Tables 5 through 7 list the macroinvertebrates collected during the spring, summer, and early fall sampling events, respectively. During the spring, ~~and~~ summer, and early fall sampling events, macroinvertebrate taxa collected in Segments 1 and 2 were generally those ranked by the EPA as having relatively high regional pollution tolerance values, whereas the taxa collected in Segments 3 and 4 comprised a combination of low, moderate, and high regional pollution tolerance, as described below. Summer sampling yielded a higher number of individuals representing more orders than spring or early fall sampling. Of the three sampling events, spring sampling yielded the lowest number of individuals representing the fewest orders.

- Within Segment 1 in the spring, 21 individuals were collected, representing 12 genera/families of five orders. Thirteen of the 21 individuals collected were within the order Diptera. Other orders represented included Isopoda, Lepidoptera, Megaloptera, and Trichoptera. In the summer, 404 individuals were collected, representing 23 genera/families of 9 orders. The order Isopoda was well represented with 267 individuals, all identified as *Asellus* sp. The second-most abundant order was Trichoptera with 54 individuals, all but 2 identified as *Cheumatopsyche* sp. Other orders represented in the summer included Coleoptera, Diptera, Hemiptera, Hirundinae, Odonata, Oligochaeta, and Turbellaria. In the early fall, 132 individuals were collected, representing 12 genera/families of nine orders. The most abundant orders were Oligochaeta and Isopoda. Fifty-one individuals were identified as Tubificidae in the order Oligochaeta, and 33 individuals were identified as *Caecidotea* sp. in the order Isopoda. The remaining 48 individuals belonged to the orders Diptera, Gastropoda, Hemiptera, Hirudinae, Odonata, Trichoptera, and Turbellaria. In general, these the organisms collected in each sampling event are ranked by the EPA as having relatively high regional pollution tolerance values.

- A total of 275 macroinvertebrate individuals were collected from Segment 2 in the spring, representing 34 genera/families of 10 orders. The most abundant organism was the family Tubificidae from the order Oligochaeta, with 74 individual collected. The second most abundant taxon was *Hydropsyche* sp. from the order Trichoptera, with 44 individuals collected. The third most abundant taxon was *Polypedilum* sp. from the order Diptera, with 34 individuals collected. Other orders included Amphipoda, Isopoda, Coleoptera, Ephemeroptera, Gastropoda, Hirudinae, and Turbellaria. In the summer, 891 individuals were collected, representing 33 genera/families of 7 orders. The bulk of organisms collected fell under the order Trichoptera, with 609 individuals identified. The most abundant taxon was *Cheumatopsyche* sp. with 353 individuals collected. The second most abundant taxon was *Hydropsyche* sp. with 189 individuals collected. Other orders included Amphipoda, Diptera, Ephemeroptera, Hirudinae, Isopoda, Oligochaeta, and Turbellaria. In the early fall, a total of 398 individuals were collected, representing 20 genera/families belonging to 10 orders. Oligochaeta was the most well represented order, with 209 individuals, 169 of which were identified as Tubificidae. The second most abundant order was Hirudinae, with 109 individuals identified. Other orders included Amphipoda, Diptera, Ephemeroptera, Hemiptera, Isopoda, Odonata, Trichoptera, and Turbellaria. In general, these the organisms collected in each sampling event are ranked by the EPA a having relatively high regional pollution tolerance values.
- A total of 230 macroinvertebrate individuals were collected from Segment 3 in the spring, representing 35 genera/families of 10 orders. The three most abundant taxa were from the order Diptera, comprisings *Eukiefferiella* sp. 77 individuals, *Parakiefferiella* sp. 27 individuals collected, and *Oliveridea* sp. 15 individuals collected. Other orders included Amphipoda, Isopoda, Coleoptera, Ephemeroptera, Hemiptera, Megaloptera, Oligocaheta, and Trichoptera. In general, these organisms are ranked by the EPA a having relatively low regional pollution tolerance values, although organisms with higher tolerance values co-occur in this Segment. In the summer, 833 individuals were collected, representing 42 genera/families of 8 orders. Diptera was the most represented order with 444 individuals, with 358 of these identified as *Simulium* sp. Oligochaeta and Trichoptera were also well represented with 178 and 91 individuals, respectively. Other orders included Coleoptera, Ephemeroptera, Hirudinae, Isopoda, and Turbellaria. One skeleton shrimp (*Caprella* sp.) was also collected. In the early fall, 370 individuals were collected, representing 37 genera/families belonging to 11 orders. Oligochaeta and Diptera were the most abundant orders, with 99 and 90 individuals identified, respectively. Trichoptera

and Isopoda were also well represented, with 58 and 45 individuals identified, respectively. Other orders included Amphipoda, Coleoptera, Ephemeroptera, Gastropoda, Hemiptera, Hirudinae, and Turbellaria. Most organisms identified in the summer and early fall sampling events are ranked by the EPA as having relatively high regional pollution tolerance values.

- A total of 152 macroinvertebrate individuals were collected from Segment ~~2~~ 4 in the spring, representing 12 genera/families of six orders. The most abundant organism was the Dipteran *Oliveridea* sp. with 44 individual collected. The second most abundant taxon was *Hydropsyche* sp. from the order Trichoptera, with 38 individuals collected. The third most abundant taxon was *Ephemerella* sp. from the order Ephemeroptera, with 30 individuals collected. Other orders included Amphipoda, Isopoda, Oligochaeta, and Trichoptera. Benthic macroinvertebrates were scarce in the tidal portion of Segment 4, where only three individuals were collected, comprising two individuals of the family Veliidae (order: Hemiptera) and one of *Hydrobeanus* sp. (order: Diptera) from one sampling location. In the summer, 301 individuals were collected, representing 26 genera/families of 9 orders. The most abundant organism was *Gammarus* sp. from the order Amphipda with 77 individuals, followed closely by *Hydropsyche* sp. from the order Trichoptera with 72 individuals. Other orders represented included Coleoptera, Diptera, Ephemeroptera, Hirudinae, Isopoda, Megaloptera, and Oligochaeta. Four *Nematoda* were also collected. Most of the samples collected in the tidal portion yielded no individuals. A total of 489 individuals were collected in the early fall, representing 21 genera/families of nine orders. The most abundant order was Amphipoda with 251 individuals, all identified as *Gammarus* sp. The second most abundant order was Trichoptera with 99 individuals identified. Other orders included Diptera, Ephemeroptera, Hirudinae, Isopoda, Odonata, Oligochaeta, and Turbellaria. In general, ~~these~~ the organisms collected in each sampling event are ranked by the EPA as having relatively low to moderate regional pollution tolerance values, although organisms with higher tolerance values co-occur in this segment.

Only two species of fish, American eel (*Anguilla rostrata*) and brown trout (*Salmo trutta*), were collected during electrofishing of Segments 2, 3, and 4 during the spring and summer sampling events, as described below. During the early fall sampling event, bluegill (*Lepomis macrochirus*) was found in addition to American eel and brown trout. Bluegill was only found in Segment 4. During the late fall sampling event (Segments 3 and 4 only), banded killifish, pumpkinseed (*Lepomis gibbosus*), and darter (*Etheostoma* spp.) were found in addition to brown trout and bluegill; no American eel were found. Only brown trout were found in Segment 3, with all other species (not including brown trout) found in Segment 4. For all sampling events, the water depths in Segment 1 were insufficient to permit electrofishing. The Cemetery Pond contained numerous koi (*Cyprinus carpio*) and was not sampled.

- Segment 2—In the spring, seven American eels were collected from Segment 2, five of which were collected for measurement. The eels collected ranged from 12 inches (300 mm) to 14 inches (350 mm) in total length. In the summer, 12 American eels were collected from Segment 2; the two collected for measurement were 6 inches (150 mm) and 8 inches (200 mm) long. In the early fall, 3 American eels were collected. No other species were collected or observed in this reach. Segment 2 was not sampled in late fall. The steep gradient and shallow water of Segment 2 probably preclude other fish species from inhabiting or transiting the stream in this area.
- Segment 3—In the spring, 19 brown trout were collected from Segment 3, 11 of which were retained for measurement; in the summer, 24 brown trout were collected, 13 of which were retained for measurement; and in the early fall, 23 brown trout were collected, 18 of which were retained for measurement. At least two year classes were represented. Adult trout ranged from 10 inches (245 mm) to 13 inches (338 mm) (total length) in the spring, from 5 inches (138 mm) to 9 inches (232 mm) in the summer, and from 7 inches (187 mm) to 10 inches (251 mm) in the early fall. Juveniles ranged from 1 to 2 inches (29 to 45 mm) (total length) in the spring, from 2 inches (52 mm) to 2.5 inches (65 mm) in the summer, and from 3 inches (79 mm) to 3.5 inches (96 mm) in the early fall. Adult trout were examined for hatchery marks, such as tags or fin clips; however, no such marks were observed (see **Figure 2.8-16, Photograph 1**). Juveniles exhibited pronounced parr marks, dark vertical bands along the flanks that disappear as trout grow (**Figure 2.8-16, Photograph 2**). During the late fall sampling event, 15 brown trout were collected, ranging from 4 inches (104 mm) to about 13 inches (340 mm) in size. It appeared that some habitat segregation by year class was occurring in Segment 3, with adults occupying snags, deep sloughs, and undercut banks, and juveniles occupying relatively straight, shallow reaches with sandy or pebble bottoms. This segregation was most apparent in the summer sampling event, with juvenile brown trout only occurring in the bedrock/cobble riffles immediately downstream of the primary surface expression. All fish collected appeared healthy, and no signs of injury or lesions were observed.
- Segment 4—In the spring, eight American eels ranging in length from approximately 3 inches to 7 inches (65 mm to 180 mm) were collected from the nontidal portion of Segment 4. Two brown trout were stunned; however, only one was netted. This specimen was 9 inches (245 mm) in total length. In addition, what appeared to be a slimy sculpin (*Cottus cognatus*) was stunned, but it was not captured due to the high current velocity in the area. One brown trout measuring about 10 inches (245 mm) was collected in the summer, along with two American eels. In the early fall, 2 American eels were stunned but not collected. Three brown trout were stunned, and one was measured at 6 inches (162 mm). Six bluegills ranging from 2 inches (56 mm) to 3 inches (85 mm) in length. No fish were collected or observed in the tidal portion of Segment 4, neither in spring nor early fall sampling events. During late fall sampling, three bluegill, eight banded killifish, one pumpkinseed, and one darter were found in the tidal portion of Segment 4. The

Adult brown trout (Salmo trutta) collected from Segment 3 during spring 2011 electrofishing **1**

Juvenile brown trout (Salmo trutta) collected from Segment 3 during spring 2011 electrofishing **2**

Figure 2.8-16
**Roseton Stream Study Site Representative Photographs**

bluegill ranged in length from 1.4 inches (38 mm) to 3.6 inches (93 mm); the banded killifish ranged from 1.7 inches (44 mm) to 3.3 inches (85 mm); the pumpkinseed was 2.4 inches (60 mm) long; and the darter was 1.7 inches (44 mm) long.

On the basis of the spring, ~~and~~ summer, and early fall 2011 water quality, benthic macroinvertebrate, and fish sampling within the Roseton stream study site, it is clear that the study area's streams exhibit two distinct communities depending on source water, flow rate, water temperature, and stream gradient. Stream Segments 1 and 2 exhibited the characteristics of a warm, shallow, and possibly ephemeral stream that is probably typical of the region. The invertebrate taxa present in Segments 1 and 2 represent organisms with relatively high tolerances for pollution and other stressors, while the fish species present (American eels in the stream, but also including the koi observed in Cemetery Pond) tend to prefer warmer waters. In addition, American eels are noted for their ability to climb dams and other steep obstacles, and this is likely the only Hudson River diadromous fish species that would be able to negotiate the steep grade within Segment 2.

In contrast, Segment 3 exhibited a comparatively high flow of cool aqueduct water that is entering the stream primarily from the main surface expression, but also from additional minor expressions. This stream segment is about 50°F cooler than Segments 1 and 2 during the warm weather months that were sampled, and harbors a benthic invertebrate community that is relatively less tolerant to pollutants or other stressors and fish community (i.e., brown trout) that is typical of cold water streams. By extension, the non-tidal reach of Segment 4 is substantially similar to Segment 3 in terms of water quality, benthic invertebrate assemblage, and fish community. This is consistent with the observation that the majority of freshwater base flow in Segment 4 originates in Segment 3, with Segments 1 and 2 contributing comparatively little in terms of base flow volume. In contrast, the tidal reach of Segment 4 exhibited lower abundance and diversity of both invertebrates and fish than the other Segments—a potential mechanism for this decreased abundance and diversity in the tidal reach is discussed below. The brown trout present in the system do not appear to have been directly stocked in the stream based on the absence of fin clips or other identifying hatchery marks (i.e., degenerated fins). There are at least two hypotheses to explain the presence of brown trout in this stream, and each hypothesis has complications. First, it is possible that these fish represent river-run trout from the Hudson River that have found suitable habitat in the artificially cool waters of the subject stream, although a significant portion of the stream that runs via culvert under the Roseton/Danskammer Generating Station property and the weir located along River Road could serve as substantial obstacles to river-run fish. Alternatively, the presence of trout in the stream may be attributable to other unknown, historic introductions (from whatever source), with subsequent year classes resulting from the presence of a reproducing population within the stream. The presence of young-of-the-year in the stream suggests that reproduction is occurring on an ongoing basis within Segment 3, and it is suspected that the stream receives little if any fishing pressure because it is located within the secured private property of the Roseton/Danskammer Generating Station. Therefore, whatever the source of the trout, there appears to be a self-sustaining population within the cooler segments (Segment 3 and the non-tidal reach of Segment 4). The paucity of both invertebrates and fish in the tidal portion of Segment 4 is likely attributable to significant temperature fluctuations during warmer months. Tidal fluctuations in this portion of Segment 4 alternate roughly every 6.5 hours, as driven by the Atlantic Ocean's tide signal as propagated up the Hudson River. During warm weather, the water temperature of the tidal Hudson River can reach as high as 80°F, while the July temperatures from Segments 3 and 4 were around 59°F. Thus, in the warmer months, during high tide, warmer Hudson River water would mix with the cooler stream discharge, resulting in warmer temperatures within the reach, whereas during low tide, the water within the tidal portion of Segment 4 would be from the stream discharge exclusively. This could result in a roughly 20°F temperature swing during warm weather with every tide cycle. Such a wide temperature change over a short time could be physiologically stressful to many invertebrate and fish species. This condition may differ in cold months, when the temperature difference between the stream and the Hudson River is less, as is suggested by the results of the late fall fish sampling conducted in Segment 4. However, fewer aquatic macroinvertebrates would be present during the winter months.

***Terrestrial Resources***

*Wildlife*

The majority of the habitat available to terrestrial wildlife within the Roseton stream study site is limited to fragmented secondary growth forest surrounding the stream channel, as described above under "Wetlands." The site also contains some early successional forest and shrubland in the utility corridors in the vicinity of stream Segment 3 that attract some wildlife species typically associated with these habitat types, more so than mature forest. As described previously, there are small areas of emergent wetlands along Segments 2 and 3 and a manmade pond within Cedar Hill Cemetery on the site's western side, which may provide marginal habitat for some generalist marshbirds, waterbirds, and other wetland-associated species.

*Birds.* Appendix 2.8-2, Table 2 lists the species of birds with the potential to occur in the Roseton stream study site during spring, summer, fall, and winter. The 2000-2005 Breeding Bird Atlas documented 60 species nesting in Block 5760D, in which the site is located. Considering the habitat requirements and relative commonality of each of these species, only some of these are expected to breed in the stream study site. Due to the degree of fragmentation and its relatively small size, the stream study site represents marginal nesting habitat for most woodland birds, particularly forest interior species. This is reflected by the low number of woodland birds observed breeding at the site during summer field surveys (Appendix 2.8-2, Table 2). Woodland bird species nesting in the site are primarily disturbance-tolerant, generalist species that have small area requirements and are commonly associated with suburban areas and other developed landscapes, including American robin, black-capped chickadee, cedar waxwing, eastern wood peewee, red-bellied woodpecker, downy woodpecker, and wood thrush.

The stream site contains areas of shrub-scrub/early successional forest in the utility corridors and along the upper reach of stream Segment 1, which provide nesting habitat for a different suite of bird species than is supported by the woodland areas. Early successional habitats can be of value to mature-forest birds as well during the post-breeding period (e.g., Vitz and Rodewald 2006). Birds observed in these areas during summer field surveys include rose-breasted grosbeak, blue-winged warbler, indigo bunting, eastern towhee, wild turkey, and gray catbird, among others. The areas of emergent wetland along stream Segments 2 and 3 and the manmade pond within Cedar Hill Cemetery provide limited foraging and/or nesting habitat for some riparian-associated species. Birds observed in these areas during summer field surveys include common yellowthroat, eastern kingbird (*Tyrannus tyrannus*), great blue heron (*Ardea herodias*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), spotted sandpiper (*Actitis macularius*), warbling vireo (*Vireo gilvus*), and yellow warbler.

The National Audubon Society's 2010 Christmas Bird Count in eastern Orange County documented 81 species wintering in the county (see Appendix 2.8-2, Table 2). Considering the habitat requirements of these species, many would not occur at the Roseton stream study site during winter (e.g., waterfowl). The bird species present at the site during winter are expected to be limited to primarily disturbance-tolerant, terrestrial species associated with residential areas. No winter bird surveys were conducted at the site, but the winter bird community is expected to be the same as described for the west connection site given the site's habitat similarity and close proximity.

Although the Roseton stream study site offers breeding and wintering habitat for a limited number of bird species, it may provide suitable stopover habitat for numerous migratory land birds passing through the area during spring and autumn. Most species are more generalistic in their habitat preferences during migration than during the non-migratory periods, and, thus, far more species are likely to occur at the site during spring and autumn than at other times of year. Species expected to utilize the site during migration include Baltimore oriole, common yellowthroat, wood thrush, yellow warbler, American redstart, black-throated blue warbler, black-throated green warbler, magnolia warbler, northern parula, ovenbird, Swainson's thrush, and yellow-rumped warbler, among others, as listed in Appendix 2.8-2, Table 2.

*Reptiles and Amphibians*. The habitats present within the Roseton stream study site have the potential to support several reptile and amphibian species, as indicated in Appendix 2.8-2, Table 3. Most notably, the stream study site has cold water seeps, a cold water stream with an associated open wetland area, and a human-made pond. Based on their habitat preferences and distribution within New York (Mitchell et al. 2006, Gibbs et al. 2007), and the NYSDEC Herp Atlas Project blocks encompassing the stream study site, the following reptile and amphibian species are considered to have the potential to occur at the site: marbled salamander, Jefferson salamander, spotted salamander (*Ambystoma maculatum*), red-spotted newt (*Notophthalmus viridescens*), northern dusky salamander (*Desmognathus fuscus fuscus*), Allegheny dusky salamander (*Desmognathus ochrophaeus*), northern redback salamander, four-toed salamander (*Hemidactylium scutatum*), northern two-lined salamander, American toad, Fowler's toad (*Anaxyrus fowleri*), gray tree frog (*Hyla versicolor*), northern spring peeper, bullfrog, green frog, wood frog, northern leopard frog (*Rana pipiens*), five-lined skink (*Eumeces fasciatus*), northern water snake (*Nerodia sipedon*), northern brown snake (*Storeria dekayi dekayi*), common garter snake, eastern ribbon snake, black racer (*Coluber constrictor*), smooth green snake (*Opheodrys vernalis*), black rat snake, milk snake (*Lampropeltis triangulum*), copperhead (*Agkistrodon contortrix*), common snapping turtle (*Chelydra serpentine*), spotted turtle (*Clemmys guttata*), wood turtle, eastern box turtle, red-eared slider (*Trachemys scripta elegans*), and painted turtle (*Chrysemys picta*).

Red-backed salamander, northern two-lined salamander, eastern newt (*Notophthalmus viridescens*), garter snake, green frog, and bullfrog were observed within the Roseton stream study site.

*Mammals.* Similar to the west connection site, the degree of habitat fragmentation and extent of development surrounding the Roseton stream study site is expected to limit the mammal community to species associated with disturbed habitats within agricultural or residential areas. Mammals expected to occur within the Roseton stream study site are the same as those listed for the west connection site. The following mammals were observed during field surveys at the Roseton stream study site: eastern chipmunk, gray squirrel, woodchuck (*Marmota monax*), white-tailed deer, eastern cottontail, and white-footed mouse. In addition, a muskrat (*Ondatra zibethicus*) was observed in the human-made pond within the cemetery, and signs of past beaver (*Castor canadensis*) activity were found within and along stream Segment 3 (i.e., chewed tree stumps along the stream channel and old dams or lodges within the stream).

Wildlife habitat surrounding the proposed pipeline route (see Figure 2.8-1) is extremely limited. Under both Option 1 and 2, the majority of the pipeline would follow existing roadways where there is heavy commercial, industrial, and/or residential development on at least one side. Beginning from the west connection site, both pipeline options would follow Route 9W south towards Old Post Road. This segment of Route 9W has extensive development on both sides, and the wildlife occurring in the area is primarily limited to non-native, invasive birds such as European starlings. Under both options, the pipeline would then follow Old Post Road, which is bordered by manicured lawn occurring within the cemetery to the south and the residential properties to the north. As such, wildlife occurring along this section of the proposed pipeline routes is limited to some common backyard bird species, such as American robin, and urban-adapted mammals, such as gray squirrel. Under Option 1, the pipeline would cross the unnamed stream and continue east in an easement across Dynegy property, discharging to the Hudson River just north of an electrical substation. Under Option 2, the pipeline would turn south along River Road past the Dynegy property and parallel stream Segment 4, discharging to the tidal section of Segment 4. Wildlife with the potential to occur within the stream Segment 4 is as described above. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline that would be constructed from the west connection site to the Hudson River, selecting one potential dewatering pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS.

*Threatened, Endangered, Special Concern, Rare, and Exploitably Vulnerable Species.* Appendix 2.8-2, Table 4 lists the threatened or endangered species and species of special concern with the potential to occur within the west and east of Hudson study areas. The federally listed species with the potential to occur within the Roseton stream study site would be the same as described for the west connection site with the addition of American eel (*Anguilla rostrata*) which has been proposed for federal listing as threatened (http://www.gpo.gov/fdsys/pkg/FR-2011-09-29/pdf/2011-25084.pdf): Atlantic sturgeon (~~Proposed~~Endangered), shortnose sturgeon (Endangered), dwarf wedgemussel (Endangered [Housatonic River drainage only]), bog turtle (Threatened), Indiana bat (Endangered), and small whorled pogonia (Threatened).

Although shortnose and Atlantic Sturgeon and dwarf wedge mussel are listed as occurring in the vicinity of the west of Hudson study area, the Atlantic and shortnose sturgeon are restricted to the Hudson River and the dwarf wedge mussel is restricted to the Lower Neversink River and would not occur within the Roseton stream study site. The American eel is under review for possible listing as threatened under the Endangered Species Act. This species is impacted by habitat loss and reduction, especially in important freshwater riverine systems in its range; overutilization for commercial harvest; parasitism; and the inadequacy of existing regulatory mechanisms. The American eel is catadromous; it spawns in the Sargasso Sea in the middle of the North Atlantic Ocean and spends its juvenile stage in fresh to brackish waters such as this Class C stream before returning to the ocean to breed. This juvenile stage may last as long as 12 years for males and 19 years for females (Able and Fahay 1998). Males are primarily found in brackish waters while females tend to remain in freshwater habitats, though some eels move between fresh and brackish water several times throughout their lifetime. Their range includes all accessible river systems (including their tributaries, ponds, and subterranean springs) and coastal areas having access to the western Atlantic Ocean, and to which oceanic currents provide transport.

NYNHP records of state and federally listed species in the vicinity of the Roseton stream study site are identical to the west connection site (see Appendix 2.8-3) and include Indiana bat, bald eagle (Threatened), and shortnose sturgeon (Endangered).

Threatened, Endangered, and New York State Special Concern reptile and amphibian species with the potential to occur within the Roseton stream study site are the same as discussed for the west connection site (i.e., Jefferson salamander, wood turtle, marbled salamander, and eastern box turtle) with the addition of the spotted turtle (Mitchell et al. 2006, Gibbs et al. 2007).

As discussed for the west connection site, peregrine falcon (NYS Endangered) is the only state- or federally listed bird species documented during the 2000-2005 Breeding Bird Atlas in the survey block encompassing the Roseton stream study site (Block 5760D). Threatened, Endangered, and Special Concern species documented during the National Audubon Society's Christmas Bird Count in eastern Orange County in 2010 with the potential to occur in the Roseton stream study site are the same as for the west connection site and include bald eagle, sharp-shinned hawk (Special Concern), Cooper's hawk (Special Concern), red-shouldered hawk (Special Concern), northern harrier (Threatened), and horned lark (Special Concern).

None of the threatened or endangered species with the potential to occur within the Roseton stream study site were observed during field surveys. With the exception of spotted turtle, the habitat requirements for the species listed above are as described for the west connection site. The spotted turtle is a NYSDEC species of Special Concern. Habitat for spotted turtle include marshy meadows, bogs, swamps, ponds, ditches, and other small bodies of still water. Individuals are usually active from March to October, with the breeding season extending from March to May. At the end of the breeding season, females leave the breeding pools in search of nesting areas that typically comprise open areas, such as meadow, field, or road edges. Population declines of this species are attributed to habitat loss and declines in water quality (NYSDEC 2011g).

As mentioned above, the majority of both dewatering pipeline route options follow the sides of existing roadways where habitat is of little value to native wildlife, including protected species and none of these species would be expected to occur within close proximity to either route option. Two exceptions are the eastern box turtle, which has the potential to occur in the clearing on the Dynegy property where the dewatering pipeline would be routed under Option 1, and the spotted turtle, which has the potential to occur along road edges at the end of the breeding season. However, as discussed previously, dewatering pipeline route Option 2 is the only route further evaluated for the FEIS.

### 2.8-3.2 FUTURE WITHOUT PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION—WEST OF HUDSON

#### *WEST CONNECTION SITE*

##### *Overview*

In the future without Project 1, the geology and soils, groundwater, floodplain, and terrestrial and aquatic natural resources described for the west connection site are expected to remain as described above in section 2.8-3.1 for existing conditions, with the exception of those changes in habitat that result from natural succession. As discussed below, minimal changes are expected to occur to ecological communities and wildlife by the 2020 analysis year.

##### *Ecological Communities*

The species observed in the subcanopy, shrub, and herbaceous layers of the early mature Appalachian oak-hickory forest would be expected to continue to grow into a mature forest, although invasive species of multiflora roseand swallow-wort now present in this community at low densities would continue to spread, with the potential of adversely affecting the future composition of this ecological community. Within the early successional forest, areas with dense multi-flora rose thickets would be expected to remain essentially the same, but native species currently present in these dense thickets may disappear over time. Areas of this successional forest that have a heterogeneous structure and less multi-flora rose would be expected to mature, although multi-flora rose would also be expected to have a negative impact on the understory of this community.

In the old successional field, successional tree species (i.e., red cedar, cottonwoods, aspens, tulips, and sumacs) found at the edges and scattered in small pockets would continue to colonize this ecological community, as would hardwoods (i.e., oaks, red maples, and hickories). Over time, this field would be expected to resemble scrub/shrub habitat and eventually the early successional forest, as described above.

The terrestrial cultural communities would be expected to remain intact.

#### *Wildlife*

Because the habitats represented on the west connection site would be expected to remain in the future without Project 1, the terrestrial wildlife communities at the site are expected to remain the same. The wooded areas at the site will continue to age. Regeneration in the Appalachian oak-hickory forest would continue to be partially suppressed by white-tailed deer browsing and the spread of non-native invasive plants, such as multiflora rose and Japanese barberry. As a result, trees lost from the canopy may not be replaced. Continued succession within the early successional woodland habitat would have the potential to reduce the suitability for species that prefer early successional habitats (e.g., blue-winged warbler and brown thrasher) and potentially benefit some woodland species by increasing total forest area. Forest size, however, would remain inadequate to support forest-interior wildlife species. The existing old field area at the west connection site would likely succeed into scrub-shrub habitat in the future and partially compensate for the reversion of the existing early successional area into mature forest, but reducing the suitability of the habitat for field-dependent species.

#### *Threatened, Endangered, Special Concern, Rare, and Exploitably Vulnerable Species*

As discussed above, the condition and types of habitats present at the west connection site are expected to be generally unchanged in the future without Project 1. Therefore, the suitability and value of the site to regionally occurring threatened, endangered, and special concern species are expected to remain the same. All of the “exploitably vulnerable” plants of the west connection site would have the potential to be adversely affected by any increase in the invasive plant species present on the site.

### *ROSETON STREAM STUDY SITE AND DEWATERING PIPELINE*

The Town of Newburgh has identified the Orchard Hill residential development as a pending project in the vicinity of the Roseton stream study site**.** This proposed project has the potential to affect natural resources within and adjacent to Segment 1 of the unnamed Class C stream due to land clearing activities and grading, and the associated habitat loss and stormwater discharges. No other significant changes in land use that would affect natural resources are anticipated in the west of Hudson study area that would affect this portion of the study area. Therefore, floodplain, groundwater resources, and aquatic and terrestrial natural resources would be expected to remain the same. Stream segments 3 and 4 would continue to receive discharge from the surface expression of the RWBT leak and would be expected to continue to support brown trout. The existing land cover within the proposed dewatering pipeline route would remain the same and would continue to provide minimal habitat, with the exception of Option 2 of the pipeline in the vicinity of stream Segment 4 and the southern end of Segment 3.

The condition and types of habitats present along both potential dewatering pipeline route options are expected to remain the same in the future without Project 1, and, as such, terrestrial wildlife communities in the surrounding area are expected to remain unchanged. The majority of the pipeline route under Option 1, and the entire route under Option 2, would follow existing roads, which are not expected to change in the future without Project 1. Under Option 1, the pipeline would deviate from the roadside and pass through an existing clearing on the Dynegy property a short distance straight to the Hudson River. These habitats would be expected to continue to support the same wildlife community. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline that would be constructed from the west connection site to the Hudson River, selecting dewatering pipeline route Option 2 as the only route further evaluated for the FEIS.

***Threatened, Endangered, Special Concern, Rare, and Exploitably Vulnerable Species***

As mentioned above, the condition and types of habitats within the Roseton stream study site and the potential dewatering pipeline route are expected to be generally unchanged in the future without Project 1. Therefore, the suitability and value of these areas to regionally occurring threatened, endangered, and special concern species are expected to remain the same as described in section 2.8-3.1 for existing conditions.

## 2.8-3.3 PROBABLE IMPACTS OF PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION—WEST OF HUDSON

### *WEST CONNECTION SITE*

***Geology and Soils***

As described in Chapter 1, "Program Description," and in Section 2.1, "Description of the Project 1 Construction Program," Phase 1: Site Preparation on the west connection site as part of Project 1, Shaft and Bypass Tunnel Construction would result in demolition of existing structures and clearing and grading of approximately 19 acres of the approximately 32.9 acres that comprise the site. Because of the large change in elevation between the eastern and western portions of the site, substantial grading would be required. The current grading plan anticipates that 180,000 cubic yards of cut and 230,000 cubic yards of fill would be required, resulting in the displacement of soils, overburden (till), and bedrock material within the area of disturbance for the grading. Much of the on-site soils would likely be suitable for backfill, but some would not be suitable for re-use and would have to be disposed. There would be a need for approximately 50,000 cubic yards of additional fill and/or topsoil for the site.

Additional soil, overburden, and bedrock would be removed from the site during Phase 2: Shaft Construction during excavation of the approximately shaft, and during Phase 3: Bypass Tunnel

Excavation, as described in detail in Section 2.1. During shaft and connector tunnel construction, rock would be excavated using controlled drilling and blasting. The rock loosened during blasting would be removed through the shaft, stockpiled, and then trucked off-site. Construction of the bypass tunnel using a tunnel boring machine (TBM) would also result in bedrock material being removed through the shaft, for stockpiling and eventual trucking off-site.

The bedrock underlying the west connection site, the Normanskill Shale Formation, is not unique to this portion of New York. Therefore, the removal of bedrock and trucking the material off-site would not result in significant adverse impacts to the region's soil or geologic resources. The localized blasting that would occur on the west connection site for the construction of the shaft would not have the potential to result earthquakes caused by movement along the faults present within the vicinity of the west connection site. The energy released during blasting for the shaft construction would occur on the earth surface and would not induce the seismic strain at depth below the earth subsurface. Seismic strain builds up over time at depths of 10 to 20 miles before an earthquake can occur (Kleinfelder 2007).

***Groundwater***

During construction of the shaft and tunnel, the excavated areas would be grouted to reduce groundwater infiltration. Any groundwater recovered during dewatering of the shaft and bypass tunnel would be treated in accordance with NYSDEC requirements and released to the Class C stream (third order tributary to Lattintown Creek) during shaft construction (see Figures 2.8-1 and Figure 2.1-6), and to the tidal portion of the stream within the Roseton stream study site ~~Class C stream~~ near its confluence with the Hudson River (dewatering pipeline Option 2), or to the Hudson River (dewatering pipeline Option 1) during tunnel construction (see Figures 2.8-1 and Figure 2.1-7). A SPDES NY-2C permit application for industrial facilities was submitted to NYSDEC Region 3 in January 2012 for the proposed dewatering facility on the west connection site. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline, selecting the potential dewatering pipeline route presented as Option 2 in the DEIS as the only route further evaluated for the FEIS. During shaft construction, it is anticipated that no more than 694 gpm (1 mgd) of groundwater would be recovered, treated, and discharged. During tunnel construction, it is anticipated that no more than 2,083 gpm (3 mgd) would be recovered, treated, and discharged. As discussed previously, wells located in the Normanskill shale have been documented to produce 3 to 225 gpm (0.004 to 0.324 mgd) with a median yield of 30 gpm (0.043 mgd), and DEP tunnel surveys in the vicinity of the west connection site conducted while the tunnel was out of service found limited fracturing and water yields leaking into the tunnel of between 2 and 4 gpm (0.003 to 0.006 mgd). Removal of groundwater recovered during dewatering would be done at the rate required to permit shaft and tunnel construction, would be controlled through grouting as described in Chapter 2.1, and would not be expected to result in significant adverse impacts to groundwater quality or supply within the vicinity of the west connection site. Construction of the shaft and bypass tunnel would have the potential to modify groundwater flow pattern in the immediate vicinity of these structures, groundwater would be expected to flow around them.

Any temporary increases in cloudiness or turbidity in wells within the vicinity of the west connection site attributed to blasting would be temporary and would not adversely affect use of groundwater from these wells.

As discussed in Section 2.9, "Hazardous Materials," the construction of Project 1 would require the storage and use of a variety of petroleum and other chemical products (e.g., diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals). The use and storage of these would be in accordance with applicable regulatory requirements, including those relating to federal Spill Prevention, Control, and Countermeasures (SPCC) requirements and state petroleum bulk storage, chemical bulk storage (CBS), and spill requirements. With implementation of these measures, potential impacts to groundwater resources would be minimized.

***Floodplains***

As shown in Figure 2.8-5, only a small area of the 100-year floodplain for the unnamed tributary of Lattintown Creek is located within the west connection site. The only Project 1 components that would be located within the floodplain include an access roadway, stormwater management structures, and outfall structures and piping. None of these components would impede floodwaters or result in increased flooding of adjacent areas. The potential discharge of no more than 694 gpm (1 mgd) would not be expected to lead to increased flooding downstream during storm events. Implementation of operational measures developed to control the rate of discharge to the stream during certain storm events would further minimize the potential for the discharges from the west connection site to result in increased flooding downstream.

***Wetlands***

As described previously, there are approximately 0.4 acre of unmapped freshwater wetlands identified within the west connection site.

***Western Wetland***

The 0.06-acre western wetland is outside the area of disturbance and would not be directly impacted as a result of any of the phases of development that would occur on the site. Activities within this 19-acre area of disturbance would not be expected to result in significant adverse impacts to the hydrology of this wetland due to decreases in groundwater and surface runoff contributions. The removal of vegetation to the east of the wetland during clearing and grading activities would have the potential to increase the penetration of light to the wetland, resulting in some change in the vegetation community, although this change would not be expected to be significant because the dominant wetland vegetation are not shade-dependent species. A landscaping plan would be developed to improve the buffer of remaining vegetation between this wetland and the 19-acre area of disturbance to enhance the vegetative screening. Additionally, as improvement for the unavoidable loss of the central wetland, discussed below, nuisance plant (e.g., multiflora rose and Japanese honeysuckle) control measures of would be implemented to enhance the quality of this wetland. The USACE conducted a jurisdictional determination of this wetland (see Appendix 2-8) and determined that it is an isolated, intrastate water and therefore not regulated by Section 404 of the Clean Water Act.This wetland is isolated, and is not anticipated to be under the jurisdiction of the USACE. Therefore, the construction of Project 1 would not require authorization from the USACE under Section 404 of the Clean Water Act. Subsequent to the issuance of the DEIS, DEP developed and submitted to NYSDEC and the Town of Newburgh in February 2012, a draft SWPPP with erosion and sediment controls, stormwater management measures, and vegetative stabilization measures to minimize impacts to the western wetland due to land-disturbing activities conducted within uplands adjacent to the wetland. After the FEIS is issued, a revised SWPPP—which is currently being prepared, and upon which the FEIS conclusions are based—will be issued to address comments from the Town of Newburgh on the draft SWPPP, and to reflect the latest project design for the west connection site and the water main extension and dewatering pipeline segment along Route 9W. Additional improvements to the buffer area would also be implemented as part of site restoration at the completion of the proposed program.

***Central Wetland***

Clearing and grading activities would result in unavoidable adverse impacts to the approximately 0.09-acre central wetland and amphibians that use the vernal pool habitat of this wetland for breeding, as discussed below under “Terrestrial Resources.” Permanent loss of this wetland area would not result in significant adverse impacts to wetland resources of the region or regional populations of the fauna it supports. The USACE conducted a jurisdictional determination (issued April 3, 2012) of this wetland (see Appendix 2.8-4) and determined that it is an isolated, intrastate water and therefore not regulated by Section 404 of the Clean Water Act.This wetland is isolated and is not anticipated to be under the jurisdiction of the USACE. Therefore, construction of Project 1 would not require authorization from the USACE under Section 404 of the Clean Water Act.

***Eastern Wetland***

The USACE conducted a jurisdictional determination (issued April 3, 2012) of this wetland and determined that it meets the criteria of waters of the United States under Section 404 of the Clean Water Act. Site preparation activities (i.e., construction of one or two three outfalls for the discharge of stormwater and treated groundwater recovered during dewatering, the pipes leading to these outfall(s), and the force main to supply potable water to the site) would avoid be sited and constructed such as to minimize impacts to the eastern wetland and would not result in adverse impacts to this resource. Subsequent to the issuance of the DEIS, DEP developed and submitted to NYSDEC and the Town of Newburgh in February 2012, a draft SWPPP with erosion and sediment controls, stormwater management measures, and vegetative stabilization measures to minimize impactct to the eastern wetland due to land-disturbing activities conducted within uplands adjacent to the wetland. After the FEIS is issued, a revised SWPPP—which is currently being prepared, and upon which the FEIS conclusions are based—will be issued to address comments raised by the Town of Wappinger on the draft SWPPP, and to reflect the latest project design for the east connection site. Additional improvements to the buffer area would also be implemented as part of site restoration at the completion of the proposed program.

### *Aquatic Resources*

Site preparation (Phase 1) of Project 1 at the west connection site would require the construction of two three outfalls to handle discharge related to stormwater and, groundwater recovered during dewatering. The proposed outfall construction would occur outside the stream channel and above the ordinary high water line, thus minimizing the potential for adversely affecting the stream. Therefore, the construction of the outfalls would not result in significant adverse impacts to the aquatic resources of the Class C stream. The proposed construction of a force main to supply potable water to the west connection site described in Section 2.14, "Infrastructure," would occur outside the eastern wetland and would use construction techniques that would not require disturbance of the stream channel (e.g., jack and boretrenchless construction techniques), thus minimizing the potential for adverse impacts to the aquatic resources of this stream.

As discussed in Section 2.14, "Infrastructure," implementation of erosion and sediment control measures (e.g., silt fences and straw bale dikes), and stormwater management measures, as part of the SWPPP (submitted to the NYSDEC and the Town of Newburgh in February 2012) developed in accordance with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001), would minimize potential impacts to water quality of the Class C stream (third order tributary to Lattintown Creek) associated with stormwater runoff during land-disturbing activities that would occur during the site preparation (Phase 1) activities. These activities would include demolition of existing structures, clearing, and grading, and excavation. During these activities, any hazardous materials encountered would be handled and removed in accordance with DEP, NYSDEC, OSHA, and EPA requirements, and the DEP-approved RAP and CHASP, as discussed in detail in Section 2.9, "Hazardous Materials." The implementation of these measures and the SWPPP would minimize the potential for significant adverse impacts to surface water quality during the site preparation of Project 1.

During shaft construction (Phase 2), stormwater and treated groundwater recovered during dewatering would be discharged to the Class C stream within the west connection site that is a third order tributary to Lattintown Creek through the new outfalls discussed above. Stormwater BMPs implemented as part of the SWPPP (i.e., stormwater management basin and other measures) developed for the construction of Project 1 at the west connection site would regulate the quality and rate at which stormwater is discharged from the west connection site through a new outfall to the Class C stream. Groundwater recovered during dewatering of the shaft would be sent to an on-site treatment system to remove suspended solids and any other contaminants in accordance with the NYSDEC SPDES permitting requirements for the project. SPDES General Permit 0-10-001, SWPPPs for the west connection site was submitted to NYSDEC and to the Town of Newburgh in February 2012. A Notice of Intent (NOI) for SPDES General Permit 0-10-

001 was also submitted to NYSDEC in February 2012. As discussed previously, up to approximately 1 mgd (694 gpm) of recovered and treated groundwater would be discharged to the Class C stream.Collection and treatment of this recovered groundwater would not be expected to result in water with a temperature that would result in significant adverse impacts to aquatic resources within the Class C stream. A SPDES NY-2C permit application for industrial facilities was submitted to NYSDEC in February 2012 for the proposed dewatering facilities at the west connection site. With the implementation of measures specified by the NYSDEC SPDES requirements, the discharge of stormwater and recovered groundwater would not result in water quality conditions within the Class C stream that fail to meet the Class C standards. Additionally, the outfalls would include dissipation structures that would, along with operational controls, allow the outfalls to comply with the NYSDEC maximum 2 ft/second discharge velocity to minimize the potential for prevent scouring of the stream bank and minimize increases in suspended sediment. Implementation of these measures would minimize potential impacts aquatic resources of the Class C stream.

As discussed above under "Groundwater," the implementation of federal and state spill control measures would minimize the potential for adverse impacts to water resources of the Class C stream from the presence of petroleum and other chemical products on the west connection site.

### *Terrestrial Resources*

*Ecological Communities*

The west connection site is predominantly wooded with the exception of a few developed sections that contain abandoned buildings and associated access roads and the successional old field habitat located in the eastern portion of the site. Because of the varied topography of the site, it would require extensive clearing, earth-moving, and grading activities as well as construction of facilities and staging areas. As indicated on Figure 2.8-10, approximately 19 acres of the west connection site would be disturbed as a result of these activities, primarily in the central and eastern portions of the site occupied by the early successional forest (approximately 12 of 17 acres) and old field habitat (approximately 5 of 6 acres), and terrestrial cultural community (approximately 1.5 of 2 acres) and would avoid the majority of the Appalachian oak-hickory forest (approximately 1 of 6 acres). Although these communities provide habitat to wildlife, as described above, these communities are common throughout the lower Hudson Valley, and the loss of these habitats within the west connection site would not result in significant adverse impacts to vegetative resources within this region of New York.

Within the area of disturbance, approximately 554 of the total of 1,285 tagged trees (i.e., trees with dbh of 8 inches or greater) would be removed as a result of site preparation (Phase 1) activities; approximately 49 54 of these would be potential Indiana bat roost trees. Opportunities for replanting native trees indigenous to this area of New York would be explored in developing the site restoration plans which are discussed below.

Phase 2: Shaft Construction and Phase 3: Bypass Tunnel Excavation would not result in adverse impacts to vegetative resources on or in the vicinity of the west connection site and the restoration of vegetative communities on the site would futher minimize the potential for impacts. At the conclusion of Project 2B, the construction offices, storage trailers, and construction equipment and support facilities (e.g., the grout/concrete batch plant, dewatering treatment plant) would be removed from the west connection site. The stormwater management facilities would remain on the west connection site and would be maintained as described in Section 2.14, "Infrastructure." The interior roadway would be retained to provide future access to the shaft (Shaft 5B) should it be necessary; Shaft 5B itself would be capped with a concrete cover and soil, and a 10-foot buffer would be created around the shaft cap. In the areas not occupied by the internal roadway and the shaft, the site would be replanted. While the specific details of the restoration plan are still being developed, it is anticipated that the restoration plan would include a combination of planting meadow habitat, with shrubs and some trees. Proposed tree species include red maple, silver maple, shagbark hickory, eastern red cedar, tulip tree, swamp white oak and eastern white pine. Shagbark hickory and white oak are two tree species that would have the ~~Tree species selected may include those with the greatest~~ potential to ~~eventually~~ provide Indiana bat summer roosting habitat.~~, such as shagbark hickory, sycamore, yellow or river birches, or white oak.~~ Vegetation planted as part of the restoration plan would include only native indigenous species to this area of New York.

*Wildlife*

Potential impacts of Project 1 to wildlife at the west connection site can be categorized as direct, permanent impacts, and temporary, indirect impacts. Direct, permanent impacts include potential mortality of individuals occurring within the site, and impacts resulting from the loss of habitat. Temporary, indirect impacts are potential noise and visual disturbances to wildlife resulting from construction activities throughout the duration of Project 1.

During Phase 1: Site Preparation, approximately 19 of the approximately 32.9 acres of the west connection site would require clearing, followed by grading to reduce the elevational grade and prepare the site for construction. The western end of the site, containing the approximately 6 acres of mostly early mature forest, would be outside the western disturbance limit (see Figure 2.8-10) with the exception of about 1 acre of this habitat. The habitat lost at the west connection site would be mostly early successional forest, old field, and terrestrial cultural habitat, and the direct impacts of Project 1 would therefore be greatest to species associated with these habitat types, particularly birds.

None of the mammals, reptiles, and amphibians known or expected to occur at the site are strictly dependent on old field or early successional forest habitats. The birds observed and presumed to be nesting within these two communities include rose-breasted grosbeak, brown thrasher, blue-winged warbler, indigo bunting, eastern towhee, wild turkey, gray catbird, orchard oriole, ruby-throated hummingbird, and prairie warbler. For each of these species, only one individual, or a male and female within close proximity, were observed. It is estimated that clearing the area would eliminate nesting habitat on-site for an estimated one to two breeding pairs of each of these species, which would not result in significant adverse impacts to regional population levels of these species. Appropriate nesting habitat for these species would continue to be available in the vicinity of the west connection site, such as within the transmission line right-of-way adjoining the site (e.g., King and Byers 2002).

Similarly, mammal and reptile species that favor early successional habitats and potentially occur in the area of disturbance, such as eastern cottontail, eastern box turtle, milk snake, and black racer, would also have suitable habitat available in the vicinity of the west connection site, such as within the transmission line right-of-way (Yahner et al. 2001, Gibbs et al. 2007). The loss of this habitat would have the potential to adversely affect some individual birds and other wildlife currently using the wildlife habitat within the area of disturbance should these individuals be unable to find suitable available habitats nearby. However, the wildlife species observed and with the potential to occur within this area are common to the lower Hudson Valley, and the loss of some individuals would not result in a significant adverse impact on regional bird and wildlife populations. Therefore, no significant adverse impacts to terrestrial wildlife resources of the successional woodland, successional old field, and terrestrial cultural communities would occur as a result of site preparation for Project 1 on the west connection site.

Habitat loss at the site is not expected to have significant impacts to most woodland wildlife species at the individual or population levels. Most of the mature forest within the west connection site would be outside the western limits of disturbance and would remain contiguous with the forested areas beyond the northern, southern, and western property boundaries. The eastern side of the woodland adjacent to the area of disturbance would possibly experience a change in microclimate and increased susceptibility to invasive species and nest predators as a result of the distinct edge that would be created by clearing the adjoining early successional habitat (Askins 1994). However, this area of woodland has already been colonized by invasive plants, such as Japanese barberry and multiflora rose, and populated by such nest predators as blue jays, crows, and raccoons. Brown-headed cowbirds were observed on-site, indicating that woodland birds, such as wood thrushes, may also be currently vulnerable to nest parasitism. Power line corridors and narrow access roads, such as those presently joining or extending through the site, are likely the primary avenues by which these invasive species, nest predators, and nest parasites have accessed and become established in the forest (Askins 1994). The quality of the woodland habitat at the west connection site is marginal for most forest wildlife species in its present state and is unlikely to be significantly degraded by the clearing that would result during the site preparation (Phase 1) activities. The bird, mammal, reptile, and amphibian species assemblages present in the woodland area are expected to undergo minimal change as a result of construction of Project 1.

As discussed under “Wetlands,” one of the two vernal pools at the west connection site, the central wetland, is located within the proposed disturbance area and would be lost. This wetland/vernal pool provides breeding habitat for wood frogs, and has the potential to also provide breeding habitat for green frogs and bullfrogs. Breeding of wood frogs could occur as early as March 7th, although the average onset of the breeding period occurs on March 28th

(Gibbs et al. 2007). Under the first clearing scenario, in which all trees are cleared by March 31, clearing would be limited to October 1 to March 31, concluding prior to March 15 if practicable, which is outside of the majority of the breeding seasons of the species of amphibians known to, or suspected to, breed in the pool within the disturbance area. During this time of year, most pool-breeding amphibians, including wood frogs and green frogs, have migrated hundreds to thousands of feet away from their breeding location to upland forest habitats for the winter (Lamoureux and Madison 1999, Calhoun et al. 2005). Therefore, many individuals that use the central wetland within the area of disturbance for breeding would be expected to be off-site during the clearing period that would result in the loss of vernal pool habitat, reducing the potential for direct mortality from clearing and other site preparation activities. Maintaining the silt fencing around the area of disturbance at the west connection site would further minimize the potential for loss of individuals once site preparation activities have started by preventing individuals from attempting to return to the area. There would be unavoidable adverse impacts to these individuals if they are unable to find suitable habitat elsewhere during the first breeding season that follows the initiation of Project 1. While adverse at the individual level, this would not be expected to result in significant adverse impacts to regional populations of wood frogs and other amphibian species potentially breeding within this vernal pool.

Certain species, such as red-backed salamanders (known to occur at the site) and mole salamanders with potential to occur at the site, such as Jefferson and marbled salamanders, spend much of the year burrowed underground (Gibbs et al. 2007). As such, clearing, grading, and blasting activities would likely result in the loss of some individual salamanders during Project 1. The unavoidable loss of these individuals would be an adverse impact, but these losses would occur within a limited area of habitat and would not be expected to result in significant adverse impacts to regional populations of these species.

Under the second clearing scenario, where removal of trees identified as potential Indiana bat summer roost sites would be limited to October 1 to March 31 and thereafter, clearing of all other vegetation could occur from April 1 through September 30, clearing and grading would have the potential to occur during the breeding season of the amphibians known, or with the potential, to breed in the central wetland/vernal pool. Clearing and grading during the breeding season would likely result in direct mortality of adult, juvenile, larval, and/or embryonic amphibians in the pool or around its edges. Any adults that survive the land disturbance would miss the current breeding season and not have an opportunity to reproduce until the following year. Reproductive failure of these individuals for one breeding season would have a negligible effect on regional population sizes. Mortality of any juvenile, larval, or embryonic amphibians developing in the pool at the time of clearing would similarly have no significant impact to the regional populations of these species.

The western wetland in the southwestern section of the west connection site is outside of the area of disturbance and is expected to remain a viable breeding pool for these and other amphibians. A vegetated buffer, between the pool’s eastern side and the western extent of the disturbance area, with a minimum width of 25 feet would be maintained and enhanced with respect to vegetative screening properties, and the other three sides of the pool would remain surrounded by thousands of feet of the existing woodland in each direction. As such, this pool is expected to remain a functional and accessible breeding habitat (Calhoun et al. 2005) during Project 1 construction. Preservation of this remaining vernal pool would help to minimize potential adverse impacts associated with the loss of vernal pool habitat within the central wetland (Windmiller and Calhoun undated). Plans to enhance this wetland/vernal pool habitat by removing invasive plants (e.g., multiflora rose and Japanese honeysuckle) and increasing vegetative screening properties of the buffer with native plant species would further further minimize the potential impacts due to the loss of the central wetland vernal pool habitat.

Construction at the west connection site has the potential to produce visual and auditory disturbances to wildlife in the surrounding areas. In particular, heavy equipment required for clearing and grading, and rock blasting would each generate noise, as discussed in detail in Section 2.13, "Noise." Clearing between October 1 and March 31 would avoid the sensitive breeding periods of wildlife in the vicinity of the site. The bird community during the October 1 through March 31 clearing window would be limited to year-round residents, such as tufted titmouse, black-capped chickadee, and red-bellied woodpecker. These species are disturbance-tolerant and associated with urban habitats and similar areas with heavy levels of human disturbance, and are unlikely to experience any significant impacts from Project 1. These species are also habitat generalists and highly mobile, which would allow them to easily move from the habitat areas they find unsuitable.

Under the second clearing scenario, where removal of trees identified as potential Indiana bat summer roost sites would be limited to October 1 to March 31 and thereafter, clearing of all other vegetation could occur from April 1 through September 30, clearing and grading would have the potential to occur during the breeding season of the majority of birds known or expected to breed within the area of disturbance. As discussed above, likely breeding birds in this area include early successional species such as rose-breasted grosbeak, blue-winged warbler, indigo bunting, eastern towhee, and gray catbird. Clearing and grading the site prior to the onset of the nesting period of these and similar species (late May–early June), would create sufficient disturbance and habitat loss to prevent birds from attempting to establish a breeding territory and nest at the site. Instead, these individuals would likely seek early successional habitat elsewhere.

However, should clearing begin during the active nesting period, which spans early June through late July for this suite of species, would likely result in nest failure. Some individuals would possibly successfully re-nest elsewhere prior to the close of the breeding season, but the majority would likely be prevented from reproducing until the following year. The loss of one breeding season for these individuals would not result in significant adverse impacts on regional populations of these common and abundant bird species. <u>However, in order to minimize the potential for adverse impacts to breeding migratory bird species which are protected under the Migratory Bird Treaty Act (MBTA), during the tree clearing of potential Indiana bat summer</u>

roosting trees, additional tree clearing would occur in three areas within the area of disturbance. During breeding bird surveys conducted at the west connection site, these three areas appeared to have the greatest breeding activitiy by migratory species such as orchard orioles, prairie warbler, rose-breasted grosbeak, and blue-winged warbler. Removal of vegetation in these areas prior to the breeding season would reduce the potential for nest failure for these species.

During shaft construction (Phase 2), increased human presence and visual and auditory disturbance due to movement of construction equipment, blasting, and other activities would have the potential to result in some avoidance of the habitats adjacent to the west connection site during the approximately 1.5 years required to complete these activities. Initial physiological and behavioral responses of birds and other wildlife to novel sources of loud noise, such as those that would be generated by blasting activities, often include increased acute stress levels, increased heart rates, and fleeing from the area. However, some individuals may habituate to and tolerate loud noises after initial exposure (Bowles 1995), although others would likely leave or avoid the area.

As described in Section 2.1, "Description of the Project 1 Construction Program," blasting during shaft construction is likely to be initiated on the west construction site during Shaft construction. It would occur intermittently for approximately 3 to 6 months, occurring in one or two blasts per day. It would initially startle and displace most wildlife from the immediate surrounding area. Most of the woodland bird species occurring in the surrounding area are considered disturbance-tolerant and commonly inhabit urban areas and other places with high levels of noise and human activity. Examples include American robin, red-bellied woodpecker, tufted titmouse, and black-capped chickadee. These birds are expected to flush from the area surrounding the site in response to the beginning stages of blasting, and then habituate to the disturbance and return. Similarly, mammals potentially occurring in the surrounding area (see "Existing Conditions," above) are primarily disturbance-tolerant, generalist species common to developed areas with high levels of human activity. Mammals near the west connection site would be expected to either withstand the introduced disturbances and remain in the area or relocate. As wildlife in the area become habituated to blasting noise or flush during the once or twice it is anticipated to occur, blasting would also gradually take place farther and farther under ground, reducing ground-level noises as the project advances. Overall, any displacement of wildlife from the surrounding area due to blasting and other disturbances would be temporary and unlikely to have significant effects at either the individual or population level.

There would be certain times during Project 1 construction when nighttime work would be required at the west connection site to maintain the project schedule. During these times, DEP would install lighting to maintain the safety and security of the site. All lighting would comply with local codes and follow the Illuminating Engineering Society Handbook and the American National Practice for Roadway Lighting (RP-8). DEP would attempt to minimize the spill of light outside of the areas of active construction.

Change to natural light regimes caused by artificial lighting is known as ecological light pollution. Ecological light pollution can imbalance the circadian rhythms of wildlife species, which often manifests in altered feeding patterns, predator-prey interactions, communication, orientation and navigation ability, and reproductive cycles. The ultimate effects that these observed changes to individuals have at the population level have been difficult to demonstrate in most cases, but they have the potential to be significant (Longcore and Rich 2004).

Light pollution affects a variety of taxa, from birds and mammals to insects. In birds, artificial lighting can induce singing outside of normal time periods (e.g., Miller 2006). Nocturnally migrating birds can be disoriented by strong directional lights, such as those on lighthouses, and extensive sky glow over major cities (Gauthreaux and Besler 2004). In some mammals, such as rodents and lagomorphs (i.e., rabbits and hares), artificial lighting may inhibit nighttime foraging and increase vulnerability to predation (Gilbert and Boutin 1991, Lima 1998). Amphibians, such as frogs, are often attracted to artificial light (Longcore and Rich 2004), which may lead them away from appropriate habitats and into areas where they experience heightened mortality. Artificial lighting may also alter frog foraging behavior (Hailman 1984). Insects attracted to artificial light are impacted by the increased exposure to foraging bats and birds (Longcore and Rich 2004).

The area adjacent to the eastern portion of the west connection site is primarily defined by the commercial properties that line Route 9W, and each of these parcels is an existing source of artificial light. Street lights lining Route 9W and headlights of cars and trucks traveling on the road contribute additional artificial light sources to the area. Because of these multiple sources of artificial light emissions, the incremental increase in lighting in the area during construction at the west connection site would have minimal effects on local wildlife. If the lighting used is directional and shielded to minimize spill beyond the construction site and avoid sky glow, there should be no significant alterations to the behaviors of wildlife in the area. The most likely biological consequence of nighttime lighting at the west connection site is an attraction of insects to the lights and an exploitation of this food source by bats and insectivorous nocturnal birds. Additionally, frogs utilizing the vernal pool beyond the western limit of disturbance may broadcast mating calls less frequently when artificial lights are in use at the site (Baker and Richardson 2006), but what effect this may have on their pairing success has yet to be studied (Wise 2007). Maintenance of the silt fences around the site's perimeter would prevent any juvenile frogs emigrating from the pool from being drawn into the construction site by the artificial lighting.

The proposed restoration of meadow habitat and planting of trees that would occur following completion of Project 1 construction, as described above under "Ecological Communities," would have the potenetial to provide habitat for wildlife species which would include some of those currently using the old field habitats that would be cleared as a result of the project. Over time, succession of the meadow habitat to old field and successional woodland would further restore the successional woodland habitat that would be lost as a result of Project 1.

***Threatened, Endangered, Special Concern, Rare, and Exploitably Vulnerable Species***

*Federally Listed Species*

*Bog Turtle.* Because the west connection site does not contain suitable habitat for the bog turtle, construction of Project 1 at this site would not adversely impact this species.

*Indiana Bat.* Indiana bats have a strong preference for roosting in dead and decayed trees exposed to direct sunlight (Callahan et al. 1997, Menzel et al. 2001, Kitchell 2008), of which the west connection site contains few. Forested wetlands, streams, lakes, and ponds are among their favored foraging habitats (Humphrey et al. 1977, Menzel et al. 2001, Murray and Kurta 2004), which the site lacks as well. The west connection site is therefore considered suboptimal roosting and foraging habitat for Indiana bats. Nevertheless, roosting and foraging habitats of Indiana bats can be highly variable (Menzel et al. 2001), and their occurrence at the site is possible. Even if additional nighttime lighting attracts insects, and subsequently foraging by insectivorous bats, the limited suitable summer roosting habitat available on the site would continue to limit the number of bats with the potential to be affected by construction activities during the day. The vast majority of trees within the west connection site do not appear to have the potential to provide summer Indiana bat roosting habitat. As discussed under “Existing Conditions,” 90 potential Indiana bat summer roosting trees were identified within the west connection site, more than half of which were dead or dying black cherry. Four of these trees were removed in March 2011 as part of the geotechnical boring program conducted on the site. A total of 54 ~~Forty-nine of the~~ potential Indiana bat summer roosting trees would be removed during site preparation (Phase 1) activities. Given that the site lacks favorable foraging and roosting habitat, the loss of these trees is not expected to have any significant impacts on local Indiana bat populations.

The sensitivity of hibernating bats to noise and other disturbances has been well documented. Noise and movement can easily arouse bats from hibernation, which wastes fat reserves, and, in turn, lowers their chances of surviving the winter (Thomas et al. 1990, Boyles and Brack 2009). In contrast, the sensitivity of non-hibernating bats to such disturbances as noise from construction equipment and blasting that would occur during the Project 1 construction at the west connection site is poorly understood. As with most animals, it is likely that non-hibernating bats initially experience increased heart rates and stress levels in response to novel disturbances, such as loud noises (Bowles 1995, Niver 2009), but any effects this may subsequently have on their condition, reproduction, and survival are unclear.

Some studies of bats conducted outside the hibernation season have shown foraging and nursing behaviors of bats to be easily disrupted by disturbances, including tourism in maternity caves (Mann et al. 2002), music concerts (Shirley et al. 2001), and even minor vegetation clearing near roost trees (Callahan 1993). Bats have also been shown to avoid foraging in noisy environments (Schaub et al. 2008, Murphy et al. 2009). Reductions in maternity colony size and complete colony abandonment following disturbances have been reported (Barbour and Davis 1969, Stihler and Hall 1993). Other studies, however, have found loud noises associated with aircrafts and military training activities to have no noticeable effect on foraging or roosting locations of bats (Shapiro and Hohmann 2005, Le Roux 2010).

Indiana bats are known to roost along major highways (Brack and Whitaker 2006, Niver 2009), near airports (Niver 2009), and under bridges (Keeley and Tutle 1999), suggesting they are tolerant of loud noises generated by human activity. The foraging behaviors and roosting locations of Indiana bats on military bases did not differ between nights with and without loud training exercises (Shapiro and Hohmann 2005), which also suggests this species is not easily disturbed by loud noises outside of the hibernation period. However, bats that have become habituated to noisy environments could be distressed by unfamiliar sounds suddenly occurring over the background noises to which they are acclimated. The severity of an animal's response to new noises is usually proportional to the ambient noise level to which it is accustomed. Indiana bats inhabiting relatively quiet areas are likely to have stronger reactions to new sounds than bats inhabiting areas that are already noisy.

The hearing range of the Indiana bat has not been described, but is likely similar to that of the closely related little brown bat. Little brown bats detect sounds between 10-130 kHz (Moss and Schnitzler 1995), with peak sensitivity between 35-40 kHz (Grinnell 1963). Echolocation calls of the Indiana bat range from 41 to 75 kHz (Fenton and Bell 1981). Noises from construction equipment (e.g., earthmovers and bulldozers) typically fall well below these frequency ranges, and are therefore unlikely to be highly audible to Indiana bats or interfere with their ability to echolocate (Niver 2009). Animals that use echolocation, such as bats, have an acute ability to sense reverberations (Simmons 1983). It has been suggested that vibrations generated from rock blasting could cause Indiana bats to abandon roosts (Niver 2009), but this has yet to be studied.

Displacement of Indiana bats from roosts would be most detrimental during the maternity period (June-July) when females are already stressed by the high energetic demands of nursing and the young are not yet ready to disperse. Displacement of pre- and post-reproductive bats during spring and autumn, respectively, would likely have comparatively minimal effects on the local population, provided that alternative habitat is available nearby. Indiana bats are known to naturally change roost locations frequently (semi-daily) throughout the non-hibernating seasons (Kurta 2004, Kitchell 2008, BCI 2011), and would therefore likely be willing and able to temporarily relocate away from any bothersome activity.

Clearing of potential roost trees at the west connection site during site preparation (Phase 1) would only occur during October 1 through March 31, prior to the emergence of Indiana bats from hibernation, to avoid removing trees in use by Indiana bats and to discourage Indiana bats from potentially occupying the site during subsequent clearing and construction activities. Noise levels and human activity would have already been established on the west connection site prior to the emergence of bats from hibernation, and thus, any individuals using the portion of the west connection site or adjacent areas for summer roosting habitat or foraging would be those habituated to the noise and activity level generated by the construction of Project 1. Because there are no known hibernacula anywhere near the west connection site (NYSDEC 2011d), the construction of Project 1 at the west connection site would also have no impact on hibernating Indiana bats.

***Small Whorled Pogonia***

Small whorled pogonia is not known to exist at the west connection site, and potential pogonia habitat is unlikely to be lost during site preparation (Phase 1) activities. The typical habitat for this species comprises slopes that border small streams (USFWS 2008), which do not occur within the area of disturbance for the west connection site.

*New York State Listed Species*

As discussed in detail below, the west connection site was determined to have a low potential for providing breeding habitat for the threatened or endangered bird species identified to have the potential to occur within the site. However, should nesting by any of these state-listed threatened or endangered bird species occur on the west connection site, the clearing scenario where clearing of non-potential Indiana bat summer roosting trees would occur from April 1 through September 30 would have the potential for adversely affect nesting success for those individuals for that breeding season. Therefore, under the scenario with possible clearing occurring between April 1 and September 30, the area to be cleared would be surveyed for potential nests of raptors and other threatened or endangered migratory bird nests. Should such nests be identified, the NYSDEC and the USFWS would be contacted, as appropriate, and an application for incidental take permit submitted as directed by these agencies.

*Bald Eagle*. The USFWS National Bald Eagle Management Guidelines outline the relative sensitivity of eagles during different stages of the nesting season, as well as the sensititivity of foraging and roosting bald eagles to human disturbance such as timber operations and forestry practices, and to blasting and other loud, intermittent noises. These guidelines recommend maintaining buffer areas between nests and the activity, sometimes recommending landscape buffers. Buffers recommended to avoid disturbance to bald eagle nesting activity due to blasting and other loud, intermittent noises range from ~~Recommendations are provided for minimizing disturbances to bald eagle nesting, foraging and roosting throughout the year through the are Federal guidelines for minimizing disturbances to bald eagles throughout the year as outlined in the~~ USFWS ~~National Bald Eagle Management Guidelines call for buffer areas of~~ 330 ft to 0.5 mi (2,640 ft)~~, depending on the type of disturbance~~. Measures recommended to avoid disturbance at foraging areas and communual roost sites that would apply to the construction of Project 1 include: ~~Buffers recommended to avoid disturbance to bald eagle nesting activity due to blasting and other loud, intermittent noises~~

- Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sties and important foraging areas.
- Do not use explosives within 0.5 mi (or within 1 mi in open areas) of communal roosts when eagles are congregating, without prior coordination with the USFWS and the state wildlife agency.

These buffer distances are consistent with, and well supported by, the findings of numerous published studies on bald eagle behavior indicating that human disturbances to bald eagles, including boats and aircrafts, fade beyond distances of a quarter to a half mile (McGarigal et al. 1991; Grubb et al. 1992, 2002; Stalmaster and Kaiser 1997, Becker 2002). Given that the west connection site is about 1 mile from the Hudson River and the nearest known nesting territory is more than four times the maximum buffer size of a half mile recommended by the USFWS, the construction of Project 1 at the west connection site would not disturb breeding or non-breeding bald eagles. Similarly, the west connection site is too far away from breeding and non-breeding bald eagle foraging habitat, which is concentrated in the Hudson River's open water and along its shoreline in Orange County (Thompson and McGarigal 2002, Thompson et al. 2005), to adversely affect bald eagle foraging activity. Therefore, Project 1 would not result in adverse impacts to bald eagles or their habitat.

*Peregrine Falcon.* Peregrine falcons are unlikely to occur in the vicinity of the west connection site during both the breeding and non-breeding seasons. The west connection site and the surrounding forest lack suitable nesting structures and open habitats that are preferred by peregrine falcons for foraging. Therefore, the construction of Project 1 would not result in adverse impacts to peregrine falcons or peregrine falcon habitat.

*Sharp-shinned Hawk.* As mentioned above, appropriate breeding habitat for sharp-shinned hawks is lacking in and near the west connection site. While the west connection site and its surroundings may offer adequate wintering and migration stopover habitat, the construction of Project 1 at this site would not significantly reduce habitat availability or quality for sharp-shinned hawks wintering in, or migrating through, the vicinity of the site. Loud noises generated by clearing, grading, or blasting activities would likely temporarily displace any transient sharp-shinned hawks from the areas immediately surrounding the site and require them to find wintering or stopover habitat in the adjacent wooded areas.

*Cooper's Hawk.* Cooper's hawks occasionally accept small woodlots and even city parks for nesting, but deep, interior forest is highly preferred. The west connection site is considered poor quality nesting habitat for Cooper's hawks, and any disturbance at the site is unlikely to have any impact on their breeding populations. The site and surrounding area may offer adequate wintering and migration stopover habitat for Cooper's hawks, but Project 1 would not significantly reduce habitat availability or quality for Cooper's hawks wintering in, or migrating through, the vicinity of the site. As with sharp-shinned hawks, loud noises generated by clearing, grading, or blasting activities would likely displace any Cooper's hawks from the areas immediately surrounding the site and require them to temporarily find wintering or stopover habitat in the adjacent wooded areas.

*Red-shouldered Hawk.* Red-shouldered hawk was not documented in the vicinity of the west connection site during the 2000-2005 Breeding Bird Atlas, but is known to occur in the area during winter. Habitat preferences of red-shouldered hawks during winter are somewhat generalistic, and they will utilize small forest fragments within agricultural and other altered landscapes. As such, red-shouldered hawk has the potential to occur in the mature woodland area in the western portion of the west connection site during winter. Disturbances from Project 1 to the old field and early successional forest at the site would not reduce winter habitat availability for red-shouldered hawks. Noises generated by clearing, grading, or blasting activities would likely displace any red-shouldered hawks from the wooded areas surrounding the site and require them to temporarily find wintering habitat in the adjacent woodlands.

*Northern Harrier*. The west connection site does not contain any suitable breeding or non-breeding habitat for northern harriers. Therefore, the construction of Project 1 at the west connection site would not result in adverse impacts to this species.

*Horned Lark.* The west connection site does not contain any suitable breeding or non-breeding habitat for horned larks. Therefore, the construction of Project 1 at the west connection site would not result in adverse impacts to this species.

*Jefferson Salamander*. Jefferson salamanders are considered to have the potential to occur at the west connection site because the site is within their geographic range and they are sometimes found in forests bordering agricultural and other disturbed areas with breeding pools (Gibbs et al. 2007). This species is difficult to survey because individuals are under ground most of the year, and its presence at the site has not been confirmed. As a mature woodland species, they would be most likely to occur in the western portion of the site, outside the area of disturbance, during any clearing and grading that took place between October 1 and March 31. Maintaining silt fencing around the area of disturbance would prevent Jefferson salamanders from attempting to enter the area at the onset of the following breeding season. Under this clearing scenario, there would be minimal potential for direct mortality of Jefferson salamanders during site preparation. The western wetland in the southwestern section of the site, which is outside of the area of disturbance, would represent an alternative breeding habitat for any Jefferson salamanders that previously bred in site's central wetland. Under the second schedule scenario, where removal of trees identified as potential Indiana bat summer roost sites would be limited to October 1 to March 31 and thereafter, clearing of all other vegetation could occur from April 1 through September 30, clearing and grading of the site could occur during the breeding season, when Jefferson salamanders would have the potential to occur in the central wetland. Any adult, juvenile, larval, and embryonic Jefferson salamanders occurring in the area during clearing and grading would be lost. Potential loss of these individuals would not be expected to result in significant adverse impacts on regional populations of this species.

*Marbled Salamander.* Marbled salamanders are relatively common in the Hudson Valley and occur in deciduous forests containing pools and other temporary wet areas for breeding (Gibbs et al. 2007). Unlike other salamander species, marbled salamanders breed in the fall and their offspring develop in vernal pools throughout the winter (Gibbs et al. 2007). Under the first schedule scenario, clearing and grading of the site would occur when adult and/or larval marbled salamanders have the potential to occur in the vernal pool within the area of disturbance. Loss of any adults or larvae potentially occurring in the pool would not have significant adverse impacts on regional populations of marbled salamanders. Clearing and grading the site from April 1 through September 30 would have a lower potential for loss of marbled salamanders, as they would be most likely to occur in the Appalachian oak-hickory forest habitat outside the area of disturbance during the non-breeding seasons. Maintaining silt fencing around the area of disturbance would prevent marbled salamanders from attempting to enter the area at the onset of the breeding season. These adults would likely seek habitat elsewhere and encounter the vernal pool on the southwestern section of the site, which would remain an accessible and functional breeding habitat. Overall, Project 1 activities at the site do not have the potential to result in significant adverse impacts to regional populations of marbled salamanders under either site clearing schedule.

*Wood Turtle.* On the west connection site, the Class C stream, the vegetated riparian corridor that includes the eastern wetland, and adjacent old field and successional woodland in proximity to the stream have the potential to provide habitat for the wood turtle. While the wetland corridor would have limited disturbance associated with the construction of the outfall(s), the old field habitat adjacent to the wetland corridor would be disturbed as a result of site preparation (Phase 1) activities, as would successional woodlands in proximity to the Class C stream near the southern portion of the site. Because wood turtles hibernate within streams, the October 1 to March 31 time frame for land clearing on the site would reduce but not eliminate the potential for a loss of wood turtle individuals using the portions of the site within the area of disturbance. Adults and young turtles dispersing from nests would still be active during the fall and have the potential to be lost due to clearing and grading activities during this period. Clearing and grading the site from April 1 through September 30 would also have the potential to cause a loss of adult or juvenile wood turtles occurring within the disturbance area. Site preparation would also eliminate potential wood turtle foraging and breeding habitat. Direct loss of any individuals and the loss of potential wood turtle habitat would be unlikely to result in significant adverse impacts to regional populations of the wood turtle. Suitable wood turtle habitat would remain available beyond the area of disturbance for the construction of Project 1 on- and off-site. Maintaining the silt fencing around the area of disturbance at the west connection site would further minimize the potential for loss of individuals once site preparation activities have started.

*Eastern Box Turtle.* Eliminating the existing areas of early successional habitat at the west connection site would reduce the amount of habitat available to eastern box turtles and have the potential to result in the loss of any individuals unable to move from the area of disturbance during site preparation (Phase 1) activities. Individuals unable to relocate to suitable habitat nearby would also be lost. The loss of these individuals and successional habitat would not result in significant adverse impacts to regional populations of the eastern box turtle. To minimize the loss of individuals, the area of disturbance would be traversed after the silt fencing and construction fencing have been installed, and any turtles found within this area would be relocated outside the fencing. Maintaining the silt fencing around the area of disturbance at the west connection site would further minimize the potential for loss of individuals once site preparation activities have started.

*Exploitably Vulnerable Plant Species*

As indicated above, all ferns with the exception of three species are listed as exploitably vulnerable, as are squawroot and striped wintergreen. These species are widely distributed within the lower Hudson Valley, and the majority of them occur in most counties within New York State. The majority of these species that occur on the west connection site were observed in the Appalachian oak-hickory forest community, in which disturbance as a result of Project 1 would be limited to approximately 1 acre. However, ebony spleenwort, spinulose wood fern, evergreen wood fern, Christmas fern, and cinnamon fern were alsoobserved within areas o**f** successional woodland on the west connection site. Because some areas of this habitat would be cleared as a result of site preparation, Project 1 would have the potential to result in looses of some individual plants belonging to these species. Because these species are found throughout the Hudson Valley, the loss of any individuals within the west connection site due to clearing and grading activities would not result in significant adverse impacts to regional populations of these plant species.

***ROSETON STREAM STUDY SITE AND DEWATERING PIPELINE ROUTE***

As discussed previously, during construction of the shaft and bypass tunnel, groundwater would infiltrate the tunnel as construction advances and would need to be removed by pumping and controlled through grouting of the excavated areas. A construction dewatering treatment and disposal system would be implemented on-site to control the quality of water discharged from the shaft to the Class C stream, and from bypass tunnel to the Hudson River or to the Class C stream within the Roseton stream study site. In the DEIS, two potential routes ~~are~~ were ~~being~~ explored for the dewatering pipeline needed to convey up to 2,083 gpm (3 mgd) of treated groundwater during the construction of the bypass tunnel (see Figure 2.8-1). Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline that would be constructed from the west connection site to the Hudson River, selecting one potential pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS. In March 2012, DEP submitted a Joint Application to USACE for an individual permit for the dewatering pipeline and other project elements, and to NYSDEC with supplemental information to facilitate its review in the context of Protection of Waters and 401 Water Quality Certification approvals.

***Geology and Soils***

Construction of the dewatering pipeline would not affect geologic resources within the Roseton stream study site. Construction of the pipeline would result in temporary impacts to soils. Soils would be replaced following construction of the pipeline.

***Groundwater***

Construction of the dewatering pipeline would not affect groundwater resources within the Roseton stream study site, nor would the dewatering of the bypass tunnel be expected to adversely affect groundwater resources or quality within the site.

### *Floodplains*

Under both options, the dewatering pipeline route minimally overlaps with 100- or 500-year floodplain zones. Construction of the pipeline within the two small portions of 100-year floodplain near Route 9W associated with the Class C stream within the west connection site, and potentially within the 100-year floodplain of the tidal portion of the stream within the Class C stream within the Roseton stream study site, using cut-and-cover and trenchless construction techniques would not adversely affect the 100-year floodplain or adversely affect flooding of adjacent areas. Similarly, the 500-year floodplain zones along the Hudson River, into which the pipeline would outfall under both options, would not be significantly impacted by installation of the pipeline.

### *Wetlands*

Disturbance and impacts to stream Segments 2, 3, and/or 4 are possible depending on the final route of the pipeline and the method of installation. For the purpose of this conservative analysis, it has been assumed that the pipeline (both options) would run along the edge of River Road and that it would be installed using jack and bore trenchless or cut-and-cover construction techniques that would minimize impacts to the stream and to wetlands.that would bury the pipeline at a depth below the bottom elevation of the existing streams and wetlands.

The installation of the dewatering pipeline along River Road (Options 1 and 2) would have the potential to temporarily disturb wetland habitat (Wetlands 6, 7, 10, and 11, see Figure 2.8-15), and would result in only a very small permanent loss of wetland habitat within the estuarine wetland at the confluence of Segment 4 with the Hudson River due to the construction of the outfall. Potential impacts to wetlands would be minimized by using jack and bore techniques to construct the dewatering pipeline at stream and wetland crossings. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline that would be constructed from the west connection site to the Hudson River. Through siting and use of trenchless construction techniques, the installation of the dewatering pipeline route Option 2 would minimize impacts to wetlands (Wetlands 6, 7, 10, and 11, see Figure 2.8-15), with only a small area of disturbance within the estuarine wetland at the confluence of Segment 4 with the Hudson River due to construction of the outfall. A Joint Application for the construction of Project 1, including construction of the dewatering pipeline and outfall, and water main was submitted to the USACE and NYSDEC in March 2012. To the extent possible, construction of the outfall for the dewatering pipeline options would be located outside wetlands and above the mean high water line. The boundaries of these wetlands would be delineated and authorization requested as necessary from the USACE under Section 404 of the Clean Water Act. Potential impacts to these wetlands due to pipeline construction would be temporary, and the disturbed areas would be restored to original grade and revegetated with native species following installation of the pipeline in accordance with permitting requirements. The outfall location and design would be selected to minimize loss of riparian wetland where the pipeline exits River Road to discharge to the Class A portion of the stream within the Roseton stream study site. It has been sited to result in a minimal loss of tidal wetlands by locating the majority of the outfall (i.e, headwall structure and riprap) above mean high water (MHW). Only approximately 0.008 acres within this tidal area would be adversely affected through the placement of riprap for the outfall structure.

Pipeline installation would also have the potential to affect a small portion of stream Segment 2 (Options 1 and 2) and stream Segment 3 (Option 1) due to installation of the pipe at stream crossings. These crossings would be designed and constructed to minimize disturbance of wetlands and the stream channel, and disturbed areas would be restored in accordance with permitting requirements.

***Aquatic Resources***

As discussed above, construction of both dewatering pipeline options have the potential to result in temporary impacts to the water quality and aquatic biota of the Class C and Class A portions of the stream at any stream crossings. Measures would be implemented in accordance with permitting requirements to minimize these impacts. Benthic macroinvertebrates lost during installation of the dewatering pipeline. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline route Option 2 that would be constructed from the west connection site to the Hudson River. Through siting and use of trenchless construction techniques, the selected alignment of Option 2 would minimize impacts to the stream, with only a small area of disturbance within the tidal portion of the stream at the confluence of Segment 4 with the Hudson River due to construction of the outfall. Therefore, temporary impacts to aquatic habitat and loss of benthic macroinvertebrates would be minimal and would not result in significant adverse impacts to populations of these species, and disturbed bottom habitat would be expected to be recolonized. The loss of macroinvertebrates within the small area of disturbance resulting from pipeline installation would not result in a significant loss of prey for fish. A Joint Application for the construction of Project 1, including construction of the dewatering pipeline and outfall, and water main was submitted to the USACE and NYSDEC in March 2012.

The construction of an outfall for the dewatering pipeline Option 1 on the Hudson River shoreline would have the potential to produce sediment disturbance, resulting in minor, short-term increases in suspended sediment. These temporary effects would be localized and confined to the immediate vicinity of sediment-disturbing activities. Construction of the outfall would also result in temporary loss of bottom habitat within the coffer dam, the permanent loss of bottom habitat within the footprint of the outfall, and the benthic macroinvertebrate individuals associated with these areas unable to move from the area of disturbance would not be expected to result in a significant adverse impact to the benthic macroinvertebrate populations within the Hudson River or result in a significant loss of prey for fish. Construction of an outfall on the Hudson River construction would require authorization from the USACE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and from the NYSDEC under Article 15 of the Environmental Conservation Law, and Section 401 Water Quality Certification. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline and selected the dewatering pipeline route Option 2 as the only route further evaluated for the FEIS.

Because the outfall for dewatering pipeline Option 2 has been sited such that the outfall headwall structure and some of the riprap would be above MHW and outside the stream channel, the construction of the outfall within the tidal portion of the stream within the Roseton stream study site (Class A) would result in a minimal loss of aquatic habitat. During the construction of the outfall, appropriate measures, such as the use of a coffer dam structure, ~~and bottom-weighted turbidity curtain to contain resuspended sediment,~~ would be implemented in accordance with permitting conditions to minimize increases of suspended sediment. When the outfall structure is completed, the cofferdam would be removed. Construction of the outfall would be anticipated to take approximately 2 weeks. With the implementation of these measures, the construction of the outfall would not result in significant adverse impacts to aquatic resources of the tidal portion of the stream within the Roseton stream study site or the Hudson River. On the basis of the habitat conditions observed within the tidal portion of the stream and the results of the benthic macroinvertebrate and fish sampling, the tidal portion of the stream where the outfall would be located would not be considered suitable habitat for Atlantic or shortnose sturgeon. Therefore, construction of the outfall would not have the potential to adversely affect either of these species.

~~The minimal To protect Atlantic sturgeon, outfall construction would occur within the late fall during the period recommended by the NYSDEC to minimize impacts to this species (NYSDEC 2011e). Use of the coffer dam and turbidity curtain would also minimize the potential for construction of the outfall to adversely impact shortnose or Atlantic sturgeon that may forage in the vicinity of the proposed outfall location.~~

The discharge of up to 2,083 gpm (3 mgd) of treated groundwater recovered during the construction of the bypass tunnel to the Hudson River with Option 1 would not be expected to result in significant adverse impacts to the Hudson River. Groundwater recovered during dewatering of bypass tunnel would be sent to the on-site treatment system at the west connection site to remove suspended solids and any other contaminants in accordance with the NYSDEC SPDES permitting requirements for Project 1. The discharge to the Hudson River would comprise an extremely small component of the flow within this segment of the Hudson River and would not have the potential to adversely affect water quality or aquatic biota, as assessed in greater detail in the discussion of the east of Hudson study area, below. Subsequent to the issuance of the DEIS, DEP advanced the design of the dewatering pipeline and selected dewatering pipeline route (Option 2 in the DEIS) as the only route further evaluated for the FEIS.

In dewatering pipeline Option 2, treated groundwater discharge would supplement the freshwater flow to the tidal portion of stream Segment 4 of the Class A portion of the stream within the Roseton stream study site. Collection and treatment of this recovered groundwater would have the potential to result in water with a temperature different from that of Segment 4 of the stream during some portions of the year. Given that this portion of the stream was found to have limited numbers of benthic invertebrates and fish from spring through fall, the discharge of the recovered groundwater to this portion of the stream would not result in significant adverse impacts to aquatic resources of the Hudson River. As discussed above, the discharge of treated groundwater meeting the NYSDEC SPDES permitting requirements for Project 1 would not have the potential to result in significant adverse impacts to water resources of the tidal portion of the stream or the Hudson River.

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

***Terrestrial Resources***

*Wildlife*

In Option 1 for the dewatering pipeline route, wildlife habitat loss resulting from the pipeline route would be primarily limited to the segment crossing the Dynegy property from River Road to the Hudson River. The rest of the proposed pipeline route would follow existing roadways and, as such, would not eliminate wildlife habitat. Within the Dynegy property, most of the proposed pipeline would be routed through an existing cleared area and require minimal removal of vegetation. Overall, any habitat loss resulting from Option 1 is not expected to have significant impacts to wildlife in the surrounding area at the individual or population levels. In Option 2 the entire pipeline route would follow existing roadways, and, therefore, no wildlife habitat would be lost.

Noise generated by machinery required for trenching and installing the pipeline has the potential to disturb wildlife. However, the majority of the pipeline under either option would be installed in areas with existing sources of loud noise, such as trucks and other traffic on the roads, and the operation of the Roseton/Danskammer power plant. Installation of the pipeline would not be expected to significantly increase noise disturbances to the wildlife occurring along either proposed route, which consists of mostly generalist, disturbance-tolerant species.

***Threatened, Endangered, Special Concern, Rare, and Exploitably Vulnerable Species***

As stated above, Options 1 and 2 for the proposed dewatering pipeline route would result in minimal habitat loss, and would only add construction noises to areas that are already consistently noisy from existing human activities. Any threatened, endangered, special concern, rare, or exploitably vulnerable species known to, or with the potential to, occur in the vicinity of the pipeline route would not be significantly impacted at the individual or population levels. One possible exception is the eastern box turtle, which may occur within the area disturbed for the pipeline crossing through the Roseton/Danskammer power plant in Option 1. Eastern box turtle habitat would not be lost as a result of pipeline installation, but any individuals occurring in the area may be displaced by construction noises and other activities taking place within their habitat. Such disturbances would be brief, however, and any impacts would be temporary.

## 2.8-4 EAST OF HUDSON

### 2.8-4.1 EXISTING CONDITIONS—EAST OF HUDSON

The east of Hudson study area for the natural resources and water resources assessment consists of the east connection site (Shaft 6 site; see Figure 1-12), and the segment of the Hudson River that includes the east connection site down to where the Class A portion of the stream within the Roseton stream study site discharges to the river. The 20.1-acre east connection site is located in the Town of Wappinger, Dutchess County, NY, on the west side of River Road. The site is bordered on the west side by the Hudson River and a railroad right-of-way, to the north and east by property owned by the New York Power Authority, and on the south by private residences. The top of the site along the eastern property line and River Road is relatively flat. However, the rest of the site slopes steeply down to the western property line and the Hudson River, with an elevation change of approximately 100 feet (see Figure 2.8-2).

***GEOLOGY AND SOILS***

As was discussed for the west connection site, the east of Hudson study area is also located in the Hudson Highland part of the Reading Prong geologic province discussed for the west connection site. This province is composed of metamorphic rocks that were further deformed during a long period of mountain building that occurred during this geologic era which resulted in numerous folds and faults. Subsequent mountain-building events served to further metamorphose the rock. The east connection site is underlain by the Mount Merino and Indian River Shale formations (Fisher et al. 1970). This sedimentary rock was deposited in still water during the Ordovician Period (about 480 to 478 million years ago) of the Paleozoic Era. The primary rock type consists of shale, with secondary rock types consisting of sandstone, slate, and isolated deposits of chert. Slate is a metamorphic rock that is typically formed by re-crystallizing shale with heat and pressure. An increasing percentage of sandstone is evident in the area of east connection site, with complete layers of sandstone up to 1-inch thick being visible within the shale beds. The top of shale is locally variable in elevation, but outcrops are common and it is generally less than 100 feet below the ground surface.

The Mount Merino and Indian River Shale formations are overlain by lacustrine silts and clay (Cadwell et al. 1989). These thin, laminated fine-grained layers were deposited in proglacial[19] lakes and have low permeability similar to glacial till. The silt and clay layers generally consist of calcareous sediments and thicknesses are variable (between 0 and 300 feet).

Soils on the east connection site comprise rocky and manmade soil series (see **Figure 2.8-17**). According to the Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA), three soil series are present, none of which are classified as hydric. The soil series include:

[19] A lake formed either by the damming action of a moraine or ice dam during the retreat of a melting glacier, or by meltwater trapped against an ice sheet due to isostatic depression of the crust around the ice.

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Figure 2.8-17

**East Connection Site: Soil Boundaries**

- Dutchess-Cardigan complex (DwB)—This complex consists of an intricate pattern of very deep, well drained Dutchess soils and moderately deep, well drained Cardigan soils that formed in glacial till deposits. Here, it is on hilltops and undulating till plains that are underlain by folded shale bedrock. Dutchess soils are commonly on lower concave slopes and Cardigan soils are commonly on upper slopes, hilltops, and near areas of rock outcrop. Slopes are complex and range from 1 to 6 percent.
- Nassau-Rock outcrop complex (NxE)—The Nassau-Rock outcrop complex consists of about 45 percent Nassau soils, 30 percent rock outcrop, and 25 percent other soils. Nassau soils are formed in till and are shallow and somewhat excessively drained. The Nassau-Rock outcrop complex is found on hills and side slopes that are underlain by folded shale bedrock. Slopes are complex and range from 25 to 45 percent.
- Udorthents (Ud)—These excessively drained to moderately well drained soils consist of excavated earthy material that has been stockpiled for eventual use as fill or topdressing; soil and rock material that has been trucked from other areas and leveled; or soil left in areas that have been excavated. They formed in manmade cut and till areas, which are generally near industrial sites, urban developments, or other construction sites.

***GROUNDWATER***

As discussed above, the overburden on the east connection site contains lacustrine silts and clay. These thin, laminated fine-grained layers were deposited in proglacial lakes and have low permeability similar to glacial till. The minimal thickness and low permeability of the overburden leads to minimal water yields, and it is not typically developed as a water supply source. The overburden material is underlain by the Mount Marino and Indian River Shale Formations (Fisher et al. 1970), which is a fine-grained sedimentary rock known for laminar bedding along consistent planes. Due to its thin laminae, or parallel layering, the rock tends to fracture along parallel planes and limit the permeability of the rock. Marino and Indian River shale zones capable of producing viable water supply resources are located in areas with moderate to high fracturing and a high degree of fracture interconnectivity. Wells located in the Mount Marino and Indian River shale, which is a part of the Martinsburg Formation, have been documented to produce 3 to 225 gpm (0.004 to 0.324 mgd) with a median yield of 30 gpm (0.043 mgd) (Orange County Water Authority 1995).

The water supply systems in Dutchess County are similar to those in Orange County (where the west connection site is located) in that they are considered suitable for domestic water supply purposes. Groundwater in certain localized areas in the vicinity of the east connection site has the potential to have been affected by human activities, such as improper waste disposal, leaks, spills, and storage of rock salt.

***FLOODPLAINS***

Areas of the east connection site that are within floodplain boundaries are limited to a narrow zone of 500-year floodplain where the western edge of the site meets the Hudson River (see

**Figure 2.8-18**). The entire east connection site is above the 100-year flood elevation, and nearly the entire east connection site is above the 500-year flood elevation.

### *WETLANDS*

There are no NWI or NYSDEC freshwater wetlands mapped on the east connection site, and no wetlands were identified during site reconnaissance (see **Figure 2.8-19**). An on-site drainage feature is located within the northeast portion of the site that originates off-site at the New York Power Authority substation, runs through woodlands on the east connection site, and terminates along the eastern edge of a gravel road leading from the temporary office structures to the soil stockpile and equipment/materials storage area to the east of the power line right-of-way. Neither the drainage nor the areas adjacent to the drainage meet the characteristics required to be classified as a wetland under the USACE three parameter approach.

### *AQUATIC RESOURCES*

The only aquatic resource in the vicinity of the east connection site is the Hudson River. The drainage feature described under "Wetlands" does not support aquatic biota. The east connection site is located in the vicinity of Hudson River mile 65. North of Peekskill (River Mile 44), the Hudson River becomes narrow and deep, with an average width of about 1,800 feet and channel depths ranging from 49 to 197 feet. This area is characterized by a turbulent mixing zone with steep shorelines and little shoal area (USFWS 1997). The Hudson River widens again at Cornwall (River Mile 56) with an average width of 1.1 miles and an average mid-channel depth of approximately 40 feet. This area has wider shoal areas, particularly along the eastern shoreline, which support submerged aquatic vegetation (SAV). The Hudson River narrows again north of Wappinger Creek (River Mile 67) and reaches depths of as much as 125 feet (USFWS 1997). The portion of the Hudson River within the study area, comprising the segment of the Hudson River that includes the shoreline of the east connection site down to the confluence of the Class C stream within the Roseton stream study site, is within a portion of the river called Newburgh Bay because of its large width (0.6 to 1 mile) and shallower depth (about 49 to 59 feet) (Findlay et al. 2006a). Water depths are shallower near the shoreline. On the west side of the Hudson River at the shoreline near Danskammer Point, depth ranges from about 6 to 11 feet. On the east side of the river at the shoreline, depth ranges from 5 to 17 feet.

Moodna Creek, Fishkill Creek, and Wappinger Creek are major tributaries to the Hudson River within the vicinity of the east of Hudson study area (USFWS 1997).

#### *Water Quality*

The Hudson River between Stony Point and Wappinger Falls is classified as oligohaline, and between Wappinger Falls and the Troy Dam it is classified as tidal freshwater; however, these salinity zones vary with season (USFWS 1997). The lower Hudson River in the vicinity of the east connection site is classified by the New York State as Class A fresh surface waters. The best usages of Class A waters are a source of water supply for drinking, culinary, or food processing purposes; primary and secondary contact recreation; and fishing. The waters are suitable for fish, shellfish, and wildlife

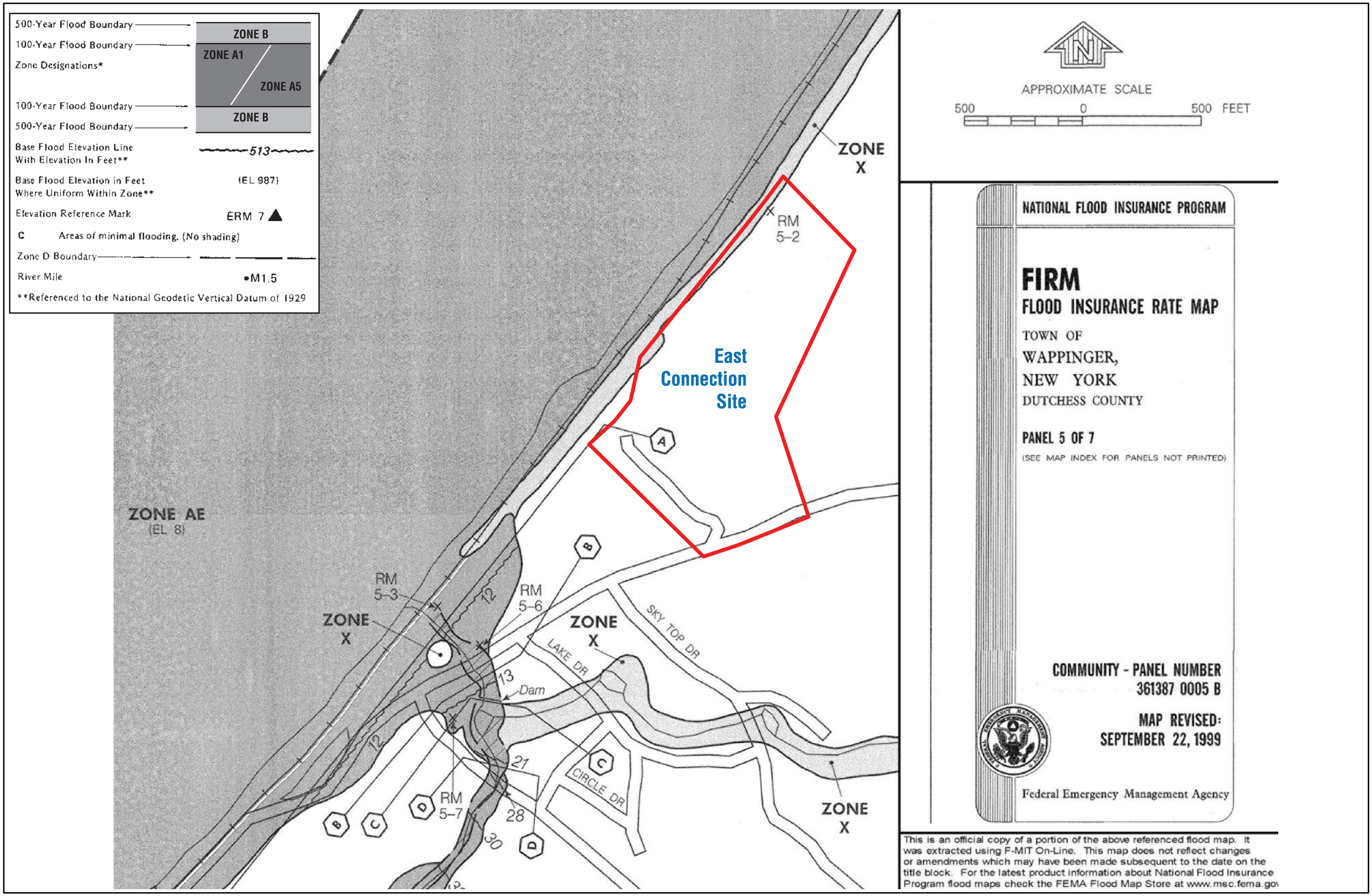


Figure 2.8-18

**East Connection Site FEMA Floodplains**

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Figure 2.8-19

**East Connection Site USFWS NWI Wetlands**

propagation and survival. This classification may be given to those waters that, if subjected to approved treatment equal to coagulation, sedimentation, filtration, and disinfection, with additional treatment if necessary to reduce naturally present impurities, meet or will meet NYSDOH drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.[20]

**Table 2.8-6** presents the NYSDEC water quality standards for Class A waters and water quality data for the Hudson River collected from USGS streamgage 01372058-Hudson River below Poughkeepsie, NY, as well as NYSDEC monitoring station 13010077- Hudson River (Lower) in Poughkeepsie. Both stations are located just to the north of the east connection site. Information was collected from 2001 to 2008; specific dates for collection of samples of each parameter are variable. In general, water quality conditions within this portion of the Hudson River meet the standards for Class A waters. However, as a result of PCB contamination of sediment within the upper Hudson River, fish consumption is a special concern.[21]

**Table 2.8-6**
**Water Quality Standards for NYSDEC Class A Waters in 6 NYCRR §703 vs. Actual Measurements for the Lower Hudson Near the East of Hudson Study Area**

| Parameter (Use Class/Standard) | Low | High | Average |
|---|---|---|---|
| Temperature (°F) [1][*No Standard*] | 45 | 71 | 61 |
| pH [1][*Between 6.5 and 8.5*] | 7.2 | 7.6 | 7.35 |
| Dissolved Oxygen (mg/L) [1][*min. daily avg. > 5, never < 4*] | 3.6 | 9.6 | 7.575 |
| Dissolved Solids (mg/L) [2][*< 500*] | 123 | 460 | 194.4 |
| Total Coliform (Colonies per 100mL) [3][*Monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively*] | 200 | 4000 | 1040 |
| Fecal Coliform (Colonies per 100mL) [3] [*monthly geometric mean < 200*] | 20 | 60 | 32 |
| Turbidity (NTU) [2] [*No increase that will cause a substantial visible contrast to natural conditions*] | 2.64 | 95.7 | 37.1 |
| Oil and Floating Substances [*No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease*] | | | |

**Notes:** [1]Based on USGS Streamgage Measurements, 2008-2009
[2]Based on NYSDEC Measurements, 2001-2007
[3] Based on NYSDEC Measurements, 2003
**Sources:** Data retrieved from STORET (http://iaspub.epa.gov/waters10/attains_get_services.storet_station?p_org=21NYDECA&p_station=13010077, accessed 3/31/2011) (http://iaspub.epa.gov/waters10/attains_get_services.storet_station?p_org=21NYDECA&p_station=13010077, accessed 3/31/2011)

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[20] New York Department of Environmental Conservation. "Part 701: Classifications-Surface Waters and Groundwaters." http://www.dec.ny.gov/regs/4592.html#15989, accessed March 31, 2011)

[21] New York Department of Environmental Conservation. "The Final New York State 2010 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy." http://www.dec.ny.gov/docs/water_pdf/303dlistfinal10.pdf, accessed March 31, 2011)

### *Aquatic Biota*

The lower Hudson River supports a diverse and productive aquatic community comprising a variety of phytoplankton and zooplankton, invertebrate species, and finfish. The following sections provide a brief description of the aquatic biota found within this portion of the Hudson River.

*Primary Producers*

Phytoplankton, submerged aquatic vegetation (SAV), and benthic macroalgae (multi-cellular algae that attach to surfaces) are the primary producers of energy in the aquatic food chain. They require sunlight as their primary energy source, and their productivity, biomass, and depth distribution will be limited by light penetration.

Phytoplankton are small (usually microscopic) plants whose movements within the waters of the Hudson River Estuary are controlled by tides and currents. The most common of Hudson Estuary phytoplankton fall under four categories: diatoms, dinoflagellates, blue-green algae, and green algae. *Asterionella formosa* is the most common diatom species found in the freshwater tidal Hudson. *Coscinodiscus excentricus* and *Cyclotella* spp. are widely distributed along the entire estuary (Boyce Thompson Institute 1977). Dinoflagellates commonly found in the Hudson River include *Ceratium hinunella* and *C. tripos*. Blue-green algae found within the lower Hudson River include *Anacystis aerriginusa and A. incerta*, and *Anabena* spp, which may occur in a free-floating or colonial form. Free-floating green algae (Chlorophyta) include the genus *Pediastrum biradiatum*, *P. duplex*, *P. simplex*, and *P. tetras*; members of the genus Scenedesmus, including *S. quafirausa*, *S. bijuga*, *S. dimorphus*, *S. obliqus*, and *S. opoliensis*, and *Ankistrodesmus falcatus*.

SAV beds are subtidal plant communities that occur at water depths of up to 6 feet at low water (New York's Sea Grant Extension Program undated). SAV is a critical component of aquatic ecosystems, both freshwater and marine. SAV communities exhibit high rates of primary productivity and are known to support abundant and diverse epifaunal and benthic communities. Many species of fish and macrocrustaceans use SAV beds as nursery and foraging habitats, and seek shelter in SAV beds to avoid predation. SAV along the mid-Hudson River Estuary typically occurs in narrow, shallow, subtidal bands along the shoreline; however, SAV occurs in the wider shoal areas in the Fishkill-Beacon area just south of the study area (USFWS 1997). The dominant species of SAV in the tidal freshwater to brackish Hudson River Estuary is the native water celery (*Vallisneria Americana*) (Findlay et al. 2006b). Additional SAV species include waterweed (*Elodea nuttallii*), coontail (*Ceratophyllum demersum*), naiad (*Najas guadalupensis*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Zannichellia palustris*), and widgeon grass (*Ruppia maritima*) (USFWS 1997). Based on sampling conducted in 2001, a relatively small SAV bed (approximately 7,750 square feet) was identified to the north of the east connection site at River Mile 68 (Findlay et al. 2006a). NYSDEC has mapped an area of Acceptable SAV habitat along the eastern shoreline of the Hudson River from about midway along the shoreline west of the east connection site to the south, and additional areas along the shoreline of both sides of the river. The areas indicated in the SAV GIS data represent areas where SAV has been known to occur and thereby considered acceptable habitats (GIS Data available from the GIS State Clearing House http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1209).

*Zooplankton*

Zooplankton are another integral component of the aquatic food web. Free floating, they are primary grazers on phytoplankton and detrital (organic debris formed by decomposition of plants and animals) material. Zooplankton are themselves consumed by such fish as bay anchovy (*Anchoa mitchilli*) and early life stages of commercially and recreationally important fish species, such as striped bass and white perch. The zooplankton community of the Hudson River includes two dominant cyclopoid copepods (*Diacyclops biscuspidatus thomasi* Forbes, and *Halicylops* sp.), calanoid copepods (*Eurytemora affinis* (Poppe), and the cladocerans *Bosmina* (subgenus *Sinobosmina) freyi, Daphnia*, *Diaphanosoma* and *Chydoros*. Rotifers also comprise part of the zooplankton community. Those found in the Hudson include *Polyarthra* spp., *Keratella cochlearis* Gosse, *Trichocerca* spp., *Asplanchna*, *Ascopmorpha*, *Brachionus*, *Collotheca*, *Filinia*, *Kellicottia*, *Notholca*, *Plesoma* and *Synchaeta* (Pace et al. 1998*)*. Zooplankton also include life stages of other organisms, such as fish eggs and larvae and decapod (group of crustacean invertebrates with five pairs of legs, e.g., shrimp, lobster, and crab) larvae that spend only part of their life cycle as plankton.

*Benthic Invertebrates*

The benthic macroinvertebrate community of the Hudson River between Stony Point and Poughkeepsie contains a mixture of freshwater and marine organisms (USFWS 1997). This community inhabits the substrate and surfaces of submerged objects, and its members are an important food source for ecologically and commercially significant fish and wildlife. Benthic macroinvertebrates are typically grouped into two categories: epifauna (species that live on top of the substrate) and infauna (species living within the substrate). Between Stony Point and Poughkeepsie, the Hudson River substrate is composed mainly of silt and fine sediments, with sand in the deeper sections of the river.

Species with the potential to occur within the Hudson River portion of the study area include oligochaete tubificid worms (*Limnodrilus hoffmeisteri*), chironomids (*Tanytarsus guerlus*), amphipods (*Gammarus* sp.), isopods (*Cyathura polita)*, and bivalves (*Pisidium casertanum*) (Simpson et al. 1985). Brackish species like the hydroid (Cordylophora sp.), amphipods (Corophium sp. and Leptocheirus sp.), bivalves (Rangia sp.), barnacles, and polychaetes are likely to be present in this downriver location (Findlay et al. 2006a). The invasive zebra mussel (*Dreissenia polymorpha*) also has the potential to occur.

*Fish*

Anadromous species with the potential to be present in the Hudson River within the study area include alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), and threespine stickleback (*Gasterosteus aculeatus*). Catadromous species within the vicinity include American eel (*Anguilla rostrata*). Freshwater species potentially within the study area include bluegill (*Lepomis macrochirus*), brown bullhead (*Ameiurus nebulosus*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), golden shiner (*Notemigonus crysoleucas*), largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), smallmouth bass (*Micropterus dolomieui*), spottail shiner (*Notropis hudsonius*), walleye (*Sander vitreus*), white catfish (*Ameiurus catus*),and yellow perch (*Perca flavescens*). Estuarine species within the vicinity of the east connection site include fourspine stickleback (*Apeltes quadracus*), hogchoker (*Trinectes maculatus*), killifish (*Fundulus diaphanous*), and white perch (*Morone americana*) (NYSDOS 2011a, b, and c).

Additional species with the potential to occur in the vicinity of the Hudson River within the study area as transients on their way to spawning grounds include rainbow smelt (*Osmerus mordax*) and tomcod (*Microgadus tomcod*) (USFWS 1997). In addition, the federally and state-listed endangered shortnose sturgeon (*Acipenser brevirostrum*) and the ~~proposed~~ federally listed endangered Atlantic sturgeon (*Acipenser oxyrinchus*) are found throughout the Hudson River and are likely to be found within the vicinity of the east connection site. Neither species of sturgeon would be expected to spawn within the site; preferred spawning habitat is located to the north in deeper areas with fairly strong currents.

Three areas designated as Significant Coastal Fish and Wildlife Habitat (SCFWH) are found within the Hudson River near the study area: Hudson River Miles 40-60, Wappinger Creek, and Kingston-Poughkeepsie Deepwater. The Hudson River Miles 40-60 SCFWH, extending from Denning Point to Stony Point, is a narrow, deep area with strong currents and a rocky bottom. This area is important for spawning of coastal migratory fish, particularly striped bass, and also serves as a migrational route and as a nursery and summering area for shortnose sturgeon and Atlantic sturgeon. The Kingston-Poughkeepsie Deepwater SCFWH begins near Wappinger Creek, just north of the east connection site, and continues north to Kingston Point. This is a continuous deepwater section of the Hudson that provides wintering habitat for shortnose sturgeon and Atlantic sturgeon, and also serves as a spawning area for Atlantic sturgeon and striped bass. Both the Hudson River Miles 40-60 SCFWH and the Kingston-Poughkeepsie Deepwater SCFWH serve as a critical habitat for most estuarine-dependent species originating within the Hudson River. The Wappinger Creek SCFWH, located on the east side of the Hudson River slightly north of the east connection site, extends from the mouth of Wappinger Creek to its first dam upstream, near the Village of Wappinger Falls. Wappinger Creek is a warm-water stream and an important spawning area for several coastal migratory fishes (alewife, blueback herring, Atlantic tomcod, and striped bass). The tidal portion of the creek serves as a wintering area for adult largemouth and smallmouth bass (NYSDOS 2011a, b, and c).

*Essential Fish Habitat*

The Hudson River portion of the study area is within a portion of the Hudson River Estuary/Raritan/Sandy Hook Bays, New York/New Jersey Estuary EFH (NOAA 2011). **Table 2.8-7** lists the species and life stages of fish identified as having EFH in this broad area. Among the species listed in the table, the majority are marine species that would only be expected to occur in this reach of the Hudson River on an occasional basis.

**Table 2.8-7**
**Summary of Federally Managed Species with EFH Designations in the East of Hudson Study Area**

| Species | Eggs | Larvae | Juvenile | Adult | Spawning Adult |
|---|---|---|---|---|---|
| Red Hake | | M,S | M,S | M,S | |
| Winter Flounder | M,S | M,S | M,S | M,S | M,S |
| Windowpane Flounder | M,S | M,S | M,S | M,S | M,S |
| Atlantic Sea Herring | | M,S | M,S | M,S | |
| Bluefish | | | M,S | M,S | |
| Atlantic Butterfish | | M | M,S | M,S | |
| Atlantic Mackerel | | | S | S | |
| Summer Flounder | | F,M,S | M,S | M,S | |
| Scup | S | S | S | S | |
| Black Sea Bass | | | M,S | M,S | |
| King Mackerel | X | X | X | X | |
| Spanish Mackerel | X | X | X | X | |
| Cobia | X | X | X | X | |

**Notes:**
S = EFH designation includes the seawater salinity zone (salinity > or = 25ppt).
M = EFH designation includes the mixing water/brackish salinity zone (0.5 ppt < salinity < 25 ppt).
F = EFH designation includes the tidal freshwater salinity zone (0 ppt < salinity < 0.5 ppt).
X = EFH has been designated for a given species and life stage.
**Source:** NOAA 2011

## *TERRESTRIAL RESOURCES*

### *Ecological Communities*

General habitat types on the east connection site (see **Figures 2.8-20 and 2.8-21a through 21o**) include maintained lawn (approximately 9 acres), forest (approximately 4 acres) that could be characterized as Appalachian oak-hickory forest, and a recently graded area along with impervious surfaces, including parking lots, access roads, and buildings/trailers (approximately 6 acres). Existing paved roadways, buildings (including temporary office structures), and two parking lots occupy the central portion of the site between River Road and the Hudson River. The maintained lawn area occupies almost half of the site, and includes common turf species and both native and non-native herbaceous species.

The approximately 4 acres of forested habitat include the following:

- An approximately 2-acre mature, mixed hardwood parcel ("northwestern forest") occupying a steeply sloped portion of the site on the northern edge of the site to the west of an existing electrical transmission line right-of-way and east of the railroad tracks. The northwestern forest is best described as an early mature Appalachian oak-hickory forest, although the more disturbed portions of this forest resemble an early successional forest. Red oak with black birch and sugar maple comprise the dominant trees farther upslope to the north in the less disturbed areas. The understory of this forest is composed of spicebush and honeysuckles. Black locust is the dominant overstory species in more disturbed areas with fewer maple and oak individuals. Other trees observed within this tree stand include black walnut (*Juglans nigra)*, Norway maple, pin oak (*Quercus*

12.16.11


Figure 2.8-20

**East Connection Site Preliminary Area of Disturbance, Existing Habitats and Potential Indiana Bat Roost Trees**

Shaft building from main entrance facing east **1**

Southwest building from main entrance facing west **2**

Figure 2.8-21a

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Northwest building from southern access road facing north-northeast **3**

Southwest building from southern access road facing south-southeast **4**

Figure 2.8-21b

**East Connection Site**
**Potential Indiana Bat Roost and Habitat Photographs**

Shaft building from trailer parking lot facing east **5**

Trailer parking lot facing northeast **6**

Figure 2.8-21c

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Northwest tree stand and substation facing north-northwest **7**

Maintained lawn facing south-southwest **8**

Figure 2.8-21d

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Northwest tree stand from southeast **9**

Northeast tree stand and trailers facing south **10**

Figure 2.8-21e

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Substation and southwest building facing southwest **11**

Northeast tree stand facing northeast **12**

Figure 2.8-21f

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Stand of eight black locust trees at the south edge of the northwest tree stand facing southwest **13**

Snag with peeling bark and woodpecker sign/crevises **14**

Figure 2.8-21g
## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Slope in northwest tree stand facing northeast **15**

Dense understory in northwest tree stand **16**

Figure 2.8-21h

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Dense understory in northeast tree stand **17**

Open understory in northeast tree stand **18**

Figure 2.8-21i

## East Connection Site

## Potential Indiana Bat Roost and Habitat Photographs

Black cherry in northwest tree stand **19**

Black locust in northwest tree stand **20**

Figure 2.8-21j

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Hophornbeam in northwest tree stand **21**

Black locust and black cherry in northwest tree stand **22**

Figure 2.8-21k

**East Connection Site**

**Potential Indiana Bat Roost and Habitat Photographs**

White oak in northeast tree stand **23**

Shagbark hickory in northeast tree stand **24**

Figure 2.8-21l

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Two hickory trees in the northeast tree stand **25**

Snag with peeling bark in northeast tree stand **26**

Figure 2.8-21m

**East Connection Site**
**Potential Indiana Bat Roost and Habitat Photographs**

Hickory and white oak in northeast tree stand **27**

Two snags with sloughing bark in northeast tree stand **28**

Figure 2.8-21n

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

Hophornbeam in northeast tree stand **29**

Two snags with sloughing bark in northwest corner of the site **30**

Figure 2.8-21o

## East Connection Site
## Potential Indiana Bat Roost and Habitat Photographs

*palustris*), red oak, white ash, and white mulberry (*Morus alba*). Approximately 358 trees with a dbh measuring 6 inches or greater were identified within the northwestern forest.

- An approximately 2-acre mature, mixed hardwood parcel ("northeastern forest") occupying a fairly flat, upslope area east of the existing right-of-way and west of the New York Power Authority parcel. The northeastern forest consists of a relatively level, mature Appalachian oak-hickory forest. This area is dominated by red oak, sugar maple, hophornbeam (*Ostrya virginiana*), black walnut, and shagbark hickory. Dominant species present within the forested habitat of the northern portions of the site include oak species (white oak and red oak), shagbark hickory, black walnut, Norway maple, and black birch, with a dominant understory of spicebush. In general, the northeastern forest contains more mature white oak, black walnut, maple, and shagbark hickory trees (up to 36 inches in dbh) with a subcanopy of cherries (black and sweet [*Prunus avium*]), hophornbeam, and an understory composed primarily of native woody and herbaceous species, although both the eastern and western parcels have substantial numbers of mature, native tree species present. Approximately 201 trees with a dbh of 6 inches or greater were observed in the northeastern forest.

***Wildlife***

Most of the habitat available to terrestrial wildlife at the east connection site is limited to fragmented secondary growth forest. The wooded areas are small and heavily disturbed, and represent marginal wildlife habitat. The majority of the site is covered by manicured and overgrown lawn and impervious surface, which are of little to no value to native wildlife. Overall, the habitats within the site likely support only disturbance-tolerant, generalist wildlife species that typically occur in small woodlots within developed areas.

*Birds*

The 2000-2005 Breeding Bird Atlas lists 64 species nesting in Block 5860C, in which the east connection site is located. Considering the habitat requirements of each of these species and the habitat present, only a subset are expected to breed at the site (see Appendix 2.8-2, Table 2). The east connection site represents marginal nesting habitat for most woodland birds, especially forest interior species. The woodland birds observed breeding at the site during summer field surveys are disturbance-tolerant species with small area requirements that commonly inhabit suburban areas and other developed landscapes. These include blue jay, black-capped chickadee, cedar waxwing, American redstart, tufted titmouse, eastern wood peewee, hairy woodpecker, red-bellied woodpecker, white-breasted nuthatch, and wood thrush. Bird species that favor open areas and forest edges were also observed at the site during summer field surveys, including common grackle, eastern kingbird, eastern phoebe, barn swallow, American robin, American goldfinch, gray catbird, Baltimore oriole, house finch, northern cardinal, yellow warbler, chipping sparrow, song sparrow, and brown-headed cowbird. The northern boundary of the east connection site adjoins a New York Power Authority transmission line right-of-way containing shrub-scrub habitat suitable for some bird species associated with early successional habitat.

Birds observed in this area during summer field surveys include blue-winged warbler, gray catbird, chestnut-sided warbler, house sparrow, European starling, indigo bunting, Carolina wren, red-winged blackbird, red-tailed hawk, and northern mockingbird. Chimney swift, great blue heron, belted kingfisher, osprey, and Cooper's hawk were observed flying over the east connection site or along the Hudson River.

The National Audubon Society's 2010 Christmas Bird Count in Dutchess County documented 77 species wintering in the county (see Appendix 2.8-2, Table 2). Considering the habitat associations of these species, many would not occur at the east connection site during winter. The birds present at the east connection site during winter are expected to be limited to primarily disturbance-tolerant, terrestrial species associated with residential areas. The following birds were observed at the east connection site during winter field surveys: American crow, American robin, black-capped chickadee, blue jay, brown-headed cowbird, Carolina wren, dark-eyed junco, downy woodpecker, European starling, northern cardinal, northern flicker, northern mockingbird, red-bellied woodpecker, red-tailed hawk, tufted titmouse, white-breasted nuthatch, and white-throated sparrow. Birds observed in the Hudson River or flying along the river include American black duck, common merganser, hooded merganser, mallard, bald eagle, peregrine falcon, ring-billed gull, and great black-backed gull.

Despite its marginal quality as breeding and wintering habitat for birds other than primarily disturbance-tolerant species, the east connection site may represent suitable stopover habitat for many additional species migrating through the Hudson Valley during spring and autumn. Small forest fragments that may otherwise be of low value as breeding and wintering habitat can still serve as viable stopover sites for many migrants (Matthews and Rodewald 2010, Seewagen et al. 2011). However, common yellowthroat and warbling vireo were the only two migratory bird species observed at the east connection site during spring migration that were not also found breeding at the site during summer field surveys. Nonetheless, several migratory species that do not breed at the site are expected to occur at the site during spring and autumn migration, such as black and white warbler, black-throated blue warbler, black-throated green warbler, magnolia warbler, northern parula, ovenbird, yellow-rumped warbler, Swainson's thrush, and hermit thrush (*Catharus guttatus*), among others (see Appendix 2.8-2, Table 2).

*Reptiles and Amphibians*

The habitats present within the east connection project site have the potential to support few reptile and amphibian species (see Appendix 2.8-2, Table 3). Water features at the site are limited to the drainage feature located within the northeastern forest, which eliminates the potential for many aquatic and semi-aquatic reptile and amphibian species to occur there. Primarily terrestrial reptile or amphibian species with the potential to occur in the forested areas of the site include red-backed salamander, American toad, northern brown snake, and black rat snake, among others. Species that may use the areas of overgrown lawn within the site or the shrub-scrub habitat in the adjoining the transmission line right-of-way include common garter snake, black racer, and eastern box turtle. During visual surveys conducted at the site in

September 2010, and May and June 2011, only red-backed salamander and spring peeper were documented. There were no incidental observations of any other reptile or amphibian species during other visits to the site.

*Mammals*

The small size of the east connection site and the fragmentation and land use in the surrounding area are expected to limit the mammal community to species associated with disturbed habitats and suburban residential areas. Examples include white-tailed deer, striped skunk, eastern cottontail, raccoon, white-footed mouse, house mouse, moles, eastern chipmunk, gray squirrel, and Virginia opossum. Eastern coyote, red fox, New England cottontail (*Sylvilagus transitionalis*), little brown bat, big brown bat, hoary bat, silver-haired bat, eastern red bat, and Indiana bat also have the potential to occur on the site. The following mammals were observed during field surveys at the east connection site: eastern chipmunk, gray squirrel, woodchuck, eastern cottontail, white-tailed deer, and red fox.

### *THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES*

#### *Overview*

The USFWS list of federally Threatened, Endangered, Candidate, and Proposed species for Dutchess County includes many of the same species listed for Orange County. The exceptions include small whorled pogonia, which is not listed as occurring in Dutchess County, and the addition of New England cottontail (*Sylvilagus transitionalis*). As discussed for the west of Hudson study area, the USFWS lists Atlantic sturgeon (~~proposed species~~ endangered) and shortnose sturgeon (endangered) as occurring in both Orange and Dutchess Counties (USFWS 2011a). These two fish species were not discussed as part of the west of Hudson study area but are discussed below. NYNHP records of state-listed species in the vicinity of the east connection site include the same species listed above for the west connection and Roseton stream study sites, namely Indiana bat, bald eagle, and shortnose sturgeon.

Threatened, Endangered, and New York State Special Concern reptile or amphibian species documented during the NYSDEC Herp Atlas Project in the survey block encompassing the east connection site include wood turtle, spotted turtle, and eastern box turtle.

State-listed bird species documented during the 2000-2005 Breeding Bird Atlas in the block encompassing the east connection site (Block 5860C) include bald eagle, sharp-shinned hawk, and Cooper’s hawk. State-listed bird species documented during the National Audubon Society’s Christmas Bird Count in Dutchess County in 2010 include bald eagle, sharp-shinned hawk, Cooper’s hawk, red-shouldered hawk, northern harrier, and horned lark.

Bald eagle, peregrine falcon, and Cooper’s hawk were the only state- and federally listed species observed at the east connection site during field surveys.

### ***Federally Listed Species***

*Shortnose Sturgeon*

The federally and state-listed-endangered shortnose sturgeon is a semi-anadromous bottom-feeding fish that can be found throughout the Hudson River system. These fish spawn in tidal freshwater areas between River Mile 125 and 152, upriver from the east connection site and the study area, but they spend the majority of their lives in brackish or saltwater (USGS 1989) and therefore have the potential to occur in the vicinity of the east connection site as transients.

Within the Hudson River, young of year shortnose sturgeon occur in freshwater, juveniles (3- to 10-year-olds) occur at the freshwater/saltwater interface over silt substrates at depths of 32 to 65 feet, and adults occur in both freshwater and upper tidal saline areas year-round (NOAA 1998). The primary summer habitat for shortnose sturgeon in the middle section of the Hudson River would not coincide with the study area; preferred habitat is the deep river channel (43 to 138 feet, or 13 to 42 m deep) (Peterson and Bain 2002). Hoff et al. (1988 in Bain 1997) reported most captures of adult shortnose sturgeon during river monitoring of fish distributions by the Hudson River electric utilities from 1969 to 1980 occurred between River Miles 24 and 76.

Spawning occurs far north of the study area, just above the salt front (River Mile 125 to 152) (USGS 1989) in areas with fairly strong currents (Woodland 2005). Most adults that will spawn in the following spring migrate past the east connection site and the study area to deep over-wintering areas near Kingston (River Mile 87), adjacent to spawning grounds (Bain 1997). Ripe and spawning individuals have been observed in the Hudson River from February to early April (USGS 1989), and NOAA (1998) states that Hudson River shortnose sturgeon spawning occurs from April to mid-May. The size of the Hudson River shortnose sturgeon spawning population was estimated to be approximately 57,000 spawning fish in the late 1990s (Bain et al. 2000), with the total Hudson River shortnose sturgeon population at approximately 61,000 fish by the late 1990s (Peterson and Bain 2002).

Shortnose sturgeon are benthic omnivores but also feed off plant surfaces (NOAA 1998). Juvenile shortnose sturgeon feed on benthic crustaceans and insect larvae. Adults within the Hudson River are known to eat gammarid amphipods and zebra mussels. The feeding behavior of shortnose sturgeon is typically indiscriminate and occurs during times of low visibility, at night or on windy days when turbidity is high. Shortnose sturgeon generally feed in shallow water (3-16 feet) along backwaters and river banks, except in late summer when rising temperatures cause them to feed in slightly deeper waters (16-32 feet) and in winter when feeding occurs in deep water (49-82 feet) (USGS 1989).

*Atlantic Sturgeon*

The Atlantic sturgeon, ~~proposed for listing as~~ federally listed endangered for the New York Bight population ~~by NMFS~~ (2012, Federal Register, Volume 77(24):5880-5912 and Federal Register, Volume 77(24):5914-5982).~~Federal Register, Volume 75, No. 193, Wednesday October 6, 2010/Proposed Rules, pages 61872 to 61903)~~, is known to occur in the Hudson River and surrounding coastal waters. It is a large anadromous, bottom-feeding species that typically spawns in the Hudson River just north of the east connection site and matures in marine waters (Bain 1997).

In the Hudson River, Atlantic sturgeon are found in the deeper portions and do not occur farther upstream than Hudson, NY (around River Mile 120) (USGS 1989). During summer months, the south Newburgh Bay area may be an area of concentration for age-1 Atlantic sturgeon (Sweka et al. 2007). Most juveniles occur between River Miles 39 and 87 (Bain 1997) and would have the potential to occur in the vicinity of the east connection site (approximately River Mile 66). For a period of 2 to 6 years, juveniles spend warmer months in upstream, freshwater areas and colder months in downstream, brackish areas of the Hudson River (USGS 1989). Juveniles migrate downstream, past the east connection site, when water temperatures drop below 68°F and overwinter in the Haverstraw-Tappan Zee region, far south of the east connection site (Sweka et al. 2007, Bain 1997). Sampling in the Hudson River showed that juvenile Atlantic sturgeon showed no preference for a specific bottom substrate in the Newburgh area (Sweka et al. 2007).

Atlantic sturgeon migrate from the ocean upriver to spawn above the salt front, between River Miles 40 and 78, from April or May to early July (Smith 1985, USGS 1989, NYSDEC 2011f, NMFS 2010, and Bain 1997). Although females leave the Hudson River soon after spawning, the males remain in the river until temperatures drop in the fall (USGS 1989). Spawning typically occurs in areas with currents between ~~46~~ 1.5 and ~~76~~ 2.5 ~~cm per second~~ feet per second and depths between 36 and 88 feet (NMFS 2010); these preferred spawning areas have much faster currents and deeper waters than are found near the east connection site. Embryos of Atlantic sturgeon have been observed in the Hudson River between River Miles 37 through 92 (Bain 1997). Larvae are demersal and migrate downstream to rearing grounds (NMFS 2010).

Based on data collected between 1985 and 1995, the Atlantic sturgeon spawning population within the Hudson River was estimated to contain approximately 870 spawning adults per year, which is likely an underestimate of current conditions due to Atlantic sturgeon fishery moratoriums in 1996 and 1998 (NMFS 2010).

Atlantic sturgeon feeding behavior is indiscriminant throughout all life stages (USGS 1989). Adult Atlantic sturgeon diets consist of benthic organisms (including worms, mollusks, gastropods, amphipods, and isopods), plants, and small fish (Bain 1997, NYSDEC 2011f, NMFS 2010). Juveniles consume aquatic insects and other invertebrates (NMFS 2010).

*American Eel*

As discussed previously for the Roseton stream study site, American eel which has been proposed for federal listing as threatened (http://www.gpo.gov/fdsys/pkg/FR-2011-09-29/pdf/2011-25084.pdf). Peak immigration of elvers (young eel) into the Hudson estuary occurs from mid-March through April (Mattes 1989 in Waldman 2006). Individuals have been observed in great numbers within tributary mouths of Hudson River (Schmidt and Lake 2006).

*New England Cottontail*

The New England cottontail is a species of Special Concern in New York State and a candidate for federal protection under the Endangered Species Act. The range of this species has contracted 80 percent since the 1960s, with only a few remnant populations persisting in New England and New York (Litvaitis and Litvaitis 1996). The current distribution of the New England cottontail in New York is limited to areas east of the Hudson River in Columbia, Dutchess, Putnam, and Westchester Counties (Litvaitis et al. 2006, Tash and Litvaitis 2007). Most individuals occur in the eastern sections of these counties, with the exception of Putnam County where there are a number of confirmed locations in both the eastern and western sides of the county (Novak 2011). New England cottontail is known to use isolated habitat fragments among developed areas, such as highway margins and utility rights of way (Litvaitis et al. 2006, 2008).

The decline of the New England cottontail has been primarily attributed to reductions in habitat availability and connectivity, and increased predation of individuals using suboptimal habitats (Villafuerte et al. 1997, Litvaitis et al. 2008). This species prefers thickets provided by regenerating forests, native shrublands, and old fields. Much of the landscape in the Northeast has changed dramatically in recent decades as idle agricultural lands and young forests that once provided New England cottontail habitat have transitioned into mature forest (Fuller and DeStefano 2003). Urban and suburban development and concomitant expansions of road networks have also greatly reduced and fragmented New England cottontail habitat (Litvaitis et al. 2008). The closely related eastern cottontail, which was introduced to the Northeast, is more of a habitat generalist than the New England cottontail and is able to better exploit this modified landscape; the eastern cottontail has thus proliferated while the New England cottontail has rapidly declined. Interference competition from eastern cottontails has been implicated as a contributor to declines of this species (Litvaitis et al. 2008), but evidence of behavioral dominance of eastern cottontails over New England cottontail is lacking (Probert and Litvaitis 1996). Instead, superior predator avoidance by eastern cottontails may explain their ability to utilize risky habitats with little cover, such as lawns, mowed fields, and mature forests more successfully than New England cottontail (Smith and Litvaitis 1999, 2000).

*Bog Turtle*

The bog turtle is listed by the USFWS as occurring in Dutchess County, but it was not documented by the NYDEC Herp Atlas Project in any survey blocks near the east connection site. The east connection site lacks any appropriate habitat for bog turtles, and individuals of this species would not be expected to occur on the site.

*Indiana Bat*

There is a known Indiana bat maternity colony approximately 1 mile south of the east connection site (NYNHP personal communication). Bats from this nearby colony possibly forage in the east connection site or travel along its woodland edges to other foraging areas (Murray and Kurta 2004, Brack and Whitaker 2006), but most studies have found that Indiana bats typically forage less than 1 mile away from their maternity roosts (Humphry et al. 1977, LaVal 1977, Gardner et al. 1991).

Further, forested wetlands, streams, lakes, and ponds are among the favored foraging habitats of Indiana bats (Humphrey et al. 1977, Menzel et al. 2001, Murray and Kurta 2004), all of which are absent on the east connection site with the exception of the portion of the site that is near the Hudson River. Maternity colonies are typically established in areas with abundant natural or artificial freshwater sources (Carter et al. 2002, Kurta et al. 2002, Watrous et al. 2006, USFWS 2007) and standing dead trees in which to roost (Menzel et al. 2001, Kitchell 2008). Indiana bats do not hibernate in or near the east connection site, or anywhere in Dutchess County (NYSDEC 2011d).

Out of the nearly 550 total trees on the east connection site, surveys for potential Indiana bat summer roosting trees identified approximately 151 trees representing nine tree species and several dead trees as meeting the general morphological characteristics of appropriate summer roosting habitat as outlined in the USFWS guidance documents (see representative photographs in Figures 2.8-21g through 21o). The majority of the potential habitat trees identified are black locust, shagbark hickory, and dead trees (snags) with peeling bark and/or crevices (see **Table 2.8-8**). Some of these trees appear to provide good habitat (peeling and sloughing bark and crevices or cracks) for Indiana bats to roost. Others, like the black cherry and hophornbeam, would be limited in their ability to provide good roost habitat. The number of dead trees with exfoliating bark is generally similar for the eastern and western forested areas. The potential Indiana bat summer roosting habitat trees observed in the eastern and western forested areas are described in detail below.

**Table 2.8-8**
**Potential Indiana Bat Summer Roosting Habitat Trees Observed on East Connection Site**

| Species | Number of Individuals |
|---|---|
| Black locust (*Robinia pseudoacacia*) | 111 |
| Black cherry (*Prunus serotina*) | 2 |
| Dead/unknown | 9 |
| Hophornbeam (*Ostrya virginiana*) | 8 |
| Red maple (*Acer rubrum*) | 2 |
| Sweet cherry (*Prunus avium*) | 1 |
| Shagbark hickory (*Carya ovata*) | 8 |
| White oak (*Quercus alba*) | 5 |
| Sugar maple (*Acer saccharum*) | 5 |
| Pignut hickory (*Carya glabra*) | 1 |
| **TOTAL** | **152** |

During the potential Indiana bat summer roosting habitat surveys conducted for the east connection site, trees displaying broadly defined characteristics that have the potential to support the Indiana bat (i.e., including shagbark hickory and dead trees with peeling bark) were also observed outside the east connection site to the north and east.

***New York State Listed Species***

*Bald Eagle*

As discussed for the west connection site, bald eagles overwinter along the lower Hudson River where they can be commonly found sitting on ice flows amidst areas with open water. Several non-breeding bald eagles were seen in the river from the east connection site during winter and autumn field surveys, but no eagles were observed during surveys conducted at other times of year. The breeding pair of eagles closest to the east connection site nested in 2010-2011 approximately 2 miles north, in Bowdoin Park. A currently inactive nest that has been used by eagles in the recent past is located approximately 1 mile upriver from the east connection site.

*Peregrine Falcon*

As discussed above, peregrine falcons traditionally nest on cliff ledges, but they will also commonly nest on bridges, buildings, and other tall artificial structures, often in cities. Peregrine falcons generally prefer open landscapes, particularly for foraging, and occupy similar areas during the breeding and non-breeding periods (White et al. 2002). During the 2000-2005 New York State Breeding Bird Atlas, the peregrine falcon was documented breeding in the atlas block in which the east connection site is located (Block 5860C), but the exact location within the block is unknown. Peregrine falcons are not expected to breed at the east connection site because it lacks appropriate natural or artificial nesting structures. The existing buildings on site are likely too short to represent attractive nesting sites for peregrine falcons. No peregrine falcons were observed breeding at the site during field surveys. One peregrine falcon was observed from the east connection site during winter, on an ice floe in the Hudson River.

*Sharp-shinned Hawk*

Sharp-shinned hawk was documented during the 2000-2005 NYS Breeding Bird Atlas in the block encompassing the east connection site. The east connection site and its immediate surroundings do not represent appropriate breeding habitat for sharp-shinned hawks, which typically nest in large, dense stands of deciduous, coniferous, or mixed forests, and pine plantations (Bildstein and Meyer 2000). Sharp-shinned hawks were not observed at the east connection site during any summer field surveys.

Sharp-shinned hawks are most common in the lower Hudson Valley during the spring and autumn migration periods (DeOrsey and Butler 2006, Bochnick 2011), and although the east connection site does not contain appropriate breeding habitat, it may represent a suitable stopover site for hawks migrating through the area. The site may also represent suitable overwintering habitat, as sharp-shinned hawks are more generalist during winter and will utilize a variety of habitat types. Sharp-shinned hawk was documented during the Dutchess County Christmas Bird Count, but it was not observed within the east connection site during any of the four winter field surveys.

*Cooper's Hawk*

Cooper's hawk was documented in the atlas block encompassing the east connection site during the 2000-2005 Breeding Bird Atlas and documented during the 2010 Christmas Bird Count in

Dutchess County. A Cooper's hawk was observed flying past the east connection site during the July 20, 2010, field survey, but no individuals were ever observed within the site. The east connection site does not contain any deep interior forest that is favored for nesting by Cooper's hawks, and their occurrence on the east connection site during the breeding season is considered unlikely. Cooper's hawks are more likely to occur in the site during migration and winter when they are less selective and use smaller habitats than those in which they typically nest. However, no Cooper's hawks were observed during visits to the site during the migration or wintering periods.

*Red-shouldered Hawk*
Red-shouldered hawk was not documented in the Breeding Bird Atlas block in which the east connection site is located, nor was it observed during summer field surveys. The species was documented during the 2010 Christmas Bird Count in Dutchess County. Red-shouldered hawks are known to use fragmented forests during winter (Dykstra et al. 2008), and, therefore, they are considered to have the potential to occur at the east connection site during winter. However, no red-shouldered hawks were observed during any of the four winter field surveys at the site.

*Northern Harrier*
Northern harriers were recorded wintering in Dutchess County during the 2010 Christmas Bird Count, but the forest, manicured lawn, and impervious surfaces that cover the majority of the east connection site do not offer appropriate wintering habitat for harriers. No harriers were observed at the east connection site during winter field surveys.

*Horned Lark*
Horned lark was not documented near the east connection site during the 2000-2005 Breeding Bird Atlas, but it was documented during the 2010 Christmas Bird Count in Dutchess County. Habitat for horned larks can include mowed areas such as airstrips (Beason 1995); the 9-acre lawn on the east connection site would be considered a mowed area. However, its relative abundance in New York State has been declining since 1966 (Smith 2008). As a grassland obligate species during both breeding and non-breeding seasons, the forest and grass area of the east connection site does have the potential for use as wintering location for horned larks. No horned larks were observed during winter field surveys.

*Eastern Box Turtle*
The eastern box turtle has been identified within the vicinity of the east connection site, as recorded in the 2000 NYSDEC Reptile and Amphibian Atlas Project. Although no eastern box turtles were observed during the natural resource surveys, the east connection site provides suitable habitat for this species.

*Basil Balm*
Basil balm (*Monarda clinopodia*) is a state-listed endangered herbaceous plant of moist woods, thickets, ravines, and banks (Clemants and Gracie 2006). In New England, basil balm has escaped from cultivation (Newcomb 1977). In New York State, this plant mostly occurs in

western counties, but it is also documented in Westchester and Ulster Counties (USDA 2011). Within the east connection site, the plant was observed in an open cleared area along the northern fence line approximately midway between the New York Power Authority property and the Hudson River.

### 2.8-4.2 FUTURE WITHOUT PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION—EAST OF HUDSON

In the future without the Project 1, the geology and soils, groundwater, floodplain, and terrestrial and aquatic resources would be expected to remain as described above under existing conditions, with the exception of those changes in habitat that result from natural succession. As discussed below, minimal changes would be expected to occur to ecological communities and wildlife by the 2020 analysis year.

#### *TERRESTRIAL RESOURCES*

##### *Ecological Communities*

The ecological communities within the east connection site are expected to remain intact, although succession is expected. The species observed in the subcanopy, shrub, and herbaceous layers of the early mature forest would be expected to continue to grow into later stage mature forest.

##### *Wildlife*

The quality and quantity of habitat present at the east connection site for wildlife is expected to remain unchanged in the future without Project 1, and, as such, terrestrial wildlife communities at the site are expected to be much the same as they are today. The maturation of wooded areas on the site is unlikely to change the wildlife species they support. Forest size, which will not change in the future without Project 1, is likely the greatest factor limiting the wildlife species present. Maintenance of the grass areas is expected to continue, and these areas would continue to be of little value to native wildlife.

#### *THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES*

As discussed above, the size, condition, and types of habitats present at the east connection site would not change in the future without Project 1. The aquatic resources of the Hudson River would remain unchanged. The suitability of the site to regionally occurring threatened, endangered, and special concern species is expected to remain the same. Specifically, the east connection site would continue to lack appropriate habitat for bog turtles, Indiana bat maternity colonies, northern harriers, horned larks, and nesting sharp-shinned, Cooper’s, and red-shouldered hawks. Bald eagles nesting or wintering along the Hudson River would continue to be unaffected by habitat conditions at the east connection site. New England cottontail, foraging Indiana bats, non-breeding peregrine falcons, and non-breeding sharp-shinned, Cooper’s, and red-shouldered hawks would still have the potential to occur at the site.

In the future without the construction of Project 1, the basil balm population(s) would be expected to remain intact.

### 2.8-4.3 PROBABLE IMPACTS OF PROJECT 1, SHAFT AND BYPASS TUNNEL CONSTRUCTION—EAST OF HUDSON

#### *GEOLOGY AND SOILS*

As described in Chapter 1, "Program Description," and in Section 2.1, "Description of the Project 1 Construction Program," site preparation activities at the east connection site would result in clearing and grading of approximately 3 of the 20.1 acres that comprise the site. The current grading plan anticipates that about 81,000 cubic yards of cut and about 6,000 cubic yards of fill would be required, resulting in the displacement of soils, and overburden (till) within the area of disturbance for the grading. It is unlikely that the cut and fill volumes can be balanced, and approximately 75,000 cubic yards of cut material would need to be disposed off-site.

Additional soil, overburden, and bedrock would be removed from the site during shaft and connector tunnel construction. During shaft and connector tunnel construction, rock would be excavated using controlled drilling and blasting. The rock loosened during blasting would be removed through the shaft, stockpiled, and trucked off-site.

The bedrock underlying the east connection site, the Mount Merino and Indian River Shale formations, are not unique to this area of New York. Therefore, the removal of bedrock and trucking the material off-site within the shaft and connector tunnel would not result in significant adverse impacts to soil or geologic resources of the region.

#### *GROUNDWATER*

During construction of the shaft and connector tunnel, the excavated areas would be grouted to reduce groundwater infiltration. Any groundwater that is recovered during dewatering of the shaft or connector tunnel would be treated in accordance with NYSDEC SPDES requirements before being released to the Hudson River through the existing DEP outfall on the east connection site. A SPDES NY-2C permit application for industrial facilities was submitted to NYSDEC in February 2012 for the proposed dewatering facilities at the east connection site. During shaft construction, it is anticipated that no more than 694 gpm (1 mgd) of groundwater would be recovered, treated by an on-site treatment system, and discharged to the Hudson River. Removal of groundwater recovered during dewatering would be done at the rate required to permit shaft and connector tunnel construction, would be controlled through grouting, and would not be expected to adversely affect groundwater quality or supply within the vicinity of the east connection site.

Any temporary increases in cloudiness or turbidity in wells within the vicinity of the east connection site attributed to blasting would be temporary and would not be expected to adversely affect use of groundwater from these wells.

As discussed in Section 2.9, "Hazardous Materials," the construction of Project 1 would require the storage and use of a variety of petroleum and other chemical products (e.g., diesel fuel for back-up power, lubricating oil for construction vehicles, and miscellaneous cleaning and maintenance chemicals). The use and storage of these would be in accordance with applicable regulatory requirements including those relating to federal SPCC requirements and state petroleum bulk storage, chemical bulk storage (CBS), and spill requirements. With implementation of these measures potential impacts to groundwater resources would be minimized.

***FLOODPLAINS***

As shown in Figure 2.8-18, no portion of the east connection site is within the 100-year floodplain, and only a small portion of the site is below the 500-year flood elevation. Therefore, the construction of Project 1 at the east connection site would not adversely affect the floodplain or affect flooding of adjacent areas.

***WETLANDS***

There are no NWI or NYSDEC freshwater wetlands mapped on the east connection site, and no wetlands were identified during site reconnaissance. Therefore, the construction of Project 1 on the east connection site would not adversely affect wetland resources.

***AQUATIC RESOURCES***

The only aquatic resource in the vicinity of the east connection site is the Hudson River. Implementation of erosion and sediment control measures (e.g., silt fences and straw bale dikes), and stormwater management measures, as part of the SWPPP developed in accordance with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001), would minimize potential impacts to the water quality of the Hudson River associated with stormwater runoff during land-disturbing activities that would occur during site preparation activities on the east connection site. During shaft and connector tunnel construction, stormwater best management practices (BMPs) implemented as part of the SWPPP would regulate the quality and rate at which stormwater is discharged to the Hudson River from the area of disturbance for the construction of Project 1 on the east connection site. Subsequent to the issuance of the DEIS, DEP developed and submitted to NYSDEC and the Town of Wappinger a draft SWPPP with erosion and sediment controls, stormwater management measures, and vegetative stabilization measures.

The discharge of up to 694 gpm (1 mgd) of treated groundwater recovered during the construction of the shaft and connector tunnel to the Hudson River through the existing DEP outfall would not be expected to result in significant adverse impacts to the Hudson River. Groundwater recovered during shaft and connector tunnel construction would be sent to the on-site treatment system at the east connection site to remove suspended solids and any other contaminants in accordance with the NYSDEC SPDES permitting requirements for Project 1. A

SPDES NY-2C permit application for industrial facilities was submitted to NYSDEC in February 2012 for the proposed dewatering facilities at the east connection site. The discharge to the Hudson River would comprise an extremely small component of the flow within this segment of the Hudson River and would not have the potential to adversely affect water quality.

With the implementation of measures specified by the NYSDEC SPDES requirements, the discharge of stormwater and recovered groundwater would not result in water quality conditions within the Hudson River that fail to meet the Class A standards and would not result in significant adverse impacts to aquatic resources of the Hudson River, the fish species for which this portion of the river has been designated EFH, or the nearby Significant Coastal Fish and Wildlife Habitats.

### *TERRESTRIAL RESOURCES*

#### *Ecological Communities*

Activities associated with Project 1 construction on the east connection site would include clearing and grading, some of which would occur in wooded areas and may also include emplacement of retaining walls along the eastern property line. Modifications may be made to site entrances and additional parking area(s). Shaft and connector tunnel construction on the east connection site would require blasting activities and removal of blasted and other excavated material from the site.

As indicated in Figure 2.8-20, approximately 3 acres of the 20.1-acre east connection site would be disturbed as a result of the site preparation activities, comprising approximately 1 acre of the 9 acres of maintained lawn, 1 acre of the approximately 4 acres of Appalachian oak-hickory forest (only the northeastern forest would be disturbed as a result of site preparation activities, resulting in the loss of 83 trees with a dbh of 6 inches or greater), an individual tree located outside the forested areas, about 0.5 acre of the approximately 5 acres of paved/impervious surface, and all of the currently graded soil with stockpiles (approximately 1 acre).

The maintained lawn and disturbed/paved areas would not result in adverse impacts to vegetative resources. Although the loss of 1 acre of Appalachian oak-hickory forest within the northeastern forest of the east connection site would adversely affect forest resources on the site, these communities are common throughout the lower Hudson Valley, and the loss of 1 acre would not result in significant adverse impacts to vegetative resources within this region of New York. Additionally, no clearing would occur in the northwestern forest on the site. Opportunities for replanting native trees indigenous to this region of New York would be explored in developing the site restoration plans, discussed below.

At the conclusion of Project 2B, Shaft 6B would be capped with a concrete cover and soil. The construction offices, storage trailers, and equipment would be removed. Both the lower parking area and the upper parking area would be removed and areas, including the inundation plug area, regraded and replanted. The main site driveway would be retained and would continue to provide access to the Hudson River Pump Station at the lower portion of the site and the Shaft 6 superstructure on the upper portion of the site. The internal driveway providing access to the Shaft 6B area would be retained to allow for any future access to the shaft should it be necessary. A tree replanting program would be completed for portions of the site, other areas would be planted as steep meadow, and certain areas would be maintained as lawn area to allow for future access. Proposed tree species include red maple and shagbark hickory.

***Wildlife***

Approximately 3 acres of the 20.1 acres of the east connection site would require clearing, followed by grading. Blasting would occur during the shaft and connector tunnel construction. Clearing and grading would result in the loss of habitats of limited value to wildlife (i.e., 1 acre of maintained lawn, 0.5 acre of paved/impervious surface, and about 1 acre of graded soil with stockpiles). The only habitat that would be lost as a result of site preparation activities of any value to wildlife is the approximately 1acre of Appalachian oak-hickory forest that would be lost from the northeast forest. The potential impacts of the project therefore pertain most to the species occurring in these areas.

The birds observed and presumed to be nesting in the northeast and northwest forests during summer field surveys include blue jay, black-capped chickadee, cedar waxwing, American redstart, tufted titmouse, eastern wood peewee, hairy woodpecker, red-bellied woodpecker, white-breasted nuthatch, and wood thrush. Birds observed along the forest edges or in the open areas between the two woodlots during the breeding season were the common grackle, eastern kingbird, eastern phoebe, barn swallow, American robin, American goldfinch, gray catbird, Baltimore oriole, house finch, northern cardinal, yellow warbler, chipping sparrow, song sparrow, and brown-headed cowbird. Because site clearing would occur during the October 1 to March 31 time frame, it is unlikely that site preparation activities would disturb birds in the process of nesting. Instead, the construction of Project 1 on the east connection site would require that individuals find nesting habitat elsewhere the first breeding season following the start of site preparation activities. The loss of nesting habitat within the east connection site would not result in significant adverse impacts to populations of bird species expected to nest on the site. Additionally, the majority of shrubland bird species observed during the breeding season in the transmission line corridor adjoining the site are migratory and would not be present during the October 1 to March 31 construction activities.

Birds that winter within the habitats that would be lost due to site preparation activities on the east connection site are common disturbance-tolerant species whose populations would not experience any impact as a result of the loss of this habitat. These include American crow, American robin, black-capped chickadee, blue jay, brown-headed cowbird, Carolina wren, dark-eyed junco, downy woodpecker, European starling, northern cardinal, northern flicker, northern mockingbird, red-bellied woodpecker, red-tailed hawk, tufted titmouse, white-breasted nuthatch, and white-throated sparrow. Each is a generalist species for which habitat is abundant in the urban and suburban areas of the lower Hudson Valley, and for which some habitat would remain on the east connection site. Waterfowl and other birds occurring in the Hudson River near the east connection site during winter would possibly avoid the area during site preparation and construction. However, birds would only be expected to avoid the area during times of extremely loud activities, such as blasting, which would be of very short duration. Species observed in this section of the Hudson during field surveys include American black duck, common merganser, hooded merganser, mallard, bald eagle, peregrine falcon, ring-billed gull, and greater black-backed gull.

The wooded areas at the east connection site support limited breeding and wintering bird communities, but may offer stopover habitat for a wide variety of migratory land birds. However, suitable stopover habitat for forest birds is locally abundant, and loss of a portion of the northeastern forest on the east connection site would have no influence on their migration through the area.

As discussed above, the east connection site has limited habitat for reptile or amphibian species. Clearing and grading activities within the 1 acre of Appalachian oak-hickory forest would have the potential to adversely impact individual reptile or amphibians using this habitat that are unable to move to available habitat nearby. However, the loss of these individuals would not be expected to result in significant adverse impacts to regional populations of species with the potential to occur on the site. Red-backed salamander was the only reptile or amphibian documented during field surveys. Species considered to have the potential to occur within the disturbance area include American toad, northern brown snake, black racer, black rat snake, and eastern box turtle. Many of these species commonly use early successional habitats and may disperse from the area of disturbance to adjacent habitats, such as the adjoining transmission line right-of-way and the northwestern forest on the east connection site.

Mammals known or expected to occur at the east connection site are primarily disturbance-tolerant, generalist species common to developed areas with high levels of human activity. Clearing a portion of the east connection site would not eliminate any significant habitat for these species, nor would it result in significant adverse impacts to regional populations of these species. The loss of this limited habitat would have the potential to adversely affect some individual birds and other wildlife currently using the wildlife habitat within the area of disturbance should these individuals be unable to find suitable available habitats nearby. However, the wildlife species observed and with the potential to occur within this area are common to the lower Hudson Valley, and the loss of some individuals would not result in a significant adverse impact on regional populations of these species. Bats with the potential to occur in or near the site (see “Existing Conditions,” above) are either migratory (and would not be in the area during the October 1 to March 31 construction period) or hibernate in caves or mines, which are not present on or in the vicinity of the east connection site.

During shaft and connector tunnel construction, increased human presence and visual and auditory disturbance due to movement of construction equipment, blasting, and other activities associated with this construction phase would have the potential to result in some avoidance of the habitats adjacent to the disturbed portion of the east connection site during the approximately

1.5 years required to complete these activities. As discussed for the west connection site, initial physiological and behavioral responses of birds and other wildlife to novel sources of loud noise, such as those that would be generated by blasting activities, often include increased acute stress levels, increased heart rates, and fleeing from the area. However, animals often habituate to and tolerate loud noises after initial exposure (Bowles 1995). The bird and wildlife species expected to occur on the site are common inhabitants of urban areas. Individuals of these species would be expected to flush from the site in response to the beginning stage of blasting, and then habituate to the disturbance and return. Additionally, as wildlife in the area become habituated to blasting noise, blasting would also gradually take place farther and farther under ground, reducing ground-level noises as the project advances. Individuals intolerant of the introduced disturbances would relocate. Suitable habitat for these generalists is ample in the surrounding landscape.

There would be certain times during Project 1 construction when nighttime work would be required at the east connection site to maintain the project schedule. During these times, DEP would install lighting to maintain the safety and security of the site. All lighting would comply with local codes and follow the Illuminating Engineering Society Handbook and the American National Practice for Roadway Lighting (RP-8). DEP would attempt to minimize the spill of light outside of the areas of active construction.

The area surrounding the east connection site is primarily residential and does not have extensive sources of nighttime lighting. The road on which the site is located (River Road) lacks street lights, and traffic is limited. However, buildings, parking areas, and access roads at the east connection site are well illuminated at night and represent the greatest source of existing artificial lighting in the area. The additional lighting used during Project 1 construction would be a negligible increase above current levels of artificial light. Additionally, the majority of species occurring in the habitats around the east connection site are generalists that have adapted to living in human-dominated environments. These species are unlikely to experience any negative effects from artificial lighting of the construction site. The most likely biological consequence of additional lighting is an increased attraction of insects to the area and subsequent exploitation of this food source by bats and birds.

### *THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES*

#### *Federally Listed Species*

*Shortnose and Atlantic Sturgeon, and American Eel*

Construction of Project 1 would not require in-water construction at the east connection site within the east of Hudson study area, but may include construction of an outfall for the dewatering pipeline within the Roseton stream study site in the west of Hudson study area. As discussed under Aquatic Resources under section 2.8-3.3 above, measures would be taken during construction of the outfall and during discharge of groundwater to protect the water quality and aquatic biota of the Hudson River. Additionally, the coffer dam ~~and turbidity curtain~~ used during construction would minimize the potential for adverse impacts to aquatic resources. On the basis of the habitat conditions observed within the tidal portion of the stream within the Roseton stream study site and the results of the benthic macroinvertebrate and fish sampling, the tidal portion of the stream where the outfall would be located would not be considered suitable habitat for Atlantic or shortnose sturgeon from the Hudson River. Therefore, construction of the outfall would not have the potential to adversely affect either of these species within the Hudson River. ~~shortnose or Atlantic sturgeon that may be foraging within the vicinity of the outfall location to be adversely affected during its construction.~~ Additionally, the discharge would comprise an extremely small component of the flow within this segment of the Hudson River and would not have the potential to adversely affect water quality or aquatic biota, or the potential use of the shoreline area in the vicinity of the stream confluence with the Hudson River ~~outfall~~ for foraging by sturgeon or American eel, or as potential spawning habitat by Atlantic sturgeon.

For the east connection site, the discharge of stormwater and treated groundwater recovered during dewatering would be in accordance with the NYSDEC SPDES requirements and would not result in water quality conditions within the Hudson River that fail to meet the Class A standards, or result in significant adverse impacts to aquatic resources of the Hudson River, including the shortnose and Atlantic sturgeon, and American eel. Subsequent to the issuance of the DEIS, DEP developed and submitted to NYSDEC and the Town of Wappinger a draft SWPPP with erosion and sediment controls, stormwater management measures, and vegetative stabilization measures. Additionally, a SPDES NY-2C permit application for industrial facilities was submitted to NYSDEC in January 2012 for the proposed dewatering facilities at the east connection site.

*New England Cottontail*

Because the New England cottontail is not visually distinguishable from the eastern cottontail, it could not be determined from field surveys whether individuals of this species were present on the east connection site. However, New England cottontail habitat includes shrubland, thicket, and similar dense, early successional habitats, which are not present on the east connection site. Therefore, New England cottontail would not be expected to occur on the site, and construction of Project 1 would not have the potential to result in significant adverse impacts to this species. New England cottontail are known to use transmission line corridors containing scrub-shrub habitat (Litvaitis et al. 2006, 2008) and, therefore, would have the potential to occur in the vicinity of the east connection site within the transmission line right-of-way.

Human activity and noise associated with the construction of Project 1 on the east connection site would have the potential to adversely affect individuals that may be using the habitats within the transmission line right-of-way near the site, but would not result in significant adverse impacts to populations of this species. Although New England cottontails will use isolated habitat fragments amongst developed areas, such as utility rights-of-way, these habitat patches usually only support a few individuals and provide meager foraging conditions (Barbour and Litvaitis 1993, Weidman and Litvaitis 2011). Therefore, few individuals would be expected to occur near the east connection site. New England cottontails in small patches have been found to be in poor physical condition, nutritionally stressed by lack of food, and at high risk for predation, resulting in severely reduced survival rates relative to individuals occupying larger, more suitable habitats (Barbour and Litvaitis 1993, Villafuerte et al. 1997). While patches over 40 acres in size are believed to be necessary to support viable New England cottontail populations (Litvaitis and Villafuerte 1996), small patches may, however, hold some value as corridors or stepping stones that facilitate movements of individuals to larger tracts of more suitable habitat (Litvaitis et al. 2008).

*Bog Turtle*
Because the east connection site does not contain suitable habitat for the bog turtle, construction of Project 1 at this site would not adversely impact this species.

*Indiana Bat*
During the clearing, grading, and blasting activities for Project 1 scheduled for October 1 to March 31, Indiana bats would be in hibernation. Because there are no known hibernacula near the site or anywhere in Dutchess County, potential impacts of the construction of Project 1 on the east connection site are limited to those that would result from loss of potential Indiana bat roosting habitat within the area of disturbance, and potential impacts to the use of potential roosting habitat on and adjacent to the east connection site that are outside the area of disturbance.

The east connection site has few dead and decayed trees exposed to direct sunlight that Indiana bats prefer for roosting (Callahan et al. 1997, Menzel et al. 2001, Kitchell 2008), and lacks forested wetlands, streams, lakes, and ponds that are favored foraging habitats (Humphrey et al. 1977, Menzel et al. 2001, Murray and Kurta 2004). The site is therefore considered suboptimal roosting and foraging habitat for Indiana bats. Nevertheless, roosting and foraging habitats of Indiana bats can be highly variable (Menzel et al. 2001), and their occurrence at the site is possible. There is a known Indiana bat maternity colony approximately 1 mile south of the site, and bats from this colony possibly forage in the east connection site or travel along its woodland edges to other foraging areas (Murray and Kurta 2004, Brack and Whitaker 2006). However, most studies have found that Indiana bats typically forage less than 1 mile away from their maternity roosts (Humphry et al. 1977, LaVal 1977, Gardner et al. 1991), and, thus, the use of the east connection site for foraging by bats from this maternity colony may be less likely than use of other sites closer to the known maternity colony.

As discussed under "Existing Conditions," approximately 152 potential Indiana bat summer roosting habitat trees were identified on the east connection site. Only 14 of these trees would be removed as a result of site preparation activities. Given that the site lacks favorable foraging and roosting habitat, the loss of these trees is not expected to have any significant impacts on local Indiana bat populations.

Noise and increased human activity associated with shaft and connector tunnel construction activities outside the hibernation season would not result in significant adverse impacts to

Indiana bat populations. Because the noise levels and human activity would have already been established on the east connection site prior to the emergence of bats from hibernation, individuals using the portion of the east connection site or adjacent areas for summer roosting habitat or foraging would be those individuals that find the level of human activity on the east connection site during construction of Project 1 acceptable.

### *New York State Listed Species*

*Bald Eagle*

Bald eagles are sensitive to a variety of disturbances throughout their annual cycle. Sounds generated by human activities usually fall well within the hearing range of birds (1 to 4 kHz; Bowles 1995, Delaney and Grubb 2004), and eagles and other birds are also highly perceptive of vibrations created by low-frequency sounds outside of their hearing range (Shen 1983, Bowles 1995).

The National Bald Eagle Management Guidelines (USFWS 2007) outline the relative sensitivity of eagles during different stages of the nesting season. Eagles are believed to be most sensitive during courtship and nest-building which take place in New York between December and March. Eagles disturbed during this phase are apt to abandon the area. Once they are on a nest, eagles become less likely to flush in response to a disturbance (Grubb and King 1991, Grubb et al. 1992), but disturbance sensitivity nevertheless remains elevated during egg-laying, incubation, and the first few weeks of chick rearing (collectively, Feb-May in NY; USFWS 2007). Adults can be easily disturbed while foraging away from the nest (Grubb and King 1991, Grubb et al. 1992). Disturbances to foraging eagles during the nesting season could reduce the rate at which the adults deliver food to nestlings, slowing down nestling development. Disturbances to foraging eagles could also prolong their time spent away from the nest, which leaves nestlings more vulnerable to cold or heat stress and predation (Steidl and Anthony 2000, USFWS 2007). Late in the breeding season (mid-May through August in New York), eaglets become prone to premature fledging from the nest if disturbed (USFWS 2007).

Bald eagles are easily disturbed by human activities outside of the breeding season as well (Stalmaster and Newman 1978, Stalmaster and Kaiser 1997). Repeatedly flying away from disturbing human activities during winter can be energetically costly and may take away time that would otherwise be spent foraging (Stalmaster and Gessaman 1984).

Federal guidelines for minimizing such disturbances to bald eagles throughout the year call for buffer areas of 330 ft to 0.5 mi (2,640 feet), depending on the type of activity. These buffer distances are consistent with, and well supported by, the findings of numerous published studies on bald eagle behavior. For example, McGarigal et al. (1991) found that bald eagles in Oregon and Washington were reactive to people and boats up to 1,312 feet away from their nest. Grubb et al. (1992) found that negative responses of eagles to boats, vehicles, and pedestrians faded beyond a distance of 1,640 feet in Michigan. Similarly, Grubb et al. (2002) found eagles nesting in Minnesota reacted to boats once they were within 2,625 feet. Construction of a large industrial facility in Washington located 1,509 feet from bald eagle roosting locations had no effect on their presence at the roosts or flush response (Becker 2002). Wintering bald eagles that were more than 3,280 feet away from a military base were infrequently flushed by loud explosions and helicopters compared to eagles that were closer to the base (Stalmaster and Kaiser 1997). People camping within 328 feet of bald eagle nests in Alaska caused significant, adverse changes to parental behaviors, whereas people camping 1,640 feet from nests did not (Steidl and Anthony 2000).

On the basis of these and other studies, it appears that properly distancing human activities from bald eagle nesting and foraging areas can effectively minimize disturbance to individuals. Buffer sizes at the lower end of the range (330 feet) recommended by USFWS (2007) apply to small-scale activities, such as tree-felling, landscaping, off-road vehicle and watercraft use, and small building construction, whereas buffer sizes at the upper end of the range (2,640 feet) apply to relatively loud sources of noise, such as helicopters and fixed-wing aircraft, and rock blasting and similar explosions.

The closest active nest to the east connection site is approximately 2 miles north, and a previously used nest is approximately 1 mile north of the site. The October 1 to March 31 construction period for Project 1 coincides with the time of year when eagles associated with either of these nests would be in their courtship and nest-building phase (USFWS 2007). Given that the distance from the east connection site to these nearest known nests is two to four times the maximum buffer size of 0.5 miles recommended by the USFWS, the clearing, grading, and activities associated with the construction of the shaft and connector tunnel would not adversely affect potential nesting activity at these two nesting locations.

In addition, there would be a limited potential for nests to be established at a location on or near the east connection site where nesting success would be adversely affected by construction activities related to Project 1. As construction progresses, DEP would continue to coordinate with the NYSDEC and the USFWS with respect to bald eagle activity in the vicinity of the east connection site and compliance with the Bald Eagle Management Guidelines. DEP would coordinate with the USFWS and NYSDEC with respect to bald eagle nesting activity near the site prior to the start of blasting.

During autumn and winter visits to the east connection site, bald eagles were observed on ice floes in the Hudson River. Non-breeding bald eagles seldom forage close to Hudson River shorelines and instead primarily take fish from open water (Thompson et al. 2005). Eagles foraging in this section of the river would be expected to be no less than 1,000 feet from the eastern limit of disturbance at the east connection site. Clearing and grading at the site is unlikely to disturb eagles foraging at this distance, as it is more than double the buffer size recommended by USFWS for activities of this scale. However, this distance is less than half the buffer size recommended for loud explosions. Therefore, rock blasting at the site could potentially displace eagles from foraging within open water areas near ~~in~~ the ~~eastern half of the section of river along~~ the east connection site. However, as the depth of the shaft construction activity increases, the noise associated with blasting would decrease, and any displacement of eagles from this area would be expected to be temporary and unlikely to have significant adverse impacts on their foraging success. Additionally, the majority of the western half of the river in front of the east connection site is beyond the buffer distance recommended for loud explosions (2,460 feet), and expected to remain an undisturbed foraging area for eagles in this stretch of river during the short periods of blasting.

*Peregrine Falcon*
Peregrine falcons are not expected to breed at the east connection site because the site lacks appropriate natural or artificial nesting structures. Therefore the construction of Project 1 on the east connection site would not result in adverse impacts to breeding habitat for this species. Peregrine falcons prefer open landscapes for foraging during both the breeding and non-breeding periods (White et al. 2002). The open areas within the east connection site represent suitable hunting grounds for peregrine falcons, but loss of this area as a result of Project 1 would not result in significant adverse impacts on local foraging opportunities. Similarly, any temporary displacement of peregrine falcons from the site due to noise or other disturbances would not significantly limit foraging opportunities in the area. Other expanses of lawn and impervious surface abound in the surrounding landscape and would be accessible to any urban-adapted peregrine falcons that previously used the east connection site.

*Sharp-shinned Hawk*
As mentioned above, appropriate breeding habitat for sharp-shinned hawks is lacking in and near the east connection site. The site and its surroundings may offer adequate wintering and migration stopover habitat, but Project 1 would not significantly reduce habitat availability or quality for sharp-shinned hawks wintering in, or migrating through, the vicinity of the east connection site. Noises generated by clearing, grading, or blasting activities would likely displace any sharp-shinned hawks from the areas immediately surrounding the east connection site and require them to find wintering or stopover habitat elsewhere.

*Cooper’s Hawk*
Cooper’s hawks occasionally accept small woodlots and even city parks for nesting, but deep, interior forest is highly preferred. The east connection site is considered poor quality nesting habitat for Cooper’s hawks, and any disturbance at the site is unlikely to have any impact on their breeding populations. The site and surrounding area may offer adequate wintering and migration stopover habitat for Cooper’s hawks, but Project 1 would not significantly reduce habitat availability or quality for Cooper’s hawks wintering in, or migrating through, the vicinity of the east connection site. As with sharp-shinned hawks, noises generated by clearing, grading, or blasting activities would likely displace any Cooper’s hawks from the areas immediately surrounding the east connection site and require them to temporarily find wintering or stopover habitat elsewhere.

*Red-shouldered Hawk*
Red-shouldered hawk was not documented in the vicinity of the east connection site during the 2000-2005 Breeding Bird Atlas, but it is known to occur in the area during winter. Habitat

preferences of red-shouldered hawks during winter are somewhat generalistic, and they will occasionally utilize small forest fragments within agricultural and other altered landscapes. As such, red-shouldered hawk has the potential to occur in the woodlots at the east connection site during winter. However, loss of this habitat would be unlikely to have significant impacts on wintering red-shouldered hawks or red-shouldered hawk populations. Noises generated by clearing, grading, or blasting activities would likely displace any red-shouldered hawks from the wooded areas surrounding the east connection site and require them to temporarily find wintering habitat elsewhere.

*Northern Harrier*

The east connection site does not contain any suitable breeding or non-breeding habitat for northern harriers. No northern harriers or harrier habitat would be disturbed as a result of the construction of Project 1.

*Horned Lark*

The east connection site has the potential to provide suitable breeding or non-breeding habitat for horned larks. No horned larks or horned lark habitat would be disturbed as a result of the construction of Project 1.

*Eastern Box Turtle*

Eastern box turtles inhabiting the east connection site may be impacted due to direct mortality during construction activities; however, individuals would most likely relocate to undisturbed areas of the east connection site or other adjacent areas offering suitable habitat.

Clearing and grading activities on the east connection site would have the potential to result in the loss of any individuals unable to move from the area of disturbance. Individuals unable to relocate to suitable habitat nearby would also be lost. The loss of these individuals and the approximately 1 acre of Appalachian oak-hickory habitat would not result in significant adverse impacts to regional populations of the eastern box turtle. To minimize the loss of individuals, the area of disturbance would be traversed after the silt fencing and construction fencing have been installed, and any turtles found within this area would be relocated outside the fencing. Maintaining the silt fencing around the area of disturbance at the east connection site would further minimize the potential for loss of individuals once site preparation activities have been initiated.

*Basil Balm*

Prior to Project 1 construction, a survey would be conducted to determine the location(s) of the population of basil balm. If construction activities are expected to occur within the vicinity of the basil balm population(s), a protection/transplanting plan would be developed in consultation with NYNHP/NYSDEC. With the implementation of this plan the construction of Project 1 on the east connection site would not result in a significant adverse impact on basil balm.

## 2.8-5 CONCLUSIONS

### 2.8-5.1 WEST OF HUDSON

***WEST CONNECTION SITE***

Construction of Project 1 on the west connection site would not result in significant adverse impacts to geology and soils, groundwater, floodplains, or aquatic or terrestrial resources, including threatened or endangered species or species of special concern. Site preparation activities (i.e., land clearing and grading) would result in the loss of about 19 acres of wildlife habitat, most of which would comprise early successional forest, old field, and terrestrial cultural habitat associated with the two residences on the site. Loss of these habitats, which are common within the lower Hudson Valley, would not result in significant adverse impacts to these vegetative resources within this region of New York. The loss of these habitats would have the greatest impact on wildlife species that use successional habitats, particularly birds, and the vernal pool for breeding. However, none of the mammals, reptiles, and amphibians known or expected to occur at the west connection site are strictly dependent on old field or early successional forest habitats. The loss of those individuals unable to move to suitable available habitat nearby would be adverse but would not result in significant adverse impacts to regional populations of these species. Although the west connection site was determined to have a low potential for providing breeding habitat for the threatened or endangered bird species, should vegetation clearing occur between April 1 and September 30, the area to be cleared would be surveyed for potential nests of raptors and other threatened or endangered migratory bird nests. If nests of these species are identified, the NYSDEC and the USFWS would be contacted, as appropriate, and an application for incidental take permit submitted as directed by these agencies. Additionally, in order to minimize the potential for adverse impacts to breeding migratory bird species which are protected under the Migratory Bird Treaty Act (MBTA), additional tree clearing would occur prior to March 31 at the same time as the clearing of the potential Indiana bat summer roosting trees, in three areas within the area of disturbance. During breeding surveys conducted at the west connection site, these three areas appeared to have the greatest breeding activity by migratory species such as orchard orioles, prairie warbler, rose-breasted grosbeak, and blue-winged warbler. Removal of vegetation in these areas prior to the breeding season would reduce the potential for nest failure for these species.

Site preparation activities would result in unavoidable adverse impacts to the approximately 0.09 acre of freshwater wetlands in the central portion of the site that provide vernal pool habitat for pool-breeding amphibians observed on the site. While the loss of this wetland and the vernal pool habitat it provides would have the potential to adversely affect amphibian breeding on the west connection site as well as individual reptiles and amphibians, the approximately 0.06-acre wetland within the western portion of the west connection site would be preserved and would be expected to remain viable habitat for the pool-breeding amphibian species in the area. With the preservation of the western wetland and enhancement from removal of invasive plant species, and enhancement of the buffer between this wetland and the area of disturbance to increase the vegetative screeining, construction of Project 1 would not result in significant adverse impacts to regional populations of amphibians and reptiles with the potential to occur on the west connection site.

Nearly all of the mature forest within the site would be outside the limits of disturbance, and the wildlife species occurring in woodland area are not expected to be significantly impacted at the individual or population levels. Construction at the west connection site has the potential to produce visual and auditory disturbances to wildlife in the surrounding areas, but these activities would occur outside of the sensitive breeding periods of wildlife and are unlikely to be a significant detriment. Therefore, construction of Project 1 at the west connection site is not expected to have significant impacts to any endangered, threatened, or special concern species, including Indiana bat. The west connection site is considered suboptimal summer roosting and foraging habitat for Indiana bat, and the loss of some areas of terrestrial habitat on the site would not result in significant adverse impacts to populations of this species.

Construction of Project 1 at the west connection site would require the recovery of groundwater during dewatering of the shaft that would be treated on-site and discharged through a new outfall to the Class C stream that runs through the southeast portion of the west connection site. The proposed outfall construction would primarily occur outside the stream channel and above the ordinary high water line, thus minimizing the potential for adversely affecting the stream. Therefore, the construction of the outfalls would not result in significant adverse impacts to aquatic resources of the Class C stream. The proposed construction of a force main to supply potable water to the west connection site would occur outside the eastern wetland and would use construction techniques that would not require disturbance of the stream channel, thus minimizing the potential for adverse impacts to the aquatic resources of this stream. Additionally, the discharge of stormwater, and treated groundwater recovered during dewatering to the Class C stream in accordance with NYSDEC SPDES permitting requirements would not result in significant adverse impacts to the aquatic resources of the stream. The design of these outfalls would control the discharge velocity to ~~meet the NYSDEC maximum 2 ft/second discharge velocity to~~ prevent scouring of the stream bank would further minimize potential for adverse impacts to water quality.

The recovery of groundwater during dewatering of the shaft and construction of the bypass tunnel would not be expected to result in significant adverse impacts to groundwater quality or supply within the vicinity of the west connection site. The implementation of regulatory requirements with respect to the use and storage of petroleum and other chemical products on the west connection site during construction of Project 1 would minimize the potential for adverse impacts to groundwater or surface water resources.

### *ROSETON STREAM STUDY SITE AND DEWATERING PIPELINE ROUTE*

The construction of the dewatering pipeline would not affect groundwater or floodplain resources. It would have the potential to result in temporary disturbance of wetlands and portions of the stream system within the pipeline corridor and permanent loss of a small amount of riparian wetland within the footprint of the outfall for Option 2 which would discharge to the Class A segment of the stream. To the extent possible, Impacts to aquatic resources and wetlands from the construction of the dewatering pipeline would be minimized by using jack and bore trenchless construction and constructing the outfall outside wetlands and above the mean high water line to the greatest extent possible. Construction of a possible outfall on the Hudson River for dewatering pipeline Option 1 would have the potential to produce sediment disturbance, resulting in minor, short-term increases in suspended sediment and the permanent loss of a small amount of bottom habitat within the footprint of the outfall. Construction of both the outfall options would implement measures, such as the use of a coffer dam structure and bottom-weighted turbidity curtain to contain resuspended sediment and minimize potential impacts to water quality and aquatic biota. On the basis of the available habitat within the vicinity of the proposed outfall location, the tidal portion of the stream within the Roseton stream study site would not be considered suitable habitat for Atlantic or shortnose sturgeon. Therefore, construction of the outfall would not have the potential to adversely affect either of these species. shornose and Atlantic sturgeon would not have the pote, including shortnose or Atlantic sturgeon that may be using the Hudson River in the vicinity of the outfall. The loss of a small amount of bottom habitat any invertebrates associated with this habitat would not result in significant adverse impacts to regional macroinvertebrate populations or to fish due to a loss of prey.

Discharge of groundwater recovered during dewatering to the Hudson River or the Class A portion of the stream within the Roseton stream study site in accordance with NYSDEC SPDES requirements would not result in significant adverse impacts to water quality or aquatic biota of the Hudson River or the Class A stream or the Hudson River, or result in the failure for the Class A stream or the Hudson River of either to meet the Class C or Class A water quality standards, respectively. Discharge of this recovered groundwater to the Class A portion of the stream may result in an improvement of the aquatic habitat at its confluence with the Hudson River, from a dampening of the temperature fluctuations that appear to occur with tidal cycle.

### 2.8-5.2 EAST OF HUDSON

Construction of Project 1 on the east connection site would not result in significant adverse impacts to geology and soils, groundwater, floodplains, or aquatic or terrestrial resources, including threatened or endangered species or species of special concern. Site preparation activities (i.e., land clearing and grading) would result in the loss of about 3 acres of habitat that is of limited value to wildlife, only 1 acre of which would be Appalachian oak-hickory forest habitat. The remaining areas would be already developed habitats, such as maintained lawn and disturbed areas. Loss of these habitats, which are common within the lower Hudson Valley, would not result in significant adverse impacts to these vegetative resources within this region of New York.

Noises generated by clearing, grading, or blasting activities would potentially displace or otherwise disturb wildlife occurring in the vicinity of the east connection site, but such disturbances would be brief and unlikely to have significant adverse effects at the individual or population levels. Similarly, habitat loss and construction disturbances at the east connection site are unlikely to significantly impact any endangered, threatened, or special concern species, including Indiana bat. The east connection site is considered suboptimal summer roosting and foraging habitat for Indiana bat, and the loss of a portion of the woodlands would not result in significant adverse impacts to populations of this species.

The discharge of stormwater and treated groundwater recovered during dewatering to the Hudson River through the existing DEP outfall in accordance with NYSDEC SPDES permitting requirements would not result in significant adverse impacts to the water quality or aquatic resources of the Hudson River or result in a failure of this portion of the river to meet the Class A water quality standards.

The recovery of groundwater during dewatering of the shaft and construction of the connector tunnel would not be expected to result in significant adverse impacts to groundwater quality or supply within the vicinity of the east connection site. The implementation of regulatory requirements with respect to the use and storage of petroleum and other chemical products on the east connection site during construction of Project 1 would minimize the potential for adverse impacts to groundwater or surface water resources in the vicinity of the site.

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