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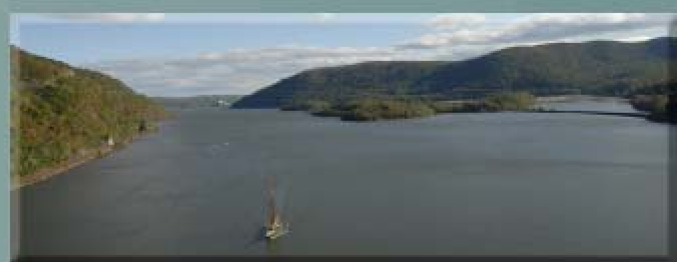
Final

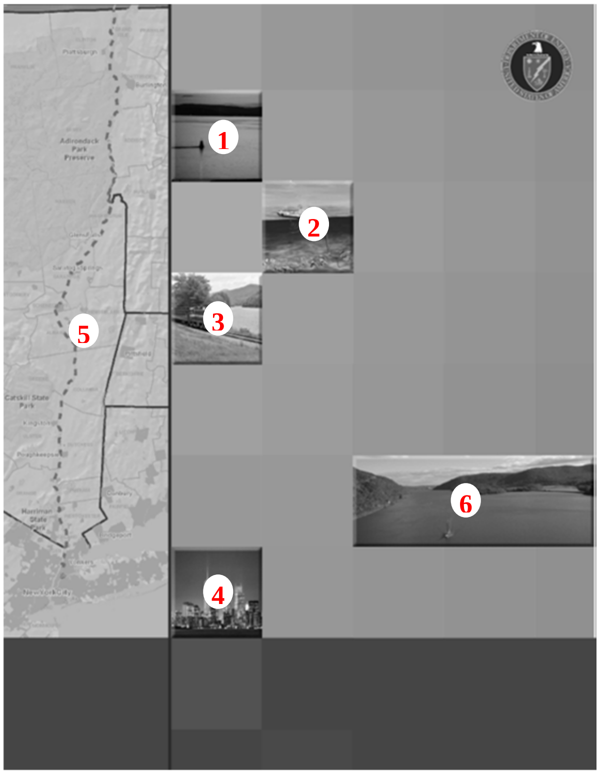
Champlain Hudson Power Express Transmission Line Project Environmental Impact Statement

Volume I: Impact Analyses



U.S. Department of Energy
Office of Electricity Delivery and Energy Reliability
Washington, DC

August 2014



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1. Lake Champlain at sunset obtained from Wikipedia.com
2. Cable-laying vessel courtesy of CHPEI
3. Upper Hudson River Railroad obtained from sncrr.com
4. New York City skyline and new World Trade Center obtained from wtc.com
5. Project route courtesy of CHPEI
6. Hudson River courtesy of CHPEI

FINAL

CHAMPLAIN HUDSON POWER EXPRESS TRANSMISSION LINE PROJECT ENVIRONMENTAL IMPACT STATEMENT

Volume I: Impact Analyses

U.S. DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY
AND ENERGY RELIABILITY

COOPERATING AGENCIES

U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ARMY CORPS OF ENGINEERS
U.S. FISH AND WILDLIFE SERVICE
U.S. COAST GUARD
NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

AUGUST 2014

COVER SHEET

RESPONSIBLE FEDERAL AGENCY: U.S. Department of Energy (DOE), Office of Electricity Delivery and Energy Reliability

COOPERATING AGENCIES: U.S. Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers, U.S. Coast Guard, U.S. Fish and Wildlife Service, New York State Department of Public Service, New York State Department of Environmental Conservation

TITLE: Champlain Hudson Power Express Transmission Line Project Environmental Impact Statement (EIS)

LOCATION: Clinton, Essex, Washington, Saratoga, Schenectady, Albany, Greene, Ulster, Dutchess, Orange, Putnam, Rockland, Westchester, Bronx, New York, and Queens counties in New York State

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ABSTRACT: Champlain Hudson Power Express, Inc. (CHPEI) has applied to the DOE for a Presidential permit to construct, operate, maintain, and connect a 336-mile (541-kilometer) electric transmission line across the international border between the United States and Canada, near the town of Champlain, New York. This EIS addresses the potential environmental impacts of the proposed transmission line (Preferred Alternative) and the No Action Alternative. The proposed transmission line would include both aquatic (underwater) and terrestrial (primarily underground) segments. The underwater portions of the transmission line would be buried in the beds of Lake Champlain and the Hudson, Harlem, and East rivers, and the terrestrial portions would be buried, principally in railroad and roadway rights-of-way. The transmission system would consist of one 1,000-MW, high-voltage direct current transmission line and ancillary aboveground facilities (e.g., cooling stations). The transmission line would be a bipole consisting of two transmission cables. A new converter station in Queens, New York, would convert the electrical power from direct current to alternating current and then interconnect with the New York City electrical grid at two points.

PUBLIC COMMENTS: In preparing this Final EIS, DOE considered comments received during the scoping periods (June 18, 2010, through August 2, 2010, and April 30, 2012 through June 14, 2012) and public comment period on the Draft EIS (November 1, 2013, through January 15, 2014). Comments on the Draft EIS were accepted during the 45-day period following publication of USEPA's Notice of

Availability (NOA) in the *Federal Register* on November 1, 2013; the public comment period was extended for an additional 30 days until January 15, 2014. DOE held four public hearings on the Draft EIS in Queens and Stony Point, New York, on November 18, 2013; Albany, New York, on November 19, 2013; and Plattsburgh, New York, on November 20, 2013. All comments were considered during preparation of this Final EIS. Appendix P in Volume III of this EIS contains the comments received on the Draft EIS and DOE's responses to these comments. This Final EIS contains revisions and new information based in part on comments received on the Draft EIS. Vertical bars in the margins marking changed text indicate the locations of these revisions and new information. Deletions are not indicated. Volumes III and IV are entirely new parts of this EIS; therefore, they do not contain bars indicating changes from the Draft EIS.

The EIS analyzes the potential environmental impacts of DOE issuing a Presidential permit for the proposed CHPE Project, which is DOE's proposed Federal action (Preferred Alternative). DOE will use the EIS to ensure that it has the information it needs for informed decisionmaking. Copies of the Final EIS are available for public review at seven local libraries as noted in **Appendix E** of the Final EIS or a copy can be requested from Mr. Brian Mills. The EIS also is available on the proposed CHPE Project EIS Web site (http://www.chpexpresseis.org). DOE will announce its decision on the Proposed Action in a Record of Decision (ROD) in the *Federal Register* no sooner than 30 days after the USEPA publishes the NOA of the Final EIS.

FINAL
CHAMPLAIN HUDSON POWER EXPRESS TRANSMISSION LINE PROJECT
ENVIRONMENTAL IMPACT STATEMENT

VOLUME I: IMPACT ANALYSES

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Summary

S.1 Background

On January 25, 2010, Champlain Hudson Power Express Incorporated (CHPEI) applied to the U.S. Department of Energy (DOE) for a Presidential permit in accordance with Executive Orders (EOs) 10485 and 12038, and 10 Code of Federal Regulations (CFR) 205.320 *et seq*. The Presidential permit, if issued, would authorize CHPEI to construct, operate, maintain, and connect the U.S. portion of an electric transmission line that would cross the international border between the United States and Canada near the town of Champlain, New York.

The proposed Champlain Hudson Power Express (CHPE) Transmission Line Project (proposed CHPE Project) would be an approximately 336-mile (541-kilometer [km])-long, 1,000-megawatt (MW), high-voltage merchant electric power transmission system that includes a transmission line that would extend to Astoria, Queens, New York (see **Figure S-1**). The system would include the transmission line, transmission line cooling stations at certain locations along the route, a direct current (DC) to alternating current (AC) converter station, and high-voltage alternating current (HVAC) interconnections from this converter station to the New York Power Authority (NYPA) Astoria Annex and the Consolidated Edison Company of New York, Inc. (ConEd) Rainey substations in Queens.

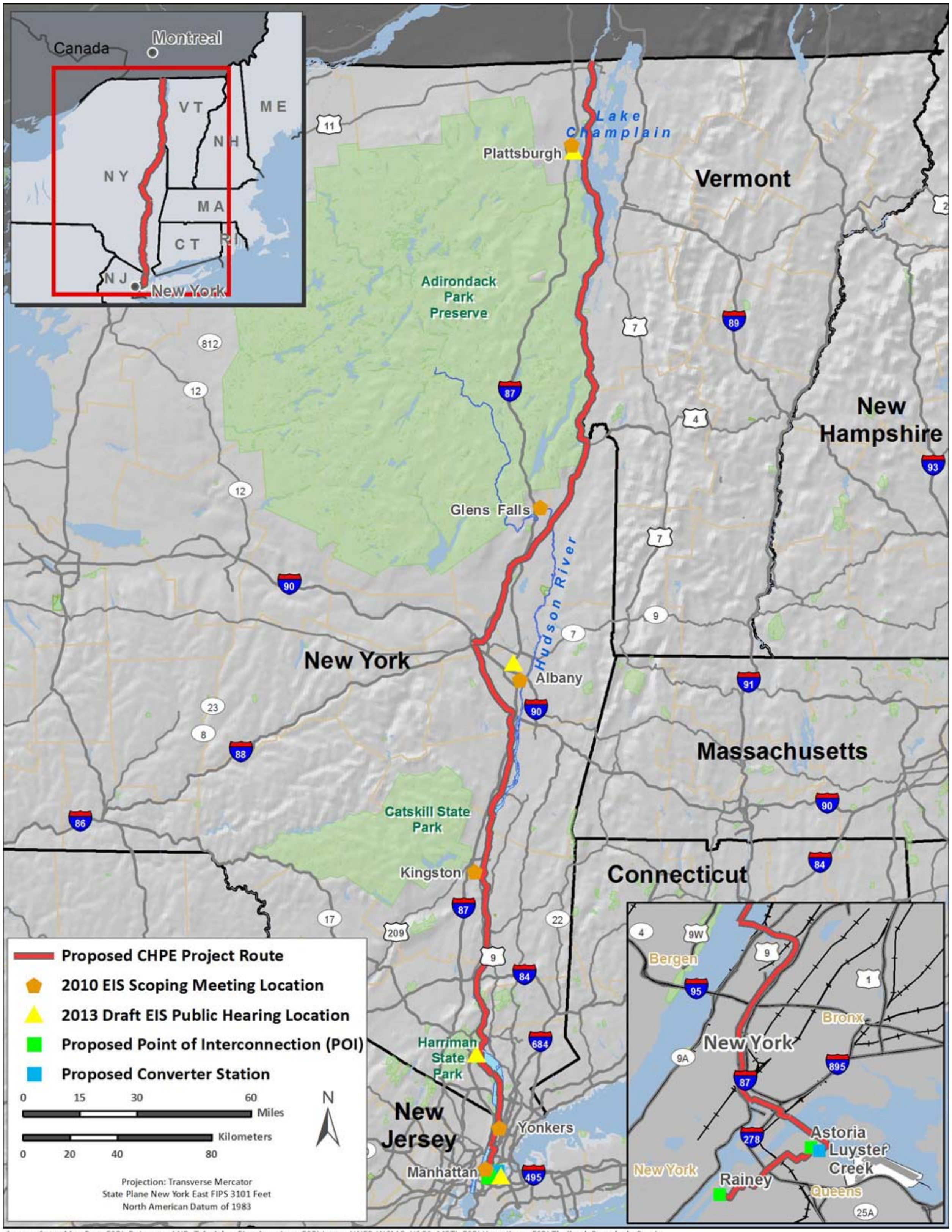
The DOE Office of Electricity Delivery and Energy Reliability is responsible for reviewing Presidential permit applications and determining whether to grant a permit for electrical transmission facilities that cross the U.S. international border. The Presidential permit for the Applicant (OE Docket Number PP-362), if issued, would authorize the Applicant to construct, operate, maintain, and connect the U.S. portion of the project at the international border.

DOE has determined that the issuance of a Presidential permit would constitute a major Federal action and that an Environmental Impact Statement (EIS) is the appropriate level of environmental review under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [U.S.C.] 4321 *et seq.*). In 2010, DOE issued in the *Federal Register* a Notice of Intent (NOI) to prepare an EIS for the Proposed Action and conducted public scoping (75 *Federal Register* 34720). In 2012, DOE issued an amended NOI to modify the scope of the EIS to reflect Applicant-proposed revisions to the project and conducted additional public scoping (77 *Federal Register* 25472).[1] These revisions included moving the transmission line out of the narrows of lower Lake Champlain, the middle Hudson River, and Haverstraw Bay into nearby road and railroad rights-of-way (ROWs) on land.

DOE prepared this Final EIS in compliance with the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1500–1508) and DOE's NEPA regulations (10 CFR Part 1021), and other applicable regulations. The preparation of an EIS includes two formal opportunities for public input: (1) the public scoping period, and (2) the Draft EIS public comment period, both of which are described further in the Public Participation section of this summary.

Other environmental review requirements are being implemented in coordination with or integrated with the NEPA process to the fullest extent possible, namely, floodplains and wetlands assessments, in accordance with EOs 11988 and 11990, respectively (both signed on May 24, 1977) and 10 CFR Part

[1] Vertical bars in the margins of the Final EIS mark changed text, including revisions and new information based in part on comments received on the Draft EIS. Deletions are not indicated.



Source: StreetMap Pro; ESRI, DeLorme, AND, Tele Atlas, First American, ESRI Japan, UNEP-WCMC, USGS, METI, ESRI Hong Kong, ESRI Thailand, Procalculo Prosis

Figure S-1. Proposed CHPE Project Location Overview Map

1022, DOE floodplain and wetland environmental review requirements; Clean Air Act Conformity requirements; threatened and endangered species consultation required under the Endangered Species Act (ESA); and consultation under the National Historic Preservation Act (NHPA).

S.2 DOE's Purpose of and Need for Agency Action

CHPEI has applied to DOE for a Presidential permit that would allow the company to construct, operate, maintain, and connect the approximately 336-mile (541-km), 1,000-MW, high-voltage electric power transmission system in the United States that would cross the U.S./Canada border. If granted, the Presidential permit would authorize the international border crossing.

The purpose of and need for DOE's action is to decide whether or not to grant a Presidential permit for the proposed CHPE Project. Applications for Presidential permits are evaluated based on the potential impacts that a proposed project could have on the environment, the operating reliability of the U.S. electric power supply, and any other factors relevant to the public interest. If DOE determines that granting a Presidential permit is in the public interest, the information contained in this EIS will also help to inform DOE's decision regarding potential mitigation measures and other conditions of the permit.

S.3 Applicant's Objectives

According to the Presidential permit application, the proposed CHPE Project would be a merchant transmission facility that would provide needed electrical energy, primarily hydroelectric and wind energy generated in Canada, to the New York City metropolitan area, which the Applicant states would result in lower wholesale electric power prices, reductions in emissions, greater fuel diversity, and increased energy supply capability and system reliability.

CHPEI has estimated that importing 1,000 MW of lower-cost Canadian energy into the power markets in New York City would be expected to save consumers in the New York Control Area between $554 million to $654 million per year (LEI 2011). Independent modeling conducted by the New York State Department of Public Service (NYSDPS) projected that ratepayer benefits in the New York Control Area would total approximately $405 million to $720 million per year (CHPEI 2012e). Therefore, the Applicant has stated that the proposed CHPE Project power would be purchased first and displace natural gas and oil-fueled sources of electrical generation supplying the region. This would result in the potential to reduce regional greenhouse gas (GHG) emissions. Using the initial year of operation of 2018 as an illustration, NYSDPS predicted that the proposed CHPE Project would reduce annual emissions of carbon dioxide (CO_2) by approximately 1.5 million tons, sulfur dioxide (SO_2) by 751 tons, and nitrogen oxides (NO_x) by 641 tons (NYSDPS 2012a).

DOE has designated southeastern New York State as a Critical Congestion Area, defined as "Areas where it is critically important to remedy existing or growing congestion problems because the current and/or projected effects of the congestion are severe" (DOE 2009a). The *U.S. Department of Energy's National Electric Transmission Congestion Study* (DOE 2006) determined that consumers in the Mid-Atlantic area of the United States, including southeastern New York State, are adversely affected by transmission congestion. These adverse effects on consumers result in consistently higher energy prices and reduced reliability of electricity.

CHPEI's application predicts that the proposed CHPE Project would result in an improvement to the overall reliability of the New York Independent System Operator's (NYISO) electricity system, because the CHPE Project would provide supplemental power capacity from Quebec, thereby improving resource adequacy and reducing loss of load expectations. The high-voltage direct current (HVDC) technology proposed for use in the proposed CHPE Project would possess four-quadrant control technology, allowing the transmission supplier to control voltage and power separately, thereby providing reactive power (i.e., used to control voltage on the transmission system to improve system efficiency) for real-time voltage control.

According to the Applicant, the voltage source converter technology that would be used in the CHPE Project would increase the efficiency of the transmission and distribution system, incorporate greater levels of renewable energy, improve power quality and stability to support new digital demands, and increase operational flexibility and greatly reduce the risk of failure that might affect the entire grid.

The Applicant notes that the proposed CHPE Project intends to accomplish the following:

- Provide 1,000 MW (7,640 gigawatt hours [GWh] per year) of electricity to New York City without contributing to additional transmission congestion on the existing electricity transmission infrastructure in the United States
- Provide additional new transmission infrastructure capacity into New York City using HVDC and HVAC cables that would be buried to avoid potential visual impacts from traditional overhead transmission lines
- Apply downward pressure on the price of electricity in the Location Marginal Price (LMP) spot markets operated by Independent System Operators (ISOs) in the New York City market
- Reduce air pollution and GHG emissions within the New York City area by alleviating the need to operate one or more existing fossil-fueled power plants within the region during periods of transmission congestion
- Improve stability of the electric grid serving the New York City metropolitan area due to the highly reliable and controllable nature of HVDC technology and its compatibility with Smart Grid initiatives
- Reduce the dependency of the New York City region on fossil fuels, such as coal, oil, and natural gas.

S.4 Public Participation and Interagency Coordination

Public participation and interagency coordination are integral elements of the NEPA process and are intended to promote open communication between DOE and regulatory agencies, Native American tribes, potential stakeholder organizations, and the public.

S.4.1 Cooperating Agencies

DOE invited several Federal and state agencies to participate in the preparation of the EIS as cooperating agencies because of their special expertise or jurisdiction by law (40 CFR 1501.6). The cooperating agencies are U.S. Environmental Protection Agency (USEPA) Region 2, the New York District of the U.S. Army Corps of Engineers (USACE), the New York Field Office (Region 5) of the U.S. Fish and Wildlife Service (USFWS), the U.S. Coast Guard (USCG), the NYSDPS, and the New York State Department of Environmental Conservation (NYSDEC).

S.4.2 Public Involvement

Initial Public Scoping. On June 18, 2010, DOE published in the *Federal Register* its *Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Public Scoping Meetings; Notice of Floodplains and Wetlands Involvement; Champlain Hudson Power Express, Inc.*

(75 *Federal Register* 34720). This and other relevant documents are available on the EIS Web site: http://www.chpexpresseis.org. During the initial public scoping period, DOE conducted seven scoping meetings: one in Connecticut and six within the Lake Champlain and Hudson River Valley corridors of New York State.

Additional Public Scoping. In response to the Applicant's submission of an amended Presidential permit application, DOE published on April 30, 2012, an *Amended Notice of Intent to Modify the Scope of the Environmental Impact Statement for the Champlain Hudson Power Express Transmission Line Project in New York State* (77 *Federal Register* 25472). DOE announced that it would revise the scope of the EIS to address the proposed changes and that it was accepting public comment on the revised scope until June 14, 2012.

DOE received scoping comments and prepared scoping reports for both scoping periods, which are available as **Appendix D** of this EIS and available for review on the EIS Web site.

The major issues identified during public scoping include impacts on protected and sensitive flora or fauna species, water quality for Lake Champlain and the Hudson River, cultural or historic resources, human health and safety, air quality, visual resources, navigation, and road traffic; impacts from the development of additional electric generation facilities in Canada; and justification of the need for additional electrical energy.

Draft EIS Public Review Period. DOE provided a 45-day public review period starting November 1, 2013, which was extended for an additional 30 days and ended on January 15, 2014, and held 4 public hearings for the Draft EIS. The public review period was initiated through publication of a Notice of Availability (NOA) in the *Federal Register* by the USEPA. Methods similar to those used during the scoping period were used to notify the public and applicable Federal and state agencies of the public review period for the Draft EIS, including distributing the document to individuals or parties who submitted scoping comments, and to other interested parties that requested a copy of the EIS.

DOE made the Draft EIS available online at the CHPE EIS Web site (http://www.chpexpresseis.org) and on the DOE NEPA Web site (http://energy.gov/nepa). The Draft EIS was also circulated to Federal, state, and local agencies with jurisdiction by law or special subject matter expertise and to any person, stakeholder organization, or agency that requested a copy (40 CFR 1502.19).

DOE received 107 comment documents on the Draft EIS, which have been categorized into eight series based on the type of commenter as follows:

- 100 series – Public Hearing Transcripts: 45 comment documents
- 200 series – Federal Agencies: 5 comment documents
- 300 series – Federal and State Elected Officials: 6 comment documents
- 400 series – State Agencies: 3 comment documents
- 500 series – Local Elected Officials: 4 comment documents
- 600 series – Local Agencies: 2 comment documents
- 700 series – Stakeholder Groups: 22 comment documents
- 800 series – Other Groups and Members of the Public: 20 comment documents.

The Final EIS includes, in **Appendix P**, a summary of the Draft EIS public review period, all comments on the Draft EIS, and responses to the comments. All comments submitted on the Draft EIS were considered in preparing the Final EIS. **Appendix P** also contains, in Table P-4, a summary of representative comments provided during the Draft EIS comment period, and changes made to the Draft EIS in response to comments or new information received in Table P-5. Following are DOE responses to major issues raised by agencies and the public during the Draft EIS public comment period and major conclusions made by DOE regarding the Proposed Action, in accordance with CEQ NEPA regulations (40 CFR 1502.12).

Issues Raised During Draft EIS Public Review Period

NEPA Process. Several comments requested an extension of the public comment period on the Draft EIS due to the length of the EIS and potentially complicated issues addressed in the document. *DOE response:* DOE extended the 45-day comment period by 30 days to provide additional time for the public to review the Draft EIS and submit comments (see **Section 1.7.3** of the Final EIS).

Land Use. Comments expressed concern that portions of the proposed CHPE Project route would be outside of the existing road and railroad ROWs in deviation areas, which would require the taking of private property, including residential and commercial properties, through eminent domain. Some comments also expressed concern that the presence of the transmission line could limit the use of some private property. *DOE response:* Analyses of the potential impacts on use of land outside the existing road and railroad ROW are included in the "Land Use" section for each terrestrial route segment of the proposed CHPE Project addressed in the EIS (see **Sections 5.2.1**, **5.3.1**, and **5.4.1** of the Final EIS). Where acquisition of land outside existing ROWs would be required, the process established under the New York State Public Service Law would be followed.

Transportation and Traffic. Several comments expressed concern that the proposed transmission line would be installed within the Federal navigation channel in various locations, which could prevent some vessels from deploying anchors due to risk of anchor damage, or could result in anchor snags on the transmission cables or concrete mats. Other comments expressed concern that the presence of the transmission line would prevent dredging of the Federal navigation channel or other locations along the Hudson River. *DOE response:* Through ongoing discussions among the USACE, USCG, maritime stakeholders, and the Applicant, the Applicant has revised its proposed cable burial depths which are reflected in the "Transportation and Traffic" section for each route segment in the Final EIS, and has agreed to relocate the transmission line to areas outside of proposed and known anchorage areas in the Hudson and Harlem rivers to reduce potential impacts on navigation and anchor snags.

Aquatic and Terrestrial Protected and Sensitive Species. One comment stated that it would be beneficial to also discuss species proposed for listing under the Endangered Species Act (e.g., northern long-eared bat) in the EIS. Other comments requested additional analysis of the potential impacts of magnetic and induced electrical fields and the use of concrete mats on sturgeon. *DOE response:* The Applicant, in consultation with the relevant resource agencies including USFWS and the National Marine Fisheries Service (NMFS), made revisions to the proposed CHPE Project and developed revised best management practices (BMPs) to avoid or minimize potential impacts on protected or sensitive species. In particular, the Applicant has agreed to conduct tree clearing activities in the winter months to avoid impacts on Indiana bats and to avoid any construction or maintenance activities that would adversely affect Karner blue butterfly habitat. DOE has prepared a Biological Assessment (BA) that concludes that the proposed CPHE Project construction, operation, and maintenance activities may affect, but are not likely to adversely affect, shortnose and Atlantic Sturgeon, Indiana and Northern long-eared bats, and the Karner blue butterfly (see **Appendix Q** of the Final EIS). The proposed CHPE Project would have no effect on other species listed under the ESA.

Cultural Resources. Several comments were concerned that the proposed CHPE Project route would cross and disrupt the Waldron Cemetery and Stony Point Battlefield Historic Park. *DOE response:* DOE has developed a Programmatic Agreement (PA) (see **Appendix T** of the Final EIS) with the New York State Historic Preservation Office (SHPO) to ensure that cultural resources are identified, avoided, or mitigated through continued consultation during project development. The Applicant intends to avoid these impacts at these locations through the use of avoidance measures such as horizontal directional drilling (HDD) where possible (see **Section 5.3.10** of the EIS).

Socioeconomics. Some comments stated that the proposed CHPE Project would result in additional local employment and other economic benefits in New York State, while other commenters expressed concerns that the CHPE Project would outsource jobs from New York State to a foreign county, lead to the reduction of in-state employment (including some due to closing of existing power plants), and increase the U.S. dependence on foreign energy. Other comments expressed concern that the proposed CHPE Project would decrease property values, including residential and commercial properties, and reduce revenue from taxes to local jurisdictions. *DOE response:* Project employment and potential impacts on tax revenues and property values are addressed in the "Socioeconomics" section for each route segment in the EIS (see **Sections 5.1.18**, **5.2.18**, **5.3.18**, and **5.4.18** of the EIS).

Transmission System Reliability. Comments stated that the proposed CHPE Project would not be in the National Interest and would be detrimental to the existing energy grid in New York State because existing power plants and renewable energy projects would not be able to connect to the transmission line, and it would not strengthen the New York State transmission system. Other comments expressed concern that the proposed CHPE Project would prevent other renewable and non-renewable proposed energy projects in New York State from being developed. *DOE response:* DOE is reviewing system interconnection and reliability studies to determine whether the proposed CHPE Project would have an adverse effect on electrical system reliability.

Impacts in Canada. Comments stated that impacts in Canada from the hydroelectric facilities that would be the source of the power should be addressed in the EIS, and without this analysis the EIS does not address potential impacts of the entire proposed CHPE Project. *DOE response:* DOE does not agree that such an analysis is appropriate or required.

NEPA does not require an analysis of potential environmental impacts that occur solely within another sovereign nation with its own environmental statutes and regulations that result from actions approved by that sovereign nation. The Quebec Provincial Government is conducting an environmental review for impacts in Canada, as applicable, as part of its authorization process associated with the construction of facilities (i.e., a new transmission line from a proposed new HVDC converter station at Hertel, in La Prairie, Quebec, to the U.S./Canada border) in the province. The Canadian Government, through the National Energy Board, would also have the authority to authorize the project and consider potential environmental impacts in its analysis (see **Section 1.7.4** of the EIS).

Other Alternatives. Several comments stated that instead of the proposed CHPE Project, energy conservation and efficiency measures should be implemented and the power should be produced locally in New York State through renewable energy projects, distributed generation, existing power plants in upstate New York or in the Hudson Valley Region, or by constructing new power plants in New York State. *DOE response:* Energy efficiency and conservation measures were considered in the Draft EIS but eliminated from further detailed analysis because DOE determined that these measures alone were not a reasonable alternative to the proposed CHPE Project (see **Section 2.5.3** of the EIS). As presented in Section 1.2 of the Draft EIS, the purpose of and need for DOE's Proposed Action is whether to issue a Presidential permit for the proposed transmission line crossing of the U.S. international border (i.e., proposed CHPE Project). Continued operation or development of other new in-state power sources or transmission lines is not the subject of the application for a Presidential permit and, therefore, is outside the scope of this EIS.

S.5 Alternatives Analyzed

This EIS addresses the No Action Alternative and DOE's Proposed Action (Preferred Alternative). The Applicant's proposed CHPE Project is described in **Section S.6**.

S.5.1 No Action Alternative

CEQ and DOE regulations require consideration of the No Action Alternative. The No Action Alternative serves as a baseline against which the potential environmental impacts of a proposed action can be evaluated. Under the No Action Alternative, DOE would not issue a Presidential permit for the proposed CHPE Project, the transmission system would not be constructed, and the potential impacts from the project would not occur.

S.5.2 DOE's Proposed Action (Preferred Alternative)

DOE's Proposed Action (Preferred Alternative) is the issuance of a Presidential permit that would authorize the construction, operation, and maintenance of the proposed CHPE Project that would cross the U.S./Canada border. This EIS has been prepared to comply with NEPA and support DOE's decisionmaking associated with the issuance of the Presidential permit for the proposed CHPE Project.

S.6 Proposed CHPE Project Overview

S.6.1 Proposed CHPE Project Route Segments

The proposed CHPE Project would include construction, operation, and maintenance of an approximately 336-mile (541-km)-long, 1,000-MW, high-voltage electric power transmission system that would have both aquatic (underwater) and terrestrial (and primarily underground) segments. The underwater portions of the transmission line would be buried in the beds of Lake Champlain and the Hudson, Harlem, and East rivers, and the terrestrial portions of the transmission line would be buried underground, principally in road and railroad ROWs.

The transmission system would consist of one 1,000-MW, HVDC transmission line, communications cable, and ancillary aboveground facilities, including a DC-to-AC converter station and cooling stations at selected locations where required. The transmission line would be a bipole consisting of two transmission cables, one positively charged and the other negatively charged. A new HVDC converter station would be constructed in Queens, New York, to convert the electrical power from DC to AC and then connect to two points of interconnection (POIs) within the New York City electrical grid. Cooling stations would be installed along the terrestrial portions of the transmission line route in certain locations to disperse accumulated heat in long cable segments installed by HDD.

The entire length of the transmission system would be buried, with the majority of the route beneath Lake Champlain and the Hudson River, and the exceptions would be ancillary above-ground facilities, such as at the converter station and cooling stations. For the purposes of understanding, the various environmental settings associated with the proposed CHPE Project, and to facilitate the analysis in the EIS, the transmission line route was divided into four geographically logical segments as follows:

- Lake Champlain Segment
- Overland Segment
- Hudson River Segment
- New York City Metropolitan Area Segment.

The four segments are shown on **Figures S-2** through **S-5**, respectively. From the U.S./Canada border, the HVDC transmission line would be located in the bed of Lake Champlain for approximately 101 miles (163 km), from near Champlain, New York, to Dresden, New York. This portion of the route composes the ***Lake Champlain Segment*** (see **Figure S-2**).

The ***Overland Segment*** begins at the southern end of Lake Champlain in the Town of Dresden, where the HVDC transmission line would exit the water at milepost (MP) 101 and be installed underground in the New York State Department of Transportation (NYSDOT) ROW, the Canadian Pacific (CP) railroad ROW, and the CSX Transportation (CSX) railroad ROW for 127 miles (204 km) until the transmission line would enter the Hudson River at the Town of Catskill, New York (see **Figure S-3**).

The ***Hudson River Segment*** begins at MP 228 where the HVDC transmission line would be buried in the bottom of the Hudson River for approximately 67 miles (108 km) to Stony Point, New York, where the transmission line would be routed upland primarily along the CSX railroad ROW and the U.S. Route 9W roadway ROW between MPs 295 and 303 (see **Figure S-4**). The transmission line would be buried underground through this entire stretch before reentering the Hudson River. The transmission line would reenter the Hudson River at MP 303 for approximately 21 miles (34 km) until it reaches the end of the Hudson River Segment at Spuyten Duyvil Creek and the Harlem River in New York City at MP 324.

The ***New York City Metropolitan Area Segment*** begins at Spuyten Duyvil at MP 324, where the HVDC transmission line would enter the Harlem River and continue south in the river for a distance of approximately 6 miles (10 km) to a point north of the Willis Avenue Bridge in the borough of the Bronx at MP 330 (see **Figure S-5**). The transmission line would exit the river and proceed east through the NYSDOT railroad corridor and rail yards along the northern side of the Bronx Kill to the East River at MP 331 and proceed to the southeast to land at the site of the ConEd Charles Poletti Power Plant complex in Astoria, Queens, New York, at MP 332.

Onshore, the HVDC transmission cables would wrap around the eastern portion of the power plant complex for approximately 1 mile (1.6 km) and would terminate in a proposed HVDC converter station occupying an approximately 4.5-acre (1.8-hectare) site along Luyster Creek. The Luyster Creek HVDC Converter Station would convert the DC electrical power to AC, and underground double-circuit 345-kilovolt (kV) AC cables would connect the converter station with the adjacent NYPA Astoria Annex 345-kV substation. An approximately 3-mile (5-km) buried 345-kV HVAC cable circuit would be constructed by CHPEI from the Astoria Annex Substation to ConEd's 345-kV Rainey Substation.

S.6.2 Proposed CHPE Project Details

The following subsections describe the specific engineering details of the transmission system: the aquatic DC transmission cables; HDD methods; terrestrial DC transmission cables; cooling stations to be used in certain locations along the transmission line; the proposed HVDC converter station and substation interconnection in Astoria, New York; and the proposed Astoria Annex to Rainey substation HVAC interconnection. The amended Presidential permit application submitted to DOE on February 28, 2012, reflected route and project changes that resulted from negotiations, including more than 50 settlement conferences held between November 2010 and February 2012, with state agencies and stakeholder organizations pursuant to the New York State Public Service Commission's (NYSPSC) Article VII Certificate of Environmental Compatibility and Public Need process review of the project (Joint Proposal). The Applicant and 13 signatory parties submitted the Joint Proposal to the NYSPSC on February 24, 2012. The NYSPSC issued an Order granting a Certificate of Environmental Compatibility and Public Need (Certificate) for the proposed CHPE Project on April 18, 2013 (NYSPSC 2013). DOE is reviewing, and this EIS analyzes, the proposed CHPE Project as amended by the Joint Proposal and the Certificate. The Certificate is available on the CHPE EIS Web site (http://www.chpexpresseis.org).

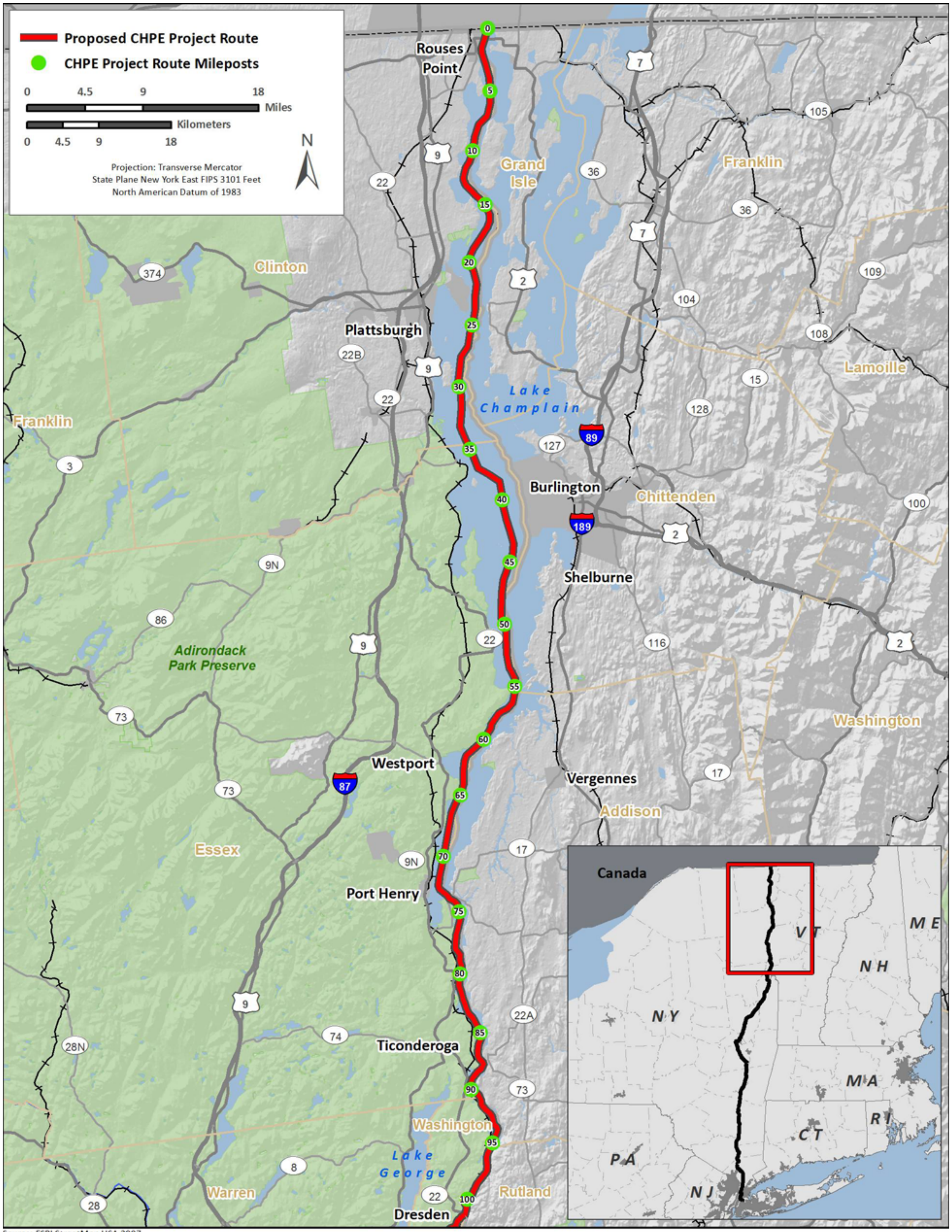


Figure S-2. Lake Champlain Segment

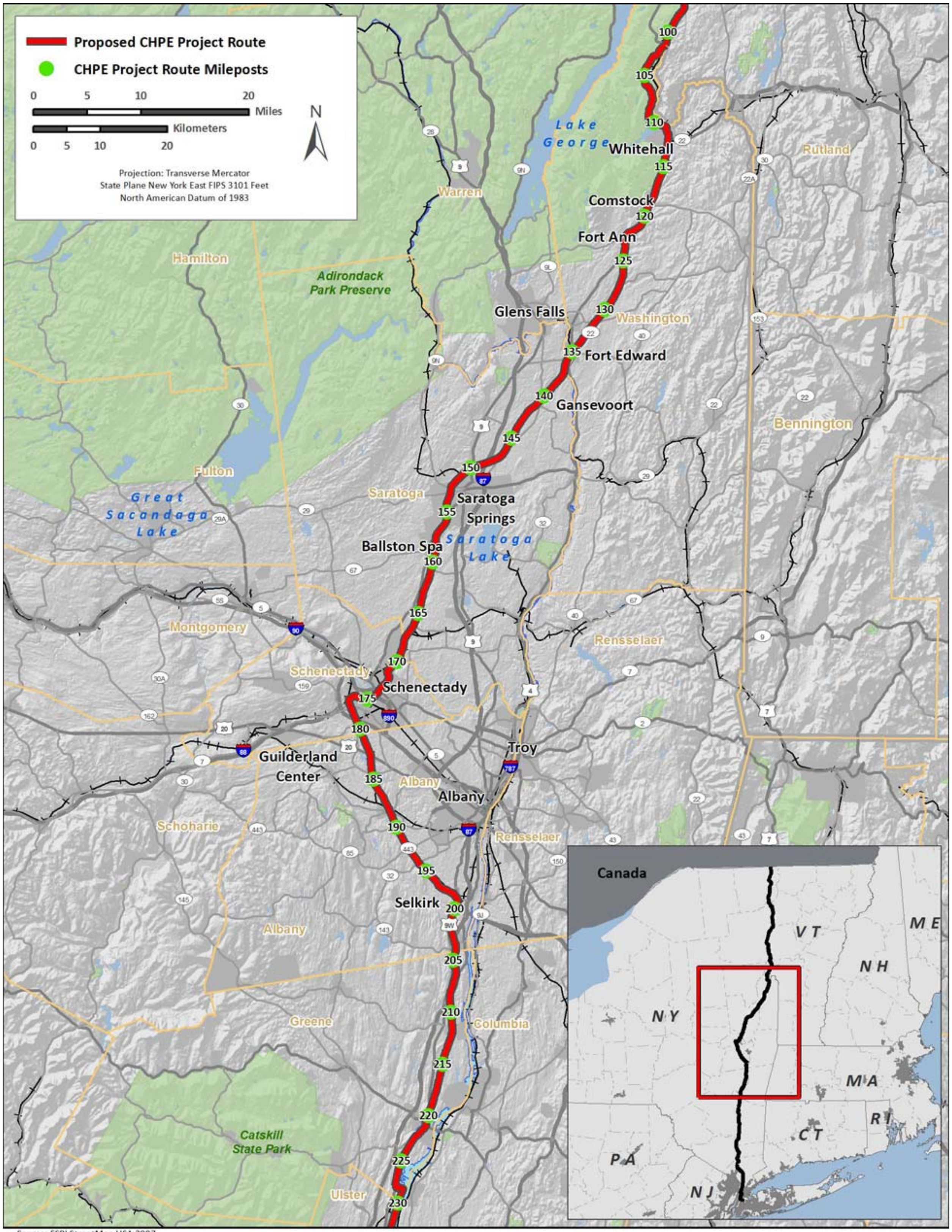


Figure S-3. Overland Segment

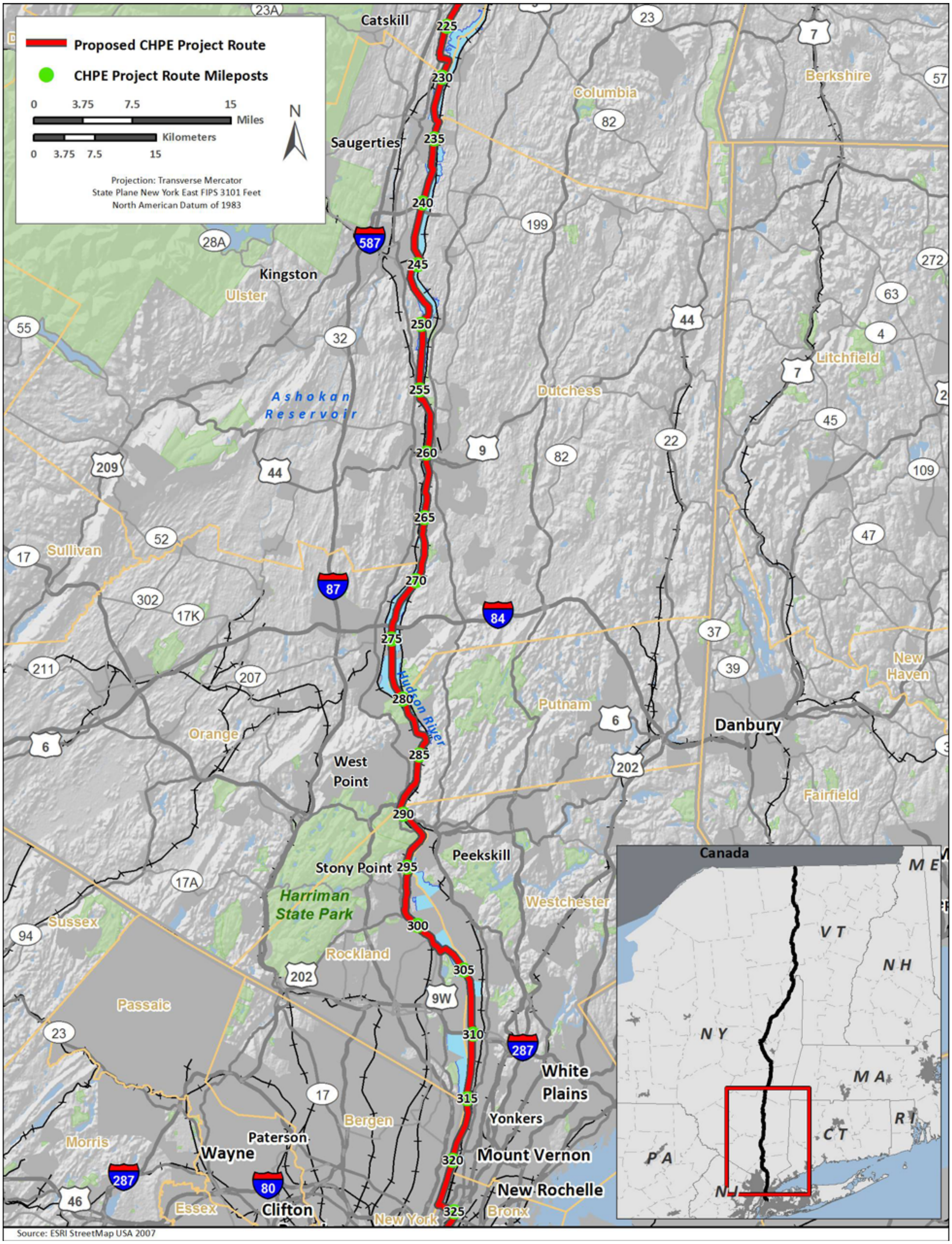


Figure S-4. Hudson River Segment

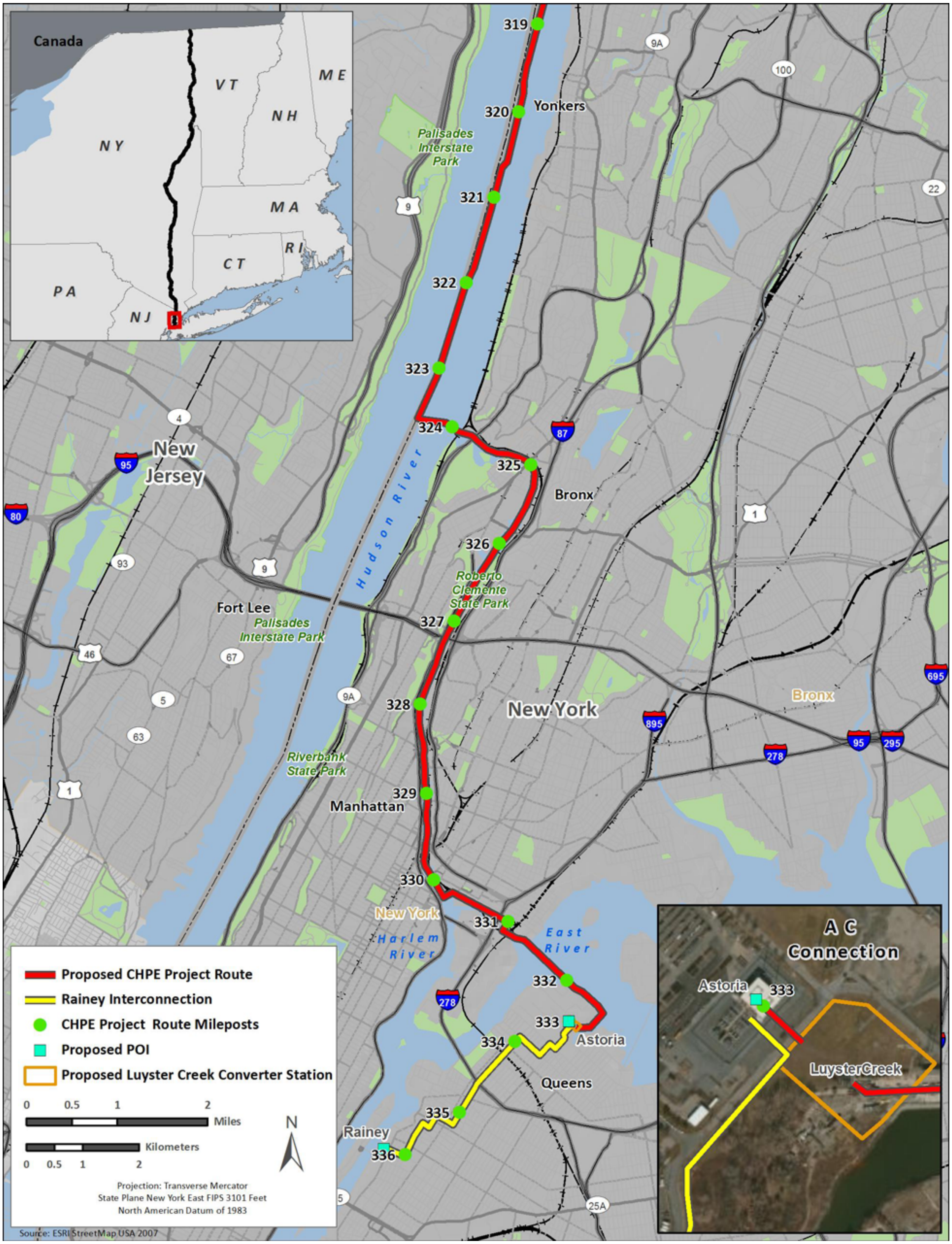


Figure S-5. New York City Metropolitan Area Segment

Appendix C of the EIS contains references to the Certificate, the Joint Proposal, and other relevant documents. The following subsections also discuss how the Applicant proposes to install and operate the transmission line and aboveground facilities of the proposed CHPE Project.

Aquatic Direct Current Transmission Cable. The transmission cables proposed for installation in the Lake Champlain, Hudson River, and New York City Metropolitan Area segments would be cross-linked polyethylene (XLPE) HVDC cables rated at 300 to 320 kV. An armored layer of galvanized steel wires embedded in bitumen would provide additional protection for the aquatic transmission cables. To prevent disturbance to the cables from unrelated marine operations in the waterways, the transmission cables would be buried beneath the bed of Lake Champlain at a depth of at least 8 feet (2.4 meters) in the sediment and at least 4 feet (1.2 meters) in rock within the federally maintained (i.e., dredged) navigation channel, and at least 4 feet (1.2 meters) in the lakebed outside of the federally maintained navigation channel. Cables installed in the Hudson River sediment bed would be buried to a minimum depth of 7 feet (2.1 meters). Cable installation in the Harlem River would be entirely within the federally maintained navigation channel at minimum depths of 8 feet (2.4 meters) in the sediment and 6 feet (1.8 meters) in rock. Cables would be installed along the entire East River route using HDD; therefore, trench burial depths would not apply (USACE 2013). The depth of burial that can be achieved would depend on available marine construction equipment, soil types and depth to bedrock, existing utilities, and the types of marine activities occurring and their potential threat to cable integrity.

Where the transmission cables cross bedrock or an existing utility such as a pipeline or another cable, they would be laid over the rock or existing utility and protective coverings, such as articulated concrete mats, would be installed over the cable crossing. An approximated total of 3.0 miles (4.8 km) of concrete mats, representing 1.5 percent of the length of the aquatic portion of the entire transmission line route, would be installed over the portions of the transmission line that cannot be buried. Specifically, concrete mats would be installed as protective covering over the transmission cables for 0.6 miles (1.0 km) in the Lake Champlain Segment, 1.8 miles (2.9 km) in the Hudson River Segment, and 0.6 miles (1.0 km) in the New York City Metropolitan Area Segment. Underwater cable installation activities would be limited to certain times of the year to avoid life-cycle or migratory impacts on aquatic species in the project area.

Horizontal Directional Drilling. HDD would be used to install the transmission cables in transition areas between aquatic and terrestrial portions of the proposed CHPE Project route under the East River; and in sensitive areas such as wetlands and streams where deemed necessary, wild blue lupine (*Lupinus perrenis*) habitat, and existing infrastructure along the terrestrial portions of the proposed CHPE Project route, and in special circumstances to avoid obstacles along the route, such as road or railroad crossings where open trenching is not possible.

The HDD operation at a water-to-land transition would include an HDD drilling rig system, a drilling fluid collection and recirculation system, temporary cofferdam installed at the water exit to maintain exit pit stability following dredging of the pit, and associated support equipment. For each proposed HDD location, two separate drill holes would be required, one for each cable. During installation, a drill rig would be placed on shore behind a temporary fluid return pit and a 40-foot (12-meter) drill pipe with a cutting head would be set in place to begin the drilling process. As the initial pilot borehole is drilled, a slurry composed of water and bentonite (i.e., a shrink-swell clay) would then be pumped into the hole to transport the drill cuttings to the surface, to aid in keeping the borehole stable, and to lubricate the drill. After the final drill length has been achieved, high-density polyethylene (HDPE) conduits would be pulled into the drilled hole from the exit point in the waterbody. Once the HDPE conduits are in place, the transmission cables would be pulled through these pipes and into a transition splice vault, which would remain in place to protect the transmission cable.

A visual and operational monitoring program would be developed and conducted during HDD operations to detect any losses of drilling fluid. Visual observations of drilling fluid in the water, or excessive loss of volume or pressure in the borehole would trigger response actions by the HDD operator, including halting drilling activities and initiating cleanup of released bentonite. A sheet pile cofferdam would be constructed around the exit pit in the waterbody to contain drilling fluids from the HDD operation. A spud barge (barge with self-leveling anchor legs that are supported by the riverbed) with a pumping system would be positioned at the cofferdam to collect any drilling fluids released into the cofferdam enclosure.

It is expected that at least three different sized HDD rigs would be employed on the proposed CHPE Project, requiring varying staging area sizes depending on the length of the drill at the particular location, proximity to sensitive areas such as wetlands where deemed necessary, access limits, and other constraints.

Terrestrial Direct Current Transmission Cable. Approximately 42 percent of the proposed CHPE Project route would be composed of underground (terrestrial) portions. For the underground portions of the transmission line route, the two cables within the bipole system would typically be laid side-by-side in a trench. After the cables are laid in the trench, the trenches would be backfilled with low thermal resistivity material, such as well-graded sand to fine gravel, stone dust, or crushed stone. For the underground transmission cables, the outer sheathing insulation would be composed of an ultraviolet-stabilized, extruded polyethylene layer. The underground transmission cables would have an outside diameter of 4.5 inches (11 centimeters [cm]), and each cable would weigh approximately 20 pounds per foot (30 kilograms per meter). A protective cover of HDPE, concrete, or polymer blocks would be placed directly above the low thermal resistive backfill material before the trench would be backfilled.

A combination of HDD and trenching techniques would be used to install the transmission line underground along upland portions of the route. Trenchless technologies would be used where roadways and railroad beds would be crossed by the transmission line. Trenchless technologies could include HDD, horizontal boring, or pipe jacking (driving a casing underground using pneumatic blows). Following completion of the transmission cable installation, the excavated area would be backfilled and regraded, and the disturbed area would be returned to its previous condition as much as possible.

The proposed CHPE Project would be in the existing ROWs of both the CP and CSX railroads between MPs 112 and 228 and MPs 295 and 301. The Applicant has stated that drafts of Occupancy Agreements for easements along the railroad corridor have been exchanged with both CP and CSX and are currently under negotiation. The final agreements would establish the terms of occupancy of the ROWs and refine required offsets of the transmission cables from the track centerline. The proposed CHPE Project would be in the Harlem River Rail Yard from MPs 330 to 331.

Cooling Stations. In certain situations where there is a long segment of cable installed by HDD, heat can accumulate in the HDPE conduit and reduce the performance of the transmission system. The Applicant has identified 16 sections of underground cabling where the potential for heat accumulation could require that a cooling equipment station be installed at each section. Each of the 16 cooling stations would consist of a chiller unit and pumping system within a building and this equipment would circulate chilled water through tubing in a closed-loop system alongside the HVDC cable to cool the cables. The building footprint would occupy 128 square feet (12 square meters) of land area and the power to the cooling station would be provided by a local electrical utility. The heat emitted from the cables within the buried conduit would then be transferred by the coolant back to the cooling station and then to the outside atmosphere above ground. It is anticipated that the cooling systems would be operated primarily during peak electric load conditions.

Luyster Creek HVDC Converter Station. An HVDC converter station would be constructed near Luyster Creek in Astoria, New York, to convert the electrical power from DC to AC (see **Figure S-5**). The converter station site would be approximately 4.5 acres (1.8 hectares) in size. The HVDC converter station building would be approximately 165 feet by 325 feet (50 meters by 99 meters) with a building footprint of 1.2 acres (0.5 hectares) and a height of approximately 70 feet (21 meters), with transformers, cooling equipment, and power line carrier filters being installed outside of the building. The converter station would be powered by electricity taken directly from the proposed CHPE Project transmission line and would not require onsite personnel during normal operations.

Astoria Annex Substation Interconnection. The Luyster Creek Converter Station would deliver its energy by underground cable to the Astoria 345-kV, sulfur hexafluoride (SF6) gas-insulated substation that serves as the primary point of system interconnection to the grid. The Applicant has proposed to modify the electrical configuration of the Astoria Annex Substation by adding a four-breaker gas-insulated switch ring bus to connect both the cable from the Luyster Creek Converter Station and the Astoria-Rainey Cable to the one remaining empty bus at the Astoria Annex Substation. This new ring bus could be constructed in a new building approximately 72 feet (22 meters) long, 58 feet (18 meters) wide, and 40 feet (12 meters) high. The new ring bus building would be 4,176 square feet (388 square meters) in size and would be located on the same parcel of land as the Luyster Creek Converter Station. The new ring bus would be connected to both the converter station and the Astoria Annex Substation by gas-insulated switch cables in underground pipes. However, no obstacles have been identified that would prevent the expansion of the existing Astoria Ring Bus to eight breaker positions. Therefore, it is unlikely that it would be necessary to build a new building to house the ring bus.

Astoria to Rainey Interconnection. CHPEI would also construct a 345-kV HVAC cable circuit from the ring bus to ConEd's Rainey Substation in Queens to deliver power reliably into ConEd's 345-kV system. This interconnection would consist of HVAC cables buried beneath city streets for approximately 3 miles (5 km) (see **Figure S-5**). The XLPE HVAC cables would be buried in a trench to a depth of more than 4 feet (1.2 meters) with a separation distance of 9 inches (23 cm) between the cables in the trench.

Additional Engineering Details – Heat. XLPE transmission cables typically operate at about 176 to 194 degrees Fahrenheit (°F) (80 to 90 degrees Celsius [°C]) with an emergency operating temperature of about 266 °F (130 °C). The proposed CHPE Project's HVDC cables would be designed to operate at normal temperature of only 158 °F (70 °C). Under limited durations (i.e., maximum of 2 hours) of emergency overload conditions, the resulting increased temperature would not exceed 176 °F (80 °C). At this increased temperature, heat must be carried away from the conductors for them to operate efficiently. Soils in and around a trench perform this heat transfer for underground cables. Where required, a low thermal resistive backfill material would be used instead of native soil in the trench around the cables to ensure sufficient standard heat transfer to the surrounding soils and groundwater.

Additional Engineering Details – Electric and Magnetic Fields. Operation of the proposed CHPE Project transmission line would produce electric and magnetic fields. Transmission lines, like all electric devices, produce electric and magnetic fields, more commonly referred to as electromagnetic fields (EMFs). Voltage, the force that drives the current, is the source of the electric field. Current, the flow of electric charge in a wire, produces the magnetic field. The strength of the EMF depends on the design of the electrical line and the distance from it. EMF is found around any electrical wiring, including household wiring, electrical appliances, and equipment.

Electric fields are measured in volts per meter (V/m) or kilovolts per meter (kV/m). Electric field strength is reduced by shielding or by intervening objects such as structures and vegetation. The proposed CHPE Project transmission cables would be shielded within a lead-alloy sheath and buried, which would effectively eliminate any exposure to the electric field above ground. In areas where the cables cannot be buried (e.g., when installed over existing utility lines or bedrock), protective covering, such as concrete mats, would be installed over them.

Magnetic fields are measured in units of gauss (G) or milligauss (mG). The average magnetic field strength in most homes (away from electrical appliances and wiring) is typically less than 2 mG. Outdoor magnetic fields in publicly accessible places can range from less than a few mG to 300 mG or more, depending on proximity to power lines and the voltage of the power line. The magnetic field produced by the proposed CHPE Project transmission line would be less than 162 mG at the land surface directly over the buried transmission line.

Like electric fields, magnetic fields fall off with distance from the source. Unlike electric fields, however, intervening objects, such as structures, or being buried, do not reduce magnetic field strength. Consequently, while electrical appliances can produce the highest localized magnetic fields, power lines serving neighborhoods and distribution lines and transformers serving individual homes or businesses are a common source of longer-term magnetic field exposure.

S.6.3 Construction and Schedule

The Applicant anticipates that the initial permitting phase of the proposed CHPE Project would continue through mid 2014, with major construction commencing later in 2014. Installation of the transmission cables is proposed to be completed between 2014 and 2017. The Applicant anticipates that the commercial operation date for the proposed CHPE Project would be 2017.

The NYSPSC Certificate issued for the proposed CHPE Project established construction work schedule windows identifying times of the year when work associated with the underwater portion of the transmission line could take place (NYSPSC 2013). These work windows were subsequently supplemented through consultation with NMFS.

Aquatic Construction Sequence. Installation of the aquatic portion of the transmission line would occur via jet plow in all locations except where installed by shear plow in southern Lake Champlain (south of MP 74), installed by HDD at water-to-land transitions and under the East River, laid on the surface over bedrock or utility line crossings and covered with concrete mats (total 3.0 miles [4.8 km] for entire aquatic portion of the proposed CHPE Project route), and blasted for 460 feet (140 meters) of trench at MP 324.5 in the Harlem River. The plowing process would be conducted using a dynamically positioned cable barge and towed plow device that simultaneously lays and embeds the aquatic transmission cables in a trench. The transmission cables composing the bipole would be deployed from the vessel to a funnel device on the plow. The plow is lowered to the lake or river floor, and the plow blade cuts into the lake or riverbed while it is towed along the pre-cleared route to carry out a simultaneous lay-and-burial operation. The plow would bury both cables of the bipole in the same trench at the same time. Anchorage of vessels during installation of the aquatic transmission line would be necessary in the event that bottom conditions are encountered that either stop forward progress at reasonable tow tension or result in excessive rolling or pitching of the jet plow. Anchorage would be anticipated in specific areas such as where locations of construction and removal of temporary cofferdams and cable landings at water-to-land transitions, marine splicing locations (although this could also be accomplished using dynamic positioning), and possibly along the 460-foot (140-meter) length of bedrock trenching in the Harlem River (at MP 324.5).

It is anticipated that the majority of the aquatic cable route would be installed and buried using water-jetting techniques, such as the jet plow and shear plow. The jet plow is fitted with hydraulic pressure nozzles that create a downward and backward flow to fluidize the sediment within a 2-foot (0.6-meter)-wide by 4- to 8-foot (1.2- to 2.4-meter)-deep trench, allowing the transmission cables to settle to the bottom of the trench under their own weight before the sediments settle back into the trench. The trench dimensions of the shear plow would be 0.8 feet (0.2 meters) wide and 4 to 8 feet (1.2 to 2.4 meters) deep.

Installation of the transmission line in the Harlem River would require blasting to excavate approximately 460 feet (140 meters) of bedrock from a former rock peninsula at MP 324.5. The minimum burial depth for the transmission line in areas of rock in the Harlem River, which is a federally maintained (i.e., dredged) navigation channel, is 6 feet below the rock surface. Geologic maps indicate this rock is Fordham gneiss with unconfined compressive strength that is too hard to remove by cutterhead, ripping, hoe-ramming, or non-explosive methods. The Applicant would conduct blasting trials using a pre-packaged chemical demolition agent loaded into boreholes drilled into the rock that, when ignited, would generate an expansive force to fracture the rock. The rock fragments would then be removed by long-reach hydraulic excavating buckets and deposited in a barge. If the trials were successful, a vertical pattern of holes would be drilled into the rock to form a trench. The broken rock would be dredged sequentially from each end of the trench progressing towards the middle with the rock fragments placed into a barge. If the trials were unsuccessful, it would be necessary to use water gel dynamites to fracture the rock, which would produce a shock wave upon detonation. The blasting program in the Harlem River would be estimated to take up to 10 weeks, requiring approximately 300 drill holes of 1.5-inch (3.8-cm) diameters with each drill taking 30 to 60 minutes to complete. The exact production schedules would be developed by the construction contractor; however, preliminary construction sequencing studies indicate 15 to 20 separate blasts could be required.

Terrestrial Cable Installation. The general sequence for installing the terrestrial DC transmission cables along the road and railroad ROWs would be conducted in steps as follows:

- Initial clearing operations (where necessary) and storm water- and erosion-control installation
- Trench excavation
- Cable installation
- Backfilling
- Restoration and revegetation.

The typical trench would be up to 9 feet (2.7 meters) wide at the top and approximately 3 feet (0.9 meters) deep to allow for proper depth and a 1-foot (0.3-meter) separation required between the two transmission cables to allow for heat dissipation. If shallow bedrock is encountered, the rock would be removed by the most suitable technique given the relative hardness, fracture susceptibility, and expected volume of material. The operation of the transmission cables would result in the generation of heat, which would reduce the electrical conductivity of the cables; therefore, prior to laying the cables, the trenches would be backfilled with low thermal resistivity material such as sand to prevent heat from one cable affecting a nearby cable. There would be a protective concrete cover such as a layer of weak concrete directly above the low thermal resistive backfill material. The whole assembly would have a marker tape placed 1 to 2 feet (0.3 to 0.6 meters) above the cables.

For crossings of waterbodies such as Catskill Creek and numerous small streams, five dry-ditch crossing methods would be used for installation of the transmission line. These methods are as follows:

- *Attachment to a Bridge.* Where available and feasible, the transmission line would be affixed directly to an existing railroad bridge as it spans the waterbody.
- *Flume Crossing Method.* This method involves installing a flume pipe to carry the stream around the work area in an enclosed pipe, allowing the trenching to be done in a dry condition, limiting the amount of sediment that can enter the waterbody.

- *Dam and Pump Crossing Method.* For this method, the stream is dammed upstream of the work area and a pump and hose are used to transport the stream flow to bypass the trenching area to a point downstream where it would be discharged back to the streambed.
- *HDD.* Under this method, cable conduits would be installed under the streambed using HDD and avoiding any disturbance to the streambed, and the cables would then be pulled through the conduits.
- *Open Cut.* The open cut method of construction involves digging an open trench across the streambed, laying the cable, and backfilling the trenched area without diverting the stream around the work area.

The waterbody crossing methods would be determined based on the NYSDPS stream width classification, NYSDEC stream type classification, and conditions present during the time of construction and would be in accordance with NYSDPS's *Environmental Management and Construction Standards and Practices for Underground Transmission and Distribution Facilities in New York State* (NYSDPS 2003).

In wetland areas, the cables would generally be installed by trenching. The typical sequence of activities would include vegetation clearing, installation of erosion controls, trenching, cable installation, backfilling, and ground surface restoration. Equipment mats or low-ground-pressure tracked vehicles would be used to minimize compaction and rutting impacts on wetland soils. To expedite revegetation of wetlands, the top 1 foot (0.3 meters) of wetland soil would be stripped from over the trench, retained, and subsequently spread back over and across the backfilled trench area to facilitate wetland regrowth by maintaining physical and chemical characteristics of the surface soil and preserving the native seed bank. Trench plugs or other methods would be used to prevent draining of wetlands or surface waters down into the trench.

The permanent ROW required for maintenance and operation of the transmission line along the terrestrial portions of the proposed CHPE Project route would be up to 20 feet (6 meters) wide for both railroad and roadway ROWs. The permanent ROW would provide protection of the transmission cables against third-party damage and would facilitate any required maintenance or repairs.

Measures to Minimize Environmental Impacts. As part of its application development process, the Applicant detailed a number of industry-accepted BMPs that it would undertake to avoid or reduce environmental impacts during construction and operation of the proposed CHPE Project. The Applicant would develop a final Environmental Management and Construction Plan (EM&CP), which documents environmental and construction management procedures and plans to be implemented during the proposed CHPE Project construction activities and during facility operation. These impact reduction measures, collectively referred to as BMPs, have been proposed by the Applicant for use during construction and operation to protect environmental, agricultural, cultural, and other potentially sensitive resources along the proposed CHPE Project route. These BMPs have been incorporated into the NYSPSC Certificate to the Applicant and will be incorporated into the final EM&CP (NYSPSC 2013). The Applicant-proposed measures have been taken into account in the environmental analyses conducted for the EIS. These measures include development of a Spill Prevention, Control, and Countermeasures (SPCC) Plan, time-of-year work restrictions, water quality monitoring, biological studies, work site restoration, and inspection and reporting.

S.6.4 Staging Areas

Aquatic Transmission Cable Support Facilities. For the portions of the proposed CHPE Project route where aquatic transmission cables would be installed, it is anticipated that minimal land-based support would be required. Transport of the aquatic transmission cables would occur via the cable-laying vessel, supported by resupply barges operated from a temporary storage area on land. This land-based support facility is expected to be no greater than 200 by 300 feet (61 by 91 meters), and would be at an existing port with heavy lift facilities, likely the Port of Albany or the Port of New York and New Jersey.

Terrestrial Transmission Cable Support Facilities. For the terrestrial portions of the proposed CHPE Project route where underground transmission cables would be installed, additional nearby temporary aboveground support facilities would be established. Support facilities could include contractor yards, storage areas, access roads, and additional workspace. Additional workspace might be required at HDD locations, cable-jointing locations, and areas with steep slopes. The support facilities would be sited within the existing road and railroad ROWs.

S.6.5 Operations and Maintenance

The proposed CHPE Project has an expected life span of 40 years or more. During this period, it is expected that the transmission system would maintain an energy availability factor of 95 percent, meaning that the transmission system would be delivering electricity 95 percent of the time, with the remaining 5 percent allocated for scheduled and unscheduled maintenance.

The HVDC and HVAC transmission cables would be designed to be relatively maintenance-free and operate within the specified working conditions. However, selected portions or aspects of the transmission system would be inspected to ensure equipment integrity is maintained.

ROW Maintenance. During operation of the proposed CHPE Project, vegetation clearing in the transmission line ROW would be performed on an as-needed basis. Vegetation management would include mowing, selective cutting to prevent the establishment of large trees (i.e., greater than 20 feet [6 meters] tall) directly over the transmission line, and vegetation clearing on an as-needed basis to conduct repairs.

Transmission Cable Repairs. While not anticipated, it is possible that over the lifespan of the proposed CHPE Project, the transmission cables could be damaged, either by human activity or natural processes. Before operation of the proposed CHPE Project begins, an Emergency Repair and Response Plan (ERRP) would be prepared to identify procedures and contractors necessary to perform maintenance and emergency repairs. The typical procedure for repair of a failure within the aquatic and terrestrial portions of the proposed CHPE Project route is described as follows:

- *Aquatic Transmission Cable Repair*. In the event of aquatic cable repair, the location of the problem would be identified and crews of qualified repair personnel would be dispatched to the work location. A portion of the transmission cable would be raised to the surface, the damaged portion of the cable cut, and a new cable section would be spliced in place by specialized jointing personnel. Once repairs were completed, the transmission cable would be reburied using a remotely operated vehicle (ROV) jetting device.
- *Terrestrial Transmission Cable Repair*. In the event of terrestrial transmission cable repair, contractors would excavate around the location of the problem and along the transmission cable for the extent of cable to be repaired or replaced. Specialized jointing personnel would remove the damaged cable and install new cable. Once complete, the transmission cable trench would be backfilled and the work area restored using the same methods as described for the original installation.

Transmission Service. The maximum electrical power delivery capability for the proposed CHPE Project under normal conditions would be 1,000 MW. The ultimate maximum capacity would be determined during final design of the proposed CHPE Project. The estimated short-time (i.e., 2-hour) emergency overload capability would be approximately 1,150 MW for the transmission system.

The NYISO would be the controlling authority for the proposed CHPE Project and the operator of the system where the energy would originate, Hydro-Québec, would coordinate with the NYISO.

Decommissioning. The Applicant proposes to de-energize and abandon the proposed CHPE Project transmission line in place following expiration of its useful life. This proposed approach or any changes to the plan for decommissioning would be subject to applicable Federal and state regulations in place at that time.

S.7 Alternatives Considered but Eliminated from Further Detailed Analysis

Several technology, alignment, and construction alternatives were considered but eliminated from further detailed study for various reasons. Alternatives considered but dismissed are discussed in the following paragraphs, along with the reasons for dismissal.

S.7.1 Alternative Upland Transmission Line Routes

The Applicant considered a range of terrestrial routes for the transmission line. These alternatives included consideration of transmission line alternatives that would have been installed either on overhead structures or buried within a new or existing terrestrial ROW, rather than in Lake Champlain or the Hudson, Harlem, and East rivers. An alternatives analysis report documenting the evaluation of alternative routes was submitted by the Applicant to the USACE in July 2013 as part of the Applicant's Clean Water Act (CWA) Section 404 permit application. This report is included in the EIS as **Appendix B**. DOE determined that these alternative transmission routes were not reasonable due to engineering feasibility, cost, and logistical considerations (e.g., legal limitations), and, therefore, they have been eliminated from further consideration in the EIS.

Alternatives considered included the following:

- Constructing the transmission line in and along existing electrical transmission line ROWs from the U.S./Canada border to New York City
- Constructing the transmission line in and along existing highway and roadway ROWs
- Constructing the transmission line within existing railroad ROWs beyond those identified as part of the proposed CHPE Project
- Using combinations of railroad, electrical, and roadway ROWs
- Development of a new electrical transmission line ROW.

These alternatives were analyzed and eliminated from further consideration for the following reasons.

- Twelve alternative alignments were identified in the NYSPSC process and in **Appendix B** as part of the alternative Hudson River Western Rail Line Route. Ten of these segments were not considered reasonable due to engineering constraints, intrusions into sensitive environmental areas and municipal parkland, existing infrastructure and development, access restrictions, required use of long HDD segments, blasting with insufficient spacing, and increased cost and construction time. The two remaining alternative alignments considered as part of this route were considered environmentally preferable and reasonable (Coeymans to Catskill and Stony Point to Clarkstown) and were adopted as part of the proposed CHPE Project analyzed in the EIS.

- The Harlem River Rail Route alternative alignment was not considered reasonable due to engineering and geotechnical constraints, existing infrastructure and development including passenger and freight rail lines and stations, potential for cable damage and significant traffic disruption, and increased cost and construction time.
- The Hell Gate Bypass Route alternative alignment was considered reasonable, would avoid conflict with existing development and reduce in-river construction, and was adopted as part of the proposed CHPE Project analyzed in the EIS.
- Two overland alternative routes, one west of Adirondack Park and one east of the Hudson River, were not considered reasonable due to engineering constraints, existing infrastructure and development, required use of long HDD segments with insufficient space in some areas, and increased cost and construction time.
- Both the development of a new electrical transmission line ROW and use of existing electrical transmission ROWs were not considered reasonable alternatives because of land use issues (extensive requirements for owner agreements or eminent domain). In addition, both alternatives were not considered reasonable due to engineering constraints, potential long and difficult HDD installations, and substantially increased project costs and construction time.

S.7.2 Conservation and Demand Reduction Measures

NYISO has projected that New York State's annual energy demand, without efficiency measures, would increase by 14 percent from approximately 163,000 GWh in 2011 to approximately 186,000 GWh in 2022, an increase of 23,000 GWh. Including implementation of the energy-efficiency measures identified in the 2009 State Energy Plan, NYISO forecasts that energy demand would increase to approximately 173,500 GWh, an increase of 10,500 GWh (7 percent). For the New York City location zone, NYISO forecasts that energy demand will increase more rapidly than statewide, rising by 9 percent between 2011 and 2022 (NYISO 2012). Consequently, NYISO has demonstrated energy-efficiency and conservation measures alone would not address southeastern New York's increasing demand for electricity and that a mix of energy efficiency, demand reduction, and new generation would be required to meet future energy demand. Therefore, DOE determined that the conservation and demand-reduction measures alternative alone is not a reasonable alternative and is therefore not addressed further in the EIS.

S.7.3 Use of HVAC Versus HVDC Technology

Two types of transmission technologies could be used to transport electricity from Canada to the New York City metropolitan area, namely HVAC or HVDC technology. The transmission technology selection greatly influences the system design and construction and the resulting potential environmental impacts.

AC Transmission Technology. An overhead HVAC transmission system is the traditional method of expanding transmission capacity within and between utility service territories. HVAC transmission by overhead lines is efficient for distances up to 400 miles (644 km). Construction of new overhead HVAC transmission cables would also require a new or expanded ROW for utility corridors, and in metropolitan and suburban areas, land costs are high and public concern regarding aesthetics and potential environmental and health effects (e.g., EMF) from an overhead HVAC transmission line result in few such projects proceeding beyond the planning stage.

DC Transmission Technology. The primary advantage of long-distance HVDC transmission technology lies in its efficiency. Because there is no need to charge the capacitance (i.e., measure of energy potential) of a transmission cable as is required for an AC transmission line, transmission losses are significantly reduced. In addition, HVDC only requires two conductors instead of three and allows for reduced separation between conductors. As a result, the need for an expansive new ROW is reduced and construction costs are lowered.

The Applicant has proposed an HVDC transmission system for the following reasons:

- *Greater Flexibility.* Long-distance HVDC transmission lines can be buried underwater and underground, and installed overhead, thus providing more flexibility with ROW planning.
- *Reduced ROW Requirements.* The proposed HVDC technology would require less ROW than comparably sized overhead HVAC transmission lines. The transmission cables would be buried, and the total corridor requirements typically would be approximately 20 feet (6 meters) wide in terrestrial sections and 30 feet (9 meters) wide in aquatic sections. An overhead HVAC transmission line of similar capacity would require a terrestrial ROW of up to 150 feet (46 meters).
- *Minimized Exposure to Electric Fields When Buried.* Independent studies have shown that buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface (WHO 2012). The burial of the transmission line at the proposed depths reduces the electric field exposure compared to an overhead transmission system.
- *Greater Reliability.* Underwater and underground armored HVDC transmission cables have a higher reliability than overhead HVAC transmission cables, primarily because they are less likely to be subject to damage from weather, collision, or vandalism. They also operate within a constant temperature regime; therefore, they are not subject to thermal derating at high ambient temperatures.
- *Enhanced Security.* Since the terrorist attacks of September 11, 2001, energy infrastructure security has become a national priority. The physical separation of transmission infrastructure in multiple corridors is one means of enhancing security, as is the installation of such facilities underwater and underground.
- *Reactive Power Requirements.* HVAC transmission is limited by the amount of reactive power required to deliver active power through transmission lines, so that long-distance power transmission by HVAC lines is restricted due to limitations on how far reactive power will travel.
- *Greater Control to Improve System Stability.* HVDC interconnections to AC transmission systems have the advantage of being able to enhance the controllability and stability of the AC transmission system by allowing the operation to regulate active power flow in the receiving transmission line.

For these reasons, the Applicant determined that only HVDC transmission technology would meet the objectives of the proposed CHPE Project; therefore, the use of HVDC technology is a component of the Applicant's preferred project proposal evaluated in the EIS. In light of this, DOE determined that the alternative of using HVAC transmission lines to deliver power into the New York City metropolitan area was not reasonable as an alternative from the Applicant, and therefore was eliminated from further consideration in the EIS.

S.7.4 Interconnection Alternatives

As part of its initial system planning evaluations, the Applicant considered a number of different locations for interconnecting the proposed CHPE Project transmission system into the grid and for siting the DC to AC converter station that would be required for this interconnection.

The Applicant conducted an Interconnection Feasibility Study to evaluate potential alternative POIs relating to the reliability of the New York State transmission system (CHPEI 2010a). The feasibility study evaluated possible POIs for the HVAC transmission interconnection at four locations in the New York City metropolitan area. The feasibility study determined that the NYPA Astoria Annex substation was the preferred location for the interconnection. The feasibility study indicated that the following locations were not feasible because of the reasons stated:

- The West 49th Street 345-kV Substation was not a practical POI location due to insufficient space for the interconnection equipment and excessive costs that would have rendered the proposed CHPE Project economically infeasible.
- The Sherman Creek POI would have required construction of a new step-down transformer station at a location where space is limited, and because ConEd indicated its preference that the Sherman Creek substation not be used as the POI.
- Engineering and environmental constraints associated with installing the HVAC transmission cables at the Gowanus 345-kV Substation rendered the site as an unreasonable POI location for the proposed CHPE Project.

Due to the reasons identified in the foregoing paragraphs, DOE determined that the West 49th Street, Sherman Creek, and Gowanus POIs were not reasonable alternatives and, therefore, were eliminated from further consideration in the EIS.

S.7.5 Alternatives to the Luyster Creek Converter Station

In conjunction with the identification of feasible POIs in the New York City metropolitan area, the Applicant identified possible sites for construction of the converter station in proximity to the POIs. Sites that were identified and evaluated are discussed as follows.

Gowanus POI Converter Station Location Alternatives. The Applicant identified the following three potential converter station sites near the existing Gowanus 345-kV Substation for evaluation:

- 611 Smith Street in Brooklyn, New York
- 688 Court Street in Brooklyn, New York
- Property within the Sunset Industrial Park in Brooklyn, New York.

However, due to concerns over environmental contamination along potential transmission cable routes and at the converter station sites, the presence of existing infrastructure and heavy vessel traffic could prohibit or further complicate the installation of the HVDC transmission cables. Therefore, locating the converter station near the Gowanus Substation was deemed to be unreasonable, and eliminated from further consideration.

Yonkers HVDC Converter Station Alternative. The Applicant identified and evaluated two potential locations in Yonkers for the 1,000-MW converter station. The first property is on Wells Avenue in Yonkers, between Alexander Street and Woodworth Avenue. The Wells Avenue site in Yonkers was included as part of the August 2010 proposal for the CHPE Project because it met the minimum size requirements, allowed for an interconnection to a number of the potential POIs under consideration, and was available to the Applicant. This previously proposed converter station site was dismissed from further consideration during the NYSPSC review process and is not included in the NYSPSC Certificate issued to the Applicant; therefore, this site is not considered further by DOE in this EIS.

A second Yonkers converter station site considered by the Applicant was at the former Yonkers (otherwise known as Glenwood) Power Station on Ravine Avenue. However, the size of the parcel (2.0 acres [0.8 hectares]) does not meet the minimum requirements for the converter station, and, therefore, this site was not considered a reasonable alternative by DOE and was eliminated from further consideration in the EIS.

Harlem River Rail Yard. An alternative converter station site was identified at a site in the Bronx along the terrestrial transmission system route at approximate MP 330.8 at a site owned by NYSDOT. However, NYSDOT declined to make that site available to the Applicant as a converter station, and consequently the Harlem River Rail Yard site was not considered a reasonable alternative by DOE and was eliminated from further consideration in the EIS.

S.8 Summary of Potential Impacts Associated with the Proposed CHPE Project

A summary of potential impacts from the construction, operation, maintenance, and emergency repairs associated with the proposed CHPE Project and the No Action Alternative are presented in the following resource area discussions and summarized in **Table S-1**. The full impact analysis, along with Applicant-proposed measures and BMPs to avoid or minimize potential impacts, is presented in **Chapter 5** (Environmental Consequences) and **Chapter 6** (Cumulative Impacts) of the EIS.

While no specific alternative power generation sources have been identified under the No Action Alternative, it is assumed that future demand growth for electric power would be met by some mix of other power generation sources. A full discussion of the No Action Alternative is provided in **Chapter 4** of the EIS.

S.8.1 Land Use

Construction and operation of the proposed CHPE Project would be consistent with relevant land uses plans and policies, including the New York State Coastal Management Program (CMP). The New York State Department of State (NYSDOS) conditionally concurred with the consistency certification of the proposed CHPE Project under the enforceable policies of the New York State CMP subject to the implementation of certain conditions. These conditions, along with other measures to minimize the potential environmental impacts, have been incorporated into the proposed CHPE Project design by the Applicant and reflected in the NYSPSC Certificate for the proposed CHPE Project (NYSPSC 2013).

Impacts from Construction

Construction activities associated with the installation of the aquatic portions of the proposed CHPE Project would result in additional vessel traffic and an area immediately surrounding the work site that would be off-limits to other vessels. However, aquatic installation activities would not prohibit any water-dependent commercial and recreational uses of adjacent areas during the few hours that construction vessels would be present or during the approximate 2-week period when HDD operations would be occurring. Because the aquatic transmission line would be installed along state-owned submerged lands in Lake Champlain and the Hudson, Harlem, and East rivers, the Applicant would be required to obtain an easement from the New York State Office of General Services and pay associated fees.

Construction activities associated with the installation of the terrestrial portion of the transmission line, which would be within roadway and railroad ROWs, would generally be compatible with existing road and railroad operations, but could result in temporary disturbances that disrupt these operations, such as roadway lane closures or reduced shoulders, and presence of heavy equipment and construction

Table S-1. Summary of Potential Impacts Associated with the Proposed CHPE Project

<table>
<tr><th rowspan="2">Comparison Factor/ Resource Area</th><th colspan="4">Proposed CHPE Project</th><th rowspan="2">No Action Alternative</th></tr>
<tr><th>Lake Champlain Segment</th><th>Overland Segment</th><th>Hudson River Segment</th><th>New York City Metropolitan Area Segment</th></tr>
<tr><td colspan="6">General Overview</td></tr>
<tr><td>State</td><td>New York</td><td>New York</td><td>New York</td><td>New York</td><td>New York</td></tr>
<tr><td>Counties</td><td>Clinton
Essex
Washington</td><td>Albany
Greene
Saratoga
Schenectady
Washington</td><td>Dutchess
Greene
Orange
Putnam
Rockland
Ulster
Westchester</td><td>Bronx
New York
Queens</td><td>N/A</td></tr>
<tr><td>Milepost Range</td><td>0–101</td><td>101–228</td><td>228–324</td><td>324–336</td><td>N/A</td></tr>
<tr><td>Corridor Type</td><td>Aquatic</td><td>Terrestrial</td><td>Aquatic/Terrestrial</td><td>Aquatic/Terrestrial</td><td>N/A</td></tr>
<tr><td>Construction Method(s)</td><td>Jet Plow, Shear Plow</td><td>Trenching, HDD</td><td>Jet Plow, Trenching, HDD</td><td>Jet Plow, Trenching, HDD, Underwater Blasting</td><td>N/A</td></tr>
<tr><td>Construction Period(s)</td><td>Cable Installation: 7 months</td><td>Cable Installation: 3 years</td><td>Cable Installation: 5 months</td><td>Cable Installation: 7 months
Converter Station: 1 year</td><td>N/A</td></tr>
<tr><td colspan="6">Impacts on Resource Areas from Construction and Operations, Maintenance, and Emergency Repairs of the Proposed CHPE Project</td></tr>
<tr><td>Land Use</td><td>Construction: Temporary, non-significant increase in limitations on water-based uses.
Operations: *Potential for future limitations on water-based uses or access during inspection activities; use limitations from maintenance and emergency repairs would be shorter and more localized than for construction.</td><td>Construction: Temporary, non-significant disruption of normal routines due to access limitations from presence of construction activities.
Operations: Potential for future land use restrictions for operations and maintenance. Emergency repair impacts similar to construction, but shorter and with more localized disturbance.</td><td>Construction/Operations: Same temporary use and access limitations or disruptions and potential future land use restrictions as Lake Champlain and Overland segments.</td><td>Construction/Operations: Same temporary use limitations or disruptions as Lake Champlain and Overland segments.</td><td>None expected. No new land use impacts would occur.</td></tr>
</table>

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Transportation and Traffic	**Construction:** Non-significant, temporary, and localized use limitations or disruptions on navigation, ferries, and other commercial and recreational transportation uses in Lake Champlain and in the Champlain Canal. **Operations:** Potential for anchor snags.	**Construction:** Non-significant disruptions on railroad operations, traffic flow on New York State Route 22, and city streets in Schenectady and street crossings. **Operations:** Potential for future temporary access limitations on roadways and railways.	**Construction:** Non-significant, temporary, and localized use limitations or disruptions affecting navigation, ferries, and other commercial and recreational transportation uses in the Hudson River. Non-significant disruptions affecting railroad operations and traffic flow on U.S. Route 9W in Stony Point, Haverstraw, and Clarkstown. **Operations:** Potential for anchor snags.	**Construction:** Non-significant, temporary, and localized use limitations or disruptions affecting navigation, ferries, and other commercial and recreational transportation uses in the Harlem and East rivers. Non-significant disruptions affecting railroad operations in the Bronx and city traffic flow in Astoria. **Operations:** Potential for anchor snags.	None expected. No new transportation, navigation, or traffic impacts would occur.
Water Resources and Quality	**Construction/Operations:** Non-significant, localized increases in turbidity and downstream sedimentation and resuspension of contaminated sediments in surface water by water jetting. Water quality impacts would be within regulatory standards.	**Construction/Operations:** Localized and non-significant increases in turbidity, suspension of sediments in surface waters, nearby groundwater wells, and wetland areas during construction.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new water resources and quality impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Aquatic Habitats and Species	**Construction:** Localized non-significant disturbance to 612 acres (248 hectares) of lake bottom resulting in habitat degradation, avoidance, or loss; noise, and vibration; impacts on benthic communities; potential for accidental exposure to hazardous materials. Potential non-significant mortalities of individuals among non-mobile species could occur from inability to adapt to new sediment conditions. **Operations:** Non-significant generation of magnetic fields and induced electric fields detectable, and potentially avoided, by some fish and shellfish species. Sediment temperature increase above the cables might lead to localized habitat avoidance of benthic infauna. Emergency repair effects expected to be less than construction because they would be shorter-term and more localized.	**Construction/Operations:** Disturbance of streambeds would be the same as for the Lake Champlain Segment with temporary, localized, non-significant stream habitat degradation or loss from increased turbidity and downstream sedimentation and resuspension of contaminated sediments in surface water during the streambed restoration process.	**Construction/Operations:** Riverbed disturbance of 533 acres (216 hectares) would involve the same impacts as indicated for Lake Champlain Segment, and additional non-significant impacts on essential fish habitat (EFH), including water column and substrates, and associated species. Impacts on streams in terrestrial portions of the route would be the same as indicated for the Overland Segment.	**Construction/Operations:** Riverbed disturbance of 36 acres (15 hectares) would involve the same impacts as indicated for the Lake Champlain and Hudson River segments, and non-significant impacts from noise and vibration due to blasting.	None expected. No new impacts on aquatic habitats and species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Aquatic Protected and Sensitive Species	**Construction:** No effects on federally listed species. Localized non-significant effects on individuals among state-listed fish and shellfish species similar to those for non-listed species. **Operations:** Same effects as for non-listed aquatic species; detection and potential avoidance of magnetic fields and sediment temperature resulting in habitat avoidance of infauna during operation. Emergency repair effects would be shorter-term and more localized than those from construction.	**Construction/Operations:** No effects on federally listed or state-listed aquatic species expected.	**Construction:** Localized non-significant effects on individuals among federally listed and state-listed sturgeon species, including habitat degradation or loss, noise, and vibration; potential vessel collisions with shortnose and Atlantic sturgeon; increased turbidity and sedimentation and redeposition of sediments; potential for accidental exposure to hazardous materials that could affect abilities to forage and reproduce. **Operations:** Same effects as for non-listed aquatic species; detection and potential avoidance of magnetic fields and sediment temperature resulting in habitat avoidance of infauna during operation. Emergency repair effects would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same non-significant effects on federally listed and state-listed sturgeon species as indicated for the Hudson River Segment, and non-significant impacts from noise and vibration due to blasting.	None expected. No new effects on aquatic protected and sensitive species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Terrestrial Habitats and Species	**Construction/Operations:** No significant impacts would be expected because the proposed CHPE Project route is installed underwater in this segment.	**Construction:** Permanent conversion of approximately 48 acres (19 hectares) of fringe forest habitat to scrub/shrub habitat. Non-significant, localized noise, dust, soil compaction, and habitat fragmentation impacts including removal of vegetation, habitat avoidance, and changes in species composition. Permanently reduced abundance would not be expected; known responses to narrow corridors do not involve permanent avoidance or population displacement; species could traverse the corridor post-construction. **Operations:** Some wildlife species would detect magnetic fields and heat generated by the transmission line during operation, but these conditions are unlikely to reduce health or productivity. Periodic vegetation maintenance in transmission line ROW would compact vegetation and soils and produce temporary fugitive dust impacts. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same conversion of some fringe forest habitat to scrub/shrub habitat during construction, as described for the Overland Segment. Same non-significant, localized habitat alterations and resulting impacts as indicated for construction in the Overland Segment. Same non-significant, localized impacts from operation, maintenance and emergency repairs as indicated for the Overland Segment.	**Construction/Operations:** No significant construction impacts on terrestrial vegetation and habitats expected because installation would occur in the Hudson River and within developed urban land with little natural vegetation and habitat. Non-significant, localized disturbance of birds and bats that could display habitat or feeding avoidance during construction. Same non-significant, localized impacts from operation, maintenance and emergency repairs as indicated for the Overland Segment.	None expected. No new impacts on terrestrial habitats and species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Terrestrial Protected and Sensitive Species	**Construction:** Non-significant, localized noise or vessel lighting disturbances of federally and state-listed Indiana bat and the Federal proposed-endangered northern long-eared bat. **Operations:** Operations are not expected to result in reduced health or productivity of the Indiana bat or the northern long-eared bat. No effects anticipated during maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Conversion and disturbance of fringe forest habitat along the ROWs may affect, but is not likely to adversely affect, federally listed and state-listed species, including bat species listed or proposed for listing, the Karner blue butterfly, and migratory birds, potentially present during construction. **Operations:** Operations and maintenance activities are not expected to adversely affect terrestrial protected and sensitive species. Effects from emergency repairs would be similar to construction but for a shorter-term and more localized than those from construction.	**Construction:** Same non-significant effects on federally listed and state-listed species and migratory birds as indicated for Lake Champlain and Overland segments. Similar non-significant construction effects on bald eagles that might be encountered when activities are underway. **Operations:** Operations and maintenance are not expected to adversely affect terrestrial protected and sensitive species.	**Construction:** No effects on federally listed species because there is no suitable habitat for them where construction would occur. **Operations:** Operations and maintenance are not expected to adversely affect terrestrial protected and sensitive species.	None expected. No new effects on terrestrial protected and sensitive species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Wetlands	**Construction/Operations:** None expected.	**Construction:** Localized potential for habitat disturbance; non-significant impacts on 67.4 acres (27.3 hectares) of wetlands, including 16.2 acres (6.6 hectares) of forested wetlands and 51.2 acres (20.7 hectares) of non-forested wetlands; and significant, permanent change on 10.2 acres (4.1 hectares) of wetlands, including 2.0 acres (0.8 hectares) of forested wetlands that would be converted to scrub-shrub wetlands, and on 8.3 acres (3.4 hectares) of non-forested wetlands resulting in habitat degradation and loss. **Operations:** Non-significant impacts from operations because heat would dissipate well below the water surface. Periodic vegetation maintenance in transmission line ROW would compact vegetation and soils and result in temporary fugitive dust impacts. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Localized potential for non-significant impacts on 0.03 acres (0.01 hectares) of wetlands including one brook under which the transmission line would be installed, potentially resulting in habitat disturbance. **Operations:** Same non-significant, localized impacts from maintenance and emergency repairs as described for the Overland Segment.	**Construction/Operations:** None expected.	None expected. No new wetlands impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Geology and Soils	**Construction:** Temporary disturbance of 127,000 cubic yards (97,000 cubic meters) of sediment. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction. No impacts from possible seismic events.	**Construction:** Temporary disturbance of approximately 585 acres (237 hectares) of upland area. Non-significant impacts from bedrock blasting and removal, increased erosion and sedimentation, and soil compaction on land and sediment disturbance in waterways and wetlands. **Operations:** Negligible increase in soil erosion and sedimentation from periodic vegetation maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Temporary disturbance of 229,000 cubic yards (175,000 cubic meters) of sediment. Temporary disturbance of approximately 47 acres (19 hectares) of upland area. Upland bedrock blasting and removal possible; erosion, sedimentation, and soil compaction over land. **Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Temporary disturbance of 11,000 cubic yards (8,400 cubic meters) of sediment. Temporary disturbance of approximately 14 acres (6 hectares) of upland area. Otherwise, same impacts as indicated for the Lake Champlain and Overland segments.	None expected. No new geology and soils impacts would occur.
Cultural Resources	**Construction:** Potential adverse effects on 5 underwater archaeological sites, 2 terrestrial sites extending into Lake Champlain, and 2 National Register of Historic Places (NRHP)-listed sites. **Operations:** No adverse effects are expected.	**Construction:** Potential adverse effects on 34 terrestrial archaeological sites, 16 NRHP-listed or -eligible sites, and 1 cemetery. **Operations:** No adverse effects are expected.	**Construction:** Potential adverse effects on 8 terrestrial archaeological sites, 6 underwater archaeological sites, 7 NRHP-listed or -eligible sites, and 1 cemetery. **Operations:** Potential visual impacts on 1 NRHP-listed site.	**Construction:** Potential adverse effects on 7 terrestrial archaeological sites and 10 NRHP-listed or -eligible sites. **Operations:** None expected.	None expected. No new cultural resources effects would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Visual Resources	**Construction:** Non-significant impacts on visual resources from temporary presence of construction vessels and activities. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Non-significant impacts on visual resources from temporary presence of construction equipment and activities. **Operations:** Non-significant impacts from operation and maintenance of cooling stations consisting of a 128-square foot (12-square meter) building. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new impacts on visual resources would occur.
Infrastructure	**Construction:** Non-significant impacts include intersecting utility lines, potential service disruption, increased fuel use, and generation of solid waste. **Operations:** Increased reliability and capacity of electricity provision. Increased fuel use during maintenance or emergency repairs.	**Construction:** Non-significant impacts include intersecting utility lines, potential service disruption of public water supply, increased fuel use, storm water management, and solid waste management. **Operations:** Increased reliability and capacity of electricity provision. Increased fuel use during maintenance or emergency repairs.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and Overland Segment for the terrestrial portion.	None expected. No new infrastructure impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Recreation	**Construction:** Temporarily limited access to water area in active construction zone. Non-significant impacts on recreational resources from temporary presence of construction vessels and activities. **Operations:** Non-significant impacts during operations and maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Potential lane restrictions on roads near recreational facilities. Non-significant impacts on recreational resources from temporary presence of construction equipment and activities. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new impacts on recreational resources would occur.
Public Health and Safety	**Construction:** Potential health and safety impacts on construction workers; no impacts are expected on general public health and safety. **Operations:** Potential health and safety impacts on contractors during operations; emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Impacts would not be expected from magnetic fields because magnetic field levels from the proposed CHPE Project would be within NYSPSC guidelines. Otherwise impacts expected to be same as indicated for Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	None expected. No new public health and safety impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Hazardous Materials and Wastes	**Construction:** Storage of hazardous materials presents potential for spill contamination of water or land (staging areas); generation of waste and debris during installation. **Operations:** Limited amounts of oils, solvents, antifreeze, and other hazardous materials generated from routine maintenance and inspections; less than construction for emergency repair.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	None expected. No new hazardous materials and wastes impacts would occur.
Air Quality	**Construction:** Localized impacts from equipment and vessel exhaust. GHG emissions from use of vehicles and equipment with diesel fuel-powered internal combustion engines. **Operations:** GHG emissions from electricity sources used to power the converter station and cooling stations. Emergency repair impacts less than construction.	**Construction/Operations:** Localized, intermittent impacts from use of construction equipment, particularly from vehicle exhaust, fugitive dust, and GHG emissions.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments. In addition, upon operation of the proposed CHPE Project, New York State power generation emissions would be reduced by an estimated by 1.5 million tons of CO_2, 751 tons of SO_2, and 641 tons of NO_x while meeting its existing annual electric power demand.	None expected. No new air quality impacts would occur; however, there would be no project-related GHG emissions reductions.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Noise	**Construction:** Localized temporary noise level increases on the water and at land staging areas. **Operations:** No significant impacts are expected.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts, including from blasting, indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	None expected. No new noise impacts would occur.
Socioeconomics	**Construction:** Negligible increase in local employment and demand for local purchases. Temporary housing required for a small number of construction workers to the area. **Operations:** Potential electricity cost savings to some end users.	**Construction/Operations:** Real property tax revenue benefits; otherwise same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	None expected. No new impacts on socioeconomics would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Environmental Justice	**Construction/Operations:** No disproportionately high and adverse human health or environmental effects on minority or low-income populations.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Although populations in this segment have higher percentages of minority and low-income populations than New York State, no disproportionately high and adverse human health or environmental effects are expected.	None expected. No new effects on environmental justice would occur.

Note: * In this table, "Operations:" refers to operational, maintenance, and potential emergency repair activities during the operational phase of the proposed CHPE Project.

personnel. Construction activities on land would introduce temporary disturbances to normal routines (e.g., limitations to property access and the presence of construction activities or equipment). The Applicant would be required to obtain leases, easements, construction permits, revocable permits/consent, highway work permits, use and occupancy agreements/permits, or other agreements from private and public landowners authorizing use of land for the terrestrial construction activities or additional workspace to support the construction activities (e.g., at HDD locations or for construction staging area facilities). Temporary storage and staging activities to support transmission line installation would be within existing commercial or industrial areas. These activities would be compatible with surrounding land uses.

Impacts from Operations, Maintenance, and Emergency Repairs

The proposed CHPE Project transmission line would generally be underwater or underground and, therefore, it would not be visible and would not interfere with surrounding land uses.

Periodic inspection of aquatic portions of the transmission line using vessel-mounted instruments would result in a negligible amount of additional vessel traffic; however, no impacts on water-dependent commercial and recreational uses would occur. Emergency repair activities, if necessary, along the aquatic portion of the transmission line could result in temporary impacts on existing commercial and recreational uses in the immediate vicinity of the work site due to the presence of cable repair vessels at the site of the fault.

Impacts on land use would result from operation of the proposed CHPE Project because future use of the land within the transmission line ROW would be limited for the lifespan of the transmission line. The Applicant would be granted either control of (via fee or easement for private property), or other appropriate interest or rights to use (via revocable consent or use and occupancy permit for public ROWs such as roadways or state land or lease for the railroad ROWs) an up to approximately 20-foot (6-meter)-wide transmission line ROW. Property owners granting the use of portions of their lands as the transmission line ROW would be prohibited from taking any action on that land that would damage or interfere with the Applicant's maintenance, inspection, and emergency repair activities with the ROW. It is anticipated that easements negotiated with private landowners would be bilateral easements in which the Applicant and landowner mutually agree to the easement provisions. While use of eminent domain would be avoided to the maximum extent practicable, limited easements or leases for the transmission line ROW in areas outside of the roadway and railroad ROWs might need to be obtained via eminent domain as part of the NYSPSC Article VII approval process. However, property owners would receive just compensation for this loss of use.

Periodic inspection of the terrestrial portions of the transmission line ROW and the cooling stations and converter station, and maintenance of the cooling stations and converter station, would generally be non-intrusive and would not disrupt (i.e., disturb, interrupt, or otherwise change) adjacent land uses. Emergency repairs of the transmission line, cooling stations, or converter station could result in temporary disturbances (e.g., limitations to or temporary changes to property access from the presence of emergency repair activities or equipment).

S.8.2 Transportation and Traffic

Construction and operation of the proposed CHPE Project would not have significant impacts, occurring intermittently for short durations, to the existing aquatic- and terrestrial-based transportation and traffic network within the proposed construction corridor. Applicant-proposed measures to avoid or minimize impacts have been incorporated into the proposed CHPE Project.

Impacts from Construction

Impacts on aquatic navigational operations along the proposed CHPE Project route would occur from the installation of the aquatic transmission cables. Impacts would occur on commercial and recreational transportation uses in Lake Champlain, the Champlain Canal, the Hudson River, the Harlem River, and Spuyten Duyvil Creek. Construction activities associated with the installation of aquatic portions of the proposed CHPE Project would include the generation of additional vessel traffic and clearance of areas in the Harlem River due to blasting, which on a small scale could inconvenience and create minor navigational obstacles (e.g., temporary loss of use of portions of waterways) for commercial and recreational water-dependent uses. However, cables would not be buried in anchorage areas and use of waterways would resume following installation activities. Each blast event in the Harlem River would only take a few seconds; however, prior to each blast, the area would be cleared to a distance determined by the fire marshal and the harbormaster. Transmission cable installation would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the work site or use a different area of the waterway. If conditions do not allow other vessels to transit around the work site, the Applicant would ensure that aquatic construction does not interfere with routine navigation by making adjustments to the work site as required. The guidance cables for the cable ferry crossing in Lake Champlain would be temporarily removed from the lakebed prior to the installation of the transmission cables, which may put the ferry temporarily out of service. Installation of the transmission cables would be coordinated with the ferry operator to minimize impacts on ferry operations. Disturbance to recreational and commercial uses would be temporary and localized at the work site. Construction would be coordinated with the USACE and USCG to avoid impacts on aquatic navigation, including avoidance of Federal-, state-, and private-owned navigation aids such as buoys and signs for boaters. For areas where the proposed aquatic transmission cables pass beneath bridges, construction would be coordinated with the owner of the bridge regarding clearances, distance from abutments and existing infrastructure, cable burial, and installation methods.

Impacts on railroad operations and traffic on roadways along the terrestrial portion of the proposed CHPE Project route would occur from the installation of the transmission cables. Impacts would occur on New York State Route 22 in Dresden and U.S. Route 9W in Haverstraw and Clarkstown, city streets in Schenectady and Queens, at ports used for land-based support, street crossings, and associated railroad corridors along the proposed CHPE Project route. Construction activities associated with the installation of the terrestrial transmission cables would generally be compatible with existing road and railroad operations, but could result in temporary minor disruptions (i.e., delays, temporary cancellations, or other changes) to these operations. Impacts would be limited to those impacting the flow of traffic which would occur when there is construction along the roadways or when roadways are crossed using trenching methods. Traffic levels of service would likely decrease due to slightly slower speeds through construction zones, but traffic flow would be maintained; therefore, impacts on traffic levels would not be significant. A Maintenance and Protection of Traffic Plan would be prepared to identify measures to minimize impacts on state highways. The Applicant would be required to obtain permissions in the form of easements, encroachment permits, highway work permits, or other agreements from private and public landowners for use of private property and road and railroad ROWs for terrestrial construction activities or additional workspace (e.g., at HDD locations or for support facilities).

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, the transmission line would be underwater or underground and, therefore, it would not interfere with the aquatic- and land-based transportation and traffic network.

Activities impacting aquatic navigational operations along the aquatic portion of the proposed CHPE Project route would include those associated with operation, regular inspection, and possible emergency repairs of the transmission line. Regular non-intrusive inspection of aquatic portions of the transmission line using vessel-mounted instruments would result in negligible additional vessel traffic. If necessary, emergency repair activities along the aquatic transmission line would be expected to result in temporary navigational obstacles (e.g., temporary loss of use of portions of waterways) for commercial and recreational vessels in the immediate vicinity of the repair site. However, use of waterways would resume following repair activities. The transmission line would also create the potential for anchor snags. Transmission cables would not be located in anchorage areas and they would be buried to the depths prescribed by the USACE (see **Section S.6.2**), thereby avoiding potential for vessel anchors hooking and causing damage either to vessels or to the transmission cables. However, anchors could become snagged on the concrete mats that would be used to cover portions of the transmission line that cannot be buried. The total area where concrete mats would be used to cover the transmission line represents less than 0.001 percent of the acreage of the waterbodies along the entire aquatic portion of the proposed CHPE Project route. Therefore, impacts on vessels or vessel anchors are not expected to be significant. In the event that an anchor snag occurs, the vessel crew would notify the USCG and the Applicant; and the Applicant would repair the cable (if necessary), transport a new anchor to the barge, cut the snagged anchor chain, and recover the anchor (if possible). The Applicant would develop an Anchor Snag Manual, including a Navigation Risk Assessment, to address situations in which a vessel's anchor snags the transmission cables or concrete mats placed above the cables, and to identify appropriate protocols.

Decommissioning of the proposed CHPE Project transmission line would consist of de-energizing and abandoning the transmission line in place. There would be similar minimal impacts on anchorage from potential anchor snags on concrete mats as described for operation of the transmission line. If decommissioning plans change, applicable regulations at the time of decommissioning would be met.

Activities impacting transportation and traffic operations along the terrestrial portion of the proposed CHPE Project route would include those associated with operation, regular inspection, maintenance, and possible emergency repairs of the transmission line. Regular inspection of the terrestrial portions of the transmission line and aboveground infrastructure (i.e., cooling stations and converter station), and routine preventive maintenance of the aboveground infrastructure would generally be non-intrusive and not disrupt (i.e., delay, temporarily cancel, or otherwise change) transportation operations or traffic. If necessary, emergency repairs of the transmission line or aboveground infrastructure would be expected to result in temporary construction-related disturbances (e.g., temporary lane rerouting or closures from the presence of emergency repair activities) that would impact transportation uses along the proposed CHPE Project route. However, vehicular traffic flow would be maintained through emergency repair work zones.

S.8.3 Water Resources and Quality

Construction within Lake Champlain, the Hudson River, and the other surface waters and wetlands along the proposed CHPE Project route would require a CWA Section 404 and Section 10 permit from the USACE. The initial permit application and supporting information was submitted to the USACE in 2010 with supplemental information provided in February 2012. The Applicant received its State Section 401 Water Quality Certification from the NYSDPS in January 2013.

Impacts from Construction

Construction activities within the aquatic portions of the proposed CHPE Project route would include the installation of transmission cables in the lakebed and river bottoms using water-jetting and shear plow techniques, HDD, and blasting. Impacts on water quality would occur from localized increases in turbidity (a measurement of the cloudiness or amount of total suspended solids in the water) and resuspension of sediments resulting from trenching and disturbance within the waterbody. Increased turbidity has the potential to reduce light levels in aquatic habitats and could result in temporary changes to water chemistry, including impacts on pH and reduced dissolved oxygen.

Construction activities associated with installation in the terrestrial portions of proposed CHPE Project route would primarily include the transmission cables being buried beneath the ground within roadway and railroad ROWs. Ground disturbance would result in increased erosion and sedimentation in runoff. Runoff on construction sites would be managed on site using BMPs incorporated into the proposed CHPE Project as Applicant-proposed measures. In addition, the proposed CHPE Project route would cross several streams and rivers. Installation methods proposed for stream crossings could include trenching, HDD, and attaching to existing infrastructure such as bridges and railroad trestles. Trenching would result in impacts on water quality from increased turbidity and potential downstream sedimentation. HDD, which would also be used in transitions from water to land and entirely under the East River, has the potential for frac-out (i.e., leaks of HDD drilling fluid) that could cause drilling fluid to become suspended or dispersed and could impact water quality. However, the Applicant would develop and implement an SPCC Plan that would also address potential releases of drilling fluid, which would be contained in the cofferdam area or the land-based HDD staging area during construction if such releases occur.

Portions of the proposed CHPE Project route would cross floodplains and coastal flood zones associated with surface waters. Temporary clearing, ground disturbance, and construction activity would occur within these floodplains. The converter station is proposed to be constructed in a coastal flood hazard area, and could be subject to flooding or storm surges. To minimize the potential for damage, the construction of the converter station would involve raising the structure above the 100-year base flow elevation.

The blasting of bedrock would be required in the Harlem River, and could be required to trench the terrestrial transmission cables in some locations. Bedrock blasting is likely to increase bedrock fracturing near the blasting zone and could temporarily increase turbidity in groundwater wells and the Harlem River near the blast zone. Therefore, impacts on groundwater and surface water quality could occur if blasting of bedrock is required.

Impacts from Operations, Maintenance, and Emergency Repairs

During operation, heat loss from the transmission line would result in negligible temperature increase of the water in its immediate vicinity. If required, emergency repairs of the aquatic transmission line where the cables would have to be unburied would result in localized increases in turbidity and resuspension of sediments that would temporarily impact water quality. The impacts from repairs would be similar to those expected during original installation, but would be for a shorter duration and would disturb a smaller area. Operation of the transmission line in terrestrial portions of the proposed CHPE Project route, would not impact water quality, water availability, or floodplains. Emergency repair activities would require ground disturbance as the damaged lines must be uncovered. Although these actions would result in increased potential for erosion and sedimentation to nearby surface waters, these impacts would be managed on site. Therefore, significant impacts would not be expected.

S.8.4 Aquatic Habitats and Species

Construction activities within Lake Champlain, the Hudson River, and the other surface waters along the proposed CHPE Project route would result in temporary impacts on aquatic habitat and species due to sediment disturbance, habitat alteration, noise and vibration, and possible shock waves from blasting. Impacts from operation of the proposed CHPE Project would include permanent habitat changes (e.g., reductions in substrate suitable for vegetation growth) at areas where concrete mats would be installed over soft bottom and temperature increases in sediments above the transmission line. A review of available scientific literature yielded inconclusive evidence that the magnetic fields produced or potentially altered by the proposed CHPE Project would impact aquatic species or habitats. Some fish species would be able to detect these magnetic fields, but the magnetic fields would not impact species' reproduction or capacity to forage or survive.

Impacts from Construction

Construction activities within the aquatic portions of the proposed CHPE Project would include the installation of transmission cables in the lakebed and river bottoms using water-jetting and shear plow techniques, and blasting in the Harlem River. Impacts on aquatic habitats and species, including essential fish habitat (EFH), would be caused by localized increases in turbidity and associated water quality degradation, sediment redeposition, underwater blasting, temporary noise and vibration, and potential accidental releases of hazardous materials.

The impacts of sedimentation and use of concrete mats on benthic organisms could include smothering, reduction of filtering rates, toxicity from exposure to anaerobic sediments, reduced light intensity, and physical abrasion. Additionally, mortalities among sessile species could occur if individuals are unable to adapt to the new sediment conditions. Increased turbidity could reduce light levels in aquatic habitats and temporarily impact water pH and reduced dissolved oxygen levels. The aquatic habitats directly affected by cable installation would primarily be confined to the footprint of the jet and shear plows, of anchors or spuds used to stabilize the barge, and of concrete mats; and those habitats affected by blasting in the Harlem River. Anchorage would be anticipated in specific areas such as locations of construction and removal of the five temporary cofferdams and cable landings at water-to-land transitions, marine splicing locations, and possibly along the 460-foot length of bedrock blasting in the Harlem River (at MP 324.5). The anchors would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. The collective length of all work where anchors might be deployed and cause impacts on benthic habitat is less than 1 percent of the approximately 197-mile (317-km) aquatic portion of the proposed CHPE Project route. Midline buoys would be used to prevent anchor sweeps that might otherwise affect benthic habitat. Concrete mats would be installed as protective covering over the transmission cables for 3.0 miles (4.8 km) in Lake Champlain and the Hudson and Harlem rivers, representing 1.5 percent of the length of the aquatic portion of the entire transmission line route. Blasting would occur for approximately 460 feet (140 meters) of bedrock in the Harlem River. Therefore, the total benthic habitat area of Lake Champlain and the Hudson and Harlem rivers affected by plowing, anchorage, concrete mats, and blasting during cable installation would be relatively small, and the impacts would be temporary and non-significant.

Expected underwater noise levels from proposed construction activities would be above the NMFS threshold of 150 decibels relative to 1 micropascal (dB re 1 μPa) root-mean-square (rms) for behavioral impacts on fish, but impacts would be expected to be localized. Behavioral responses of fish could range from a temporary startle to avoidance of an area affected by noise. No injury or physiological impacts would be expected.

The proposed CHPE Project route would avoid directly transiting 18 of the 22 Significant Coastal Fish and Wildlife Habitats (SCFWHs) in the Hudson River within 1 mile of the route, but would cross 5 SCFWHs (Catskill Creek, Esopus Estuary, Kingston-Poughkeepsie Deepwater Habitat, Hudson Highlands, and Lower Hudson Reach). Although the transmission line would cross the Catskill Creek SCFWH at MPs 221 to 222, it would cross beneath this SCFWH via HDD; therefore, no impacts on this SCFWH would occur. Construction activities would have temporary, localized effects on the four other SCFWHs crossed by the proposed CHPE Project due to sediment disturbance, turbidity, and associated water quality degradation. This would impact spawning fish in these areas. Additionally, concrete mats would be installed over approximately 1.0 mile (1.6 km), or 1.0 acres (0.4 hectares), of SCFWHs, which represents less than 0.01 percent of the affected SCFWHs. Therefore, concrete mat coverage would be small relative to the total available habitat along the aquatic portion of the proposed CHPE Project.

Overland portions of the proposed CHPE Project route would cross surface water bodies. The transmission lines would be installed over these water bodies by bridge attachment, or beneath the water bodies via HDD or dry ditch crossing methods. Crossings by bridge attachment and HDD would avoid impacts on aquatic habitats and species. HDD would also be used in transitions from water to land and could result in frac-out (i.e., leaks of HDD drilling fluid into the surrounding sediment and water column) that could impact aquatic species and habitat. However, an SPCC Plan would be adopted, and releases of drilling fluid would be remediated during construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from operation of the proposed CHPE transmission system on aquatic habitats and species would include non-significant temperature increases in the sediment, changes in habitat from use of concrete mats, and production or alteration of magnetic and electric fields. During operation of the transmission line, heat loss from the cables could be expected, and would result in increased temperatures in the sediments around the cables. For a cable buried at 4 or 8 feet (1.2 and 2.4 meters) below the sediment surface, the maximum estimated temperature rise over ambient soil temperature at 8 inches (20.3 cm) below the surface of the sediments would be 9 °F and 4 °F (5.0 °C and 2.56 °C), respectively. However, the temperature increase at the sediment surface directly above the cable is estimated to diminish to 1.8 °F (1.20 °C and 1.24 °C at 4 and 8 feet [1.2 and 2.4 meters], respectively), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C and 0.0002 °C, respectively). It is likely that these are overestimated because they do not take into account the cooling effect from natural water flow, which would result in further heat dissipation, the proposed deeper burial of the transmission line, or the insulation provided by the sheathing surrounding the transmission cables. Heat from the cables would dissipate in the sediments, just below the sediment and water interface, which is the biologically productive zone in the sediments. Where the transmission cables are covered with concrete mats, the increase in ambient water temperature surrounding the cables would be 0.25 °F (0.14 °C) and the increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mat is expected to be 1.26 °F (0.70 °C) or less. The effect of the temperature increases would be extremely localized to the area directly above the cables. Therefore, significant impacts on benthic resources from temperature during operation of the transmission line would not be anticipated.

The magnetic field produced by the transmission line would be less than 162 mG in the area directly over the buried transmission line in Lake Champlain and the Hudson, Harlem, and East rivers. According to studies, the survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields. Experiments that exposed fathead minnows, juvenile sunfish, juvenile channel catfish, and striped bass to 360,000 mG showed no evidence in changes in activity. Evidence indicates that electrosensitive organisms such as sturgeon can also detect the weak induced electric fields generated from magnetic fields and respond by attraction or avoidance. However, electric fields used in these studies were higher than the expected induced electric fields at the sediment bed for the proposed CHPE Project transmission line. The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. As such, significant impacts on demersal and electrosensitive species such as Atlantic and shortnose sturgeon that occur in the Hudson River Segment are not expected. Additionally, the effect of magnetic fields on fish eggs and larvae is expected to be negligible.

Pre- and post-energizing sediment temperature and magnetic field surveys, and a hydrophone study to determine the movements of adult Atlantic sturgeon in the Hudson Estuary would be developed and implemented as required by the proposed CHPE Project's NYSPSC Certificate (NYSPSC 2013).

Areas where concrete mats or rip-rap (i.e., rock or concrete protective armoring) would be installed to help protect the transmission lines where an appropriate level of cable burial cannot be achieved, for example where there is exposed bedrock or existing submerged utility lines, would cause a change in benthic habitat type equal to the area of their footprint, and would also result in impacts on submerged aquatic vegetation (if present), shellfish, and benthic communities. However, the concrete mats would eventually provide additional new hard-bottom habitat for benthic organisms to colonize, essentially functioning as small patch reefs.

Since the installed transmission cables would not require maintenance, no impacts from maintenance activities are anticipated on aquatic habitats or species. However, impacts could result from localized increases in turbidity and redeposition of sediments resulting from disturbance within the waterbody if the transmission line fails or becomes damaged during operation and requires emergency repair. The cables would have to be dug out of the sediment, repaired, and then reburied. Impacts from repair activities would be similar to the original installation, but would have a smaller area of disturbance and would occur over a shorter duration.

S.8.5 Aquatic Protected and Sensitive Species

Installation, operation, and emergency repairs of the proposed aquatic transmission cable may affect, but are not likely to adversely affect, the federally listed shortnose sturgeon and Atlantic sturgeon (includes the New York Bight distinct population segment [DPS], Gulf of Maine DPS, and Chesapeake Bay DPS of the Atlantic sturgeon). No effects on federally listed marine mammals or non-threatened/non-endangered marine mammals would be expected from the proposed CHPE Project, as occurrences of these species are rare in the Hudson, Harlem, and East rivers. In addition, the proposed CHPE Project transmission line would cross under the East River via HDD. Observations of federally listed sea turtles have been reported in western Long Island Sound. Although it is possible that sea turtles may enter the East River from the Sound, they are generally considered extralimital and would likely occur only as occasional transients. Therefore, the potential for impact from the CHPE Project on sea turtles is so low, it is considered discountable. Additionally, neither the NMFS nor the USFWS have designated or proposed designated critical habitat along the proposed CHPE transmission line installation route; therefore, the proposed CHPE Project would have no effect on designated or proposed to be designated critical habitat. Applicant-proposed measures developed in coordination with Federal and state natural resources agencies would avoid or minimize impacts on aquatic species during construction and operational activities. A BA has been prepared to assist in determining the impacts of the proposed CHPE Project and to facilitate ESA Section 7 consultation and will be included in **Appendix Q** of the Final EIS.

Impacts from Construction

Sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, noise and vibration, vessel strikes, and accidental release of hazardous materials could affect federally listed shortnose sturgeon and Atlantic sturgeon in the Hudson and Harlem rivers during cable installation. The sensitivity of fish to localized and temporary increases in turbidity, suspended sediment, and downstream sedimentation is species- and life-stage-specific, and associated impacts might include impairment of feeding, impaired ability to locate predators, and reduced breeding activity. The Applicant would restrict construction activities to specific timing windows to protect ESA-listed and candidate fish species during spawning migrations, which are the most vital and sensitive portions of their lifecycle.

The NYSPSC Certificate issued for the proposed CHPE Project established construction work schedule windows identifying times of the year when work associated with the underwater portion of the transmission line may take place (NYSPSC 2013). These work windows were subsequently supplemented through consultation with NMFS. These established work windows and time of year restrictions were developed to avoid impacts on overwintering, spawning migrations, spawning activity, and larval stages of ESA- and state-listed fish and EFH species. NYSDOS has conditionally concurred with these construction windows as part of its CMP consistency certification for the proposed CHPE Project. Restriction of construction activities to specific windows of time would protect ESA-listed fish species during spawning migrations, which are the most vital and sensitive portions of their life cycle.

Installation of rip-rap or concrete mats and blasting in the Harlem River would be permanent alterations of habitat and could affect shortnose and Atlantic sturgeon, where the concrete mats or rip-rip replaces some soft sediment (forage habitat) with hard-bottom habitat. The affected area would be very small relative to the overall area of available habitat, adjacent habitat would still be available, and new communities of benthic organisms that are prey for shortnose and Atlantic sturgeon would be expected to recolonize over time. Effects of blasting, as described in **Section S.8.4**, on sturgeon are considered to be remote because sturgeon are transient species in this area of the Harlem River, and sturgeon eggs and larvae are not expected to occur in the Harlem River. However, in addition to detonating the charge in bore holes and stemming the charge with pea gravel, avoidance and minimization of blasting effects on sturgeon could be accomplished by not blasting during slack tides, chasing fish from the site with an air-gun prior to blasts, and surrounding the site with a bubble curtain to minimize fish entry into the shock zone. Noise generated by cable-laying vessels and blasting would elicit temporary behavioral responses by ESA-listed fish species. Most of these effects would be either temporary or intermittent, and it is expected that only a few individuals would be affected relative to the populations and that they would react by moving away from noise sources.

Vessel collisions could impact shortnose and Atlantic sturgeon. However, Applicant-proposed measures, such as operation of vessels at decreased speeds in shallow waters, would reduce noise levels and provide shortnose and Atlantic sturgeon species an opportunity to move out of the way of moving vessels, thereby making it unlikely that a collision would occur.

Any state-listed lake sturgeon or state-listed mooneye present in Lake Champlain during proposed construction activities could be affected by sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, temporary noise and vibration, and potential accidental releases of hazardous materials. The installation of the proposed aquatic transmission line would cause a temporary disturbance on benthic habitat, which supports benthic prey items for state-listed lake sturgeon, but would remain usable as potential foraging habitat for these species. Impacts on the state-listed lake sturgeon could occur from the installation of concrete mats or rip-rap; however, the placement would result in a very small area of overall affected habitat, and sturgeon would be able to utilize adjacent areas for foraging and other activities. Effects on the state-listed giant floater and state-listed pink heelsplitter in Lake Champlain could occur because individuals of these mussel species could be lost during installation due to increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, and accidental releases of hazardous materials.

As specified in the proposed CHPE Project's Certificate issued by NYSPSC, the Applicant would conduct a series of pre- and post-energizing studies, including benthic macroinvertebrate and sediment sampling and bathymetry surveys, for use in post-installation compliance monitoring (NYSPSC 2013). All studies would be developed in consultation with appropriate resource agencies. The Applicant also would establish the Hudson River and Lake Champlain Habitat Enhancement, Restoration, and Research/Habitat Improvement Project Trust to support items such as such as habitat restoration, enhancement, or protection; habitat research; fish and wildlife species restoration, enhancement, or protection; and water quality improvement.

Impacts from Operations, Maintenance, and Emergency Repairs

Increased temperature, magnetic fields, and weak induced electric fields during operation of the proposed transmission line could impact the protected species identified. During operation, the buried aquatic transmission cables would emit a magnetic field of less than 160 mG measured at the sediment surface, and induced electric fields could be created by water currents or the movement of an animal through the magnetic field. Evidence indicates that electrosensitive organisms (including all sturgeon species) can detect induced electric fields and respond by attraction or avoidance. In some cases, freshwater sturgeon exposed to electromagnetic fields in laboratory studies exhibited temporarily altered swimming behaviors; however, these exposures were at greater magnitudes than those modeled for the proposed aquatic transmission cable. The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. Fish migration would not be affected because migratory species use multiple stimuli for migration, not magnetic detection alone, and species are also exposed to other natural alterations in the Earth's geomagnetic field such as magnetic anomalies in sediments. Additionally, the effect of magnetic fields on fish eggs and larvae is expected to be negligible.

Increases in temperature associated with operation of the transmission line at the sediment-water interface would not be expected to affect pelagic fish, but could have the potential to affect demersal fish that would be closer to the bottom. At burial depths of 4 and 8 feet (1.2 and 2.4 meters) below the surface, the temperature increase at the sediment surface directly above the cable is estimated to be 1.8 °F (1.20 °C and 1.24 °C, respectively), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C and 0.0002 °C, respectively). A measurable amount of local heat generation would not pose a physical barrier to ESA- or state-listed fish passage, and would allow benthic organisms to colonize and demersal fish species (including demersal eggs and larvae) to use surface sediments without being affected. Therefore, effects on reproduction or feeding would not be significant. The potential increase in temperature of the riverbed surface would be within the normal temperature range of all life stages of shortnose and Atlantic sturgeon. Heat could be released from exposed gaps in the concrete mats and rip-rap placed over the aquatic transmission line where it cannot be buried. The estimated increase in ambient water temperature surrounding the transmission cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C). The cooling effect of moving water should quickly dissipate this heat. Therefore, significant effects from operation of the proposed CHPE Project transmission line on protected species would not be expected.

No effects would be anticipated from maintenance because the transmission cable itself would be maintenance-free. Emergency repairs, if necessary, would result in sediment disturbance resulting in temporarily increased turbidity and decreased water quality, and noise could impact protected species. These impacts would be similar to those described for construction but on a smaller scale and over a shorter duration.

As specified in the proposed CHPE Project's Certificate issued by NYSPSC, the Applicant would conduct a series of pre- and post-energizing studies, including sediment temperature and magnetic field surveys and Atlantic sturgeon hydrophone surveys, for use in post-installation compliance monitoring (NYSPSC 2013). The Atlantic sturgeon study would document the species' movements in relation to transmission line operation.

S.8.6 Terrestrial Habitats and Species

Construction and operation of the proposed CHPE Project would generally include the permanent removal and crushing of vegetation, soil compaction, and dust generation. Noise would temporarily increase during construction and maintenance and emergency repair activities, which could result in impacts on wildlife through reduced communications ranges, interference with predator/prey detection, or habitat avoidance. The direct displacement of species would occur during vegetation removal; however, habitat fragmentation and permanent displacement of entire breeding populations would not occur because construction activities would be in fringe habitat within or along existing ROWs.

Impacts from Construction

Impacts on vegetation and habitat could occur from permanent removal of vegetation, root damage associated with excavation, vegetation crushing, soil compaction, potential spread of invasive species, and the generation of dust. In total, approximately 236 acres (96 hectares) of existing forest cover could be temporarily disturbed and 48 acres (19 hectares) changed permanently to managed grasses or shrub habitat to accommodate proposed construction corridors and any necessary additional workspace. However, the habitat along the proposed CHPE Project route would be removed primarily along existing roadway and railroad ROWs, where most vegetation is disturbed. Some fringe forest habitat within and immediately adjacent to these ROWs would be converted to shrub habitat as a result of transmission line installation. In areas where the ROW cannot support installation of the transmission line, deviation areas would be used. Typically, deviation areas identified along the proposed CHPE Project route would be located immediately adjacent to existing ROWs and would extend to an outer boundary ranging up to approximately 200 feet (61 meters) away from the ROW. Like the existing ROWs, deviation areas would primarily be composed of forest fringe (i.e., at the edge of the forest) habitat, and would also include some interior forested areas, streams, residential areas, urban developed areas, and highways or roadways with maintained vegetation. Forested habitat in deviation areas could be more suitable to wildlife because it extends away from the ROWs. Therefore, construction in these areas could result in habitat fragmentation impacts greater than those incurred from construction within the ROWs. Applicant-proposed measures, including clearly marking areas to avoid, using appropriate vegetation-removal and dust-control methods, and developing and implementing an Invasive Species Management Plan, would be implemented to reduce further impacts on vegetation and habitat.

Noise created during construction could result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance. Prior exposure to noise is the most important factor in the response of wildlife to noise because wildlife can become accustomed (or habituated) to the noise. The proposed construction activities would primarily occur along road and railroad ROWs where there is a high level of ambient noise.

Temporary direct displacement of wildlife species during vegetation removal and habitat reduction could occur; however, habitat fragmentation resulting in permanent or significant displacement of entire breeding populations would not occur because construction activities would be in fringe habitat within or along existing ROWs. Wildlife that could be displaced include birds, burrowing animals, and other species that use forests for foraging, breeding, and nesting. However, studies on forest habitat fragmentation indicated that displacement impacts associated with 26-foot (8-meter)-wide corridors were not significant. Interior-forest dwelling species did not avoid inhabitance along the corridor's edges; however, species composition was altered as an edge-preferring species abundances in these areas increased. Additionally, presence of the transmission line corridor, which would primarily be a mixture of grasses and shrubs, would not preclude wildlife from crossing the corridor to reach habitat on the other side. Construction of the up to approximately 20-foot (6-meter)-wide corridor for the proposed CHPE Project would be expected to result in similar localized and temporary changes in community composition (e.g., tree removal and possible displacement of wildlife). However, construction would occur in habitat previously disturbed by noise, emissions from railroads and cars, and human activity. Since only a small percentage of habitat available for wildlife would be impacted, and mobile species that currently inhabit and prefer these areas likely would relocate to seek out similar habitat, construction of the proposed CHPE Project corridor and installation of the transmission line would not be expected to impact the habitats in these areas significantly. Additionally, Applicant-proposed measures, including constructing outside of the breeding season, avoiding sensitive habitat, and using HDD would be implemented to reduce further impacts on wildlife.

Impacts from Operations, Maintenance, and Emergency Repairs

Magnetic and electric fields have the potential to enhance growth response in certain plant species; however, the effects of such on plants are inconclusive. Operation of the transmission line would increase the ambient soil temperature, which could alter biodiversity of terrestrial vegetation and habitat; however, temperature would quickly dissipate as distance from the transmission line increases.

The transmission line ROW would be maintained (i.e., vegetation would be trimmed or removed) to protect the buried transmission line and cooling stations from damage caused by tree roots, to maintain the function of permanent storm water management or access control features, and to replace location and identification markers as necessary. Vegetation management along the ROW would establish stable low-growing vegetation with shallow root systems that would not interfere with the transmission line and would allow adequate access to cooling stations. Vegetation clearing and selective cutting of trees would occur as needed. Such activities would be short-term in duration, but would occur periodically over the operating life of the proposed CHPE Project.

Impacts on vegetation and habitat from maintenance or emergency repair activities could occur from removal of vegetation, root damage associated with excavation, soil compaction, and the generation of dust, but such activities would only occur as necessary and be of a very short duration and small area of disturbance.

Although there is evidence that wildlife can detect magnetic and electric fields associated with transmission lines, previous studies have shown that behaviors would not be affected by relatively small changes in magnetic and electric fields and such fields do not cause any adverse health, behavioral, or productivity effects in animals, including both wildlife and livestock. Operation of the transmission line would increase the ambient soil temperature, which could alter biodiversity of terrestrial vegetation and habitat thereby affecting foraging, nesting, and avoidance behavior in wildlife that use that habitat; however, temperature would quickly dissipate within increasing distance from the transmission line and would be restricted to the maintained transmission line ROW.

Impacts from maintenance and emergency repair activities on wildlife would occur because the permanent ROWs would be permanently maintained as scrub-shrub habitat with woody vegetation less than 20 feet (6 meters) tall. The proposed maintenance could also displace adult or breeding birds, burrowing animals, and other species that use forest edge habitats for foraging, breeding, and nesting. Wildlife species could be displaced permanently if such activities cause a long-term disturbance of breeding habitats, but this would be unlikely as the ROW is fringe habitat or in a previously disturbed area and vegetation in the ROW would be regularly maintained.

S.8.7 Terrestrial Protected and Sensitive Species

Federally listed species that could occur in the proposed CHPE Project transmission line construction corridor include Karner blue butterfly, Indiana bat, and northern long-eared bat. The proposed CHPE

Project may affect, but is not likely to adversely affect, the federally listed Indiana bat and Karner blue butterfly and the northern long-eared bat that is proposed for listing as endangered. Indiana bats and northern long-eared bats roosting or foraging within or adjacent to the construction corridor could be disturbed. The proposed CHPE Project could affect the Karner blue butterfly from removal of nectar habitat, which is used for foraging. Wild blue lupine, which is the host plant for the butterfly larvae, would not be affected. There is no critical habitat designated or proposed-designated in the vicinity of the proposed CHPE Project. A BA has been prepared to assist in determining the impacts of the proposed CHPE Project and to facilitate ESA Section 7 consultation and is included in **Appendix Q** of the Final EIS.

The federally listed small whorled pogonia, northern wild monkshood, bog turtle, piping plover, roseate tern, and New England cottontail and the red knot that is proposed for listing could, but are not likely to, be present in the proposed construction corridor; research to date indicates no recorded presence of these species or their suitable habitats along the transmission line route. Therefore, no impacts on these species would be expected.

Construction activities could result in non-significant disturbances (i.e., noise, dust, and lighting) to bat species listed or proposed for listing, bald eagles, state-listed birds, and migratory birds. Such disturbances can cause habitat avoidance by birds in the immediate vicinity of construction. However, these activities would be temporary and localized. Additionally, birds (including protected species of birds) would be able to move away from the construction area; therefore, effects on foraging, productivity and survival would not be significant. Effects from disturbance and habitat fragmentation on state-listed plant and insect species could occur as a result of habitat loss from construction activities; these effects would be similar to those described for non-listed species. However, implementation of several Applicant-proposed measures to prevent direct take of protected and sensitive species during construction would avoid or minimize impacts.

Impacts from Construction

Non-significant effects on protected and sensitive species from construction would include disturbance to the foraging, resting, and nesting/breeding bats and birds. Bats and birds could encounter temporary, increased noise from underwater and underground cable installation and increased construction traffic. Noise associated with the construction vehicles and equipment would produce sound at varying frequencies and intensities that might influence the behavior of species. The effects would vary depending on the species, type of vessel or machinery, relative noise level, distance, frequency, and season. Most bats and birds along the terrestrial transmission line routes are not expected to shift farther away given the current level of disturbance from the actively used railroad ROW being used for the line. Any that would move into similar adjacent habitats nearby during construction would likely return to the area once construction is completed, which would last less than 2 weeks in any given location along the transmission line route. The Luyster Creek HVDC Converter Station is proposed to be sited in an industrial area with no suitable habitat for protected and sensitive species; therefore, no effects would be expected from construction of this facility.

Effects on protected species and their habitats that result from vegetation clearing would be the same as described for non-listed species and habitats. These would include habitat loss or degradation via crushing, removal, or other disturbances, changes in community composition, and potential for displacement. However, in the immediate vicinity of the railroad ROW, where most of the clearing would occur, much of the habitat consists of disturbed open lands and secondary forest lacking suitable habitat for most protected and sensitive species. All construction including HDD installation and trenching would avoid direct impacts on all Karner blue butterfly lupine habitat. Approximately 1.8 acres (0.7 hectares) of mapped Karner blue butterfly nectar habitat occurs within the 33-foot (10-meter) construction corridor proposed for trenching installation of the transmission line along the CP railroad ROW. The final work around the boundary would be identified in the EM&CP and fenced to keep all construction activities within it. Following construction activities, the impacted nectar habitat would be restored by seeding species that would provide nectar sources.

Since the corridor would be relatively narrow (i.e., up to approximately 20 feet [6 meters] wide), interior-dwelling species would not likely avoid inhabitance along the edges of the proposed CHPE Project corridor. Also, presence of the transmission line corridor, which would primarily be a mixture of covered with grasses and shrubs, would not preclude wildlife from crossing the corridor to reach habitat on the other side. Several Applicant-proposed measures, including use of HDD under sensitive habitat and marking all known locations of protected and sensitive species on construction drawings and in the field, would be implemented to avoid or minimize impacts on protected and sensitive species. Construction personnel would be trained to identify known and potential rare, threatened, and endangered species where possible, and to follow the identification and protection measures included in the EM&CP, including avoiding areas flagged as sensitive habitat.

Impacts from Operations, Maintenance, and Emergency Repairs

During the operational phase of the transmission line, vegetation management would be conducted within the transmission line ROW to prevent the growth of large woody vegetation to avoid damage to the transmission cables, or to provide access to the ROW in the event that emergency repairs or other maintenance of the cables are required. Potential effects from vegetation management would be discountable and would be avoided and minimized through implementation of protective measures during operation and maintenance of the proposed CHPE Project. No herbicides or pesticides would be used within occupied Karner blue butterfly and frosted elfin butterfly habitats, except as approved by the USFWS and NYSDEC. Any vegetation management, emergency repairs, or other operational maintenance activities required within Karner blue butterfly or frosted elfin butterfly habitats would be implemented in accordance with a mitigation plan for these species being developed by the Applicant in consultation with USFWS and NYSDEC.

No significant effects from the magnetic fields generated by the transmission line would be anticipated. There is no evidence to suggest that magnetic and electric fields associated with transmission lines result in any adverse effects on the health, behavior, or productivity of animals. The research indicates that some species of animals, including birds, are able to detect magnetic fields at levels that could be associated with transmission lines; however, detection is not a conclusive indicator of adverse effects.

S.8.8 Wetlands

Wetlands can provide a variety of functions, including wildlife habitat, groundwater recharge or discharge, sediment and shoreline stabilization, flood storage, nutrient removal, sediment and toxicant retention and production export, and, in some cases, aesthetic and recreational value. Impacts are expected on a total of 77.7 acres (31.4 hectares) of wetlands along the proposed CHPE Project route. Construction activities within the construction corridor along the proposed CHPE Project route would result in impacts on wetland areas due to soil disturbance, changes in surface runoff patterns, and vegetation clearing. Long-term impacts from operation of the proposed CHPE Project would include permanent habitat changes to forested wetlands.

Impacts from Construction

Construction activities within Lake Champlain, the Hudson River, and the Harlem and East rivers would include the installation of the transmission line in the lakebed and river bottom. While these water bodies are considered open water, not wetlands, there are freshwater and tidal wetlands along the shores of these features. Additionally, although installation of the transmission line would occur in portions of SCFWHs along the Hudson River, the proposed CHPE Project would not cross or impact any wetlands contained therein. Impacts on wetlands adjacent to the underwater transmission line in Lake Champlain, the Hudson River, and the Harlem and East rivers are not anticipated as the installation activities would occur more than 100 feet (30 meters) from wetlands, construction would take place over a short period of time, and construction-related sediment releases into the water column would comply with water quality standards. The proposed cooling stations and the Luyster Creek Converter Station would not be located in wetlands.

Transmission line construction in the Overland Segment would directly impact approximately 67 acres (27 hectares) of wetlands within the construction corridor. The Hudson River Segment of the proposed CHPE Project would have an 8-mile (13-km) terrestrial segment that would cross three additional wetland areas in Stony Point and Haverstraw totaling 0.8 acres (0.3 hectares). The transmission line would cross a 0.03-acre (0.01-hectare) wetland in Haverstraw; the other two crossings would be by HDD. No delineated wetlands are present in the construction corridor of the New York City Metropolitan Area Segment.

The construction sequence within wetlands along the proposed Overland Segment would typically consist of vegetation clearing within the construction corridor (tree stumps would only be removed from the trench line or where necessary), removal and stockpiling of the upper 18 inches (46 cm) of hydric soils, followed by excavation of a trench approximately 3.5 feet (1.1 meters) deep and up to 9 feet (2.7 meters) wide at the surface, or the use of HDD technology. The cables would then be placed in the trench, and then the trench would be backfilled. Land restoration would include placing the removed wetland soils back onto the excavated trench area to facilitate wetlands restoration, and the disturbed area would be mulched or hydro seeded. Restoration of wetlands would be completed within 24 hours after backfilling is completed.

Temporary impacts would occur on 16.2 acres (6.6 hectares) of forested wetlands and 51.2 acres (20.7 hectares) of non-forested wetlands. Following completion of construction activities and surface restoration, these 67.4 acres (27.3 hectares) of wetlands would be expected to re-establish themselves naturally. Emergent wetland vegetation would re-establish quickly following construction, and woody species would follow. Forested wetlands would be expected to go through several stages of successional vegetation before returning to the pre-construction vegetation cover type. Wetland functions and values, including wildlife habitat, groundwater recharge or discharge, sediment and shoreline stabilization, flood storage, nutrient removal, sediment and toxicant retention, and production export would be expected to be restored to these disturbed wetlands.

Permanent, significant impacts would occur on 2.0 acres (0.8 hectares) of forested wetlands that would be converted to emergent or scrub-shrub wetlands and on 8.3 acres (3.4 hectares) of non-forested wetlands. This conversion would alter the wetland vegetation from trees greater than 20 feet (6 meters) to woody vegetation less than 20 feet (6 meters), including true shrubs and young trees. Impacts on forest-dwelling wetland species would be expected once the wetland has been converted from a forested wetland to a shrub-scrub wetland. Wetland mitigation would be required for any permanent impacts on wetlands. As part of its Section 404 and Section 10 permit application, the Applicant has submitted a conceptual wetland mitigation plan to the USACE to address this permanent change in habitat type. To mitigate for permanent impacts on wetlands, per the mitigation plan, the Applicant would establish 1 acre (0.4 hectares) of new wetland and preservation and enhancement of 10 acres (4 hectares) of wetlands for each 1 acre (0.4 hectares) of permanently impacted wetlands.

HDD would be used in some locations to reduce the level of impacts on wetlands when compared to trenching. A total of 0.5 miles (0.8 km) of wetlands would be crossed by use of HDD. Where used, the HDD borehole would be drilled underneath the wetland, a conduit would be pulled into the borehole, and then the transmission cables would be pulled into the conduit. The HDD drilling equipment and drill entry point would be located outside the wetland and the drill would exit beyond the other boundary of the wetland, avoiding direct impacts on wetlands. As required in the EM&CP, an SPCC Plan would be in place to respond to any frac-outs of bentonite.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts on wetlands from operation of the proposed CHPE Project would not be expected because the installed transmission line would not require maintenance. Thus, maintenance activities would be confined to routine ROW vegetation management in the Overland Segment as established in the EM&CP Vegetation Management Plan. These activities would consist of cutting woody vegetation by hand or by mechanical means every few years. The 2.0 acres (0.8 hectares) of forested and 8.3 acres (3.4 hectares) of non-forested wetlands that would be permanently impacted (for a total of approximately 10.2 acres [4.1 hectares] of impacted wetlands) would be subject to routine vegetation management activities. These activities would not be expected to alter wetland hydrology, compact wetland soils, or otherwise change the physical characteristics or functions and values of the wetlands in the transmission line ROW.

Although the transmission line is designed to be maintenance free, trenching or excavation could be required to conduct emergency repairs of defective cable segments under wetlands. These activities would be infrequent and would occur in accordance with applicable Federal, state, and local permits. Impacts from these emergency repairs would be similar to the initial construction, as the defective section would be dug up, a new section spliced in, and the cable reburied.

Where the cables would be installed by HDD, impacts on wetland areas from emergency repairs would be avoided because the transmission cables would be cut and pulled out of the installed conduit and the new cable pulled into it without affecting the wetland.

Additionally, significant impacts would not be expected on nearby wetlands from emergency repair activities on aquatic transmission line segments. Localized increases in turbidity and redeposition of sediments from disturbance within the waterbody would result from emergency repair actions; however, these repair actions would occur over a short period of time and in a more limited area than initial installation, and, therefore, impacts on nearby freshwater or tidal wetlands would not be anticipated.

S.8.9 Geology and Soils

Impacts from Construction

Construction activities associated with the installation of the aquatic portions of the proposed CHPE Project would result in localized modification of lakebed and river microtopography; and suspension, transport, and resettlement of riverine and lacustrine sediments. Pre-existing conditions would likely be reacquired over time and impacts minimized through the use of Applicant-proposed measures, such as the use of a shear plow in the southern portion of Lake Champlain.

Impacts from construction activities associated with the installation of the terrestrial portions of the proposed CHPE Project would include short-term increases in soil erosion, soil compaction, and bedrock blasting. Exact locations of bedrock blasting are yet to be determined. Applicant-proposed measures, such as silt fences, would minimize impacts and, once installation is completed and trenches have been filled, local drainage characteristics and soils would be returned to previous conditions.

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts would be expected from the operation of the aquatic portion of the transmission line because there would be no thermal or magnetic or electric field impacts on geology and soils. Maintenance for the transmission line itself is not anticipated to be necessary as it is designed to be maintenance-free. No impacts would be expected on physiography, topography, geology, or seismicity, apart from intermittent emergency repair activities, as required. The proposed transmission cables would be insulated and armored cables would be designed to accommodate seismic events. If the transmission line failed due to a seismic event, its protection system would quickly de-energize the transmission system and the HVDC transmission cables would dissipate very limited energy under short circuit (i.e., fault) conditions; therefore, it would not result in direct impacts on the environment, navigation, or public safety. A cable repair procedure would be implemented, as appropriate, immediately following any seismic events.

For the terrestrial portion of the transmission line, periodic mowing or tree-clearing maintenance activities of the terrestrial ROW could result in soil erosion or sedimentation, but impacts would not be significant, and soils would be retained on site with the use of Applicant-proposed measures (i.e., BMPs). Maintenance for the transmission line itself is not anticipated to be necessary as it is designed to be maintenance-free. Maintenance of the cooling stations and converter station would occur, but would not result in any impacts on geology and soils. Emergency repairs of the terrestrial portion of the transmission line would result in impacts on soils similar to, but less than, those described for construction activities because a smaller area would be disturbed for a shorter duration. The impacts of such activities also would be minimized through the use of Applicant-proposed measures.

S.8.10 Cultural Resources

Ground-disturbing activities associated with the installation of the transmission cables could result in adverse effects on historic properties in the proposed CHPE Project Area of Potential Effects (APE). Geographic Information System (GIS) analysis indicates that there are 51 terrestrial archaeological sites, 2 terrestrial sites that extend into Lake Champlain, 11 underwater sites, 36 National Register of Historic Places (NRHP)-listed or -eligible architectural properties, and 2 historic cemeteries in the APE.

Impacts from Construction

Ground-disturbing activities associated with construction could damage archaeological features and would be expected to disturb the context of artifacts of terrestrial archaeological sites, underwater sites, and historic cemeteries. In the case of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP, this could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a Programmatic Agreement (PA) (see **Appendix T** of the Final EIS) has been developed to manage and resolve adverse effects through avoidance, minimization, or mitigation. Because the transmission line would be underground or underwater and would avoid any standing structures, the adverse effects from construction on the NRHP-listed and -eligible architectural properties in the APE would be limited to exposure to temporary noise, dust, and vibrations and short-term visual effects from the proximity of construction activities and equipment. The effects would not require mitigation. HDD would be used to install the transmission line under Stony Point Battlefield Historic Park.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_

Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a Cultural Resources Management Plan (CRMP) that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known terrestrial and underwater archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. Circumventing known underwater sites or anomalies would avoid potential damage to the integrity of the site. A PA pursuant to 36 CFR 800.14(b) has been prepared (see **Appendix T**) and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G**.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation of the proposed CHPE Project would have no effects on terrestrial and underwater archaeological sites in the APE. Because the proposed CHPE Project would involve an underground transmission line, operations would have no adverse effects on 33 of the 36 architectural properties in the APE. The operation of the proposed cooling station at MP 112 could have noise and visual impacts on the McMore Residence (National Register Eligible [NRE] 15) and the Main Street Historic Bridge (National Register Listed [NRL] 19). Operation of the proposed cooling station at MP 296 could have noise and visual impacts on Stony Point Battlefield Historic Park. Depending on the exact location of the cooling station, these impacts could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T** of the Final EIS) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. Vegetation maintenance activities and emergency repairs, if necessary, would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources sites; therefore, effects would not be expected from such activities.

S.8.11 Visual Resources

Construction and operation of the proposed CHPE Project would generally be consistent with the existing visual environment. Impacts would be anticipated during construction from the presence of construction equipment and activities along the project route. Constructed facilities, such as cooling stations and the converter station, would be visible during operations, but would only result in minimal changes to the existing visual landscape.

Impacts from Construction

Construction equipment and materials would be visible along the proposed CHPE Project route during the construction period. Along the aquatic portions of the proposed CHPE Project route, the transmission cables would be buried beneath the beds of existing waterways and a cable-laying vessel, support vessels, and barges would be visible on the water surface. Minimal land-based support would be required. Land-based support facilities would be constructed within existing ports with existing heavy lift facilities and would be within the existing industrial context of the viewsheds. Additionally, construction materials on the water surface would only be visible in one place for a short duration as construction progresses though the waterway, thereby minimizing impacts on visual and aesthetic resources.

Along the terrestrial portions of the proposed CHPE Project route, construction equipment would temporarily be visible in the locations of active construction on land along existing road and railroad ROWs. Equipment necessary for clearing, trench excavation, cable installation, backfilling, and restoration would be located briefly at each construction site. Temporary support facilities would also be established along the terrestrial portions of the proposed CHPE Project route. These facilities would be sited within the road or railroad ROWs and use the minimum space required to facilitate safe installation. Following construction, impacted areas within terrestrial portion of the proposed CHPE Project route would be seeded and allowed to revegetate naturally. Depending on the type of vegetation involved, natural conditions could return in a matter of months to a few years.

Where the proposed CHPE Project route would cross aesthetic resources such as Stony Point Battlefield State Park and Rockland Lake State Park, the Applicant would use HDD techniques, which would allow installation of the transmission line without disturbing the surface features of the parks. This would eliminate any potential impacts on these aesthetic resources from construction activities. Construction equipment would be visible during construction at the HDD staging area sites.

Impacts from Operations, Maintenance, and Emergency Repairs

No visual impacts or impacts on aesthetic resources would be anticipated along the aquatic portion of the proposed CHPE Project route during operations, because no permanent facilities would be present. Minimal visual impacts during inspection and emergency repair activities along the aquatic portion of the route would be anticipated from the temporary presence of vessels and repair activities that would be visible along the proposed CHPE Project route.

Along the terrestrial portions of the proposed CHPE Project transmission line, visual impacts during maintenance and emergency repair activities would be anticipated from the temporary presence of ROW vegetation maintenance and repair activities and equipment along the proposed CHPE Project route.

Cooling stations would be present along the proposed CHPE Project route within aesthetic resources, such as Saratoga Spa State Park and Spensieri Park. However, the cooling stations would not result in significant visual impacts or would have impacts on aesthetic resources because the cooling stations would be small and only minimally change the character of the existing viewshed.

Operation of the Luyster Creek Converter Station would not be expected to result in any impacts on sensitive aesthetic resources because no sensitive aesthetic resources are present in the immediate vicinity of the converter station site. Additionally, operation would not be anticipated to result in visual impacts because the converter station would be in character with the existing industrial nature of the visual environment, and would be comparable in scale to its surroundings and not break the existing established horizontal skyline.

S.8.12 Infrastructure

Impacts from Construction

Construction of the aquatic portions of the proposed CHPE Project would require crossing existing electrical, water supply, communications, natural gas, sanitary sewer, and other utility lines in waterways. Temporary disruptions (i.e., interruptions) in utility services would be avoided to the extent practicable and coordinated with utility owners. Installation of the aquatic portion of the transmission line would potentially disturb and suspend sediment, some of which might be contaminated, that could temporarily adversely impact water supply systems along the proposed CHPE Project route. However, the NYSPSC Certificate contains conditions that set forth procedures the Applicant must follow to avoid or minimize impacts on water supply systems along the proposed CHPE Project route. Model results indicate that, in conjunction with Applicant-proposed measures, acute toxicity-based water quality standards likely would not be exceeded under the proposed CHPE Project. Impacts on solid waste management facilities would occur due to the generation and management of soils and debris during construction and HDD activities, but contributions to area landfills (which have capacity) would be not be significant.

Construction of the terrestrial portions of the proposed CHPE Project would also require crossing utility lines that intersect road and railroad ROWs. Construction would be coordinated with local utilities to eliminate or minimize disruption to utility service. Capacities of solid waste management facilities would be reduced due to the disposal of construction-related debris and appropriate disposal of contaminated soils. Clean excavated soils would be reused as fill, and waste would be recycled to the maximum extent practicable, thus minimizing the proposed CHPE Project's contributions to regional landfill capacities.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical infrastructure in New York State would benefit over the long term because the proposed CHPE Project would increase reliability, efficiency, and capacity and reduce congestion in the New York Control Area.

Since the transmission line would be maintenance-free and inspections would be non-intrusive, impacts on other electrical infrastructure, storm water management systems, communications lines, natural gas supply lines, or sanitary sewer systems in the aquatic operational portions of the proposed CHPE Project corridor would not be expected. Any emergency repair activities that could impact utilities would be coordinated with the utility providers. Operation of the terrestrial portions of the proposed CHPE Project would not result in impacts on other electrical infrastructure, communications, natural gas supply, or sanitary sewer systems in the proposed CHPE Project corridor.

S.8.13 Recreation

Construction and operation of the proposed CHPE Project would result in limited, temporary impacts, but would not permanently impact any recreational resources along the proposed CHPE Project route.

Impacts from Construction

Construction activities associated with the installation of aquatic portions of the proposed CHPE Project would include the generation of additional vessel traffic, which could inconvenience recreational water-dependent uses and possibly create temporary navigational obstacles. During underwater cable installation, there would be construction vessel activity along the proposed route. Access to shoreline recreational areas (i.e., boat launches and piers) would be maintained, as feasible, but could be partially limited during construction for safety reasons.

Construction activities associated with the installation of the terrestrial portion of the proposed CHPE Project, which would be buried underground along existing railroad and roadway ROWs, could reduce the number of traffic lanes in local roadways accessing recreational resources along the proposed route. Access to recreational areas would be maintained at all times during construction activities using traffic flaggers or other traffic management methods in coordination with park operators. Following construction, the Applicant would reseed the construction area and allow it to revegetate naturally, thereby returning any recreational areas and adjacent areas to their natural conditions. Use of HDD would avoid adverse impacts on recreational users by allowing installation of the transmission line without disturbing the surface features or uses of park lands. Staging areas for HDD would be outside of park boundaries, though equipment could be visible during construction; however, no permanent impacts on recreational resources would be anticipated. No cooling stations would be constructed on park lands or in recreational areas, and access to recreational areas would be maintained during construction.

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, the proposed CHPE Project transmission line would generally be underwater or underground and, therefore, it would not be visible or interfere with recreational resources. Maintenance activities, including inspection and preventive maintenance of the cooling stations and converter station, would be expected to occur throughout the life of the transmission line; however, these activities would occur on an intermittent basis.

Periodic non-intrusive inspection of aquatic portions of the transmission line using vessel-mounted instruments would result in negligible additional vessel traffic, and would not impact recreational water-dependent uses. If necessary, emergency repair activities along the aquatic transmission line would result in temporary inconveniences and navigational obstacles for recreational vessels in the immediate vicinity of the repair site for up to approximately 2 weeks.

Periodic inspections of the terrestrial portions of the transmission line and aboveground infrastructure (i.e., cooling stations and converter station), and routine preventive maintenance or emergency repairs of the aboveground infrastructure, would generally be non-intrusive and would not disrupt (i.e., disturb, interrupt, or otherwise change) adjacent recreational resources.

S.8.14 Public Health and Safety

Construction and operation of the proposed CHPE Project would be conducted in accordance with the activity-specific Health and Safety Plans (HASPs) and Emergency Contingency Plan to be developed by the Applicant. The HASPs would identify requirements for minimum construction and operational distances from residences or businesses, and requirements for temporary fencing around staging, excavation, and laydown areas during construction, including blasting. The HASPs would identify measures to be employed during operations to limit public access to the proposed facilities (i.e., permanent fencing around the cooling stations and converter station). The HASPs would include provisions for worker protection, as required under the National Electrical Safety Code and by the Federal Occupational Safety and Health Administration.

Impacts from Construction

Specialized equipment would be necessary for the installation of the proposed transmission cables in the aquatic environment. Construction personnel would be performing the work on a vessel designed solely for the purpose of installing transmission cables. Operation of the aquatic installation equipment and vessels would be performed by personnel specifically trained to use this equipment. An Aquatic Safety and Communications Plan detailing USCG regulations for safely operating vessels and requiring coordination with the USCG Waterways Management and Vessel Traffic Services would be developed to meet regulatory permit conditions regarding working over or near water.

Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal and state safety regulations. The activity-specific HASPs would contain hazard communications information, hazard identification, risk assessment, and the information necessary to perform the work safely (e.g., Safety Data Sheets and personal protective equipment to be used). Blasting activities and safety measures during such activities would be managed with a blasting plan. All construction sites in both aquatic and terrestrial environments would be managed to prevent harm to the general public. The public would be notified prior to commencement of construction activities and temporary fencing around staging, excavation, and laydown areas would be installed during construction activities.

Impacts from Operations, Maintenance, and Emergency Repairs

An ERRP would be prepared prior to the proposed CHPE transmission system being put into operation that would identify procedures necessary to perform maintenance and emergency repairs. The ERRP would detail the activities, methods, and equipment involved in repairs and maintenance of the transmission system. Contractors would follow all guidelines detailed in the ERRP when conducting maintenance or emergency repair activities.

All aquatic transmission cables would be accessible by either divers or ROVs, and periodic non-intrusive inspections would be performed in accordance with manufacturer's specifications to ensure equipment integrity and protection is maintained. Contractors would follow all guidelines detailed in the ERRP when conducting maintenance or emergency repair activities.

The aquatic transmission cables require no fluid for insulation and would be buried at depths or otherwise protected to prevent disturbance from unrelated operations in waterways. Before the proposed CHPE transmission system would be put into operation, the terrestrial portions of the route would be appropriately marked, and the final route and placement of the transmission cable and associated equipment would be provided to the NYSPSC for addition to the "Call Before You Dig" database. This would be expected to prevent any accidental damage of, or contact with, the cables once they are operational.

Magnetic and electric field levels associated with the proposed CHPE Project transmission line would be below any established health effect levels and would comply with NYSPSC siting guidelines.

S.8.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the aquatic and terrestrial transmission cables would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products, and small amounts of hazardous wastes would be generated as by-products of the transmission cable installation and burial process.

The installation of the aquatic transmission cables has the potential to suspend temporarily and transport sediment and any associated contaminants from water-jetting activities. However, a majority of the sediments would be redeposited in close proximity to its source. The transmission cables would enter the Hudson River approximately 45 miles (72 km) downstream of the southern end of the Hudson River Polychlorinated Biphenyl (PCB) Dredging Project; therefore, the proposed CHPE Project would not impact the Hudson River PCB Dredging Project.

The installation of the terrestrial transmission cables could disturb contaminants potentially deposited in the soil due to the extended use of portions of these areas as railroads and the current and former use of nearby areas for industrial and commercial operations.

Construction of the cooling stations along the route of the transmission line and the Luyster Creek HVDC Converter Station and would involve the transport, handling, use, and onsite storage of hazardous materials and petroleum products.

Construction of the converter station would not interfere with the ongoing Resource Conservation and Recovery Act (RCRA) investigations and remedial activities occurring on the former Astoria Gas Works site to the west. Construction of cooling stations would be sited in consultation with the NYSDEC to ensure that they do not conflict with ongoing remedial investigation activities, as applicable.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate the vessels, remote diving vehicles, trains, trucks, and other equipment needed to conduct terrestrial ROW maintenance activities, routine non-intrusive inspections, and potential emergency repairs of the aquatic and terrestrial transmission cables.

Should any sections of the transmission cables need to be unearthed for inspection or emergency repair, localized disturbances of soil and sediment potentially containing contaminants would be required. However, because the transmission cables themselves are designed to be maintenance-free and require infrequent inspections, any impacts from maintenance and emergency repairs on hazardous materials and wastes would not be significant. The transmission cables do not contain any hazardous fluids, thereby eliminating any potential for sediment contamination from the cables themselves.

A type of refrigerant gas, presumably a non-halogenated hydrocarbon, would be used with the heat exchange process in the chiller system at the cooling stations. If released, this refrigerant would vaporize and not result in air, soil, or groundwater contamination at the cooling stations. Operation of these cooling stations would require limited amounts of hazardous materials and petroleum products for equipment lubrication, cleaning, routine maintenance, and emergency repairs. Minimal amounts of hazardous materials would also be required for standard operations, maintenance, and emergency repairs at the Luyster Creek HVDC Converter Station.

S.8.16 Air Quality

Temporary impacts on air quality would result from construction and maintenance equipment emissions, and no direct emissions would occur from operation of the proposed CHPE Project.

Impacts from Construction

Construction-related air pollutant and GHG emissions associated with the installation of aquatic portions of the proposed CHPE Project primarily would occur from diesel fuel-powered internal combustion engines. Heavy equipment, barges, generators, and boats would emit pollutants such as carbon monoxide (CO), CO_2, sulfur oxide (SO_x), particulate matter (PM), NO_x, and volatile organic compounds (VOCs), including aldehydes and polycyclic aromatic hydrocarbons (PAHs). All emissions associated with aquatic cable installation in a single waterbody would occur during a 1-year construction season. Emissions associated with construction of the aquatic portions of the proposed CHPE Project would not exceed the General Conformity Rule *de minimis* thresholds established in 40 CFR 93.153(b) for individual nonattainment pollutants.

Construction-related air and GHG emissions associated with the installation of the terrestrial portion of the transmission cable and the converter station would primarily be from diesel internal combustion engines and fugitive dust from earthmoving activities. Bulldozers, rock trenchers, bucket loaders, cranes, and other heavy equipment use diesel internal combustion engines, and would emit air pollutants. Fugitive dust emissions would result as the construction corridor is generally unpaved and most of the heavy equipment use would occur within the construction corridor. Applicant-proposed measures would be implemented to reduce impacts from emissions and minimize fugitive dust.

All emissions associated with construction would be temporary and spread over approximately 3 years of planned work activities. It is anticipated that construction emissions associated with the terrestrial portions of the proposed CHPE Project would not exceed the General Conformity Rule *de minimis* thresholds and, therefore, a General Conformity Determination is not required for any portion of the proposed CHPE Project.

The construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, increase the frequency or severity of a violation of any ambient air quality standard, exceed any evaluation criteria established by the State Implementation Plan (SIP), or delay the attainment of any standard or other milestone contained in the SIP.

Impacts from Operations, Maintenance, and Emergency Repairs

Air pollutant and GHG emissions associated with maintenance, inspection, and emergency repair activities would stem from vehicle and equipment engine use and the generation of fugitive dust. Fugitive dust would be created during earthmoving activities and traveling along unpaved roads. Although maintenance, inspection, and emergency repair activities would occur for the life of the proposed CHPE Project, there would not be significant impacts on the regional air quality due to the sporadic small-scale nature and likely short duration of these activities. The types of heavy equipment and vehicles used would be similar to those described for construction; however, their usage would be considerably less. The resulting increase in emissions would not be significant. In addition, maintenance and emergency repair activities associated with the proposed cooling stations and converter station would not have significant impacts on the regional air quality.

In addition, the proposed CHPE Project would introduce 7.65 terawatt hours (TWh) per year of low-carbon renewable energy from Canada into New York's power markets. Upon operation of the proposed CHPE Project, it has been estimated that annual New York State power generation emissions would be reduced by 1.5 million tons of CO_2, 751 tons of SO_2, and 641 tons of NO_x while meeting its annual electric power demand.

S.8.17 Noise

Construction and operation of the proposed CHPE Project would be in compliance with all applicable noise policies and codes.

Impacts from Construction

Construction of the aquatic portions of the transmission line would cause a temporary increase in noise levels in the construction area. Aquatic construction activities would generally occur at distances greater than 600 feet (183 meters) from noise-sensitive receptors. However, in some locations construction activities would occur at distances approximately 100 to 500 feet (30 to 152 meters) from shore. There would be noise impacts on residents along the shoreline when vessels and heavy equipment are within 500 feet (152 meters) of the shoreline. At this distance range, the noise level was conservatively estimated to range from 62 to 70 A-weighted decibels (dBA). Given the nature of the continuously progressing installation along the aquatic transmission line route, it is likely that nearby receptors on the shoreline would be subject to noticeable sound increases for no more than a few hours as the work would progress at a rate of approximately 1.5 miles (2.4 km) per day.

The blasting program required to excavate rock along the proposed CHPE Project route in the Harlem River would consist of drilling boreholes and use of either pre-packaged chemical demolition agent or water gel dynamite to generate the expansive force necessary to fracture the rock. Nominal noise and vibration would be expected from the drilling process, and noise would result primarily from air compressors mounted on the barge. It is unlikely that blasting would generate appreciable aboveground noise. The proposed blasting activities would comply with frequently used vibration thresholds. Blasting and its noise and vibration effects on nearby land uses and structures would be managed with a blasting plan for each site. With proper implementation of a blasting plan, whereby all nearby existing buildings and structures are accounted for, the increase in noise and vibration levels would be managed to minimize noise impacts on potential receptors.

Construction of the terrestrial portion of the transmission line would cause a temporary increase in noise levels. Terrestrial transmission cable installation requires a wide range of site preparation and cable installation activities and equipment that generate noise. Terrestrial construction would generally occur approximately 100 to 500 feet (30 to 152 meters) from residences and users of recreational resources along the terrestrial portions of the project route. At these distances, the noise level was conservatively estimated to range from 66 to 86 dBA. However, in a few places along the transmission line route, including the Overland Segment, Stony Point, Haverstraw, and Queens, construction activities would occur within 100 feet (30 meters) of residences. Noise levels within this distance would be approximately 80 to 85 dBA, similar to those produced by a motorcycle at 50 feet (15 meters). Noise at these levels could result in speech or sleep interference in areas close to the operating construction equipment. Applicant-proposed measures such as equipping construction equipment with appropriate sound-muffling devices (i.e., Original Equipment Manufacturer [OEM] or better), maintaining equipment in good operating condition at all times, and limiting high-noise construction activities to daylight hours in areas with sensitive noise receptors would minimize impacts. The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line.

HDD installation activities at the major water-to-land transitions would result in temporary noise level increases at nearby noise-sensitive receptors. Noise generated from the HDD operation would be relatively constant and, at a level of up to 89 dBA within 100 feet (30 meters) of the HDD equipment, slightly louder than typical construction noise levels. HDD operations at the major water-to-land transitions would be in place for up to approximately 2 weeks, and, where warranted, the Applicant has proposed to erect wooden sound barriers in addition to the above-cited noise minimization measures, or in extreme cases, offer temporary lodging for affected residents.

Impacts from Operations, Maintenance, and Emergency Repairs

Noise impacts from the operation of cooling stations and the converter station and maintenance and emergency repair activities would be expected. The increase in sound levels resulting from periodic inspection and vegetation maintenance activities in the transmission line ROW would not be significant and primarily would be associated with noise generated from additional vessel and construction vehicle traffic. Such activities would be short-term in duration, but could occur multiple times over the operating life of the transmission line. Noise levels generated from emergency repair activities would be similar to those expected during construction but with less equipment, only in a discrete area where repair activities are required, and for a shorter duration.

The cooling stations would be designed by the Applicant to limit noise generated to levels of 50 dBA at 100 feet (30 meters) away. Residential areas are present along the proposed CHPE Project route and some residences could be within 100 feet (30 meters) of the cooling stations. However, cooling station noise levels at nearby receptors would comply with the NYSDEC Noise Policy of 65 dBA for new noise sources. In addition, cooling stations would only operate as required to cool the transmission cables, primarily during summer months. The operation of the Luyster Creek HVDC Converter Station would add to baseline environmental noise levels in the immediate area; however, operations would be compliant with the New York City zoning exterior standard for exterior uses bordering an M3 industrial zone, the New York City Noise Code, and the NYSDEC Noise Policy.

S.8.18 Socioeconomics

Construction and operation of the proposed CHPE Project would require relatively few specialized workers and laborers over the lifetime of the project. Project requirements for non-specialized construction workers and local housing units along the CHPE Project corridor should be adequate to meet labor demands associated with the project. Tax receipts and revenue associated with construction expenditures would increase for local municipalities and an annual reduction in wholesale electrical energy market prices would occur.

Impacts from Construction

Over the approximated 4-year construction period, the proposed CHPE Project would result in an estimated average 300 direct construction jobs. Additionally produced indirect and induced jobs would be associated with supplying materials and providing other services for construction of the proposed CHPE Project.

Relatively few (i.e., approximately 20) specialized workers would be required during construction activities and would be on site only for the duration of those activities (i.e., 2 weeks or less) in any given location. Non-specialized workers would be hired from the existing construction workforce along each segment of the proposed CHPE Project corridor. Therefore, it is unlikely that large numbers of workers would permanently migrate to the area to meet the labor demands of the project. The few specialized workers travelling to the area for construction of the proposed CHPE Project would likely be housed either in local hotels or other short-term boarding units. Given the low number of specialized workers required for construction, existing housing options along each segment of the proposed project corridor should be adequate to meet the temporary increase in demand.

Spending associated with construction (e.g., purchase of building materials, construction workers' wages, and purchases of goods and services) would temporarily increase tax receipts and revenue for local economies. Building materials required for the proposed CHPE Project would be purchased as needed from local sources. Construction activities within roadways could interfere with access to local businesses. However, construction zones would be established in a given location for 2 or less weeks at a time and a Maintenance and Protection of Traffic Plan would be developed to ensure continuous road access to businesses.

Easements would be acquired by the Applicant, where appropriate, along the proposed CHPE Project corridor and the Applicant would pay for any associated land restoration costs following construction activities in these areas. Since construction activities would be temporary and property would be returned to pre-construction conditions once completed, it is unlikely that property values would be impacted.

Impacts from Operations, Maintenance, and Emergency Repairs

Approximately 26 direct, full-time employees would be hired to operate the proposed CHPE Project; of this total, 21 employees would be located in the New York City metropolitan area. A negligible number of indirect jobs could also be created for maintenance inspections and possible emergency repairs that, if needed, would be conducted by contractors. Considering the low number of jobs that would be created, the existing workforce within the project area would be able to meet the employment and housing demands of the proposed CHPE Project.

The Applicant would pay fees, as appropriate, to New York State agencies for use of state lands occupied by the proposed CHPE Project. Some elements of the proposed CHPE Project transmission system facilities would be taxable as real property. Local municipalities would impose a tax on the facilities and the Applicant would pay the tax. Tax receipts are estimated to be 2 percent of the annually assessed municipal property value; this percentage is calculated per New York State tax regulations and is subject to change.

Residents throughout the New York City metropolitan area are projected to receive approximately $200 million in annual energy savings. The vast majority (i.e., 91 percent) of savings is expected for the New York City metropolitan area. Costs associated with operation of the transmission system would be borne (as a merchant project) by investors; they would not be directly passed on to ratepayers.

The transmission line would typically be buried primarily in road and railroad ROWs and would not be visible; therefore, its presence would not present a general detriment to private property values. Easement payments to landowners would compensate landowners for any access or use restrictions placed on private properties and would offset any potential impacts on property values. The Applicant would also pay for any land restoration costs associated with any emergency repairs to the system that might be required. Because maintenance and emergency repair activities would only occur in a given location for 2 weeks or less, no change in private property values would be expected.

S.8.19 Environmental Justice

Construction and operation of the proposed CHPE Project would not result in disproportionately high and adverse effects on minority and low-income populations.

Impacts from Construction

The census tracts along the proposed CHPE Project transmission line corridor have minority or low-income population levels that generally are lower than those for New York State, except for census tracts closest to New York City where a larger number of minority and low-income populations reside, particularly in Queens. Human health and environmental effects from increases in air emissions, noise, dust, and construction vehicle traffic on all populations, including minority and low-income populations, would be small, and occur only on a transitory, temporary schedule. Portions of the transmission line would be constructed in aquatic environments, which would further reduce construction-related effects on minority and low-income populations because activities would occur farther from populations residing on land. Cooling stations would be constructed along the proposed CHPE Project route primarily in existing railroad ROWs, and the Luyster Creek HVDC Converter Station would be constructed in an industrial area with no permanent residents. Therefore, no disproportionately high and adverse effects on minority and low-income populations would occur from construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Operation of the transmission line would create magnetic fields; however, no adverse effects from magnetic fields on minority and low-income populations would be expected because the cables would be placed underground in the same trench, and no known human health effects from exposure to magnetic fields at the level to be emitted by the proposed CHPE Project have been identified. Human health and environmental effects would be limited to operation of the converter station and maintenance and emergency repairs of the transmission system. Effects from increases in air emissions, noise, and traffic on all populations, including minority and low-income populations, would be small, and would occur only on an intermittent, temporary schedule in primarily aquatic environments and existing roadway and railroad ROWs at durations and frequencies less than that for construction. Portions of the transmission line in aquatic environments would have less maintenance and emergency repair-related effects on minority and low-income populations because activities would occur farther from populations residing on land. Noise levels would be expected to increase as a result of cooling station and converter station operation; however, those levels would primarily occur in industrial areas or railroad or roadway ROWs. Therefore, no disproportionately high and adverse impacts on minority and low-income populations would occur from operations, maintenance, and emergency repairs.

S.8.20 Cumulative Impacts

Impacts from Construction

Construction activities along aquatic portions of the proposed CHPE Project route could result in, on a temporary basis, increased water turbidity, disturbance and resuspension of sediments, disturbances to aquatic species, localized degradation of aquatic species habitat, increased vessel traffic, increased air emissions, and increased noise levels. Recolonization of impacted areas by benthic organisms would begin to occur within months after activities have ceased. Cumulatively, other construction activities occurring in the same time and vicinity, and past and reasonably foreseeable construction activities, would have similar impacts on the aquatic environment. Other projects identified along the aquatic segments of the proposed CHPE Project include the maintenance dredging of the Hudson River at the North Germantown Reach (although this should be complete prior to the commencement of the proposed CHPE Project); the Tappan Zee Hudson River Crossing Project; the Grande Isle Intertie and New England Clean Power Link in Lake Champlain; and the Spectra-Algonquin Incremental Market Natural Gas Pipeline Project, West Point Transmission Project, and one portion of the proposed West Point Net Zero Project in the Hudson River (though the timing of these projects are not yet established). Multiple activities occurring at the same time and in the same vicinity would have greater impacts than just one project. If construction activities overlap in this area, then the construction-related impacts, such as disturbed substrate, temporary water quality degradation, sediment redeposition, increased turbidity, increased noise and vibration, and the potential for spills could be greater than for just one project. However, construction of the proposed CHPE Project would not affect any one area for an extended period of time (i.e., generally no more than 2 weeks), so the possible short temporal overlap between the proposed CHPE Project and another project would limit cumulative impacts.

Construction activities along terrestrial portions of the proposed CHPE Project route could result in vegetation clearing, disturbances to wildlife, localized degradation of wildlife habitat, direct mortality of wildlife individuals, soil disturbance and erosion, storm water runoff into surface water, increased traffic, increased air emissions, and increased noise levels. These potential impacts would all be short-term in nature or limited in area or degree. Cumulatively, other construction activities occurring in the same time and vicinity would have similar impacts on terrestrial environments. Other projects identified along the terrestrial portions of the proposed CHPE Project include CSX Track Expansion between Ravenna and Haverstraw, the Haverstraw Water Supply Project, the redevelopment of the Stony Point waterfront, and the Luyster Creek Energy Project and ConEd Learning Center in Astoria. Multiple activities occurring at the same time and vicinity would have greater impacts than just one project. Construction of the proposed CHPE Project would not affect any one area over an extended period of time (i.e., generally no more than several weeks), so the short temporal overlap would limit cumulative impacts for concurrent projects.

Impacts from Operations, Maintenance, and Emergency Repairs

The proposed CHPE Project individually would not be considered a strong source of magnetic fields. Other existing and proposed transmission lines that would be crossed by the proposed CHPE Project would be an additional source of magnetic fields at the location of the crossing. Individuals of a migrant aquatic species (e.g., shortnose sturgeon) might encounter crossing submerged cables emitting magnetic fields along an entire migratory route. A review of scientific literature yielded inconclusive evidence that magnetic field emissions associated with transmission lines result in adverse effects on the health, behavior, or productivity of animals. However, the cumulative impacts of magnetic fields on aquatic and terrestrial species over a lifetime are poorly understood.

In general, the strongest magnetic and electric fields around the outside of a substation, such as in the vicinity of the proposed Luyster Creek HVDC Converter Station, are from power lines entering and leaving the substation. Beyond the substation fence or wall, the magnetic field produced by the substation equipment is usually indistinguishable from background levels. Though the proposed CHPE Project would not generate magnetic fields above the 200 mG NYSPSC interim standard, the project could contribute to magnetic emissions greater than 200 mG in those areas where the proposed HVAC transmission line crosses other utility lines. Other sources of magnetic fields in outdoor urban areas include existing power lines and streetlights. People are exposed to numerous sources of magnetic fields on a daily basis from sources like power lines, but also from electric devices in home and office environments. The research available on the health impacts of magnetic field exposure are not definitive, and no conclusions regarding the health impacts can be drawn based on what is presently known about the health impacts of magnetic fields.

Several factors could impact the energy generation market over the next few years. Energy policies are putting increasing emphasis on energy conservation and providing reliable, clean, and renewable sources of energy. Existing generating plants in the state that are not meeting air quality, water quality, or other safety standards could be forced either to upgrade equipment or to retire affected generating units earlier than planned. Proposed upgrades in the electrical transmission infrastructure along the proposed CHPE Project corridor would increase the viability of wind energy, including offshore wind energy, as an important source of clean, renewable energy in the long term; however, the upgrades necessary to make this happen would not likely occur within the next few years. Other proposed HVDC transmission projects, in addition to the proposed CHPE Project, would facilitate the importation of energy into New York City from interstate or Canadian sources. The proposed CHPE Project would be expected to contribute to cumulative increases in electrical capacity, efficiency, and reliability and decreases in transmission congestion in the New York Control Area.

The proposed CHPE Project is intended to reduce criteria pollutant and GHG emissions by alleviating the need to operate older, more emissive fossil-fueled power plants. New York State currently derives approximately 21 percent of its electricity generation needs from renewable resources, most of which comes from hydroelectric power, and the majority of the remaining generation is fossil-fuel based. The proposed CHPE Project would reduce annual emissions of CO_2, SO_2, and NO_x. As older, more emissive fossil-fueled sources of power generation are retired, the proposed CHPE Project would be expected to have long-term, beneficial, cumulative impacts on air quality, particularly in the New York City area where there are many fossil-fueled generating units and high-energy demand.

Since the proposed CHPE Project transmission line would be designed to be maintenance-free, cumulative impacts from maintenance and emergency repair activities would be limited to a negligible increase in vessel and maintenance vehicle traffic in the transmission line ROW. Potential clearing of land adjacent to the transmission line ROW, along with management of vegetation growth in the transmission line ROW during operation of the proposed CHPE Project, would also cumulatively reduce the amount of forested areas and availability of wildlife habitat.

1. Purpose of and Need for the Action

1.1 Background

The proposed Champlain Hudson Power Express (CHPE) Transmission Line Project (proposed CHPE Project) would consist of an approximately 336-mile (541-kilometer [km])-long, 1,000-megawatt (MW), high-voltage merchant electric power transmission system that includes a transmission line that would run from the U.S./Canada border to Astoria, Queens, New York, and associated equipment. In addition to the transmission line itself, the system would include transmission line cooling stations at certain locations along the route, a direct current (DC) to alternating current (AC) converter station, improvements to the Astoria Annex Substation, and high-voltage alternating current (HVAC) interconnection from this substation to the Consolidated Edison Company of New York, Inc. (ConEd) Rainey Substation in Queens.

On January 25, 2010, Champlain Hudson Power Express, Inc.[2] (CHPEI) (the Applicant) applied to the U.S. Department of Energy (DOE) for a Presidential permit pursuant to Executive Order (EO) 10485, as amended by EO 12038, and the regulations codified at 10 Code of Federal Regulations (CFR) 205.320 *et seq.* (2000), "Application for Presidential Permit Authorizing the Construction, Connection, Operation, and Maintenance of Facilities for Transmission of Electric Energy at International Boundaries."[3] Subsequently, Transmission Developers, Inc. (TDI), on behalf of the Applicant, submitted amendments to the Presidential permit on August 5, 2010; July 7, 2011; and February 28, 2012.

The February 28, 2012, amendment reflected route and project changes that resulted from negotiations, including more than 50 settlement conferences held between November 2010 and February 2012, with state agencies and stakeholder organizations pursuant to the New York State Public Service Commission's (NYSPSC) Article VII Certificate of Environmental Compatibility and Public Need process review of the project (Joint Proposal). The Applicant and 13 signatory parties submitted the Joint Proposal to the NYSPSC on February 24, 2012. TDI submitted it to DOE as an amendment to the Presidential Permit on February 28, 2012. The NYSPSC issued an Order granting a Certificate of Environmental Compatibility and Public Need (Certificate) for the proposed CHPE Project on April 18, 2013 (NYSPSC 2013). DOE is reviewing, and this Environmental Impact Statement (EIS) analyzes, the proposed CHPE Project as amended by the Joint Proposal and the Certificate.

An overview of the proposed CHPE Project is provided in the following paragraphs, and additional project information is provided in **Chapter 2** (*Proposed Action and Alternatives*). The DOE Web site for the EIS is found at http://www.chpexpresseis.org, and additional project information is available on the Web site associated with the Applicant at http://www.chpexpress.com.

The DOE Office of Electricity Delivery and Energy Reliability is responsible for reviewing Presidential permit applications and determining whether to grant a permit for electrical transmission facilities that cross the U.S. international border. The Presidential permit for the Applicant (OE Docket Number

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[2] CHPEI is a joint venture of TDI–USA Holdings Corporation (TUHC), a Delaware corporation, and National Resources Energy, LLC. TUHC, the majority shareholder in CHPEI (75 percent), is a subsidiary of Transmission Developers Inc. (TDI), a Canadian Corporation. National Resources Energy is a wholly owned subsidiary of National RE/sources Group, a limited liability corporation duly organized under the laws of the State of Connecticut. TDI's lead investor is the Blackstone Group, an energy investment company.

[3] Additionally, the Applicant formally applied for the DOE Section 1705 Loan Guarantee Program in January 2010. The program closed on September 30, 2011, and the Applicant did not receive any funding from this program. The Applicant applied for and was granted the right to enter the DOE Section 1703 loan program when the 1705 program closed. However, the Applicant withdrew its application in September 2012 and is no longer seeking a Loan Guarantee from the DOE.

PP-362), if issued, would authorize the Applicant to construct, operate, maintain, and connect the United States portion of the project at the international border.

DOE has determined that the issuance of a Presidential permit would constitute a major Federal action and that an EIS is the appropriate level of environmental review under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [U.S.C.] 4321 *et seq.*).

DOE has prepared this EIS in compliance with the requirements of NEPA, the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1500–1508), DOE implementing procedures for NEPA (10 CFR Part 1021), and other applicable regulations.

This EIS was prepared to meet the following key objectives:

- Identify baseline conditions along the proposed CHPE Project corridor
- Identify and assess potential impacts on the natural and human environment that might result from implementation of the proposed CHPE Project in the United States
- Describe and evaluate reasonable alternatives to the proposed CHPE Project in the United States, including the No Action Alternative
- Identify specific mitigation measures, as appropriate, to minimize environmental impacts
- Facilitate decisionmaking by DOE and other applicable Federal and New York State regulatory agencies responsible for the issuance of associated permits and approvals.

1.1.1 Overview of the Presidential Permit Process

As required by 10 CFR 205.320(a), any entity "who operates an electric power transmission or distribution facility crossing the border of the United States, for the transmission of electric energy between the United States and a foreign country, shall have a Presidential Permit, in compliance with EO 10485, as amended by EO 12038." EO 10485, as amended by EO 12038, authorizes the Secretary of Energy "[u]pon finding the issuance of the permit to be consistent with the public interest, and, after obtaining the favorable recommendations of the Secretary of State and the Secretary of Defense thereon, to issue to the applicant, as appropriate, a permit for [the] construction, operation, maintenance, or connection" of "facilities for the transmission of electric energy between the United States and a foreign country." In determining whether the issuance of a Presidential permit would be consistent with the public interest, DOE assesses the environmental impacts of the proposed project, the impact of the proposed project on electric reliability, and any other factors that DOE considers relevant to the public interest.

1.1.2 Description of the Proposed CHPE Project

The proposed CHPE Project would cross the international border from Canada into the United States underwater in the Town of Champlain, New York, and extend approximately 336 miles (541 km) south through New York State to the New York City metropolitan area electricity market. The Applicant would construct, operate, and maintain the aquatic (underwater) and terrestrial (underground) transmission line system that ultimately terminates in Queens, New York. Although primarily underwater or underground, some specific project components of the transmission system, including various cooling equipment and the converter station, would be aboveground.

Figure 1-1 depicts, in general, the proposed route of the proposed CHPE Project. Detailed maps of the entire route are provided in **Appendix A**.

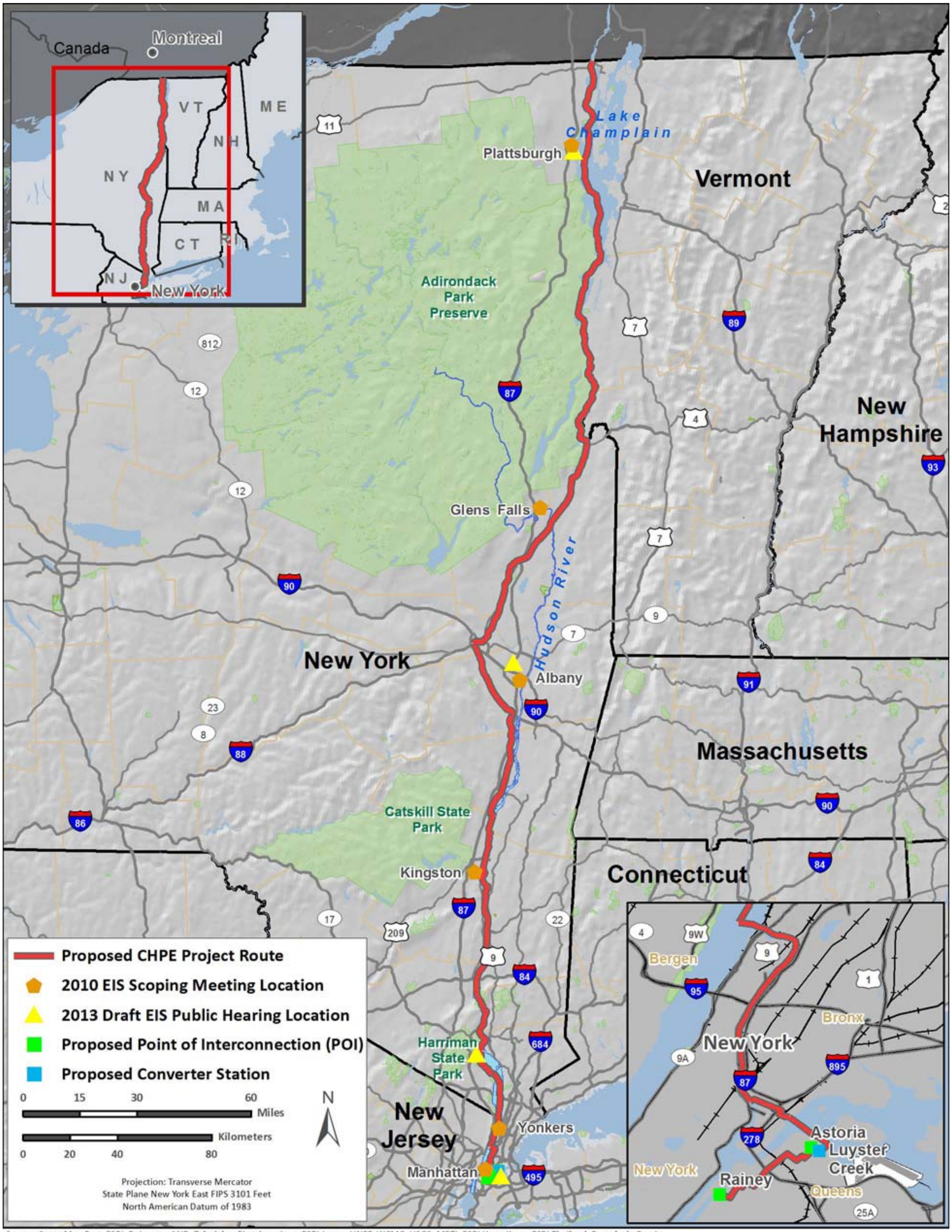


Figure 1-1. Proposed CHPE Project Location Overview Map

1.2 DOE's Purpose of and Need for Agency Action

The purpose of and need for DOE's action is to decide whether or not to grant a Presidential permit for the proposed CHPE Project. DOE will consider the impact analysis contained within this EIS when it decides whether or not to grant the permit for the proposed CHPE Project.

1.3 DOE's Proposed Action

The proposed Federal action is the granting of the Presidential permit for the construction, operation, and maintenance of the proposed CHPE Project facilities that would cross the international border. This EIS analyzes potential environmental impacts from the Proposed Action (Preferred Alternative) and the No Action Alternative. Because the proposed CHPE Project would involve actions in floodplains and wetlands, in accordance with 10 CFR Part 1022, *Compliance with Floodplain and Wetland Environmental Review Requirements,* this Final EIS includes a floodplain and wetland impact analysis. If granted, the Presidential permit would authorize the international border crossing.

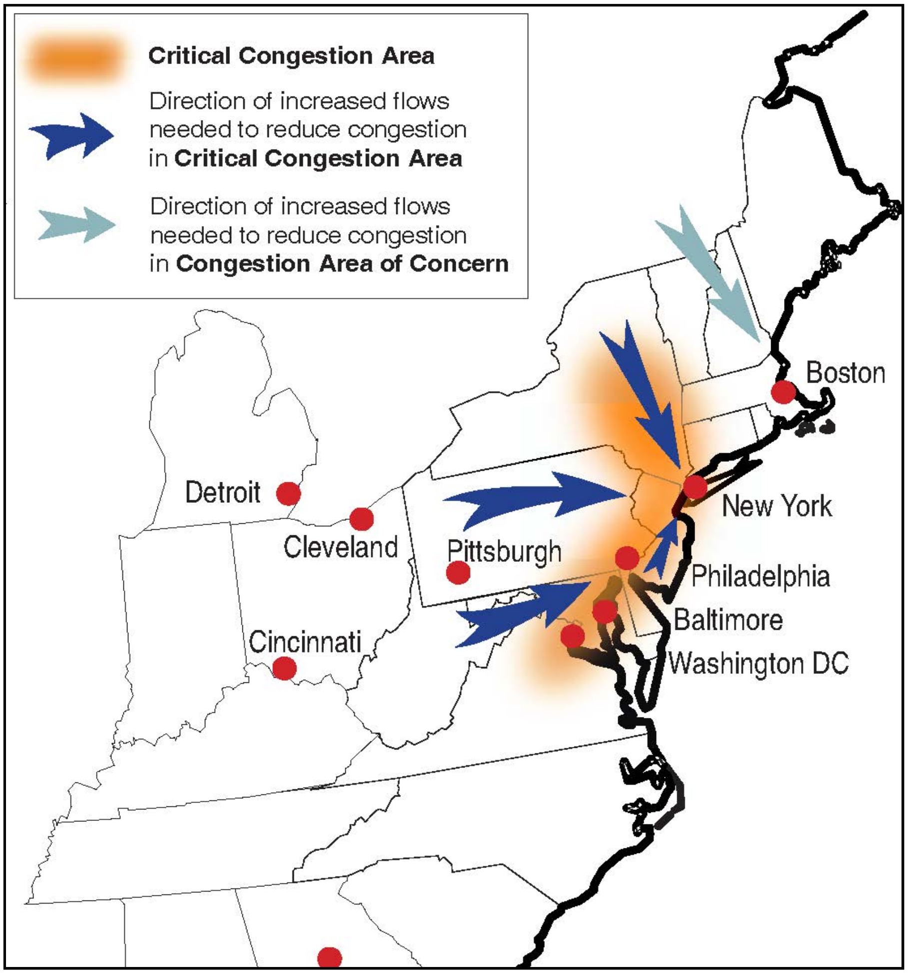
1.4 Applicant's Objectives

According to the Presidential permit application, the proposed CHPE Project would be a merchant transmission facility that would provide needed electrical energy, primarily hydroelectric and wind energy generated in Canada, to the New York City metropolitan area, which the Applicant states would result in lower wholesale electric power prices, reductions in emissions, greater fuel diversity, and increased energy supply capability and system reliability.

DOE has designated southeastern New York State as a Critical Congestion Area, defined as "Areas where it is critically important to remedy existing or growing congestion problems because the current and/or projected effects of the congestion are severe" (DOE 2009a). The *U.S. Department of Energy's National Electric Transmission Congestion Study* (DOE 2006) determined that consumers in the Mid-Atlantic area of the United States, including southeastern New York State, are adversely affected by transmission congestion. These adverse effects on consumers result in consistently higher energy prices and reduced reliability of electricity. The outcome of the 2006 report included the designation of two congestion corridors within the United States. The Mid-Atlantic Area National Electric Transmission Corridor includes parts of New York, New Jersey, Pennsylvania, Maryland, Delaware, and the District of Columbia, as shown in **Figure 1-2**. The other congestion corridor, the Southwest Area National Interest Electric Transmission Corridor, includes southwestern states and would not be affected by the proposed CHPE Project.

The 2009 update of the 2006 DOE congestion study indicated that providing electricity to southeastern New York State is the greatest challenge for the Mid-Atlantic Electric Transmission Corridor. In particular, the southeastern portion of New York State is densely populated, and land for new or expanded transmission rights-of-way (ROWs) is generally not available. In addition, residents of New York State, along with other consumers in the Mid-Atlantic Electric Transmission Corridor, pay more for electric power than non-congested areas in the United States (DOE 2009a).

The 2006 study found that "New York City's electricity supply problems are especially complex and difficult. Building new generation capacity within the city is extremely challenging because of air quality restrictions, high real estate values, fuel supply problems, and local opposition to power plants. Some additional generation is being added north of the city to serve the city's requirements. Adding major new transmission lines to the north and northwest would increase the options available to the city for power. During the summer, the city could be served by excess, relatively inexpensive hydropower from Canada" (DOE 2006).



Source: DOE 2009a

Figure 1-2. Mid-Atlantic Corridor Critical Transmission Congestion Map

The 2009 update discussed the ongoing efforts of the New York State Department of Public Service (NYSDPS) program to reduce transmission congestion in the southeastern portion of New York State through policy actions, energy efficiency, and effective demand response (NYSEPB 2009). These efforts, along with the recent economic slow-down, have reduced the forecasted growth rates. However, the study suggests that high-load growth and extreme hot weather would continue to reduce the reliability of the electric power transmission system in New York State (DOE 2009a). Furthermore, the New York Independent System Operator (NYISO), which manages New York's energy transmission grid in the New York (State) Control Area (NYCA), forecasts the electricity demand in New York State to increase by approximately 0.6 percent annually between 2012 and 2022, from 163,000 gigawatt hours (GWh) in 2011 to approximately 173,000 GWh in 2022 (NYISO 2012).

> A Smart Grid is a digitally enabled electrical grid that acts on information about the behavior of energy sources and demand loads within the system and automatically takes corrective actions to improve the efficiency, reliability, and sustainability of electricity services.

The Applicant expects the proposed high-voltage direct current (HVDC) transmission system technology to be supportive of NYISO's planning to implement Smart Grid-enabling technologies. The HVDC voltage source converter technology that would be used to convert the DC into AC electricity is able to independently control the reactive and real power flow at the AC system to which it is connected. Power flows, both reactive and real, must be carefully controlled for a power system to operate within acceptable voltage limits. When power flows are outside of acceptable limits, higher losses and reduced overall transmission efficiency result. When there is not enough reactive power, the voltage levels decline and it is not possible to push the power demanded by loads through the lines. Post-event evaluations attribute the August 14, 2003, blackout that affected the northeast United States and portions of Ontario, Canada, to inadequate levels of reactive power, which ultimately caused the power plant and transmission line failures and set the blackout in motion (US-C Task Force 2004).

A generator typically produces some mixture of "real" and "reactive" power, and the balance between them can be adjusted on short notice to meet changing conditions. Real power is the form of electricity that powers equipment. Reactive power, a characteristic of AC systems, is the energy supplied to create or be stored in electric or magnetic fields in and around electrical equipment.

The reactive voltage injected by voltage source converters can be controlled to regulate active power flow in the receiving transmission line. While one voltage source converter regulates the DC voltage, another controls the reactive power flows in the lines. Since each is also able to provide reactive compensation, the converter station is able to carry out an overall real and reactive power compensation of the total transmission system to which it is connected, improving system stability and reliability.

According to the Applicant, the voltage source converter technology would increase the efficiency of the transmission and distribution system, incorporate greater levels of renewable energy, improve power quality and stability to support new digital demands, increase operational flexibility, and greatly reduce the risk of failure that might affect the entire grid (DOE 2009b, CHPEI 2010a).

The Federal Energy Regulatory Commission (FERC) issued an Order to CHPEI (Docket No. ER10-1175-000, dated July 10, 2010) allowing CHPEI to presubscribe 75 percent of the Project's transmission capacity through supply contracts (75 *Federal Register* 26218). The Applicant would be required to conduct an open bid for the remaining 25 percent capacity to meet fair-trade requirements through Order No. 888, *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities* (FERC Stats. & Regs. 31036 [1996], as amended [18 CFR Parts 35 and 385]). The Applicant stated that it would solicit supply contracts to presubscribe 75 percent of the transmission capacity of electrical energy delivered to the New York City metropolitan area, and the remaining 25 percent would be allocated through an open season process. As hydroelectric resources currently represent approximately 98 percent of the power generation in the Hydro-Québec control area where the CHPE system would originate (Hydro-Québec 2011), the Applicant expects that most of the power transported through the proposed CHPE Project would be from renewable resources, primarily hydropower.

Studies performed for the proposed CHPE Project showed that in addition to power being delivered by the CHPE Project to the New York City metropolitan area electrical market, it is anticipated that this power would be of lower cost. Therefore, the Applicant has stated that the proposed CHPE Project power would be purchased first and displace natural gas and oil-fueled sources of electrical generation supplying the region. This would result in the potential to reduce regional greenhouse gas (GHG) emissions. Using the initial year of operation of 2018 as an illustration, NYSDPS predicted that the proposed CHPE Project would reduce annual emissions of carbon dioxide (CO_2) by approximately 1.5 million tons, sulfur dioxide (SO_2) by 751 tons, and nitrogen oxides (NO_x) by 641 tons (NYSDPS 2012a). A study completed for the Applicant by London Economics International (LEI) in 2011 estimated that the project would result in annual emissions reductions of approximately 3.5 million tons of CO_2, 130 tons of SO_2, and 560 tons of NO_x (LEI 2011, Frayer 2012). LEI also estimated that importing 1,000 MW of lower-cost Canadian energy into the power markets in New York City would be expected to save consumers in the New York Control Area between $554 million to $654 million per year (LEI 2011). Independent modeling conducted by the NYSDPS projected that ratepayer benefits in the New York Control Area would total approximately $405 million to $720 million per year (CHPEI 2012e). LEI also estimated that Independent System Operator-New England (ISO-NE) ratepayers would see reduced energy prices and receive ratepayer benefits systemwide in the range of $20 million to $25 million per year (LEI 2011).

A previous study conducted by LEI in 2010 stated that the proposed CHPE Project would result in an improvement to the overall reliability of the NYISO's electricity system, because the CHPE Project would provide supplemental power capacity from Quebec, thereby improving resource adequacy and reducing loss of load expectations (LEI 2010). The HVDC technology proposed for use in the proposed CHPE Project would possess four-quadrant control technology, allowing the transmission supplier to control voltage and power separately, thereby providing reactive power (i.e., used to control voltage on the transmission system to improve system efficiency) for real-time voltage control. The proposed CHPE Project would also have the ability to provide black start service. "Black start" capability refers to the ability of a generating unit or station to start operating and delivering electric power without assistance from the electric system. Black start units are essential to restart generation and restore power to the grid in the event of an outage (CHPEI 2010a).

The Applicant notes that the proposed CHPE Project intends to accomplish the following:

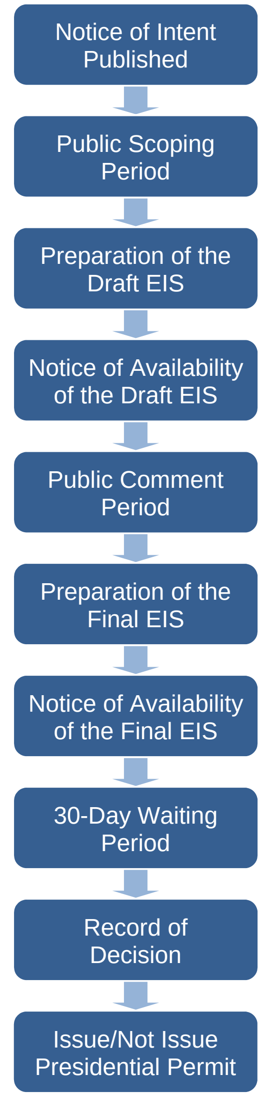
- Provide 1,000 MW (7,640 GWh per year) of electricity to New York City without contributing to additional transmission congestion on the existing electricity transmission infrastructure in the United States
- Provide additional new transmission infrastructure capacity into New York City using HVDC and HVAC cables that would be buried to avoid potential visual impacts from traditional overhead transmission lines
- Apply downward pressure on the price of electricity in the Location Marginal Price (LMP) spot markets operated by Independent System Operators (ISOs) in the New York City market
- Reduce air pollution and GHG emissions within the New York City area by alleviating the need to operate one or more existing fossil-fueled power plants within the region during periods of transmission congestion
- Improve stability of the electric grid serving the New York City metropolitan area due to the highly reliable and controllable nature of HVDC technology and its compatibility with Smart Grid initiatives
- Reduce the dependency of the New York City region on fossil fuels, such as coal, oil, and natural gas.

1.5 Overview of Public Participation in the NEPA Process

DOE determined that the appropriate level of NEPA review for the Proposed Action is an EIS. DOE prepared this Final EIS in compliance with the requirements of NEPA (42 U.S.C. Part 4321 *et seq.*), CEQ regulations for implementing NEPA (40 CFR Parts 1500–1508), and DOE implementing procedures for NEPA (10 CFR Part 1021) and floodplain and wetlands environmental review requirements (10 CFR Part 1022).

In 2010, DOE issued in the *Federal Register* a Notice of Intent (NOI) to prepare an EIS for the Proposed Action and conducted public scoping (75 *Federal Register* 34720). In 2012, DOE issued an Amended NOI to modify the scope of the EIS to reflect Applicant-proposed revisions to the project and conducted additional public scoping (77 *Federal Register* 25472) (see **Section 1.7**). These revisions included moving the transmission line out of the narrows of lower Lake Champlain, the middle Hudson River, and

Haverstraw Bay into nearby road and railroad rights-of-way (ROWs) on land. DOE provided a 45-day public review period starting November 1, 2013, which was extended for an additional 30 days and ended on January 15, 2014, and held public hearings for the Draft EIS. The public review period was initiated through publication of a Notice of Availability (NOA) in the *Federal Register* by the U.S. Environmental Protection Agency (USEPA). Methods similar to those used during the scoping period were used to notify the public and applicable Federal and state agencies of the public review period for the Draft EIS, including distributing the document to individuals or parties who submitted scoping comments, and to other interested parties that requested a copy of the EIS. The distribution list for the EIS is provided in **Appendix E**. DOE made the Draft EIS available online at the CHPE EIS Web site (http://www.chpeexpresseis.org) and on the DOE NEPA Web site (http://energy.gov/nepa). The Draft EIS was also circulated to Federal, state, and local agencies with jurisdiction by law or special subject matter expertise and to any person, stakeholder organization, or agency that has requested a copy (40 CFR 1502.19). The Final EIS includes, in **Appendix P**, a summary of the Draft EIS public review period, all comments on the Draft EIS that were received during the public comment period, and responses to the comments. All comments on the Draft EIS received or postmarked during the comment period were considered in preparing the Final EIS. Comments received after the end of the comment period were addressed to the extent practicable.



An NOA for the Final EIS will be published in the *Federal Register* to announce that the Final EIS is available. The Final EIS will be distributed to all individuals and parties that submitted substantive comments on the Draft EIS and to other interested parties that request a copy of the EIS. A Record of Decision (ROD) would be issued no sooner than 30 days following publication of the NOA for the Final EIS.

A chronology of the Presidential permit application process and EIS public notices to date for the proposed CHPE Project is provided in **Table 1-1**.

1.6 Public Participation and Interagency Coordination

Public participation and interagency coordination are integral elements of the NEPA process and are intended to promote open communication between DOE and regulatory agencies, Native American tribes, potential stakeholder organizations, and the public.

1.6.1 Cooperating Agencies

DOE has invited several Federal and state agencies to participate in the preparation of this EIS as cooperating agencies because of their special expertise or jurisdiction by law, such as a permitting authority (40 CFR 1501.6). The cooperating agencies are USEPA Region 2, the New York District of the U.S. Army Corps of Engineers (USACE), the New York Field Office (Region 5) of the U.S. Fish and Wildlife Service (USFWS), the U.S. Coast Guard (USCG), the NYSDPS, and the New York State Department of Environmental Conservation (NYSDEC). Each agency's role relative to this EIS is as follows:

Table 1-1. Proposed CHPE Project Presidential Permit Application Milestones

Date	Action	Summary
January 25, 2010	Initial Presidential permit application submitted	Project consists of two 1,000-MW HVDC cables; one routed to the New York City metropolitan area and the second to Bridgeport, Connecticut.
March 5, 2010	Notice of Application published in the *Federal Register*	DOE issued a Notice of Application announcing that the Applicant had applied for a Presidential permit.
June 18, 2010	DOE issued NOI to prepare an EIS and initiate public scoping	DOE announced its intention to prepare an EIS and conduct public scoping meetings.
August 5, 2010	Amendment to the Presidential permit application submitted	The Applicant submitted an amendment to DOE identifying elimination of the facilities serving Connecticut from the application and confirming that the Presidential permit application would be for a single 1,000-MW cable to the New York City metropolitan electric power market.
July 7, 2011	Amendment to the Presidential permit application submitted	The Applicant amended its application to incorporate five conditions proposed by the New York State Department of State (NYSDOS) in its June 8, 2011, Coastal Zone Conditional Consistency Certification.
February 28, 2012	Amendment (i.e., Joint Proposal) to the Presidential permit application submitted	The Applicant submitted the Joint Proposal developed under the NYSPSC Article VII review process as an amendment to the Presidential permit application. This amendment included relocation of portions of the transmission line out of the southern end of Lake Champlain; onto city streets within the City of Schenectady; out of the Hudson River between Coeymans and Catskill, New York; out of the Hudson River around Haverstraw Bay on road and railroad ROWs; out of portions of the Harlem and East rivers, and relocation of the HVDC converter station from Yonkers to Queens. It also identified the addition to the project of a buried 3-mile (5-km) HVAC line that would interconnect the Astoria and Rainey substations in Queens.
April 30, 2012	Amended NOI to modify scope of EIS	DOE issued an amended NOI announcing intent to modify the scope of the EIS analysis to reflect the February 28, 2012, amendment and to conduct additional public scoping.

- ***USEPA.*** The USEPA is required under Section 309 of the CAA to review and publicly comment on the environmental impacts of major Federal actions including actions that are the subject of draft and final EISs, and is responsible for implementing certain procedural provisions of NEPA (e.g., publishing the Notices of Availability of the draft and final EISs in the *Federal Register*) to establish statutory timeframes for the environmental review process.

- ***USACE.*** The USACE will use the EIS in their decisionmaking for the permits that would be required under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA). A complete alternatives analysis under 40 CFR 230.404(b)(1) of the CWA is required during the USACE permitting process. That alternatives analysis is included in this EIS as **Appendix B**. In accordance with 33 CFR Part 325 Appendix B (8)(c), the USACE is coordinating with DOE to ensure that this EIS can be adopted by USACE in support of its decisionmaking requirements on the Section 10 and Section 404 permit applications submitted by the Applicant.
- ***USFWS.*** The USFWS' role as a cooperating agency will include evaluation of environmental impacts on fish and wildlife and their habitats, including trust resources such as migratory birds, interjurisdictional fish, federally listed threatened and endangered species, and land administered by the USFWS. Regulations that could apply to this project include the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, and the Fish and Wildlife Coordination Act.
- ***USCG.*** The USCG has requested cooperating agency status to coordinate its review with DOE. The USCG's role as a cooperating agency will include evaluation of navigational risks. The USCG provides recommendations concerning possible impacts on navigational safety and security under the authority of the Ports and Waterways Safety Act (33 U.S.C. Part 1231) and the Rivers and Harbors Act (33 U.S.C. Part 471).
- ***NYSDPS.*** Construction and operation of the proposed CHPE Project requires a Certificate of Environmental Compatibility and Public Need (Certificate) and a CWA Section 401 Water Quality Certification, which were issued by the NYSPSC and NYSDPS respectively in early 2013 (NYSPSC 2013, NYSDPS 2013). The NYSDPS, which serves as staff to the NYSPSC, is participating as a cooperating agency in DOE's preparation of this EIS to coordinate its review with DOE.
- ***NYSDEC.*** NYSDEC has responsibility for the review and approval of projects that would affect water quality, wetlands, fish and wildlife, and air quality within the state and has promulgated a number of regulations that would affect the development of the proposed CHPE Project. NYSDEC has requested cooperating agency status to participate in reviewing the scope and the analysis included in the EIS. NYSDEC may review the EIS and provide feedback on the EIS to DOE.

1.6.2 Federal Authorizations and Approvals

Federal agencies that could have permitting, review, or other approval responsibilities related to certain aspects of the proposed CHPE Project are discussed in the following paragraphs. Federal agencies may use all or part of this EIS to fulfill their regulatory responsibilities for their actions related to the proposed CHPE Project.

To construct and operate the proposed CHPE Project, the Applicant would be required to consult with and obtain permits and approvals from several government agencies. **Table 1-2** lists the permits, approvals, and consultations that would be associated with the proposed CHPE Project. The roles of the agencies shown in **Table 1-2** are more fully addressed in various chapters of this EIS, where relevant to particular environmental resources and conditions. Full text of the laws can be accessed at the following Web site: http://uscode.house.gov/lawrevisioncounsel.shtml. EOs can be accessed at the following Web site: http://www.archives.gov/federal-register/executive-orders/disposition.html. The following paragraphs describe the authorizations and approvals potentially required for the proposed CHPE Project by Federal agencies.

Table 1-2. Potential Permits and Approvals Associated with the Proposed CHPE Project

Agency	Permit/Approval/Consultation
Federal	
Department of Energy Office of Electricity Delivery and Energy Reliability	Review of applications for Presidential permits for construction, operation, and maintenance of a cross-border facility for the transmission of electrical energy. Determination of public interest includes potential environmental impacts, impacts on system reliability, and other factors.
FERC	Section 205 of the Federal Power Act (FPA).
USACE	Section 404 of the CWA.
	Section 10 of the Rivers and Harbors Act.
USFWS	ESA Section 7, MBTA, and Golden and Bald Eagle Act consultation, as necessary.
National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)	ESA Section 7 and Marine Mammal Protection Act (MMPA) consultation, and Magnuson-Stevens Fishery Conservation and Management Act (MSA) EFH review.
State of New York	
NYSPSC	Certificate of Environmental Compatibility and Public Need under Article VII of the New York State Public Service Law.
	Water Quality Certification under Section 401 of the Clean Water Act.
NYSDOS	Coastal Zone Management Act (CZMA) Consistency Review.
NYSDEC	New York State Pollutant Discharge Elimination System (SPDES) permit (storm water management during construction), state threatened and endangered species consultation.
New York State Historic Preservation Office (SHPO)	National Historic Preservation Act (NHPA) Section 106 consultation.
New York State Office of General Services	Use and occupancy of state-owned underwater lands.
New York State Department of Transportation	Use and occupancy of state-owned highway areas.
New York State Thruway Authority and New York State Canal Corporation	Use and occupancy of state-owned highway and canal areas.
Municipal	
Municipalities along the proposed CHPE Project route in New York	Permits and consents for use of municipal lands for construction and operation of transmission line, with PSC endorsement as necessary under the Public Service Law.
Various City of New York Departments	Building, street excavation, street closure, and structural welding permits; permits under the City of New York Fire Code, Construction Codes, and Electrical Code; permits for the discharge of wastewater or storm water to city's sewer system, permits for the use and supply of water; and forestry permits.

Sources: CHPEI 2010a, CHPEI 2010c

DOE. DOE would review CHPEI's Presidential permit application and determine whether to issue a Presidential permit for the proposed CHPE Project. Applications are evaluated based on the potential impacts that a proposed project could have on the environment, the operating reliability of the United States electric power supply, and any other factors relevant to the public interest. DOE is responsible for developing this EIS in accordance with NEPA to address the impacts of issuing the Presidential permit for the international border crossing and the connected action of constructing, operating, and maintaining the proposed CHPE Project.

USACE. The USACE would review and could issue a permit for the proposed CHPE Project under Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. Section 10 requires approval prior to the commencement of construction activities in or over navigable waters of the United States, or that affect the course, location, condition, or capacity of such waters. CWA Section 404 requires approval prior to discharging dredged or fill material into jurisdictional waters of the United States, including wetlands.

In a June 17, 2010, letter, the USACE agreed to participate in the development of this EIS as a cooperating agency. The USACE may adopt this EIS to provide necessary environmental review to support its decision whether the construction and installation of the proposed CHPE Project is not contrary to the public interest, which would result in the issuance of a Department of the Army permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA, as amended.

FERC. The proposed CHPE Project would be a public utility subject to regulation by FERC under the Federal Power Act (FPA). FERC's authority under the FPA includes the review of all issuances of securities under FPA Section 204 and review of all rate filings under FPA Sections 205 and 206. On July 1, 2010, FERC issued an Order to the Applicant, which authorized the Applicant to charge negotiated rates for transmission rights on the proposed CHPE Project that would link the Quebec electric grid to the New York City metropolitan electric market (Docket No. ER10-1175-000) (CHPEI 2010a).

USFWS. Section 7 of the ESA requires that Federal agencies consult with the USFWS when the agency determines an action may affect a listed species or critical habitat. The MBTA requires Federal agencies to consult with the USFWS to determine if an agency's proposed action would have, or is likely to have, measurable negative effects on migratory bird populations, and if so, to develop measures intended to avoid any negative effects on migratory birds. The Bald and Golden Eagle Protection Act requires consultation with the USFWS to determine if a proposed project may have potential impacts on bald and golden eagles and, if applicable, to develop habitat conservation plans intended to avoid and minimize the project's impacts on the bald and golden eagles.

NMFS. Section 7 of the ESA requires that Federal agencies consult with the National Marine Fisheries Service (NMFS) when the agency determines that an action may affect a listed species or critical habitat. NMFS is also responsible for protecting whales, dolphins, porpoises, seals, and sea lions under the MMPA. The MSA requires Federal agencies to consult with NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be such that may adversely affect essential fish habitat (EFH).

USEPA. For the proposed CHPE Project, the USEPA would be consulted by the USACE for CWA Section 404 permitting. Of particular concern to the USEPA would be the CHPE Project storm water management plan and the potential disturbance of contaminated soils during cable installation.

USCG. The USACE would consult with the USCG for its Section 10 and Section 404 permitting decisions. Consultation would be expected throughout all stages of the proposed CHPE Project to identify methods to avoid or minimize impacts on marine navigation. The Applicant would also seek approval from the USCG when construction activities would be expected to infringe on any designated safety and security areas (CHPEI 2010a).

1.6.3 New York State Approvals and Authorizations

NYSPSC. Construction and operation of the proposed CHPE Project would require that a Certificate of Environmental Compatibility and Public Need, pursuant to Article VII of the Public Service Law, be obtained from the NYSPSC. Article VII of the Public Service Law supersedes the State Environmental Quality Review (SEQR) Act, so the Certificate would also satisfy the need for a SEQR review. In addition, the NYSPSC would approve an Environmental Management and Construction Plan (EM&CP) for the proposed CHPE Project.

On April 18, 2013, the NYSPSC issued an Order Granting a Certificate of Environmental Compatibility and Public Need (Certificate) to the Applicant associated with construction and operation of the proposed CHPE Project (NYSPSC 2013). The Certificate (without attachments such as the Certificate conditions) is provided as **Appendix C**.

NYSDOS. Under the Federal Coastal Zone Management Act (CZMA), the New York State Department of State (NYSDOS) must issue a Coastal Zone Consistency Certification prior to any Federal agencies approving any action for projects that would occur within and directly affect a state's coastal area. NYSDOS issued a Conditional Coastal Consistency Determination for the proposed CHPE Project on June 8, 2011 (NYSDOS 2011a) (see **Appendix F**).

NYSDEC. NYSDEC is responsible for processing requests for a General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities in accordance with the New York SPDES requirements. NYSDEC is also responsible for verifying compliance with the state Tidal Wetlands and Freshwater Wetlands Acts of 1973 and 1975, respectively. NYSDEC is also consulted with regarding potential impacts on state-listed species.

New York State Office of General Services. The New York State Office of General Services is responsible for managing the use and occupation of underwater lands in New York State and may authorize a construction permit and an easement for the use and occupation of underwater state-owned lands under the New York State Public Lands Law.

New York SHPO. Under Section 106 of the National Historic Preservation Act (NHPA), the State Historic Preservation Office (SHPO), which is under the New York State Office of Parks and Recreation, is authorized to review all projects that could have a significant impact on historical structures or protected archaeological sites.

New York Natural Heritage Program (NYNHP). The NYNHP reviews the location of projects, activities, and actions for any records of rare species or significant natural communities in their database that could be impacted by a project or action.

Table 1-2 listed the permits, approvals, and consultations that could be associated with the proposed CHPE Project.

1.7 Public Involvement

1.7.1 Public Scoping Process

Initial Public Scoping. On June 18, 2010, DOE published in the *Federal Register* its *Notice of Intent to Prepare an Environmental Impact Statement and to Conduct Public Scoping Meetings; Notice of Floodplains and Wetlands Involvement; Champlain Hudson Power Express, Inc.* (75 *Federal Register* 34720). This and other relevant documents are available on the EIS Web site: http://www.chpexpresseis.org. The NOI explained that DOE would prepare an EIS to assess the potential environmental impacts from its proposed Federal action of granting a Presidential permit to CHPEI to construct, operate, maintain, and connect its proposed new electric transmission line. The NOI also announced DOE's plans to conduct scoping meetings and invited the public to participate in the scoping process.

The purpose of conducting scoping for an EIS is to provide interested agencies, stakeholder organizations, Native American tribes, and members of the public an opportunity to submit comments to assist DOE in identifying potentially significant environmental issues and in determining the appropriate scope of the EIS. Scoping helps ensure that relevant issues are identified early in the NEPA process and are properly studied.

The NOI was sent to interested parties including Federal, state, and local officials; agency representatives; stakeholder organizations; and local libraries, newspapers, and radio and TV stations in the vicinity of the proposed CHPE Project area. Issuance of the NOI initiated a 45-day public scoping period that ended on August 2, 2010. The NOI noted that comments submitted after the deadline "would be considered to the extent practicable."

DOE placed the NOI in 18 local and regional newspapers along the proposed CHPE Project corridor to announce the dates and times of the scoping meetings and invite the local public to attend. Copies of newspaper advertisement tear sheets and affidavits are included in the Scoping Summary Report, which is available on the EIS Web site: http://www.chpexpresseis.org. In addition, press releases were sent out to 10 local radio and 17 television stations and to 26 newspapers prior to the scoping meetings. **Appendix D** includes the Scoping Summary Report.

During the initial public scoping period, DOE conducted seven scoping meetings: one in Connecticut and six within the Lake Champlain and Hudson River Valley corridors of New York State. **Figure 1-1**, which provides an overview of the route of the proposed CHPE Project, also indicates where the scoping meetings were conducted. The scoping meetings occurred between July 8 and July 16, 2010, as noted in the meeting information summary provided in **Table 1-3**.

Table 1-3. Public Scoping Meeting Dates and Locations

Meeting Date	Location	Number of Attendees
July 8, 2010	City Hall, Bridgeport, CT	10
July 9, 2010	Federal Building, Manhattan, New York City	25
July 12, 2010	Royal Regency Hotel, Yonkers, NY	27
July 13, 2010	Holiday Inn, Kingston, NY	28
July 14, 2010	Holiday Inn, Albany, NY	31
July 15, 2010	Ramada Inn, Glens Falls, NY	18
July 16, 2010	North Country Chamber of Commerce, Plattsburgh, NY	28

The scoping meetings provided the public with the opportunity to learn more about the proposed CHPE Project and to provide comments on potential environmental issues associated with implementation of the CHPE Project. A total of 33 individuals provided verbal comments at the meetings, and their comments were transcribed by court reporters. Transcripts of the verbal comments received at the scoping meetings, along with materials and handouts provided at the meetings, are presented in the Scoping Summary Report. In addition, DOE received scoping comments in the form of 22 written letters or emails from government agencies, non-governmental organizations, and private citizens. The transcripts, meeting notices, and comment letters received during the initial scoping period are available on the EIS Web site: http://www.chpexpresseis.org.

Additional Public Scoping. In response to the Applicant's submission of the Joint Proposal amendment, DOE published on April 30, 2012, an *Amended Notice of Intent to Modify the Scope of the Environmental Impact Statement for the Champlain Hudson Power Express Transmission Line Project in New York State* (77 *Federal Register* 25472). DOE announced that it would revise the scope of the EIS to address the proposed changes and that it was accepting public comment on the revised scope until June 14, 2012.

DOE received scoping comments and prepared scoping reports for both scoping periods, which are available as **Appendix D** of this EIS and available for review on the EIS Web site.

During April 2012, the NYSPSC held six public statement hearings on the Joint Proposal. While DOE did not conduct separate scoping meetings, it recognized that comments provided by the public during the NYSPSC's public statement hearings might be relevant to DOE's NEPA process. Therefore, DOE announced that it would review the April NYSPSC public statement hearing transcripts and consider them, in addition to scoping comments submitted directly to DOE on the EIS, as potential scoping comments for purposes of the EIS. **Appendix D** contains a Scoping Summary Report Addendum summarizing comments related to the Joint Proposal amendment. The full versions of the scoping reports and the NYSPSC hearing transcripts are available on the EIS Web site: http://www.chpexpresseis.org.

1.7.2 Issues Raised During Public Scoping

A variety of general issues and concerns were raised as a result of the public scoping process, including the following:

- Impacts on protected, threatened, endangered, or sensitive flora or fauna species
- Impacts on water quality for Lake Champlain and the Hudson River
- Cultural or historic resources impacts
- Human health and safety impacts, with particular focus on the potential for the disturbance of known contaminants within the Hudson River
- Impacts on air quality
- Impacts from the development of additional electric generation facilities in Canada
- Visual impacts
- Impacts on navigation, future navigational improvements, and road traffic
- Justification of the need for additional electrical energy.

Additionally, specific issues and concerns were raised during the scoping process, including the following:

- Comments questioned the purpose of and need for the proposed CHPE Project and asserted that the EIS needs to provide evidence that the necessary electricity demand exists (or will exist) for the CHPE Project.
- Comments requested that the alternatives analysis include an evaluation of energy efficiency and conservation measures as an alternative to building the proposed CHPE Project.
- Comments stated that the proposed project would not lower electricity rates, improve the electricity grid, alleviate congestion, grow or improve New York State's electricity infrastructure, or provide local or long-term jobs to the communities along the proposed transmission line, and would instead send jobs and economic development to Canada.
- Comments expressed support for more electricity and lower costs to obtain electricity.
- Comments expressed concern that the proposed CHPE Project would be inconsistent with or would undercut Governor Cuomo's "energy highway" initiative that seeks to invest in New York State resources to upgrade the state's energy infrastructure and Article X legislation designed to expedite construction of new power generation in New York State. Comments stated that the proposed project would bypass the existing grid and existing New York generators who would not be able to access the line and could lead to the closure of upstate power generators.
- Comments raised questions about how the use of "green power" would be guaranteed. Other comments stated support for the use of "clean energy." Other comments stated that the proposed project would impede the development of renewable energy and New York State's ability to meet the Renewable Portfolio Standard goal of 30 percent renewable resources by 2015.
- Comments expressed concerns about the HVDC converter station. Comments noted potential visual impacts, land use issues, impacts on cultural resources, health and safety concerns, potential air quality impacts, and concerns about the converter station resulting in disproportionate impacts on low-income and minority populations.
- Comments expressed concern that the use of ROWs and approval of the proposed project could create a competitive monopoly for CHPE and lead to lawsuits related to access to land.
- Comments stated that there could be potential environmental impacts from burying the transmission cables in Lake Champlain and the Hudson River. Comments expressed concerns regarding sediment disturbance and the impacts that sediment would have on wildlife, fish habitat, endangered species, and benthic habitat. Comments also noted that the sediment disturbance could cause suspension of polychlorinated biphenyls (PCBs) and other contaminants in the water column and have an adverse impact on drinking water quality and human health and safety.
- Comments requested that the EIS contain an analysis of the effects of electromagnetic fields (EMFs) and thermal effects produced by both DC and AC transmission cables on the public and aquatic ecosystems, including behavior and reproduction of fish and other animals.
- Comments expressed concerns about the impacts of the transmission system on existing infrastructure. Comments noted the presence of pipelines, power cables, outfalls, and other electricity lines that the proposed CHPE Project could impact.
- Comments expressed concerns about impacts on navigation and potential interaction of the transmission cables with anchors and ship apparatus in Lake Champlain and the Hudson River.
- Comments stated that the route of the proposed CHPE Project would contain many important visual resources and that the EIS should analyze the impact that construction of the transmission line would have on these resources.

- Comments stated that the proposed project could be a violation of Article 14 of the New York State Constitution, which specifies that lands constituting a Forest Preserve cannot be sold to a private entity, and that the Attorney General of New York had previously stated that underwater lands adjacent to Adirondack Park were considered Forest Preserve lands.
- Comments stated that the EIS needs to address potential impacts on future land use in residential areas and from eminent domain and impacts on existing agricultural lands and recreation areas.
- Comments identified potential alternatives.
- Comments requested that DOE assess alternative land-based transmission line route alternatives for the proposed CHPE Project, including use of railroad ROWs the entire route or the use of interstate highway median strips.
- Comments requested that DOE discuss a siting alternative to the CHPE interconnection at the Astoria Annex Substation.
- Comments requested that alternative converter station sites in Yonkers be examined, including the possible reuse of the former Glenwood Power Plant building.
- Comments stated that the transmission line from the Astoria Annex Substation to the ConEd Rainey Substation should be placed in the East River rather than through neighborhoods in Queens.
- Comments requested that alternatives to the use of HVDC technology be examined.
- Comments stated that other entities have proposed similar projects within portions of the Hudson River and asked how many other lines could be located along the same route. Other comments expressed concern that approval of the proposed project could lead to construction of additional transmission lines from Canada.
- Comments requested that the EIS address the health, environmental, cultural, and socioeconomic impacts from existing and future hydropower development in Canada in general and specifically on traditional lands and activities of Canadian First Nations.

1.7.3 Draft EIS Public Review Period

DOE provided a 45-day public review period starting November 1, 2013, which was extended for an additional 30 days and ended on January 15, 2014, and held public hearings for the Draft EIS. The public review period was initiated through publication of a Notice of Availability (NOA) in the *Federal Register* by the USEPA. Methods similar to those used during the scoping period were used to notify the public and applicable Federal and state agencies of the public review period for the Draft EIS, including distributing the document to individuals or parties who submitted scoping comments, and to other interested parties that requested a copy of the EIS.

DOE made the Draft EIS available online at the CHPE EIS Web site (http://www.chpexpresseis.org) and on the DOE NEPA Web site (http://energy.gov/nepa). The Draft EIS was also circulated to Federal, state, and local agencies with jurisdiction by law or special subject matter expertise and to any person, stakeholder organization, or agency that requested a copy (40 CFR 1502.19).

During the Draft EIS public review period, DOE conducted four public hearings in Queens, Stony Point, Albany, and Plattsburgh, New York. **Figure 1-1**, which provides an overview of the route of the proposed CHPE Project, also indicates where the public hearings were conducted. The public hearings occurred between November 18 and 20, 2013, as noted in the meeting information summary provided in **Table 1-4**.

Table 1-4. Draft EIS Public Hearing Dates and Locations

Hearing Date	Location	Number of Attendees
November 18, 2013	LaGuardia Courtyard by Marriott, Astoria, Queens, NY	40
November 18, 2013	Stony Point Center, Stony Point, NY	215
November 19, 2013	Holiday Inn, Albany, NY	68
November 20, 2013	West Side Ballroom, Plattsburg, NY	41

DOE received 107 comment documents on the Draft EIS, which have been categorized into eight series based on the type of commenter as follows:

- 100 series – Public Hearing Transcripts: 45 comment documents
- 200 series – Federal Agencies: 5 comment documents
- 300 series – Federal and State Elected Officials: 6 comment documents
- 400 series – State Agencies: 3 comment documents
- 500 series – Local Elected Officials: 4 comment documents
- 600 series – Local Agencies: 2 comment documents
- 700 series – Stakeholder Groups: 22 comment documents
- 800 series – Other Groups and Members of the Public: 20 comment documents.

The Final EIS includes, in **Appendix P**, a summary of the Draft EIS public review period and comments received, a table of substantial changes made from the Draft EIS, all comments on the Draft EIS, and responses to the comments. All comments submitted on the Draft EIS were considered in preparing the Final EIS. **Appendix P** also contains, in Table P-4, a summary of representative comments provided during the Draft EIS comment period, and changes made to the Draft EIS in response to comments or new information received in Table P-5. Following are DOE responses to major issues raised by agencies and the public during the Draft EIS public comment period and major conclusions made by DOE regarding the Proposed Action, in accordance with CEQ NEPA regulations (40 CFR 1502.12).

Issues Raised During Draft EIS Public Review Period

NEPA Process. Several comments requested an extension of the public comment period on the Draft EIS due to the length of the EIS and potentially complicated issues addressed in the document. *DOE response:* DOE extended the comment period by 30 days to provide additional time for the public to review the Draft EIS and submit comments.

Land Use. Comments expressed concern that portions of the proposed CHPE Project route would be outside of the existing road and railroad ROWs in deviation areas, which would require the taking of private property, including residential and commercial properties, through eminent domain. Some comments also expressed concern that the presence of the transmission line could limit use of some private property. *DOE response:* Evaluations of the potential impacts on use of land outside the existing road and railroad ROW were included in the EIS. Where acquisition of land outside existing ROWs would be required, the process established under the New York State Public Service Law would be followed.

Transportation and Traffic. Several comments expressed concern that the proposed transmission line would be installed within the Federal navigation channel in various locations, which could prevent some vessels from deploying anchors due to risk of anchor damage, or could result in anchor snags on the transmission cables or concrete mats. Other comments expressed concern that the presence of the transmission line would prevent dredging of the Federal navigation channel or other locations along the Hudson River. *DOE response:* Through ongoing discussions among the USACE, USCG, maritime stakeholders, and the Applicant, the Applicant has revised its proposed cable burial depths which are reflected in the Final EIS, and has agreed to relocate the transmission line in the area of a proposed anchorage area in the lower Hudson River and elsewhere in the Hudson and Harlem rivers to reduce potential impacts on navigation as appropriate.

Aquatic and Terrestrial Protected and Sensitive Species. One comment stated that it would be beneficial to also discuss species proposed for listing under the Endangered Species Act (e.g., northern long-eared bat) in the EIS. Other comments requested additional evaluation of the potential impact of magnetic and induced electrical fields and the use of concrete mats on sturgeon. *DOE response:* The Applicant, in consultation with the relevant resource agencies including USFWS and the NMFS, made revisions to the proposed CHPE Project and developed revised management measures to avoid or minimize potential impacts on protected or sensitive species. In particular, the Applicant has agreed to conduct tree clearing activities in the winter months to avoid impacts on Indiana bats and to avoid any construction or maintenance activities that would adversely affect Karner blue butterfly habitat. DOE has prepared a Biological Assessment (BA) that concludes that the proposed CPHE Project construction, operation, and maintenance activities may affect, but is not likely to adversely affect shortnose and Atlantic Sturgeon, Indiana and Northern long-eared bats, and the Karner blue butterfly. The proposed CHPE Project would have no effect on other species listed under the ESA.

Cultural Resources. Several comments were concerned that the proposed CHPE Project route would cross and disrupt the Waldron Cemetery and Stony Point Battlefield Historic Park. *DOE response:* DOE has developed a Programmatic Agreement (PA) (see **Appendix T**) with the New York SHPO to ensure that cultural resources are identified, avoided, or mitigated through continued consultation during project development.

Socioeconomics. Some comments stated that the proposed CHPE Project would result in additional local employment and other economic benefits in New York State, while other commenters expressed concerns that the CHPE Project would outsource jobs from New York State to a foreign county, lead to the reduction of in-state employment (including some due to closing of existing power plants), and increase the U.S. dependence on foreign energy. Other comments expressed concern that the proposed CHPE Project would decrease property values, including residential and commercial properties, and reduce revenue from taxes to local jurisdictions. *DOE response:* Information concerning project employment and potential impacts on municipal tax collections is included in the EIS.

Transmission System Reliability. Comments stated that the proposed CHPE Project would not be in the National Interest and would be detrimental to the existing energy grid in New York State because existing power plants and renewable energy projects would not be able to connect to the transmission line, and it would not strengthen the New York State transmission system. Other comments expressed concern that the proposed CHPE Project would prevent other renewable and non-renewable proposed energy projects in New York State from being developed. *DOE response:* DOE is reviewing system interconnection and reliability studies to determine whether the proposed CHPE Project would have an adverse effect on electrical system reliability.

Impacts in Canada. Comments stated that impacts in Canada from the hydroelectric facilities that would be the source of the power should be addressed in the EIS, and without this analysis the EIS does not address potential impacts of the entire proposed CHPE Project. *DOE response:* DOE does not agree that such an analysis is appropriate for several reasons. First, the Federal action evaluated in the EIS is not the building of the potential electrical generating facilities, but the permitting of the construction, operation, maintenance, and connection of an electric transmission facility at the U.S./Canada international border.

Secondly, NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation. EO 12114 requires Federal agencies to prepare an analysis of significant impacts from a Federal action in certain defined circumstances and exempts agencies from preparing analyses in others. The EO does not require Federal agencies to evaluate impacts outside the U.S. when the foreign nation is participating with the U.S. or is otherwise involved in the action [Section 2-3(b)]. The Quebec Provincial Government is conducting an environmental review for impacts in Canada, as applicable, as part of its authorization process associated with the construction of facilities (i.e., a new transmission line from a proposed new HVDC converter station at Hertel, in La Prairie, Quebec, to the U.S./Canada border) in the province. The Canadian Government, through the National Energy Board, would also have the authority to authorize the project and consider potential environmental impacts in its analysis.

Finally, the Federal action would not affect the global commons (e.g., outer space, Antarctica), and would not produce a product, emission, or effluent that is "prohibited or strictly regulated by Federal law in the U.S. because its toxic effects on the environment create a serious public health risk" or which involves regulated or prohibited radioactive materials.

Other Alternatives. Several comments stated that instead of the proposed CHPE Project, energy conservation and efficiency measures should be implemented and the power should be produced locally in New York State through renewable energy projects, distributed generation, existing power plants in upstate New York or in the Hudson Valley Region, or by constructing new power plants in New York State. *DOE response:* Energy efficiency and conservation measures were considered in the Draft EIS but eliminated from further detailed analysis because DOE determined that these measures alone were not a reasonable alternative to the proposed CHPE Project. As presented in Section 1.2 of the Draft EIS, the purpose of and need for DOE's Proposed Action is whether to issue a Presidential permit for the proposed transmission line crossing of the U.S. international border (i.e., proposed CHPE Project). Continued operation or development of other new in-state power sources or transmission lines is not the subject of the application for a Presidential permit and, therefore, is outside the scope of this EIS.

Major Conclusions

In the Draft EIS, DOE analyzed a No Action alternative and the proposed Federal action of granting the Presidential permit for the construction, operation, and maintenance of the proposed CHPE Project facilities that would cross the international border. Under the No Action alternative, DOE would not issue a Presidential permit for the U.S. portion of the proposed CHPE Project and the transmission line would not be built. Under the proposed Federal action of granting the Presidential permit, the transmission line would be constructed and maintained from the U.S./Canada international border to the Con Ed substation in Queens, New York as described in the Draft EIS. DOE has determined that issuance of a Presidential permit to the Applicant for construction, operation, and maintenance of the proposed CHPE Project would not result in a significant impact to the environment.

Before granting a Presidential permit, DOE must also determine if a proposed international electric transmission line would have an adverse impact on the reliability of the U.S. electric power supply system. In reaching this determination, DOE considers the operation of the electrical grid with a specified maximum amount of electric power transmitted over the proposed line. DOE is reviewing the interconnection studies conducted by the Applicant and NYISO to determine whether a Reliability Finding should be issued for the CHPE Project.

1.7.4 Issues Outside the Scope of this EIS – Impacts in Canada

During the scoping process, several comments requested that the EIS address environmental and socioeconomic impacts in Canada, not just in the United States. DOE does not believe that such an analysis is appropriate.

While development of the proposed CHPE Project would require the construction of a new transmission line from a proposed new HVDC converter station at Hertel, in La Prairie, Quebec, to the U.S. border, NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation. This approach is consistent with EO 12114, *Environmental Effects Abroad of Major Federal Actions* (January 4, 1979), which requires Federal agencies to prepare an analysis of potentially significant impacts from a Federal action in certain defined circumstances and exempts agencies from preparing analyses in others. Section 2-3[b] of the EO does not require Federal agencies to evaluate impacts outside the United States when the foreign nation is participating with the United States or is otherwise involved in the action. The Government of Quebec, through the Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs, would conduct an environmental review for impacts of the project in Quebec as part of its authorization process associated with the facilities to be constructed in the province. The Canada Government, through the National Energy Board, would also authorize the project and consider the environmental impacts in its analysis. In both cases, Hydro-Québec would provide an environmental impact study to the authorities with the filings for the project approval.

The electrical power to be supplied by the proposed CHPE Project would be transmitted through a proposed new HVDC converter station at Hydro-Québec TransÉnergie's 735/315-kilovolt (kV) Hertel Substation, south of Montreal in Quebec, Canada. A new transmission line would carry this electricity to the proposed CHPE Project facilities at the border between the United States and Canada. The CHPE transmission line would cross into the United States near the Town of Champlain, New York (see **Figure 1-1**). The Canadian portion of the transmission system between the Hertel Substation and the U.S. border would be approximately 31 miles (50 km) in length. As in the United States, the transmission line in Canada would consist of one 1,000-MW HVDC bipole consisting of two underground cables connected as a bipole pair.

Hydro-Québec Production has filed an interconnection request (Number 157T) to Hydro-Québec TransÉnergie for the construction and operation of the facilities in Canada with the Canadian National Energy Board and the Québec Régie de l'énergie. The transmission line project, referred to as the Hertel-New York Interconnection, is scheduled to be commissioned in the fall of 2017 (see http://www.hydroquebec.com/hertel-new-york) (Hydro-Québec TransÉnergie 2013). The National Energy Board considers the environmental impacts as part of its analysis. Hydro-Québec TransÉnergie would file its Environmental Impact Statement at the provincial level with the Government of Quebec, through the Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs and with the National Energy Board at the Federal level. In accordance with the National Energy Board Electricity Regulations, an environmental assessment of the proposed Hertel-New York Interconnection would be carried out either under the Canadian Environmental Assessment Agency or under provincial laws. Hydro-Québec TransÉnergie states it would file an environmental impact study with the Québec Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs to obtain the permits required to carry out the project (Hydro-Québec TransÉnergie 2013). The Hertel-New York Interconnection review would follow the Bureau d'audiences publiques sur l'environnement's (BAPE) environmental impact assessment process, which includes review of the environmental assessment study, public consultation, and approval by Quebec provincial authorities (BAPE 2013).

During scoping for the proposed CHPE Project, public comments were received regarding the potential impacts of constructing the new hydroelectric facilities that would provide the power that the proposed CHPE Project would transmit. The sources of power that would be transmitted on the proposed CHPE Project transmission line are expected to be from the bulk electric transmission system. As such, the source of supply can be any generating station interconnected to the Hydro-Québec TransÉnergie electric transmission system. Among these sources would be the four-station, 1,500-MW Romaine hydroelectric generating complex that is currently under construction by Hydro-Québec in Canada. This hydroelectric facility is expected to be put into service starting in 2015 (NYSPSC 2012). The development of this hydroelectric facility is independent of and not connected to the proposed CHPE Project and would not be affected by the possible Federal action of issuing a Presidential permit.

For the foregoing reasons, potential environmental impacts in Canada are not addressed in this EIS.

1.8 Organization of this EIS

This EIS examines the environmental impacts of the Proposed Action and the No Action Alternative. The following environmental resource areas are being addressed in detail for the proposed CHPE Project:

- Land Use
- Transportation and Traffic (including navigation and marine security)
- Water Resources and Quality (including floodplains)
- Aquatic Habitat and Species
- Aquatic Protected and Sensitive Species (including EFH)
- Terrestrial Habitat and Species
- Terrestrial Protected and Sensitive Species
- Wetlands
- Geology and Soils
- Cultural Resources
- Visual Resources
- Infrastructure
- Recreation
- Public Health and Safety (including intentional destructive acts)
- Hazardous Materials and Wastes
- Air Quality
- Noise
- Socioeconomics
- Environmental Justice
- Cumulative Impacts.

Where relevant, the environmental laws, regulations, permits, and EOs that might apply to the proposed CHPE Project are described in more detail in the appropriate resource area sections.

This EIS is organized into 12 chapters followed by appendices. **Chapter 1** provides the purpose of and need for the agency action and describes DOE's Proposed Action. **Chapter 2** contains a description of the proposed CHPE Project and alternatives considered. **Chapter 3** contains a general description of the physical resources and baseline conditions that could be affected by the proposed CHPE Project. **Chapter 4** presents an analysis of the potential environmental consequences from implementing the No Action Alternative. **Chapter 5** presents an analysis of the potential environmental impacts from implementing the proposed CHPE Project. **Chapter 6** includes an analysis of the potential cumulative impacts. **Chapter 7** addresses public participation and interagency coordination activities. **Chapter 8** lists the preparers of the document. **Chapter 9** lists references used in the preparation of the document. **Chapter 10** contains a list of acronyms used throughout the document. **Chapter 11** contains a glossary of terms, and **Chapter 12** contains an index.

Appendix A contains an atlas of detailed maps showing the proposed CHPE Project transmission line and associated facilities. **Appendix B** contains the Least Environmentally Damaging Practicable Alternative (LEDPA) analysis prepared by the Applicant as part of its CWA Section 404 permit application and reviewed by USACE. **Appendix C** contains the NYSPSC Order granting the Certificate of Environmental Compatibility and Public Need for the proposed CHPE Project. **Appendix D** includes the Scoping Summary Report and Addendum. **Appendix E** contains the distribution list for the EIS. **Appendix F** contains Coastal Zone Consistency documentation and land use tables. **Appendix G** includes a listing of Applicant-proposed impact avoidance and minimization measures and best management practices (BMPs) that the Applicant has committed to implementing as part of construction and operation of the proposed CHPE Project and that were considered in the environmental evaluation supporting this Final EIS. **Appendix H** contains information on ESA Section 7 consultations with USFWS and NMFS. **Appendix I** contains a summary of wetlands and soil types found along the proposed CHPE Project route. **Appendix J** contains information on cultural resources and the Section 106 consultation. **Appendix K** identifies visual and recreational resources along the route. **Appendix L** contains information used in the environmental justice analysis. Information related to air quality and noise analysis is presented in **Appendices M** and **N**, respectively. **Appendix O** provides the Contractor Disclosure Statement. **Appendix P** includes comments received on the Draft EIS and responses to those comments. The BA and Essential Fish Habitat Assessment for the proposed CHPE Project are in **Appendix Q** and **Appendix R**, respectively. **Appendix S** contains the Floodplain Statement of Findings that has been prepared in accordance with 10 CFR Part 1022. **Appendix T** includes the Programmatic Agreement that has been prepared to resolve the proposed CHPE Project's potential adverse effects on historic properties. **Appendix U** contains the Navigation Risk Assessment for the aquatic portions of the proposed CHPE Project that has been prepared by the Applicant.

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2. Proposed Action and Alternatives

This section describes the proposed CHPE Project and alternatives to the project. It provides a description of the Proposed Action (**Section 2.1**), which is the issuance of a Presidential permit for the proposed CHPE Project; the No Action Alternative (**Section 2.2**); a description of the Applicant's preferred project proposal (**Section 2.3**), which is the proposed CHPE Project; proposed CHPE Project location, design, and construction methods (**Section 2.4**); other alternatives considered but eliminated from further detailed analysis (**Section 2.5**); and a summary of environmental impacts that could result from the proposed CHPE Project (**Section 2.6**).

2.1 Proposed Action

DOE's Proposed Action (Preferred Alternative) is the issuance of a Presidential permit that would authorize the construction, operation, and maintenance of the proposed CHPE Project that would cross the U.S./Canada border. This EIS has been prepared to comply with NEPA and to support DOE's decisionmaking associated with the issuance of the Presidential permit for the proposed CHPE Project.

2.2 No Action Alternative

CEQ and DOE regulations require consideration of the No Action Alternative. The No Action Alternative serves as a baseline against which the potential environmental impacts of a proposed action can be evaluated. Under the No Action Alternative, DOE would not issue a Presidential permit for the proposed CHPE Project and the transmission system would not be constructed, and the potential impacts from the project would not occur.

2.3 Proposed CHPE Project Overview

CHPEI, as the Applicant for the Presidential permit, would develop the proposed CHPE Project as a merchant transmission facility to connect renewable sources of power generation in Canada with load centers in the New York City metropolitan area (TDI 2010). According to the Applicant, the estimated total capital cost for the proposed CHPE Project would be approximately $2.2 billion and it could be in service by 2017 (CHPEI 2012b). By some projections, the proposed CHPE Project would create an average of 300 direct construction jobs during its estimated 4-year construction period (TDI 2010).

The proposed CHPE Project would include construction, operation, and maintenance of an approximately 336-mile (541-km)-long, 1,000-MW, high-voltage electric power transmission system that would have both aquatic (underwater) and terrestrial (and primarily underground) segments. The underwater portions of the transmission line would be buried in the beds of Lake Champlain and the Hudson, Harlem, and East rivers, and the terrestrial portions of the transmission line would be buried underground, principally in railroad ROWs and, to a lesser extent, roadway ROWs. The HVDC transmission system would consist of one 1,000-MW HVDC transmission line, communications cable, and ancillary aboveground facilities, including an HVDC converter station and cooling stations at selected locations where required. The transmission line would be a bipole consisting of two transmission cables, one positively charged and the other negatively charged. The transmission line would connect from an HVDC transmission line in the Canadian Province of Quebec and transmit electric power to a new HVDC converter station in the New York City metropolitan area. The new HVDC converter station would convert the electrical power from DC to AC and then connect to two points of interconnection (POIs) within the New York City electrical grid. Cooling stations would be installed along the terrestrial portions of the transmission line route in certain locations to disperse accumulated heat in long cable segments installed by horizontal directional drilling (HDD). The proposed CHPE Project would be owned and operated in the United States by the Applicant.

The CHPE transmission system would deliver 1,000 MW of power to the POI in the New York City metropolitan area. Two solid dielectric (no fluids), cross-linked polyethylene (XLPE) cables would be used for the HVDC portion of the proposed CHPE Project. The HVDC portion would be approximately 333 miles (536 km) in length and have a nominal operating voltage of approximately 300 kV, but would be operated periodically at the maximum operating voltage of 350 kV during periods of peak demand. Two underground HVAC lines rated at 345-kV would also be installed to interconnect to an existing electrical substation in Queens. This underground circuit would be approximately 3 miles (5 km) in length.

The entire length of the transmission system would be buried, with the majority of the route beneath Lake Champlain and the Hudson River, and the exceptions would be bridge attachments, if practicable, and ancillary aboveground facilities, such as at the converter station and cooling stations.

By burying transmission cables underwater and underground, landscape and visual impacts normally associated with overhead transmission lines would be avoided. In addition, when HVDC electric transmission cables are buried, electric field levels can be reduced. For more than 25 percent of the proposed CHPE Project route, the transmission cables would be buried underground along the ROW of two railroads to avoid identified sensitive features, including the Champlain Canal system and the Hudson River PCBs dredging project within the Upper Hudson River between Hudson Falls, New York, and the Federal Dam at Troy, New York.

In addition to these features, other geographic, infrastructure, and development features that would affect placement of the transmission cables were considered when developing the proposed CHPE Project route, such as the following:

- The locations of existing commercial, industrial, and residential development
- The locations and nature of previously disturbed ROWs that could be used for new transmission cable installation, including those ROWs associated with existing railroad lines and electric transmission cables
- The locations and nature of Adirondack Park Forest Preserve lands.

2.3.1 Evolution of the Proposed CHPE Project

DOE and NYSPSC Permitting Processes. Following the Applicant's Presidential permit application filing, DOE published a notice in the March 5, 2010, *Federal Register* (75 *Federal Register* 10229) announcing the receipt of the Presidential permit application for the proposed CHPE Project. On March 30, 2010, the Applicant filed an application for a Certificate of Environmental Compatibility and Public Need (Original NYSPSC Application), a CWA Section 401 State Water Quality Certificate, and other environmental permits with the NYSPSC in accordance with Article VII of the New York State Public Service Law. Article VII establishes the review process for the NYSPSC to consider any application to construct and operate an electric transmission line with a design capacity of 100 kV or more extending for at least 10 miles (16 km), or with a capacity of 125 kV and extending for a distance of greater than 1 mile (1.6 km) within the State of New York.

As described in **Section 1.7**, DOE issued an NOI to prepare an EIS and to initiate public scoping on June 18, 2010, and held public scoping meetings on the proposed CHPE Project as described in the original application.

The Original NYSPSC Application was supplemented by the Applicant on July 22, 2010; July 29, 2010; August 6, 2010; and August 11, 2010. The Applicant's July 22, 2010, supplement informed the NYSPSC and the 30 active stakeholders that have been identified as a party to the settlement negotiations as part of the NYSPSC Article VII process for this project[4] that the Applicant was revising its proposal to eliminate the HVDC circuit between the U.S./Canada border and Bridgeport, Connecticut, and change the POI in New York City from the ConEd Sherman Creek substation in Manhattan to a substation in Astoria, Queens, New York, owned by the New York Power Authority (NYPA). The Applicant also amended its Presidential permit application to DOE on August 5, 2010, to reflect these project revisions.

On August 12, 2010, the Secretary of the NYSPSC determined that the submitted documents, as supplemented, were filed or otherwise in compliance with the filing requirements of Article VII as of August 11, 2010, and that the formal review of the project would be initiated. Procedural conferences were held in this proceeding before the NYSPSC Administrative Law Judges on September 21, 2010, and January 19, 2011. Public statement hearings were held before Administrative Law Judges on the following dates and at the following locations:

- October 24, 2010, in Yonkers, New York
- October 28, 2010, in Kingston, New York
- November 3, 2010, in Schenectady, New York
- November 4, 2010, in Whitehall, New York
- November 9, 2010, in Plattsburgh, New York.

The Applicant also hosted informal informational sessions for the public on the following dates and locations:

- March 9, 2010, in Albany, New York
- April 13, 2010, in Plattsburgh, New York
- April 20, 2010, in Kingston, New York
- May 4, 2010, in Scotia, New York
- May 12, 2010, in Yonkers, New York.

After exploratory discussions among the 30 active stakeholder parties, a Notice of Impending Settlement Negotiations was filed with the Secretary of the NYSPSC by the Applicant and served to all parties on November 2, 2010.

CZMA Consistency Review. On December 6, 2010, the Applicant submitted its Coastal Consistency Assessment Form to the NYSDOS requesting a concurrence on its finding that the proposed CHPE Project would be consistent with the policies of the New York State Coastal Management Program. On June 8, 2011, NYSDOS issued a Conditional Concurrence with Consistency Certification to the Applicant (see **Appendix F**). In this letter, NYSDOS "conditionally concurred with the consistency certification for the project under the enforceable policies of the New York State Coastal Management Program (CMP)."

[4] The 30 active stakeholder parties are as follows: the Adirondack Park Agency; Adirondack Council; Albany County, New York; Central Hudson Gas & Electric Corporation; CHPEI; City of New York; City of Yonkers; Consolidated Edison Company of New York, Inc.; County of Rockland, New York; County of Westchester, New York; Entergy Nuclear Power Marketing, LLC; Greene County, New York; International Brotherhood of Electrical Workers Local Union No. 97; Independent Power Producers of New York, Inc. (IPPNY); National Grid USA; New York Power Authority (NYPA); New York State Council of Trout Unlimited; New York State Canal Corp./New York State Thruway Authority; New York State Department of Agriculture and Markets; NYSDEC; NYSDOT; New York State Office of Parks, Recreation and Historic Preservation; NYSDPS; Orange and Rockland Utilities, Inc.; Riverkeeper, Inc.; Scenic Hudson, Inc.; Town of Saugerties, New York; Saratoga County, New York; Vermont Electric Power Company, Inc. and Vermont Transco LLC; and the Utility Intervention Unit of the NYSDOS's Consumer Protection Division.

In its concurrence, NYSDOS developed conditions that, if adopted by the Applicant, pursuant to 15 CFR 930.4, would allow the project to be consistent with the CMP. These conditions are summarized in the following:

- The transmission line would be buried at the maximum depth achievable that would allow each pole of the bipole to be buried in a single trench using a jet plow. Given the state of the available information, this is expected to be at least 6 feet (1.8 meters) below the sediment-water interface in a single trench in coastal waters regulated by the New York State CMP, which in the case of the proposed CHPE Project occur in the Hudson, Harlem, and East rivers. Should the bipole occupy any federally maintained (i.e., dredged) navigation channels, it would be located at least 15 feet (5 meters) below the authorized depth within those channels. The cable would be maintained at these depths and the depth of burial would be verified on a periodic basis so it would not become a hazard to navigation or marine resources. (Subsequent to the issuance of the NYSDOS conditional concurrence, the USACE New York District Public Notice for the proposed CHPE Project [NAN-2009-01089-EYA] dated October 2013 [USACE 2013] identified burial depths, including in the federally maintained navigation channel [see **Section 2.4.10.1**]. The NYSPSC Certificate stated that in the event USACE imposes conditions conflicting with the Certificate, such conflicts must be reconciled with the USACE and NYSPSC.)
- All transitions from aquatic and terrestrial configurations within the coastal area would be accomplished by HDD and would be at a depth sufficient so they would not interfere with any current or future water-dependent uses.
- The transmission cable would not occupy any area within the Hudson River north of the southerly boundary of the Inbocht Bay and Duck Cove Significant Coastal Fish and Wildlife Habitat (SCFWH).
- The transmission cable would be in a terrestrial, buried configuration around the Haverstraw Bay SCFWH.
- When work would be conducted in identified SCFWHs, it would be conducted during the timeframes provided in narratives describing the SCFWHs (NYSDOS 2012). Outside of SCFWHs, all in-water work would be conducted in accordance with the recommendations developed during the NYSPSC Article VII process (NYSDOS 2011a).

The Applicant incorporated these changes in the proposed CHPE Project design, and on July 7, 2011, submitted an amended Presidential permit application to DOE identifying that the project would be modified in accordance with these conditions (CHPEI 2011, TDI 2012a). The conditions were also incorporated into NYSPSC's April 2013 Order Granting a Certificate of Environmental Compatibility and Public Need to the Applicant associated with construction and operation of the proposed CHPE Project (NYSPSC 2013).

Following submission of the amended Presidential permit application, public and intervener input into the NYSPSC process continued to occur. As a result of these discussions, the Applicant also proposed to construct the HVDC converter station adjacent to the Astoria Annex Substation in Queens and to construct an approximately 3-mile (5-km), 345-kV HVAC interconnection circuit between the Astoria Annex Substation and the ConEd 345-kV Rainey substation, also in Queens.

2.3.2 Identification of the Proposed CHPE Project Joint Proposal

As mentioned in **Section 2.3.1**, in November 2010, a Notice of Impending Settlement Negotiations was filed in the state process. Between November 2010 and February 2012, more than 50 settlement conferences were held. These settlement negotiations culminated with the filing of a "Joint Proposal of

Settlement" (Joint Proposal) with the NYSPSC on February 24, 2012. The following governmental and nongovernmental organizations are signatory parties to the Joint Proposal:

- The Applicant, CHPEI
- NYSDPS
- NYSDEC
- NYSDOS
- New York State Department of Transportation (NYSDOT)
- New York State Department of Agriculture and Markets
- Adirondack Park Agency (APA)
- Riverkeeper, Inc.
- Scenic Hudson, Inc.
- City of Yonkers, New York
- City of New York, New York
- New York State Council of Trout Unlimited
- New York State Office of Parks, Recreation, and Historic Preservation
- Palisades Interstate Park Commission.

The Joint Proposal set forth a proposed route for the proposed CHPE Project and impact reduction measures, including the establishment of a $117 million trust fund for environmental management purposes, as detailed in Joint Proposal Term 144, to be used exclusively for in-water mitigation studies and projects that have a direct nexus to the construction and operation of the proposed CHPE Project.

As expressed in the Joint Proposal, the signatory parties entered into the Joint Proposal on the understanding that it constitutes a negotiated resolution of the issues in the proceeding. The support of the signatory parties for the Joint Proposal is expressly conditioned upon acceptance or approval by the NYSPSC of all provisions thereof, without material change or condition (CHPEI 2012b). On February 28, 2012, TDI, on behalf of the Applicant, submitted the Joint Proposal as an amendment to the Presidential permit application. The CHPE Project as currently proposed by the Applicant and evaluated herein is the transmission line route and system components reflected in the Joint Proposal and subsequent modifications as discussed below. The CHPE Project is described in the following paragraphs and is referred herein as the proposed CHPE Project.

The proposed CHPE Project (the Applicant's Preferred Alternative) is essentially identical to the August 2010 proposal for major portions of the transmission line route, with the exception of a few alignment changes resulting from and included in the Joint Proposal. The previously proposed CHPE Project alignments from the August 2010 proposal are identified in **Section 2.5**.

Since the Joint Proposal was issued in February 2012, three subsequent modifications have been made to the proposed CHPE Project, all of which occur on the grounds of the ConEd Charles Poletti Power Plant complex in Astoria, New York, and are reflected in subsequent Joint Proposal exhibits submitted by the Applicant and are as follows.

- To avoid routing the transmission line through the site of a liquefied natural gas (LNG) storage facility on the Charles Poletti Power Plant complex at proposed CHPE Project milepost (MP) 332, the transmission line route would follow the East River shoreline to the east and south along Luyster Creek around the perimeter of the LNG facility. The route would remain entirely within the power plant complex (CHPEI 2012tt).
- The proposed site for the CHPE Project HVDC Converter Station along Luyster Creek in the Charles Poletti Power Plant complex (at MP 333) was revised as the Applicant and ConEd

reached consensus on its footprint. The acreage of the site was reduced from 5.2 acres (2.1 hectares) to 4.5 acres (1.8 hectares) (CHPEI 2012uu). See **Section 2.4.6** for more information about the converter station.

- The Applicant has agreed to compensate ConEd for installation of electrical system upgrades from the Astoria Annex Substation to the Astoria East Substation rather than use operating procedures to ensure that sufficient power can flow through the system into the grid (see **Section 2.4.7**) (CHPEI 2012k).

2.3.3 Issuance of the Certificate of Environmental Compatibility and Public Need for the Proposed CHPE Project

On December 27, 2012, the Administrative Law Judges issued a recommendation to the NYSPSC that a Certificate of Environmental Compatibility and Public Need be issued to the Applicant for the proposed CHPE Project (NYSPSC 2012). On January 17, 2013, the NYSDPS Office of Energy Efficiency and the Environment issued a CWA Section 401 State Water Quality Certificate to the Applicant for the proposed CHPE Project (NYSDPS 2013). The NYSPSC then issued an Order granting the Certificate of Environmental Compatibility and Public Need (Certificate) (see **Appendix C**) for the proposed CHPE Project on April 18, 2013 (NYSPSC 2013). In its Certificate, the NYSPSC stated "The [proposed CHPE] Project would satisfy a need by providing additional transmission capacity into the New York City load pocket and an additional source of supply – hydroelectric power – that is both renewable and relatively stable in price, enhancing the fuel diversity in the City. Moreover, by allowing a new entrant into the New York City market, approval of the proposed CHPE Project would advance NYSPSC's policy favoring competition. Finally, the proposed CHPE Project would advance State policies by enabling access to a source of clean energy supply." The Certificate includes 165 attached conditions, some of which require measures to reduce, avoid, or measure environmental impacts.

2.4 Proposed CHPE Project Location, Design, and Construction Methods

The following subsections describe the route segments analyzed in this EIS and specific engineering details of the transmission system: the aquatic DC transmission cables; HDD methods; terrestrial DC transmission cables; cooling stations to be used in certain locations along the transmission line; the proposed HVDC converter station and substation interconnection in Astoria, New York; and, finally, the proposed Astoria Annex to Rainey substation HVAC interconnection as approved by NYSPSC under the Certificate.

The following subsections discuss how the Applicant proposes to install and operate the transmission line and aboveground facilities of the proposed CHPE Project based on information available when this EIS was prepared (CHPEI 2012vv).

2.4.1 Description of the Route Segments

For the purposes of understanding the various environmental settings associated with the proposed CHPE Project, and to facilitate the analysis in this EIS, the transmission line route was divided into four geographically logical segments:

- Lake Champlain Segment
- Overland Segment
- Hudson River Segment
- New York City Metropolitan Area Segment.

The four segments are shown on **Figures 2-1** through **2-4**, respectively, and supporting detailed maps of the full project route are provided in **Appendix A**.[5] From the U.S./Canada border, the HVDC transmission line would be routed through the Lake Champlain lake bed for approximately 101 miles (163 km), entirely within the jurisdictional waters of New York State from near Champlain, New York, to Dresden, New York. This portion of the route composes the Lake Champlain Segment (see **Figure 2-1**).

The Overland Segment begins at the southern end of Lake Champlain in the Town of Dresden, where the HVDC transmission line would exit the water at MP 101 and be installed underground in NYSDOT ROW for approximately 11 miles (17 km) along New York State Route 22, crossing under South Bay in Lake Champlain via HDD at MP 109, to MP 112 in the Town of Whitehall, New York (see **Figure 2-2**). Beginning at MP 112 in Whitehall, the transmission line would be buried within an existing railroad ROW owned by the Canadian Pacific (CP) Railway for approximately 64 miles (103 km) through the municipalities of Fort Ann, Hartford, Kingsbury, Fort Edward, Moreau, Northumberland, Wilton, Greenfield, Saratoga Springs, Milton, Ballston, Clifton Park, Glenville, Schenectady, and Rotterdam, New York. In Schenectady, the transmission line would be routed underground off the railroad ROW for more than 1 mile (1.6 km) through city streets between MPs 173 and 174 to avoid engineering constraints along the railroad ROW. After returning to the CP railroad ROW in Schenectady, the transmission line would then transfer to the CSX Transportation (CSX) railroad ROW at MP 177.0 in the town of Rotterdam and continue south underground for approximately 51 miles (81 km) through the municipalities of Guilderland, New Scotland, Bethlehem, Coeymans, New Baltimore, Coxsackie, Athens, and Catskill. The transmission line would go off the railroad ROW where it would follow Alpha Road in Catskill and connect to the Hudson River at MP 228, south of the Inbocht Bay and Duck Cove SCFWH.

The Hudson River Segment begins at MP 228 where the HVDC transmission line would enter the Hudson River at the Town of Catskill, New York (see **Figure 2-3**). Upon entering the Hudson River, the transmission line would be buried in the river bottom for approximately 67 miles (108 km) until exiting the water near the Town of Stony Point, New York, north of the Haverstraw Bay SCFWH in the Hudson River. The transmission line route would avoid 15 "Exclusion Areas" containing high-quality wildlife habitats in the Hudson River between Catskill and Stony Point, as identified by NYSDEC during the development of the Joint Proposal (CHPEI 2012jj). The transmission line would bypass the Haverstraw Bay SCFWH by following the CSX railroad ROW through the communities of Stony Point and Haverstraw, and the U.S. Route 9W ROW in Clarkstown between MPs 295 and 303. The transmission line would be buried through this entire stretch before reentering the Hudson River. HDD would be used to install the cables at the land/water interfaces, under roads and wetland areas, and under Stony Point State Historical Park, Hook Mountain State Park, and Rockland Lake State Park. The transmission line would reenter the Hudson River at MP 303 for approximately 21 miles (34 km) until it reaches the end of the Hudson River Segment at Spuyten Duyvil Creek (the area where the Harlem River shipping channel connects to the Hudson River) and the Harlem River in New York City at MP 324.

The New York City Metropolitan Area Segment begins at Spuyten Duyvil at MP 324, where the HVDC transmission line would enter the Harlem River and continue south in the river for a distance of approximately 6 miles (10 km) to a point north of the Willis Avenue Bridge in the borough of the Bronx at MP 330 (see **Figure 2-4**). The transmission line would exit the river and proceed east through the NYSDOT railroad corridor and rail yards along the northern side of the Bronx Kill to the East River.

[5] Joint Proposal Section III.A ("Facility Description") was intended to provide only a general narrative overview of the transmission line route. The distances identified in this EIS are derived from route alignments and mileposts shown in the maps provided in Appendix B of the Joint Proposal, are used as the source data for purposes of the NEPA analysis, and may deviate slightly from the Joint Proposal Facility Description.

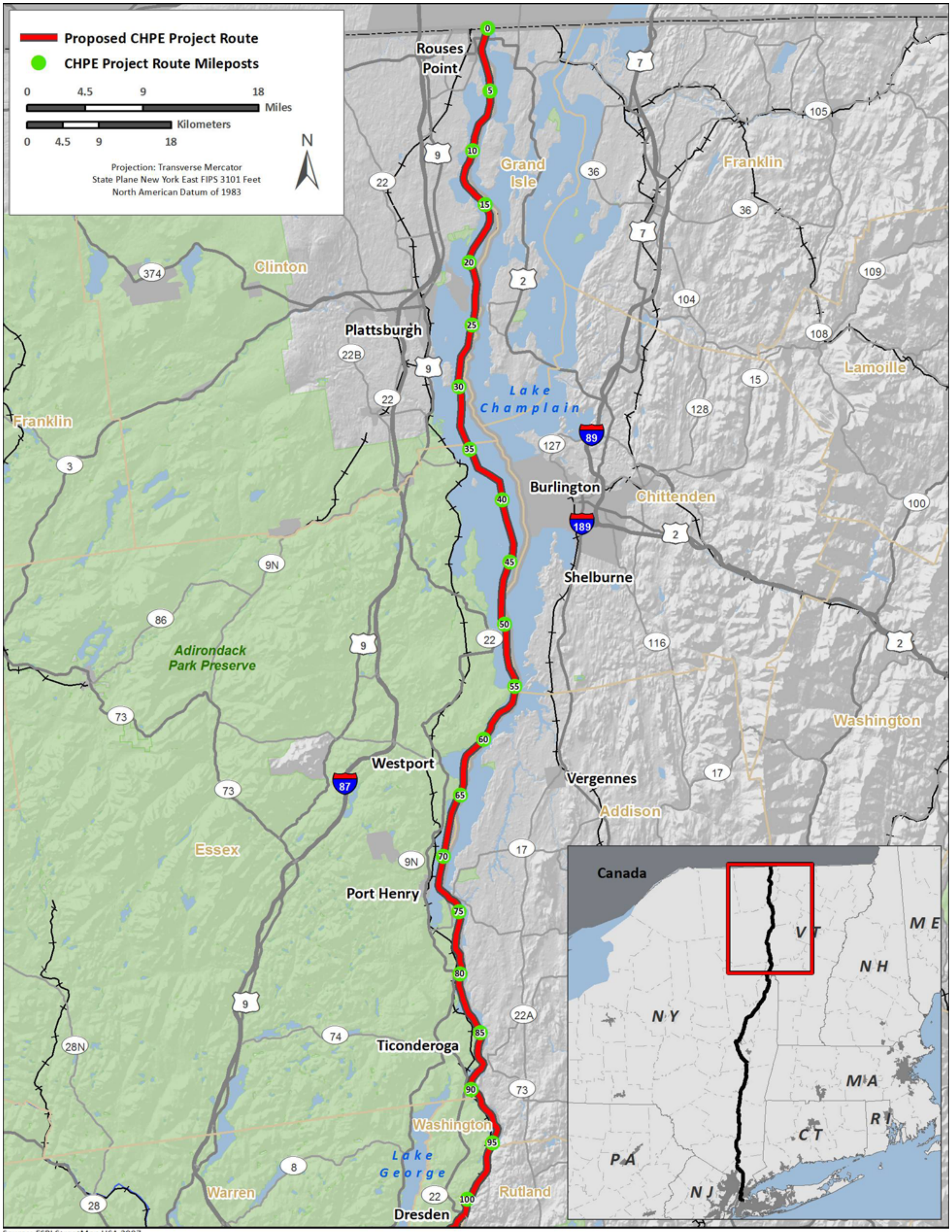


Figure 2-1. Lake Champlain Segment

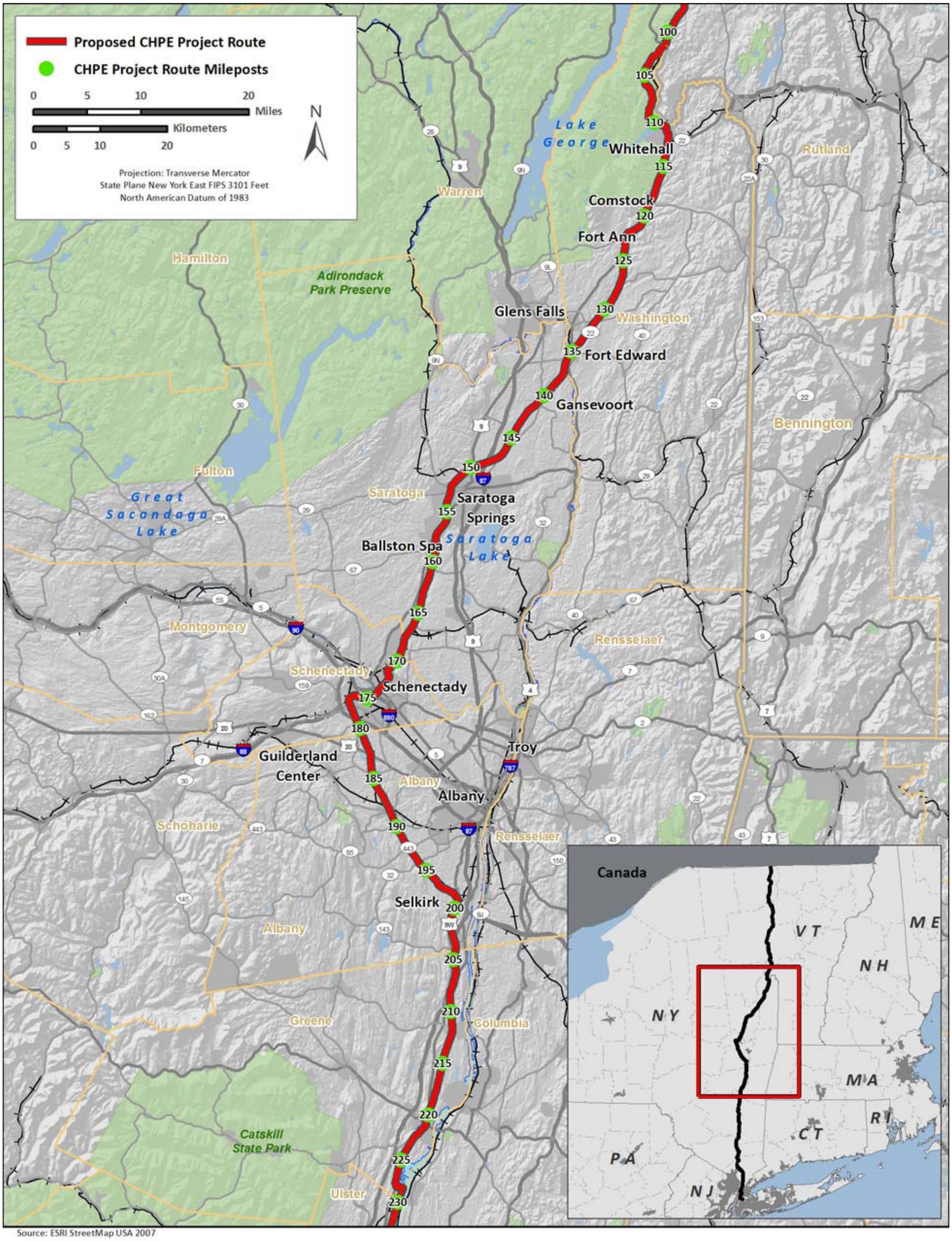


Figure 2-2. Overland Segment

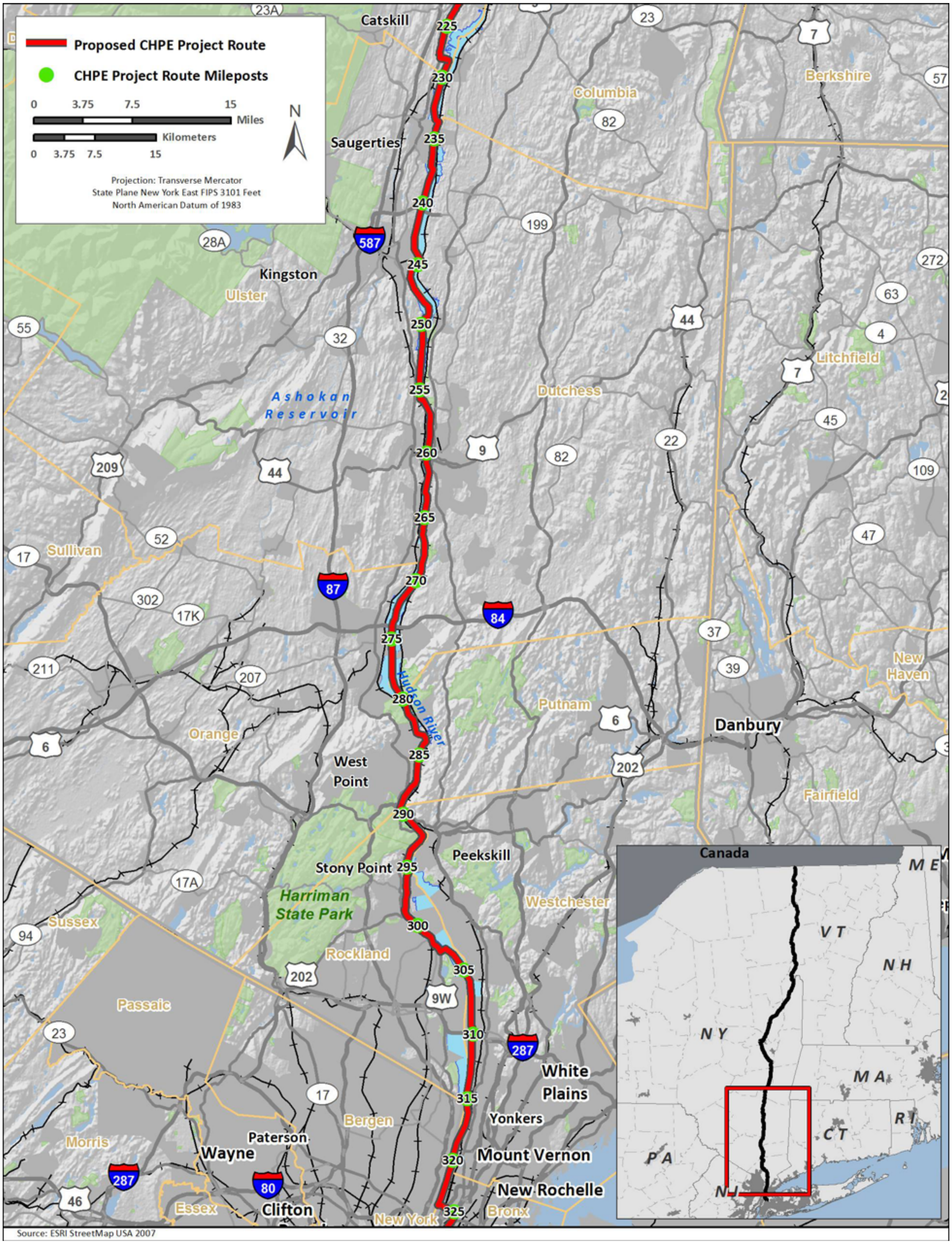


Figure 2-3. Hudson River Segment

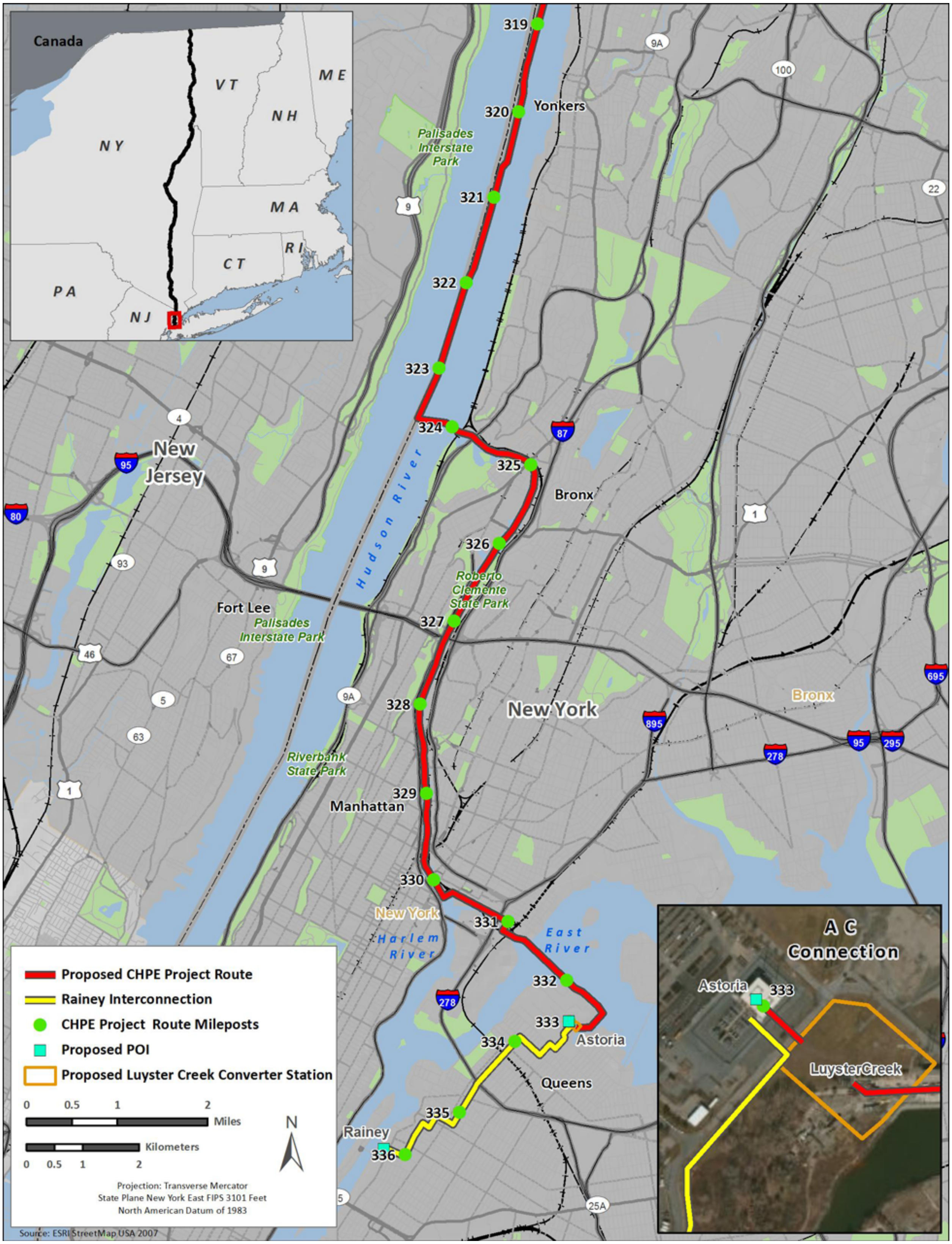


Figure 2-4. New York City Metropolitan Area Segment

The transmission line would be buried within the CSX ROW for approximately 1 mile (1.6 km), crossing beneath the Robert F. Kennedy Bridge and the Hell Gate railroad bridge. The transmission line would then cross under the East River at MP 331 using HDD and proceed to the southeast to land at the site of the ConEd Charles Poletti Power Plant complex in Astoria, Queens, New York, at MP 332. Once onshore, the HVDC transmission cables would wrap around the eastern portion of the power plant complex for approximately 1 mile (1.6 km) and would terminate in a proposed HVDC converter station occupying an approximately 4.5-acre (1.8-hectare) site along Luyster Creek (also referred to as Steinway Creek) on land adjacent to the Astoria Annex 345-kV electrical substation. The Luyster Creek HVDC Converter Station would convert the DC electrical power to AC, and underground double-circuit 345-kV AC cables would connect the converter station with the adjacent Annex substation, which was recently constructed by NYPA.

The Applicant has agreed to construct the facilities necessary to allow at least 1,550 MW of electric energy to be delivered from the Astoria Annex Substation into ConEd's 345-kV system unless prevented by a transmission system outage, maintenance outage, or if the New York State Bulk Power System (NYSBPS), the power system within the New York Control Area (NYSRC 2007), is in an "emergency" or "emergency state" that prevents the delivery of 1,550 MW of energy out of the Astoria Annex Substation. To achieve this result, the Applicant proposes to construct an approximately 3-mile (5-km) buried 345-kV HVAC cable circuit from the Astoria Annex Substation to ConEd's 345-kV Rainey Substation. The Applicant has also agreed to construct a new ring bus (a substation switching arrangement that might consist of four or more circuit breakers connected in a closed loop) at the converter station to facilitate the interconnection into the Astoria Annex Substation and the extension to the Rainey Substation.

Table 2-1 provides a breakdown of the cable sections associated with the proposed CHPE Project route, including the segment, corridor type (aquatic or terrestrial), reference MPs, and length. Approximately 58 percent of the route's length is aquatic, while 42 percent is terrestrial.

2.4.2 Aquatic Direct Current Transmission Cable

The transmission cables proposed for installation in the Lake Champlain, Hudson River, and New York City Metropolitan Area segments would be cross-linked polyethylene (XLPE) HVDC cables rated at 300 to 320 kV (depending upon the manufacturer). The polyethylene insulation in the XLPE cable eliminates the need for fluid insulation, enables the cable to operate at higher temperatures with lower dielectric losses, improves transmission reliability, and reduces risk of network failure. In general, aquatic transmission cables include a polyethylene sheath extruded over a lead-alloy sheath to provide superior mechanical and corrosion protection (see **Figure 2-5**). An armored layer of galvanized steel wires embedded in bitumen provides additional protection for the aquatic transmission cables. The outer layer of the aquatic transmission cable would consist of an asphaltic compound with polypropylene reinforcement. The diameter of each aquatic cable would be approximately 4.9 inches (12.4 centimeters [cm]) and the cable would weigh approximately 29 pounds per foot (lb/ft) (43 kilograms/meter [kg/m]) (TDI 2010).

Aquatic transmission cables are generally sited to maximize the system's operational reliability while minimizing the costs and potential environmental impacts caused during construction, operation, and maintenance. Underwater cable installation activities would be limited to certain times of the year to avoid life-cycle or migratory impacts on aquatic species in the project area in accordance with conditional concurrence of the proposed CHPE Project with the New York State CMP issued by NYSDOS (see **Section 2.3.2** and **Appendix F.1**). In addition, the aquatic transmission cables would be sited to avoid areas that could cause damage to the system or impede future maintenance activities. For the proposed

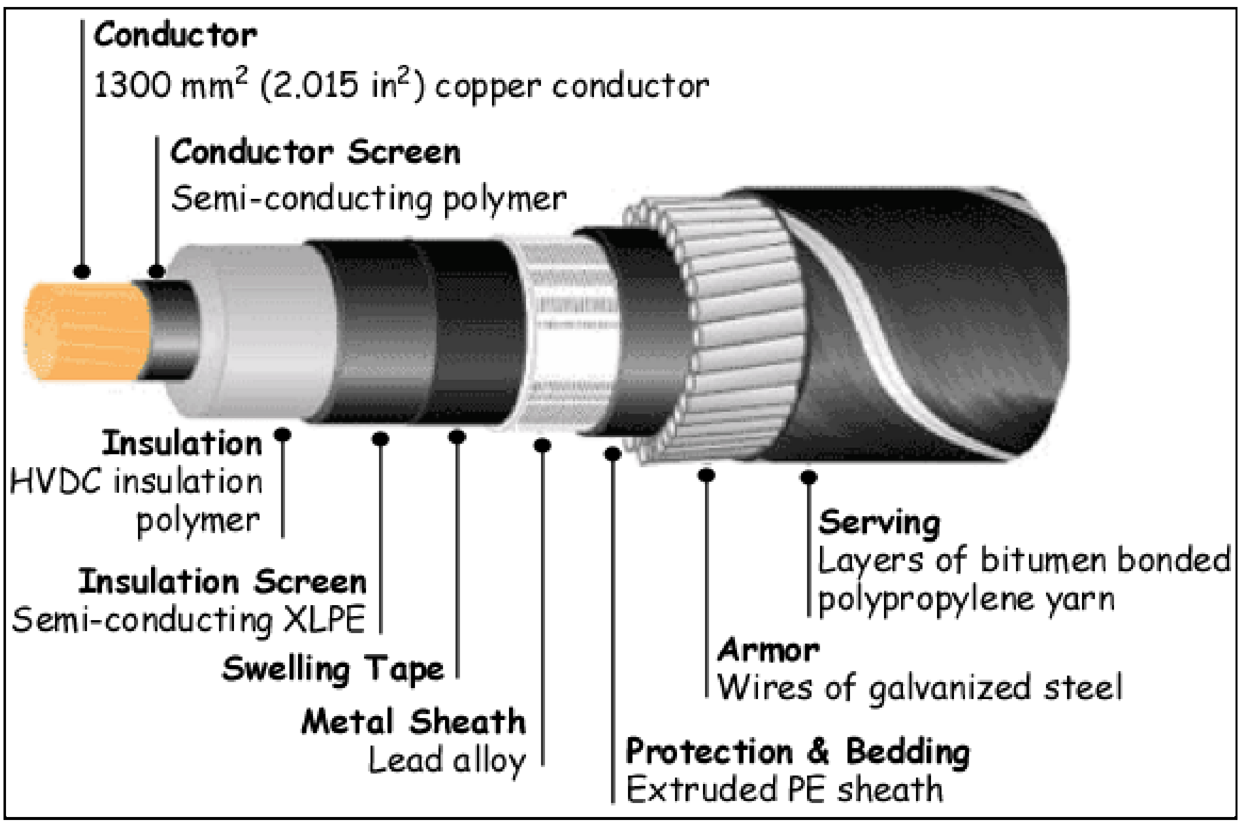
Table 2-1. Summary of the Proposed CHPE Project Transmission Line Route

Cable Section	Segment	Corridor Type	Milepost Start*	Milepost End*	Construction Corridor Width (feet)	Length (miles)*
U.S./Canada Border to Dresden, NY, in Lake Champlain	Lake Champlain	Aquatic	0	101	50	101
Dresden to Whitehall, NY (along NY State Route 22)	Overland	Terrestrial	101	112	25	11
CP Railroad ROW from Whitehall to Schenectady, NY	Overland	Terrestrial	112	173	33	61
City Streets in Schenectady, NY	Overland	Terrestrial	173	174	25	1
CP Railroad ROW from Schenectady to Rotterdam, NY	Overland	Terrestrial	174	177	33	3
CSX Railroad ROW from Schenectady to Catskill, NY	Overland	Terrestrial	177	227	48	50
Alpha Road from CSX Railroad ROW to Hudson River in Catskill	Overland	Terrestrial	227	228	25	1
Hudson River from Catskill to Haverstraw Bay (Stony Point, NY)	Hudson River	Aquatic	228	295	50	67
CSX Railroad and U.S. Route 9W ROW around Haverstraw Bay	Hudson River	Terrestrial	295	303	48	8
Hudson River from Haverstraw Bay to Spuyten Duyvil and Harlem River	Hudson River	Aquatic	303	324	50	21
Harlem River to Bronx	New York City Metropolitan Area	Aquatic	324	330	50	6
Railroad ROW in Bronx to East River	New York City Metropolitan Area	Terrestrial	330	331	33	1

Cable Section	Segment	Corridor Type	Milepost Start*	Milepost End*	Construction Corridor Width (feet)	Length (miles)*
East River to Astoria	New York City Metropolitan Area	Aquatic	331	332	50	1
Luyster Creek Converter Station/Astoria Annex Substation	New York City Metropolitan Area	Terrestrial	332	333	50	1
HVAC Line from Astoria Annex Substation to Rainey Substation along City Streets in Queens, NY	New York City Metropolitan Area	Terrestrial	333	336	10	3
					Total Aquatic Length	**196**
					Total Terrestrial Length	**140**
					Total Length	**336**

Source: CHPEI 2012b

Note: *Mileposts and distances are based on the route maps as shown in Appendix B of the Joint Proposal.



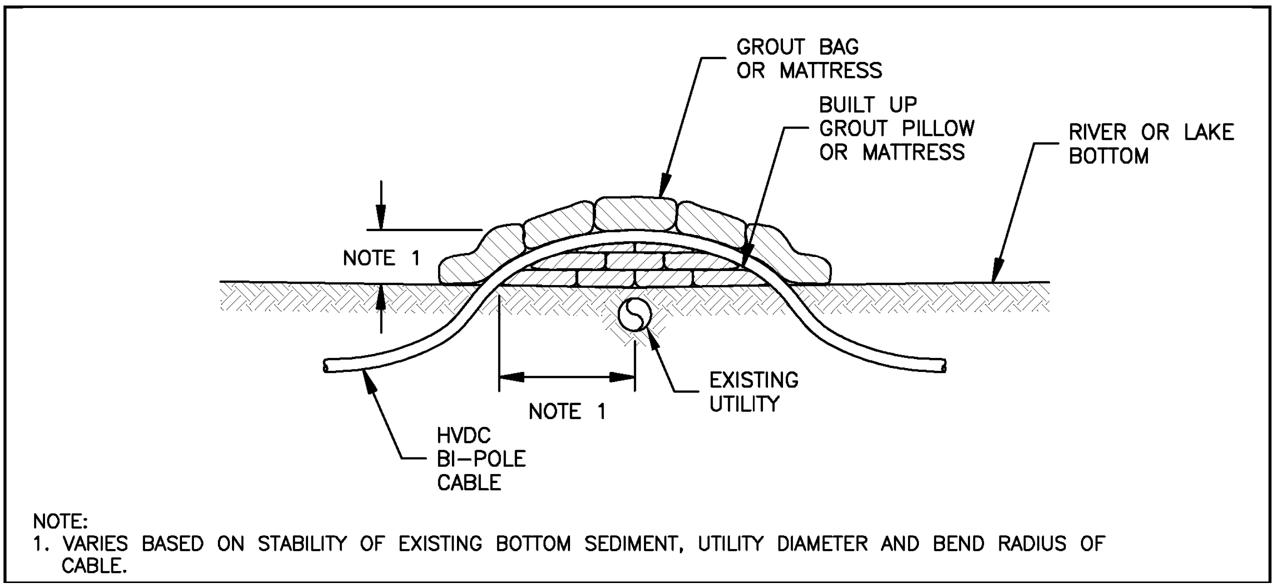
Source: Cross-Sound Cable Company 2012

Figure 2-5. Example Aquatic HVDC Transmission Cable Cross-Section

CHPE Project route, the transmission cables would primarily follow existing waterways from the U.S./Canada border, south to the New York City metropolitan area. To the extent practicable, the transmission cables would be buried beneath the beds of these waterways at a depth of at least 4 to 8 feet (1.2 to 2.4 meters) to prevent disturbance to the cables from unrelated marine operations in the waterways. The depth of burial that can be achieved would depend on available marine construction equipment, soil types and depth to bedrock, existing utilities, and the types of marine activities occurring and their potential threat to cable integrity (TDI 2010).

In general, the burial depths below the sediment-water interface would be 4 feet (1.2 meters) within Lake Champlain, 7 feet (2.1 meters) in the Hudson River, and 8 feet (2.4 meters) in the Harlem River. Transmission cables would be installed along the entire East River route using HDD; therefore, burial depths would not apply.

However, burial depths might vary in response to site-specific factors identified within Lake Champlain and the Hudson and Harlem rivers. These factors could include the presence of existing infrastructure and federally maintained navigation channels, the potential for anchor damage, the identification of archaeological or historic resources, localized geological or topographical obstacles, or other environmental concerns (TDI 2010). For example, in areas where there are soft-bottom conditions, the transmission cables could be buried at a greater depth to provide additional protection against damage. Where the transmission cables cross bedrock or an existing utility such as a pipeline or another cable, they would be laid over the existing utility and protective coverings such as grout pillows or articulated concrete mattresses (i.e., mats) would be installed over the cable crossing (CHPEI 2012f) (see **Figure 2-6**). Physical surveys, including diver surveys of each utility, would be performed prior to cable installation in an attempt to reduce the requirement for concrete mats.



Source: CHPEI 2012d

Figure 2-6. Representative Schematic of Protective Measures for Aquatic Transmission Cables

Articulated concrete mats (see **Figure 2-7**) are typically made of small pre-formed 9- to 12-inch (22.7- to 30-cm)-thick concrete blocks that are interconnected by cables or synthetic ropes in a two-dimensional grid. The concrete mats used for the proposed CHPE Project would be 40 feet (12 meters) long, 8 feet (2.4 meters) wide, and 9 inches (23 cm) deep. An average of three concrete mats would be placed lengthwise end-to-end at each location. Specifically, concrete mats would be installed as protective

Source: IMCA 2011

Figure 2-7. Typical Articulated Concrete Mats

covering over the transmission cables for 0.6 miles (1.0 km) in the Lake Champlain Segment, 1.8 miles (2.9 km) in the Hudson River Segment, and 0.6 miles (1.0 km) in the New York City Metropolitan Area Segment, representing 1.5 percent of the length of the aquatic portion of the entire transmission line route. Coordination with utility owners would occur and standard utility crossing procedures would be employed to prevent damage to pre-existing utilities. Where bedrock is near the surface, protective coverings such as concrete mats would be installed to protect the cables. If necessary, blasting could be used to create a trench in which to bury the cables.

Installation of the transmission line in the Harlem River would require blasting to excavate approximately 460 feet (140 meters) of bedrock from a former rock peninsula at MP 324.5. The minimum burial depth for rock in the Harlem River, which contains a federally maintained navigation channel, is 6 feet below the rock surface (USACE 2013). Geological maps indicate this rock is Fordham Gneiss with unconfined compressive strength that is too hard to remove by cutterhead, ripping, hoe-ramming, or non-explosive methods. Additional information on blasting in the Harlem River is in **Section 2.4.10.1**.

As shown in **Table 2-1**, the transmission line would consist of aquatic HVDC cables from the U.S./Canada border (MP 0) to Dresden, New York (MP 101); from Catskill, New York (MP 228) to Stony Point, New York (MP 295); from Clarkstown, New York (MP 303) to the Bronx, New York (MP 330); and from the Bronx (MP 331) to Queens, New York (MP 332).

2.4.3 Horizontal Directional Drilling

HDD would be used to install the transmission cables in transition areas between aquatic and terrestrial portions of the proposed CHPE Project route, in sensitive areas and under the East River. Sensitive areas include wetlands and streams where deemed necessary, wild blue lupine (*Lupinus perrenis*) habitat, and existing infrastructure along the terrestrial portions of the proposed CHPE Project route; and where necessary to avoid obstacles along the route, such as road or railroad crossings where trenching is not possible. The equipment used and scale of the HDD operation would vary depending on the length and depth of the installation. The largest, most complex HDD operation would occur at the five water-to-land transitions that are planned. This larger-scale HDD technology would be used at the transitions at MPs 101, 228, 295, 303, and 330. This process is described below.

For each proposed HDD location, two separate drill holes would be required, one for each cable. Each cable would be installed within a 10-inch (64-cm)-diameter, or larger, high-density polyethylene (HDPE) tube-shaped duct, or conduit. To maintain appropriate separation between the two cables, a minimum of 6 feet (1.8 meters) would be required between each drill path.

During installation, a drill rig would be placed onshore behind a temporary fluid return pit and a 40-foot (12-meter) drill pipe with a cutting head would be set in place to begin the drilling process. As the initial pilot borehole is drilled, a slurry composed of water and bentonite (i.e., a shrink-swell clay) would then be pumped into the hole to transport the drill cuttings to the surface, to aid in keeping the borehole stable, and to lubricate the drill.

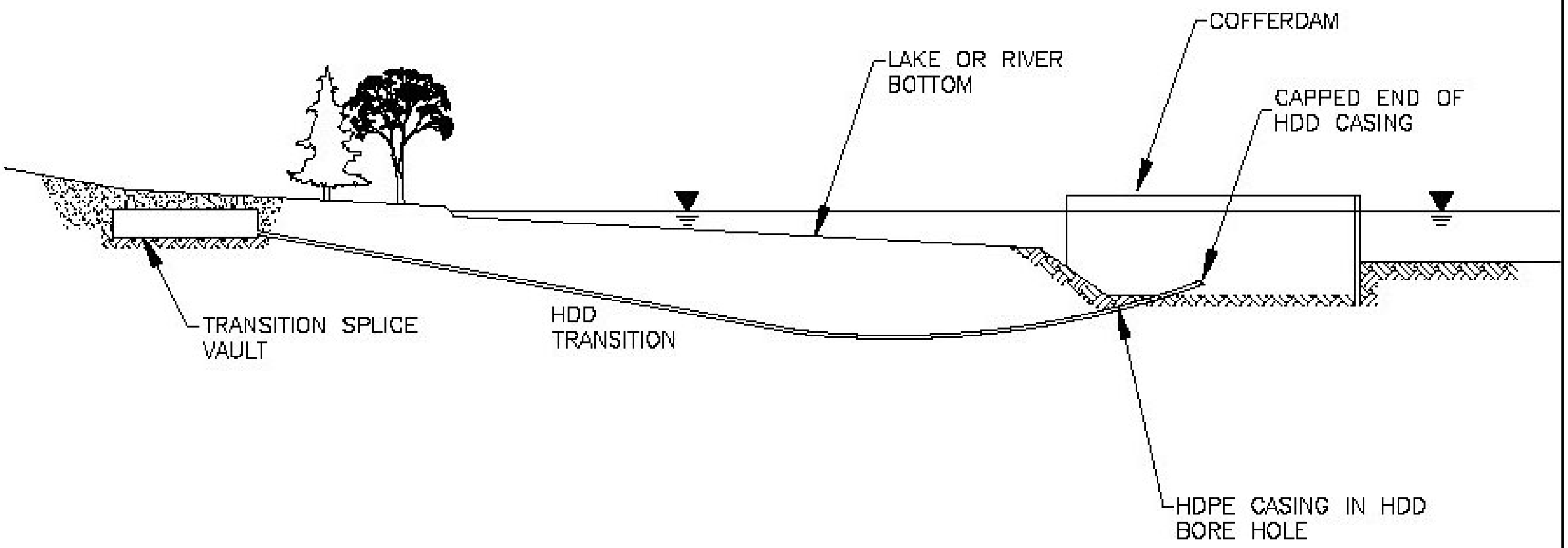
After each 40-foot (12-meter) segment of pipe is installed, an additional length of drill pipe would be added until the final drill length has been achieved (see **Figure 2-8**). As necessary, the borehole would be widened by repeated passes of a widening tool called a reamer. When the desired borehole diameter and drill length have been achieved, a pulling head would be attached to the end of the drill pipe and the drill pipe would then be used to pull back an HDPE conduit pipe into the borehole from the exit end. Separate conduits would be installed for each of the bipole cables. After the HDPE conduits are in place, the transmission cables would be pulled through these pipes and into a transition splice vault, which would remain in place to protect the transmission cable.

At each water-to-land transition, a transition, or splice, vault would be constructed on shore below grade to facilitate the splicing of aquatic transmission cables to terrestrial transmission cables. Transition vaults are segmental precast reinforced concrete assemblies typically measuring 35 feet (10.7 meters) long by 9 feet (2.7 meters) wide and 8 feet (2.4 meters) high. The transition vault would house the transition joints (from aquatic to terrestrial cables) and the aquatic transmission cable anchoring system. After splicing is completed, the transition vaults would be filled with sand or flowable fill and covered with concrete slabs. The locations of transition vaults would be clearly identified to ensure public safety.

The HDD operation would include an HDD drilling rig system, a drilling fluid collection and recirculation system, temporary cofferdam installed at the water exit to maintain exit pit stability following dredging of the pit, and associated support equipment. Excavated soils would be temporarily stored on site during construction, and would be used to restore the site to its previous grade once the drilling process has been completed, or removed and disposed of at an approved location. The Applicant estimates that approximately 100 cubic yards (76 cubic meters) of drill cuttings (used bentonite and excess soil) would be generated for disposal at each of the seven major HDD installations. **Figure 2-9** shows an example of an HDD drill rig operation staging area for landfall locations. HDD staging areas in entirely terrestrial locations (i.e., roadway crossings) would be smaller in size and less complex due to smaller equipment requirements.

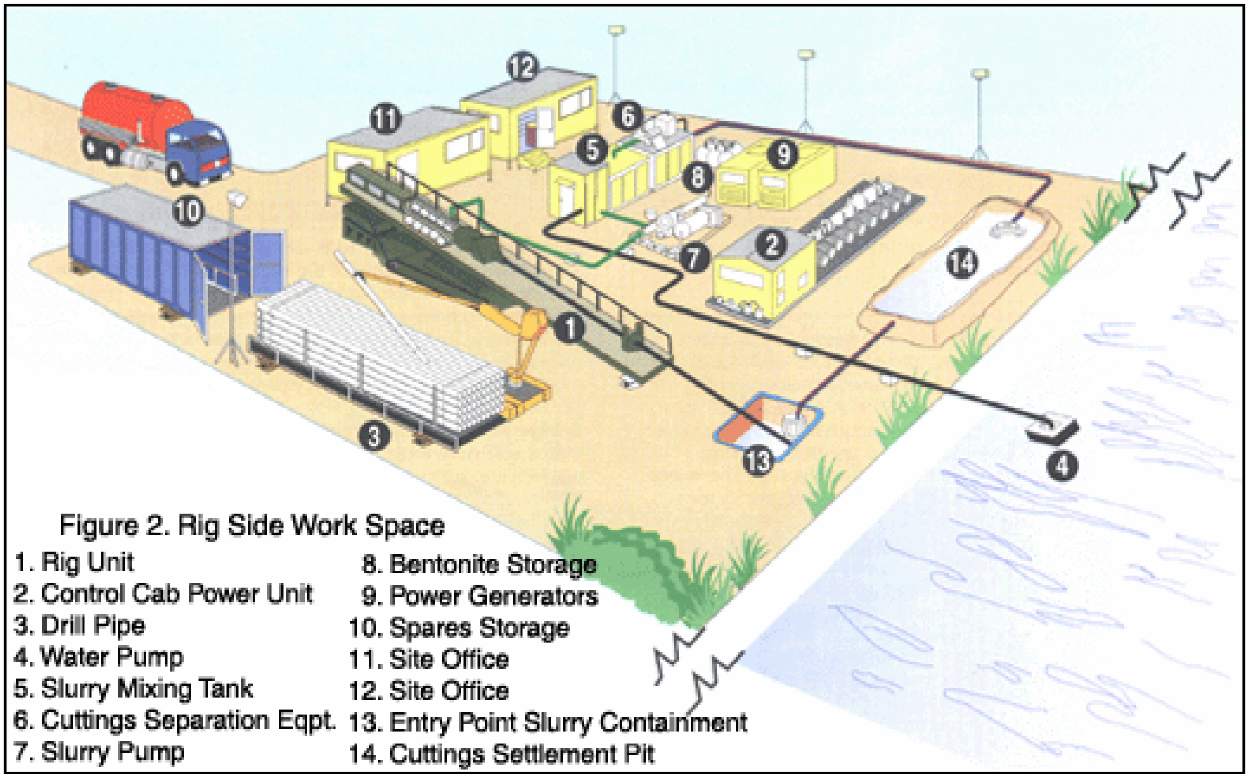
NOTES:

1. COFFERDAM TO BE UTILIZED WHERE NECESSARY TO STABILIZE BOTTOM SEDIMENT AT HDD TERMINUS OTHER ALTERNATIVES PROVIDING EQUIVALENT ENVIRONMENTAL PROTECTION MAY BE EMPLOYED WHERE BOTTOM CONDITIONS DO NOT PERMIT DRIVEN PILES.
2. PILES SHALL BE REMOVED OR CUT BELOW THE MUD LINE. AT COMPLETION OF CABLE INSTALLATION IN COORDINATION WITH THE BMP REQUIREMENTS.
3. COFFERDAM WILL EXTEND ABOVE THE WATERLINE IN SHALLOW WATER. EXPOSED STRUCTURE WILL BE MARKED BY BUOYS AND OTHER NAVIGATION AIDS. A NOTICE TO MARINERS WILL BE ISSUED WHEN APPROPRIATE.
4. COFFERDAMS IN DEEP WATER NOT BE EXTENDED TO THE WATER SURFACE. EACH INSTALLATION WILL BE MARKED BY BUOYS AND OTHER NAVIGATION AIDS. A NOTICE TO MARINERS WILL BE ISSUED WHERE APPROPRIATE.



Source: CHPEI 2012a

Figure 2-8. Example HDD Techniques



Source: Laney Drilling 2012

Figure 2-9. Typical HDD Landfall Drill Rig Operation

For drilling operations extending from land into the water and water onto land, the directional drill would be expected to exit the ground in water at a depth sufficient to avoid potential impacts on or littoral zone or intertidal habitat. A temporary cofferdam would be constructed at the offshore exit hole location. The purpose of the cofferdam would be to reduce turbidity associated with the dredging and HDD operations and to help maintain the exit pit. A cofferdam would be approximately 16 feet (5 meters) by 30 feet (9 meters) or 480 square feet (44 square meters) with a dredged entry/exit pit typically 6 to 8 feet (1.8 to 2.4 meters) deep and would be constructed using steel sheet piles installed with a vibratory hammer.

Sheet pile used to construct cofferdams would be installed in pairs with 8 to 10 pairs of sheets installed per day. Each pair of sheets would provide a wall 4 feet (1.3 meters) wide and approximately 50 feet (15 meters) tall. A single pair of sheets can be installed in 30 to 120 minutes depending on the geotechnical conditions. After the vibratory penetration, each sheet would be "seated" into hard strata as required. Approximately 4 to 6 strikes per pair of sheets would be required to "seat" the pile wall. The Applicant has committed to using soft starts for vibratory installation. Each cofferdam would be constructed within 25 to 30 days. The cofferdam would be rectangular in shape and open at the end facing away from shore to allow for pull back of the conduits and the cables. The depth of the cofferdam would be determined based on existing conditions. The area inside the cofferdam would be excavated to create an exit pit at the waterward end of the borehole. The cofferdam would extend 6 feet (1.8 meters) below the mudline.

Dredging activities associated with the proposed CHPE Project would only be for cofferdam installation. Dredging and cofferdam installation would occur during the construction windows established for the proposed CHPE Project (see **Table 2-2**). Depending on the sediment composition, approximately 107 cubic yards (82 cubic meters) of sediment would be excavated from within a cofferdam. Material

Table 2-2. Underwater Construction Windows

CHPE Project Milepost (MP)	Location	Construction Window	Construction Method
Lake Champlain			
0 to 73	U.S./Canada Border to Crown Point	May 1 to August 31	Jet Plow
73 to 101	Crown Point to Dresden	September 1 to December 31	Shear Plow
Hudson River			
228 to 269	Cementon (Catskill) to New Hamburg	August 1 to October 15 [a]	Jet Plow
269 to 295	New Hamburg to Stony Point	September 15 to November 30	Jet Plow
303 to 324	Clarkstown to Harlem River	July 1 to October 31	Jet Plow
Harlem and East Rivers			
324 to 330	Harlem River	May 31 to November 30 [b]	Jet Plow
331 to 332	East River	May 15 to November 30	HDD

Source: NYSPSC 2013, CHPEI 2014

Notes:

a. The transmission line would be installed between MPs 245 and 269 between September 14 and November 30 to avoid impacts on the Kingston-Poughkeepsie Deepwater SCFWH.

b. Blasting would take place between July 1 and November 30.

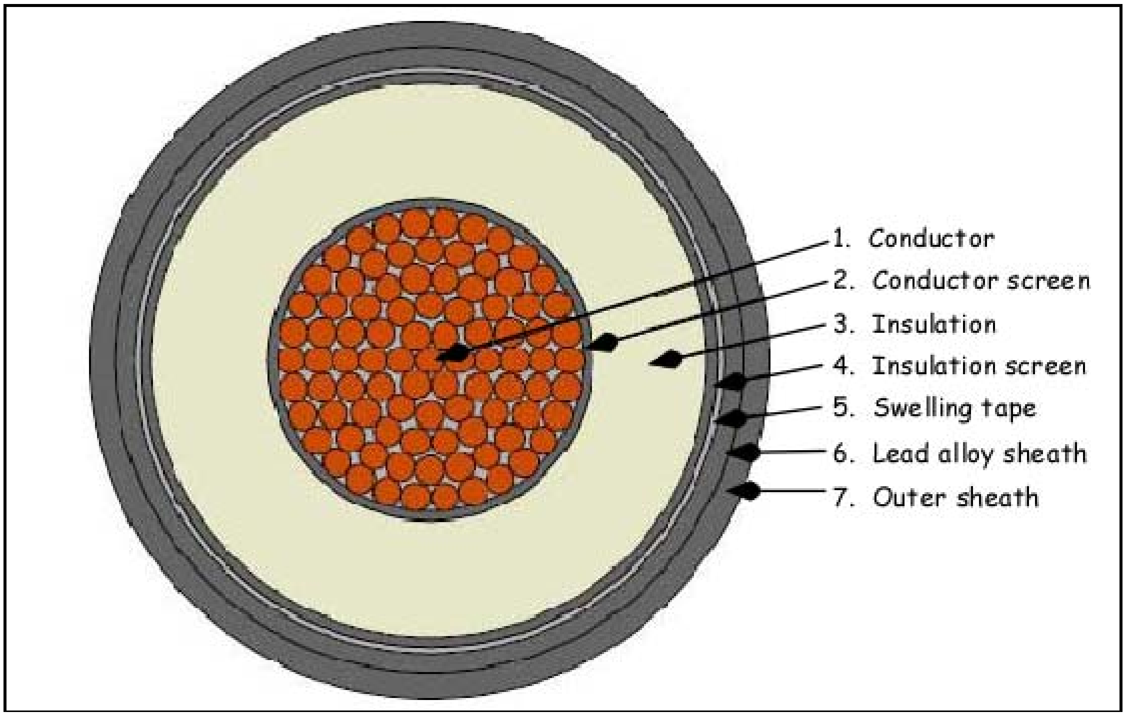
would be dredged using a closed clamshell dredge (also known as an environmental bucket) and removed by barge to an appropriately permitted processing facility. Dredging would be conducted during 8- to 12-hour shifts daily. The dredged material would be placed temporarily on a spud barge (barge with self-leveling anchor legs that are supported by the riverbed) or dredge scow for storage and ultimate disposal at an appropriately permitted facility. The barge would be anchored by two 3-foot (0.9-meter) diameter spuds. Silt curtains would be used as required around the work area; however, it is not anticipated that any silt would escape from within the cofferdam. At the end of cable installation, the cofferdam would be cut at the mudline using divers and underwater cutting or burning equipment such as exothermic rods, the exit pit would be backfilled with clean sand using equipment mounted on a spud barge, and the HDD staging area would be restored and revegetated as appropriate to preconstruction grades and conditions to the extent practicable.

A visual and operational monitoring program would be developed as part of the EM&CP and conducted during HDD operations to detect any losses of drilling fluid. The monitoring program would consist of visual observations in the surface water at the targeted drill exit point and monitoring of the drilling fluid volume and pressure within the borehole. Visual observations of drilling fluid in the water, or excessive loss of volume or pressure in the borehole would trigger response actions by the HDD operator, including halting drilling activities and initiating cleanup of released bentonite. A barge with a pumping system would be positioned at the cofferdam during drilling to collect any drilling fluid released into the cofferdam enclosure. Any collected drilling fluids would be disposed of at a permitted facility. In addition to water-to-land transitions, HDD could also be used to install the transmission cables beneath other environmentally sensitive areas such as wetlands and streams where deemed necessary; existing infrastructure along the terrestrial portions of the proposed CHPE Project route; and in special circumstances to avoid obstacles along the CHPE Project route, such as road or railroad crossings where open trenching would not be possible (TDI 2010). Additionally, HDD would be used to install the transmission line entirely under the East River from the Bronx to Queens. Therefore, the proposed CHPE

Project route includes approximately 200 locations covering approximately 17 total miles (27 km) where HDD would be used, including approximately 0.8 miles (1.3 km) of the transmission line that would traverse under wetlands using HDD (see **Appendix A** for locations of HDD applications). It is expected that at least three different sized HDD rigs would be employed on the project, requiring varying staging area sizes depending on the length of the drill at the particular location, proximity to sensitive areas such as wetlands where deemed necessary, access limits, and other constraints.

2.4.4 Terrestrial Direct Current Transmission Cable

Approximately 42 percent of the proposed CHPE Project route would be composed of underground (terrestrial) portions. In general, the buried transmission line would be routed underground beginning at MP 101.3 to MP 228.4 to cross the divide between Lake Champlain and the Hudson River watersheds, and to bypass PCB dredging activities along the Upper Hudson River. For the underground transmission cables, the outer sheathing insulation would be composed of an ultraviolet-stabilized, extruded polyethylene layer (see **Figure 2-10**). The underground transmission cables would have an outside diameter of 4.5 inches (11.4 cm), and each cable would weigh approximately 20 lb/ft (30 kg/m) (TDI 2010).



Source: CHPEI 2012c

Figure 2-10. Example Terrestrial HVDC Transmission Cable Cross-Section

The underground portion of the proposed CHPE Project route would start at Dresden, New York. For the underground portions of the transmission line route, the two cables within the bipole system would typically be laid side-by-side (approximately 12 to 15 inches [30 to 38 cm] apart) in a trench approximately 4 to 5 feet (1.2 to 1.5 meters) deep to provide for at least 3 feet (0.9 meters) of cover over the cables. Subsequent to laying the cables in the open trench, the trenches would be backfilled with low thermal resistivity material, such as well-graded sand to fine gravel, stone dust, or crushed stone. A protective cover of HDPE, concrete, or polymer blocks would be placed directly above the low thermal resistive backfill material. A marker tape would then be placed 1 to 2 feet (0.3 to 0.6 meters) above the cables.

Beginning at Dresden, the transmission line would be installed for approximately 127 miles (204 km) along existing road ROWs and existing CP and CSX railroad ROWs. A combination of HDD and trenching techniques would be used to install the transmission line underground along this portion of the route. Construction layout and staging and work areas for cable installation within road and railroad ROWs would be confined to the state road ROW or the railroad ROW. A typical staging area for construction equipment in a roadway ROW would be approximately 24 to 38 feet (7 to 12 meters) wide along one side of the roadway. A typical staging area for construction equipment in a railroad ROW would be approximately 33 feet (10 meters) wide along one side of the railroad track for the CP ROW and 48 feet (15 meters) wide along one side of the track for the CSX ROW (TDI 2010). Trenchless technologies would be used where roadways and railroad beds would be crossed by the transmission line. Trenchless technologies could include HDD, horizontal boring, or pipe jacking (driving a casing underground using pneumatic blows).

Where a trenchless technology is used for road or railroad crossings, a temporary starting pit would be excavated on either side of the road or railroad bed to allow for the installation of a carrier pipe or casing. Horizontal boring is similar to HDD as described in the previous paragraphs, but uses an auger-type drill head (i.e., a rotating screw-shaped blade) to remove soil from the borehole. Pipe jacking involves pushing a casing pipe into the soil along the desired alignment and removing the soil from within the casing pipe. The specific technology used at each crossing location would be selected based on the distance to be crossed, the type of soil present, and the space available for staging the operation.

Any excavated soils would be temporarily stockpiled adjacent to the worksite or transported off site if onsite storage is not possible. Where soil is stockpiled on site, it would be stabilized with erosion and sedimentation controls. Following completion of the transmission cable installation, the excavated area would be backfilled and regraded, as necessary. The Applicant proposes that once construction is complete, all debris and equipment would be removed from the site and recycled to the maximum extent feasible and the remainder disposed of at an approved facility, and the disturbed area would be returned to its previous condition as much as possible (CHPEI 2012q).

The proposed CHPE Project would be in the existing ROWs of both the CP and CSX railroads from MPs 112 to 228 and MPs 295 to 301. The Applicant has stated that drafts of Occupancy Agreements for easements along the railroad corridor have been exchanged with both CP and CSX and are currently under negotiation. The final agreements would establish the terms of occupancy of the ROWs and refine required offsets of the transmission cables from the track centerline. In a number of instances, the transmission line would deviate from established ROWs (i.e., railroads or roads) to accommodate features such as bridges, roadway crossings, and areas where the existing ROW is too narrow to permit cable installation while meeting the established clearance criteria (CHPEI 2012b). The locations where these minor route alterations would occur are referred to as deviation areas.

2.4.5 Cooling Stations

As described in **Section 2.4.3**, many portions of the transmission cable would be installed using HDD methods. In certain situations where there is a long segment of cable installed by HDD, heat can accumulate in the HDPE conduit, which would reduce the performance of the transmission system. The Applicant has identified 16 sections of underground cabling where the potential for heat accumulation could require that cooling facilities be installed. The cooling stations would be modular in design and installed on a concrete pad, with electrical power provided by a local electrical utility. Sixteen cooling equipment stations might be constructed along the transmission line route and are proposed to be located at approximate MPs 110, 112, 145, 146, 158, 185, 208, 227, 228, 296, two at 298, 299, two at 302, and 331. These cooling stations would consist of an aboveground building measuring approximately 8 feet

(2.4 meters) by 8 feet (2.4 meters) by 16 feet (4.8 meters) (see **Figure 2-11**). Each cooling station would consist of a chiller unit and pumping system within the building and this equipment would circulate chilled water through tubing in a closed-loop system alongside the HVDC cable to cool the cables (see **Figure 2-12**).

The heat emitted from the cables within the buried conduit would then be transferred by the coolant back to the cooling station and then to the outside atmosphere above ground. The Applicant has estimated that approximately 245 gallons (927 liters) of cooling water would typically be required to fill the system to cool an HDD segment of 3,000 feet (915 meters) in length. The final design and cooling capacity of the equipment depends on the length of the HDD segment, burial depth, cable losses, and the specified ambient conditions. It is anticipated that the cooling systems would be operated primarily during peak load conditions (CHPEI 2012b).

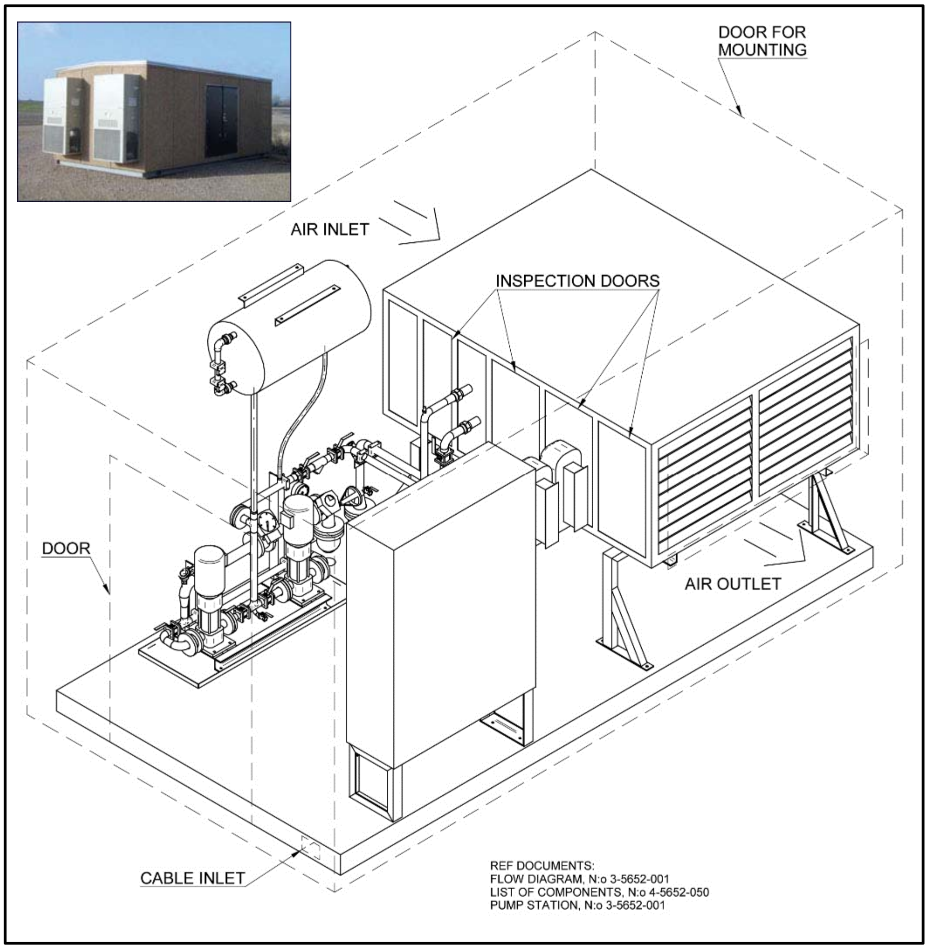
2.4.6 Luyster Creek HVDC Converter Station

The HVDC transmission cables would terminate approximately 333 miles (536 km) south of the U.S./Canada border at a proposed HVDC converter station near Luyster Creek in Astoria, New York. The Luyster Creek HVDC Converter Station would convert the electrical power from DC to AC. An underground HVAC line would connect to the adjacent Astoria Annex Substation and then run approximately 3 miles (5 km) to ConEd's Rainey Substation in Queens as described in **Section 2.4.8**.

The HVDC converter station would be a "compact type" with a total site footprint (i.e., building and associated areas and equipment) of approximately 4.5 acres (1.8 hectares) (see **Figure 2-13**). The main building would be approximately 165 feet by 325 feet (50 meters by 99 meters) with a building footprint of 1.2 acres (0.5 hectares) and a height of approximately 70 feet (21 meters). The building would contain 10 bays to provide access for annual maintenance, and truck access for maintenance would be on the eastern side of the building. The Luyster Creek Converter Station would be designed to blend into the local environment and surroundings. The indoor design of the HVDC converter station would limit the need for exterior switchyards and would reduce audible sound and the risk of flashover (i.e., unintended and undesired electrical discharge or arc). It is anticipated that transformers, cooling equipment, and power line carrier filters would be the major equipment installed outside of the building. The converter station would be powered by electricity taken directly from the proposed CHPE Project transmission line. In the unlikely event this is not possible, electric power from a local utility (i.e., ConEd) would be used. A diesel generator may also be used as emergency backup to provide black start capability (i.e., the ability to start operating and delivering electric power without assistance from the electric system in the event of an outage) and providing emergency power for the converter station. The facility would not require onsite personnel during normal operations (CHPEI 2010a).

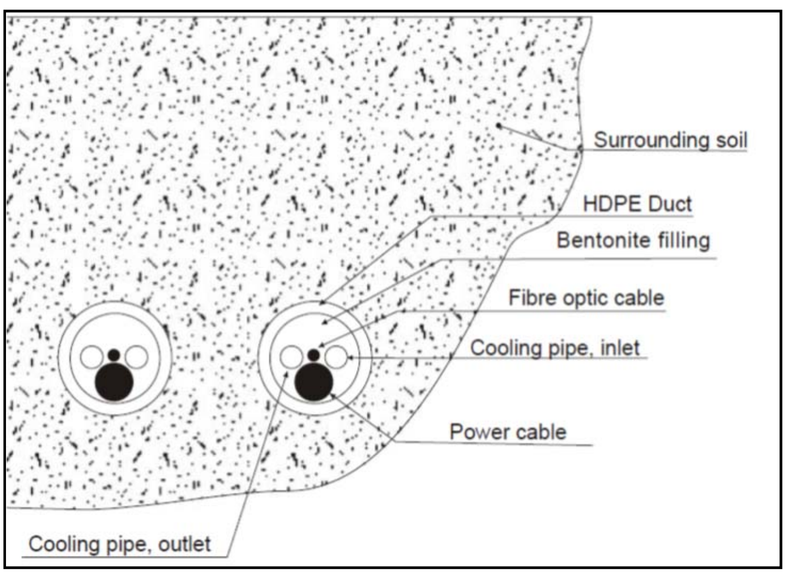
2.4.7 Astoria Annex Substation Interconnection

The Luyster Creek Converter Station would deliver its energy by underground cable to the Astoria 345-kV, SF6 gas-insulated substation that was recently constructed in Astoria by NYPA to support a new 650-MW combined-cycle power plant, the Astoria Energy II Plant (AEII Plant). The Astoria Annex Substation is adjacent to the Charles Poletti Power Plant complex on 20th Avenue, Astoria, Queens County, New York, on part of an approximately 47-acre (19-hectare) parcel owned by NYPA. The entire project area is zoned for heavy industrial use and the NYPA property is part of a 291-acre (117-hectare) parcel formerly shared with ConEd. The property has been used since 1905 for the generation of electricity. The power plant complex includes the 835-MW Poletti Power Project, which began commercial operation in 1977 burning fuel oil or natural gas, and the 650-MW combined-cycle AEII



Source: CHPEI 2012b

Figure 2-11. Representative Schematic of Cooling Unit for Underground Cable



Source: CHPEI 2013a

Figure 2-12. Representative Schematic of Cooling Pipes inside an HDPE Conduit

Source: Virtual Earth Imagery

Figure 2-13. Proposed Luyster Creek Converter Station Site

Plant, which began commercial operations at this location in December 2005. The Poletti Power Project and its associated 345-kV substation have been retired from service and replaced by the AEII Plant and the Astoria Annex Substation.

The 345-kV AC transmission cables would connect into the Astoria Annex Substation owned by NYPA to distribute the electricity from the proposed CHPE Project transmission system into ConEd's electrical grid for the New York City metropolitan area. The Astoria Annex Substation presently interconnects with the ConEd system through two cables that connect to the ConEd East 13th Street substation. In addition, in May 2012, ConEd completed construction of an additional interconnection ("Feeder 34091") between the Astoria Annex Substation and its Astoria East 138-kV Substation, also located on the Charles Poletti Power Plant complex. However, with the installation of this new ConEd line between the Astoria East and Astoria Annex substations and additional requirements discussed as follows, the Astoria Annex Substation currently cannot accommodate the proposed CHPE Project interconnection without an expansion of the facility (CHPEI 2012k).

The Applicant has proposed to modify the electrical configuration of the Astoria Annex Substation by adding a four-breaker gas-insulated switch ring bus to connect both the cable from the Luyster Creek Converter Station and the Astoria-Rainey Cable (see **Section 2.4.8** below) to the one remaining empty bus at the Astoria Annex Substation. This new ring bus could be constructed in a new building approximately 72 feet (22 meters) long, 58 feet (18 meters) wide, and 40 feet (12 meters) high. The new ring bus would have a footprint of 4,176 square feet (388 square meters) and would be located on the same parcel of land as the Luyster Creek Converter Station. The new ring bus could be connected to both the converter station and the Astoria Annex Substation by gas-insulated switch cables in underground pipes (CHPEI 2012j). However, no obstacles have been identified that would prevent the expansion of the existing ring bus at the Astoria Annex Substation to eight breaker positions. Therefore, it is unlikely that it would be necessary to build a new building to house the ring bus.

The Applicant has also agreed to compensate ConEd for upgrading their 138-kV section of Feeder Cable 34091 to ensure that energy deliverability to the ConEd system would be sufficient to permit at least 1,550 MW of electricity to flow from the Astoria Annex Substation into ConEd's transmission system grid. The upgrades would consist of either adding another 138-kV cable circuit between the Astoria Annex and Astoria East substations or replacing the conductors in the substations themselves (CHPEI 2012k).

CHPE Project construction activities at this site would include construction of the Luyster Creek Converter Station and the ring bus, an HDD operation to install the HDPE conduit to bring the cable from the East River onto land, trench approximately 1 mile (1.6 km) to bring the cable across the site to the substation, the physical interconnection from the ring bus into the Astoria Annex Substation, and a portion of the HVAC interconnection between the Astoria Annex and Rainey substations.

2.4.8 Astoria to Rainey Interconnection

The Applicant, in consultation with NYPA and ConEd, has determined that a 345-kV HVAC cable circuit would need to be constructed from the Astoria Annex Substation to ConEd's Rainey Substation in Queens to reliably deliver power into ConEd's 345-kV system. The Applicant has committed to constructing this interconnection, which would consist of HVAC cables buried beneath city streets for approximately 3 miles (5 km). The XLPE HVAC cables would be buried in a trench to a depth of more than 4 feet (1.2 meters) with a separation distance of 9 inches (23 cm) between the cables in the trench. The route of the HVAC cables would run from 31st Street on the Annex Substation to 20th Avenue, then along 20th Avenue to 29th Street, and along 29th Street to 21st Avenue. The cables would then follow 21st Avenue to 23rd Street, running along 23rd Street for approximately 1.3 miles (2.1 km) to 30th Drive, from 30th Drive to 14th Street, and then from 14th Street to 31st Drive, and 31st Drive to 12th Street, and 12th Street to 35th Avenue to the Rainey Substation (see **Figure 2-4**).

2.4.9 Additional Engineering Details

Heat. Ambient water temperatures in the Hudson, Harlem, and East rivers range from 32 degrees Fahrenheit (°F) (0 degrees Celsius [°C]) in January to a maximum of 81 °F (27 °C) in July (Historic Hudson River 2004, Riverkeeper 2013, Blumberg and Pritchard 1997). XLPE transmission cables operate at about 176 to 194 degrees °F (80 to 90 degrees °C) with an emergency operating temperature of about 266 °F (130 °C). The proposed CHPE Project's HVDC cables would be designed to operate at normal temperature of only 158 °F (70 °C). Under limited durations (i.e., maximum of 2 hours) of emergency overload conditions, the temperature would not exceed 176 °F (80 °C). At these temperatures, heat must be carried away from the conductors for them to operate efficiently. The air performs this function for overhead lines, and soils in and around a trench perform this for underground cables. All of the heat generated from buried cables must be dissipated through the soil. Different soils have different abilities to transfer heat; saturated soils conduct heat more easily than, for instance, dry soils. A soil thermal survey, which measures the ability of various soil types to dissipate energy, could be necessary prior to initiating construction activities to determine the soil's ability to transmit heat away from the cables. The selection of backfill type can make a difference on the cable capacity rating. Where required, a low thermal resistive backfill material would be used instead of native soil in the trench around the cables to ensure sufficient standard heat transfer to the surrounding soils and groundwater.

Electric and Magnetic Fields. Operation of the proposed CHPE Project transmission line would produce electric and magnetic fields. Transmission lines, like all electric devices, produce electric and magnetic fields, or EMF. Voltage, the force that drives the current, is the source of the electric field. Current, the flow of electric charge in a wire, produces the magnetic field. The strength of the EMF depends on the design of the electrical line and the distance from it. EMF is found around any electrical wiring, including household wiring, electrical appliances, and equipment.

Electric fields are measured in volts per meter (V/m) or kilovolts per meter (kV/m). Throughout a home, the average electric field strength from wiring and appliances is typically less than 0.01 kV/m. Electric field levels in public buildings such as shops, offices, and malls are comparable with residential levels. Outdoor electric fields in publicly accessible places can vary widely from less than 0.01 kV/m to 12 kV/m. Electric field strength is reduced by shielding or by intervening objects such as structures and vegetation. The proposed CHPE Project transmission line would be shielded within a lead-alloy sheath and buried, which would effectively eliminate any exposure to the electric field (Cross-Sound Cable Company 2012, WHO 2012).

Magnetic fields are measured in units of gauss (G) or milligauss (mG). The average magnetic field strength in most homes (away from electrical appliances and wiring) is typically less than 2 mG. Appliances carrying high current or with high torque motors, such as microwave ovens, vacuum cleaners, or electric shavers, can generate fields of tens or hundreds of mG directly around them. Office workers are exposed to similar fluctuating magnetic fields, while equipment or machine workers or those working for electric utilities are generally exposed to slightly higher level fields. Outdoor magnetic fields in publicly accessible places can range from less than a few mG to 300 mG or more, depending on proximity to power lines and the voltage of the power line.

Like electric fields, magnetic fields fall off with distance from the source. Unlike electric fields, however, intervening objects, such as structures or by being buried, do not reduce magnetic field strength. Consequently, while appliances can produce the highest localized magnetic fields, power lines serving neighborhoods and distribution lines and transformers serving individual homes or businesses are a common source of longer-term magnetic field exposure (BPA 2010).

Electromagnetic Interference. The proposed HVDC technology and transmission cable would be designed to eliminate any potential electromagnetic interference (EMI) that could affect television or radio service along the transmission line corridor (TDI 2010). The Luyster Creek Converter Station would be designed to meet the requirements of local radio, television, and telephone EMI limits. Specifically, the Applicant has stated that any potential radio interference from the HVDC converter station would comply with the limits stated in British Standard EN50121-5 (2000), *Railway Applications—Electromagnetic compatibility—Emission and immunity of fixed power supply installations and apparatus*, in the frequency range of 500 kiloHertz (kHz) – 30 megahertz (MHz). They have also stated that the facility would comply with the limits stated in CISPR 11 (*Industrial, Scientific, and Medical (ISM) Radio-Frequency Equipment—Electromagnetic Disturbance Characteristics—Limits and Methods of Measurement*), Group 1 and Class A, in the frequency range of 30 MHz–1 gigahertz (GHz). The corona noise level (caused by the local sound-pressure level changes due to the individual corona discharges) from the outdoor yard at the Luyster Creek HVDC Converter Station would not exceed 100 microvolts per meter (μV/m) in the frequency range of 500 kHz to 30 MHz within a 1,475-foot (450-meter) perimeter, as measured from any energized component in the converter station or adjacent AC switching station.

Additional details regarding the features required to minimize EMI at the Luyster Creek HVDC Converter Station would be developed during the detailed design phase of the proposed CHPE Project.

2.4.10 Construction and Schedule

The Applicant anticipates that the initial permitting phase of the proposed CHPE Project would continue through mid 2014, with major construction commencing later in 2014. Installation of the transmission cables is proposed to be completed between 2014 and 2017. The Applicant anticipates that the commercial operation date for the proposed CHPE Project would be 2017 (TDI 2010, CHPEI 2012ww).

2.4.10.1 Aquatic Transmission Cable Installation

To the extent practical, the aquatic transmission cables would be buried beneath the beds of existing waterways (see **Figures 2-1** through **2-4** and **Appendix A** for maps of the waterways) at depths ranging between 4 and 8 feet (1.2 and 2.4 meters) beneath the bed surface. To prevent disturbance to the transmission cables from unrelated marine operations in the waterways, the cables would be buried beneath the bed of Lake Champlain at a depth of at least 8 feet (2.4 meters) in the sediment and at least 4 feet (1.2 meters) in rock within the federally maintained (i.e., dredged) navigation channel, and at least 4 feet (1.2 meters) in the lakebed outside of the federally maintained navigation channel. Cables installed in the Hudson River sediment bed would be buried to a minimum depth of 7 feet (2.1 meters). Cable installation in the Harlem River would be entirely within the federally maintained navigation channel at minimum depths of 8 feet (2.4 meters) in the sediment and 6 feet (1.8 meters) in rock. Transmission cables would be installed along the entire East River route using HDD; therefore, trench burial depths would not apply.

Burial depths could vary in response to site-specific factors (e.g., presence of existing infrastructure or archaeological resources, environmental concerns, localized geological or topographical obstacles) identified along the proposed CHPE Project route. Where the transmission cables would cross areas that contain surficial bedrock or existing infrastructure (e.g., other cables, pipelines), the transmission cables would generally be laid atop the existing bedrock or infrastructure and protected by material placed over the transmission cables. Protective material could include concrete (e.g., rip-rap, grout mattresses), protective cable ducts, or other low-impact protective armoring (TDI 2010). Aquatic transmission cables would cross under a cable ferry crossing in Lake Champlain. The Ticonderoga–Larrabee Point Ferry, which would be crossed the proposed CHPE Project route near MP 86, uses two parallel, steel guidance cables that are lifted by steel sheaves to pull the ferry along the cables. The guidance cables rest along the bottom of the lake when they are not in use and typically are replaced every 4 years. The guidance cables would be temporarily removed from the lakebed prior to the installation of the transmission cables, which may put the ferry temporarily out of service. After installation and burial of the transmission cables, the guidance cables would be replaced over the top of the transmission cables. Installation of the cables would be coordinated with the ferry operator to minimize impacts on ferry operations.

The NYSPSC Certificate issued for the proposed CHPE Project established construction work schedule windows identifying times of the year when work associated with the underwater portion of the transmission line may take place. These work windows were subsequently supplemented through consultation with NMFS. These established work windows and time of year restrictions (**Table 2-2**) were developed in part to avoid impacts on overwintering, spawning migrations, spawning activity, and larval stages of ESA-listed fish species. Spawning seasons for ESA-listed fish species in the Hudson River Segment are April through May for shortnose sturgeon and May through June for Atlantic sturgeon. The NYSDOS has conditionally concurred with these construction windows as part of its CMP consistency certification for the proposed CHPE Project. Restriction of construction activities to specific windows of time would protect ESA-listed fish species during spawning migrations, which are vital and sensitive stages of their lifecycle.

The general sequence for installing the aquatic DC transmission cables is as follows:

- Route-clearing operation
- Cable installation
- Post-installation survey.

The first step in the installation of the aquatic transmission cables would involve conducting a pre-installation route clearing operation (i.e., debris removal) in the year preceding transmission line installation. Debris removal in Lake Champlain and the Hudson and Harlem rivers would occur during the approved construction windows (see **Table 2-2**). Debris removal would occur from September 15 through October 30 in the Hudson River within the appropriate construction windows and would be accomplished in 20 calendar days during 12-hour shifts.

Route clearing could require one to three stages based on the site conditions. All stages of route clearing would use a tug and barge equipped with cutter wheel equipment, or with a smaller tug if possible. Support vessels would include a crane barge to remove larger debris as required or a debris barge to transport recovered riverbed debris. The initial stage of route clearing is designed to find and remove debris lying on and just below the river floor. This stage is performed with large grapnel equipment. In areas of extensive debris or suspect areas, a second stage clearing would be performed with a de-trenching grapnel. This grapnel provides penetration of up to 3 feet (0.9 meters) into the riverbed. After completion of the grapnel runs, a third stage of clearing (i.e., plow pre-rip) would be required if the site conditions indicate the potential for sub-surface debris. The plow pre-rip is designed to clear and prove the entire route to the full burial depth, and would be performed in the Hudson and Harlem rivers using a jet plow but without the cables loaded. Transit routes for the route-clearing equipment would vary based on the location of marine-based yards along the route, but the yards would generally be no more than 50 miles (81 km) from the equipment's location. Temporary marine yards would be set up and moved as the route-clearing operation progresses.

Once cleared of debris, the next step would be the simultaneous installation of both transmission cables by either a jet plow or a shear plow. The Applicant would employ a fleet of approximately four vessels, including the cable-laying vessel, survey boat, crew boat, and tugboat or tow boat, which would be used to coordinate laying of cable. The plowing process would be conducted using a dynamically positioned cable barge and towed plow device that simultaneously lays and embeds the aquatic transmission cables in a trench. A barge would propel itself along the route with its forward winches, with other moorings holding the alignment during the installation. A four-point mooring system would allow a support tug to move the anchors while the installation and burial proceeds. A dynamically positioned cable barge would use thrusters and a propulsion system to tow the plow without the use of anchors.

The skid-mounted plow would be towed by the barge because it has no propulsion system. For burial, the barge tows the plow at a safe distance as the laying and burial operation proceeds (see **Figure 2-14**). The transmission cables composing the bipole would be deployed from the barge to a funnel device on the plow. The plow is lowered to the lake or river floor, and the plow blade cuts into the lake or riverbed while it is towed along the pre-cleared route to carry out a simultaneous lay-and-burial operation. The plow would then bury both cables of the bipole in the same trench.

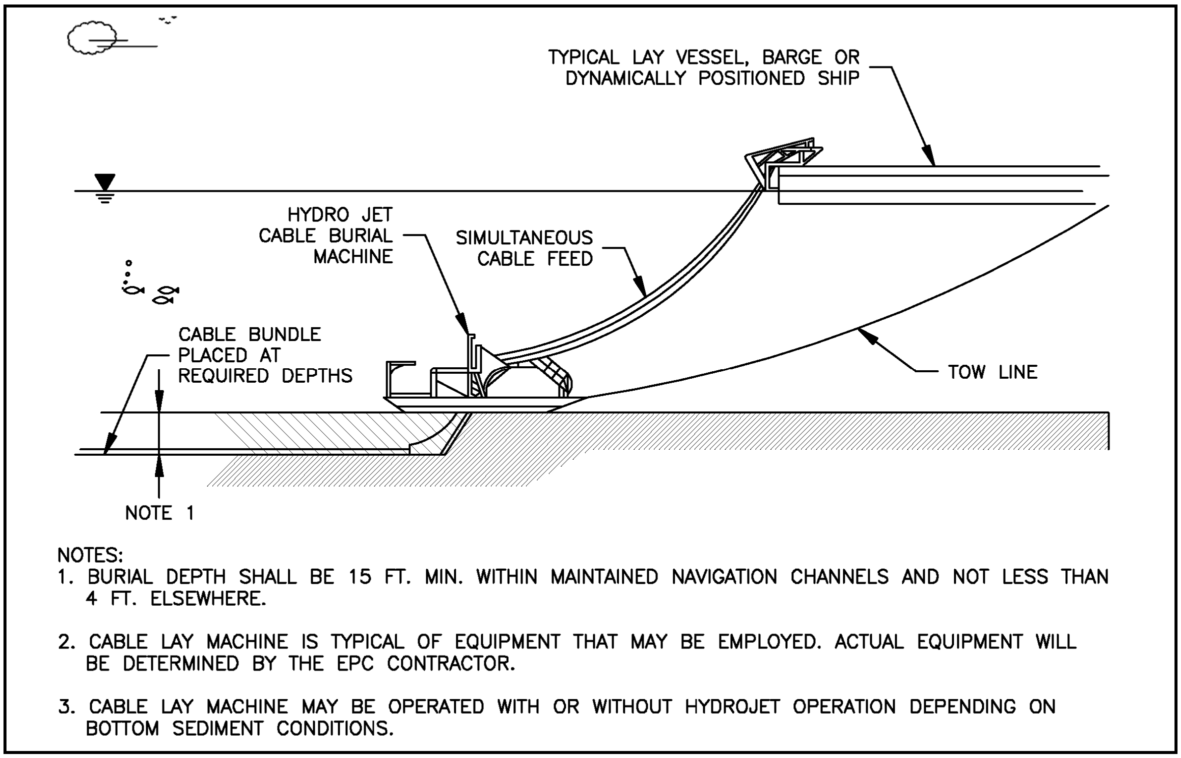


Figure 2-14. Typical Aquatic Transmission Cable Installation Process

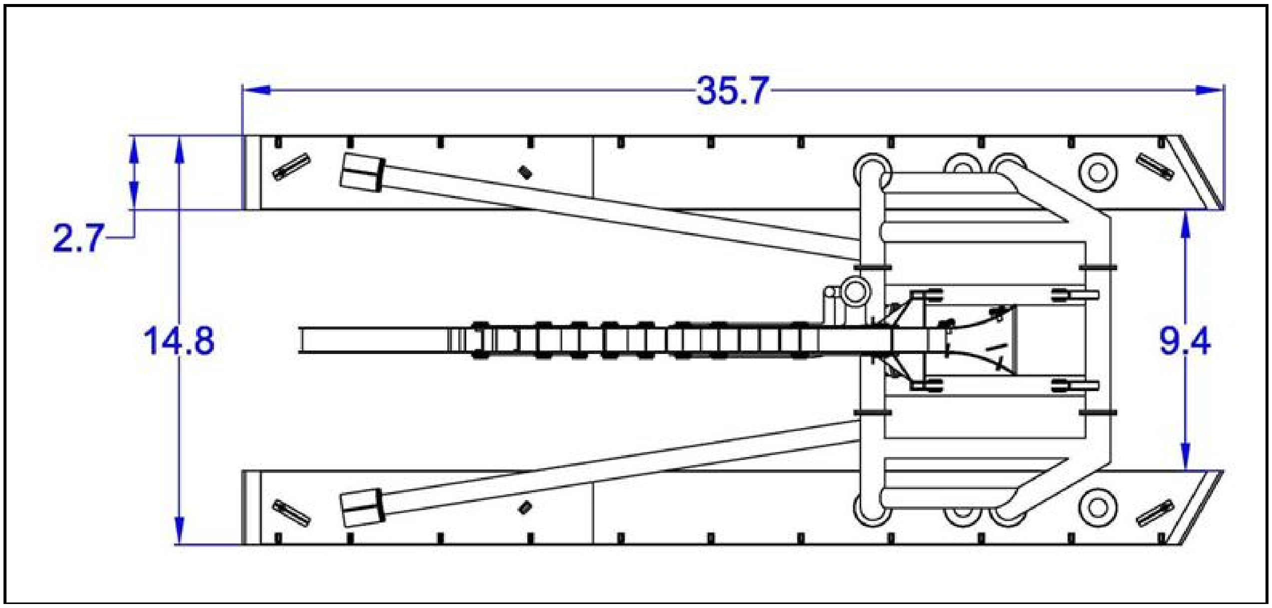
It is anticipated that the majority of the aquatic cable route would be installed and buried using water-jetting techniques (see **Figure 2-15**), which would result in short-term, localized sediment suspension and transport. The water-jetting process uses jets of pressurized water to fluidize the sediments. The jet plow is fitted with hydraulic pressure nozzles that create a downward and backward flow within the trench, allowing the transmission cables to settle into the trench under its own weight before the sediments settle back into the trench. Jet plows generally are used to install cables to a depth of between 3 to 10 feet (0.9 to 3 meters), although plows are available that can install cables to a depth of up to 16 feet (5 meters). Where used along the proposed CHPE Project route, the jet plow would create a 2-foot (0.6-meter)-wide by 4- to 8-foot (1.2- to 2.4-meter)-deep trench. Depending on the sediment particle-size composition, the majority (approximately 70 to 80 percent) of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the plow. With higher currents, more sediment can be transported outside the trench area (HTP 2008, MMS 2009, CHPEI 2012i).

Source: CHPEI 2012d

Figure 2-15. Example of Water Jet Trenching Device

Anchorage of vessels during installation of the aquatic transmission line would be used in the event that bottom conditions are encountered that either stop forward progress at reasonable tow tension or result in excessive rolling or pitching of the jet plow. In such cases, the barge would be stopped, anchors deployed to hold the barge in position, and obstructions investigated and remedied. Anchors would also be used during idle periods due to weather conditions. Open water anchorages are not envisioned as a common event. Specific areas where anchorage would be anticipated include construction and removal of temporary cofferdams and cable landings at water-to-land transitions, marine splicing locations (although this could also be accomplished using dynamic positioning), and possibly along the 460-foot (140-meter) length of bedrock trenching in the Harlem River (at MP 324.5). The collective length of all work areas where anchors might be deployed is projected to be less than 1 percent of the approximately 197-mile (317-km) aquatic portion of the proposed CHPE Project installation route. Barges would include four 10,000-pound (4,536-kilogram) stockless "navy" anchors measuring approximately 10.3 feet (3.1 meters) long by 6.7 feet (2.0 meters) wide with an approximate footprint of 3 square feet [0.3 square meters]). Installation barges would also include two 3-foot (0.9-meter)-diameter spuds for use in shallow water. The anchors would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. Midline buoys would be used to prevent anchor chain sweeps.

Both water jetting and mechanical plowing would displace lake or river floor sediment within a narrow trench, which would permit the transmission cables to sink under their own weight. The displaced sediment would settle out, and the trench would refill following the installation of the transmission cables. The bottom area directly disturbed by water jetting or mechanical plowing varies depending upon sediments and depth of installation, but would range from 12 to 16 feet (4 to 5 meters) in width (see **Figure 2-16**).



Source: Caldwell Marine International 2010
Note: Dimensions are shown in feet.

Figure 2-16. Typical Cable Plow Dimensions

For portions of the transmission line route where the sediment stiffness is low, a shear plow would be used. For the shear plowing technique, the plow is tethered to a surface support vessel, which tows the plow along the lake or riverbed. A trench, approximately 0.8 feet (0.2 meters) wide and 4 to 8 feet (1.2 to 2.4 meters) deep, is made for the cables by the plowshare and the cables settle into the trench. In water deeper than 150 feet (46 meters), such as in portions of Lake Champlain, the transmission cables would be buried using a jet plow or laid on the surface of the lake bottom and retro-buried using a jetting cable burial remotely operated vehicle (ROV). Condition 161 of the NYSPSC Certificate issued for the proposed CHPE Project requires that the Applicant conduct an immediate post-installation survey to document the location and depth of burial associated with the cables. Where it has been determined that the installation operation did not result in adequate backfill over the transmission cables, a backfill plow can be used, which employs horizontal blades that capture the sediment pushed off to the sides during plowing and pulls it back into the trench and over the cables. Usually, the trench completely refills over time periods that range from 6 months to 5 years depending on the soil type and water currents (ISE 2003), as bottom sediment naturally backfills the trench over the cable through wave action or bed load transport of sediments. Certificate Condition 161 also requires the Applicant to conduct underwater depth-of-burial surveys every 5 years.

The burial depth for the area of rock excavation in the Harlem River is stated in the USACE Public Notice as being 6 feet below the bottom of the waterbody (USACE 2013). The proposed transmission line would cross exposed bedrock for approximately 460 feet (140 meters). Geologic maps indicate this rock is Fordham Gneiss with unconfined compressive strength that is too hard to remove by cutterhead, ripping, hoe-ramming, or non-explosive methods. Blasting trials would be conducted using a pre-packaged chemical demolition agent (e.g., Green Break or RocKracker) that would be inserted into holes drilled into rock. These packaged demolition agents would be loaded into boreholes and, when ignited, would generate an expansive force to fracture the rock. The rock fragments would then be removed by long-reach hydraulic excavating buckets and deposited onto a barge. If the trials are successful, a vertical pattern of holes would be drilled into the rock to form a trench. The broken rock would be dredged sequentially from each end of the trench progressing towards the middle with the rock fragments placed onto a barge. Turbidity would be generated as a result of operations. However, impacts are expected to be minimal because of the crystalline nature of the rock and because silt curtains would be used to surround the operations to avoid the spread of a turbidity plume.

In the event that trials with the pre-packaged chemical demolition agent are unsuccessful because of the rock's hardness or other reasons, it would be necessary to use water gel dynamites to fracture the rock so it can be dredged. The dynamite would produce a shock wave upon detonation. The force of the shock wave could be decreased by stemming the top of the blast holes with pea gravel, which might require an increase in the number of boreholes needed to be drilled to get the powder factor (i.e., pounds of dynamite per cubic yard of rock) required to break the rock. Each blast hole would be detonated in a controlled sequence to move the rock towards the open end of the trench, and to minimize vibrations that would travel towards the shoreline. Explosives would be detonated during each delay (typically 8 milliseconds apart). Blasting would occur within the proposed CHPE Project construction window for the Harlem River (see **Table 2-2**).

The blasting program in the Harlem River is estimated to last 10 weeks, requiring approximately 300 drill holes with each drill taking 30 to 60 minutes to complete. Nominal noise, vibration, and turbidity is expected from the drilling process, which would employ small diameter drill holes (approximately 1.5 inches [3.8 cm]) that generate a small amount of suspended sediment. The sediment would be contained by means of floating silt curtains as appropriate. Air compressors mounted on the barge would generate additional construction noise. Drilling is anticipated to be conducted from a barge on spuds. Prior to blasting, the barge would be moved off the drilled holes with clearance of the vicinity as required by the fire marshal and the harbormaster.

The blast events are anticipated to have a duration of only a few seconds, but they would be preceded and followed by warnings and clearings of the area for inspections, all of which could last approximately 2 hours. The exact production schedules would be developed by the blasting construction contractor. Preliminary construction sequencing studies indicate that 15 to 20 separate blasts could be required. Peak ground vibrations are predicted to range from 0.25 inches (0.64 cm) per second at a distance of 200 feet (61 meters) from the trench, 1 inch (2.5 cm) per second at a distance of 75 feet (23 meters), 2 inches (5 cm) per second at 50 feet (15 meters), and 4 inches (10 cm) per second at 30 feet (9 meters). Peak water pressures are predicted to be 10 psi at 200 feet (61 meters), 30 psi at 75 feet (23 meters), 50 psi at 50 feet (15 meters), and 85 psi at 30 feet (9 meters) from the trench.

Following clearance by the blaster, mucking of blasted trench materials would be completed with long-reach backhoes to lift muck out of the trench and, if the fragmentation is good, putting it to the side. Large rocks would require removal to shore and disposal. An estimated 1,200 tons of rock material would be anticipated to be removed from the trench and temporarily stored on the river bottom adjacent to the trench. The cables would be laid over a sand backfill in the trench and covered with sand layer. The remainder of the trench would be backfilled with the blasted aggregate materials.

The transmission line would be installed within the limits of the federally maintained navigation channels in the southern end of Lake Champlain (approximate MP 98 to MP 101), in the Harlem River (approximate MPs 324 to 330), and the East River (approximate MP 331). The transmission line would traverse a total of approximately 9.0 miles (14.5 km) of navigation channels, although HDD would be used to install the transmission cables under the entire East River route (see **Appendix A**). Although conventional trenching is not currently proposed outside water-to-land transition points where cofferdams would be installed, it could be used to reach specific cable burial depths required by regulatory agencies at locations where the transmission cables would be sited within, or would cross, maintained navigation channels and plows would be unable to achieve the required burial depth. In these situations, either a clamshell dredge or barge-mounted excavator would be used to pre-dredge a trench into which the cable would be laid. The trench would typically be over excavated by approximately 20 percent to allow for slumping, or movement of loosely consolidated sediment down a slope, of trench sidewalls prior to cable installation. Because the trench spoil cannot be sidecast for re-use as backfill, it would be brought to the surface and placed on barges for disposal at an approved location. This work would most likely occur from spud or jack-up barges, although anchor-moored barges could also be employed, depending on equipment availability and site conditions. The barge would have a crane, typically outfitted with a 6- to 9-cubic-yard (4.6- to 6.9-cubic-meter) clamshell bucket. Alternatively, the barge could have a track hoe excavator working off the deck of the barge, possibly with an extended boom for areas of deeper water. Once a segment of trench is excavated, cable would be laid, and the clamshell dredge or excavator would place clean backfill back into the trench.

In limited areas along the aquatic route, the necessary burial depths for the protection of the transmission cables might not be achievable due to geology (e.g., areas of bedrock) or existing submerged infrastructure crossings (e.g., other electric cables, natural gas pipelines). In these instances, the transmission cables would be buried as deep as possible or simply laid atop the lake or river bottom and covered with sloping stone rip-rap or articulated concrete mats for protection.

The ROW required for operation of the aquatic transmission cables is dependent on the water depth, but would be expected to be approximately 30 feet (9.1 meters) in width in most underwater areas. For the majority of the underwater portions of the CHPE Project route, the two cables that compose the bipole would be installed approximately 1 foot (0.3 meters) or less apart in the same trench. The area of Lake Champlain between MP 42 and MP 67, which is approximately 25 miles (40 km) in length, is more than 100 feet (30 meters) deep with water depths in some areas approaching 400 feet (122 meters). In this area, the cables would be laid on the bottom and retro-buried using an ROV. All proposed aquatic transmission cables would be bundled together and simultaneously laid and buried within the same trench (USACE 2013).

For the installation of the transmission line in Lake Champlain, a vessel designed to transit the New York State canal system would be required. This would limit the size of a barge that would be used to install the transmission cables. The Applicant anticipates that the transmission cables would be transported in baskets to the Port of Albany where the baskets would be loaded onto the laying vessel or onto a supply barge. A practical limit for baskets and cables is in the range of 300 to 500 metric tons. The height of the vessel with the basket must comply with maximum 15 feet (4.6 meters) vertical clearance of bridges along the Champlain Canal. Assuming a vessel deck of 4 feet (1.2 meters) above the water surface and a carousel height of 4 feet (1.2 meters), the height of the basket cannot be greater than 7 feet (2.1 meters). Additionally, the typical draft of an installation barge is 12 feet (3.7 meters); however, purpose-built tugs and barges would be used to transit to Lake Champlain on the New York State canal system where the controlling depth is 9.5 feet (2.9 meters).

Given the limitations on barge size and the amount of transmission cable that could be carried on board, the Applicant estimates that the cable-laying vessel would be able to carry approximately 6 miles (10 km) of cables. This would result in approximately 17 splices in the 101-mile (163-km)-long Lake Champlain Segment of the proposed CHPE Project. With the same assumption, there would be approximately 16 splices in the Hudson and Harlem rivers, where the proposed CHPE Project route length would total approximately 95 miles (153 km).

The aquatic transmission cables would likely be manufactured in and shipped on ocean-going vessels from Europe to be installed by one or more United States-registered vessels. The aquatic cables would have to be loaded to a smaller cable-laying vessel (i.e., barge) that would be capable of operating in the Champlain Canal in order for the cables to be installed in Lake Champlain. The Port of Albany has been identified by the Applicant as having adequate berthing and heavy lift facilities to complete this task (TDI 2010).

2.4.10.2 Terrestrial Direct Current Transmission Cable Installation

The general sequence for installing the terrestrial DC transmission cables along the road and railroad ROWs would be conducted in steps as follows (CHPEI 2010c):

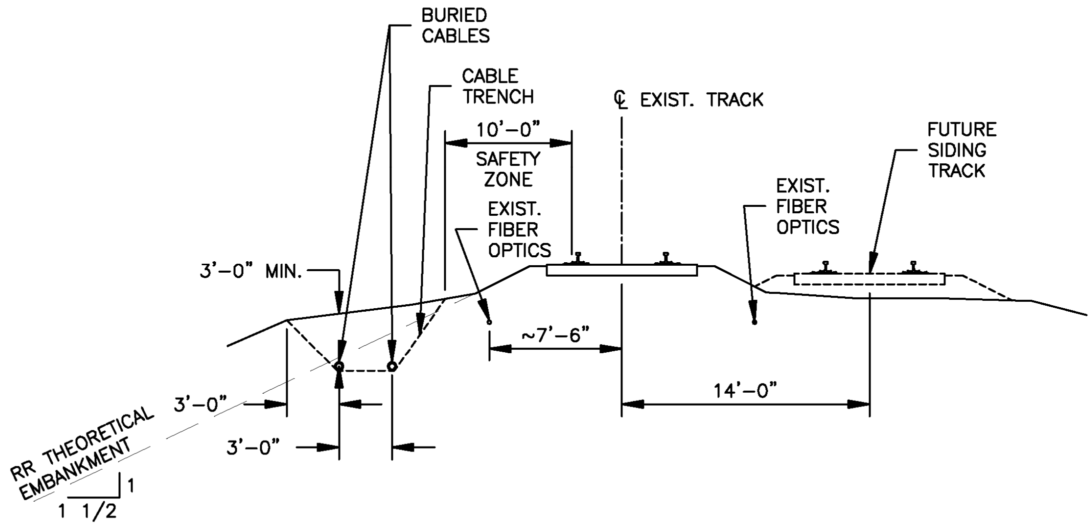
- Initial clearing operations (where necessary) and storm water- and erosion-control installation
- Trench excavation
- Cable installation
- Backfilling
- Restoration and revegetation.

It is anticipated that the majority of the supplies and equipment required for terrestrial transmission cable installation would be transported to the underground portions of the proposed CHPE Project route via roadways or the railroad whose ROW is being used. However, for construction in railroad ROWs, it is anticipated that local roadways would also be used by construction workers to get to and from contractor yards or the railroad ROW, to deliver supplies directly to the site, or to transport equipment (e.g., dewatering pumps, generators, excavators) directly to the site (CHPEI 2010c). To the extent possible, the installation of the terrestrial transmission cables along the railroad ROWs would be from rail-mounted equipment, and the construction equipment and materials would be transported by rail.

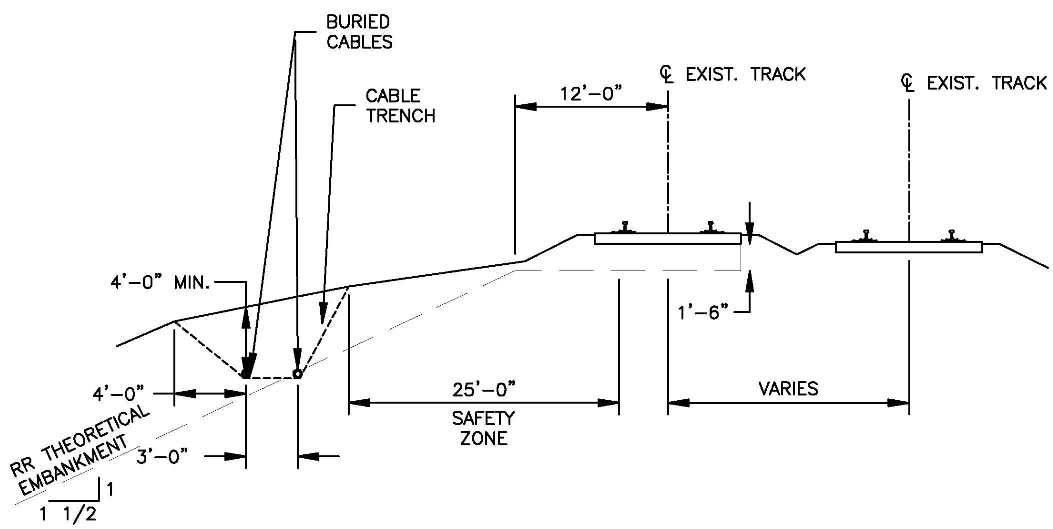
The underground transmission cables would require a number of joints and a flat pad would be installed under each joint for splicing activities. The number of joints would be determined either by the maximum length of cable that could be transported or by the maximum length of cable that could be pulled. The jointing would be performed in a jointing pit or splice vault, with typical segment lengths ranging from 0.1 to 0.5 miles (0.2 to 0.8 km) (CHPEI 2010a). These splice vaults would be similar to the transition vaults that would be used to splice aquatic transmission cables to terrestrial transmission cables at the transitions from water to land (see **Section 2.4.3**). The splice vaults would be backfilled after the splices are completed. While splice vaults are not intended for future access, if emergency repair required replacing a section of cable, use of splice vaults would be considered on a case-by-case basis. The portion of the transmission line within the road and railroad ROWs could therefore require more than 400 splices as part of the installation process.

Along the road and railroad ROWs in normal terrain, where soil conditions range from organic, loam, sand, gravel, or other unconsolidated material, the trench would be excavated using wheeled or tracked construction vehicles, or rail-mounted equipment where possible (CHPEI 2010a). The typical trench would be up to 9 feet (2.7 meters) wide at the top and approximately 3 feet (0.9 meters) deep to allow for proper depth and a 1-foot (0.3-meter) separation required between the two transmission cables to allow for heat dissipation. In the railroad ROWs, a minimum offset distance would be required from the two transmission cables to the railroad track, with each railroad having their own minimum separation requirements for collocation of utilities in its ROW. For the CP Railway ROW, a minimum distance of 10 feet (3 meters) from the centerline of the outermost railroad track to the edge of the cable trench would be required by the railroad. For the CSX Railroad ROW, a minimum distance of 25 feet (8 meters) from the centerline of the outermost track to the edge of the cable trench would be required (see **Figure 2-17**) (CHPEI 2010c). Along road ROWs, the transmission cables would be installed in the shoulder of the road or, where that is not possible due to constraints, under the road.

If shallow bedrock is encountered, the rock would be removed by the most suitable technique given the relative hardness, fracture susceptibility, and expected volume of material. The operation of the transmission cables would result in the generation of heat, which would reduce the electrical conductivity of the cables; therefore, prior to laying the cables, the trenches would be backfilled with low thermal



Ballasted Track Cross-Section, Single Track on CP ROW



Ballasted Track Cross-Section, Double Track on CSX ROW

Source: CHPEI 2010c

Figure 2-17. Cross-Sections of Railroad ROWs with Buried Cables

resistivity material such as sand to prevent heat from one cable affecting a nearby cable. There would be a protective concrete cover consisting of a layer of weak concrete directly above the low thermal resistive backfill material. The whole assembly would have a marker tape placed 1 to 2 feet (0.3 to 0.6 meters) above the cables. The top of the soil covering the trench might be slightly crowned to compensate for settling (CHPEI 2010c).

For crossings of waterbodies such as Catskill Creek and numerous small streams, the following five dry-ditch crossing methods would be used for installation of the transmission line:

- *Attachment to a Bridge*. Where available and feasible, the transmission line would be affixed directly to an existing railroad bridge as it spans the waterbody.
- *Flume Crossing Method.* This method involves installing a flume pipe to carry the stream water around the work area, allowing the trenching to be done in a dry condition, and limiting the amount of sediment that might enter the waterbody.
- *Dam and Pump Crossing Method.* For this method, the stream is dammed upstream of the work area and a pump and hose are used to transport the stream flow to bypass the trenching area to a point downstream where it would be discharged back to the streambed. This method also allows the trenching to occur in a dry condition.
- *HDD*. Under this method, cable conduits would be installed under the streambed using HDD and avoiding any disturbance to the streambed, and the cables would then be pulled through the conduits.
- *Open Cut.* The open cut method of construction involves digging an open trench across the streambed, laying the cable, and backfilling the trenched area without diverting the stream around the work area.

The waterbody crossing methods would be determined based on the NYSDPS stream width classification, NYSDEC stream type classification, and conditions present during the time of construction in accordance with NYSDPS's *Environmental Management and Construction Standards and Practices for Underground Transmission and Distribution Facilities in New York State* (NYSDPS 2003). The categories for water bodies are defined by NYSDPS as follows.

- Minor Waterbodies – less than or equal to 10 feet (3 meters) wide at the crossing location as measured from water's edge to water's edge.
- Intermediate Waterbodies – greater than 10 feet (3 meters) wide, but less than or equal to 100 feet (30 meters) wide at the crossing location as measured from water's edge to water's edge.
- Major Waterbodies – crossings of more than 100 feet (30 meters) wide as measured from water's edge to water's edge.

Intermittent streams that are dry at the time of crossing would only be crossed by open cut with prior approval from NYSDPS and NYSDEC.

In wetland areas, the cables would generally be installed by trenching. The typical sequence of activities would include vegetation clearing, installation of erosion controls, trenching, cable installation, backfilling, and ground surface restoration. Equipment mats or low-ground-pressure tracked vehicles would be used to minimize compaction and rutting impacts on wetland soils. To expedite revegetation of wetlands, the top 1 foot (0.3 meters) of wetland soil would be stripped from over the trench, retained, and subsequently spread back over and across the backfilled trench area to facilitate wetland regrowth by maintaining physical and chemical characteristics of the surface soil and preserving the native seed bank. Trench plugs or other methods would be used to prevent draining of wetlands or surface waters down into the trench. If the trenching, stockpiling, cable installation, and backfilling are conducted from the railroad, soil compaction would be reduced, as heavy equipment operation on the ground surface along the cable trenches would be minimized. HDD would be used to install the cable under certain wetlands. A clean-up crew would complete the restoration and revegetation of the construction corridors and other temporary construction workspace. In conjunction with backfilling operations, any woody material and construction debris would be removed from the construction corridor. The temporary construction area would be seeded with a fast growing annual seed mixture to quickly stabilize the wetland area while the rhizomes, rootstock, and seeds in the wetland soils allow the native vegetation to re-establish over the course of the growing season (CHPEI 2010c).

The permanent ROW required for maintenance and operation of the transmission line along the terrestrial portions of the proposed CHPE Project route would be approximately 20 feet (6 meters) wide for both railroad and roadway ROWs. The permanent ROW would provide protection of the transmission cables against third party damage and would facilitate any required maintenance or repair (TDI 2010). On land, the transmission cables would generally be separated by a distance of approximately 1 foot (0.3 meters) (CHPEI 2010a).

2.4.11 Staging Areas

Aquatic Transmission Cable Support Facilities. For the portions of the proposed CHPE Project route where aquatic transmission cables would be installed, it is anticipated that minimal land-based support would be required. Transport of the aquatic transmission cables would occur via the cable-laying vessel, supported by resupply barges operated from a temporary storage area on land. This land-based support facility is envisioned to be no greater than 200 by 300 feet (61 by 91 meters), and would be at an existing port with heavy lift facilities, such as the Port of Albany or the Port of New York & New Jersey (CHPEI 2010a). The proposed CHPE Project would not require the construction of new facilities at these ports.

Terrestrial Transmission Cable Support Facilities. For the terrestrial portions of the proposed CHPE Project route where underground transmission cables would be installed, additional nearby temporary aboveground support facilities would be established. Support facilities could include contractor yards, storage areas, access roads, and additional workspace. Additional workspace might be required at HDD locations, cable jointing locations, and areas with steep slopes. The support facilities would be sited within the existing road and railroad ROWs (CHPEI 2010a).

2.4.12 Measures to Minimize Environmental Impacts

As part of its application development process, the Applicant detailed a number of industry-accepted BMPs that it would undertake to avoid or reduce environmental impacts during construction and operation of the proposed CHPE Project. The Applicant would develop a final Environmental Management and Construction Plan (EM&CP), which documents environmental and construction management procedures and plans to be implemented during the proposed CHPE Project construction activities and during facility operation. A draft EM&CP was included as part of the NYSPSC Certificate for the proposed CHPE Project. In addition, the Applicant has proposed to employ a number of specific measures to minimize environmental impacts as part of its filings with the NYSPSC and the USACE. These impact reduction measures, collectively referred to as BMPs, have been proposed by the Applicant for use during construction and operations to protect environmental, agricultural, cultural, and other potentially sensitive resources along the proposed CHPE Project route. These BMPs have been incorporated into the Certificate and will be incorporated into the final EM&CP (NYSPSC 2013). The Applicant-proposed measures have been taken into account in the environmental analyses conducted for this EIS. These measures include development of a Spill Prevention, Control, and Countermeasures (SPCC) Plan or its equivalent filed as part of the EM&CP and implemented during construction; time of year work restrictions; water quality monitoring; biological studies; work site restoration; and inspection and reporting. A listing of specific BMPs proposed by the Applicant as part of the proposed CHPE Project and considered in the EIS evaluation is provided in **Appendix G**. The Certificate, provided in **Appendix C**, includes several appendices (not included in **Appendix C**) such as the main text of the Joint Proposal, the Applicant's draft EM&CP, and a document describing all project BMPs in detail. The Certificate includes 165 attached conditions, some of which require measures to reduce, avoid, or measure environmental impacts, and are discussed in appropriate resource areas in **Chapter 5** of this EIS.

A final EM&CP would be developed in consultation with NYSDPS and NYSDEC as the project design is advanced prior to construction.

2.4.13 Operations and Maintenance

The proposed CHPE Project has an expected life span of 40 years or more (CHPEI 2012b). During this period, it is expected that the transmission system would maintain an energy availability factor of 95 percent, meaning that the transmission system would be delivering electricity 95 percent of the time, with the remaining 5 percent allocated for scheduled and unscheduled maintenance.

During operation of the transmission cables, heat would be generated, and this heat would be released into the surrounding soils or sediment. The highest temperatures would be found in close proximity to the cable (i.e., within 1 foot [0.3 meters]), with temperatures dissipating with distance. As part of installing the cables in trenches in the terrestrial portions of the proposed CHPE Project route, the trenches may be backfilled with low thermal resistivity material to dissipate heat during operation. For underwater portions, heat would flow from the cable into the surrounding saturated sediment.

The HVDC and HVAC transmission cables would be designed to be relatively maintenance-free and operate within the specified working conditions. However, selected portions or aspects of the transmission system would be inspected to ensure equipment integrity is maintained (CHPEI 2010a).

Transmission Cable Inspection. Following transmission cable installation, regular inspections of visible parts of the transmission cables, landfall areas, and nearshore protection elements would be conducted to ensure cable integrity. All of the aquatic transmission cables would be accessible either by divers or ROVs, and, therefore, inspections would be performed in accordance with manufacturer's specifications to ensure equipment integrity and protection (e.g., appropriate burial depths, concrete mats, rip-rap) were maintained. The aquatic portion of the transmission system would be surveyed at least once every 5 years, and inspections would focus on verifying the depth of cable burial, condition of infrastructure protection measures, and identifying areas where protection of the transmission system or the environment could be compromised. The upland cable would be inspected every 3 years to ensure that adequate cover exists.

In addition, spot checks of the transmission cable protection materials would be performed during or after the first year of operation. These spot checks would occur more frequently at locations where strong currents would be expected or in other areas where abnormalities were identified (e.g., extreme storm conditions or ice crush outages) (CHPEI 2010a).

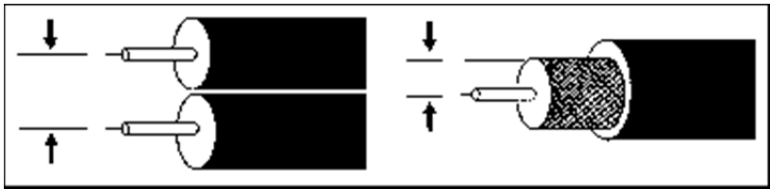
Following completion of the terrestrial facilities, on-the-ground inspectors would survey the terrestrial ROW once a year for:

- Vegetation on the ROW that might be capable of disrupting (i.e., damaging) the cables below
- Line exposures at areas with steep slopes and stream banks
- Locations requiring transmission system marker replacement
- Unauthorized encroachments
- Permanent storm water features requiring maintenance
- Vandalism.

Subsequent to the proposed commercial operation date of 2017, a scan of the installed transmission cables (see **Figure 2-18**) could be conducted using a Time Domain Reflectometer (pulse echo meter) or Optical Time Domain Reflectometer or other similar device. These scans would identify possible anomalies that could lead to failure and would provide an accurate report of the location of the transmission system, as might be required by regulatory agencies (i.e., USACE, NYSPSC, New York State Office of General Services, and USCG) (CHPEI 2010a).

Typical Cable Inspection Method

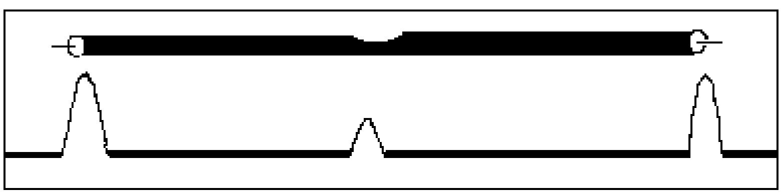
When two metallic conductors are placed close together, they form a cable impedance. The insulating material that keeps the conductors separated is the cable dielectric. The impedance of the cable is determined by the spacing of the conductors from each other and the type of dielectric used.



If the conductors are manufactured with exact spacing and the dielectric is exactly constant, then the impedance will be constant. If the conductors are randomly spaced or the dielectric changes along the cable, then the impedance will also vary along the cable.

A Time Domain Reflector (TDR) looks for a change in impedance, which can be caused by a variety of circumstances, including cable damage, water ingress, change in cable type, improper installation, and even manufacturing flaws.

A TDR sends electrical pulses down the cable and samples the reflected energy. Any impedance change will cause some energy to reflect back toward the TDR and will be displayed. How much the impedance change determines the amplitude of the reflection.



Source: Granite Island Group 2010

Figure 2-18. Cable Inspection Scan

Although no components of the transmission system would require regular replacement, regular inspections, in accordance with the manufacturer's specifications, would be performed during scheduled outages to ensure equipment integrity is maintained. For example, insulators would be inspected and cleaned if there were excess deposits of industrial contaminants and soot. Additionally, metal parts (i.e., nuts, bolts, cable cleats, and grounding scraps) would be inspected for corrosion and tightness and cooling water levels in the cooling stations maintained (CHPEI 2010a).

ROW Maintenance. During operation of the proposed CHPE Project, vegetation clearing in the transmission line ROW would be performed on an as-needed basis. Vegetation management would include mowing, selective cutting to prevent the establishment of large trees (i.e., greater than 20 feet [6 meters] tall) directly over the transmission line, and vegetation clearing on an as-needed basis to conduct repairs. Vegetation along the transmission line ROW would primarily be managed by mechanical means including such mechanisms as brush hogging, mowing, or hand cutting. Any vegetation management activities currently conducted by the railroads and highway operators within railroad and roadway ROWs would continue following the construction and operation of the transmission cable. A Vegetation Management Plan for the operational period of the transmission system would be developed and supplied as part of the EM&CP. The goal of the Vegetation Management Plan would be to establish stable low-growing vegetation with shallow root systems that would not interfere with the cables.

Transmission Cable Repairs. While not anticipated, it is possible that over the expected 40-year lifespan of the proposed CHPE Project, the transmission cables could be damaged, either by human activity or natural processes. The proposed cable installation design and techniques identified by the Applicant would minimize the potential for mechanical damage to the cable system and ensure operational safety and reliability of the cables. If a cable were to be damaged, a protection system in place would detect the fault and the HVDC Converter Station switching system would de-energize the transmission system in approximately 5 milliseconds.

Direct burial of the aquatic transmission cables to a depth between 4 to 8 feet (1.2 to 2.4 meters) below the lake bottom or riverbed provides a margin of safety and reliability against cable damage by vessels or anchors. The transmission cables themselves would have protective steel armoring wires to protect against damage. At the landfall locations, the aquatic transmission cables would be encased within an HDPE conduit to provide protection against mechanical damage. The steel-wire armored cables would be hermetically sealed to prevent the ingress of water and contain no circulating fluids or reservoirs.

Underground terrestrial transmission cables would be buried to an approximate depth of 3 to 4 feet (0.9 to 1.2 meters) below ground surface with a pre-cast concrete cap placed on top of the trench above the cables where they are installed by trenching. At utility and roadway crossings where the cables are installed by HDD, the HVDC transmission cables would be protected by a steel sleeve. The HVDC converter station would be designed, manufactured, installed, and tested by a reputable equipment vendor with international HVDC transmission experience.

Before operation of the proposed CHPE Project begins, an Emergency Repair and Response Plan (ERRP) would be prepared to identify procedures and contractors necessary to perform maintenance and emergency repairs.

The ERRP would detail the activities, methods, and equipment involved in repair and maintenance work for the transmission system. Although the scope of work for each situation would be adjusted to fit the conditions of the problem, the typical procedure for repair of a failure within the aquatic and terrestrial portions of the proposed CHPE Project route is described as follows:

- *Aquatic Transmission Cable Repair*. In the event of aquatic cable repair, the location of the problem would be identified and crews of qualified repair personnel would be dispatched to the work location. Depending on the location of the problem, a variety of equipment would be used to perform the necessary work. As part of the ERRP, appropriate vessels and qualified personnel would be pre-selected to minimize the response time. Once the failure location was identified, a portion of the transmission cable, equal to approximately 2.5 times the water depth, would be raised to the surface in preparation for cable replacement. The damaged portion of the cable would be cut and a new cable section would be spliced in place by specialized jointing personnel. Once repairs were completed, the transmission cable would be reburied using an ROV jetting device (CHPEI 2010a).
- *Terrestrial Transmission Cable Repair.* In the event of terrestrial transmission cable repair, pre-selected local contractors identified during the development of the ERRP would excavate around the location of the problem and along the transmission cable for the extent of cable to be repaired or replaced. Once the portion of the transmission cable was excavated, specialized

jointing personnel would remove the damaged cable and install new cable. Once complete, the transmission cable trench would be backfilled and the work area restored using the same methods as described for the original installation (CHPEI 2010a).

2.4.14 Transmission Service

The maximum electrical power delivery capability for the proposed CHPE Project under normal conditions would be 1,000 MW. The ultimate maximum capacity would be determined during final design of the proposed CHPE Project. In general, the power transfer capability would be limited by the maximum thermal capacity of the proposed CHPE Project. The estimated short-time (i.e., 2-hour) emergency overload capability would be approximately 1,150 MW for the transmission system (TDI 2010).

The NYISO would be the controlling authority for the proposed CHPE Project. However, as with all interconnected transmission systems, the operator of the system where the energy would originate, Hydro-Québec, would coordinate with the NYISO.

2.4.15 Decommissioning

The Applicant proposes to de-energize and abandon the proposed CHPE Project transmission line in place following expiration of its useful life. This proposed approach or any changes to the plan for the decommissioning would be subject to applicable Federal and state regulations in place at that time.

2.5 Alternatives Considered but Eliminated from Further Detailed Analysis

Several technology, alignment, and construction alternatives were considered but eliminated from further detailed study for various reasons. Alternatives considered but dismissed are discussed in the following paragraphs, along with the reasons for dismissal.

2.5.1 Previously Considered Route Alignments

This subsection describes discrete components of the segment alignments for the CHPE Project route that the Applicant initially proposed in its 2010 amended Presidential permit application, but were not included in the Joint Proposal or in the NYSPSC Certificate issued for the proposed CHPE Project. These previously proposed components of the CHPE Project route are not part of the proposed CHPE Project route as approved in the Certificate; however, these components were presented to the public during DOE's 2010 public scoping process about the project. **Figures 2-19** through **2-21** show the previously proposed CHPE Project alignments. They are further described as follows by geographical segment.

Lake Champlain Segment. There were no previously proposed CHPE Project alignments within the Lake Champlain Segment between MPs 0.0 and 101.

Overland Segment. The Overland Segment contained the previously proposed Lower Lake Champlain, Schenectady, and Middle Hudson River alignments, as shown in **Figure 2-19**.

Lower Lake Champlain Alignment. Instead of exiting the Lake Champlain at MP 101, under the 2010 version of the route the transmission line would have continued south in Lake Champlain and exited the lake and entered the CP railroad ROW near MP 112 in Whitehall. The transmission line would have traversed a federally maintained navigation channel throughout the entire reach of this option. No cooling stations would have been required under this alignment as it would be nearly entirely aquatic.

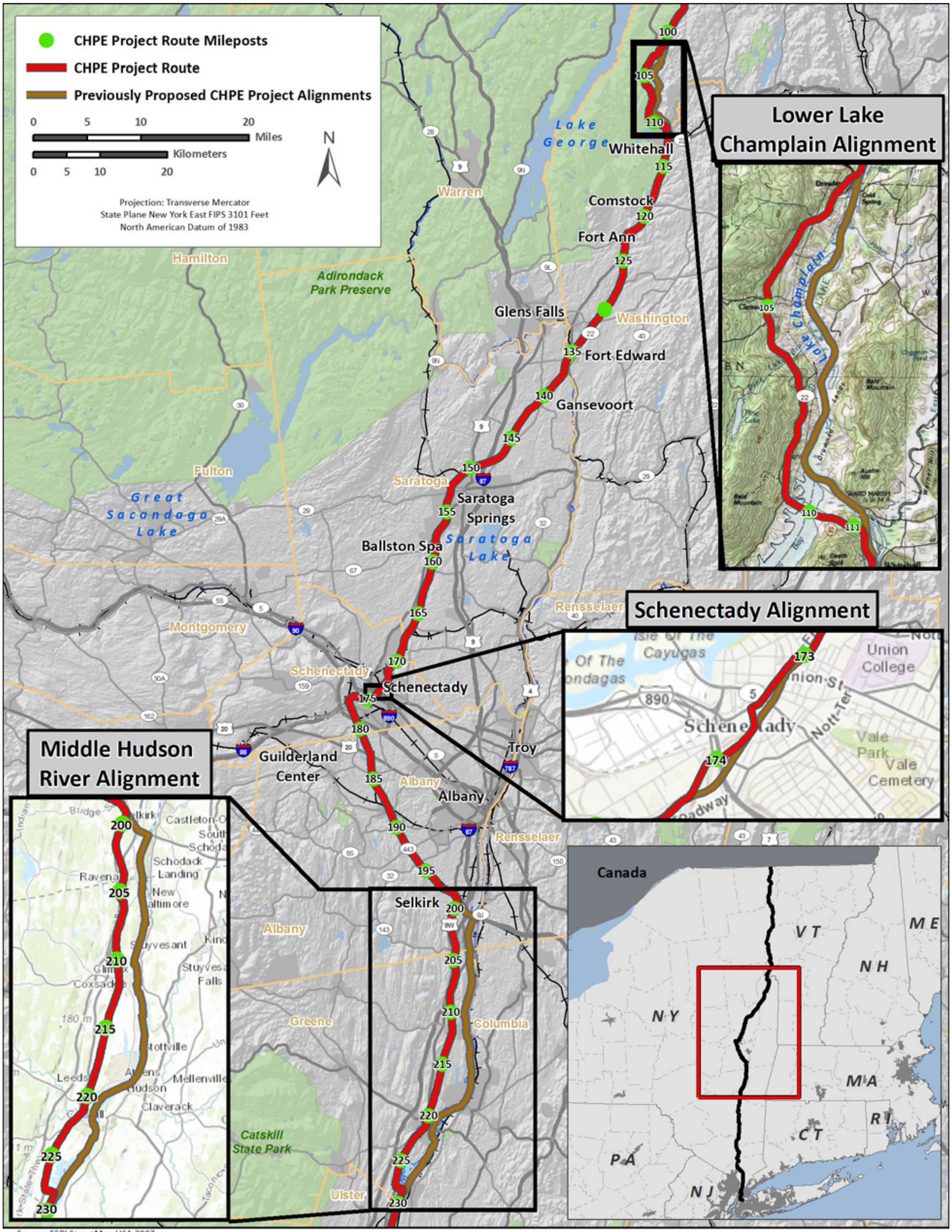


Figure 2-19. Previously Considered CHPE Project Alignments in the Overland Segment

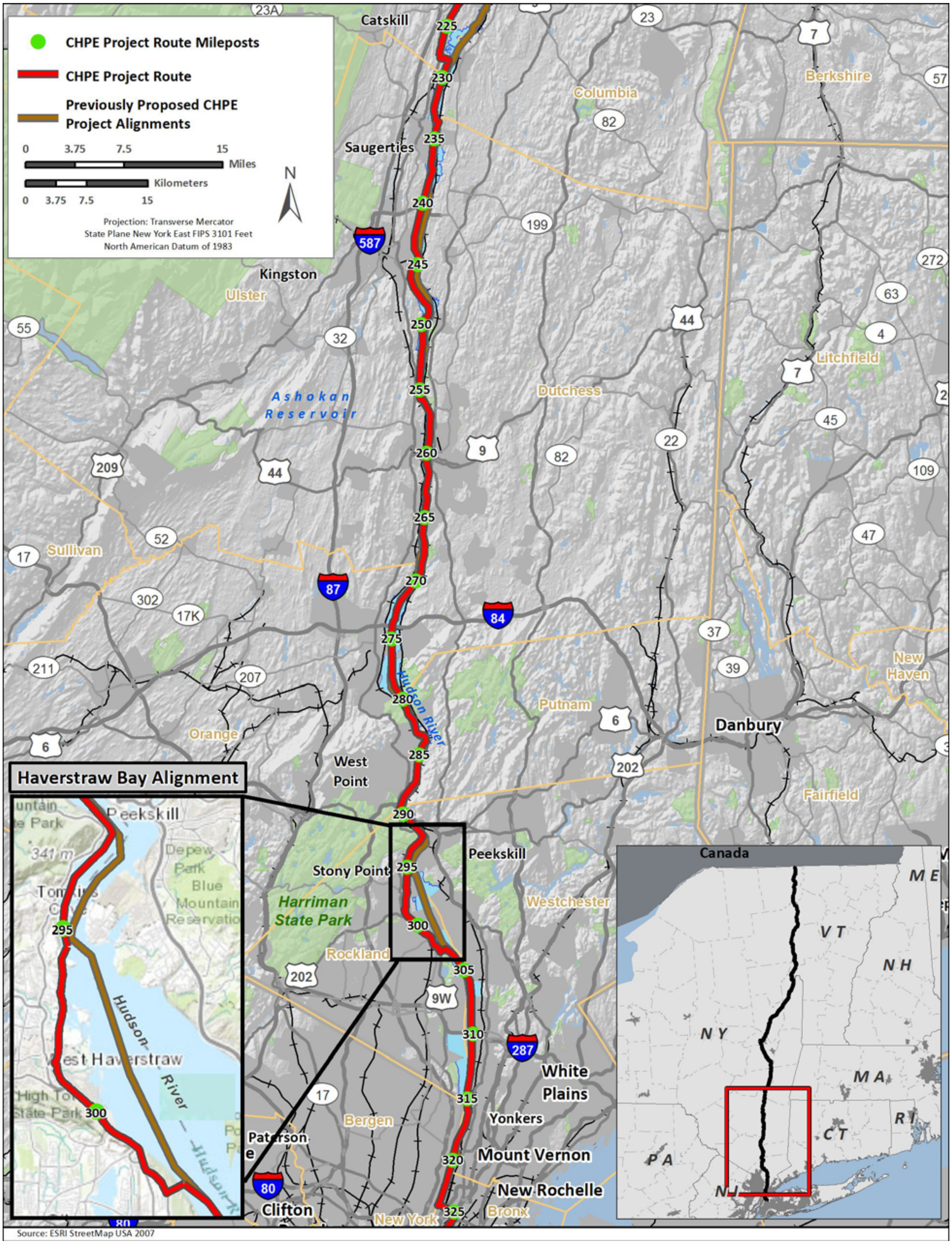


Figure 2-20. Previously Considered CHPE Project Alignments in the Hudson River Segment

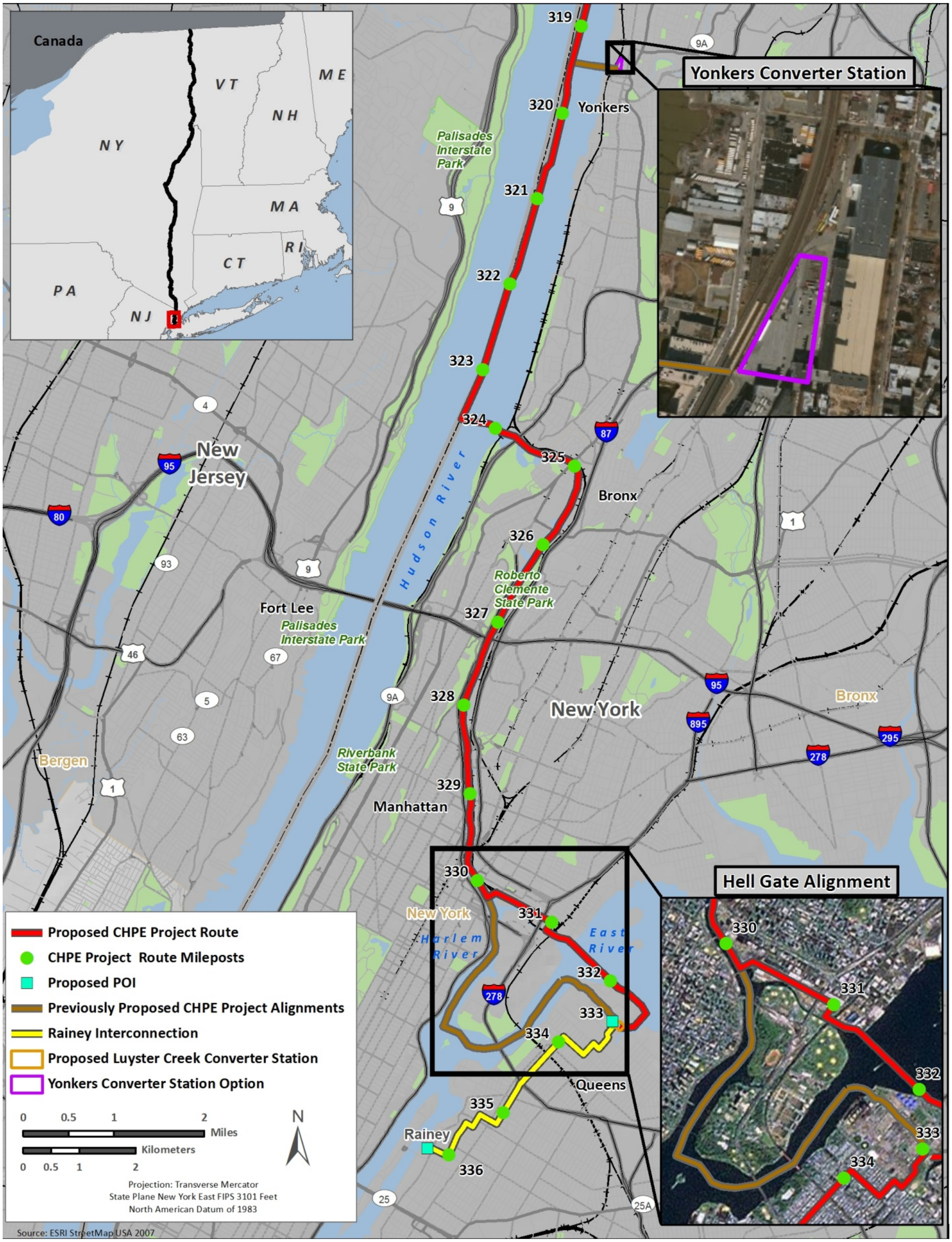


Figure 2-21. Previously Considered CHPE Project Alignments in the New York City Metropolitan Area Segment

Schenectady Alignment. The transmission line would have remained in the railroad ROW for more than 1 mile (1.6 km) between MPs 173 and 174 rather than transiting through city streets.

Middle Hudson River Alignment. Instead of continuing to follow the CSX railroad ROW south of Bethlehem and entering the Hudson River in Catskill at MP 228, the transmission line would have exited the railroad ROW east of MP 199 in the Town of Coeymans and entered the Hudson River. The transmission line would have followed the Hudson River south, crossing the navigation channel 11 times under this option. No cooling stations would have been required under this alignment as it would have been nearly entirely aquatic.

Hudson River Segment. The Hudson River Segment contained the previously proposed Haverstraw Bay Alignment (see **Figure 2-20**). Instead of exiting the Hudson River at MP 295, bypassing Haverstraw Bay and re-entering the river south of the bay at MP 303, the transmission line would have continued to follow the Hudson River through the bay. No cooling stations would have been required under this alignment as it would be nearly entirely aquatic.

New York City Metropolitan Area Segment. Previously proposed CHPE Project alignments under the New York City Metropolitan Area Segment were the Hell Gate Alignment and the Yonkers Converter Station, which are shown in **Figure 2-21**.

Hell Gate Alignment. Instead of exiting the Harlem River at MP 330, the originally proposed transmission line route would have continued in the Harlem River to the East River, and then followed the East River to the Charles Poletti Power Plant complex in Astoria. No cooling stations would have been required under this alignment as it would be nearly entirely aquatic.

Yonkers HVDC Converter Station. Under this scenario, the HVDC transmission cables would have terminated at MP 319 at an HVDC converter station in Yonkers, New York. The Yonkers HVDC Converter Station would have been on Wells Avenue and would have a footprint of approximately 3.0 acres (1.2 hectares).

Six double-circuit, polyethylene-sheathed, 345-kV aquatic HVAC transmission cables would have transmitted electricity from the Yonkers HVDC Converter Station to the Astoria Annex Substation under this scenario. From the Yonkers HVDC Converter Station, six HVAC transmission cables 4.7 inches (11.9 cm) in diameter would have entered the Hudson River and continued south through the Hudson River, Harlem River, and East River for a distance of 14 miles (23 km). The six HVAC cables would have been installed underground between the converter station and the Hudson River by HDD or through an existing utility tunnel. In the Hudson, Harlem, and East rivers, the cables would have been installed 3 feet (0.9 meters) below the river bottom in two bundles 33 feet (10 meters) apart. The HVAC transmission cables would have terminated at the Astoria Annex Substation near the Charles Poletti Power Plant complex (TDI 2010).

These previously proposed project alignments were dismissed from further consideration during the NYSPSC review process due to engineering feasibility, cost, and logistical considerations (e.g., legal limitations), and are not included in the NYSPSC Certificate issued to the Applicant; therefore, they are not considered further by DOE in this EIS.

2.5.2 Alternative Upland Transmission Line Routes

In addition to considering route alignment modifications to the Proposed CHPE Project, the Applicant considered a range of terrestrial routes for the transmission line. These alternatives included consideration of transmission line alternatives that would have been installed either on overhead structures or buried within a new or existing terrestrial ROW, rather than in Lake Champlain or the Hudson, Harlem, and East rivers.

Alternatives considered included:

- Constructing the transmission line in and along existing electrical transmission line ROWs from the U.S./Canada border to New York City
- Constructing the transmission line in and along existing highway and roadway ROWs
- Constructing the transmission line within existing railroad ROWs beyond those identified as part of the proposed CHPE Project
- Using combinations of railroad, electrical, and roadway ROWs
- Development of a new electrical transmission line ROW.

These options were evaluated for technical feasibility, cost, and potential environmental impacts. **Appendix B** contains the alternatives analysis report that presents the results of the Applicant's analyses of these alternatives. This alternatives analysis report was submitted by the Applicant to the USACE in July 2013 as part of the Applicant's CWA Section 404 permit application (CHPEI 2013c). DOE determined that alternative transmission routes were not reasonable due to engineering feasibility, cost, and logistical considerations (e.g., legal limitations), and, therefore, they have been eliminated from further consideration in this EIS. These alternatives were eliminated for the following reasons.

- Twelve alternative alignments were identified in the NYSPSC process and in **Appendix B** as part of the alternative Hudson River Western Rail Line Route. Ten of these segments were not considered reasonable due to engineering constraints, intrusions into sensitive environmental areas and municipal parkland, existing infrastructure and development, access restrictions, required use of long HDD segments, blasting with insufficient spacing, and increased cost and construction time. The two remaining alternative alignments considered as part of this route were considered environmentally preferable and reasonable (Coeymans to Catskill and Stony Point to Clarkstown) and were adopted as part of the proposed CHPE Project analyzed in the EIS.
- The Harlem River Rail Route alternative alignment was not considered reasonable due to engineering and geotechnical constraints, existing infrastructure and development including passenger and freight rail lines and stations, potential for cable damage and significant traffic disruption, and increased cost and construction time.
- The Hell Gate Bypass Route alternative alignment was considered reasonable, would avoid conflict with existing development and reduce in-river construction, and was adopted as part of the proposed CHPE Project analyzed in the EIS.
- Two overland alternative routes, one west of Adirondack Park and one east of the Hudson River, were not considered reasonable due to engineering constraints, existing infrastructure and development, required use of long HDD segments with insufficient space in some areas, and increased cost and construction time.
- Both the development of a new electrical transmission line ROW and use of existing electrical transmission ROWs were not considered reasonable alternatives because of land use issues (extensive requirement for owner agreements or eminent domain). In addition, both alternatives were not considered reasonable due to engineering constraints, potential long and difficult HDD installations, substantial increase in project costs, and construction time.

2.5.3 Conservation and Demand Reduction Measures

During the public scoping period, comments were received that questioned whether the proposed CHPE Project was needed and whether future demand for electricity could be met using energy-efficiency and conservation measures. The State of New York's ongoing program for meeting its future energy needs is laid out in the New York State Energy Plan. The 2009 State Energy Plan outlines five strategies required to work in combination to achieve New York's policy objectives: (1) produce, deliver, and use energy more efficiently; (2) support development of in-state energy supplies; (3) invest in energy and transportation infrastructure; (4) stimulate innovation in a clean energy economy; and (5) engage others in achieving the state's policy objectives. New York State's energy-efficiency goal is to reduce electricity use by 15 percent by 2015 (a component of the State's "45 by 15" Plan; the other component is to meet 30 percent of the state's electricity supply through renewable resources) (NYSEPB 2009).

The proposed CHPE Project has been proposed to meet the increasing demand for electricity in southeastern New York State, as forecasted by the NYISO, that would not be met by other ongoing activities, including measures to reduce energy demand and energy-efficiency and conservation measures. NYISO has projected that New York State's annual energy demand, without efficiency measures, would increase from approximately 163,000 GWh in 2011 to approximately 186,000 GWh in 2022, an increase of 23,000 GWh (14 percent). Including implementation of the energy-efficiency measures identified in the 2009 State Energy Plan, NYISO forecasts that energy demand would increase to approximately 173,500 GWh, an increase of 10,500 GWh (7 percent). For the New York City location zone, NYISO forecasts that energy demand will increase more rapidly than statewide, rising from 54,060 GWh in 2011 to 59,118 GWh in 2022, an increase of 5,058 GWh (9 percent) (NYISO 2012). Consequently, NYISO has demonstrated that energy-efficiency and conservation measures alone would not address southeastern New York's increasing demand for electricity and that a mix of energy efficiency, demand reduction, and new generation would be required to meet future energy demand. Therefore, DOE determined that the conservation and demand-reduction measures alternative alone is not a reasonable alternative and is, therefore, not addressed further in this EIS.

2.5.4 Use of HVAC versus HVDC Technology

Two types of transmission technologies could be used to transport electricity from Canada to the New York City metropolitan area, namely HVAC or HVDC technology. The transmission technology selection greatly influences the system design and construction and the resulting potential environmental impacts.

AC Transmission Technology. An overhead HVAC transmission system is the traditional method of expanding transmission capacity within and between utility service territories. HVAC transmission by overhead lines is efficient for distances up to 400 miles (644 km). In order to deliver 1,000 MW over such a system without significant losses, the cables would be required to be energized at 500 kV. When buried (underground or underwater), even a voltage rating at this level would be inadequate to achieve long-distance transmission. The longest 500-kV HVAC underground transmission system currently in operation is approximately 25 miles (40 km) in Japan (ADOE 2010).

Construction of new overhead HVAC transmission cables would also require a new or expanded ROW for utility corridors, and in metropolitan and suburban areas, land costs are high and public concern regarding aesthetics and potential environmental and health effects (e.g., EMF) from an overhead HVAC transmission line result in few such projects proceeding beyond the planning stage.

Capacity at existing overhead HVAC transmission corridors can be increased through upgrading and overbuilding; however, most of the high-voltage corridors in the New York Control Area are already at or near capacity because of either technical constraints or security and contingency considerations regarding the loss of common towers.

DC Transmission Technology. The primary advantage of long-distance HVDC transmission technology lies in its efficiency. Because there is no need to charge the capacitance (i.e., measure of energy potential) of a transmission cable as is required for a cable with alternating voltage, transmission losses are significantly reduced. In addition, HVDC only requires two conductors instead of three and allows for reduced separation between conductors. As a result, the need for an expansive new ROW is reduced and construction costs are lowered (ADOE 2010).

The Applicant has proposed an HVDC transmission system for the following reasons:

- *Greater Flexibility.* Long-distance HVDC transmission lines can be buried underwater and underground, and installed overhead, thus providing more flexibility with ROW planning.
- *Reduced ROW Requirements.* The proposed HVDC technology would require less ROW than comparably sized overhead HVAC transmission lines. The transmission cables would be buried, and the total corridor requirements typically would be approximately 20 feet (6 meters) wide in terrestrial sections and 30 feet (9 meters) wide in aquatic sections. An overhead HVAC transmission line of similar capacity would require a terrestrial ROW of up to 150 feet (46 meters). Reduced ROW requirements would result, therefore, in fewer environmental impacts from land-clearing activities. Overhead HVAC ROW requires extensive initial vegetative clearing and ongoing vegetative management throughout the ROW. Buried HVDC transmission corridors require less ground-surface maintenance.
- *Minimal Exposure to Electric Fields When Buried*. Independent studies have shown that buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface (WHO 2012). There would be a constant magnetic field, which, at the surface, would decrease with distance from the cable centerline. The burial of the transmission line at the proposed depths reduces the electric field exposure compared to an overhead transmission system.
- *Greater Reliability.* Underwater and underground armored HVDC transmission cables have a higher reliability than overhead HVAC transmission cables, primarily because they are less likely to be subject to damage from weather, collision, or vandalism. They also operate within a constant temperature regime; therefore, they are not subject to thermal derating at high ambient temperatures.
- *Enhanced Security.* Since the terrorist attacks of September 11, 2001, energy infrastructure security has become a national priority. The physical separation of transmission infrastructure in multiple corridors is one means of enhancing security, as is the installation of such facilities underwater and underground.
- *Reactive Power Requirements.* HVAC transmission is limited by the amount of reactive power required to deliver active power through transmission lines, so that long-distance power transmission by HVAC lines is restricted due to limitations on how far reactive power will travel.
- *Greater Control to Improve System Stability*. HVDC interconnections to AC transmission systems have the advantage of being able to enhance the controllability and stability of the AC transmission system by allowing the operation to regulate active power flow in the receiving transmission line. While similar benefits can be achieved through generator voltage control or transmission compensation devices including phase shifters, such alternative measures are generally not as time-responsive as an HVDC system.

For these reasons, the Applicant determined that only HVDC transmission technology would meet the objectives of the proposed CHPE Project; therefore, the use of HVDC technology is a component of the Applicant's proposed CHPE Project evaluated in this EIS. In light of this, DOE determined that the alternative of using HVAC transmission lines to deliver power into the New York City metropolitan area was not reasonable as an alternative from the Applicant, and therefore was eliminated from further consideration in this EIS.

2.5.5 Interconnection and Converter Station Alternatives

The proposed CHPE Project would transport electricity from sources in Canada on a merchant basis for delivery into the New York City metropolitan electrical transmission and distribution grid. As part of its initial system planning evaluations, the Applicant considered a number of different locations for interconnecting the proposed CHPE Project transmission system into the grid and for siting the DC to AC converter station that would be required for this interconnection.

2.5.5.1 Alternatives to an Interconnection to the Astoria Annex Substation

The Applicant evaluated a number of existing substations in the New York City metropolitan area as potential POIs for the proposed CHPE Project, based on the following criteria:

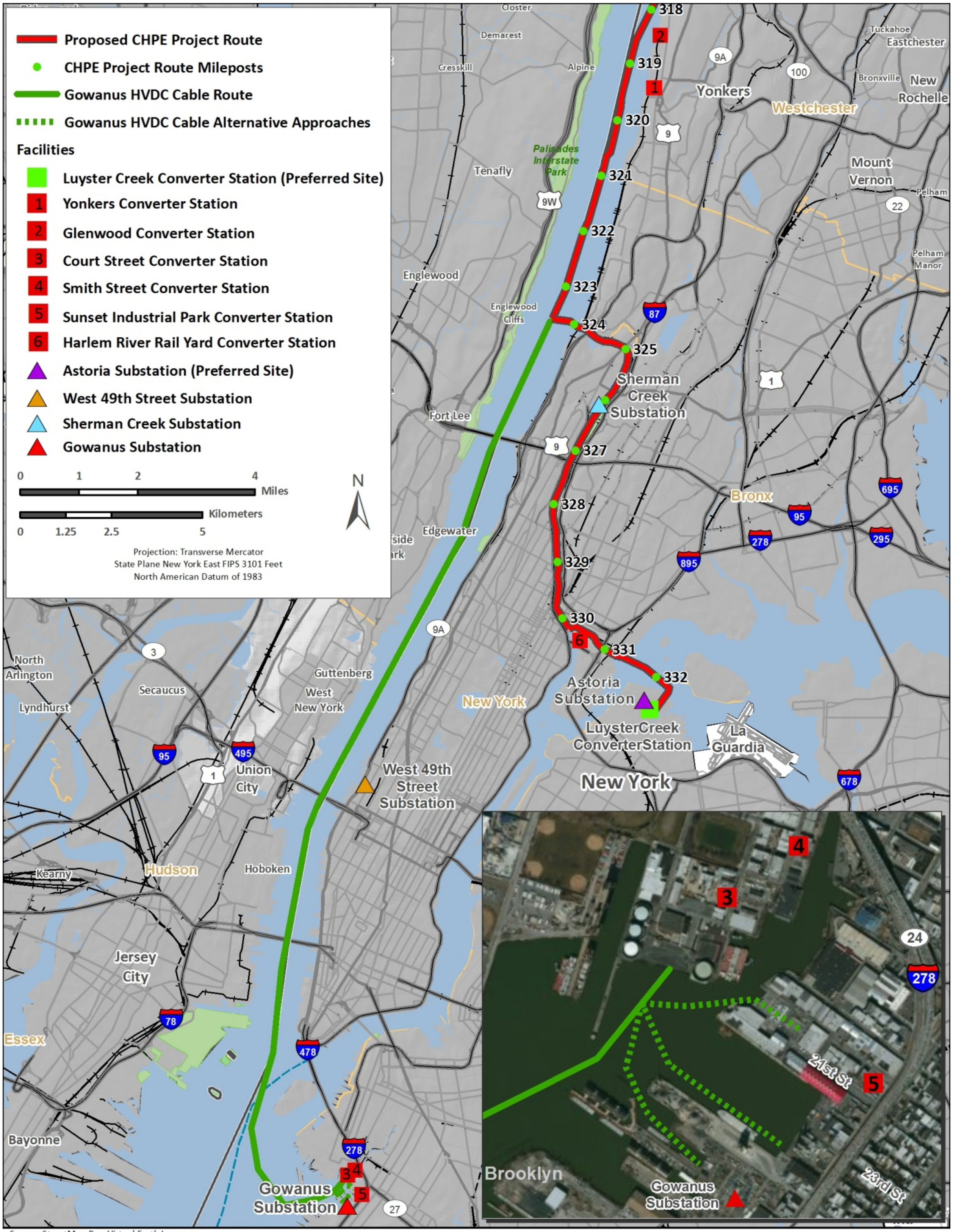
- Availability of interconnection points (breaker positions) at the substation, or the capability to add interconnection positions
- Capability of existing distribution circuits, connected to the substation, that could accommodate the additional capacity of the proposed CHPE Project, or the possibility of distribution system upgrades, if necessary
- Proximity of a potential converter station site to the substation
- Accessibility to the substation property for the HVAC transmission cables from the converter station
- Relative costs for each of the aforementioned criteria.

The Applicant conducted an Interconnection Feasibility Study to evaluate potential alternative POIs relating to the reliability of the New York State transmission system (CHPEI 2010a). The feasibility study evaluated possible POIs for the HVAC transmission interconnection at the following locations:

- West 49th Street 345-kV Substation in Kings County, New York
- Sherman Creek 138-kV Substation in New York County, New York
- Gowanus 345-kV Substation in New York County, New York
- Astoria Annex 345-kV Substation at Astoria, Queens County, New York.

The feasibility study indicated that the West 49th Street 345-kV Substation was not a practical POI location due to insufficient space for the interconnection equipment and excessive costs (greater than $600 million) for required substation upgrades, costs that would have rendered the proposed CHPE Project economically infeasible. Therefore, the West 49th Street 345-kV Substation was not considered a reasonable POI by DOE, and was eliminated from further detailed consideration in this EIS.

The Interconnection Feasibility Study also considered the Sherman Creek, Gowanus, and Astoria Annex substations as potential POIs for the proposed CHPE Project (CHPEI 2010a). **Figure 2-22** shows these locations. The evaluation took into consideration the availability of these nearby sites to construct and operate the required HVDC converter station, which are described as follows:



Source: StreetMap Pro; Virtual Earth Imagery.

Figure 2-22. Alternative Locations Considered for POIs and HVDC Converter Stations

- *Sherman Creek.* The Sherman Creek 138-kV AC Substation is composed of two existing substations – Sherman Creek East and Sherman Creek West. Because the proposed transmission cables would operate at 345 kV, the Applicant would have been required to install a 345/138-kV AC transformer substation adjacent to the Sherman Creek Substation to accommodate (step down) the higher voltage. This area would be approximately 0.5 acres (0.2 hectares) (CHPEI 2010a). Because the Sherman Creek POI would have required construction of a new step-down transformer station, and because ConEd indicated its preference that the Sherman Creek substation not be used as the POI, this location is not a reasonable POI for the proposed CHPE Project.
- *Gowanus.* There are concerns at the Gowanus 345-kV Substation regarding environmental contamination along potential transmission cable routes in the vicinity of the substation and complications associated with the recent designation of the Gowanus Canal as a Superfund National Priorities List (NPL) site. In addition, both the Hudson and East rivers in the vicinity of lower Manhattan experience heavy vessel traffic, including transportation ferries and cargo ships. Also, the presence of numerous existing infrastructure (e.g., existing cables and pipelines) and numerous underground road and transit tunnels throughout this portion of New York City could prohibit or further complicate the installation of the HVDC transmission cables here. Given the engineering and environmental constraints of installing the HVAC transmission cables at Gowanus, the Gowanus 345-kV Substation is not a reasonable POI for the proposed CHPE Project.
- *Astoria.* The potential POI at Astoria provided an advantage because the interconnection could be made directly to the Astoria Annex Substation without the need to construct an additional step-down substation. ConEd had indicated its preference that the CHPE Project POI be at the Astoria location, and therefore, this POI was identified as the preferred termination point for the proposed CHPE Project (CHPEI 2010c).

Due to the reasons identified in the foregoing paragraphs, DOE determined that the Sherman Creek and Gowanus POIs were not reasonable alternatives and therefore were eliminated from further consideration in this EIS.

2.5.5.2 Alternatives to the Luyster Creek Converter Station

In conjunction with the identification of feasible POIs in the New York City metropolitan area, the Applicant identified possible sites for construction of the converter station in proximity to the POIs. Sites were identified and evaluated based on the following criteria:

- Sufficient land available for the converter station facility (approximately 3 to 5 acres [1.2 to 2.0 hectares])
- Proximity to the HVDC transmission cable route to minimize environmental impacts, neighborhood disruption (i.e., disturbances, interruptions, or changes), and costs associated with the cable connections to the converter station
- Consistency with site zoning designation(s) and land use(s) in proximity to the converter station site in order to maintain substantive compliance with local ordinances and land use requirements and expectations
- Potential environmental impacts associated with the transmission cable installation and the construction of the converter station.

As described in **Section 2.4.6**, a proposed converter station site has been identified in Queens, New York, adjacent to the proposed Astoria Annex Substation POI. This location was selected because of its proximity to the substation and its location on a parcel of land that is currently used for electrical generation and transmission. Other potential converter station sites were also identified and evaluated for use in conjunction with the POIs discussed in the preceding paragraphs. These alternative converter station sites are presented in the following paragraphs.

Gowanus POI Converter Station Location Alternatives. The Applicant identified the following three potential converter station sites near the existing Gowanus 345-kV Substation for evaluation:

- 611 Smith Street in Brooklyn, New York
- 688 Court Street in Brooklyn, New York
- Property within the Sunset Industrial Park in Brooklyn, New York.

Each of these potential sites is immediately adjacent to the East River, thereby reducing the length of the HDD required. These potential sites are also in relatively close proximity to the Gowanus Substation, so that the span required for the HVAC transmission cables would be minimized.

However, to connect the HVDC transmission cables to one of the aforementioned converter station sites while remaining in the water, the most likely HVDC cable route would have extended through either the Hudson River or the East River into Gowanus Bay and the Gowanus Canal. As a result of the years of discharge, storm water runoff, sewer outfalls, and industrial pollution, the Gowanus Canal has become one of the nation's most contaminated water bodies. Contaminants impacting the canal include PCBs, coal tar, heavy metals, and volatile organic compounds (VOCs). CHPE Project development activities in this area would have been expected to incur increased costs due to the management of these impacted soils and sediments. Recently, the USEPA added the Gowanus Canal to the NPL. As a result of this determination, the USEPA is expanding its investigations to define the nature and extent of the contamination further and developing a plan to address the contamination (USEPA 2012j). These ongoing activities were seen as introducing an unacceptable level of risk and uncertainty to the proposed CHPE Project construction schedule and the identification of facility installation requirements.

In addition to the concerns over environmental contamination along potential transmission cable routes and at the converter station sites, the presence of existing infrastructure and heavy vessel traffic could prohibit or further complicate the installation of the HVDC transmission cables. Therefore, this alternative was deemed to be unreasonable, and eliminated from further consideration.

Yonkers HVDC Converter Station Alternative. The Applicant identified and evaluated two potential locations for the 1,000-MW converter station that would provide for an interconnection to the existing Astoria Annex Substation, and an opportunity to interconnect to the Sherman Creek and Gowanus POI locations. The first property is on Wells Avenue in Yonkers, between Alexander Street and Woodworth Avenue (see **Figure 2-4**). While the property is not immediately adjacent to a waterway like the other sites, there are options for installing transmission cables from the property to the proposed converter station location, including the presence of an existing tunnel that could be used to route the cable from the Hudson River to the converter station. However, this site is in apparent conflict with adopted municipal redevelopment plans for this area. In addition, more than 14 miles (22 km) of HVAC transmission cables would have been required to transmit the AC power to the POI at Astoria or Gowanus. The Wells Avenue site in Yonkers was included as part of the August 2010 proposal for the CHPE Project because it met the minimum size requirements, allowed for an interconnection to a number of the potential POIs under consideration, and was available to the Applicant. This site was evaluated as a previously proposed CHPE Project alignment (see **Section 2.5.1**).

A second Yonkers converter station site considered by the Applicant was at the former Yonkers (otherwise known as Glenwood) Power Station on Ravine Avenue, which is approximately 0.5 miles (0.8 km) north of the Yonkers HVDC Converter Station alternative described above. The potential benefits of this location are that it is adjacent to the Hudson River and the transmission cable landings would have been simplified. In addition, the reuse of a former industrial building would be consistent with adopted land use plans and policies. However, the size of the parcel (2.0 acres [0.8 hectares]) does not meet the minimum requirements for the converter station, and, therefore, this site was not considered a reasonable alternative by DOE and was eliminated from further consideration in this EIS.

Harlem River Rail Yard. As part of the review of the CHPE application to the NYSPSC pursuant to Article VII of the New York State Public Service Law, a possible converter station site in the Bronx, New York, was identified by NYSDPS staff. This alternative converter station site would have been at a site along the terrestrial transmission system route at approximate MP 330.8 at a site owned by NYSDOT. However, NYSDOT declined to make that site available to the Applicant as a converter station, and consequently the Harlem River Rail Yard site was not considered a reasonable alternative by DOE and eliminated from further consideration in this EIS.

2.5.6 Alternatives to the Astoria Annex to Rainey Substation Interconnection

The evaluation of the alternative for interconnecting the Astoria Annex Substation and the Rainey Substation in Queens was conducted under the auspices of the NYSPSC' certification process for the proposed CHPE Project. Multiple alternatives using city streets in Queens were considered by the Applicant. However, existing infrastructure, New York City Department of Transportation restrictions, and planned construction eliminated other possible alternatives to the one proposed in the Joint Proposal. In addition, a connection between the substations via the East River was precluded by the presence of two tidal energy facilities in these waters, the Astoria Tidal Energy Project and the Roosevelt Island Tidal Energy Project. Therefore, other connection routing alternatives were not considered reasonable by DOE and were eliminated from further consideration in this EIS. The preferred route has been reviewed and accepted by the New York City Department of City Planning (CHPEI 2012h).

2.6 Summary of Potential Impacts Associated with the Proposed CHPE Project

A summary of potential impacts from the construction, operation, maintenance, and emergency repairs associated with the proposed CHPE Project and the No Action Alternative are presented in the following resource area discussions and summarized in **Table 2-3**. The full impact analysis, along with Applicant-proposed measures and BMPs to avoid or minimize potential impacts, is presented in **Chapter 5** (Environmental Consequences) and **Chapter 6** (Cumulative Impacts) of this EIS.

While no specific alternative power generation sources have been identified under the No Action Alternative, it is assumed that future demand growth for electric power would be met by some mix of other power generation sources. A full discussion of the No Action Alternative is provided in **Chapter 4**.

2.6.1 Land Use

Construction and operation of the proposed CHPE Project would be consistent with relevant land uses plans and policies, including the New York State CMP. NYSDOS conditionally concurred with the consistency certification of the proposed CHPE Project under the enforceable policies of the New York State CMP subject to the implementation of certain conditions. These conditions, along with other measures to minimize potential environmental impacts, have been incorporated into the proposed CHPE Project design by the Applicant and reflected in the NYSPSC Certificate for the proposed CHPE Project.

Table 2-3. Summary of Potential Impacts Associated with the Proposed CHPE Project

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
General Overview					
State	New York	New York	New York	New York	New York
Counties	Clinton Essex Washington	Albany Greene Saratoga Schenectady Washington	Dutchess Greene Orange Putnam Rockland Ulster Westchester	Bronx New York Queens	N/A
Milepost Range	0–101	101–228	228–324	324–336	N/A
Corridor Type	Aquatic	Terrestrial	Aquatic/Terrestrial	Aquatic/Terrestrial	N/A
Construction Method(s)	Jet Plow, Shear Plow	Trenching, HDD	Jet Plow, Trenching, HDD	Jet Plow, Trenching, HDD, Underwater Blasting	N/A
Construction Period(s)	Cable Installation: 7 months	Cable Installation: 3 years	Cable Installation: 5 months	Cable Installation: 7 months Converter Station: 1 year	N/A
Impacts on Resource Areas from Construction and Operations, Maintenance, and Emergency Repairs of the Proposed CHPE Project					
Land Use	**Construction:** Temporary, non-significant increase in limitations on water-based uses. **Operations:*** Potential for future limitations on water-based uses or access during inspection activities; use limitations from maintenance and emergency repairs would be shorter and more localized than for construction.	**Construction:** Temporary, non-significant disruption of normal routines due to access limitations from presence of construction activities. **Operations:** Potential for future land use restrictions for operations and maintenance. Emergency repair impacts similar to construction, but shorter and with more localized disturbance.	**Construction/Operations:** Same temporary use and access limitations or disruptions and potential future land use restrictions as Lake Champlain and Overland segments.	**Construction/Operations:** Same temporary use limitations or disruptions as Lake Champlain and Overland segments.	None expected. No new land use impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Transportation and Traffic	**Construction:** Non-significant, temporary, and localized use limitations or disruptions on navigation, ferries, and other commercial and recreational transportation uses in Lake Champlain and in the Champlain Canal. **Operations:** Potential for anchor snags.	**Construction:** Non-significant disruptions on railroad operations, traffic flow on New York State Route 22, and city streets in Schenectady and street crossings. **Operations:** Potential for future temporary access limitations on roadways and railways.	**Construction:** Non-significant, temporary, and localized use limitations or disruptions affecting navigation, ferries, and other commercial and recreational transportation uses in the Hudson River. Non-significant disruptions affecting railroad operations and traffic flow on U.S. Route 9W in Stony Point, Haverstraw, and Clarkstown. **Operations:** Potential for anchor snags.	**Construction:** Non-significant, temporary, and localized use limitations or disruptions affecting navigation, ferries, and other commercial and recreational transportation uses in the Harlem and East rivers. Non-significant disruptions affecting railroad operations in the Bronx and city traffic flow in Astoria. **Operations:** Potential for anchor snags.	None expected. No new transportation, navigation, or traffic impacts would occur.
Water Resources and Quality	**Construction/Operations:** Non-significant, localized increases in turbidity and downstream sedimentation and resuspension of contaminated sediments in surface water by water jetting. Water quality impacts would be within regulatory standards.	**Construction/Operations:** Localized and non-significant increases in turbidity, suspension of sediments in surface waters, nearby groundwater wells, and wetland areas during construction.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new water resources and quality impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Aquatic Habitats and Species	**Construction:** Localized non-significant disturbance to 612 acres (248 hectares) of lake bottom resulting in habitat degradation, avoidance, or loss; noise, and vibration; impacts on benthic communities; potential for accidental exposure to hazardous materials. Potential non-significant mortalities of individuals among non-mobile species could occur from inability to adapt to new sediment conditions. **Operations:** Non-significant generation of magnetic fields and induced electric fields detectable, and potentially avoided, by some fish and shellfish species. Sediment temperature increase above the cables might lead to localized habitat avoidance of benthic infauna. Emergency repair effects expected to be less than construction because they would be shorter-term and more localized.	**Construction/Operations:** Disturbance of streambeds would be the same as for the Lake Champlain Segment with temporary, localized, non-significant stream habitat degradation or loss from increased turbidity and downstream sedimentation and resuspension of contaminated sediments in surface water during the streambed restoration process.	**Construction/Operations:** Riverbed disturbance of 533 acres (216 hectares) would involve the same impacts as indicated for Lake Champlain Segment, and additional non-significant impacts on essential fish habitat (EFH), including water column and substrates, and associated species. Impacts on streams in terrestrial portions of the route would be the same as indicated for the Overland Segment.	**Construction/Operations:** Riverbed disturbance of 36 acres (15 hectares) would involve the same impacts as indicated for the Lake Champlain and Hudson River segments, and non-significant impacts from noise and vibration due to blasting.	None expected. No new impacts on aquatic habitats and species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Aquatic Protected and Sensitive Species	**Construction:** No effects on federally listed species. Localized non-significant effects on individuals among state-listed fish and shellfish species similar to those for non-listed species. **Operations:** Same effects as for non-listed aquatic species; detection and potential avoidance of magnetic fields and sediment temperature resulting in habitat avoidance of infauna during operation. Emergency repair effects would be shorter-term and more localized than those from construction.	**Construction/Operations:** No effects on federally listed or state-listed aquatic species expected.	**Construction:** Localized non-significant effects on individuals among federally listed and state-listed sturgeon species, including habitat degradation or loss, noise, and vibration; potential vessel collisions with shortnose and Atlantic sturgeon; increased turbidity and sedimentation and redeposition of sediments; potential for accidental exposure to hazardous materials that could affect abilities to forage and reproduce. **Operations:** Same effects as for non-listed aquatic species; detection and potential avoidance of magnetic fields and sediment temperature resulting in habitat avoidance of infauna during operation. Emergency repair effects would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same non-significant effects on federally listed and state-listed sturgeon species as indicated for the Hudson River Segment, and non-significant impacts from noise and vibration due to blasting.	None expected. No new effects on aquatic protected and sensitive species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Terrestrial Habitats and Species	**Construction/Operations:** No significant impacts would be expected because the proposed CHPE Project route is installed underwater in this segment.	**Construction:** Permanent conversion of approximately 48 acres (19 hectares) of fringe forest habitat to scrub/shrub habitat. Non-significant, localized noise, dust, soil compaction, and habitat fragmentation impacts including removal of vegetation, habitat avoidance, and changes in species composition. Permanently reduced abundance would not be expected; known responses to narrow corridors do not involve permanent avoidance or population displacement; species could traverse the corridor post-construction. **Operations:** Some wildlife species would detect magnetic fields and heat generated by the transmission line during operation, but these conditions are unlikely to reduce health or productivity. Periodic vegetation maintenance in transmission line ROW would compact vegetation and soils and produce temporary fugitive dust impacts. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same conversion of some fringe forest habitat to scrub/shrub habitat during construction, as described for the Overland Segment. Same non-significant, localized habitat alterations and resulting impacts as indicated for construction in the Overland Segment. Same non-significant, localized impacts from operation, maintenance and emergency repairs as indicated for the Overland Segment.	**Construction/Operations:** No significant construction impacts on terrestrial vegetation and habitats expected because installation would occur in the Hudson River and within developed urban land with little natural vegetation and habitat. Non-significant, localized disturbance of birds and bats that could display habitat or feeding avoidance during construction. Same non-significant, localized impacts from operation, maintenance and emergency repairs as indicated for the Overland Segment.	None expected. No new impacts on terrestrial habitats and species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Terrestrial Protected and Sensitive Species	**Construction:** Non-significant, localized noise or vessel lighting disturbances of federally and state-listed Indiana bat and the Federal proposed-endangered northern long-eared bat. **Operations:** Operations are not expected to result in reduced health or productivity of the Indiana bat or the northern long-eared bat. No effects anticipated during maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Conversion and disturbance of fringe forest habitat along the ROWs may affect, but is not likely to adversely affect, federally listed and state-listed species, including bat species listed or proposed for listing, the Karner blue butterfly, and migratory birds, potentially present during construction. **Operations:** Operations and maintenance activities are not expected to adversely affect terrestrial protected and sensitive species. Effects from emergency repairs would be similar to construction but for a shorter-term and more localized than those from construction.	**Construction:** Same non-significant effects on federally listed and state-listed species and migratory birds as indicated for Lake Champlain and Overland segments. Similar non-significant construction effects on bald eagles that might be encountered when activities are underway. **Operations:** Operations and maintenance are not expected to adversely affect terrestrial protected and sensitive species.	**Construction:** No effects on federally listed species because there is no suitable habitat for them where construction would occur. **Operations:** Operations and maintenance are not expected to adversely affect terrestrial protected and sensitive species.	None expected. No new effects on terrestrial protected and sensitive species would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Wetlands	**Construction/Operations:** None expected.	**Construction:** Localized potential for habitat disturbance; non-significant impacts on 67.4 acres (27.3 hectares) of wetlands, including 16.2 acres (6.6 hectares) of forested wetlands and 51.2 acres (20.7 hectares) of non-forested wetlands; and significant, permanent change on 10.2 acres (4.1 hectares) of wetlands, including 2.0 acres (0.8 hectares) of forested wetlands that would be converted to scrub-shrub wetlands, and on 8.3 acres (3.4 hectares) of non-forested wetlands resulting in habitat degradation and loss. **Operations:** Non-significant impacts from operations because heat would dissipate well below the water surface. Periodic vegetation maintenance in transmission line ROW would compact vegetation and soils and result in temporary fugitive dust impacts. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Localized potential for non-significant impacts on 0.03 acres (0.01 hectares) of wetlands including one brook under which the transmission line would be installed, potentially resulting in habitat disturbance. **Operations:** Same non-significant, localized impacts from maintenance and emergency repairs as described for the Overland Segment.	**Construction/Operations:** None expected.	None expected. No new wetlands impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Geology and Soils	**Construction:** Temporary disturbance of 127,000 cubic yards (97,000 cubic meters) of sediment. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction. No impacts from possible seismic events.	**Construction:** Temporary disturbance of approximately 585 acres (237 hectares) of upland area. Non-significant impacts from bedrock blasting and removal, increased erosion and sedimentation, and soil compaction on land and sediment disturbance in waterways and wetlands. **Operations:** Negligible increase in soil erosion and sedimentation from periodic vegetation maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Temporary disturbance of 229,000 cubic yards (175,000 cubic meters) of sediment. Temporary disturbance of approximately 47 acres (19 hectares) of upland area. Upland bedrock blasting and removal possible; erosion, sedimentation, and soil compaction over land. **Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Temporary disturbance of 11,000 cubic yards (8,400 cubic meters) of sediment. Temporary disturbance of approximately 14 acres (6 hectares) of upland area. Otherwise, same impacts as indicated for the Lake Champlain and Overland segments.	None expected. No new geology and soils impacts would occur.
Cultural Resources	**Construction:** Potential adverse effects on 5 underwater archaeological sites, 2 terrestrial sites extending into Lake Champlain, and 2 National Register of Historic Places (NRHP)-listed sites. **Operations:** No adverse effects are expected.	**Construction:** Potential adverse effects on 34 terrestrial archaeological sites, 16 NRHP-listed or -eligible sites, and 1 cemetery. **Operations:** No adverse effects are expected.	**Construction:** Potential adverse effects on 8 terrestrial archaeological sites, 6 underwater archaeological sites, 7 NRHP-listed or -eligible sites, and 1 cemetery. **Operations:** Potential visual impacts on 1 NRHP-listed site.	**Construction:** Potential adverse effects on 7 terrestrial archaeological sites and 10 NRHP-listed or -eligible sites. **Operations:** None expected.	None expected. No new cultural resources effects would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Visual Resources	**Construction:** Non-significant impacts on visual resources from temporary presence of construction vessels and activities. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Non-significant impacts on visual resources from temporary presence of construction equipment and activities. **Operations:** Non-significant impacts from operation and maintenance of cooling stations consisting of a 128-square foot (12-square meter) building. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new impacts on visual resources would occur.
Infrastructure	**Construction:** Non-significant impacts include intersecting utility lines, potential service disruption, increased fuel use, and generation of solid waste. **Operations:** Increased reliability and capacity of electricity provision. Increased fuel use during maintenance or emergency repairs.	**Construction:** Non-significant impacts include intersecting utility lines, potential service disruption of public water supply, increased fuel use, storm water management, and solid waste management. **Operations:** Increased reliability and capacity of electricity provision. Increased fuel use during maintenance or emergency repairs.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and Overland Segment for the terrestrial portion.	None expected. No new infrastructure impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	Overland Segment	Hudson River Segment	New York City Metropolitan Area Segment	
Recreation	**Construction:** Temporarily limited access to water area in active construction zone. Non-significant impacts on recreational resources from temporary presence of construction vessels and activities. **Operations:** Non-significant impacts during operations and maintenance. Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction:** Potential lane restrictions on roads near recreational facilities. Non-significant impacts on recreational resources from temporary presence of construction equipment and activities. **Operations:** Emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment for the aquatic portion of the transmission line route and the Overland Segment for the terrestrial portion.	None expected. No new impacts on recreational resources would occur.
Public Health and Safety	**Construction:** Potential health and safety impacts on construction workers; no impacts are expected on general public health and safety. **Operations:** Potential health and safety impacts on contractors during operations; emergency repair impacts would be shorter-term and more localized than those from construction.	**Construction/Operations:** Impacts would not be expected from magnetic fields because magnetic field levels from the proposed CHPE Project would be within NYSPSC guidelines. Otherwise impacts expected to be same as indicated for Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	None expected. No new public health and safety impacts would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Hazardous Materials and Wastes	**Construction:** Storage of hazardous materials presents potential for spill contamination of water or land (staging areas); generation of waste and debris during installation. **Operations:** Limited amounts of oils, solvents, antifreeze, and other hazardous materials generated from routine maintenance and inspections; less than construction for emergency repair.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	None expected. No new hazardous materials and wastes impacts would occur.
Air Quality	**Construction:** Localized impacts from equipment and vessel exhaust. GHG emissions from use of vehicles and equipment with diesel fuel-powered internal combustion engines. **Operations:** GHG emissions from electricity sources used to power the converter station and cooling stations. Emergency repair impacts less than construction.	**Construction/Operations:** Localized, intermittent impacts from use of construction equipment, particularly from vehicle exhaust, fugitive dust, and GHG emissions.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments. In addition, upon operation of the proposed CHPE Project, New York State power generation emissions would be reduced by an estimated by 1.5 million tons of CO_2, 751 tons of SO_2, and 641 tons of NO_x while meeting its existing annual electric power demand.	None expected. No new air quality impacts would occur; however, there would be no project-related GHG emissions reductions.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Noise	**Construction:** Localized temporary noise level increases on the water and at land staging areas. **Operations:** No significant impacts are expected.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	**Construction:** Localized temporary noise level increases in residential, commercial, and industrial areas. Temporary, localized construction noise impacts, including from blasting, indicated for terrestrial and aquatic habitats and species. **Operations:** Short-term noise level changes during inspections and maintenance of the transmission line ROW. Emergency repair noise impacts would be shorter-term and more localized than those from construction. Noise levels would be within state thresholds for operation of cooling stations and would not be significant.	None expected. No new noise impacts would occur.
Socioeconomics	**Construction:** Negligible increase in local employment and demand for local purchases. Temporary housing required for a small number of construction workers to the area. **Operations:** Potential electricity cost savings to some end users.	**Construction/Operations:** Real property tax revenue benefits; otherwise same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	**Construction/Operations:** Same as indicated for the Lake Champlain and Overland segments.	None expected. No new impacts on socioeconomics would occur.

Comparison Factor/ Resource Area	Proposed CHPE Project				No Action Alternative
	Lake Champlain Segment	**Overland Segment**	**Hudson River Segment**	**New York City Metropolitan Area Segment**	
Environmental Justice	**Construction/Operations:** No disproportionately high and adverse human health or environmental effects on minority or low-income populations.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Same as indicated for the Lake Champlain Segment.	**Construction/Operations:** Although populations in this segment have higher percentages of minority and low-income populations than New York State, no disproportionately high and adverse human health or environmental effects are expected.	None expected. No new effects on environmental justice would occur.

Note: * In this table, "Operations:" refers to operational, maintenance, and potential emergency repair activities during the operational phase of the proposed CHPE Project.

Impacts from Construction

Construction activities associated with the installation of the aquatic portions of the proposed CHPE Project would result in additional vessel traffic and an area immediately surrounding the work site that would be off-limits to other vessels. However, aquatic installation activities would not prohibit any water-dependent commercial and recreational uses of adjacent areas during the few hours that construction vessels would be present or during the approximate 2-week period when HDD operations would be occurring. Because the aquatic transmission line would be installed along state-owned submerged lands in Lake Champlain and the Hudson, Harlem, and East rivers, the Applicant would be required to obtain an easement from the New York State Office of General Services and pay associated fees.

Construction activities associated with the installation of the terrestrial portion of the transmission line, which would be within roadway and railroad ROWs, would generally be compatible with existing road and railroad operations, but could result in temporary disturbances that disrupt these operations, such as roadway lane closures or reduced shoulders, and presence of heavy equipment and construction personnel. Construction activities on land would introduce temporary disturbances to normal routines (e.g., limitations to property access and the presence of construction activities or equipment). The Applicant would be required to obtain leases, easements, construction permits, revocable permits/consent, highway work permits, use and occupancy agreements/permits, or other agreements from private and public landowners authorizing use of land for the terrestrial construction activities or additional workspace to support the construction activities (e.g., at HDD locations or for construction staging area facilities).

Temporary storage and staging activities to support transmission line installation would be within existing commercial or industrial areas. These activities would be compatible with surrounding land uses.

Impacts from Operations, Maintenance, and Emergency Repairs

The proposed CHPE Project transmission line would generally be underwater or underground and, therefore, it would not be visible and would not interfere with surrounding land uses.

Periodic inspection of aquatic portions of the transmission line using vessel-mounted instruments would result in a negligible amount of additional vessel traffic; however, no impacts on water-dependent commercial and recreational uses would occur. Emergency repair activities, if necessary, along the aquatic portion of the transmission line could result in temporary impacts on existing commercial and recreational uses in the immediate vicinity of the work site due to the presence of cable repair vessels at the site of the fault.

Impacts on land use would result from operation of the proposed CHPE Project because future use of the land within the transmission line ROW would be limited for the lifespan of the transmission line. The Applicant would be granted either control of (via fee or easement for private property), or other appropriate interest or rights to use (via revocable consent or use and occupancy permit for public ROWs such as roadways or state land or lease for the railroad ROWs) an up to approximately 20-foot (6-meter)-wide transmission line ROW. Property owners granting the use of portions of their lands as the transmission line ROW would be prohibited from taking any action on that land that would damage or interfere with the Applicant's maintenance, inspection, and emergency repair activities with the ROW. It is anticipated that easements negotiated with private landowners would be bilateral easements in which the Applicant and landowner mutually agree to the easement provisions. While use of eminent domain would be avoided to the maximum extent practicable, limited easements or leases for the transmission line ROW in areas outside of the roadway and railroad ROWs might need to be obtained via eminent domain as part of the NYSPSC Article VII approval process. However, property owners would receive just compensation for this loss of use.

Periodic inspection of the terrestrial portions of the transmission line ROW and the cooling stations and converter station, and maintenance of the cooling stations and converter station, would generally be non-intrusive and would not disrupt (i.e., disturb, interrupt, or otherwise change) adjacent land uses. Emergency repairs of the transmission line, cooling stations, or converter station could result in temporary disturbances (e.g., limitations to or temporary changes to property access from the presence of emergency repair activities or equipment).

2.6.2 Transportation and Traffic

Construction and operation of the proposed CHPE Project would not have significant impacts, occurring intermittently for short durations, to the existing aquatic- and terrestrial-based transportation and traffic network within the proposed construction corridor. Applicant-proposed measures to avoid or minimize impacts have been incorporated into the proposed CHPE Project.

Impacts from Construction

Impacts on aquatic navigational operations along the proposed CHPE Project route would occur from the installation of the aquatic transmission cables. Impacts would occur on commercial and recreational transportation uses in Lake Champlain, the Champlain Canal, the Hudson River, the Harlem River, and Spuyten Duyvil Creek. Construction activities associated with the installation of aquatic portions of the proposed CHPE Project would include the generation of additional vessel traffic and clearance of areas in the Harlem River due to blasting, which on a small scale could inconvenience and create minor navigational obstacles (e.g., temporary loss of use of portions of waterways) for commercial and recreational water-dependent uses. However, cables would not be buried in anchorage areas and use of waterways would resume following installation activities. Each blast event in the Harlem River would only take a few seconds; however, prior to each blast, the area would be cleared to a distance determined by the fire marshal and the harbormaster. Transmission cable installation would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the work site or use a different area of the waterway. If conditions do not allow other vessels to transit around the work site, the Applicant would ensure that aquatic construction does not interfere with routine navigation by making adjustments to the work site as required. The guidance cables for the cable ferry crossing in Lake Champlain would be temporarily removed from the lakebed prior to the installation of the transmission cables, which may put the ferry temporarily out of service. Installation of the transmission cables would be coordinated with the ferry operator to minimize impacts on ferry operations. Disturbance to recreational and commercial uses would be temporary and localized at the work site. Construction would be coordinated with the USACE and USCG to avoid impacts on aquatic navigation, including avoidance of Federal-, state-, and private-owned navigation aids such as buoys and signs for boaters. For areas where the proposed aquatic transmission cables pass beneath bridges, construction would be coordinated with the owner of the bridge regarding clearances, distance from abutments and existing infrastructure, cable burial, and installation methods.

Impacts on railroad operations and traffic on roadways along the terrestrial portion of the proposed CHPE Project route would occur from the installation of the transmission cables. Impacts would occur on New York State Route 22 in Dresden and U.S. Route 9W in Haverstraw and Clarkstown, city streets in Schenectady and Queens, at ports used for land-based support, street crossings, and associated railroad corridors along the proposed CHPE Project route. Construction activities associated with the installation of the terrestrial transmission cables would generally be compatible with existing road and railroad operations, but could result in temporary minor disruptions (i.e., delays, temporary cancellations, or other changes) to these operations. Impacts would be limited to those impacting the flow of traffic which would occur when there is construction along the roadways or when roadways are crossed using trenching methods. Traffic levels of service would likely decrease due to slightly slower speeds through construction zones, but traffic flow would be maintained; therefore, impacts on traffic levels would not be significant. A Maintenance and Protection of Traffic Plan would be prepared to identify measures to minimize impacts on state highways. The Applicant would be required to obtain permissions in the form of easements, encroachment permits, highway work permits, or other agreements from private and public landowners for use of private property and road and railroad ROWs for terrestrial construction activities or additional workspace (e.g., at HDD locations or for support facilities).

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, the transmission line would be underwater or underground and, therefore, it would not interfere with the aquatic- and land-based transportation and traffic network.

Activities impacting aquatic navigational operations along the aquatic portion of the proposed CHPE Project route would include those associated with operation, regular inspection, and possible emergency repairs of the transmission line. Regular non-intrusive inspection of aquatic portions of the transmission line using ship-mounted instruments would result in negligible additional vessel traffic. If necessary, emergency repair activities along the aquatic transmission line would be expected to result in temporary navigational obstacles (e.g., temporary loss of use of portions of waterways) for commercial and recreational vessels in the immediate vicinity of the repair site.

However, use of waterways would resume following repair activities. The transmission line would also create the potential for anchor snags. Transmission cables would not be located in anchorage areas and they would be buried to the depths prescribed by the USACE (see **Section 2.4.10.1**), thereby avoiding potential for vessel anchors hooking and causing damage either to vessels or to the transmission cables. However, anchors could become snagged on the concrete mats that would be used to cover portions of the transmission line that cannot be buried. The total area where concrete mats would be used to cover the transmission line represents less than 0.001 percent of the acreage of the waterbodies along the entire aquatic portion of the proposed CHPE Project route. Therefore, impacts on vessels or vessel anchors are not expected to be significant. In the event that an anchor snag occurs, the vessel crew would notify the USCG and the Applicant; and the Applicant would repair the cable (if necessary), transport a new anchor to the barge, cut the snagged anchor chain, and recover the anchor (if possible). The Applicant would develop an Anchor Snag Manual, including a Navigation Risk Assessment, to address situations in which a vessel's anchor snags the transmission cables or concrete mats placed above the cables, and to identify appropriate protocols.

Decommissioning of the proposed CHPE Project transmission line would consist of de-energizing and abandoning the transmission line in place. There would be similar minimal impacts on anchorage from potential anchor snags on concrete mats as described for operation of the transmission line. If decommissioning plans change, applicable regulations at the time of decommissioning would be met.

Activities impacting transportation and traffic operations along the terrestrial portion of the proposed CHPE Project route would include those associated with operation, regular inspection, maintenance, and possible emergency repairs of the transmission line. Regular inspection of the terrestrial portions of the transmission line and aboveground infrastructure (i.e., cooling stations and converter station), and routine preventive maintenance of the aboveground infrastructure would generally be non-intrusive and not disrupt (i.e., delay, temporarily cancel, or otherwise change) transportation operations or traffic. If necessary, emergency repairs of the transmission line or aboveground infrastructure would be expected to result in temporary construction-related disturbances (e.g., temporary lane rerouting or closures from the presence of emergency repair activities) that would impact transportation uses along the proposed CHPE Project route. However, vehicular traffic flow would be maintained through emergency repair work zones.

2.6.3 Water Resources and Quality

Construction within Lake Champlain, the Hudson River, and the other surface waters and wetlands along the proposed CHPE Project route would require a CWA Section 404 and Section 10 permit from the USACE. The initial permit application and supporting information was submitted to the USACE in 2010 with supplemental information provided in February 2012. The Applicant received its State Section 401 Water Quality Certification from the NYSDPS in January 2013.

Impacts from Construction

Construction activities within the aquatic portions of the proposed CHPE Project route would include the installation of transmission cables in the lakebed and river bottoms using water-jetting and shear plow techniques, HDD, and blasting. Impacts on water quality would occur from localized increases in turbidity (a measurement of the cloudiness or amount of total suspended solids in the water) and resuspension of sediments resulting from trenching and disturbance within the waterbody. Increased turbidity has the potential to reduce light levels in aquatic habitats and could result in temporary changes to water chemistry, including impacts on pH and reduced dissolved oxygen.

Construction activities associated with installation in the terrestrial portions of proposed CHPE Project route would primarily include the transmission cables being buried beneath the ground within roadway and railroad ROWs. Ground disturbance would result in increased erosion and sedimentation in runoff. Runoff on construction sites would be managed on site using BMPs incorporated into the proposed CHPE Project as Applicant-proposed measures. In addition, the proposed CHPE Project route would cross several streams and rivers. Installation methods proposed for stream crossings could include trenching, HDD, and attaching to existing infrastructure such as bridges and railroad trestles. Trenching would result in impacts on water quality from increased turbidity and potential downstream sedimentation. HDD, which would also be used in transitions from water to land and entirely under the East River, has the potential for frac-out (i.e., leaks of HDD drilling fluid) that could cause drilling fluid to become suspended or dispersed and could impact water quality. However, the Applicant would develop and implement an SPCC Plan that would also address potential releases of drilling fluid, which would be contained in the cofferdam area or the land-based HDD staging area during construction if such releases occur.

Portions of the proposed CHPE Project route would cross floodplains and coastal flood zones associated with surface waters. Temporary clearing, ground disturbance, and construction activity would occur within these floodplains. The converter station is proposed to be constructed in a coastal flood hazard area, and could be subject to flooding or storm surges. To minimize the potential for damage, the construction of the converter station would involve raising the structure above the 100-year base flow elevation.

The blasting of bedrock would be required in the Harlem River, and could be required to trench the terrestrial transmission cables in some locations. Bedrock blasting is likely to increase bedrock fracturing near the blasting zone and could temporarily increase turbidity in groundwater wells and the Harlem River near the blast zone. Therefore, impacts on groundwater and surface water quality could occur if blasting of bedrock is required.

Impacts from Operations, Maintenance, and Emergency Repairs

During operation, heat loss from the transmission line would result in negligible temperature increase of the water in its immediate vicinity. If required, emergency repairs of the aquatic transmission line where the cables would have to be unburied would result in localized increases in turbidity and resuspension of sediments that would temporarily impact water quality. The impacts from repairs would be similar to those expected during original installation, but would be for a shorter duration and would disturb a smaller area. Operation of the transmission line in terrestrial portions of the proposed CHPE Project route, would not impact water quality, water availability, or floodplains. Emergency repair activities would require ground disturbance as the damaged lines must be uncovered. Although these actions would result in increased potential for erosion and sedimentation to nearby surface waters, these impacts would be managed on site. Therefore, significant impacts would not be expected.

2.6.4 Aquatic Habitats and Species

Construction activities within Lake Champlain, the Hudson River, and the other surface waters along the proposed CHPE Project route would result in temporary impacts on aquatic habitat and species due to sediment disturbance, habitat alteration, noise and vibration, and possible shock waves from blasting. Impacts from operation of the proposed CHPE Project would include permanent habitat changes (e.g., reductions in substrate suitable for vegetation growth) at areas where concrete mats would be installed over soft bottom and temperature increases in sediments above the transmission line. A review of available scientific literature yielded inconclusive evidence that the magnetic fields produced or potentially altered by the proposed CHPE Project would impact aquatic species or habitats. Some fish species would be able to detect these magnetic fields, but the fields would not impact species' reproduction or capacity to forage or survive.

Impacts from Construction

Construction activities within the aquatic portions of the proposed CHPE Project would include the installation of transmission cables in the lakebed and river bottoms using water-jetting and shear plow techniques, and blasting in the Harlem River. Impacts on aquatic habitats and species, including essential fish habitat (EFH), would be caused by localized increases in turbidity and associated water quality degradation, sediment redeposition, underwater blasting, temporary noise and vibration, and potential accidental releases of hazardous materials.

The impacts of sedimentation and use of concrete mats on benthic organisms could include smothering, reduction of filtering rates, toxicity from exposure to anaerobic sediments, reduced light intensity, and physical abrasion. Additionally, mortalities among sessile species could occur if individuals are unable to adapt to the new sediment conditions. Increased turbidity could reduce light levels in aquatic habitats and temporarily impact water pH and reduced dissolved oxygen levels. The aquatic habitats directly affected by cable installation would primarily be confined to the footprint of the jet and shear plows, of anchors or spuds used to stabilize the barge, and of concrete mats; and those habitats affected by blasting in the Harlem River. Anchorage would be anticipated in specific areas such as locations of construction and removal of the five temporary cofferdams and cable landings at water-to-land transitions, marine splicing locations, and possibly along the 460-foot length of bedrock blasting in the Harlem River (at MP 324.5). The anchors would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. The collective length of all work where anchors might be deployed and cause impacts on benthic habitat is less than 1 percent of the approximately 197-mile (317-km) aquatic portion of the proposed CHPE Project route. Midline buoys would be used to prevent anchor sweeps that might otherwise affect benthic habitat. Concrete mats would be installed as protective covering over the transmission cables for 3.0 miles (4.8 km) in Lake Champlain and the Hudson and Harlem rivers, representing 1.5 percent of the length of the aquatic portion of the entire transmission line route. Blasting would occur for approximately 460 feet (140 meters) of bedrock in the Harlem River. Therefore, the total benthic habitat area of Lake Champlain and the Hudson and Harlem rivers affected by plowing, anchorage, concrete mats, and blasting during cable installation would be relatively small, and the impacts would be temporary and non-significant.

Expected underwater noise levels from proposed construction activities would be above the National Marine Fisheries Service (NMFS) threshold of 150 decibels relative to 1 micropascal (dB re 1 µPa) root-mean-square (rms) for behavioral impacts on fish, but impacts would be expected to be localized. Behavioral responses of fish could range from a temporary startle to avoidance of an area affected by noise. No injury or physiological impacts would be expected.

The proposed CHPE Project route would avoid directly transiting 18 of the 22 SCFWHs in the Hudson River within 1 mile of the route, but would cross 5 SCFWHs (Catskill Creek, Esopus Estuary, Kingston-Poughkeepsie Deepwater Habitat, Hudson Highlands, and Lower Hudson Reach). Although the transmission line would cross the Catskill Creek SCFWH at MPs 221 to 222, it would cross beneath this SCFWH via HDD; therefore, no impacts on this SCFWH would occur. Construction activities would have temporary, localized effects on the four other SCFWHs crossed by the proposed CHPE Project due to sediment disturbance, turbidity, and associated water quality degradation. This would impact spawning fish in these areas. Additionally, concrete mats would be installed over approximately 1.0 mile (1.6 km), or 1.0 acres (0.4 hectares), of SCFWHs, which represents less than 0.01 percent of the affected SCFWHs. Therefore, concrete mat coverage would be small relative to the total available habitat along the aquatic portion of the proposed CHPE Project.

Overland portions of the proposed CHPE Project route would cross surface water bodies. The transmission lines would be installed over these water bodies by bridge attachment, or beneath the water bodies via HDD or dry ditch crossing methods. Crossings by bridge attachment and HDD would avoid impacts on aquatic habitats and species. HDD would also be used in transitions from water to land and could result in frac-out (i.e., leaks of HDD drilling fluid into the surrounding sediment and water column) that could impact aquatic species and habitat. However, an SPCC Plan would be adopted, and releases of drilling fluid would be remediated during construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from operation of the proposed CHPE transmission system on aquatic habitats and species would include non-significant temperature increases in the sediment, changes in habitat from use of concrete mats, and production or alteration of magnetic and electric fields. During operation of the transmission line, heat loss from the cables could be expected, and would result in increased temperatures in the sediments around the cables. For a cable buried at 4 or 8 feet (1.2 and 2.4 meters) below the sediment surface, the maximum estimated temperature rise over ambient soil temperature at 8 inches (20.3 cm) below the surface of the sediments would be 9 °F and 4 °F (5.0 °C and 2.4 °C), respectively. However, the temperature increase at the sediment surface directly above the cable is estimated to diminish to 1.8 °F (1.20 °C and 1.24 °C at 4 and 8 feet [1.2 and 2.4 meters], respectively), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C and 0.0002 °C, respectively). It is likely that these are overestimated because they do not take into account the cooling effect from natural water flow, which would result in further heat dissipation, the proposed deeper burial of the transmission line, or the insulation provided by the sheathing surrounding the transmission cables. Heat from the cables would dissipate in the sediments, just below the sediment and water interface, which is the biologically productive zone in the sediments. Where the transmission cables are covered with concrete mats, the increase in ambient water temperature surrounding the cables would be 0.25 °F (0.14 °C) and the increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mat is expected to be 1.26 °F (0.70 °C) or less. The effect of the temperature increases would be extremely localized to the area directly above the cables. Therefore, significant impacts on benthic resources from temperature during operation of the transmission line would not be anticipated.

The magnetic field produced by the transmission line would be less than 162 mG in the area directly over the buried transmission line in Lake Champlain and the Hudson, Harlem, and East rivers. According to studies, the survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields. Experiments that exposed fathead minnows, juvenile sunfish, juvenile channel catfish, and striped bass to 360,000 mG showed no evidence in changes in activity. Evidence indicates that electrosensitive organisms such as sturgeon can also detect the weak induced electric fields generated from magnetic fields and respond by attraction or avoidance. However, electric fields used in these studies were higher than the expected induced electric fields at the sediment bed for the proposed CHPE Project transmission line. The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. As such, significant impacts on demersal and electrosensitive species such as Atlantic and shortnose sturgeon that occur in the Hudson River Segment are not expected. Additionally, the effect of magnetic fields on fish eggs and larvae is expected to be negligible.

Pre- and post-energizing sediment temperature and magnetic field surveys, and a hydrophone study to determine the movements of adult Atlantic sturgeon in the Hudson Estuary would be developed and implemented as required by the proposed CHPE Project's NYSPSC Certificate (NYSPSC 2013).

Areas where concrete mats or rip-rap (i.e., rock or concrete protective armoring) would be installed to help protect the transmission lines where an appropriate level of cable burial cannot be achieved, for example where there is exposed bedrock or existing submerged utility lines, would cause a change in benthic habitat type equal to the area of their footprint, and would also result in impacts on submerged aquatic vegetation (SAV) (if present), shellfish, and benthic communities. However, the concrete mats would eventually provide additional new hard-bottom habitat for benthic organisms to colonize, essentially functioning as small patch reefs.

Since the installed transmission cables would not require maintenance, no impacts from maintenance activities are anticipated on aquatic habitats or species. However, impacts could result from localized increases in turbidity and redeposition of sediments resulting from disturbance within the waterbody if the transmission line fails or becomes damaged during operation and requires emergency repair. The cables would have to be dug out of the sediment, repaired, and then reburied. Impacts from repair activities would be similar to the original installation, but would have a smaller area of disturbance and would occur over a shorter duration.

2.6.5 Aquatic Protected and Sensitive Species

Installation, operation, and emergency repairs of the proposed aquatic transmission cable may affect, but are not likely to adversely affect, the federally listed shortnose sturgeon and Atlantic sturgeon (includes the New York Bight distinct population segment [DPS], Gulf of Maine DPS, and Chesapeake Bay DPS of the Atlantic sturgeon). No effects on federally listed marine mammals or non-threatened/non-endangered marine mammals would be expected from the proposed CHPE Project, as occurrences of these species are rare in the Hudson, Harlem, and East rivers. In addition, the proposed CHPE Project transmission line would cross under the East River via HDD. Observations of federally listed sea turtles have been reported in western Long Island Sound. Although it is possible that sea turtles may enter the East River from the Sound, they are generally considered extralimital and would likely occur only as occasional transients. Therefore, the potential for impact from the CHPE Project on sea turtles is so low, it is considered discountable. Additionally, neither the NMFS nor the USFWS have designated or proposed designated critical habitat along the proposed CHPE transmission line installation route; therefore, the proposed CHPE Project would have no effect on designated or proposed to be designated critical habitat. Applicant-proposed measures developed in coordination with Federal and state natural resources agencies would avoid or minimize impacts on aquatic species during construction and operational activities. A BA has been prepared to assist in determining the impacts of the proposed CHPE Project and to facilitate ESA Section 7 consultation and will be included in **Appendix Q** of the Final EIS.

Impacts from Construction

Sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, noise and vibration, vessel strikes, and accidental release of hazardous materials could affect federally listed shortnose sturgeon and Atlantic sturgeon in the Hudson and Harlem rivers during cable installation. The sensitivity of fish to localized and temporary increases in turbidity, suspended sediment, and downstream sedimentation is species- and life-stage-specific, and associated impacts might include impairment of feeding, impaired ability to locate predators, and reduced breeding activity. The Applicant would restrict construction activities to specific timing windows to protect ESA-listed and candidate fish species during spawning migrations, which are the most vital and sensitive portions of their lifecycle.

The NYSPSC Certificate issued for the proposed CHPE Project established construction work schedule windows identifying times of the year when work associated with the underwater portion of the transmission line may take place (NYSPSC 2013). These work windows were subsequently supplemented through consultation with NMFS. These established work windows and time of year restrictions were developed to avoid impacts on overwintering, spawning migrations, spawning activity, and larval stages of ESA- and state-listed fish and EFH species. NYSDOS has conditionally concurred with these construction windows as part of its CMP consistency certification for the proposed CHPE Project. Restriction of construction activities to specific windows of time would protect ESA-listed fish species during spawning migrations, which are the most vital and sensitive portions of their life cycle.

Installation of rip-rap or concrete mats and blasting in the Harlem River would be permanent alterations of habitat and could affect shortnose and Atlantic sturgeon, where the concrete mats or rip-rip replaces some soft sediment (forage habitat) with hard-bottom habitat. The affected area would be very small relative to the overall area of available habitat, adjacent habitat would still be available, and new communities of benthic organisms that are prey for shortnose and Atlantic sturgeon would be expected to recolonize over time. Effects of blasting, as described in **Section 2.6.4**, on sturgeon are considered to be remote because sturgeon are transient species in this area of the Harlem River, and sturgeon eggs and larvae are not expected to occur in the Harlem River. However, in addition to detonating the charge in bore holes and stemming the charge with pea gravel, avoidance and minimization of blasting effects on sturgeon could be accomplished by not blasting during slack tides, chasing fish from the site with an air-gun prior to blasts, and surrounding the site with a bubble curtain to minimize fish entry into the shock zone. Noise generated by cable-laying vessels and blasting would elicit temporary behavioral responses by ESA-listed fish species. Most of these effects would be either temporary or intermittent, and it is expected that only a few individuals would be affected relative to the populations and that they would react by moving away from noise sources.

Vessel collisions could impact shortnose and Atlantic sturgeon. However, Applicant-proposed measures, such as operation of vessels at decreased speeds in shallow waters, would reduce noise levels and provide shortnose and Atlantic sturgeon species an opportunity to move out of the way of moving vessels, thereby making it unlikely that a collision would occur.

Any state-listed lake sturgeon or state-listed mooneye present in Lake Champlain during proposed construction activities could be affected by sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, temporary noise and vibration, and potential accidental releases of hazardous materials. The installation of the proposed aquatic transmission line would cause a temporary disturbance on benthic habitat, which supports benthic prey items for state-listed lake sturgeon, but would remain usable as potential foraging habitat for these species. Impacts on the state-listed lake sturgeon could occur from the installation of concrete mats or rip-rap; however, the placement would result in a very small area of overall affected habitat, and sturgeon would be able to utilize adjacent areas for foraging and other activities. Effects on the state-listed giant floater and state-listed pink heelsplitter in Lake Champlain could occur because individuals of these mussel species could be lost during installation due to increases in turbidity and associated water quality degradation, sediment redeposition, installation of rip-rap or concrete mats, and accidental releases of hazardous materials.

As specified in the proposed CHPE Project's Certificate issued by NYSPSC, the Applicant would conduct a series of pre- and post-energizing studies, including benthic macroinvertebrate and sediment sampling and bathymetry surveys, for use in post-installation compliance monitoring (NYSPSC 2013). All studies would be developed in consultation with appropriate resource agencies. The Applicant also would establish the Hudson River and Lake Champlain Habitat Enhancement, Restoration, and Research/Habitat Improvement Project Trust to support items such as such as habitat restoration, enhancement, or protection; habitat research; fish and wildlife species restoration, enhancement, or protection; and water quality improvement.

Impacts from Operations, Maintenance, and Emergency Repairs

Increased temperature, magnetic fields, and weak induced electric fields during operation of the proposed transmission line could impact the protected species identified. During operation, the buried aquatic transmission cables would emit a magnetic field of less than 160 mG measured at the sediment surface, and induced electric fields could be created by water currents or the movement of an animal through the magnetic field. Evidence indicates that electrosensitive organisms (including all sturgeon species) can detect induced electric fields and respond by attraction or avoidance. In some cases, freshwater sturgeon exposed to electromagnetic fields in laboratory studies exhibited temporarily altered swimming behaviors; however, these exposures were at greater magnitudes than those modeled for the proposed aquatic transmission cable. The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. Fish migration would not be affected because migratory species use multiple stimuli for migration, not magnetic detection alone, and species are also exposed to other natural alterations in the Earth's geomagnetic field such as magnetic anomalies in sediments. Additionally, the effect of magnetic fields on fish eggs and larvae is expected to be negligible.

Increases in temperature associated with operation of the transmission line at the sediment-water interface would not be expected to affect pelagic fish, but could have the potential to affect demersal fish that would be closer to the bottom. At burial depths of 4 and 8 feet (1.2 and 2.4 meters) below the surface, the temperature increase at the sediment surface directly above the cable is estimated to be 1.8 °F (1.20 °C and 1.24 °C, respectively), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C and 0.0002 °C, respectively). A measurable amount of local heat generation would not pose a physical barrier to ESA- or state-listed fish passage, and would allow benthic organisms to colonize and demersal fish species (including demersal eggs and larvae) to use surface sediments without being affected. Therefore, effects on reproduction or feeding would not be significant. The potential increase in temperature of the riverbed surface would be within the normal temperature range of all life stages of shortnose and Atlantic sturgeon. Heat could be released from exposed gaps in the concrete mats and rip-rap placed over the aquatic transmission line where it cannot be buried. The estimated increase in ambient water temperature surrounding the transmission cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C). The cooling effect of moving water should quickly dissipate this heat. Therefore, significant effects from operation of the proposed CHPE Project transmission line on protected species would not be expected.

No effects would be anticipated from maintenance because the transmission cable itself would be maintenance-free. Emergency repairs, if necessary, would result in sediment disturbance resulting in temporarily increased turbidity and decreased water quality, and noise could impact protected species. These impacts would be similar to those described for construction but on a smaller scale and over a shorter duration.

As specified in the proposed CHPE Project's Certificate issued by NYSPSC, the Applicant would conduct a series of pre- and post-energizing studies, including sediment temperature and magnetic field surveys and Atlantic sturgeon hydrophone surveys, for use in post-installation compliance monitoring (NYSPSC 2013). The Atlantic sturgeon study would document the species' movements in relation to transmission line operation.

2.6.6 Terrestrial Habitats and Species

Construction and operation of the proposed CHPE Project would generally include the permanent removal and crushing of vegetation, soil compaction, and dust generation. Noise would temporarily increase during construction and maintenance and emergency repair activities, which could result in impacts on wildlife through reduced communications ranges, interference with predator/prey detection, or habitat avoidance. The direct displacement of species would occur during vegetation removal; however, habitat fragmentation and permanent displacement of entire breeding populations would not occur because construction activities would be in fringe habitat within or along existing ROWs.

Impacts from Construction

Impacts on vegetation and habitat could occur from permanent removal of vegetation, root damage associated with excavation, vegetation crushing, soil compaction, potential spread of invasive species, and the generation of dust. In total, approximately 236 acres (96 hectares) of existing forest cover could be temporarily disturbed and 48 acres (19 hectares) changed permanently to managed grasses or shrub habitat to accommodate proposed construction corridors and any necessary additional workspace. However, the habitat along the proposed CHPE Project route would be removed primarily along existing roadway and railroad ROWs, where most vegetation is disturbed. Some fringe forest habitat within and immediately adjacent to these ROWs would be converted to shrub habitat as a result of transmission line installation. In areas where the ROW cannot support installation of the transmission line, deviation areas would be used. Typically, deviation areas identified along the proposed CHPE Project route would be located immediately adjacent to existing ROWs and would extend to an outer boundary ranging up to approximately 200 feet (61 meters) away from the ROW. Like the existing ROWs, deviation areas would primarily be composed of forest fringe (i.e., at the edge of the forest) habitat, and would also include some interior forested areas, streams, residential areas, urban developed areas, and highways or roadways with maintained vegetation. Forested habitat in deviation areas could be more suitable to wildlife because it extends away from the ROWs. Therefore, construction in these areas could result in habitat fragmentation impacts greater than those incurred from construction within the ROWs. Applicant-proposed measures, including clearly marking areas to avoid, using appropriate vegetation-removal and dust-control methods, and developing and implementing an Invasive Species Management Plan, would be implemented to reduce further impacts on vegetation and habitat.

Noise created during construction could result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance. Prior exposure to noise is the most important factor in the response of wildlife to noise because wildlife can become accustomed (or habituated) to the noise. The proposed construction activities would primarily occur along road and railroad ROWs where there is a high level of ambient noise.

Temporary direct displacement of wildlife species during vegetation removal and habitat reduction could occur; however, habitat fragmentation resulting in permanent or significant displacement of entire breeding populations would not occur because construction activities would be in fringe habitat within or along existing ROWs. Wildlife that could be displaced include birds, burrowing animals, and other species that use forests for foraging, breeding, and nesting. However, studies on forest habitat fragmentation indicated that displacement impacts associated with 26-foot (8-meter)-wide corridors were not significant. Interior-forest dwelling species did not avoid inhabitance along the corridor's edges; however, species composition was altered as an edge-preferring species abundances in these areas increased. Additionally, presence of the transmission line corridor, which would primarily be a mixture of grasses and shrubs, would not preclude wildlife from crossing the corridor to reach habitat on the other side. Construction of the up to approximately 20-foot (6-meter)-wide corridor for the proposed CHPE Project would be expected to result in similar localized and temporary changes in community composition (e.g., tree removal and possible displacement of wildlife). However, construction would occur in habitat previously disturbed by noise, emissions from railroads and cars, and human activity. Since only a small percentage of habitat available for wildlife would be impacted, and mobile species that currently inhabit and prefer these areas likely would relocate to seek out similar habitat, construction of the proposed CHPE Project corridor and installation of the transmission line would not be expected to impact the habitats in these areas significantly. Additionally, Applicant-proposed measures, including constructing outside of the breeding season, avoiding sensitive habitat, and using HDD would be implemented to reduce further impacts on wildlife.

Impacts from Operations, Maintenance, and Emergency Repairs

Magnetic and electric fields have the potential to enhance growth response in certain plant species; however, the effects of such on plants are inconclusive. Operation of the transmission line would increase the ambient soil temperature, which could alter biodiversity of terrestrial vegetation and habitat; however, temperature would quickly dissipate as distance from the transmission line increases.

The transmission line ROW would be maintained (i.e., vegetation would be trimmed or removed) to protect the buried transmission line and cooling stations from damage caused by tree roots, to maintain the function of permanent storm water management or access control features, and to replace location and identification markers as necessary. Vegetation management along the ROW would establish stable low-growing vegetation with shallow root systems that would not interfere with the transmission line and would allow adequate access to cooling stations. Vegetation clearing and selective cutting of trees would occur as needed. Such activities would be short-term in duration, but would occur periodically over the operating life of the proposed CHPE Project.

Impacts on vegetation and habitat from maintenance or emergency repair activities could occur from removal of vegetation, root damage associated with excavation, soil compaction, and the generation of dust, but such activities would only occur as necessary and be of a very short duration and small area of disturbance.

Although there is evidence that wildlife can detect magnetic and electric fields associated with transmission lines, previous studies have shown that behaviors would not be affected by relatively small changes in magnetic and electric fields and such fields do not cause any adverse health, behavioral, or productivity effects in animals, including both wildlife and livestock. Operation of the transmission line would increase the ambient soil temperature, which could alter biodiversity of terrestrial vegetation and habitat thereby affecting foraging, nesting, and avoidance behavior in wildlife that use that habitat; however, temperature would quickly dissipate within increasing distance from the transmission line and would be restricted to the maintained transmission line ROW.

Impacts from maintenance and emergency repair activities on wildlife would occur because the permanent ROWs would be permanently maintained as scrub-shrub habitat with woody vegetation less than 20 feet (6 meters) tall. The proposed maintenance could also displace adult or breeding birds, burrowing animals, and other species that use forest edge habitats for foraging, breeding, and nesting. Wildlife species could be displaced permanently if such activities cause a long-term disturbance of breeding habitats, but this would be unlikely as the ROW is fringe habitat or in a previously disturbed area and vegetation in the ROW would be regularly maintained.

2.6.7 Terrestrial Protected and Sensitive Species

Federally listed species that could occur in the proposed CHPE Project transmission line construction corridor include Karner blue butterfly, Indiana bat, and northern long-eared bat. The proposed CHPE Project may affect, but is not likely to adversely affect, the federally listed Indiana bat and Karner blue butterfly and the northern long-eared bat that is proposed for listing as endangered. Indiana bats and northern long-eared bats roosting or foraging within or adjacent to the construction corridor could be disturbed. The proposed CHPE Project could affect the Karner blue butterfly from removal of nectar habitat, which is used for foraging. Wild blue lupine, which is the host plant for the butterfly larvae, would not be affected. There is no critical habitat designated or proposed-designated in the vicinity of the proposed CHPE Project. A BA has been prepared to assist in determining the impacts of the proposed CHPE Project and to facilitate ESA Section 7 consultation and is included in **Appendix Q** of the Final EIS.

The federally listed small whorled pogonia, northern wild monkshood, bog turtle, piping plover, roseate tern, and New England cottontail and the red knot that is proposed for listing could, but are not likely to, be present in the proposed construction corridor; research to date indicates no recorded presence of these species or their suitable habitats along the transmission line route. Therefore, no impacts on these species would be expected.

Construction activities could result in non-significant disturbances (i.e., noise, dust, and lighting) to bat species listed or proposed for listing, bald eagles, state-listed birds, and migratory birds. Such disturbances can cause habitat avoidance by birds in the immediate vicinity of construction. However, these activities would be temporary and localized. Additionally, birds (including protected species of birds) would be able to move away from the construction area; therefore, effects on foraging, productivity and survival would not be significant. Effects from disturbance and habitat fragmentation on state-listed plant and insect species could occur as a result of habitat loss from construction activities; these effects would be similar to those described for non-listed species. However, implementation of several Applicant-proposed measures to prevent direct take of protected and sensitive species during construction would avoid or minimize impacts.

Impacts from Construction

Non-significant effects on protected and sensitive species from construction would include disturbance to the foraging, resting, and nesting/breeding bats and birds. Bats and birds could encounter temporary, increased noise from underwater and underground cable installation and increased construction traffic. Noise associated with the construction vehicles and equipment would produce sound at varying frequencies and intensities that might influence the behavior of species. The effects would vary depending on the species, type of vessel or machinery, relative noise level, distance, frequency, and season. Most bats and birds along the terrestrial transmission line route are not expected to shift farther away given the current level of disturbance from the actively used railroad ROW being used for the line. Any that would move into similar adjacent habitats nearby during construction would likely return to the area once construction is completed, which would last less than 2 weeks in any given location along the transmission line route. The Luyster Creek HVDC Converter Station is proposed to be sited in an industrial area with no suitable habitat for protected and sensitive species; therefore, no effects would be expected from construction of this facility.

Effects on protected species and their habitats that result from vegetation clearing would be the same as described for non-listed species and habitats. These would include habitat loss or degradation via crushing, removal, or other disturbances, changes in community composition, and potential for displacement. However, in the immediate vicinity of the railroad ROW, where most of the clearing would occur, much of the habitat consists of disturbed open lands and secondary forest lacking suitable habitat for most protected and sensitive species. All construction including HDD installation and trenching would avoid direct impacts on all Karner blue butterfly lupine habitat. Approximately 1.8 acres (0.7 hectares) of mapped Karner blue butterfly nectar habitat occurs within the 33-foot (10-meter) construction corridor proposed for trenching installation of the transmission line along the CP railroad ROW. The final work around the boundary would be identified in the EM&CP and fenced to keep all construction activities within it. Following construction activities, the impacted nectar habitat would be restored by seeding species that would provide nectar sources.

Since the corridor would be relatively narrow (i.e., up to approximately 20 feet [6 meters] wide), interior-dwelling species would not likely avoid inhabitance along the edges of the proposed CHPE Project corridor. Also, presence of the transmission line corridor, which would primarily be a mixture of covered with grasses and shrubs, would not preclude wildlife from crossing the corridor to reach habitat on the other side. Several Applicant-proposed measures, including use of HDD under sensitive habitat and marking all known locations of protected and sensitive species on construction drawings and in the field, would be implemented to avoid or minimize impacts on protected and sensitive species. Construction personnel would be trained to identify known and potential rare, threatened, and endangered species where possible, and to follow identification and protection measures included in the EM&CP, including avoiding areas flagged as sensitive habitat.

Impacts from Operations, Maintenance, and Emergency Repairs

During the operational phase of the transmission line, vegetation management would be conducted within the transmission line ROW to prevent the growth of large woody vegetation to avoid damage to the transmission cables, or to provide access to the ROW in the event that emergency repairs or other maintenance of the cables are required. Potential effects from vegetation management would be discountable and would be avoided and minimized through implementation of protective measures during operation and maintenance of the proposed CHPE Project. A Vegetation Management Plan for the operational phase would be developed as part of the EM&CP. No herbicides or pesticides would be used within occupied Karner blue butterfly and frosted elfin butterfly habitats, except as approved by the USFWS and NYSDEC. Any vegetation management, emergency repairs, or other operational maintenance activities required within Karner blue butterfly or frosted elfin butterfly habitats would be implemented in accordance with a mitigation plan for these species being developed by the Applicant in consultation with USFWS and NYSDEC.

No significant effects from the magnetic fields generated by the transmission line would be anticipated. There is no evidence to suggest that magnetic and electric fields associated with transmission lines result in any adverse effects on the health, behavior, or productivity of animals. The research indicates that some species of animals, including birds, are able to detect magnetic fields at levels that could be associated with transmission lines; however, detection is not a conclusive indicator of adverse effects.

2.6.8 Wetlands

Wetlands can provide a variety of functions, including wildlife habitat, groundwater recharge or discharge, sediment and shoreline stabilization, flood storage, nutrient removal, sediment and toxicant retention and production export, and, in some cases, aesthetic and recreational value. Impacts are expected on a total of 77.7 acres (31.4 hectares) of wetlands along the proposed CHPE Project route. Construction activities within the construction corridor along the proposed CHPE Project route would result in impacts on wetland areas due to soil disturbance, changes in surface runoff patterns, and vegetation clearing. Long-term impacts from operation of the proposed CHPE Project would include permanent habitat changes to forested wetlands.

Impacts from Construction

Construction activities within Lake Champlain, the Hudson River, and the Harlem and East rivers would include the installation of the transmission line in the lakebed and river bottom. While these water bodies are considered open water, not wetlands, there are freshwater and tidal wetlands along the shores of these features. Additionally, although installation of the transmission line would occur in portions of SCFWHs along the Hudson River, the proposed CHPE Project would not cross or impact any wetlands contained therein. Impacts on wetlands adjacent to the underwater transmission line in Lake Champlain, the Hudson River, and the Harlem and East rivers are not anticipated as the installation activities would occur more than 100 feet (30 meters) from wetlands, construction would take place over a short period of time, and construction-related sediment releases into the water column would comply with water quality standards. The proposed cooling stations and the Luyster Creek Converter Station would not be located in wetlands.

Transmission line construction in the Overland Segment would directly impact approximately 67 acres (27 hectares) of wetlands within the construction corridor. The Hudson River Segment of the proposed CHPE Project would have an 8-mile (13-km) terrestrial segment that would cross three additional wetland areas in Stony Point and Haverstraw totaling 0.8 acres (0.3 hectares). The transmission line would cross a 0.03-acre (0.01-hectare) wetland in Haverstraw; the other two crossings would be by HDD. No delineated wetlands are present in the construction corridor of the New York City Metropolitan Area Segment.

The construction sequence within wetlands along the proposed Overland Segment would typically consist of vegetation clearing within the construction corridor (tree stumps would only be removed from the trench line or where necessary), removal and stockpiling of the upper 18 inches (46 cm) of hydric soils, followed by excavation of a trench approximately 3.5 feet (1.1 meters) deep and up to 9 feet (2.7 meters) wide at the surface, or the use of HDD technology. The cables would then be placed in the trench, and then the trench would be backfilled. Land restoration would include placing the removed wetland soils back onto the excavated trench area to facilitate wetlands restoration, and the disturbed area would be mulched or hydro seeded. Restoration of wetlands would be completed within 24 hours after backfilling is completed.

Temporary impacts would occur on 16.2 acres (6.6 hectares) of forested wetlands and 51.2 acres (20.7 hectares) of non-forested wetlands. Following completion of construction activities and surface restoration, these 67.4 acres (27.3 hectares) of wetlands would be expected to re-establish themselves naturally. Emergent wetland vegetation would re-establish quickly following construction, and woody species would follow. Forested wetlands would be expected to go through several stages of successional vegetation before returning to the pre-construction vegetation cover type. Wetland functions and values, including wildlife habitat, groundwater recharge or discharge, sediment and shoreline stabilization, flood storage, nutrient removal, sediment and toxicant retention, and production export would be expected to be restored to these disturbed wetlands.

Permanent, significant impacts would occur on 2.0 acres (0.8 hectares) of forested wetlands that would be converted to emergent or scrub-shrub wetlands and on 8.3 acres (3.4 hectares) of non-forested wetlands. This conversion would alter the wetland vegetation from trees greater than 20 feet (6 meters) to woody vegetation less than 20 feet (6 meters), including true shrubs and young trees. Impacts on forest-dwelling wetland species would be expected once the wetland has been converted from a forested wetland to a shrub-scrub wetland. Wetland mitigation would be required for any permanent impacts on wetlands. As part of its Section 404 and Section 10 permit application, the Applicant has submitted a conceptual wetland mitigation plan to the USACE to address this permanent change in habitat type. To mitigate for permanent impacts on wetlands, per the mitigation plan, the Applicant would establish 1 acre (0.4 hectares) of new wetland and preservation and enhancement of 10 acres (4 hectares) of wetlands for each 1 acre (0.4 hectares) of permanently impacted wetlands.

HDD would be used in some locations to reduce the level of impacts on wetlands when compared to trenching. A total of 0.5 miles (0.8 km) of wetlands would be crossed by use of HDD. Where used, the HDD borehole would be drilled underneath the wetland, a conduit would be pulled into the borehole, and then the transmission cables would be pulled into the conduit. The HDD drilling equipment and drill entry point would be located outside the wetland and the drill would exit beyond the other boundary of the wetland, avoiding direct impacts on wetlands. As required in the EM&CP, an SPCC Plan would be in place to respond to any frac-outs of bentonite.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts on wetlands from operation of the proposed CHPE Project would not be expected because the installed transmission line would not require maintenance. Thus, maintenance activities would be confined to routine ROW vegetation management in the Overland Segment as established in the EM&CP Vegetation Management Plan. These activities would consist of cutting woody vegetation by hand or by mechanical means every few years. The 2.0 acres (0.8 hectares) of forested and 8.3 acres (3.4 hectares) of non-forested wetlands that would be permanently impacted (for a total of approximately 10.2 acres [4.1 hectares] of impacted wetlands) would be subject to routine vegetation management activities. These activities would not be expected to alter wetland hydrology, compact wetland soils, or otherwise change the physical characteristics or functions and values of the wetlands in the transmission line ROW.

Although the transmission line is designed to be maintenance free, trenching or excavation could be required to conduct emergency repairs of defective cable segments under wetlands. These activities would be infrequent and would occur in accordance with applicable Federal, state, and local permits. Impacts from these emergency repairs would be similar to the initial construction, as the defective section would be dug up, a new section spliced in, and the cable reburied.

Where the cables would be installed by HDD, impacts on wetland areas from emergency repairs would be avoided because the transmission cables would be cut and pulled out of the installed conduit and the new cable pulled into it without affecting the wetland.

Additionally, significant impacts would not be expected on nearby wetlands from emergency repair activities on aquatic transmission line segments. Localized increases in turbidity and redeposition of sediments from disturbance within the waterbody would result from emergency repair actions; however, these repair actions would occur over a short period of time and in a more limited area than initial installation, and, therefore, impacts on nearby freshwater or tidal wetlands would not be anticipated.

2.6.9 Geology and Soils

Impacts from Construction

Construction activities associated with the installation of the aquatic portions of the proposed CHPE

Project would result in localized modification of lakebed and river microtopography; and suspension, transport, and resettlement of riverine and lacustrine sediments. Pre-existing conditions would likely be reacquired over time and impacts minimized through the use of Applicant-proposed measures, such as the use of a shear plow in the southern portion of Lake Champlain.

Impacts from construction activities associated with the installation of the terrestrial portions of the proposed CHPE Project would include short-term increases in soil erosion, soil compaction, and bedrock blasting. Exact locations of bedrock blasting are yet to be determined. Applicant-proposed measures, such as silt fences, would minimize impacts and, once installation is completed and trenches have been filled, local drainage characteristics and soils would be returned to previous conditions.

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts would be expected from the operation of the aquatic portion of the transmission line, because there would be no thermal or magnetic or electric field impacts on geology and soils. Maintenance for the transmission line itself is not anticipated to be necessary as it is designed to be maintenance-free. No impacts would be expected on physiography, topography, geology, or seismicity, apart from intermittent emergency repair activities, as required. The proposed transmission cables would be insulated and armored cables would be designed to accommodate seismic events. If the transmission line failed due to a seismic event, its protection system would quickly de-energize the transmission system and the HVDC transmission cables would dissipate very limited energy under short circuit (i.e., fault) conditions; therefore, it would not result in direct impacts on the environment, navigation, or public safety. A cable repair procedure would be implemented, as appropriate, immediately following any seismic events.

For the terrestrial portion of the transmission line, periodic mowing or tree-clearing maintenance activities of the terrestrial ROW could result in soil erosion or sedimentation, but impacts would not be significant, and soils would be retained on site with the use of Applicant-proposed measures (i.e., BMPs). Maintenance for the transmission line itself is not anticipated to be necessary as it is designed to be maintenance-free. Maintenance for the cooling stations and converter station would occur, but would not result in any impacts on geology and soils. Emergency repairs of the terrestrial portion of the transmission line would result in impacts on soils similar to, but less than, those described for construction activities because a smaller area would be disturbed for a shorter duration. The impacts of such activities also would be minimized through the use of Applicant-proposed measures.

2.6.10 Cultural Resources

Ground-disturbing activities associated with the installation of the transmission cables could result in adverse effects on historic properties in the proposed CHPE Project Area of Potential Effects (APE). Geographic Information System (GIS) analysis indicates that there are 51 terrestrial archaeological sites, 2 terrestrial sites that extend into Lake Champlain, 11 underwater sites, 36 National Register of Historic Places (NRHP)-listed or -eligible architectural properties, and 2 historic cemeteries in the APE.

Impacts from Construction

Ground-disturbing activities associated with construction could damage archaeological features and would be expected to disturb the context of artifacts of the terrestrial archaeological sites, underwater sites, and historic cemeteries. In the case of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP, this could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a Programmatic Agreement (PA) (see **Appendix T** of the Final EIS) has been developed to manage and resolve adverse effects through avoidance, minimization, or mitigation. Because the transmission line would be underground or underwater and would avoid any standing structures, the adverse effects from construction on the NRHP-listed and -eligible architectural properties in the APE would be limited to exposure to temporary noise, dust, and vibrations and short-term visual effects from the proximity of construction activities and equipment. The effects would not require mitigation. HDD would be used to install the transmission line under Stony Point Battlefield Historic Park.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a Cultural Resources Management Plan (CRMP) that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known terrestrial and underwater archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. Circumventing known underwater sites or anomalies would avoid potential damage to the integrity of the site. A PA pursuant to 36 CFR 800.14(b) has been prepared (see **Appendix T**) and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G**.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation of the proposed CHPE Project would have no effects on terrestrial and underwater archaeological sites in the APE. Because the proposed CHPE Project would involve an underground transmission line, operations would have no adverse effects on 33 of the 36 architectural properties in the APE. The operation of the proposed cooling station at MP 112 could have noise and visual impacts on the McMore Residence (National Register Eligible [NRE] 15) and the Main Street Historic Bridge (National Register Listed [NRL] 19). Operation of the proposed cooling station at MP 296 could have noise and visual impacts on Stony Point Battlefield Historic Park. Depending on the exact location of the cooling station, these impacts could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T** of the Final EIS) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. Vegetation maintenance activities and emergency repairs, if necessary, would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources sites; therefore, effects would not be expected from such activities.

2.6.11 Visual Resources

Construction and operation of the proposed CHPE Project would generally be consistent with the existing visual environment. Impacts would be anticipated during construction from the presence of construction equipment and activities along the project route. Constructed facilities, such as cooling stations and the converter station, would be visible during operations, but would only result in minimal changes to the existing visual landscape.

Impacts from Construction

Construction equipment and materials would be visible along the proposed CHPE Project route during the construction period. Along the aquatic portions of the proposed CHPE Project route, the transmission cables would be buried beneath the beds of existing waterways and a cable-laying vessel, support vessels, and barges would be visible on the water surface. Minimal land-based support would be required. Land-based support facilities would be constructed within existing ports with existing heavy lift facilities and would be within the existing industrial context of the viewsheds. Additionally, construction materials on the water surface would only be visible in one place for a short duration as construction progresses though the waterway, thereby minimizing impacts on visual and aesthetic resources.

Along the terrestrial portions of the proposed CHPE Project route, construction equipment would temporarily be visible in the locations of active construction on land along existing road and railroad ROWs. Equipment necessary for clearing, trench excavation, cable installation, backfilling, and restoration would be located briefly at each construction site. Temporary support facilities would also be established along the terrestrial portions of the proposed CHPE Project route. These facilities would be sited within the road or railroad ROWs and use the minimum space required to facilitate safe installation. Following construction, impacted areas within terrestrial portion of the proposed CHPE Project route would be seeded and allowed to revegetate naturally. Depending on the type of vegetation involved, natural conditions could return in a matter of months to a few years.

Where the proposed CHPE Project route would cross aesthetic resources such as Stony Point Battlefield State Park and Rockland Lake State Park, the Applicant would use HDD techniques, which would allow installation of the transmission line without disturbing the surface features of the parks. This would eliminate any potential impacts on these aesthetic resources from construction activities. Construction equipment would be visible during construction at the HDD staging area sites.

Impacts from Operations, Maintenance, and Emergency Repairs

No visual impacts or impacts on aesthetic resources would be anticipated along the aquatic portion of the proposed CHPE Project route during operations, because no permanent facilities would be present. Minimal visual impacts during inspection and emergency repair activities along the aquatic portion of the route would be anticipated from the temporary presence of vessels and repair activities that would be visible along the proposed CHPE Project route.

Along the terrestrial portions of the proposed CHPE Project transmission line, visual impacts during maintenance and emergency repair activities would be anticipated from the temporary presence of ROW vegetation maintenance and repair activities and equipment along the proposed CHPE Project route.

Cooling stations would be present along the proposed CHPE Project route within aesthetic resources, such as Saratoga Spa State Park and Spensieri Park. However, the cooling stations would not result in significant visual impacts or would have impacts on aesthetic resources because the cooling stations would be small and only minimally change the character of the existing viewshed.

Operation of the Luyster Creek Converter Station would not be expected to result in any impacts on sensitive aesthetic resources because no sensitive aesthetic resources are present in the immediate vicinity of the converter station site. Additionally, operation would not be anticipated to result in visual impacts because the converter station would be in character with the existing industrial nature of the visual environment, and would be comparable in scale to its surroundings and not break the existing established horizontal skyline.

2.6.12 Infrastructure

Impacts from Construction

Construction of the aquatic portions of the proposed CHPE Project would require crossing existing electrical, water supply, communications, natural gas, sanitary sewer, and other utility lines in waterways. Temporary disruptions (i.e., interruptions) in utility services would be avoided to the extent practicable and coordinated with utility owners. Installation of the aquatic portion of the transmission line would potentially disturb and suspend sediment, some of which might be contaminated, that could temporarily adversely impact water supply systems along the proposed CHPE Project route. However, the NYSPSC Certificate contains conditions that set forth procedures the Applicant must follow to avoid or minimize impacts on water supply systems along the proposed CHPE Project route. Model results indicate that, in conjunction with Applicant-proposed measures, acute toxicity-based water quality standards likely would not be exceeded under the proposed CHPE Project. Impacts on solid waste management facilities would occur due to the generation and management of soils and debris during construction and HDD activities, but contributions to area landfills (which have capacity) would be not be significant.

Construction of the terrestrial portions of the proposed CHPE Project would also require crossing utility lines that intersect road and railroad ROWs. Construction would be coordinated with local utilities to eliminate or minimize disruption to utility service. Capacities of solid waste management facilities would be reduced due to the disposal of construction-related debris and appropriate disposal of contaminated soils. Clean excavated soils would be reused as fill, and waste would be recycled to the maximum extent practicable, thus minimizing the proposed CHPE Project's contributions to regional landfill capacities.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical infrastructure in New York State would benefit over the long term because the proposed CHPE Project would increase reliability, efficiency, and capacity and reduce congestion in the New York Control Area.

Since the transmission line would be maintenance-free and inspections would be non-intrusive, impacts on other electrical infrastructure, storm water management systems, communications lines, natural gas supply lines, or sanitary sewer systems in the aquatic operational portions of the proposed CHPE Project corridor would not be expected. Any emergency repair activities that could impact utilities would be coordinated with the utility providers. Operation of the terrestrial portions of the proposed CHPE Project would not result in impacts on other electrical infrastructure, communications, natural gas supply, or sanitary sewer systems in the proposed CHPE Project corridor.

2.6.13 Recreation

Construction and operation of the proposed CHPE Project would result in limited, temporary impacts, but would not permanently impact any recreational resources along the proposed CHPE Project route.

Impacts from Construction

Construction activities associated with the installation of aquatic portions of the proposed CHPE Project would include the generation of additional vessel traffic, which could inconvenience recreational water-dependent uses and possibly create temporary navigational obstacles. During underwater cable installation, there would be construction vessel activity along the proposed route. Access to shoreline recreational areas (i.e., boat launches and piers) would be maintained, as feasible, but could be partially limited during construction for safety reasons.

Construction activities associated with the installation of the terrestrial portion of the proposed CHPE Project, which would be buried underground along existing railroad and roadway ROWs, could reduce the number of traffic lanes in local roadways accessing recreational resources along the proposed route. Access to recreational areas would be maintained at all times during construction activities using traffic flaggers or other traffic management methods in coordination with park operators. Following construction, the Applicant would reseed the construction area and allow it to revegetate naturally, thereby returning any recreational areas and adjacent areas to their natural conditions. Use of HDD would avoid adverse impacts on recreational users by allowing installation of the transmission line without disturbing the surface features or uses of park lands. Staging areas for HDD would be outside of park boundaries, though equipment could be visible during construction; however, no permanent impacts on recreational resources would be anticipated. No cooling stations would be constructed on park lands or in recreational areas, and access to recreational areas would be maintained during construction.

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, the proposed CHPE Project transmission line would generally be underwater or underground and, therefore, it would not be visible or interfere with recreational resources. Maintenance activities, including inspection and preventive maintenance of the cooling stations and converter station, would be expected to occur throughout the life of the transmission line; however, these activities would occur on an intermittent basis.

Periodic non-intrusive inspection of aquatic portions of the transmission line using vessel-mounted instruments would result in negligible additional vessel traffic, and would not impact recreational water-dependent uses. If necessary, emergency repair activities along the aquatic transmission line would result in temporary inconveniences and navigational obstacles for recreational vessels in the immediate vicinity of the repair site for up to approximately 2 weeks.

Periodic inspections of the terrestrial portions of the transmission line and aboveground infrastructure (i.e., cooling stations and converter station), and routine preventive maintenance or emergency repairs of the aboveground infrastructure, would generally be non-intrusive and would not disrupt (i.e., disturb, interrupt, or otherwise change) adjacent recreational resources.

2.6.14 Public Health and Safety

Construction and operation of the proposed CHPE Project would be conducted in accordance with the activity-specific Health and Safety Plans (HASPs) and Emergency Contingency Plan to be developed by the Applicant. The HASPs would identify requirements for minimum construction and operational distances from residences or businesses, and requirements for temporary fencing around staging, excavation, and laydown areas during construction, including blasting. The HASPs would identify measures to be employed during operations to limit public access to the proposed facilities (i.e., permanent fencing around the cooling stations and converter station). The HASPs would include provisions for worker protection, as required under the National Electrical Safety Code (NESC) and by the Federal Occupational Safety and Health Administration (OSHA).

Impacts from Construction

Specialized equipment would be necessary for the installation of the proposed transmission cables in the aquatic environment. Construction personnel would be performing the work on a vessel designed solely for the purpose of installing transmission cables. Operation of the aquatic installation equipment and vessels would be performed by personnel specifically trained to use this equipment. An Aquatic Safety and Communications Plan detailing USCG regulations for safely operating vessels and requiring coordination with the USCG Waterways Management and Vessel Traffic Services would be developed to meet regulatory permit conditions regarding working over or near water.

Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal and state safety regulations. The activity-specific HASPs would contain hazard communications information, hazard identification, risk assessment, and the information necessary to perform the work safely (e.g., Safety Data Sheets [SDSs] and personal protective equipment [PPE] to be used). Blasting activities and safety measures during such activities would be managed with a blasting plan. All construction sites in both aquatic and terrestrial environments would be managed to prevent harm to the general public. The public would be notified prior to commencement of construction activities and temporary fencing around staging, excavation, and laydown areas would be installed during construction activities.

Impacts from Operations, Maintenance, and Emergency Repairs

An ERRP would be prepared prior to the proposed CHPE transmission system being put into operation that would identify procedures necessary to perform maintenance and emergency repairs. The ERRP would detail the activities, methods, and equipment involved in repairs and maintenance of the transmission system. Contractors would follow all guidelines detailed in the ERRP when conducting maintenance or emergency repair activities.

All aquatic transmission cables would be accessible by either divers or ROV, and periodic non-intrusive inspections would be performed in accordance with manufacturer's specifications to ensure equipment integrity and protection is maintained. Contractors would follow all guidelines detailed in the ERRP when conducting maintenance or emergency repair activities.

The aquatic transmission cables require no fluid for insulation and would be buried at depths or otherwise protected to prevent disturbance from unrelated operations in waterways. Before the proposed CHPE transmission system would be put into operation, the terrestrial portions of the route would be appropriately marked, and the final route and placement of the transmission cable and associated equipment would be provided to the NYSPSC for addition to the "Call Before You Dig" database. This would be expected to prevent any accidental damage of, or contact with, the cables once they are operational.

Magnetic and electric field levels associated with the proposed CHPE Project transmission line would be below any established health effect levels and would comply with NYSPSC siting guidelines.

2.6.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the aquatic and terrestrial transmission cables would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products, and small amounts of hazardous wastes would be generated as by-products of the transmission cable installation and burial process.

The installation of the aquatic transmission cables has the potential to suspend temporarily and transport sediment and any associated contaminants from water-jetting activities. However, a majority of the sediments would be redeposited in close proximity to its source. The transmission cables would enter the Hudson River approximately 45 miles (72 km) downstream of the southern end of the Hudson River PCB Dredging Project; therefore, the proposed CHPE Project would not impact the Hudson River PCB Dredging Project.

The installation of the terrestrial transmission cables could disturb contaminants potentially deposited in the soil due to the extended use of portions of these areas as railroads and the current and former use of nearby areas for industrial and commercial operations.

Construction of the cooling stations along the route of the transmission line and the Luyster Creek HVDC Converter Station and would involve the transport, handling, use, and onsite storage of hazardous materials and petroleum products.

Construction of the converter station would not interfere with the ongoing Resource Conservation and Recovery Act (RCRA) investigations and remedial activities occurring on the former Astoria Gas Works site to the west. Construction of cooling stations would be sited in consultation with the NYSDEC to ensure that they do not conflict with ongoing remedial investigation activities, as applicable.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate the vessels, remote diving vehicles, trains, trucks, and other equipment needed to conduct terrestrial ROW maintenance activities, routine non-intrusive inspections, and potential emergency repairs of the aquatic and terrestrial transmission cables.

Should any sections of the transmission cables need to be unearthed for inspection or emergency repair, localized disturbances of soil and sediment potentially containing contaminants would be required. However, because the transmission cables themselves are designed to be maintenance-free and require infrequent inspections, any impacts from maintenance and emergency repairs on hazardous materials and wastes would not be significant. The transmission cables do not contain any hazardous fluids, thereby eliminating any potential for sediment contamination from the cables themselves.

A type of refrigerant gas, presumably a non-halogenated hydrocarbon, would be used with the heat exchange process in the chiller system at the cooling stations. If released, this refrigerant would vaporize and not result in air, soil, or groundwater contamination at the cooling stations. Operation of these cooling stations would require limited amounts of hazardous materials and petroleum products for equipment lubrication, cleaning, routine maintenance, and emergency repairs. Minimal amounts of hazardous materials would also be required for standard operations, maintenance, and emergency repairs at the Luyster Creek HVDC Converter Station.

2.6.16 Air Quality

Temporary impacts on air quality would result from construction and maintenance equipment emissions, and no direct emissions would occur from operation of the proposed CHPE Project.

Impacts from Construction

Construction-related air pollutant and GHG emissions associated with the installation of aquatic portions of the proposed CHPE Project primarily would occur from diesel fuel-powered internal combustion engines. Heavy equipment, barges, generators, and boats would emit pollutants such as carbon monoxide (CO), CO_2, sulfur oxide (SO_x), particulate matter (PM), NO_x, and VOCs, including aldehydes and polycyclic aromatic hydrocarbons (PAHs). All emissions associated with aquatic cable installation in a single waterbody would occur during a 1-year construction season. Emissions associated with construction of the aquatic portions of the proposed CHPE Project would not exceed the General Conformity Rule *de minimis* thresholds established in 40 CFR 93.153(b) for individual nonattainment pollutants.

Construction-related air and GHG emissions associated with the installation of the terrestrial portion of the transmission cable and the converter station would primarily be from diesel internal combustion engines and fugitive dust from earthmoving activities. Bulldozers, rock trenchers, bucket loaders, cranes, and other heavy equipment use diesel internal combustion engines, and would emit air pollutants. Fugitive dust emissions would result as the construction corridor is generally unpaved and most of the heavy equipment use would occur within the construction corridor. Applicant-proposed measures would be implemented to reduce impacts from emissions and minimize fugitive dust.

All emissions associated with construction would be temporary and spread over approximately 3 years of planned work activities. It is anticipated that construction emissions associated with the terrestrial portions of the proposed CHPE Project would not exceed the General Conformity Rule *de minimis* thresholds and, therefore, a General Conformity Determination is not required for any portion of the proposed CHPE Project.

The construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, increase the frequency or severity of a violation of any ambient air quality standard, exceed any evaluation criteria established by the State Implementation Plan (SIP), or delay the attainment of any standard or other milestone contained in the SIP.

Impacts from Operations, Maintenance, and Emergency Repairs

Air pollutant and GHG emissions associated with maintenance, inspection, and emergency repair activities would stem from vehicle and equipment engine use and the generation of fugitive dust. Fugitive dust would be created during earthmoving activities and traveling along unpaved roads. Although maintenance, inspection, and emergency repair activities would occur for the life of the proposed CHPE Project, there would not be significant impacts on the regional air quality due to the sporadic small-scale nature and likely short duration of these activities. The types of heavy equipment and vehicles used would be similar to those described for construction; however, their usage would be considerably less. The resulting increase in emissions would not be significant. In addition, maintenance and emergency repair activities associated with the proposed cooling stations and converter station would not have significant impacts on the regional air quality.

In addition, the proposed CHPE Project would introduce 7.65 terawatt hours (TWh) per year of low-carbon renewable energy from Canada into New York's power markets. Upon operation of the proposed CHPE Project, it has been estimated that annual New York State power generation emissions would be reduced by 1.5 million tons of CO_2, 751 tons of SO_2, and 641 tons of NO_x while meeting its annual electric power demand.

2.6.17 Noise

Construction and operation of the proposed CHPE Project would be in compliance with all applicable noise policies and codes.

Impacts from Construction

Construction of the aquatic portions of the transmission line would cause a temporary increase in noise levels in the construction area. Aquatic construction activities would generally occur at distances greater than 600 feet (183 meters) from noise-sensitive receptors. However, in some locations construction activities would occur at distances approximately 100 to 500 feet (30 to 152 meters) from shore. There would be noise impacts on residents along the shoreline when vessels and heavy equipment are within 500 feet (152 meters) of the shoreline. At this distance range, the noise level was conservatively estimated to range from 62 to 70 A-weighted decibels (dBA). Given the nature of the continuously progressing installation along the aquatic transmission line route, it is likely that nearby receptors on the shoreline would be subject to noticeable sound increases for no more than a few hours as the work would progress at a rate of approximately 1.5 miles (2.4 km) per day.

The blasting program required to excavate rock along the proposed CHPE Project route in the Harlem River would consist of drilling boreholes and use of either pre-packaged chemical demolition agent or water gel dynamite to generate the expansive force necessary to fracture the rock. Nominal noise and vibration would be expected from the drilling process, and noise would result primarily from air compressors mounted on the barge. It is unlikely that blasting would generate appreciable aboveground noise. The proposed blasting activities would comply with frequently used vibration thresholds. Blasting and its noise and vibration effects on nearby land uses and structures would be managed with a blasting plan for each site. With proper implementation of a blasting plan, whereby all nearby existing buildings and structures are accounted for, the increase in noise and vibration levels would be managed to minimize noise impacts on potential receptors.

Construction of the terrestrial portion of the transmission line would cause a temporary increase in noise levels. Terrestrial transmission cable installation requires a wide range of site preparation and cable installation activities and equipment that generate noise. Terrestrial construction would generally occur approximately 100 to 500 feet (30 to 152 meters) from residences and users of recreational resources along the terrestrial portions of the project route. At these distances, the noise level was conservatively estimated to range from 66 to 86 dBA. However, in a few places along the transmission line route, including the Overland Segment, Stony Point, Haverstraw, and Queens, construction activities would occur within 100 feet (30 meters) of residences. Noise levels within this distance would be approximately 80 to 85 dBA, similar to those produced by a motorcycle at 50 feet (15 meters). Noise at these levels could result in speech or sleep interference in areas close to the operating construction equipment. Applicant-proposed measures such as equipping construction equipment with appropriate sound-muffling devices (i.e., Original Equipment Manufacturer [OEM] or better), maintaining equipment in good operating condition at all times, and limiting high-noise construction activities to daylight hours in areas with sensitive noise receptors would minimize impacts. The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line.

HDD installation activities at the major water-to-land transitions would result in temporary noise level increases at nearby noise-sensitive receptors. Noise generated from the HDD operation would be relatively constant and, at a level of up to 89 dBA within 100 feet (30 meters) of the HDD equipment, slightly louder than typical construction noise levels. HDD operations at the major water-to-land transitions would be in place for up to approximately 2 weeks, and, where warranted, the Applicant has proposed to erect wooden sound barriers in addition to the above-cited noise minimization measures, or in extreme cases, offer temporary lodging for affected residents.

Impacts from Operations, Maintenance, and Emergency Repairs

Noise impacts from the operation of cooling stations and the converter station and maintenance and emergency repair activities would be expected. The increase in sound levels resulting from periodic inspection and vegetation maintenance activities in the transmission line ROW would not be significant and primarily would be associated with noise generated from additional vessel and construction vehicle traffic. Such activities would be short-term in duration, but could occur multiple times over the operating life of the transmission line. Noise levels generated from emergency repair activities would be similar to those expected during construction but with less equipment, only in a discrete area where repair activities are required, and for a shorter duration.

The cooling stations would be designed by the Applicant to limit noise generated to levels of less than 50 dBA at 100 feet (30 meters). Residential areas are present along the proposed CHPE Project route and some residences could be within 100 feet (30 meters) of the cooling stations. However, cooling station noise levels at nearby receptors would comply with the NYSDEC Noise Policy of 65 dBA for new noise sources. In addition, cooling stations would only operate as required to cool the transmission cables, primarily during summer months. The operation of the Luyster Creek HVDC Converter Station would add to baseline environmental noise levels in the immediate area; however, operations would be compliant with the New York City zoning exterior standard for exterior uses bordering an M3 industrial zone, the New York City Noise Code, and the NYSDEC Noise Policy.

2.6.18 Socioeconomics

Construction and operation of the proposed CHPE Project would require relatively few specialized workers and laborers over the lifetime of the project. Project requirements for non-specialized construction workers and local housing units along the CHPE Project corridor should be adequate to meet labor demands associated with the project. Tax receipts and revenue associated with construction expenditures would increase for local municipalities and an annual reduction in wholesale electrical energy market prices would occur.

Impacts from Construction

Over the approximated 4-year construction period, the proposed CHPE Project would result in an estimated average 300 direct construction jobs. Additionally produced indirect and induced jobs would be associated with supplying materials and providing other services for construction of the proposed CHPE Project.

Relatively few (i.e., approximately 20) specialized workers would be required during construction activities and would be on site only for the duration of those activities (i.e., 2 weeks or less) in any given location. Non-specialized workers would be hired from the existing construction workforce along each segment of the proposed CHPE Project corridor. Therefore, it is unlikely that large numbers of workers would permanently migrate to the area to meet the labor demands of the project. The few specialized workers travelling to the area for construction of the proposed CHPE Project would likely be housed either in local hotels or other short-term boarding units. Given the low number of specialized workers required for construction, existing housing options along each segment of the proposed project corridor should be adequate to meet the temporary increase in demand.

Spending associated with construction (e.g., purchase of building materials, construction workers' wages, and purchases of goods and services) would temporarily increase tax receipts and revenue for local economies. Building materials required for the proposed CHPE Project would be purchased as needed from local sources. Construction activities within roadways could interfere with access to local businesses. However, construction zones would be established in a given location for 2 or less weeks at a time and a Maintenance and Protection of Traffic Plan would be developed to ensure continuous road access to businesses.

Easements would be acquired by the Applicant, where appropriate, along the proposed CHPE Project corridor and the Applicant would pay for any associated land restoration costs following construction activities in these areas. Since construction activities would be temporary and property would be returned to pre-construction conditions once completed, it is unlikely that property values would be impacted.

Impacts from Operations, Maintenance, and Emergency Repairs

Approximately 26 direct, full-time employees would be hired to operate the proposed CHPE Project; of this total, 21 employees would be located in the New York City metropolitan area. A negligible number of indirect jobs could also be created for maintenance inspections and possible emergency repairs that, if needed, would be conducted by contractors. Considering the low number of jobs that would be created, the existing workforce within the project area would be able to meet the employment and housing demands of the proposed CHPE Project.

The Applicant would pay fees, as appropriate, to New York State agencies for use of state lands occupied by the proposed CHPE Project. Some elements of the proposed CHPE Project transmission system facilities would be taxable as real property. Local municipalities would impose a tax on the facilities and the Applicant would pay the tax. Tax receipts are estimated to be 2 percent of the annually assessed municipal property value; this percentage is calculated per New York State tax regulations and is subject to change.

Residents throughout the New York City metropolitan area are projected to receive approximately $200 million in annual energy savings. The vast majority (i.e., 91 percent) of savings is expected for the New York City metropolitan area. Costs associated with operation of the transmission system would be borne (as a merchant project) by investors; they would not be directly passed on to ratepayers.

The transmission line would typically be buried primarily in road and railroad ROWs and would not be visible; therefore, its presence would not present a general detriment to private property values. Easement payments to landowners would compensate landowners for any access or use restrictions placed on private properties and would offset any potential impacts on property values. The Applicant would also pay for any land restoration costs associated with any emergency repairs to the system that might be required. Because maintenance and emergency repair activities would only occur in a given location for 2 weeks or less, no change in private property values would be expected.

2.6.19 Environmental Justice

Construction and operation of the proposed CHPE Project would not result in disproportionately high and adverse effects on minority and low-income populations.

Impacts from Construction

The census tracts along the proposed CHPE Project transmission line corridor have minority or low-income population levels that generally are lower than those for New York State, except for census tracts closest to New York City where a larger number of minority and low-income populations reside, particularly in Queens. Human health and environmental effects from increases in air emissions, noise, dust, and construction vehicle traffic on all populations, including minority and low-income populations, would be small, and occur only on a transitory, temporary schedule. Portions of the transmission line would be constructed in aquatic environments, which would further reduce construction-related effects on minority and low-income populations because activities would occur farther from populations residing on land. Cooling stations would be constructed along the proposed CHPE Project route primarily in existing railroad ROWs, and the Luyster Creek HVDC Converter Station would be constructed in an industrial area with no permanent residents. Therefore, no disproportionately high and adverse effects on minority and low-income populations would occur from construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Operation of the transmission line would create magnetic fields; however, no adverse effects from magnetic fields on minority and low-income populations would be expected because the cables would be placed underground in the same trench, and no known human health effects from exposure to magnetic fields at the level to be emitted by the proposed CHPE Project have been identified. Human health and environmental effects would be limited to operation of the converter station and maintenance and emergency repairs of the transmission system. Effects from increases in air emissions, noise, and traffic on all populations, including minority and low-income populations, would be small, and would occur only on an intermittent, temporary schedule in primarily aquatic environments and existing roadway and railroad ROWs at durations and frequencies less than that for construction. Portions of the transmission line in aquatic environments would have less maintenance and emergency repair-related effects on minority and low-income populations because activities would occur farther from populations residing on land. Noise levels would be expected to increase as a result of cooling station and converter station operation; however, those levels would primarily occur in industrial areas or railroad or roadway ROWs. Therefore, no disproportionately high and adverse impacts on minority and low-income populations would occur from operations, maintenance, and emergency repairs.

2.6.20 Cumulative Impacts

Impacts from Construction

Construction activities along aquatic portions of the proposed CHPE Project route could result in, on a temporary basis, increased water turbidity, disturbance and resuspension of sediments, disturbances to aquatic species, localized degradation of aquatic species habitat, increased vessel traffic, increased air emissions, and increased noise levels. Recolonization of impacted areas by benthic organisms would begin to occur within months after activities have ceased. Cumulatively, other construction activities occurring in the same time and vicinity, and past and reasonably foreseeable construction activities, would have similar impacts on the aquatic environment. Other projects identified along the aquatic segments of the proposed CHPE Project include the maintenance dredging of the Hudson River at the North Germantown Reach (although this should be complete prior to the commencement of the proposed CHPE Project); the Tappan Zee Hudson River Crossing Project; the Grande Isle Intertie and New England Clean Power Link in Lake Champlain; and the Spectra-Algonquin Incremental Market Natural Gas Pipeline Project, West Point Transmission Project, and one portion of the proposed West Point Net Zero Project in the Hudson River (although the timing of these projects are not yet established). Multiple activities occurring at the same time and in the same vicinity would have greater impacts than just one project. If construction activities overlap in this area, then the construction-related impacts, such as disturbed substrate, temporary water quality degradation, sediment redeposition, increased turbidity, increased noise and vibration, and the potential for spills could be greater than for just one project. However, construction of the proposed CHPE Project would not affect any one area for an extended period of time (i.e., generally no more than 2 weeks), so the possible short temporal overlap between the proposed CHPE Project and another project would limit cumulative impacts.

Construction activities along terrestrial portions of the proposed CHPE Project route could result in vegetation clearing, disturbances to wildlife, localized degradation of wildlife habitat, direct mortality of wildlife individuals, soil disturbance and erosion, storm water runoff into surface water, increased traffic, increased air emissions, and increased noise levels. These potential impacts would all be short-term in nature or limited in area or degree. Cumulatively, other construction activities occurring in the same time and vicinity would have similar impacts on terrestrial environments. Other projects identified along the terrestrial portions of the proposed CHPE Project include CSX Track Expansion between Ravenna and Haverstraw, the Haverstraw Water Supply Project, the redevelopment of the Stony Point waterfront, and the Luyster Creek Energy Project and ConEd Learning Center in Astoria. Multiple activities occurring at the same time and vicinity would have greater impacts than just one project. Construction of the proposed CHPE Project would not affect any one area over an extended period of time (i.e., generally no more than several weeks), so the short temporal overlap would limit cumulative impacts for concurrent projects.

Impacts from Operations, Maintenance, and Emergency Repairs

The proposed CHPE Project individually would not be considered a strong source of magnetic fields. Other existing and proposed transmission lines that would be crossed by the proposed CHPE Project would be an additional source of magnetic fields at the location of the crossing. Individuals of a migrant aquatic species (e.g., shortnose sturgeon) might encounter crossing submerged cables emitting magnetic fields along an entire migratory route. A review of scientific literature yielded inconclusive evidence that magnetic field emissions associated with transmission lines result in adverse effects on the health, behavior, or productivity of animals. However, the cumulative impacts of magnetic fields on aquatic and terrestrial species over a lifetime are poorly understood.

In general, the strongest magnetic and electric fields around the outside of a substation, such as in the vicinity of the proposed Luyster Creek HVDC Converter Station, are from power lines entering and leaving the substation. Beyond the substation fence or wall, the magnetic field produced by the substation equipment is usually indistinguishable from background levels. Though the proposed CHPE Project would not generate magnetic fields above the 200 mG NYSPSC interim standard, the project could contribute to magnetic emissions greater than 200 mG in those areas where the proposed HVAC transmission line crosses other utility lines. Other sources of magnetic fields in outdoor urban areas include existing power lines and streetlights. People are exposed to numerous sources of magnetic fields on a daily basis from sources like power lines, but also from electric devices in home and office environments. The research available on the health impacts of magnetic field exposure are not definitive, and no conclusions regarding the health impacts can be drawn based on what is presently known about the health impacts of magnetic fields.

Several factors could impact the energy generation market over the next few years. Energy policies are putting increasing emphasis on energy conservation and providing reliable, clean, and renewable sources of energy. Existing generating plants in the state that are not meeting air quality, water quality, or other safety standards could be forced either to upgrade equipment or to retire affected generating units earlier than planned. Proposed upgrades in the electrical transmission infrastructure along the proposed CHPE Project corridor would increase the viability of wind energy, including offshore wind energy, as an important source of clean, renewable energy in the long term; however, the upgrades necessary to make this happen would not likely occur within the next few years. Other proposed HVDC transmission projects, in addition to the proposed CHPE Project, would facilitate the importation of energy into New York City from interstate or Canadian sources. The proposed CHPE Project would be expected to contribute to cumulative increases in electrical capacity, efficiency, and reliability and decreases in transmission congestion in the New York Control Area.

The proposed CHPE Project is intended to reduce criteria pollutant and GHG emissions by alleviating the need to operate older, more emissive fossil-fueled power plants. New York State currently derives approximately 21 percent of its electricity generation needs from renewable resources, most of which comes from hydroelectric power, and the majority of the remaining generation is fossil-fuel based. The proposed CHPE Project would reduce annual emissions of CO_2, SO_2, and NO_x. As older, more emissive fossil-fueled sources of power generation are retired, the proposed CHPE Project would be expected to have long-term, beneficial, cumulative impacts on air quality, particularly in the New York City area where there are many fossil-fueled generating units and high-energy demand.

Since the proposed CHPE Project transmission line would be designed to be maintenance-free, cumulative impacts from maintenance and emergency repair activities would be limited to a negligible increase in vessel and maintenance vehicle traffic in the transmission line ROW. Potential clearing of land adjacent to the transmission line ROW, along with management of vegetation growth in the transmission line ROW during operation of the proposed CHPE Project, would also cumulatively reduce the amount of forested areas and availability of wildlife habitat.

3. Affected Environment

This section provides a description of the existing environment within the proposed CHPE Project area. To facilitate discussion, this EIS divides the approximately 336-mile (541-km) proposed transmission line route into four segments: Lake Champlain Segment (**Section 3.1**), Overland Segment (**Section 3.2**), Hudson River Segment (**Section 3.3**), and New York City Metropolitan Area Segment (**Section 3.4**). This division is based on geographical and environmental similarities along the route, as described in **Section 2.4.1**.

The Lake Champlain and Hudson River segments contain primarily aquatic corridors, the Overland Segment contains primarily terrestrial corridors, and the New York City Metropolitan Area Segment is a combination of aquatic and terrestrial corridors. The potential impacts associated with constructing and operating the proposed CHPE Project are discussed in **Chapter 5** based on the environmental resource areas described in the following sections.

Brief definitions of each resource area; laws, regulations, and guidelines potentially applicable to the resource; and existing conditions are discussed for each segment, as appropriate. A region of influence (ROI) for each resource area in which impacts would likely occur is also defined. The ROIs were determined based on regulatory requirements, where applicable, combined with the expected maximum area of measurable construction or operational impacts for that particular resource.

3.1 Lake Champlain Segment

3.1.1 Land Use

3.1.1.1 Background on the Resource Area

This section describes existing land uses in the vicinity of the proposed CHPE Project route, and land use plans and policies applicable to the proposed CHPE Project area. General land use categories have been classified along the proposed CHPE Project route based on review of aerial photographs, site visits to selected locations along the proposed route, and data from the New York State Geographic Information System (GIS) Clearinghouse (CHPEI 2012i). The applicable land use plans are identified in **Sections 3.1.1.2**, **3.2.1**, **3.3.1**, and **3.4.1**, and relevant individual policies and the associated consistency analysis are in Exhibit 121 of the Joint Proposal.

The NYSPSC issued a Certificate for the proposed CHPE Project on April 18, 2013. Conditions that the Applicant must meet in order to maintain compliance with the Certificate (i.e., Certificate Conditions) are attached to the Certificate (see **Appendix C**). Condition 16 of the Certificate states that the proposed CHPE Project must comply with all local zoning ordinances. If the proposed CHPE Project is unable to comply with a local zoning ordinance, the Applicant would petition the NYSPSC for relief from the ordinance. Local zoning ordinances are identified in Exhibits 7, 35, and 115 of the Joint Proposal. Because the proposed CHPE Project would comply with all local zoning ordinances, the CHPE Project's consistency with local zoning ordinances is not described in detail in this section.

The land use ROI for the proposed CHPE Project is the area within 50 feet (15 meters) on either side of the centerline of the transmission cables and within deviation areas, when present (see **Section 3.2.1**). No deviation areas are present within the Lake Champlain Segment. This area was selected as the ROI because it includes the permanent easement (ROW) within which the transmission line would be operated and maintained and the temporary work areas that would be affected during construction (i.e., construction corridors). As the transmission line would be installed underground, land use impacts during the operational phase of the proposed CHPE Project would be restricted to the property containing the transmission line. Adjacent land uses outside the permanent transmission line ROW would be affected, but only for a short time period during the construction process. **Table 2-1** identifies the construction corridors along the proposed CHPE Project route. The ROI for land use is entirely within New York State.

3.1.1.2 Proposed CHPE Project

The Lake Champlain Segment would be located in Clinton and Essex counties. The proposed CHPE Project would be located in seven communities in Clinton County (Village of Rouses Point; Town of Champlain; Town of Chazy; City of Plattsburg; and towns of Beekmantown, Peru, and Ausable); seven communities in Essex County (towns of Chesterfield, Willsboro, Essex, Westport, Moriah, Crown Point, and Ticonderoga); and two communities in Washington County (towns of Putnam and Dresden). While New York State assumes ownership of and has jurisdiction over development of submerged lands within Lake Champlain below the high water line, local municipalities include portions of the lake within their planning boundaries. **Appendix A** presents a detailed map atlas of the proposed CHPE Project route corridor and shows the municipalities crossed by the route, and general land uses in the vicinity. Land Use Table F.2-1 in **Appendix F.2** identifies that the only general land use (i.e., land cover type) within the ROI in the Lake Champlain Segment is open water.

Land Uses. General uses within Lake Champlain include recreation (e.g., fishing, boating, swimming, and water sports) and other water-dependent uses such as transportation via ferry services. Ferry services in this segment include three Lake Champlain Ferry crossings (Grand Isle, Vermont-Plattsburgh, New York; Burlington, Vermont-Port Kent, New York; Charlotte, Vermont-Essex, New York), Fort Ticonderoga Ferry crossing (Ticonderoga, New York-Shoreham, Vermont), Federal Navigation Channel in the vicinity of the towns of Putnam and Dresden, and the presence or crossing of utility services infrastructure (CHPEI 2012b). See **Sections 3.1.13**, **3.1.2**, and **3.1.12** respectively for more information on these uses.

The Lake Champlain Segment route is entirely aquatic; therefore, it is not used for agriculture. The ROI does not encompass any agricultural districts or prime or unique farmland as designated by the Natural Resources Conservation Service (NRCS).

Land Use Plans and Policies. Because the proposed CHPE Project would be entirely submerged under Lake Champlain in this segment, most land use plans and policies would not be relevant. The following paragraphs identify the plans that might be relevant to the proposed CHPE Project in the Lake Champlain Segment. Exhibit 121 of the Joint Proposal has a list of all land use policies that might be relevant to the proposed CHPE Project.

New York Coastal Zone Management Policies. Pursuant to the CZMA, the New York State Legislature passed the Waterfront Revitalization and Coastal Resources Act (Executive Law, Article 42, *Waterfront Revitalization of Coastal Areas and Inland Waterways*), which forms the basis for coordinating all state actions affecting the coastal area. In New York State, the enforceable coastal policies are those in the New York State CMP and the policies of Local Waterfront Revitalization Programs (LWRPs). There are 44 enforceable policies under the New York State CMP to which all Federal and state agencies must adhere. The Applicant must certify to the NYSDOS that the proposed CHPE Project would be consistent with the New York State CMP. DOE cannot authorize the Presidential permit for the proposed CHPE Project prior to NYSDOS's concurrence with the Applicant's certification. As described in **Section 3.3.1**, a conditional consistency determination for the proposed CHPE Project has been issued by NYSDOS. Because Lake Champlain is an "inland waterway" and is not within New York State's coastal zone as defined by the CZMA, Federal agency activities associated with the lake are not required to be consistent with the state's CMP. Consistency with the applicable Lake Champlain LWRPs is considered in this EIS.

Waterfront Revitalization of Coastal Areas and Inland Waterways
Article 42 of New York Executive Law authorizes local communities that border coastal areas and designated inland waterways to participate in the New York State CMP through the development and implementation of LWRPs. LWRPs supplement the New York State CMP by defining area-specific goals and needs at the local level. An LWRP consists of a plan to preserve, enhance, protect, develop and use a community's waterfront in which critical issues are addressed; and a program to implement the plan.

Local Waterfront Revitalization Programs. Article 42 of New York Executive Law authorizes local communities that border coastal areas and designated inland waterways, such as Lake Champlain, to participate in the New York State CMP through the development and implementation of LWRPs. LWRPs supplement the New York State CMP by defining area-specific goals and needs at the local level. An LWRP consists of a plan to preserve, enhance, protect, develop, and use a community's waterfront in which critical issues are addressed; and a program to implement the plan. In addition to area-specific policies, LWRPs must either incorporate the 44 enforceable polices of the state CMP or determine they are not applicable. Some LWRPs have also enacted permit requirements regulating activities within designated LWRP zones. In accordance with New York State Public Service Law, Section 130, the proposed CHPE Project is exempt from obtaining local permits and approvals associated with LWRPs; however, the exemption does not apply to the LWRP provisions. Projects that could impact coastal areas or inland waterways, such as the proposed CHPE Project, must be reviewed for consistency with the LWRPs.

One local municipality (Town of Essex) within the Lake Champlain Segment has an LWRP. The Town of Essex LWRP also includes a Harbor Management Plan. The Applicant submitted a coastal zone consistency certification assessment and accompanying forms to the NYSDOS starting in December 2010. See the Coastal Zone Consistency Documentation in **Appendix F.1** for a list of enforceable coastal policies within the LWRP that might be relevant and the Applicant's consistency assessment.

"Forever Wild" clause of Article XIV of the New York State Constitution. Adirondack Park contains approximately 6 million acres (2.4 million hectares) of public and private land. Within Adirondack Park, the Adirondack Forest Preserve covers 2.6 million acres (1 million hectares) of state land open to the public and that is constitutionally protected to remain "forever wild" forest under Article XIV of the New York State Constitution (the "Forever Wild" clause). Regarding Forest Preserve land, Article XIV states, "They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed." The "Forever Wild" status of the lakebed of Lake Champlain (i.e., submerged lands under Lake Champlain) is undetermined and is currently being considered by the New York State Office of General Services, but comments received during scoping suggested that it might be Forest Preserve and thus subject to the "Forever Wild" clause. As stated in **Section 1.6.3**, the New York State Office of General Services manages use and occupation of submerged lands in New York State through the issuance of construction permits and easements and associated fees. The NYSPSC Administrative Law Judges and the NYSDEC determined that the proposed CHPE Project, including this EIS, is not the appropriate forum for analyzing the Article XIV "Forever Wild" clause or for determining New York State Office of General Services' authority to grant leases or other property rights to lands submerged under Lake Champlain (NYSPSC 2012, NYSDEC 2013c). Therefore, the status of portions of the proposed CHPE Project route as Forest Preserve and the associated applicability of the "Forever Wild" clause are not discussed further in this EIS.

3.1.2 Transportation and Traffic

The existing transportation systems, conditions, and travel patterns in the vicinity of the proposed CHPE Project route that are documented in this section are based on a review of maps, aerial photography, and

GIS data; site visits to selected locations along the transmission cable routes; and transportation data from the Port Authority of New York & New Jersey (Port Authority). The transportation systems consist of the road network and navigable waterways. The traffic network, vehicular traffic, travel patterns, circulation, and parking are described for the project area. The transportation system is addressed from a regional and a local perspective. This analysis will focus on those areas of the transportation network that are most likely to be affected by the proposed CHPE Project.

For purposes of this analysis, the transportation and traffic ROI is the area within the proposed CHPE Project construction corridors and intersections within 0.25 miles (0.4 km) of the construction corridors. Rail systems are not addressed in this section because the proposed CHPE Project would be located within the ROW of the CP and CSX rail systems under agreement with those operators. Any potential conflicts with rail systems operations would be resolved between the parties in accordance with the commercial agreements covering construction and operation of the transmission system within the railroad ROW.

The Lake Champlain Segment would be located in the counties of Clinton, Essex, and Washington in northeastern New York. The proposed CHPE Project transmission system would traverse Lake Champlain from roughly north to south for the entirety of this segment, which includes MPs 0 to 101. The proposed CHPE Project construction corridor would range between 20 and 50 feet (6 and 15 meters) in width within this segment. While, in general, Lake Champlain is navigable, there are no federally designated shipping lanes or recommended vessel routes within Lake Champlain, with the exception of a few federally maintained channels into harbors and the designated channel in the narrower southern portion of the lake, south of Benson's Landing at MP 97. This channel has a project depth (which is the depth of a channel as designated and constructed by the USACE) of 12 feet (4 meters) (CHPEI 2012z). Commercial marine navigation is limited to the following two ferry operations connecting points in the states of New York and Vermont (a total of four ferry routes):

- The Lake Champlain Transportation Company operates three ferries, which cross Lake Champlain at the following locations:
    - Grand Isle, Vermont, to Plattsburgh, New York (24-hour service; year round)
    - Burlington, Vermont, to Port Kent, New York (seasonal; mid-June to mid-October)
    - Charlotte, Vermont, to Essex, New York (varying schedule; year round).
- The Fort Ticonderoga Ferry Company operates a seasonal cable-guided ferry service between Shoreham, Vermont, and Ticonderoga, New York, from May through October. The cable guidance system was installed in 1946 and consists of two 2.75-inch (7.0-cm) steel cables, stretched parallel to each other across the lake and securely anchored in concrete on either end. The cables are lifted and carried by four hardened steel sheaves (wheel with a grooved rim), one on each corner of the present barge, and serve to steer the barge between two landing ramps, at each end of the course. When not actually in use on the sheaves, they return to their resting place on the bottom of the lake and do not interfere with other boat traffic. The cables are replaced every 4 years (CHPEI 2012aa).

There are also wide-ranging recreation opportunities on the lake that include fishing, motor boating, kayaking, sailing, jet skiing, and scuba diving.

The proposed CHPE Project's transmission cables would pass under the U.S. Route 2 Bridge (Bridge Road) near MP 1 (see **Figure 2-1**). NYSDOT and the Vermont Agency of Transportation (VTrans) also recently completed a project to replace the Champlain Bridge (which carried New York State Route 185 and Vermont State Route 17), otherwise known as the Crown Point Bridge, which spanned the state line between Crown Point, New York, and Chimney Point, Vermont, and was demolished in December 2009. The replacement bridge opened in November 2011.

3.1.3 Water Resources and Quality

3.1.3.1 Background on the Resource Area

Water resources include surface water, floodplains, and groundwater. An evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

Surface water resources generally consist of lakes, rivers, and streams. Waters of the United States are defined in the CWA, as amended, and are regulated by the State of New York, the USEPA, and the USACE. These agencies assert jurisdiction over (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) nonnavigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries. Section 404 of the CWA regulates the discharge of fill material into waters of the United States, which includes wetlands. Wetlands are discussed in **Section 3.1.8**.

A waterbody can be deemed impaired if water quality analyses conclude that exceedances of water quality standards, established by the CWA, occur. NYSDEC maintains the Waterbody Inventory and Priority Waterbodies List (WI/PL), a database that contains information on water quality, the ability of waters to support their water use classifications (defined and described under each segment), and known or suspected sources of contamination. The list is used to prepare the New York State Water Quality Report (Section 305(b) Report) and the 303(d) list of impaired waters, both of which are requirements under the CWA. The CWA requires that New York establish a Section 303(d) list to identify impaired waters and establish Total Maximum Daily Loads (TMDLs) for the sources causing the impairment. A TMDL is the maximum amount of a substance that can be assimilated by a waterbody without causing impairment.

Storm water is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade lakes, rivers, and streams. Proper management of storm water flows is important to the management of surface water quality and natural flow characteristics. Storm water management systems are typically designed to contain runoff on site during construction. Maintaining storm water flows on site during construction reduces potential for the transport of sediments or construction-related pollutants into adjacent water bodies during, or as the result of, storm events. Construction activities, such as clearing, grading, trenching, and excavating, disturb soils and sediment. If not managed properly, disturbed soils and sediments can easily be washed into nearby water bodies during storm events, reducing water quality.

Floodplains are flat or nearly flat land adjacent to a river or stream that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows; and the flood fringe, which are areas covered by the flood, but do not experience a strong current. The Federal Emergency Management Agency (FEMA) is responsible for mapping and delineating floodplains and determining the flood risk for susceptible areas. FEMA defines flood zones by geographic areas that FEMA has defined according to varying levels of flood risk. A 100-year floodplain is determined based on the area with an approximately 1 percent or greater probability of flooding per year and corresponds to the FEMA Zone A.

Groundwater consists of subsurface hydrologic resources. It is an essential resource that functions to recharge surface water and is often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate. Groundwater is water that exists in the pore spaces and fractures in rock and sediment beneath the Earth's surface. In the saturated zone below the water table, water percolates through interconnected pore spaces, moving downward by the force of gravity and upward toward zones of lower pressure.

In New York State, to enhance regulatory protection in areas where groundwater resources are most productive and most vulnerable, the New York State Department of Health (NYSDOH) identified 18 Primary Water Supply Aquifers (also referred to as Primary Aquifers) in the NYSDEC Division of Water Technical & Operational Guidance Series (TOGS). These are defined as "highly productive aquifers presently utilized as sources of water supply by major municipal water supply systems." Principal aquifers are also identified in TOGS. These are "aquifers known to be highly productive or whose geology suggests abundant potential water supply, but which are not intensively used as sources of water supply by major municipal systems at the present time" (NYSDEC 2010a).

Sole-source aquifer designation is a tool to protect drinking water supplies in areas with few or no alternatives to groundwater resources. The USEPA defines a sole-source aquifer as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

The ROI for water resources for the Lake Champlain Segment of the proposed CHPE Project includes all of Lake Champlain from the international border with Canada south to Dresden, New York (MP 101). This ROI for the Lake Champlain portions of the route was selected because localized project activities could result in impacts throughout the width of the waterbody.

3.1.3.2 Proposed CHPE Project

Surface Water. Lake Champlain is one of the largest freshwater lakes in the United States, encompassing approximately 435 square miles (mi^2) (1,127 square kilometers [km^2]) and 587 miles (945 km) of shoreline within the Lake Champlain Basin. The 8,234-mi^2 (21,343-km^2) basin includes land in Vermont, New York, and the Province of Quebec. Lake Champlain is approximately 120 miles (193 km) in length and approximately 12 miles (19 km) wide at its greatest width. Lake Champlain flows from Whitehall, New York, north across the U.S./Canadian border to its outlet at the Richelieu River in Quebec. The Richelieu River then flows north to the St. Lawrence River. Lake Champlain averages about 64 feet in depth (20 meters), but reaches depths of 400 feet (122 meters) at its deepest section with water level fluctuations in response to precipitation, temperature, and runoff variations (LCBP 2004a).

Lake Champlain is divided into five distinct areas, each with different physical and chemical characteristics: Missisquoi Bay, Inland Sea (or Northeast Arm), Mallets Bay, Main Lake (or Broad Lake), and South Bay. Missisquoi Bay lies mostly within Canada and is shallow with relatively warm waters. Water from the Missisquoi Bay flows into the Inland Sea. The Inland Sea contains water that generally flows south from Missisquoi Bay, north from Malletts Bay, and passes through and around the Champlain Islands. Malletts Bay is restricted by causeways constructed along the northern and western boundary of the bay and has the most restricted circulation of the five distinct areas of Lake Champlain. Main Lake contains the deepest, coldest water and about 81 percent of the volume of the entire lake. The South Lake is narrow and shallow, similar to a river. Water retention time varies by lake area (LCBP 2006). Retention is longest in the Main Lake (about 3 years), and shortest in the South Lake (less than 2 months) (LCBP 2004a).

Lake Champlain has a number of uses. Approximately 200,000 people, or about 35 percent of the Lake Champlain Basin population, depend on Lake Champlain itself for drinking water. Approximately 4,200 people draw water directly from Lake Champlain for individual use. Little information is available from the states of New York or Vermont on the quality of these unregulated drinking water supplies. It is likely that this water has minimal or no treatment. Because public water systems drawing from the lake have showed coliform contamination, it is possible that these individual water withdrawals are similarly contaminated. There are 99 public water systems in New York State and Vermont drawing water from Lake Champlain. State parks, public beaches, boat launches, and wildlife management areas (WMAs) are along the shoreline of Lake Champlain for recreational use (see **Section 3.1.13** for a discussion of recreational uses around Lake Champlain) (LCBP 2004a). Although there are no designated commercial shipping lanes within Lake Champlain, several ferries use the lake. The southern part of the lake, beginning at MP 97 along the transmission line route, is a federally maintained (i.e., dredged) navigation channel.

Water Quality. Water quality in the Lake Champlain watershed is generally good to excellent; however, Lake Champlain itself is the dominant feature of the watershed and the most significant water quality issues are associated with the lake (NYSDEC 2012b). Lake Champlain is listed in the *Final New York State June 2010 Section 303(d) List of Impaired Waters Requiring a Total Maximum Daily Load (TMDL)/Other Strategy* (NYSDEC 2010g). NYSDEC listed Lake Champlain as an impaired waterbody, meaning it frequently does not support appropriate uses based on its water quality classification. The list divides the lake into four regions through which the proposed CHPE Project route passes: North Main Lake, Middle Main Lake, South Main Lake, and South Lake. All regions are listed as impaired for fish consumption due to contaminated sediments/PCBs, likely from past industrial discharges (NYSDEC 2010g). PCB contamination areas are discussed in greater detail in **Section 3.1.15**. The USEPA also lists total phosphorus as a cause of impairment for all regions and lists the probable cause as agriculture, and, more specifically, animal feeding operations leading to nonpoint source pollution. In addition, atmospheric deposition is also listed as a probable cause of phosphorus loading (USEPA 2012b).

The waters of Lake Champlain are generally classified as Class A, Class AA, or Class B in the 303(d) list (NYSDEC 2012c, NYSDEC 2010g). Both Class A and Class AA waters are a source of water supply for drinking, culinary, or food-processing purposes; primary or secondary contact recreation; and fishing. Class B waters have the same standards as Class A and Class AA, except they are not expected to be water supply sources for drinking or culinary or food-processing purposes (NYSDEC 2012e). NYSDEC Regulations Chapter X Part 703 provides applicable narrative water quality standards for these water classifications; with respect to turbidity, the regulations state that there is to be no increase that will cause a substantial visible contrast to natural conditions (NYSDEC 2012f).

The Lake Champlain Long-Term Water Quality and Biological Monitoring Program has conducted water quality sampling annually since 1992. The project is conducted jointly by NYSDEC and the Vermont Department of Environmental Conservation (VTDEC) and includes a variety of sampling parameters. The sampling network consists of 15 lake stations and 22 tributary stations. The purpose of this program is to identify water quality issues and assess the progress of reducing water pollution in the lake. Generally, water quality has been found to be good, with dissolved oxygen concentrations approaching saturation and phosphorus levels that are typically below the in-lake criterion. Total Suspended Solids (TSS) values varied throughout the lake. Samples taken in the northern and middle portions were less than 5 milligrams per liter (mg/L) for TSS (VTDEC 2012).

The Lake Champlain Sediment Toxics Assessment Program has documented contaminant levels within sediments on the lake bottom. During initial surveys in 1991, samples were collected from 30 sites throughout the lake and analyzed for common contaminants such as trace elements, PCBs, chlorinated hydrocarbon pesticides (e.g., dichloro-diphenyl-trichloroethane [DDT]), and PAHs. The surveys identified the presence of contaminants at elevated levels in sediment, water, and biota. The program prioritized PCBs and mercury as persistent contaminants found lakewide, and arsenic, cadmium, chromium dioxins/furans, lead, nickel, PAHs, silver, zinc, copper, and persistent chlorinated pesticides as persistent contaminants in localized areas (McIntosh 1994).

Floodplains. The aquatic transmission line would be routed through Lake Champlain. With respect to floodplains, Lake Champlain itself is classified as a 100-year floodplain by FEMA (Zone AE, defined as a "High-Risk Area"). AE zones have established Base Flood Elevations. The Base Flood Elevation for Lake Champlain is 102 feet (31 meters) above mean sea level (MSL) (FEMA 2012).

Groundwater. In New York State, approximately one-quarter of residents rely on groundwater as a source of potable water. The majority of groundwater for private wells and small-scale municipal supply comes from fractures in the bedrock (Nystrom 2011). Bedrock in this area is mainly crystalline rock with smaller areas of carbonate rock, sandstone, and shale. The surficial material throughout the area was deposited primarily during the Pleistocene epoch when glaciers covered the northeastern United States and deposited till over the area when they melted. Glacial till generally yields low amounts of water, whereas sand and gravel deposits can form productive aquifers.

Groundwater quality in the Lake Champlain basin in New York State is generally good, but samples taken in 2009 had characteristics or concentrations of constituents that equaled or exceeded current or proposed Federal or New York State drinking water standards. These included color, pH, sodium, total dissolved solids, iron, manganese, gross alpha radioactivity, radon-222, and bacteria. To enhance regulatory protection in areas where groundwater resources are most productive and most vulnerable, NYSDOH identified 18 Primary Water Supply Aquifers (also referred to as Primary Aquifers) across the state in 1980 (NYSDEC 2010a). The proposed CHPE Project route does not cross any Primary or sole-source Aquifers in the Lake Champlain Segment.

3.1.4 Aquatic Habitats and Species

3.1.4.1 Background on the Resource Area

This section describes freshwater, estuarine, and marine ecosystems and aquatic animals and plants that occur in the proposed CHPE Project area. Aquatic species protected under ESA, MMPA, and MBTA are discussed in **Section 3.1.5**. Aquatic species not protected under those regulations and discussed in this section include submerged aquatic vegetation (SAV), shellfish, benthic resources, and fish. The ROI in aquatic portions of the proposed CHPE Project is the entire waterbody through which the transmission line route would traverse (e.g., Lake Champlain from the international border with Canada to Dresden, Hudson River, Spuyten Duyvil Creek, Harlem River, and East River). The ROI for the aquatic portions of the proposed CHPE Project includes open water, flats, bays, and any other submerged habitats of water bodies that would be traversed by the transmission cables, including protected habitats such as essential fish habitat (EFH) and Significant Coastal Fish and Wildlife Habitat (SCFWH). This aquatic ROI was selected because both aquatic habitat and species can occur throughout the whole waterbody, and proposed CHPE Project activities could result in impacts throughout the waterbody.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 *et seq.*) calls for direct actions to stop or reverse the continued loss of fish habitats and requires cooperation among NMFS and other Federal agencies, state agencies, Fishery Management Councils, and fishing enthusiasts to protect, conserve, and enhance EFH. The MSA includes a mandate that Federal agencies must consult with the U.S. Secretary of Commerce on all proposed activities authorized, funded, or undertaken by a Federal agency that might adversely affect EFH. See **Section 1.6.2** for additional detail on the EFH consultation requirements for Federal agencies.

SCFWHs are state-designated areas for the conservation of fish and wildlife habitats identified as critical to the maintenance or re-establishment of species of fish and wildlife (Executive Law of New York, Article 42, and Sections 910–920). These areas are identified by NYSDEC and under New York State Codes, Rules, and Regulations (NYCRR) Title 19, Part 600 (19 NYCRR Part 600), as areas that must be "protected and preserved so as to maintain their viability as habitats." These designations are subsequently incorporated in the New York State CMP under authority provided by the CZMA. A habitat impairment test must be conducted for any activity that is subject to consistency review under Federal and state laws, or under applicable local laws contained in an approved LWRP. The coastal zone consistency determination for the proposed CHPE Project and other associated documentation are provided in **Appendix F.1**.

When an action has the potential to impair the viability of a SCFWH, it would only be permitted when there is no reasonable alternative, all adverse effects would be minimized to the maximum extent practicable, the action would advance one or more of the coastal policies, or if it would result in a regional or statewide public benefit.

3.1.4.2 Proposed CHPE Project

Aquatic Habitat and Vegetation. Lake Champlain provides littoral, pelagic, and demersal habitat for fish species. Littoral habitat includes nearshore habitats such as outcroppings, grassbeds, and debris that provide refuge and forage habitat. Because of the sunlight penetration, the littoral zone is very productive and supports minnows, younger fish, and lower species on the food chain. It also supports habitat for predatory fish. Pelagic habitat is open lake waters, which are typically colder and less productive than littoral habitat. Pelagic waters can be stratified during the summer, providing suitable temperatures for warmwater, coolwater, and coldwater fish. Pelagic fish spend most of their life cycle in the open lake except when spawning. Demersal habitat includes the bottom waters and benthic habitat beneath pelagic waters. Benthic habitat supports crustaceans, insect larvae, and burrowing worms that live on the rich accumulation of organic matter and are prey for the demersal fish species. The bottom of Lake Champlain is composed of a variety of substrates including mud, clay, silt, sand, gravel, cobble, boulders, bedrock outcrops, logs, and organic material such as tree limbs or leaves. Aquatic vegetation is also considered substrate structure (Trzaskos and Malchoff 2006).

Historically, there have been numerous species of aquatic vegetation present in Lake Champlain, along shoreline areas and in shallow embayments in the littoral habitats. Common native species include milfoils (*Myriophyllum* spp.), pondweeds (*Potamogeton* spp.), and water celery (*Vallisneria americana*) (ILEC 2012). Water depths for the majority of the proposed CHPE Project route in the Lake Champlain Segment generally north of Crown Point, New York, exceed those that support SAV.

Two nonindigenous, invasive plant species, Eurasian watermilfoil (*Myriophyllum spicatum*) and water chestnut (*Trapa natans*), are known to crowd out native species and impede recreational activities, such as fishing, boating, and swimming, by forming dense monotypic stands (LCBP et al. 2005, ILEC 2012). These two species are present in Lake Champlain, and are 2 of the 13 priority aquatic nuisance species listed for the Lake Champlain Basin. Eurasian watermilfoil and water chestnut cause significant adverse ecological and economic impacts and have a high potential to expand their range throughout the Lake Champlain Basin. Education and outreach efforts are being conducted in an effort to control these species (LCBP et al. 2005).

Essential Fish Habitat. There is no EFH designated in Lake Champlain.

Significant Coastal Fish and Wildlife Habitats. There are no SCFWHs designated in Lake Champlain.

Shellfish and Benthic Communities. The benthic invertebrate community of the Lake Champlain Basin includes native mussels, aquatic snails, crustaceans, oligochaetes, and insects that support a diverse ecosystem. The western, or New York, side of the Lake Champlain Basin supports 14 native freshwater mussel species (LCBP 2012d).

Since the invasion of the nonnative zebra mussel (*Dreissena polymorpha*) in Lake Champlain in 1993, the benthic macroinvertebrate community of the lake has undergone substantial change (FTC 2009). The result has been increased water clarity and subsequent aquatic plant growth in shallow areas of the lake, which has dramatically altered the lake's native benthic community (LCBP 2012e). Deepwater benthic macroinvertebrates, which depend on phytoplankton deposited from upper water layers as a primary food source, have declined by 33 percent since the early 1990s; however, in shallow littoral areas, benthic macroinvertebrate density increased by 25 percent (FTC 2009).

Seventy benthic samples were collected in Lake Champlain during the spring 2010 marine survey conducted by the Applicant (CHPEI 2012o). The benthic community was composed mainly of bivalves, dipterans, amphipods, and worms. The most abundant organisms in the samples were zebra mussels, chironomid midges (*Tanytarsus* sp.), and pea clams (*Pisidium* sp.), which composed 18, 12, and 8 percent of the total species composition, respectively. In general, taxa richness and the total number of individuals collected decreased with water depth. Of the benthic sampling sites conducted during the survey, shallower sampling sites (less than 50 feet [15 meters] in depth) had the largest number of individuals and taxa, while the deepest sampling sites (up to approximately 200 feet [61 meters] in depth) had the least. Water temperature also varied substantially between sampling sites depending on depth. Results from this survey did not find any unique benthic habitats or unexpectedly high densities of invertebrates (CHPEI 2012o).

Fish. Fish of Lake Champlain can be grouped by temperature preference, trophic level, habitat, and migration within the lake basin (FTC 2009). Fish in Lake Champlain are divided into three temperature groups: coldwater, coolwater, and warmwater species based on each species' summer temperature preferences for optimal health and efficient growth and reproduction. Warmwater fish prefer summer temperatures between 80 to 87 °F (27 to 30 °C); coolwater fish prefer summer temperatures between 69 to 77 °F (21 to 25 °C); and coldwater fish prefer summer temperatures below 59 °F (15 °C) (Trzaskos and Malchoff 2006). Most fish species in the lake are predatory whether or not they are nearshore or offshore residents or migratory (FTC 2009). Life history characteristics of representative species in the Lake Champlain Segment are presented in Table H.2-1 in **Appendix H**. Protected fish species are discussed in detail in **Section 3.1.5**.

The NYSDEC and VTFWD stock rainbow, lake, and brown trout in the Lake Champlain Basin waters and the USFWS stocks young Atlantic salmon (NYSDEC 2010h).

3.1.5 Aquatic Protected and Sensitive Species

3.1.5.1 Background on the Resource Area

Aquatic protected and sensitive species are freshwater, estuarine, and marine animals and plants that occur in the ROI of each segment of the proposed CHPE Project. Aquatic protected and sensitive species are those species that are afforded protection under the ESA (50 CFR Part 17), MMPA (50 CFR Part 216), New York's Endangered Species Regulations (6 NYCRR Part 182), and, in the Lake Champlain Segment, the Vermont Fish and Wildlife Regulations (Title 10 Vermont Statutes Annotated [V.S.A.] Chapter 123). Aquatic protected and sensitive species could include shellfish, finfish, marine reptiles, and marine mammals. The potential presence of federally listed (and candidate) and state-listed aquatic species within the ROI was determined through a review of available publications, and databases maintained by the NYSDEC, USFWS, and NMFS.

Discussions with the NYSDEC, NYNHP, USFWS, and NMFS regarding the potential impact of the proposed CHPE Project on threatened and endangered species and their occupied habitats have been ongoing since 2010. The Applicant has been regularly consulting with these agencies to obtain information about protected species and develop measures to avoid or minimize impacts beginning in

2010. In August 2010, DOE invited USFWS to become a cooperating agency on this EIS, and the USFWS accepted in September 2010. DOE initiated Section 7 consultation with letters to USFWS and NMFS in June 2012, and responses to those letters were received in June and July 2012. These letters are provided in **Appendix H.1**. A BA has been prepared as part of ESA consultation and to establish a foundation to support the ESA Section 7 consultation for listed species, and contains a full listing of consultations leading up to preparation of the BA (see **Appendix Q**). It is anticipated that the USFWS and NMFS would issue a Biological Opinion in response to the BA. As federally listed aquatic species occur in the Hudson River and New York City Metropolitan Area segments, further discussion on ESA is provided in **Section 3.3.5**.

Under New York State Environmental Conservation Law, the NYSDEC maintains a list of plant and animal species that are considered rare, threatened, endangered, or species of special concern. The New York Endangered and Threatened Species Regulations, which are codified at 6 NYCRR Part 182, prohibit the "take" of any species listed by the state as endangered or threatened (except as authorized by an incidental take permit). The regulations also prohibit the importation, transportation, possession, or sale of any endangered or threatened species of fish or wildlife or hide, unless otherwise authorized. Under Vermont Statutes, the Vermont Fish and Wildlife Department (VTFWD) maintains a list of state-listed endangered and threatened species. Vermont Fish and Wildlife Regulations, which are codified at Title 10 V.S.A. Chapter 123, prohibit "take" (which includes harassment or harm) of a Vermont threatened or endangered species, unless permitted by the Vermont Agency of Natural Resources.

The aquatic protected and sensitive species ROI within the aquatic portions of the proposed CHPE Project segments is the entire waterbody of that segment. This definition of the ROI takes into account the geographic area within which impacts could be experienced, including the distance that sediment plumes from construction could travel, and the distance that individual fish species can migrate through the body of water. The aquatic protected and sensitive species ROIs for the aquatic portions of the proposed CHPE Project include Lake Champlain from the international border with Canada to MP 101 for the Lake Champlain Segment.

3.1.5.2 Proposed CHPE Project

Federally Listed Species. No ESA-listed aquatic threatened or endangered species occur in the Lake Champlain Segment. While there is one population of Atlantic salmon (*Salmo salar*) listed under the ESA (i.e., the Gulf of Maine distinct population segment [DPS]), the land-locked population of Atlantic salmon present in Lake Champlain is not part of this DPS (USFWS 2012a). A discussion of the fish that occur in Lake Champlain, including Atlantic salmon, is found in **Section 3.1.4** and **Appendix H.2**.

State-Listed Species. State-listed fish species that occur in the Lake Champlain Segment include lake sturgeon (*Acipenser fulvescens*) and mooneye (*Hiodon tergisus*) (VTFWD 2005a). Two state-listed mussel species expected to occur in Lake Champlain are the pink heelsplitter (*Potamilus alatus*) and the giant floater (*Pyganodon grandis*) (VTFWD 2005b). The state-listed Eastern sand darter (*Ammocrypta pellucid*), which is found in the lower sections of the Mettawee and Poultney rivers, is not expected to occur in Lake Champlain (VTFWD 2005a), and is, therefore, not discussed further. A summary of the state-listed species in the Lake Champlain Segment, including status and habitat, is provided in **Table 3.1.5-1**.

3.1.6 Terrestrial Habitats and Species

This section describes the affected terrestrial environment occurring along the proposed CHPE Project transmission line route in the Lake Champlain Segment. Although the segment is entirely aquatic, terrestrial biological resources in the Lake Champlain Segment and along the entire proposed CHPE Project route could include animal species (e.g., birds and bats) and their adjacent habitats.

Table 3.1.5-1. State-Listed Species of the Lake Champlain Segment

Common Name	Scientific Name	New York Status	Vermont Status	Species Information
Lake sturgeon	*Acipenser fulvescens*	T	E	Inhabits mud, sand, and gravel. Spawns in the spring from May to June in areas of clean, large rubble such as along windswept, rocky island shores and in rapids in streams. Deep holes near spawning areas are also important for staging.
Mooneye	*Hiodon tergisus*	T	--	Inhabits shallow areas of large lakes and deep pools of clear rivers where the bottom is relatively free of silt, generally in non-flowing waters. Migrates up large rivers to spawn from March through May. Deposits eggs over rocks in swift water.
Pink heelsplitter	*Potamilus alatus*	--	E	Inhabits shallow lake habitat; substrates include silt and silty sand in slow currents.
Giant floater	*Pyganodon grandis*	--	T	Inhabits large rivers and lakes, in sand, sand and gravel, silty sand, and clay. This species is mobile.

Sources: VTFWD 2005a, VTFWD 2005b, NYSDEC 2012g

Key: T = threatened; E = endangered

Because some terrestrial species (e.g., birds and bats) use aquatic environments as a source of food, the ROI for terrestrial habitats and species within aquatic portions of the proposed CHPE Project is the entire waterbody of the segment as is discussed in **Sections 3.1.4** and **3.1.5**. Therefore, in the Lake Champlain Segment, the ROI is Lake Champlain.

Vegetation and Habitat. There are no terrestrial habitats in the Lake Champlain Segment. The only terrestrial species that could be impacted by the proposed CHPE Project are avian (bird) and chiropteran (bat) species. WMAs and Bird Conservation Areas (BCAs) along the Lake Champlain shoreline are discussed in **Section 3.1.8**. No habitats are present in existing port facilities that would be used as staging areas that would be used for the proposed CHPE Project.

Wildlife. In the Lake Champlain Segment, the proposed CHPE Project route is entirely aquatic. The only terrestrial species that could occur at the project site are bird and bat species that could fly over Lake Champlain. A wide variety of songbirds, hawks, and owls can be found along most of the proposed CHPE Project route, including various species of passerines, raptors, wading birds, and game birds that use upland, wetland, or riparian habitats. Examples of bird species representative of early successional forest/shrublands along the Lake Champlain shoreline include black-billed cuckoo (*Coccyzus erythropthalmus*), brown thrasher (*Toxostoma rufum*), and ruffed grouse (*Bonasa umbellus*) (NYSDEC 2012h). Mammals that could occur include Indiana bat (*Myotis sodalis*), eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*) (NYSDEC 2012i). The Indiana bat is a federally listed endangered species; see **Section 3.1.7** for a detailed discussion on this species.

3.1.7 Terrestrial Protected and Sensitive Species

Protected species are species that are protected under Federal or state laws. Terrestrial threatened and endangered species are terrestrial animals and plants protected under the ESA or New York State's

Endangered Species Regulations that are expected to occur in the proposed CHPE Project ROI. All endangered, threatened, rare, or exploitably vulnerable native plant species are protected pursuant to Section 9-1503 of the New York State Environmental Conservation Law. The Protected Native Plants Program was created by New York State in 1989 as a result of the adoption of the protected native plants regulation (6 NYCRR 193.3). Terrestrial species that could occur in the vicinity of the proposed CHPE Project include upland and wetland plants, invertebrates, amphibians, reptiles, birds, and marine mammals. See **Section 3.1.5** for more information on aquatic protected and sensitive species and consultations to date with USFWS and NYSDEC regarding protected and sensitive species.

In addition to federally and state-listed threatened and endangered species, there are other protected species along the proposed CHPE Project route. A number of species of birds along the proposed CHPE Project corridor are protected by Federal laws including the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). The MBTA prohibits the take of migratory birds, including any species also listed under the ESA. Likewise, the BGEPA prohibits the taking of bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively).

Because terrestrial species (e.g., birds and bats) use aquatic environments, the ROI for terrestrial protected and sensitive species along the aquatic portions of the proposed CHPE Project includes the entire waterbody within the segment as discussed in **Sections 3.1.4** and **3.1.5**. Therefore, in the Lake Champlain Segment, the ROI would be Lake Champlain.

Federally Listed Species

Federally listed terrestrial species or those proposed for Federal listing that could occur within or adjacent to the Lake Champlain Segment ROI include the Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and breeding bald eagles. There is no critical habitat designated or proposed to be designated within the ROI for this segment.

Indiana bat. The Indiana bat is currently listed as endangered under the ESA, as amended (USFWS 2007a). In New York State, knowledge of its distribution is limited to known caves and mines in which they hibernate (September through June). The potential for the occurrence of the Indiana bat during the summer is in part determined by the proximity to a known wintering location. In the Lake Champlain Segment, the Indiana bat could occur in Essex and Clinton counties. The Indiana bat is likely to occur in Essex County during both the summer and winter due to the presence of two hibernacula (i.e., location chosen for hibernation) in Essex County (USFWS 2007a). The hibernacula in Essex County include a Priority 2 hibernaculum (site of geographic or regional importance to the species that has between 1,000 and fewer than 10,000 bats) located approximately 25 miles (38 km) from southern end of the Lake Champlain Segment (MP 101), and a Priority 4 hibernaculum (site with a population of fewer than 50 bats) located within 1 mile (1.6 km) of Lake Champlain (USFWS 2007a). The Indiana bat could occur in Clinton County during the summer, due to the presence of the nearby Essex County hibernaculum.

Indiana bats can travel hundreds of miles after dispersing from hibernacula in the spring, which could bring this species into the range of the Lake Champlain Segment. Groups of female bats form maternity colonies in the crevices of trees or under the loose bark of dead trees. During the fall breeding season, female bats can number from 50 to 100 individuals in a single tree (NYSDEC 2012j). Maternity colonies typically roost during the day, but little is known about the foraging or roosting behavior of Indiana bats at night (Murray and Kurta 2004).

Bat roost and maternity colonies could be associated with a variety of forested community types adjacent to the Lake Champlain Segment ROI, including Appalachian oak-hickory, beech-maple mesic, floodplains, and hemlock-northern hardwood forests. Bats forage on flying insects along river and lake shorelines, in the crowns of trees in floodplains, and in upland forests. Indiana bats prefer to forage and travel along the forest-air interface of the forest canopy or along forest edges/hedgerows (USFWS 2007a). Roosting and foraging habitat for Indiana bats could occur adjacent to, and in a few areas in, the Lake Champlain Segment ROI.

Northern long-eared bat. The northern long-eared bat was proposed for listing as endangered under the ESA in October 2013 at which time the USFWS initiated a 12-month finding toward a final status determination (78 *Federal Register* 61046). The USFWS reported that no critical habitat for the species was determinable. There are limited data on population trends for the northern long-eared bat; however, all reported occurrences of the species are marked by small populations that are in decline (Schmidt 2003, 78 *Federal Register* 61046). This species has been observed year-round throughout New York State (USFWS 2013a).

Habitat use changes throughout the year and varies based on sex and reproductive status. Generally, summer and winter ranges for this species are identical, but the habitat types used within those ranges differ. For example, reproductive females often use different summer habitat than males and non-reproductive females. Breeding for this species begins in late summer or early fall when males begin swarming near hibernacula. Northern long-eared bats overwinter in multi-species hibernacula that are typically caves or abandoned underground mine shafts with deep crevices (Caceres and Pybus 1997, Caceres and Barclay 2000). In these hibernacula, this species will usually compose less than 25 percent of the total number of individuals (Caceres and Pybus 1997). Northern long-eared bats have been observed in 58 hibernacula in mines, caves, and tunnels in New York.

Following fertilization, pregnant females migrate to summer areas where they roost in small colonies of between 30 and 60 bats, although larger maternity colonies have been observed. Maternity colonies are formed in roost trees and are more widely distributed and numerous than are major hibernacula. Like the Indiana bat, the female northern long-eared bat will nest under the loose dead bark of trees such as shagbark hickory, which is found in the proposed CHPE Project area. There is also documentation of this species roosting in man-made structures such as buildings and barns. Potential summer habitat occurs throughout much of New York State.

Edge habitat is important for northern long-eared bats as they migrate and forage (WDNR 2013). Bats will migrate from hibernacula to summer roosts, or fly from their roosts to feeding grounds following the habitat edges to maintain protection from wind and predation.

The northern long-eared bat occurs in every county in New York State. Based upon this species' habitat preferences during winter and summer, it can be assumed that these bats would occur in similar or the same areas indicated for the Indiana bat along the proposed CHPE Project route.

Bald eagle. The bald eagle was delisted by the USFWS in 2007; however, there is a post-delisting monitoring plan in place for the species, as required by the ESA (Section 4[g][1]). In addition, the bald eagle is protected under the BGEPA; therefore, it is included here as a federally listed species. Bald eagles prefer undisturbed areas near large lakes and reservoirs, marshes and swamps, or stretches along rivers where they can find open water and their primary food, which is fish. Each year, bald eagles migrate from their northern nesting areas to New York's rivers and reservoirs in search of open water, food, and roosting sites (NYSDEC 2010j).

Until the 2000s, there had been regular reports of eagles wintering along Lake Champlain, but in low numbers (well less than a dozen). Since then, sightings have begun to increase, and in 2010, 30 wintering eagles were observed along the southern half of the lake (23 adults, 7 immature), compared with a record 84 wintering bald eagles counted in 2008 in the same area (NYSDEC 2010j).

Based on the USFWS list of known or likely county occurrences of federally listed species, there is a potential that bald eagles could winter in Clinton County (USFWS 2012c).

State-Listed Species

Because the Lake Champlain Segment is entirely aquatic, the only terrestrial species expected to occur within the ROI are bird and bat species. The Indiana bat and bald eagle are also state-listed and could occur in the Lake Champlain Segment. These species are described under *Federally Listed Species* above. A summary of the state-listed bird species that occur within 0.25 miles (0.4 km) of the Lake Champlain Segment, including their status and habitat, is provided in **Table 3.1.7-1** (CHPEI 2012x).

Table 3.1.7-1. State-Listed Species Occurring within 0.25 miles of the Lake Champlain Segment

Common Name	Scientific Name	New York Status	Species Information
Peregrine falcon	*Falco peregrinus*	E	Highly migratory falcon with an expansive foraging range. Arrives in northern breeding areas late April or early May; southern departure begins late August to early September. Prefers open habitat and often nests on ledges or holes on the face of rocky cliffs or crags.
Short-eared owl	*Asio flammeus*	E	Highly migratory bird that breeds in Essex County. Prefers marshes and open lowland areas, and recent nests have been observed in pastures and agricultural areas in New York State.
Northern harrier	*Circus cyaneus*	T	Raptor with a very large home range, and whose breeding range includes most of New York State. Prefers open marshy and lowland areas, similar to the short-eared owl.
Loggerhead shrike	*Lanius ludovicianus*	E	Prefers open habitats such as pastures, hayfields, and other agricultural areas. It uses the thorns of certain shrubs and trees, such as hawthorn (*Crataegus* sp.), to impale its prey. The Washington hawthorn (*C. phaenopyrum*) is a widely distributed species often used as an ornamental tree in New York State.

Sources: CHPEI 2012x, MDNR 2012, MFG 2012, NatureServe 2012, NYSDEC 2012j, NYSDEC 2012k, PFAF Database 2012, UW 2012a.

Key: T = threatened; E = endangered

Migratory Birds

Most of New York State is overlapped by migration flyways for waterfowl, shorebirds, and birds of prey. Warblers and other songbirds generally pass through the state in high numbers as well. Although the terrestrial habitats along Lake Champlain provide breeding and wintering habitat for only a limited number of bird species, they might represent suitable stopover habitats for numerous other bird species migrating through the region.

Migrating birds of prey that are expected to pass over the Lake Champlain Segment during the daytime include osprey (*Pandion haliaetus*), bald eagle, northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), broadwinged hawk (*Buteo platypterus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and peregrine falcon (*Falco peregrinus*). On rare occasions, northern goshawk (*Accipiter* *gentilis*) and golden eagle could also pass through the ROI. Table H.2-5 in **Appendix H** identifies breeding birds that have been identified along the proposed CHPE Project route.

3.1.8 Wetlands

3.1.8.1 Background on the Resource Area

The USACE and the USEPA jointly define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (USACE 1987). Wetlands can provide a variety of functions, including wildlife habitat, groundwater recharge or discharge, sediment and shoreline stabilization, flood storage, nutrient removal, sediment and toxicant retention and production export, and, in some cases, aesthetic and recreational value (CHPEI 2012ee).

Wetlands are protected as "waters of the United States" under Section 404 of the CWA. The term "waters of the United States" incorporates deepwater aquatic habitats and special aquatic habitats, including wetlands. Jurisdictional waters of the United States regulated under the CWA include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, and "other" waters that, if degraded or destroyed, could affect interstate commerce. Wetlands are also protected under EO 11990, *Protection of Wetlands* (43 *Federal Register* 6030). This EO requires that Federal agencies provide leadership and take actions to minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.

The Federal government, including the DOE, operates on a policy of "no net loss" of wetlands, meaning that operations and activities shall avoid the net loss of size, function, or value of wetlands.

Section 404 of the CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other waters of the United States unless a permit is issued by the USACE or an approved state. When there is a proposed discharge, all appropriate and practicable steps must first be taken to avoid and minimize impacts on aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, or other aquatic resource functions. The USACE is responsible for determining the appropriate form and amount of compensatory mitigation required (USACE 2009a). Encroachment into wetlands or other waters of the United States also requires a permit from the state and the Federal government. For the proposed CHPE Project, a Section 404 permit would be required, and the Applicant has submitted a Section 404 permit application supplement to the USACE in February 2012 (CHPEI 2012a) following the original application in December 2010 (CHPEI 2010b). Consultations with the USACE are ongoing, including jurisdictional determination of wetlands delineated along the proposed CHPE Project route by the Applicant. The Applicant submitted preliminary jurisdictional determination maps and received comments from the USACE on the maps in early 2013, and submitted revised maps to the USACE in May 2013. Upon approval of all permit application materials, the USACE would issue a Section 404 permit for the proposed CHPE Project.

NYSDEC and the USACE have a joint permit application process, in which applications that are received by the NYSDEC are forwarded to the USACE. In accordance with Section 401 of the CWA, applicants under Article VII of the New York Public Service Law involving activities in jurisdictional waters of the United States must obtain a Water Quality Certificate from the NYSDPS, indicating that the proposed activity would not violate water quality standards (CHPEI 2012hh). The NYSDPS issued the Water Quality Certificate for the proposed CHPE Project on January 18, 2013 (NYSDPS 2013).

The NYSDEC regulates freshwater wetlands in New York State under the Freshwater Wetlands Act (FWA), Article 24 of the New York State Environmental Conservation Law, and 6 New York Code of Rules and Regulations Part 663 (6 NYCRR Part 663). State jurisdictional wetlands in general must be at least 12.4 acres (5 hectares) in size. In accordance with the FWA, the NYSDEC also regulates activities within the 100-foot (30-meter) "adjacent area" outside of the wetland boundary to provide a buffer zone for New York State freshwater wetlands (CHPEI 2012ee).

Under the New York State FWA, wetlands are classified into one of four classes, which rank wetlands according to their ability to perform wetland functions and provide wetland benefits. Class I wetlands have the highest rank, and the ranking descends through Classes II, III, and IV. These classifications are based on a variety of criteria, including vegetation cover type, special ecological associations, threatened or endangered species, hydrology of adjacent water bodies, the presence or absence of invasive species, wildlife, cultural significance, aesthetics, and landscape features (CHPEI 2012ee).

Tidal and estuarine wetlands in New York State are regulated under the Tidal Wetlands Act (Article 25 of the New York State Environmental Conservation Law) and its implementing regulations (6 NYCRR Part 661). This Act preserves and protects wetlands (salt marshes, flats) now or formerly connected to tidal waters. Adjacent areas within 300 feet (91 meters) (or 150 feet [45 meters] in New York City) or up to an elevation of 10 feet (3 meters) from the landward edge of tidal wetlands are also protected (NYSDEC 2010b). To implement this policy, the NYSDEC administers the Tidal Wetlands Regulatory Program, which is designed to prevent the damage and destruction of tidal wetlands. Under the Tidal Wetlands Act, NYSDEC administers a permit program regulating activities in tidal wetlands and their adjacent areas (USACE 2012a). Tidal influence would occur from the mouth of the Hudson River to the Troy Dam and in the Harlem and East rivers.

The NYSDEC classifies tidal wetlands into categories based on hydrology and vegetation (NYSDEC 2010b), and they are mapped as part of the New York State Official Tidal Wetlands Inventory. The maps were created based on aerial photography taken in 1974. The wetlands mapped during the wetland delineation conducted for the proposed CHPE Project overlap the NYSDEC tidal wetlands in some areas.

Wetlands within the roadway and railroad ROWs along the entire proposed CHPE Project route and at the converter station sites were identified and delineated by the Applicant according to the Federal Routine Determination Method presented in the 1987 USACE *Wetlands Delineation Manual* (USACE 1987), the *Interim Regional Supplement for the Northcentral and Northeast Region* (USACE 2009b), and the *New York State Freshwater Wetlands Delineation Manual* (Browne et al. 1995). Wetlands outside the roadway and railroad ROWs could not be surveyed due to lack of access and were estimated based on visual observations, aerial photography, and soils maps. The 1987 USACE manual, Interim Regional Supplement, and guidance memorandums emphasize a three-parameter approach to wetland boundary determination in the field, including evidence of wetland hydrology, presence of hydric soils, and predominance of hydrophytic vegetation. All three parameters are normally present in wetlands. **Appendix A** depicts delineated wetlands along the proposed CHPE Project route.

For the purposes of this analysis, the wetlands ROI consists of wetlands directly crossed by the transmission line and wetlands within 100 feet (30 meters) of either side of the transmission line centerline. The ROI was defined to be consistent with the 100-foot (30-meter) regulatory "adjacent area" as defined by the FWA, and because any impacts from the proposed CHPE Project would likely be confined within this area based on expected implementation of Applicant-proposed impact minimization measures (see **Appendix G**). Two sets of wetland acreages along the ROI are identified in the analysis: acreages of wetlands field-delineated by the Applicant, and acreages of NYSDEC-designated freshwater and tidal wetlands.

Wetland delineations for the proposed CHPE Project were conducted by the Applicant during three periods: October to December 2009, April to June 2010, and October to December 2011. The wetland delineation study areas included wetlands that would be directly crossed by the transmission line or that are adjacent to the proposed CHPE Project route (CHPEI 2012a, CHPEI 2012ee). All wetlands delineated within the study area are listed in **Appendix I.1** and depicted in **Appendix A**. The total acreage of wetlands delineated in the proposed CHPE Project ROI for wetlands is 258 acres (104 hectares).

The NYSDEC freshwater wetlands were identified in the Overland and Hudson River segments and total approximately 58 acres (23 hectares) within the ROI for the proposed CHPE Project. Most of the NYSDEC freshwater wetlands that would be crossed are classified as Class I or II wetlands, although the transmission line would cross all four classes of wetlands (CHPEI 2012m). NYSDEC tidal wetlands in the ROI were identified in the Hudson River and New York City Metropolitan Area segments. The total area of tidal wetlands within the proposed CHPE Project ROI is approximately 453 acres (183 hectares).

Most wetlands and water bodies that have been identified in the proposed CHPE Project area are regulated by both the USACE and NYSDEC; however, most of the smaller wetlands along the proposed CHPE Project route that are less than 12.4 acres (5 hectares) in size would not be considered jurisdictional under the New York FWA. Both USACE and New York State jurisdictional wetlands have been considered by the Applicant in the assessment of the proposed CHPE Project's impacts on wetland areas (CHPEI 2012ee).

Wetlands in the proposed CHPE Project area have been classified using the Cowardin classification system, *The Classification of Wetlands and Deepwater Habitats of the United States*, which describes classifications for wetlands and water bodies (Cowardin et al. 1979, USACE 2012a). Under the Cowardin classification system, all wetlands and deepwater habitats belong to one of the following major systems: marine, estuarine, riverine, lacustrine, or palustrine. All wetlands within the ROI were determined to be palustrine, meaning nontidal vegetated wetlands. Within the palustrine system, wetlands could be palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested wetlands (PFO), or palustrine open water wetlands (POW). See **Appendix I.1** for more information on these palustrine wetlands.

In addition to the wetland delineations, a *Wetlands Functions and Values Assessment* was completed in February 2012 for the freshwater wetlands in the ROI that could be impacted by the proposed CHPE Project and that are potentially under Federal or state jurisdiction (CHPEI 2012n). Consideration of the wetlands classifications assigned by the NYSDEC was included in the assessment. According to the Wetlands Functions and Values: Descriptive Approach described in the *Highway Methodology Workbook Supplement* (USACE New England District 1999), wetland functions are ecosystem properties that are present without any subjective human values, and are considered to be the result of the biological, geologic, hydrologic, biogeochemical, and physical processes that occur within a wetland. These processes include the following:

- Groundwater recharge/discharge
- Floodflow alteration
- Fish and shellfish habitat
- Sediment/toxicant/pathogen retention
- Nutrient removal/retention/transformation
- Production (nutrient) export
- Sediment/shoreline stabilization
- Wildlife habitat.

Wetland values are considered to be the perceived benefits to society that can be derived from the ecosystem functions or other characteristics of a wetland. These values may depend on considerations such as the location of the wetland, accessibility, human disturbance or pressures, economics, surrounding land uses, and cultural or historic information. Values attributed to wetlands include the following:

- Recreation
- Education/scientific value
- Uniqueness/heritage
- Visual quality/aesthetics
- Threatened and endangered species habitat.

Based on this assessment, the majority of the wetlands within the proposed CHPE Project area have the ability to provide some function with respect to groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, nutrient removal/retention/transformation, production export, and wildlife habitat. Wetlands associated with water bodies can provide some function with respect to sediment/shoreline stabilization or fish and shellfish habitat. A few wetlands in the proposed CHPE Project area possess values including recreation, educational and scientific value, uniqueness and heritage, and visual quality and aesthetics. Many of the wetlands in areas where the proposed CHPE Project route would occur along existing railroad ROWs and state highways have been previously disturbed or have invasive plant species (CHPEI 2012a).

3.1.8.2 Proposed CHPE Project

Wetland Physical Characteristics and Functions. No wetlands were delineated in the Lake Champlain Segment because the lake is considered open water and the transmission line would be buried within the Lake Champlain lakebed (CHPEI 2012a).

Wetland Habitat and Species. Although there are no wetlands within the ROI of the proposed CHPE Project within the Lake Champlain Segment, the transmission line route passes within approximately 1.5 miles (2.4 km) of wetlands contained in the 2,800-acre (1,130-hectare) Lake Champlain Marshes BCA, which is composed of six WMAs (CHPEI 2012b, CHPEI 2012i). Wetlands along the western shore of Lake Champlain have been designated as the Lake Champlain Marshes BCA because they support a diversity of bird species that use the area, are an important aspect of migratory stopover supporting concentrations of waterfowl and wading birds, and provide habitat for a variety of rare, threatened, or endangered species and state species of special concern (NYSDEC 2012l). The WMAs within 1.5 miles (2.4 km) of the transmission line include King Bay State Wetland Game Management Area (approximate MP 3 to 5), Montys Bay (approximate MP 15 to 17), Ausable Marsh and Wickham Marsh (between MPs 32 and 35), Putts Creek (also a BCA) (MP 80), and East Bay (MP 110). These WMA shoreline wetland complexes include large marshes, forested swamps, and shrub swamps, which provide habitat for a wide variety of avian species, including migratory bird species that are dependent on wetlands for breeding and migration (NYSDEC 2012l). Avian species present in the Lake Champlain Marshes BCA include American bittern, least bittern, osprey, upland sandpiper (*Bartramia longicauda*), black tern (*Chlidonias niger*), northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), pied-billed grebe, vesper sparrow (*Pooecetes gramineus*), and grasshopper sparrow (*Ammodramus savannarum*) (NYSDEC 2012l). In addition to waterfowl, certain Lake Champlain fish species, such as the northern pike (*Esox lucius*), require wetlands as spawning grounds and nursery areas for their young.

Lake Champlain Basin wetlands are on the Atlantic flyway, a migratory corridor for waterfowl and other birds, and provide critical resting and feeding sites during fall and spring migration periods. Approximately 20,000 to 40,000 ducks and geese have been counted on flights during early October. More than 30 species of waterfowl nest and raise their young in the Lake Champlain Basin annually, including black duck (*Anas rubripes*), wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), common goldeneye (*Bucephala clangula*), hooded merganser (*Lophodytes cucullatus*), and Canada goose (*Branta canadensis*) (NYSDEC 2012l).

The proposed CHPE Project route does not pass through any SCFWHs within the Lake Champlain Segment because no SCFWHs have been designated in Lake Champlain (CHPEI 2012b).

3.1.9 Geology and Soils

This section addresses the geology, topography and physiography, soils and sediments, and, where applicable, geological hazards such as seismicity, slope stability, and liquefaction associated with the proposed CHPE Project route. Data for this section are drawn from the U.S. Geological Survey (USGS), the NRCS, survey reports from the Applicant, and other surveys and academic sources.

Soils are discussed only for the terrestrial portion of the proposed CHPE Project, which includes the entire Overland Segment and portions of the Hudson River and New York City Metropolitan Area segments. Sediments are discussed for the aquatic portions of the proposed CHPE Project, which includes the entire Lake Champlain Segment and most of the Hudson River and New York City Metropolitan Area segments.

Prime farmland is protected under the Farmland Protection Policy Act (FPPA) of 1981. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing crops and is also available for this use. The land could be cropland, pasture, rangeland, or other land, but not urban built-up land or water. The FPPA is intended to minimize the conversion of farmland to nonagricultural uses. The Act also ensures that Federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies to protect farmland. The implementing procedures of the FPPA and NRCS require Federal agencies to evaluate the adverse effects (direct and indirect) of their programs on prime farmland and farmland, and to consider alternative actions that could avoid adverse effects. According to the FPPA, this evaluation is not applicable to non-Federal activities on private or non-Federal lands where Federal assistance for farmland conversion is not requested (7 CFR Part 658).

For the purposes of this analysis, the ROI for geology and soils is defined as 100 feet (30 meters) on each side of the transmission route centerline (see **Figure 3.2.1-1**). This ROI was selected based on an expectation that, given the construction activities proposed, the vast majority of impacts on geology and soils would likely occur within this area.

Physiography and Topography. The northernmost area of the proposed CHPE Project encompasses the region south of the U.S./Canada border to Whitehall, New York, which is within the Lake Champlain Lowlands, part of the St. Lawrence Valley Geomorphic Province. This province is characterized by wave-cut terraces and low hills. Elevations range from 80 to 1,000 feet (24 to 305 meters) above MSL, increasing in elevation gradually from the St. Lawrence River southward and eastward and westward from Lake Champlain. The primary geomorphic processes in the region are lakeshore and fluvial erosion and sediment transport and deposition (USFS 2010).

Geology. The geology within the Lake Champlain Segment is dominated by Lake Champlain and its predecessors. As the Pleistocene-aged glaciers began to melt and recede, glacial meltwater filled the Lake Champlain Basin between the Adirondack and Green mountains. The resulting lake, known as Lake Vermont, originally flowed south into the Hudson River Valley. As the glaciers continued to recede, flow in the basin reversed direction towards what became the St. Lawrence River. Deposits left by the retreating glacier range from massive boulders and cobbles to fine sands and silt (Henry Sheldon Museum 2004).

Lake Champlain is surrounded by Pleistocene marine clays overlaying older lacustrine silty clays, below which lies bedrock. Bedrock is mainly Ordovician carbonate and shale, with some sandstones from the Cambrian period (USFS 2010).

Sediments. Surficial sediments in the northern portion of Lake Champlain are primarily fine-grained, with rocky areas and obstructions occurring along the route of the transmission line. Slopes and elevations vary, with some sections of steeply sloped sediments. Soft sediments exist below these surficial deposits throughout the majority of the route, at depths ranging from 5 to 80 feet (1.5 to 24 meters), though some areas of compacted sediments exist along the project route. Bedrock is exposed on the bottom of Lake Champlain along the proposed CHPE Project route at MPs 9.0, 10.3, 11.3, 15.6, 19.9, 20.9, 37.1, 41.3, 44.0, 46.3, and 59.2 (CHPEI 2012m).

Sediments lakewide are contaminated with low levels of cadmium, mercury, and other trace metals, while sediments along the proposed transmission line route near Plattsburgh, New York (approximate MP 25) show elevated concentrations of PCBs, PAHs, dioxins, and furans, and exceed NOAA's Effects Range Median (ER-M) for lead (McIntosh 1994). For a more detailed discussion of sediment contamination, please refer to **Section 3.1.15**.

Seismicity. The 2008 USGS United States National Seismic Hazard Map for New York indicates that the seismic hazard rating for the Lake Champlain Segment ranges from approximately 12 to 30 percent g (peak ground acceleration as a percentage of the force of gravity). This represents the potential for low to moderate damage to structures and utilities during a seismic event. The hazard rating is highest closer to the U.S./Canada border (USGS 2012a, USGS 2013). Studies indicate that soils in this segment would have a 10 percent chance of liquefaction from a seismic event with a ground shaking rating of 15 percent g (LCBP 2012b).

3.1.10 Cultural Resources

3.1.10.1 Regulatory Compliance and Resource Setting

The National Historic Preservation Act of 1966 (16 U.S.C. Part 470 *et. seq.*; NHPA) is the primary Federal law protecting cultural resources. Cultural resources include archaeological sites, historical structures and objects, and traditional cultural properties. Historic properties are cultural resources that are listed in or eligible for listing in the National Register of Historic Places (NRHP) because they are significant and retain integrity (36 CFR 60.4). The NHPA addresses several types of historic properties, including prehistoric and historic archaeological sites, buildings and structures, districts, and objects. Section 106 of the NHPA requires that Federal agencies take into account the potential effects of their proposed actions (undertakings) on historic properties, and to develop measures to avoid, minimize or mitigate any adverse effects. Regulations for Protection of Historic Properties (36 CFR Part 800) describe the process for compliance with Section 106, and provide steps a Federal agency must take to determine the Area of Potential Effects (APE) of a proposed undertaking, identify historic properties within the APE, assess potential effects of the proposed undertaking on historic properties, and consult with interested parties. These steps are carried out in consultation with State Historic Preservation Officers (SHPOs), American Indian tribes (including those with historic ties to the APE), Tribal Historic Preservation Officers (THPOs), and other consulting parties (36 CFR 800.2).[6]

NEPA (42 U.S.C 4321 Section 101[b][4]) requires a Federal agency to coordinate its plans to preserve the important historic, cultural, and natural aspects of the national heritage of the United States. CEQ's

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[6] The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 also requires Federal agencies to consult with American Indian tribes with historic ties to the APE regarding the disposition of American Indian human remains, burial goods, and cultural items recovered from federally owned or controlled lands.

implementing NEPA regulations require that Federal officials consider an action's potential adverse effects on resources listed, or eligible for listing, in the NRHP (40 CFR 1509.27[b][8]), and that Federal agencies "[i]ntegrate the requirements of NEPA with other planning and environmental review procedures required by law…so that all such procedures run concurrently rather than consecutively" (40 CFR 1500.2[c]). DOE's compliance with Section 106 requirements are being coordinated with the development of this EIS; however, the EIS is not intended to substitute for a Section 106 agreement document per 36 CFR 800.8(c).

Section 106 Consultations. Section 106 consultations for the proposed CHPE Project are ongoing.[7]

In January 2011, DOE formally initiated the Section 106 consultation process with the Advisory Council on Historic Preservation (ACHP), the New York SHPO, the Delaware Nation, the St. Regis Mohawk Tribe, the Stockbridge-Munsee Community, the Shinnecock Indian Nation, and the U.S. Bureau of Indian Affairs (collectively the "Consulting Parties") regarding the proposed CHPE Project in January 2011. In November 2012, DOE and the Applicant held a series of consultation meetings and, DOE invited the Consulting Parties to participate in a consultation meeting in Albany to discuss the proposed APE for the CHPE Project. In May 2013, DOE distributed the following three cultural resources studies to the Consulting Parties with a letter requesting their feedback on both the proposed APE and the completed studies:

- *Phase IA Literature Review and Archaeological Sensitivity Assessment, Champlain Hudson Power Express* (McQuinn et al. 2010)
- *Phase IB Archaeological Field Reconnaissance and Phase II Archaeological Site Evaluation, Champlain Hudson Power Express, Canadian Pacific Railway Segment* (Kilkenny et al. 2012)
- *Phase IA Literature Review and Archaeological Sensitivity Assessment Addendum, Champlain Hudson Power Express Terrestrial Route Modifications* (McQuinn et al. 2012).

See **Appendix J** for correspondence associated with Section 106 consultations and consultation meeting minutes, including lists of attendees.

DOE prepared a Programmatic Agreement (PA) pursuant to 36 CFR 800.14(b) to resolve the proposed CHPE Project's potential adverse effects on historic properties (see **Appendix T**). The Consulting Parties, the public, and other interested parties, as appropriate, developed the PA in consultation. The PA requires the Applicant to develop and implement a Cultural Resources Management Plan (CRMP) for the proposed CHPE Project in consultation with the Consulting Parties prior to the initiation of construction activities.

Archeological and Terrestrial Area of Potential Effects. The DOE has defined an APE that includes the geographic areas within which the proposed CHPE Project may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 CFR 800.16[d]). The APE includes all areas along the proposed transmission line construction corridor where ground-disturbing activities would be conducted. It also includes those areas outside the proposed transmission corridor, including the Luyster Creek HVDC Converter Station site, the Astoria to Rainey HVAC cable alignment, transmission interconnection sites, laydown areas, access roads, and other locations that may be affected by the proposed CHPE Project construction and operations. Additionally, the APE will take into account potential indirect effects on standing historic properties (i.e., buildings, structures, objects, and districts)

[7] Section 106 consultation is the process of seeking, discussing, and considering the views of interested parties, and, where feasible, seeking agreement regarding identified adverse effects to historic properties (36 CFR 800.16[f]).

from the use of heavy equipment, particularly along the terrestrial sections of the proposed CHPE Project route.

Construction activities (e.g., excavation activities and installation of cables) are expected to occur within a 25-foot (8-meter)-wide corridor, or 12.5 feet (4 meters) on either side of the proposed CHPE Project's centerline. To accommodate additional areas beyond trenching activities and to account for indirect effects from construction activities, the APE is defined as encompassing 25 feet (8 meters) on either side of the proposed CHPE Project's centerline. In total, the proposed CHPE Project's APE includes a 50-foot (15-meter)-wide corridor extending along the Project's 336-mile (541-km)-long route from the U.S./Canada border to ConEd's Rainey Substation; an approximate area of 20,200 acres (8,175 hectares). The APE might be further refined through additional engineering.

Regional Prehistory. The prehistory of eastern New York is generally divided into the Paleoindian, Archaic, and Woodland periods. The Paleoindian Period begins with the first human occupation of the region at least 11,300 years ago. Paleoindians in New York lived in small groups, were highly mobile, and used a small range of chipped stone tools, including fluted projectile points, to hunt migratory game animals. Human adaptation to warmer climatic conditions following the last Ice Age characterizes the Archaic Period (8000 to 1000 B.C.). Archaic populations practiced a hunting and gathering strategy that focused on small game animals and the intensive processing of wild plants. By the Late Archaic Period, the populations also began producing carved soapstone vessels. The first widespread production of ceramic vessels characterize the Woodland Period (1000 B.C. to A.D. 1600). Populations began to occupy permanent villages and gradually adopted agricultural practices during this time. During the Late Woodland Period, there was an increased focus on the cultivation of the New World staples of maize (i.e., corn), beans, and squash. Many of these groups also began living in larger villages that were protected by palisades (Ritchie 1980).

Regional History. Sustained contact between Native Americans and Europeans in eastern New York State began with Samuel de Champlain's exploration of the region in 1609 (LCMM 2009a). The same year, Dutch explorer Henry Hudson navigated the Hudson River (which was named after him) north to the present-day City of Albany. European settlers soon followed these two explorers. During the French and Indian War (1754 to1763), there were several naval battles on Lake Champlain, as the British sought to dislodge the French from their forts at Ticonderoga, Crown Point, and Chimney Point (LCMM 2009b). During the American Revolutionary War (1775 to 1783), naval battles took place on both Lake Champlain and the Hudson River, as British and American forces fought to control the waterways and access to Canada (LCMM 2009c). In 1779, an American military garrison was established at West Point, near the present-day Village of Highland Falls. The garrison at West Point is now occupied by the United States Military Academy (USMA) and is the oldest continuously occupied military outpost in the United States (USMA 2009). The War of 1812 brought further conflict to the Champlain Valley, as British and American forces again sought control of Lake Champlain. The defeat of the British Royal Navy in 1814 essentially ended the era of naval fleets on the lake and brought a sustained peace to the region (LCMM 2009d).

The construction of the Champlain Canal between 1817 and 1823 provided a link between communities in the north and manufacturing centers along the Hudson River and the Atlantic seaboard. The canal underwent several realignments and improvements throughout the 1800s to accommodate increased traffic and larger vessels. The growth of the railroads decreased the significance of the canal system, but brought new economic benefits to the region (LCMM 2009e). The modern Barge Canal replaced the Champlain Canal in the early 20th century. The Barge Canal was an attempt to revitalize the canal system; however, commercial canal traffic peaked in the 1890s and has since decreased steadily.

Examples of historic properties that would be expected within the setting of the proposed CHPE Project route or APE include the following:

- Terrestrial archaeological sites (prehistoric or historic sites containing physical evidence of human activity but no standing structures)
- Underwater sites (including shipwrecks and former terrestrial archaeological sites that are now submerged)
- Architectural properties (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance)
- Cemeteries
- Properties recognized by the Champlain Valley National Heritage Partnership
- Sites of traditional, religious, or cultural significance to American Indian tribes (including archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that the tribes consider essential for the preservation of their traditional culture).[8]

3.1.10.2 Characterization of the Resource Area and Background

Two cultural resources investigations for the Lake Champlain Segment of the proposed CHPE Project have been completed since April 2010. These studies have varied in objectives and scope because they were conducted consistent with the CHPE Project as it was proposed at the time of the studies. Both studies, which were conducted in 2010 for the proposed CHPE Project, compiled and synthesized information from previous cultural resources investigations and other sources within broad corridors to understand the location, type, and number of historic properties that could be affected by the proposed CHPE Project as proposed at that time. As engineering and construction design proceeds, if further changes in the route occur outside of the APE, additional cultural resources studies might be required. The CRMP, which is currently under preparation, will address the completion of the identification and evaluation of historic properties consistent with continued refinements of the proposed CHPE Project.

The initial investigation, completed in April 2010, was the pre-Phase IA archeological screening, a desktop study of the proposed CHPE Project proposed at that time (Glazer et al. 2010). This preliminary desktop study compiled existing information about previous cultural resources investigations within a broad corridor approximately 385 miles (620 km) in length, 1,000 feet (305 meters) wide on the terrestrial route, 2,000 feet (610 meters) wide in Lake Champlain, within 100 feet (30 meters) of both sides of the Champlain Canal, and most of the Hudson River and its immediate shoreline. The documentary research performed for this study included reviewing information collected from the New York SHPO, NYSDEC, Lake Champlain Maritime Museum, and New York State Museum. This study provides an overview of previous cultural resources surveys in the area, and the previously reported types of cultural resources to be expected in the vicinity of and within or immediately adjacent to the CHPE Project route as proposed at that time. The study identified 145 previous cultural resource surveys, 529 terrestrial archaeological sites, 626 underwater sites, and 451 architectural properties that are listed or eligible for listing in the NRHP (Glazer et al. 2010).

The second investigation, completed in August 2010, was the Phase IA literature review and archaeological sensitivity assessment of the proposed CHPE Project route at that time (McQuinn et al. 2010). The study area in this more extensive desktop survey report was the same as for the earlier pre-Phase IA archaeological screening study, but also specifically identified sites within 25 feet (8 meters) of the construction corridor centerline (i.e., a 50-foot [15-meter]-wide corridor) for the

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[8] Sites of traditional, religious, or cultural significance to Native Hawaiian and Alaskan organizations must also be considered in accordance with 36 CFR 800.4(a)(4) and 800.11(c)(1), although there are no sites of significance to Native Hawaiian organizations that are relevant to the proposed CHPE Project route or APE.

proposed CHPE Project route at the time. According to the report's Management Summary, 47 previous cultural resource surveys, 26 terrestrial archaeological sites, 41 underwater sites, and 51 architectural properties listed or eligible for listing in the NRHP were identified. A detailed review of the report, however, indicates that the Management Summary had inaccurate counts and that 39 terrestrial archaeological sites, 29 underwater sites, and 47 architectural properties listed or eligible for listing in the NRHP were identified within or adjacent to the 50-foot (15-meter)-wide construction corridor at that time (McQuinn et al. 2010). The report also included detailed recommendations regarding additional Phase IB testing along the transmission line route as proposed at that time.

To identify and address potential impacts on cultural resources, an independent GIS analysis was conducted of the Applicant's cultural resources data collected during these investigations. The results of the independent GIS analysis are presented for each of the proposed CHPE Project segment APEs as provided in **Sections 3.1.10.3**, **3.2.10**, **3.3.10**, and **3.4.10**.

3.1.10.3 Cultural Resources Identified in the Lake Champlain Segment APE of the Proposed CHPE Project

The independent GIS analysis based on site data provided by the Applicant indicates that two terrestrial archaeological sites, seven underwater sites, and three architectural properties listed in the NRHP are located in the APE of the Lake Champlain Segment. **Table 3.1.10-1** provides a summary of these known cultural resources.

The boundaries of the two terrestrial archaeological sites and two architectural properties (Fort Crown Point National Historic Landmark [NHL] and Fort Ticonderoga NHL) identified in **Table 3.1.10-1** extend into Lake Champlain, although the justification for these boundaries is not clear. These sites would be reexamined by the Applicant to determine whether any cultural resources extend into the APE in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. If the terrestrial archaeological sites extend into the APE, they would be evaluated to determine if they are eligible for listing in the NRHP. The two architectural properties are already listed in the NRHP. As a result, if cultural resources are found to extend into Lake Champlain, these resources would be evaluated to determine if they are contributing elements to the properties. One of the underwater sites is a NRHP-listed property associated with Fort Montgomery, two are confirmed shipwrecks, and four are possible shipwrecks. The four possible shipwrecks would be evaluated to determine their NRHP eligibility. Lake Champlain has been surveyed in its entirety by the Lake Champlain Maritime Museum, and the cultural resources identified in the APE of the Lake Champlain Segment of the proposed CHPE Project are presented in the Pre-Phase IA Archaeological Screening (Glazer et al. 2010). As a result, apart from the eligibility evaluations discussed above, no additional cultural resource investigations of the Lake Champlain Segment are required.

Table 3.1.10-1. Known Cultural Resources in the APE of the Lake Champlain Segment

Site Type	Site Name and/or State and/or Project Site Number	Description
Terrestrial Archaeological Site	NYSM 5108; Site 92	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	Flat Rock Bay (NYSM 1344; Site 94)	Pre-contact Woodland site
Underwater Site (NRHP-listed)	NYSM 11626 (LC 1)	Building debris or structural remains associated with Fort Montgomery
Underwater Site	NYSM 11628 (LC 3)	Railroad drawboat
Underwater Site	NYSM 11630 (LC 5)	Likely a tree, but the presence of a magnetic anomaly suggests that it could be of cultural origin
Underwater Site	NYSM 11631 (LC 6)	Likely a tree, but the presence of a magnetic anomaly suggests that it could be of cultural origin
Underwater Site	VT-AD-1-23 (LC 32)	Possible wreck, largely buried
Underwater Site	VT-AD-729 (LC 42)	Possible wreck, although lack of magnetic signature suggests a tree or other debris, NRHP status undetermined
Underwater Site	VT-AD-731 (LC 44)	Wreck located in 1982; canal boat (possibly the *Willis G. Fisher*) sank in distress with a load of coal
NRHP-listed Architectural Property	Lake Champlain Bridge (OPRHP 03102.000192, NRL 15)	20th-century roadway bridge; demolished in 2010
NRHP-listed Architectural Property	Fort Crown Point NHL (OPRHP 03102.000016, NRL 17)	18th-century fort and associated features; archaeological site boundary extends into Lake Champlain
NRHP-listed Architectural Property	Fort Ticonderoga NHL (OPRHP 03115.000002, NRL 18)	18th-century fort and associated features; archaeological site boundary extends into Lake Champlain

Sources: Glazer et al. 2010; McQuinn et al. 2010, 2012.

Notes: This table and similar tables for cultural resources reflect information available at time of EIS publication (see **Section 3.5**).

Key: LC = Lake Champlain; OPRHP = Office of Parks, Recreation, and Historic Preservation for New York State; NHL = National Historic Landmark; NRL = National Register Listed; NYSM = New York State Museum; VT-AD = Addison County, Vermont.

3.1.11 Visual Resources

> The term **visual resources** encompasses the overall visual character of a project site and includes individual aesthetic resources. **Aesthetic resources** are those sites of particular beauty or aesthetic value.

3.1.11.1 Background on the Resource Area

Visual resources include the natural and man-made physical features that give a particular landscape its character. The features that form the overall visual impression a viewer receives include landforms, vegetation, water, color, adjacent scenery, scarcity, and man-made modifications. While visual resources represent the general features within the viewshed of a proposed action, aesthetic resources are specific features of value, such as parks and vistas with high scenic integrity. Many places have been recognized for their beauty and designated through Federal or state political processes. Recognition of aesthetic resources also occurs at local levels through zoning, planning, or other public means. That these special places are formally recognized is a matter of public record (NYSDEC 2000).

According to the NYSDEC Program Policy (NYSDEC 2000), examples of aesthetic resources can include the following:

- A property on or eligible for inclusion in the National or State Register of Historic Places (16 U.S.C. 470a *et seq.*, Parks, Recreation and Historic Preservation Law Section 14.07)
- State Parks (Parks, Recreation and Historic Preservation Law Section 3.09)
- Urban Cultural Parks (Parks, Recreation and Historic Preservation Law Section 35.15)
- The State Forest Preserve [New York State Constitution Article XIV]
- National Natural Landmarks (36 CFR Part 62)
- A site, area, lake, reservoir or highway designated or eligible for designation as scenic (New York State Environmental Conservation Law Article 49 or Department of Transportation equivalent)
- Scenic Areas of Statewide Significance (of Article 42 of Executive Law)
- Adirondack Park Scenic Vistas
- Palisades Park (Palisades Interstate Park Commission).

The assessment of potential impacts on visual resources in this EIS evaluates the potential for both visual impacts and impacts on aesthetic resources and follows the NYSDEC Program Policy entitled *Assessing and Mitigating Visual Impacts*. A visual impact occurs when an object becomes permanently visible in the existing environment. Visual impacts are independent of any classification of the quality or value of a viewshed (NYSDEC 2000).

The assessment of potential impacts on aesthetic resources in this EIS was adapted in part from the analysis provided in the Visual Assessment Reports for the proposed CHPE Project prepared by the Applicant (CHPEI 2012s, CHPEI 2012r) and involves the following steps as outlined in the NYSDEC program policy (NYSDEC 2000):

- Describe the existing visual character of the project site/study area
- Inventory the aesthetic resources found near the project site/study area
- If the proposed project is found to be within the viewshed of any aesthetic resources, conduct a visual assessment of the proposed project
- Evaluate the aesthetic and visual impacts of the proposed project.

The first step in evaluating the impacts of a proposed project on aesthetic resources is to describe the existing visual character of the project site and to inventory the aesthetic resources found near a project site. NYSDEC policy recommends an inventory distance of 5 miles (8 km). Due to the fact that the transmission line would be installed underground, there would be only 16 small aboveground structures (i.e., cooling stations) and 1 larger aboveground structure (i.e., converter station) along the 336-mile (541-km) proposed CHPE Project route, the evaluation methodology used in the EIS was modified to catalogue aesthetic resources within 1 mile (1.6 km) of the route within aquatic environments and within 0.5 miles (0.8 km) of the route within terrestrial environments. These limits bound the ROI for the impacts on aesthetic resources. The analysis also takes into consideration the low vertical profile of construction equipment, the temporary nature of construction activities, the nature of the topography found along the CHPE Project route, and prevalent vegetative cover. In this case, the ROI and viewshed on open water is dictated by the size of transmission cable installation vessels, which due to distance decay would be negligible beyond 1 mile (1.6 km).

To evaluate the potential impacts on aesthetic resources from the proposed CHPE Project, key observation points (KOPs) were chosen from which to assess how the proposed CHPE Project would change viewsheds. These points are chosen based on how representative they are of viewpoints for area users and are used to evaluate how a viewshed as an aesthetic resource would appear both before and after a project is completed. This analysis focuses on the aesthetic resources found within the ROI that could be directly impacted by construction and operation of the proposed CHPE Project (i.e., those aesthetic resources that would be within the ROI for construction of the converter station and cooling stations and those aesthetic resources through which the proposed CHPE Project route would be constructed). The remaining aesthetic resources found within the ROI that could just be temporarily affected by proposed CHPE Project construction activities are presented in **Appendix K**.

3.1.11.2 Proposed CHPE Project

Description of Resources and Viewscape. The Lake Champlain Segment of the proposed CHPE Project route would be through the Lake Champlain Basin. The Lake Champlain Basin is dominated by the north-south, 120-mile (193-km)-long, 12-mile (19-km)-wide Lake Champlain. The Adirondack Mountains of New York are in the western portion of the basin and the Green Mountains of Vermont are in the eastern portion. Land cover in the basin is predominantly forested and agricultural. The largest urban area is the City of Plattsburgh, New York, on the western shore of Lake Champlain (LCBP 2004b). Along the shoreline of the lake, residential and commercial development tends to be more common and population densities are slightly higher (LCBP 2004c). Elevations vary from about 100 feet (30 meters) above MSL near the lake to greater than 3,500 feet (1,065 meters) above MSL in the Adirondacks and Green mountains. The ranges have steep slopes and a tree line at higher elevations. The ranges are largely undeveloped and are bordered by rural communities.

Development is limited within the mountainous areas. The viewshed along the proposed CHPE Project route in this segment varies depending on the location of the viewer. Overall, the viewshed is dominated by Lake Champlain, the Adirondacks, and the Green Mountains. This portion of the route contains NRHP-listed cultural resources, National Natural Landmarks, National Scenic Byways, and state parks. No New York Scenic Areas of Statewide Significance (SASS), National Wildlife Refuges, National Park Service properties, National Historic Sites, local parks, state game refuges, wild and scenic rivers, Adirondack Scenic Vistas, Palisades Park property, or New York Bond Act properties are within the ROI for this portion of the proposed CHPE Project (NYSDOS 2004a, CHPEI 2012a, NPS 2012a, NYSDEC 2012m, USDOT-FHWA 2012a). A full description of the aesthetic resources found within the ROI for the Lake Champlain Segment is included in **Appendix K**. For a discussion of cultural resources found along the proposed CHPE Project route in the Lake Champlain Segment, please see **Section 3.1.10**.

Key Observation Points. No KOPs were established for this portion of the proposed CHPE Project because no permanent aboveground facilities would be constructed in the Lake Champlain Segment and, therefore, no post-construction impacts on aesthetic resources would be expected in this segment of the proposed CHPE Project route.

3.1.12 Infrastructure

Infrastructure consists of the systems and physical structures that enable a human population in a specified area to function. Infrastructure is wholly human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban or developed. The availability of infrastructure and its capacity for expansion are generally regarded as essential to the economic growth of an area. The infrastructure components discussed in this section include utilities and solid waste management. Utilities include electrical power supply, water supply, storm water drainage, communications systems, natural gas, liquid fuel supply, and sanitary sewer and wastewater systems. Solid waste management primarily relates to the availability of collection and processing systems and landfills to support a population's residential, commercial, and industrial solid waste needs. The infrastructure information contained in this section provides a brief overview of each infrastructure component and summarizes its existing general condition.

The proposed CHPE Project primarily would have localized effects on existing infrastructure; therefore, the general ROI for infrastructure is within the designated construction corridors for the proposed CHPE Project route, which varies along the transmission line route but is generally within 25 feet (8 meters) of the proposed transmission line centerline (see **Table 2-1** for construction corridor widths and **Figure 3.2.1-1** for an illustration of the ROI). However, the ROI for the electrical system is the NYSBPS because this is the bulk power system to which the proposed CHPE Project would be interconnected in the New York Control Area (CHPEI 2012l).

The NYISO's 2011 *Congestion Assessment and Resource Integration Study* (CARIS) involved a model-based cost/benefit analysis of potential solutions for electric transmission congestion issues in the New York Control Area. The model results indicated that, of the solutions analyzed, transmission and demand response improvements proved to be the most feasible and cost/benefit-effective approaches to relieving electric transmission congestion in the New York Control Area (NYSRC 2007). The 2011 CARIS estimated the New York Control Area peak load to be 32,712 MW in 2011 with a capacity of 40,106 MW. However, load growth was projected to increase at a faster rate than resources and capacity (NYISO 2011a). In its 2010 Reliability Needs Assessment Report (RNA), the NYISO identified a number of uncertainties that would affect the long-term reliability of the NYSBPS (NYISO 2010a). These uncertainties included the following:

- Higher than projected load growth
- A possible decision to decline renewal of the licenses of the Indian Point Power Plant (expires in 2013)
- New environmental regulatory programs (within the 10-year planning horizon) designed to improve air quality and address the impact of a power plant's cooling water systems on aquatic life.

Commercial and known but unidentified infrastructure systems intersect with the proposed CHPE Project ROI (i.e., crossings) at MPs 83.5, 83.6, 85.9, and 86.7 in the Lake Champlain Segment (CHPEI 2013d). The following paragraphs describe crossings for utilities that could be identified with a particular type of infrastructure.

Electrical Systems. The Lake Champlain Segment is within the NYSBPS area. Eleven electrical line crossings have been identified in the proposed CHPE Project ROI; a single underwater electrical line crossing has been identified at each of the following MPs: 0.8, 1.2, and 7.7; and two crossings at each of the following MPs: 23.4, 23.7, 41.1, and 88.7 (CHPEI 2013d).

Water Supply Systems. Nearly 95 percent of New York State residents receive water from public water supply systems. Public water supply systems in New York State range from New York City's system, which is the largest engineered water system in the nation and serves more than 9 million people, to privately owned water supply companies serving municipalities, to schools and stores with their own water supply. There are nearly 10,000 public water systems in New York State (NYSDOH 2011).

Lake Champlain serves as a water source for about 200,000 people, which represents 35 percent of the Lake Champlain Drainage Basin's population (LCBP 2004a). Approximately 20 million gallons per day (MGD) (76 million liters per day) are pumped from the lake. There are 26 water withdrawal systems in Lake Champlain (LCBP 2012c) that are used for New York State residents. The locations of the water supply intakes in Lake Champlain are not identified to ensure the security of these systems, but none are within the ROI.

Storm Water Management. The entire Lake Champlain Segment is within the Lake Champlain Drainage Basin. No substantial storm water management infrastructure has been identified within the ROI of the Lake Champlain Segment of the proposed CHPE Project.

Communications. Six buried underwater telephone cables have been identified and are at MPs 0.8, 1.2, 7.7, 23.4, 23.8, and 43.4 (CHPEI 2013d). Three of these telephone lines are potentially combined with electrical lines.

Natural Gas Supply. No substantial natural gas pipelines or infrastructure have been identified within the ROI of the Lake Champlain Segment (CHPEI 2012w).

Liquid Fuel Supply. No substantial liquid fuel pipelines or infrastructure have been identified within the ROI of the Lake Champlain Segment (CHPEI 2012w).

Sanitary Sewer and Wastewater Treatment. Five sewer lines have been identified on the lake bottom in the vicinity of the proposed CHPE Project; three crossings at MP 0.8 and single crossings at MP 24 and 81.6 (CHPEI 2013d). The sewer crossings at MPs 0.8 and 24 are 500 feet (152 meters) and 1,000 feet (305 meters) outside of the ROI, respectively (CHPEI 2012w).

Solid Waste Management. As of February 2012, New York State had 26 municipal solid waste landfills. Based on 2010 data, these landfills accepted a total of 7.7 million tons of solid waste annually and had approximately 220 million tons of capacity remaining, which included permitted construction that had not been completed. Therefore, in 2010, New York State had approximately 28.5 years of capacity remaining based on receipt of 7.7 million tons annually. The closest municipal landfill to the Lake Champlain Segment is the Clinton County Landfill, with a remaining capacity of 5,259,600 tons as of 2010 (NYSDEC 2010f).

3.1.13 Recreation

Recreational resources include areas and infrastructure designated by local, state, and Federal planning entities to offer visitors and residents diverse opportunities to enjoy leisure activities. Recreational resources can range from being natural and relatively undisturbed areas to being highly developed sites with permanent infrastructure. Aquatic recreational resources include recreational fishing and boating areas, and water sport areas. Land-based recreational resources include open space, parklands, hiking and biking trails, wilderness and conservation areas, playgrounds, and ballparks.

The ROI for existing recreational resources is defined as 1 mile (1.6 km) from the transmission line for aquatic areas of the proposed CHPE Project route. This ROI distance was selected to encompass the majority of recreational resources that could be physically or visually impacted by the proposed CHPE Project.

The 101 miles (163 km) of the Lake Champlain Segment (MP 0 to 101) would be primarily an aquatic transmission line buried in the bottom of Lake Champlain. There are six state parks, one national scenic byway, two state WMAs, five New York State nature and historic preserve areas, and one state historic site along the shoreline of Lake Champlain. These recreational areas provide opportunities for boating, fishing, swimming, sailing, kayaking, canoeing, waterskiing, picnicking, golfing, hiking and biking, bird watching, cross-country skiing, downhill skiing, ice fishing, ice skating, and snowshoeing (ARTC 2012, LCR 2012a, LCR 2012b). There are two resources (Chimney Point State Historic Site and Crown Point State Historic Site) that provide educational opportunities for children and the general public (NYS OPRHP 2012a, VSHS 2012). **Appendix K** lists the visual and recreational resources along the proposed CHPE Project route and the specific recreational opportunities available at each park.

The largest recreational resource along this segment, which is also the largest publicly protected area in the contiguous United States, is Adirondack Park, a 6-million-acre (2.4-million-hectare) state park. State-owned lands within Adirondack Park are constitutionally (New York State Constitution, Article 14S3, Article XIV, Conservation, 15 May 1885) protected to remain a "forever wild" Forest Preserve (ARTC 2012). The park is also home to 105 towns and villages (ARTC 2012).

The visual resources associated with recreational areas are discussed in **Section 3.1.11**. For a discussion of cultural resources found along the proposed CHPE Project route, please see **Section 3.1.10**.

3.1.14 Public Health and Safety

3.1.14.1 Background on the Resource Area

The Public Health and Safety section addresses potential impacts of the proposed CHPE Project on public health and safety. The evaluation includes potential impacts on construction personnel and the public from construction and operation of the proposed CHPE Project. A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety addresses workers' health and safety during facilities construction, and public safety during construction activities and subsequent operation of the newly constructed facilities.

The ROI for public health and safety is 25 feet (8 meters) on each side of the transmission line centerline, which includes designated construction corridors. This ROI was selected because the primary public health and safety concern during construction activities is construction safety. This ROI also represents the maximum likely impact area from magnetic and electric fields associated with the transmission line operation and maintenance and emergency repair activities. **Table 2-1** identifies the construction corridors along the proposed CHPE Project route. **Figure 3.2.1-1** shows the ROI for public health and safety along a terrestrial portion of the proposed CHPE Project route.

Contractor Health and Safety. Construction site safety requires adherence to regulatory requirements imposed for the benefit of construction workers. The health and safety of onsite construction workers is safeguarded by numerous regulations designed to comply with standards issued by OSHA, USEPA, and state occupational safety and health agencies. These standards specify health and safety requirements, the amount and type of training required for industrial workers, the use of personal protective equipment (PPE), administrative controls, engineering controls, and permissible exposure limits for workplace stressors.

Public Health and Safety. Public safety and accident hazards can often be identified and reduced or eliminated. The degree of hazard exposure depends primarily on the location of the hazard relative to the population. Activities that can be hazardous include those related to transportation, maintenance and repair activities, and the creation of extremely noisy environments. The proper operation, maintenance, and repairs of vehicles and equipment carry important safety implications. Additionally, any facility with a high risk for an explosion or fire creates unsafe environments for workers or nearby populations.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that each Federal agency "(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." Children (youths) are defined as populations 16 years of age or younger. However, the proposed CHPE Project would not result in potentially disproportionate effects on children, and therefore is not discussed further in the EIS.

Electric and Magnetic Field Safety. Electric and magnetic fields (EMFs) are produced by anything that carries electricity, such as overhead power lines and underground cables, or by anything that uses electricity, such as household appliances. This EIS defines an EMF as an electric and magnetic field with an extremely low frequency (ELF) range of 3 to 3,000 Hertz (Hz). The EMF of an electrical transmission line typically measures at a power-frequency of 60 Hz. Electric and magnetic fields are not coupled or interrelated in the ELF range the same way that they are at higher frequency ranges. Therefore, in the ELF range it is more appropriate to refer to them as "electric and magnetic fields" rather than "electromagnetic fields."

Electric fields are present even when the equipment is turned off, as long as it remains connected to the source of electrical power. Magnetic fields result from the flow of electrical current through wires or electrical devices and increase in strength as the current increases. According to the *EMF Electric and Magnetic Fields Associated with the Use of Electric Power Questions & Answers*, prepared by the National Institute of Environmental Health Sciences (NIEHS) and the DOE Electric and Magnetic Fields Research and Public Information Dissemination Program (RAPID), underground transmission lines do not produce electric fields above ground but can produce magnetic fields above ground (NIEHS 2002). This is because electric fields are easily shielded, or weakened, by conducting objects (e.g., trees, buildings, human skin) where magnetic fields are not. Magnetic fields pass through most materials and are more difficult to shield; therefore, they are the primary concern regarding potential health effects associated with EMF from transmission lines (DOE 2012).

For electrical transmission lines, EMF levels are highest next to the transmission cable (i.e., typically near the center of the electrical transmission line ROW) and decrease as the distance from the transmission line increases (CHPEI 2012t). The EMF strength is inversely proportional to the square of the distance from the transmission line. For example, at a distance of 300 feet (91 meters) from the transmission line, the EMF strength would be one-ninth the strength it would be at a distance of 100 feet (30 meters) from the line. When HVDC bipole cables are within close proximity of each other, the opposing magnetic fields substantially cancel each other out (NYSDOS 2011b).

Electrical systems operate via DC or AC. DC and its corresponding magnetic field is constant (varies little in magnitude and direction) over time, where AC and its corresponding magnetic field varies, or cycles, over time in both magnitude and polarity. The frequency of AC cycles is expressed in Hz, which is the number of cycles per second (i.e., 1 Hz is equal to one cycle per second). In North America, AC systems typically operate at 60 Hz. Since DC magnetic fields are static, they do not induce (produce) currents in surrounding stationary objects or humans (NIEHS 2002, Vitatech 2012). AC magnetic fields, however, can induce small currents in surrounding objects or in humans. These "induced currents" (sometimes referred to as stray currents) are a focal point of research on how EMF can affect human health.

The unit of measure for electrical field strength is kV per meter (kV/m). The strength or intensity of magnetic fields is commonly measured in a unit called a gauss (G). The magnetic field levels addressed in this EIS are discussed in units of milligauss (mG), which is a thousandth of a G. **Table 3.1.14-1** presents typical magnetic field levels produced at distances of 1 and 2 feet (0.3 and 0.6 meters) from common household appliances.

Table 3.1.14-1. Magnetic Field Levels of Various Household Appliances

Appliance	Magnetic Field at 1 foot (mG)	Magnetic Field at 2 feet (mG)
Hair Dryer	Bg – 70	Bg –10
Window A/C	Bg – 20	Bg – 6
Color TV	Bg – 20	Bg – 8
Dishwasher	6 – 30	2 – 7
Refrigerator	Bg – 20	Bg – 10
Can Opener	40 – 300	3 – 30
Microwave Oven	1 – 200	1 – 30
Washing Machine	1 – 30	Bg – 6
Power Drill	20 – 40	3 – 6

Source: NIEHS 2002

Bg = Measurement indistinguishable from background levels; mG = milligauss.

Magnetic fields vary based on the source of the field. There are natural and artificial sources of static magnetic fields. Electric currents circulating within the Earth's core give the planet an expansive natural magnetic field that extends outward through the planet's crust into space. The strength of this field varies, but is highest at the North and South magnetic poles (~700 mG) and is lowest at the equator (~200 mG). Measurements of the Earth's natural DC magnetic field over the United States range from 470 to 590 mG (CHPEI 2012t). The Earth's magnetic field in the vicinity of Albany is estimated at 531.5 mG (NOAA 2012a). Additional to the natural geomagnetic field are static magnetic fields produced artificially by unvarying electrical currents and permanent magnets. Sources of artificial static fields include medical equipment, energy technologies, industries, utilities (e.g., electric transmission lines) and transportation vehicles.

In 1996, the World Health Organization established the International EMF Project to develop a solid base of scientific evidence regarding the potential health risks associated with exposure to EMF, particularly from electric transmission lines (DOE 2012). This project is overseen by an advisory committee consisting of representative of 8 international organizations, 8 independent scientific institutions, and more than 50 national governments.

World Health Organization research, in 1999, on results of all published studies on effects of magnetic fields, determined suggestive association between childhood leukemia and estimates of ELF (extremely low frequency or power-frequency) magnetic fields. Regarding health effects other than cancer, World Health Organization scientists reported that the epidemiological studies "do not provide sufficient evidence to support an association between extremely-low-frequency magnetic field exposure and adult cancers, pregnancy outcome, or neurobehavioral disorders" (DOE 2012).

In 2002, the World Health Organization published a handbook titled *Establishing a Dialogue on Risks from Electromagnetic Fields* to improve the decisionmaking process by reducing misunderstandings.

Under the "Electromagnetic Fields and Public Health: the Present Evidence" section", the handbook concluded that:

> "Scientific knowledge about the health effects of EMF is substantial and is based on a large number of epidemiological, animal, and in-vitro studies. Many health outcomes ranging from reproductive defects to cardiovascular and neurodegenerative diseases have been examined, but the most consistent evidence to date concerns childhood leukemia. In 2001, an expert scientific working group of WHO's International Agency for Research on Cancer (IARC) reviewed studies related to the carcinogenicity *of static and extremely low frequency (ELF) electric and magnetic fields*. Using the standard IARC classification that weighs human, animal and laboratory evidence, ELF magnetic fields were classified as *possibly carcinogenic to humans* based on epidemiological studies of childhood leukemia. An example of a well-known agent classified in the same category is coffee, which may increase risk of kidney cancer, while at the same time be protective against bowel cancer. "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. Evidence for all other cancers in children and adults, as well as other types of exposure (i.e., static fields and ELF electric fields) was considered inadequate to classify either due to insufficient or inconsistent scientific information. While the classification of ELF magnetic fields as possibly carcinogenic to humans has been made by IARC, it remains possible that there are other explanations for the observed association between exposure to ELF magnetic fields and childhood leukemia."

Also in 2002, the DOE EMF RAPID Program provided information on typical magnetic field levels encountered by people living in the United States. Most people in the United States are exposed to magnetic field strengths that average less than 2 mG. NIEHS also reported that the results of a study by the Electric Power Research Institute found that the average measurements from all rooms in each house (i.e., all-room mean magnetic field) for 992 homes studied throughout the United States were 0.9 mG. The all-room measurements were made away from electrical appliances and reflect primarily the magnetic fields from household wiring and exterior power lines (DOE 2012).

There are no Federal standards limiting residential or occupational exposure to DC or low-frequency (i.e., 60-Hz) magnetic or electric fields. However, the NYSPSC has established siting guidelines for the development of new or expanded electric transmission facilities. The *Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities*, issued and effective September 11, 1990, by the NYSPSC established a magnetic field strength interim standard of 200 mG, measured 3 feet (0.9 meters) above grade at the edge of the transmission line ROW. Measured at this height along the edge of the ROW, the magnetic field strength may not exceed 200 mG. This interim standard is based on a measurement during a worst-case scenario wherein transmission lines would be running at their peak capacities on a continual basis and magnetic fields would be at their highest levels. Measurements of magnetic field strengths should be calculated at this time of year to ensure that magnetic field measurements during the peak capacity season would be below the NYSPSC interim standard of 200 mG (NYSPSC 1990).

The NYSPSC interim standard is intended to ensure that magnetic fields at the edges of future major electric transmission ROWs are no stronger than the fields of existing 345-kV lines operating throughout the state. NYSPSC adopted the interim standard as a prudent avoidance measure. The concept of prudent avoidance holds that individuals or society should take those measures to avoid magnetic field exposures that entail little or modest cost and that appear to be prudent, given the current level of scientific knowledge about health risks (NYSPSC 1990). The NYSPSC approach recognizes emerging evidence neither provides a basis to suggest that magnetic fields pose a significant risk, nor asserts that they pose no risk. Therefore, the interim standard is a guideline that would avoid unnecessary increases in existing levels of exposure to magnetic fields, but is not intended to imply either safe or unsafe levels of exposure.

3.1.14.2 Proposed CHPE Project

Contractor Health and Safety. Occupational hazards for the proposed CHPE Project would include risks associated with aquatic construction activities and heavy equipment (i.e., cranes, winches, boats, and barges), installation of equipment, heavy equipment transportation, contact with electrical lines, and potential to sever existing utility lines. Specialized equipment is necessary for the installation of utilities in aquatic environments. Construction personnel perform work on a marine vessel designed solely for the purpose of installing transmission cables. Operation of the aquatic installation equipment and vessels is performed by personnel specially trained to use this equipment.

All contractors performing activities are responsible for following Federal and state safety regulations and workers compensation programs and are required to conduct those activities in a manner that does not pose an undue risk to workers or personnel. Industrial hygiene programs address exposure to hazardous materials, use of PPE, and availability of Safety Data Sheets (SDSs). Industrial hygiene is the responsibility of the contractors, as applicable. The contractor is responsible for reviewing potentially hazardous workplace operations; monitoring exposure to workplace chemicals (e.g., asbestos, lead, hazardous materials), physical hazards (e.g., noise propagation, falls), and biological agents (e.g., infectious waste, wildlife, poisonous plants); recommending and evaluating controls (e.g., prevention, administrative, engineering) to ensure personnel are properly protected or unexposed; and ensuring a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures.

Public Health and Safety. Potential hazards along the aquatic portion of the transmission line include accidents related to cable installation and vessel accidents. Among the safety protocols that are implemented to ensure navigational safety during general construction activities is implementation and maintenance of safety clearance zones, issuances of notices to mariners through the USCG, and appropriate use of navigational aids (e.g., lights and fog horns/sounds) (MMS 2009).

The New York State Department of Homeland Security and Emergency Services (NYS DHSES) was created in 2010 to provide leadership, coordination, and support for efforts to prevent, protect against, prepare for, respond to, and recover from fires, terrorism, and other man-made and natural disasters, threats, and other emergencies. There are five offices of the NYS DHSES: Counter Terrorism, Cyber Security, Emergency Management, Fire Prevention and Control, and Interoperable and Emergency Communications. The NYS DHSES is dedicated to working closely with all levels of government, the private sector, and volunteer organizations to improve the readiness, response, and recovery capabilities of communities throughout the State of New York (NYS DHSES 2012).

The New York State Fire Prevention and Control resources include 18,500 career firefighters, 270 paid on-call firefighters, 96,063 volunteer firefighters, 5,380 Emergency Medical Service First Responders, 16,597 emergency medical technicians (EMTs), and 1,807 paramedics operating out of 1,786 municipal fire departments and 3,573 fire stations (NYS DHSES 2012).

The New York Division of State Police is one of the ten largest law enforcement agencies in the nation. It is the only full-service police department in the State of New York with statewide jurisdiction. The Division of State Police is divided into two branches: the Uniform Force and the Bureau of Criminal Investigation, and is organized into a Division Headquarters in Albany and 11 separate troops (NYSP 2010).

USCG inland navigational rules are followed on Lake Champlain, and the USCG Burlington Station is the primary law enforcement authority over navigational safety and search and rescue operations in Lake

Champlain (USCG 2012). The New York State Police Marine Detail also maintains boat patrols throughout the Lake Champlain boating season (early spring through late fall) to enforce navigational and conservation laws, working closely with the USCG (NYSP 2009). Additionally, local town fire and rescue maritime units also patrol areas along the lake and provide assistance in emergency situations.

Magnetic Field Safety. Magnetic field levels at various locations along the transmission line route were calculated by the Applicant to support the CHPE Project impact analysis (CHPEI 2012t, CHPEI 2012ll) (see **Section 5.1.14**). Electric field levels were not calculated because the new HVDC transmission cables would be shielded and installed in a trench at least 4 feet (1.2 meters) under the lake bottom. The World Health Organization has stated that "When power lines are buried in the ground, the electric fields at the surface are hardly detectable" (WHO 2012). Thus, the electric field levels associated with the underground cables as part of the proposed CHPE Project are not considered further in this EIS.

3.1.15 Hazardous Materials and Wastes

This section considers the storage, transportation, handling, and use of hazardous materials; the generation, storage, transportation, and disposal of hazardous wastes; and the presence of special hazards. Hazardous materials and hazardous waste are defined by 49 CFR 171.8 and 42 U.S.C. Part 6903, respectively. Examples of hazardous materials include liquid fuels, solvents, oils, lubricants, and hydraulic fluids. Examples of hazardous wastes include spent hazardous materials and by-products from their use. Special hazards are regulated under 15 U.S.C. Chapter 53 and include asbestos-containing material, PCBs, and lead-based paint.

The USEPA has authorized the NYSDEC as the agency responsible for hazardous waste regulatory programs in New York State. Under this authorization process, the NYSDEC issues the permits, conducts inspections, signs consent orders, gathers and processes data, compels corrective actions including assessing fines, and approves various manifests and management plans on behalf of the USEPA. New York State hazardous waste management regulations are defined by 6 NYCRR Parts 370, 371, 372, 373, 374, and 376.

Improper management of hazardous materials and wastes can threaten the health and well-being of humans and wildlife species, botanical habitats, soil and sediment, and water resources. In the event of a release of hazardous materials or wastes, the extent of environmental contamination varies based on the type and quantity of the contaminant and the type of soil or sediment, topography, and water resources.

The hazardous materials and wastes ROI for the proposed CHPE Project is the area within the construction corridor and construction staging areas. This ROI was selected because it encompasses the geographic area that could reasonably be impacted by the proposed CHPE Project during construction, operations, maintenance, and emergency repair activities when hazardous materials constituents could be used and generated, or when existing contaminants could be encountered. **Table 2-1** identifies the various widths of the construction corridor along the proposed CHPE Project route.

The Lake Champlain Sediment Toxics Assessment Program has documented various environmental contaminants in the sediment of Lake Champlain. Most of these contaminants flow into the lake from point and nonpoint sources scattered throughout the Lake Champlain watershed and settle into the lake sediment. Initial surveys in 1991 collected samples from 30 sites throughout the lake and analyzed them for common contaminants. The program identified PCBs and mercury as persistent contaminants lakewide; and arsenic, cadmium, chromium, dioxins, lead, nickel, PAHs, silver, zinc, copper, and persistent chlorinated pesticides as persistent contaminants in localized areas. The program also identified three areas of Lake Champlain for intensive surveys and clean-up actions: Outer Malletts Bay, Inner Burlington Harbor, and Cumberland Bay (CHPEI 2012bb). The closest known contaminated sediment area is 2.5 miles (4.0 km) from the proposed transmission line route.

Sediment samples were collected by the Applicant along the proposed CHPE Project route at approximately 2-mile (3-km) intervals. No specific areas of environmental contamination were identified; however, as a result of the distances between sample locations, it is possible that isolated areas of sediment contamination exist and were not identified. In particular, the portions of the proposed CHPE Project route in Lake Champlain in the vicinity of tributaries currently and formerly lined with industrial activities, such as the LaChute River at MP 89, have the highest potential for undiscovered sediment contamination associated with current and former industrial operations (Myer and Gruendling 1979).

3.1.16 Air Quality

3.1.16.1 Background on the Resource Area

The potential impacts of the proposed CHPE Project on local and regional air quality in the United States and on global climate change are addressed in this section. In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of criteria pollutants in the atmosphere. The air quality in a region is a result of not only the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological "air basin," and the prevailing meteorological conditions.

Ambient Air Quality Standards. Under the CAA, the USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to affect human health and the environment. The NAAQS represent the maximum allowable concentrations for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (including particulate matter equal to or less than 10 microns in diameter [PM_{10}] and particulate matter equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb) (40 CFR Part 50). The CAA also gives the authority to states to establish air quality rules and regulations stricter than the Federal standards. New York State has adopted the NAAQS and promulgated additional State Ambient Air Quality Standards (SAAQS) for criteria pollutants. In some cases, the SAAQS are more stringent than the Federal primary standards (see bold text in **Table 3.1.16-1**). The NYSDEC regulates air quality for New York State.

Attainment versus Nonattainment and General Conformity. The USEPA classifies the air quality in an air quality control region (AQCR), or in subareas of an AQCR, according to whether the concentrations of criteria pollutants in ambient air exceed the NAAQS. Areas within each AQCR are therefore designated as either "attainment," "nonattainment," "maintenance," or "unclassified" for each of the six criteria pollutants. Attainment means that the air quality within an AQCR is better than the NAAQS. Nonattainment indicates that criteria pollutant levels exceed NAAQS. Maintenance indicates that an area was previously designated nonattainment but is now attainment. An unclassified air quality designation by USEPA means that there is not enough information to classify an AQCR appropriately, so the area is considered attainment. The USEPA has delegated the authority for ensuring compliance with the NAAQS in New York to the NYSDEC. In accordance with the CAA, each state must develop a State Implementation Plan (SIP), which is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS.

The General Conformity Rule (CAA 176(c)(4)) applies to all Federal actions in nonattainment or maintenance areas. This rule requires that any Federal action meet the requirements of a SIP or Federal Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not cause a new violation of the NAAQS; contribute to an increase in the frequency or severity of violations of NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

Table 3.1.16-1. Ambient Air Quality – Federal Standards and New York State Standards

Pollutant	Average Period	Federal Air Quality Standards				New York State Standards[a]	
		Primary Standards		Secondary Standards			
		Level[b]	Statistic[c]	Level	Statistic	Level	Statistic
Carbon Monoxide (CO)	8-hour	9 ppm	Maximum	None		9 ppm	Maximum
	1-hour	35 ppm	Maximum			35 ppm	Maximum
Lead[d] (Pb)	Rolling 3-month avg.	0.15 $\mu g/m^3$	Maximum	Same as Primary		None	
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm	Arithmetic Mean	Same as Primary		**0.05 ppm**	Arithmetic Mean
	1-hour	0.100 ppm[e]	3-year avg.	0.053 ppm	Arithmetic Mean	None	
Total Suspended Particulates (TSP)[f]	12 consecutive months	None		None		**75 $\mu g/m^3$**	Geometric Mean
	24-hour	260 $\mu g/m^3$	Maximum	150 $\mu g/m^3$	Maximum	**250 $\mu g/m^3$**	Maximum
Particulate Matter (PM_{10})[g]	24-hour	150 $\mu g/m^3$	Maximum	Same as Primary		None	
Particulate Matter ($PM_{2.5}$)	Annual	15 $\mu g/m^3$	Arithmetic Mean	Same as Primary		None	
	24-hour	35 $\mu g/m^3$[h]	3-year avg.	Same as Primary			
Ozone (O_3)[i]	8-hour (2008 std.)	0.075 ppm	3-year avg.	Same as Primary		None	
	8-hour (1997 std.)	0.08 ppm	3-year avg.	Same as Primary		0.08 ppm	Maximum
	1-hour	0.12 ppm	Not Applicable in NYS[j]	Same as Primary		0.12 ppm	Maximum
Sulfur Dioxide (SO_2)	Annual	0.03 ppm	Arithmetic Mean	None		0.03 ppm	Arithmetic Mean
	24-hour	0.14 ppm	Maximum			0.14 ppm	Maximum
	3-hour	None		0.5 ppm	Maximum	0.50 ppm	Maximum
	1-hour	75 ppb	3-year avg.[k]	None		None	
Hydrocarbons (non-methane)	3-hour (6 to 9 a.m.)	None		None		**0.24 ppm**	Maximum

Source: NYSDEC 2012a

Notes:

a. State standards that are more stringent than Federal standards are in **bold**. New York State also has standards for beryllium, fluorides, hydrogen sulfide, and settleable particulates (dustfall). Ambient monitoring for these pollutants is not currently conducted.

b. Gaseous concentrations for Federal standards are corrected to a reference temperature of 25 °C and to a reference pressure of 760 millimeters of mercury.

c. All maximum values are concentrations not to be exceeded more than once per calendar year. (Federal 1-hour ozone standard not to be exceeded more than 3 days in 3 calendar years).

d. While the Federal standard for lead has not yet officially been adopted by New York State, the 0.15 $\mu g/m^3$ standard was became effective throughout New York State on January 1, 2013, and replaced the previous level of 1.5 $\mu g/m^3$.

e. The 0.100 parts per million (ppm) standard was effective January 22, 2010. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average within an area must not exceed 0.100 ppm.

f. New York State also has 30-, 60-, and 90-day standards and geometric mean standards of 45, 55, and 65 $\mu g/m^3$ in 6 NYCRR Part 257. While these TSP standards have been superseded by the PM_{10} standards, TSP measurements can still serve as surrogates to PM_{10} measurements in the determination of compliance status.

g. Federal standard for PM_{10} has not yet officially been adopted by New York State, but is currently being applied to determine compliance status.

h. Federal standard was changed from 65 to 35 $\mu g/m^3$ on December 17, 2006. Compliance with the Federal standard is determined by using the average of 98th percentile 24-hour value during the past 3 years, which cannot exceed 35 $\mu g/m^3$.

i. Former New York State Standard for ozone of 0.08 ppm was not officially revised via regulatory process to coincide with the Federal standard of 0.12 ppm, which is currently being applied by New York State to determine compliance status. Compliance with the Federal 8-hour standards is determined by using the average of the 4th highest daily value during the past 3 years, which cannot exceed 0.084 ppm or 0.075 ppm, effective May 27, 2008).

j. USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.

k. Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Existing Conditions: Climate Patterns. The climate of New York State is broadly representative of the humid continental type, which prevails in the northeastern United States. The average annual mean temperature ranges from about 40 °F (4 °C) in the Adirondacks to near 55 °F (13 °C) in the New York City area. In January, the average mean temperature is approximately 16 °F (-9 °C) in the Adirondacks, but increases to about 26 °F (-3 °C) along the lower Hudson River valley. Poughkeepsie and New York City have recorded temperatures of 107 °F (42 °C). Record cold temperatures of -40 °F (-40 °C) or colder have been recorded in the northern half of the state (NYSCO 2010).

The prevailing wind is generally from the west in New York State. A southwest component becomes evident in winds during the warmer months while a northwest component is characteristic of the colder half of the year. Occasionally, very strong winds accompany well-developed storm systems moving across the continent or northward along the Atlantic coast.

Existing Conditions: Pollutants. Most pollutants come from industries that manufacture chemicals and other goods, from on- and off-road vehicles and power equipment, and from energy facilities that burn oil, gas, or coal. Pollutants emitted from tall stacks move high in the air, descending to earth miles downwind from their source.

There are numerous mobile and stationary emissions sources within the proposed CHPE Project area. Generally, the New York City area has much higher emissions than the rest of the proposed CHPE Project area. The types of emissions sources of particulate matter in New York State vary widely.

Sources include fossil fuel combustion in heating and mobile sources such as trucks, cars, and buses. A number of large electric utility plants presently operate not only in New York City itself, but also in the Hudson River valley. There are also many industrial and commercial operations, and gasoline transfer and use, from which (VOC) emissions originate.

Fugitive dust, as defined by the USEPA, is significant atmospheric PM dust that comes from disturbance of granular material exposed to the air by mechanical equipment or vehicles.

Fine particulate consists of both primary and secondary particles. Primary particles are generally coarse particles directly emitted into the atmosphere from motor vehicles, power generation facilities, industrial facilities, and residential wood and forest product burning sources. Primary particles also include fugitive dust. This type of generated dust is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations (USEPA 1995). Secondary particles are formed from precursor gases reacting in the atmosphere from the combination of various pollutants: sulfur oxide (SO_x), nitrogen oxides (NO_x), VOCs, and ammonia (NH_3). These pollutants are emitted from many of the same emissions sources as precursors of ozone.

Greenhouse Gas Emissions. GHGs are gaseous emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include CO_2, methane, and nitrous oxide. GHGs are primarily produced by the burning of fossil fuels and through industrial and biological processes. On September 22, 2009, the USEPA issued a final rule for mandatory GHG reporting from large GHG emissions sources in the United States. The purpose of the rule is to collect comprehensive and accurate data on CO_2 and other GHG emissions that can be used to inform future policy decisions. In general, the threshold for reporting is 25,000 metric tons or more of CO_2 equivalent GHG emissions per year, but excludes mobile source emissions. The overwhelming majority of emissions that would be generated by the proposed CHPE Project would be mobile source emissions.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was signed in October 2009 and requires Federal agencies to set goals for reducing GHG emissions. One requirement within EO 13514 is the development and implementation of an agency Strategic Sustainability Performance Plan (SSPP) that prioritizes agency actions based on lifecycle return on investment. Each SSPP is required to identify, among other things, "agency activities, policies, plans, procedures, and practices" and "specific agency goals, a schedule, milestones, and approaches for achieving results, and quantifiable metrics" relevant to the implementation of EO 13514. On September 20, 2010, DOE publicly released its SSPP. This implementation plan describes specific actions the DOE will take to achieve its individual GHG reduction targets, reduce long-term costs, and meet the full range of goals of the EO. The proposed CHPE Project, as an activity that requires a Presidential permit from DOE, would fall under the Scope 3 GHG emissions requirements. However, the Scope 3 GHG goals in the DOE SSPP do not include emissions generated by prime contractors not directly associated with DOE site operations. The SSPP is expected to be updated in the future as GHG reduction policy and implementation guidance become further developed. Future SSPP goals could include Scope 3 goals for these types of prime contractors, but that is uncertain at this time.

Region of Influence. For the Lake Champlain Segment, the ROI includes the following New York counties that are along the proposed CHPE Project route and represents the area where the substantial majority of impacts from emissions could occur: Clinton, Essex, and Washington. These counties are part of the USEPA-designated Champlain Valley Interstate AQCR.

3.1.16.2 Proposed CHPE Project

The Lake Champlain Segment of the proposed CHPE Project includes 101 miles (163 km) of the transmission line route from the international border with Canada to Dresden, New York. **Table 3.1.16-2** lists the most recent published emissions inventories for each county in the ROI and the entire Champlain Valley Interstate AQCR.

Table 3.1.16-2. Lake Champlain Segment Local and Regional Air Emissions Inventory (2008)

Counties and AQCRs	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Clinton County	2,565	10,833	13,504	943	4,846	1,205
Essex County	2,523	15,320	21,998	1,563	2,839	865
Washington County	898	7,413	483	25	2,261	379
Champlain Valley Interstate AQCR	**26,873**	**116,999**	**244,437**	**10,069**	**45,933**	**11,422**

Source: USEPA 2012c
Notes: tpy = tons per year.

Essex County is in nonattainment for 8-hour ozone, but only for the portion of Whiteface Mountain that is higher than 1,900 feet (579 meters) in elevation. The proposed CHPE Project would not include the Essex County nonattainment area. Therefore, all counties outside of this area in the Lake Champlain Segment ROI are in attainment for all criteria pollutants.

3.1.17 Noise

3.1.17.1 Background on the Resource Area

Noise is defined as unwanted sound. Sound is made up of tiny fluctuations in air pressure. Sound, within the range of human hearing, can vary in intensity by more than one million units. Therefore, a logarithmic scale, known as the decibel (dB) scale, is used to quantify sound intensity and to compress the scale to a more manageable range.

Sound is characterized by both its amplitude (how loud it is) and frequency (or pitch). The human ear does not hear all frequencies equally. In fact, the human hearing organs of the inner ear deemphasize very low and very high frequencies. The A-weighted decibel (dBA) is used to reflect this selective sensitivity of human hearing. This scale puts more weight on the range of frequencies where the average human ear is most sensitive, and less weight on those frequencies we do not hear as well. The human range of hearing extends from approximately 3 dBA to around 140 dBA. **Table 3.1.17-1** shows a range of typical noise levels from common noise sources.

Table 3.1.17-1. Common Noise Sources and Noise Levels

Sound Pressure Level (dBA)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet Gas lawn mower at 3 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Rau and Wooten 1980

Environmental noise is often expressed as a sound level occurring over a stated period of time, typically 1 hour. When the acoustic energy is averaged over a stated period of time, the resulting equivalent sound level represents the energy-based average sound level for that that period. This is called the equivalent continuous noise level (L_{eq}) and it represents an energy-based average (or mean) noise level occurring over a stated time period. The L_{eq} represents a constant sound that, over the specified period, has the same acoustic energy as the time-varying sound. This metric is used as a baseline by which to compare project-related noise levels (i.e., noise modeling results, which are also expressed as an hourly L_{eq}) and to assess the potential project-related noise increase over existing (or ambient) conditions.

Statewide Noise Limits: NYSDEC Noise Guidance. On October 6, 2000, NYSDEC issued a program guidance document: *Assessing and Mitigating Noise Impacts*. The guidance document discusses noise generation and propagation, offers methodology for performing noise assessments, and suggests ways to evaluate whether increases in noise levels are environmentally significant.

An increase in noise levels of 10 dBA is perceived by most individuals to be twice as loud. The guidance document recommends that for non-industrial settings, the Sound Pressure Level (SPL) should not exceed existing ambient noise levels by more than 6 dBA at a given receptor; however, this limit should be used as a general guideline as opposed to a regulatory limit. For example, in rural settings with low existing ambient noise levels, an increase of more than 6 dBA could be deemed acceptable because the baseline ambient noise level is low. However, the addition of any new noise source in a non-industrial setting should not raise the noise level above a maximum of 65 dBA, as 65 dBA allows for undisturbed speech at a distance of approximately 3 feet (0.9 meters) and is considered the "upper end" non-industrial ambient limit. Ambient noise levels in industrial or commercial areas should not exceed 79 dBA (NYSDEC 2001).

Although not specified in the guidance document, the 6 dBA increase limit has generally been applied to the minimum measured L_{eq} for licensing of electrical generating facility, commercial development, and other projects in New York State.

While the Applicant intends to use appropriate sound control measures, through the NYSPSC Article VII approval process the Applicant has received waivers from local laws and ordinances to allow execution of 24-hour per day construction activities in certain areas along the transmission line route (CHPEI 2012l, CHPEI 2012v).

Region of Influence. For the proposed CHPE Project, the ROI for noise is primarily the project construction corridor. However, any noise-sensitive receptor near the project construction corridor could be affected by noise depending upon the sound level of the project-related sound source, the distance to the noise-sensitive receptor from the proposed CHPE Project, and the existing noise levels. Therefore, the ROI extends 600 feet (183 meters) on either side from the transmission line route centerline because beyond this distance noise generated by proposed CHPE Project construction activities would be below 65 dBA, which is the maximum noise level permitted by any new noise source in a non-industrial setting as determined by NYSDEC guidance (NYSDEC 2001).

3.1.17.2 Proposed CHPE Project

Within the Lake Champlain Segment, the aquatic transmission cables would be installed entirely in the open water areas of Lake Champlain. On the water, sound is generated by natural sources, such as wind and waves, and by man-made sources, such as other boat and barge traffic. On shore, existing sound sources at noise-sensitive receptors include transportation noise, such as railroad or roadway noise, or machinery noise such as building climate and ventilation equipment or machinery required for local industrial operations.

Noise-sensitive receptors in the Lake Champlain Segment ROI include recreational boaters on the lake and residences along the shoreline of Lake Champlain. Parks within 600 feet (183 meters) of the transmission line route include Barber Homestead Park (MP 64.5) and Crown Point State Park (MP 73.8). No schools, libraries, and hospitals have been identified within 600 feet (183 meters) of the transmission line centerline of this segment. Areas in which a quiet setting is a basis for recreational use of the area might also be considered noise-sensitive.

3.1.18 Socioeconomics

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly characteristics of population and economic activity. Regional birth and death rates, immigration, and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators are typically accompanied by changes in other components, such as housing availability and the demand for public services.

The ROI is the geographical area in which a majority of the socioeconomic effects would occur because it receives economic benefits from implementation of a proposed action. Impacts can occur due to residency distribution of employees, commuting distances and times, and the locations of businesses providing goods and services to employees and their dependents. Other criteria can include regional economic activity, population, housing, and schools. The ROI of the aquatic portions of the proposed CHPE Project is defined as the New York counties directly adjacent to the aquatic route (see **Figure 3.1.18-1**). This ROI was selected because these are the locations where construction activities would occur and, therefore, would be the primary sources of goods and services and workers used for the proposed CHPE Project and the primary recipients of economic benefits. All the counties in the ROI are in New York State. Workers could be hired from areas outside of New York State; however, any socioeconomic impact would be negligible, and the New York job market would be more than capable of providing sufficient workers. Therefore, possible out-of-state sources of workers are not analyzed further in this EIS. Additionally, data and analyses pertaining to schools and community services within the ROI are excluded from the socioeconomic analysis because noticeable population changes, resulting in impacts on schools and community services (e.g., police and fire), would not be expected.

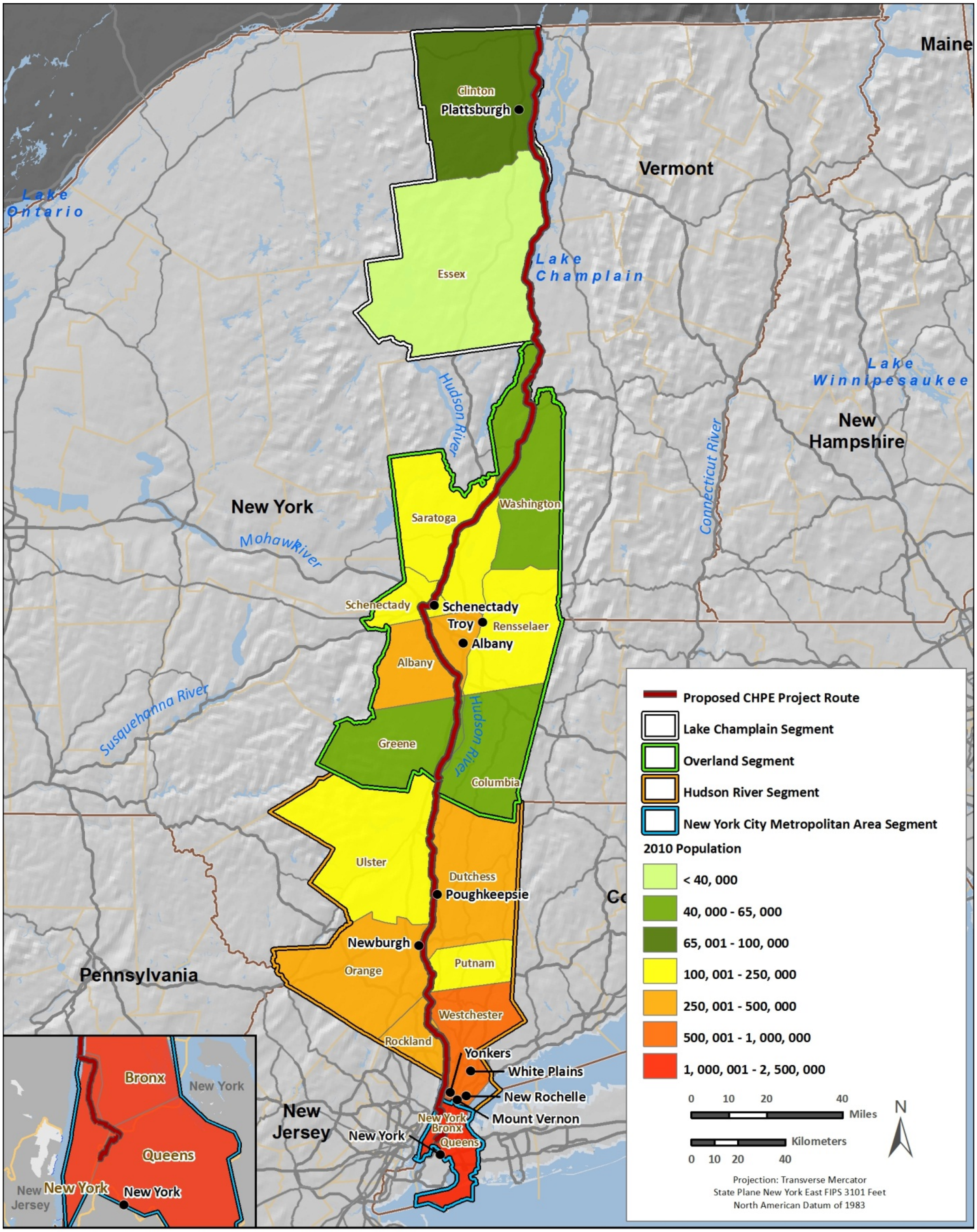
Socioeconomic data at the county, state, and national levels permit characterization of baseline conditions in the context of regional, state, and national trends. The socioeconomic baseline conditions are presented in the analysis using three spatial levels: (1) county-level data for the ROI, (2) state-level data, and (3) national-level data for the United States. County-level data are included to provide a baseline condition for the socioeconomic resources within the ROI because the socioeconomic effects from the proposed CHPE Project would not be expected to be felt beyond the county level. Data for New York State and the United States are included to provide a comparison.

Population. The Lake Champlain Segment contains the northernmost counties in New York along the construction corridor. Clinton and Essex counties are predominately rural with a total population of 122,000. The City of Plattsburgh is within Clinton County and is the largest population center in the Lake Champlain Segment. Population growth within the Lake Champlain Segment varied from 1990 to 2010. In Clinton County, the population decreased 4.4 percent from the 1990 U.S. Census to 2010. The population of Essex County increased by approximately 6 percent from 1990 to 2010 (USCB 1990, USCB 2000, USCB 2012a). Complete population data are displayed in **Table 3.1.18-1**.

Employment. The largest percentage of the labor force in the Lake Champlain Segment was employed in the educational, health, and social services industry from 2008 through 2010 (USCB 2012b; USDC 2008). The second largest industry by percentage of employment in Clinton County was the retail trade industry. The arts, entertainment, recreation, accommodation, and food services industry accounted for the second largest industry by percentage of employment in Essex County, representing approximately 12 percent of all employment. Clinton and Essex counties reported approximately 7 and 10 percent of the labor force, respectively, employed in the construction industry (see **Table 3.1.18-2**).

Annual unemployment rates in the two counties ranged from 5.2 percent in Essex County in 2002 to 10.2 percent in Clinton County in 2010 (BLS 2012). Overall, there was an increase of 4 and 4.5 percent in unemployment for Essex and Clinton counties, respectively, from 2002 to 2011. The unemployment rate for these counties was similar to the statewide unemployment rate until 2005 when the unemployment rate increased in these counties relative to New York (see **Figure 3.1.18-2**).

Taxes and Revenue. Property taxes in New York State are determined locally by calculating a tax levy and dividing it by the value of all property in the jurisdiction (NYSDTF 2012). Tax receipts are approximately 2 percent annually of the assessed property value, as calculated per New York State tax regulations (CHPEI 2012mm).



Sources: 2010 County Population: U.S. Census Bureau 2010; Basemap: ESRI StreetMap USA 2007

Figure 3.1.18-1. New York Counties within the ROI for Socioeconomics

Table 3.1.18-1. Population Summary for the Lake Champlain Segment, 1990 to 2010

Location	1990	2000	2010*	Percentage Change		
				1990 to 2000	2000 to 2010	1990 to 2010
United States	248,709,873	281,421,906	308,591,917	13.2	9.7	24.1
New York State	17,990,455	18,976,457	19,378,102	5.5	2.1	7.7
Clinton County	85,969	79,894	82,128	-7.1	2.8	-4.4
Essex County	37,152	38,851	39,370	4.6	1.3	6.0

Sources: USCB 1990, USCB 2000, USCB 2012a

*Note: 2011 census data were not available for all counties. 2010 data were used for consistent reference.

Table 3.1.18-2. Overview of Employment by Industry for the Lake Champlain Segment, 2008 to 2010

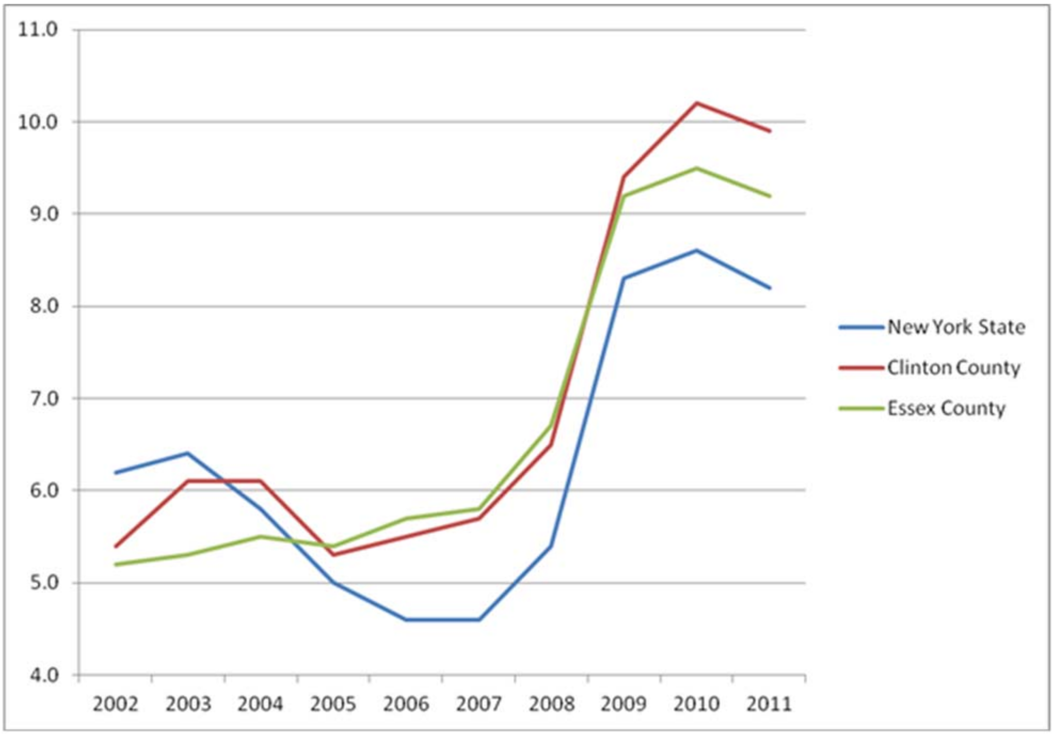
Industry*	United States	New York State	Clinton County	Essex County
Population age 16 years old and over in labor force	**141,848,097**	**9,075,825**	**31,179**	**17,918**
Agriculture, forestry, fishing and hunting, and mining	1.9%	0.6%	2.2%	1.8%
Construction	6.8%	5.8%	6.9%	9.5%
Manufacturing	10.7%	7.0%	11.7%	9.5%
Wholesale trade	2.9%	2.7%	2.0%	1.3%
Retail trade	11.6%	10.7%	13.1%	11.5%
Transportation and warehousing, and utilities	5.0%	5.2%	6.3%	3.3%
Information	2.3%	3.0%	1.0%	1.3%
Finance, insurance, real estate, and rental and leasing	6.8%	8.4%	3.9%	4.3%
Professional, scientific, management, administrative, and waste management services	10.5%	10.9%	5.3%	5.1%
Educational, health and social services	22.6%	27.1%	27.0%	31.0%
Arts, entertainment, recreation, accommodation and food services	9.1%	8.6%	7.6%	12.2%
Other services (except public administration)	4.9%	5.1%	4.0%	3.9%
Public administration	4.9%	4.9%	9.0%	5.5%

Sources: USCB 2012b, USDC 2008

*Note: Data for employment, by industry, are provided using a multi-year estimate because single-year estimates are not provided for populations under 65,000.

Housing. An analysis of available rental housing was conducted because a small number of specialized workers could come from areas outside of the active construction area (i.e., outside the community or county where work is currently taking place) and might need to live in short-term rental units, motels, and campgrounds. Clinton County has approximately 600 rental units; 2,200 seasonal, recreational, or occasional use units; and at least 25 hotels, motels, and campgrounds, composing approximately 950 units (PNCCC 2012). Essex County has approximately 670 rental units; 7,600 seasonal, recreational, or occasional use units; and at least 700 hotel, motel, and campground units (USCB 2012a, NYVN 2012).

Housing in the counties within the Lake Champlain Segment consists of approximately 61,500 housing units with 22 percent of these units being vacant in 2010. In addition, approximately 33,600 of these units were owner-occupied, or 55 percent of all occupied units. The remaining occupied units in the Lake Champlain Segment are rented. At the county level, the largest number of vacancies was in Essex County with approximately 9,300 vacant units. Essex County also contained a larger percentage of vacant units at 37 percent, compared to a vacancy rate of 13 percent in Clinton County (USCB 2012a).



Source: BLS 2012

Figure 3.1.18-2. Unemployment in the Lake Champlain Segment, 2002 to 2011

3.1.19 Environmental Justice

EO 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, stipulates that "…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…". According to the USEPA, "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA 2012a)." Minority populations are populations identified in census data as Hispanic or Latino, Black or African American, Asian, Native Hawaiian and other Pacific Islander, some other race, or two or more races. Low-income populations are families that are living below the U.S. poverty level.

The environmental justice ROI consists of census tracts that the proposed CHPE Project transmission line passes through, which represents the broadest areas within which potential effects could occur on minority or low-income populations. To ensure the potential for effects on communities along the ROI were adequately addressed, all available census population and demographics data were considered. Details on community demographics for each of the four segments of the CHPE Project route were analyzed using Federal census tract data. Census tracts are small, uniquely numbered areas that typically encompass an average of 4,000 inhabitants; tract inhabitants can range from 0 to as many as 8,000 inhabitants. Census tract data may be used to indicate population statistics for each tract, or may be combined to provide population statistics for an entire county, state or the country. The U.S. Census Bureau collects, maintains and publishes demographics data for the populations within each tract. Demographics data describing minority and low-income populations are presented for the census tracts in the ROI and for the entire county through which the transmission line route passes. Analysis in this EIS compares minority and low-income population data for the census tracts in the ROI and then, for comparison purposes, county and New York State population data. Since the transmission line would not traverse Vermont or New Jersey, impacts on minority and low-income populations in these states would not be expected; therefore population demographics within these states are not analyzed further in this EIS. The counties through which each segment of the proposed CHPE Project ROI passes are shown in **Figure 3.1.18-1**.

The ROI in this segment passes through Lake Champlain. Because no residents occur directly within the lake, analysis for effects was conducted using census tract data on minority and low-income populations that border the Lake Champlain Segment. Fifteen census tracts border the Lake Champlain Segment ROI in New York State. In 2010, minority populations within these tracts were predominantly Black, ranging from 0.1 to 4.2 percent of the population, with a median of 0.7 percent across the tracts. The median household income within the census tracts bordering Lake Champlain ranged from $35,608 to $70,709. Data revealed low-income populations in all of the census tracts, throughout the segment's ROI, which ranged from 3.2 to 16.8 percent of the total number of families in the tracts. Four census tracts (i.e., 820.02, 9612, 1020, and 1021) along this segment had higher low-income population levels than the percentage of the state population that was considered low-income. See **Appendix L** for census tract data for populations along the CHPE Project route.

The Lake Champlain Segment ROI includes populations residing primarily in Clinton and Essex counties; a single census tract in Washington County in this segment is discussed under the Overland Segment in **Section 3.2.19**). In 2010, the minority populations in Clinton and Essex counties (8.9 percent and 7.1 percent, respectively) composed less than 10 percent of each county's total population. This minority percentage was far less than the 40 percent of the total population reported for New York State. The median household incomes for Clinton and Essex counties were $46,843 and $44,734, respectively in 2010, which is below New York State's median household income of $55,217. However, the percentage of the total number of families that earned below the poverty level for Clinton County (9.4 percent) and Essex County (7.4 percent) was lower than the 11 percent of the total number of families that earned below the poverty level in New York State (see **Table 3.1.19-1**).

Table 3.1.19-1. Race, Ethnicity, and Poverty Characteristics for the Lake Champlain Segment in 2010

	ROI		New York State
	Clinton County	Essex County	
Total Population	82,128	39,370	19,378,102
Percent White	91.1	92.9	58.3
Percent Black or African American	3.6	2.5	14.4
Percent American Indian and Alaska Native	0.3	0.3	0.3
Percent Asian	1.1	0.7	7.3
Percent Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0
Percent Other Race	0.1	0.1	0.4
Percent Two or More Races	1.2	1.0	1.7
Percent Hispanic or Latino	2.5	2.5	17.6
Total Percent Minority Population	8.9	7.1	41.7
Percent Families below Poverty Level	9.4	7.4	11.0
Median Household Income	$46,843	$44,734	$55,217

Source: USCB 2012b

Note: Census tract data are provided in **Appendix L**.

3.2 Overland Segment

3.2.1 Land Use

The issues analyzed in the Land Use section, data sources used, and the definition of the land use ROI are discussed in **Section 3.1.1.1**. As discussed in that section, the land use ROI is the area within 50 feet (15 meters) on either side of the centerline of the transmission line and includes deviation areas, when present. The transmission line, in most cases, would be installed within road and railroad ROWs, but in some locations would deviate outside of these ROWs. Deviation areas refer to these minor alterations of the transmission line route from the established road and railroad ROWs to bypass features such as bridges, roadway crossings, and areas where the existing ROW is too narrow to permit cable installation while meeting established clearance criteria from infrastructure such as railroad tracks and edges of roadways (CHPEI 2012b). Deviation areas are identified in maps provided in Appendix B of the Joint Proposal. **Figure 3.2.1-1** depicts the land use ROI and ROIs for several other resource areas at a representative location (MP 209) within the Overland Segment.

Deviation Areas
Deviation areas are minor deviations of the proposed CHPE Project transmission line route from established road and railroad ROWs to bypass features such as bridges, roadway crossings, and areas where the existing ROW is too narrow to permit cable installation while meeting established clearance criteria.

The Overland Segment runs through areas ranging from rural (such as the portion of the CP railroad ROW near Adirondack Park) to urban (such as the City of Schenectady). The proposed CHPE Project within the Overland Segment would traverse Washington, Saratoga, Schenectady, Albany, and Greene counties. Land use within the ROI of the Overland Segment is primarily transportation due to use as road and railroad ROWs. Land Use Table F.2-1 in **Appendix F** identifies the amount of each general land use (i.e., land cover type) within the ROI in the Overland Segment. See Land Use Table F.2-2 in **Appendix F** for more information on the communities traversed by the terrestrial portions of the Overland Segment, and the general and specific land uses within and directly adjacent to the ROI within each community. Land ownership of the areas where the proposed CHPE Project route would deviate outside the alignment of New York State Route 22 and the CSX and CP railroad ROWs in the Overland Segment includes private (for commercial, residential, and other uses), New York State (for roadways and water), municipal (for roadways), and railroads (for New York Central Lines and other railroad ROWs) (CHPEI 2012f).

Land Uses. At the northern end of the Overland Segment, the transmission line route would exit Lake Champlain at the Hamlet of Dresden Station within the Town of Dresden (MP 101). Upon exiting Lake Champlain in Dresden, the transmission line would travel by way of HDD under private residential property, a municipal street, and CP railroad ROW before reaching the New York State Route 22 ROW. The proposed CHPE Project would then travel 11 miles (18 km) along the New York State Route 22 ROW through the Town of Dresden and the Village and Town of Whitehall. Generally, transportation land uses occur within the Route 22 ROW. Land uses adjacent to the Dresden portion of this segment are primarily forested land with a mix of open land/pasture/hay/scrub/shrub and agriculture and scattered residential and commercial/industrial/transportation uses (CHPEI 2012b). New York State Route 22 within this segment is also known as the New York State Bicycle Route 9 and the Lakes to Locks Passage, a New York State National Scenic Byway that has been designated an All American Road (NYSDOT 2012a, USDOT-FHWA 2012b).

Source: Microsoft Imagery 2010.

Figure 3.2.1-1. Example Widths of ROIs in the Overland Segment

Because the Town of Dresden is within Adirondack Park and it has not adopted a Comprehensive Plan, and development within the boundaries of Dresden is under the jurisdiction of the Adirondack Park Agency (APA). APA has developed land use classifications for private and public (state) lands located within Adirondack Park in accordance with the Adirondack Park Land Use and Development Plan and the Adirondack Park State Land Master Plan, respectively (see *Plans and Policies* subsection for more information). The portion of the proposed CHPE Project in Dresden and Adirondack Park would be within the Resource Management, Moderate Intensity, and Rural Use private land use classifications. New York State Route 22 and its ROW are in the Travel Corridor public land use classification, which is an overlay to the basic private and public land use classifications through which the Route 22 ROW corridor passes (APA 2011a). The Dresden and Adirondack Park portion of the proposed CHPE Project would be immediately adjacent to the Moderate Intensity (hamlet of Clemons) and the Wild Forest (Lake George Wild Forest) private land use classifications, and the Intensive Use (South Bay State Boat Launch) public land use classification (APA 2011b).

The South Bay State Boat Launch and the South Bay Pier, which are managed by NYSDEC, are on the west and east banks of the South Bay, respectively, at the locations where the proposed CHPE Project would enter and exit the South Bay. Recreational activities occur at both the South Bay State Boat Launch and South Bay Pier. The transmission line route continues through the Village of Whitehall within the New York State Route 22 ROW. The land uses along the route in the Village of Whitehall are primarily forested and agriculture; however, there is scattered open land/pasture/hay/scrub/shrub and residential uses are predominant along the southern portion of the route in the Village of Whitehall.

South of MP 112, the transmission line would be located in the CP railroad ROW. The CP railroad ROW within the Village of Whitehall, Town and Village of Fort Edward, Town of Northumberland, Town of Milton, Ballston (Hamlet of Ballston Lake), and the City of Schenectady are very narrow and directly adjacent to residential, commercial, and industrial uses. In some locations, these uses, including primary structures and associated structures and uses such as decks, parking lots, and yards are within the Overland Segment ROI and have encroached within the railroad ROW. Other residences and commercial and industrial uses are adjacent to the proposed CHPE Project scattered along the Overland Segment.

In the City of Schenectady, the proposed CHPE Project would deviate from the CP railroad ROW at approximately MP 173 where it would travel northwest along Greene Street and then turn west to follow Erie Boulevard for approximately 0.5 miles (0.8 km) before turning south through a parking lot and reentering the railroad ROW for 0.1 mile (0.2 km). At MP 174, the transmission line route would exit the railroad ROW traveling through an industrial area (TA Predel & Company, a scrap yard and recycling center), cross under I-890, travel along the western edge of the General Electric (GE) facility campus, and then travel south to reenter the CP railroad ROW southwest of MP 174. Land ownership in this area includes private (for commercial uses), New York State (for roadway), municipal (for City of Schenectady and Schenectady County roadways), and railroad (for New York Central Lines ROW) (CHPEI 2012f). Land uses along the portion of the route in City of Schenectady streets are primarily transportation, industrial, and commercial uses, including retail establishments and offices along Erie Boulevard. There is also a walking trail on the western edge of the GE campus. The route in Schenectady would not traverse any agricultural districts.

The proposed CHPE Project would continue south from the Schenectady area after switching from the CP railroad ROW to the CSX railroad ROW underground through the CSX railroad ROW for approximately 51 miles (82 km) through Albany and Greene counties to the Town of Catskill and Hamlet of Cementon, where it would follow Alpha Road for 1 mile (1.6 km) and enter the Hudson River. Land uses within this portion of the Overland Segment ROI vary, but are generally undeveloped (i.e., forested and open land/pasture/hay/scrub/shrub land cover types) or consist of commercial/industrial/transportation uses. High-density residential areas are present within the ROI in the villages of Ravena and Coxsackie and scattered along the ROW within the village of Catskill. Similar to areas within the CP railroad ROW, portions of the proposed CHPE Project in the CSX railroad ROW in the villages of Voorheesville and Ravena are very narrow and directly adjacent to residential, commercial, and industrial uses. In some locations, these are within the Overland Segment ROI. Other residences and commercial and industrial uses are adjacent to the proposed CHPE Project scattered along the Overland Segment. The Lafarge Cement Plant is east of the ROI at MPs 201 to 202.

The proposed CHPE Project would deviate outside of the railroad ROWs for short distances in many locations. Land ownership within these areas includes private (for commercial and residential uses), New York State (for roadways and Champlain Canal buffer), municipal (for roadways), and railroad (for railroad ROW) (CHPEI 2012f).

In addition to the residences within and along the ROI, there are several sensitive land uses (i.e., land uses associated with susceptible populations [e.g., children, elderly, those in poor health] and activities [e.g., places of worship, schools, health care facilities]) in the vicinity of the proposed CHPE Project route in the Overland Segment. Some sensitive land uses along the transmission line route include Trinity Episcopal Church (Village of Whitehall), Maple Avenue Middle School (Town of Glenville), St. John's Lutheran Church (Town of Glenville), and several recreational facilities.

> Sensitive land uses could be susceptible to disturbances from installation of the transmission cables (e.g., noise, traffic, dust), and generally include educational, recreational, religious, and health care facilities.

There are three state and four local recreational facilities and one other state land area (Saratoga Nursery) within the ROI, and several additional state and local facilities adjacent to the proposed CHPE Project. Additionally, there are three regional recreational trails in the Overland Segment. The Ballston Veterans Bikeway is within the ROI, but would not intersect with the proposed CHPE Project route. The proposed route of the Champlain Canalway Trail would intersect with the transmission line route within the Village of Whitehall, and the route would cross under the Erie Canalway Trail along Union Street within the City of Schenectady. See **Section 3.2.13** for more detailed information on recreational resources within the Overland Segment.

Agriculture is a major land use within some communities traversed by the Overland Segment, particularly in Washington and Saratoga counties. Article 25-AA of the New York State Agriculture and Markets Law authorizes the creation of local agricultural districts to encourage improvement, and continued use of agricultural land for the production of food and other agricultural products through preferential property assessments, and the consideration of agricultural districts in local planning and development of laws, ordinances, rules, and regulations. The proposed CHPE Project would cross portions of three agricultural districts in Washington County, two districts in Saratoga County, and one district each in Schenectady and Albany counties. See **Section 3.2.9** for more information on soils characterized as important farmland soils within the Overland Segment.

Land Use Plans and Policies. The following plans might be relevant to the proposed CHPE Project within the Overland Segment. Exhibit 121 of the Joint Proposal has a list of all land use policies within these plans that might be relevant to the proposed CHPE Project within the Overland Segment.

2009 New York State Open Space Conservation Plan. This Plan provides an integrated statewide strategy for land conservation and encourages state and local stakeholders to implement specific conservation recommendations while developing their own conservation strategies. The Plan identifies three priority conservation projects in Washington County, one project (with four sub-projects) in Saratoga County, one project in Schenectady County, and five projects in Albany County. The proposed route of the Champlain Canalway Trail is adjacent to the proposed CHPE Project in the Village and Town of

Whitehall, and Exhibit 121 of the Joint Proposal identified it as an optional deviation to the proposed transmission line route from Poultney Avenue to Ryder Road.

Adirondack Park State Land Master Plan. This Master Plan was prepared by the APA to provide a framework for managing all state lands within the Adirondack Park without diluting the intent of the "forever wild" protection of the Preserve. The State Land Master Plan classifies public lands in the Park as Wilderness, Primitive, Canoe, Wild Forest, Intensive Use, Historic, and State Administrative, and includes the overlays of Wild, Scenic, and Recreational Rivers and Travel Corridors. The proposed CHPE Project would be within the New York State Route 22 ROW, which is within the Travel Corridor public land use classification. Guidelines for management and use of Travel Corridors include maintaining a park-like atmosphere on state lands within the Travel Corridor, and state lands within Travel Corridors but outside of the ROW that are otherwise assigned another public land classification will be managed in compliance with the guidelines for that classification. In addition, no new structures or improvements will be constructed within the Travel Corridor but outside of the ROW, unless they conform to an adopted unit management plan for the Travel Corridor or the underlying land classification.

Adirondack Park Land Use and Development Plan. In accordance with Section 805 of the Adirondack Park Agency Act and the Adirondack Park Land Use and Development Plan, all private lands in the park are classified into one of six categories: Hamlet, Moderate Intensity, Low Intensity, Rural Use, Industrial Use, and Resource Management. Lands traversed by the proposed CHPE Project along New York State Route 22 have been classified as Rural Use, Resource Management, and Moderate Intensity. Most uses are permitted in Rural Use areas, although uses that preserve rural character are most suitable. Compatible uses in Resource Management areas include residential uses, agriculture, and forestry. Special care is taken to ensure the natural open space character of Resource Management areas are protected. Most uses are permitted in the Moderate Intensity category, although concentrated residential development is most appropriate. Major public utility uses are considered secondary uses in Rural Use, Resource Management, and Moderate Intensity areas. Secondary uses are generally compatible uses based on their location, impact on nearby uses, and conformity with intensity guidelines.

Local Waterfront Revitalization Programs. The Village of Whitehall LWRP might be relevant to the proposed CHPE Project. See **Section 3.1.1.2** for more information on LWRPs, and the Coastal Zone Consistency Documentation in **Appendix F.1** for a list of enforceable policies within this LWRP that might be relevant and the Applicant's consistency assessment.

Local Municipal Land Use Plans. Thirty-seven land use plans developed by local communities along the Overland Segment might be relevant to the proposed CHPE Project. See Land Use Table F.2-6 in **Appendix F** for a list of local municipal land use plans that might be relevant to the Overland Segment of the proposed CHPE Project. Exhibit 121 of the Joint Proposal has a full list of policies from these plans that might be relevant.

Only three plans (Hartford, New York Comprehensive Plan; Town of Ballston Final Draft Comprehensive Plan; and Town of Bethlehem Comprehensive Plan and Generic EIS) identify policies applicable to electric transmission corridors or projects. The Hartford, New York, Comprehensive Plan recommends that utility lines be placed underground to reduce visual impacts and increase their reliability. The Town of Ballston Final Draft Comprehensive Plan and Town of Bethlehem Comprehensive Plan and Generic EIS recommend that any utility facilities be placed in visually unobtrusive locations.

3.2.2 Transportation and Traffic

The Overland Segment runs through areas ranging from rural (such as portions of the CP railroad ROW) to urban (such as the City of Albany). The proposed CHPE Project in the Overland Segment would traverse Washington, Saratoga, Schenectady, Albany, and Greene counties. The transmission system within this segment includes MPs 101 to 228. The proposed CHPE Project route would be buried primarily within existing railroad ROWs that are currently used exclusively for freight transport for a total of approximately 114 miles (183 km), and existing road ROWs for approximately 13 miles (21 km). **Appendix A** presents a detailed map atlas of the proposed CHPE Project route and identifies the major roads that would be crossed by the route.

The northern terminus of this segment is in the Town of Dresden (MP 101). The proposed CHPE Project route would use the New York State Route 22 ROW for 11 miles (18 km) to the Town of Whitehall, where the CP railroad ROW is near Lake Champlain. New York State Route 22 is a two-lane road between Whitehall and Ticonderoga. The transmission cables would use the CP railroad ROW for approximately 64 miles (103 km), not including a 1-mile (1.6-km) detour through city streets in Schenectady, before entering the CSX railroad ROW, which would be used for approximately 51 miles (82 km). The CP railroad ROW in this area once had two sets of tracks along much of its length, but only one set of tracks remains. From the railroad ROW, the Schenectady detour would follow Green Street, a narrow two-lane side street in a commercial area, for several hundred feet to Erie Boulevard. Erie Boulevard is a wide four-lane road that serves commercial areas in downtown Schenectady. The transmission line route would follow Erie Boulevard for approximately 1 mile (1.6 km), and south of State Street the route would temporarily return to the railroad ROW from Erie Street through a parking lot. The transmission line would again deviate from the ROW and traverse the GE complex in Schenectady before again rejoining the CP railroad ROW. The last mile (1.6 km) of this segment would follow the Alpha Road ROW from the CSX railroad ROW to the Hudson River in the Town of Catskill. Alpha Road is a narrow two-lane, no-outlet road in a relatively rural area used for access to a private cement manufacturing facility. The railroad ROWs used by the proposed CHPE Project in the Overland Segment intersect several other notable road ROWs, as shown in **Table 3.2.2-1**.

3.2.3 Water Resources and Quality

The definitions of and issues associated with surface waters, floodplains, and groundwater are discussed in **Section 3.1.3**. The ROI for water resources and quality in the Overland Segment is 100 feet (30 meters) from the transmission line centerline (see **Figure 3.2.1-1**). This ROI was selected because this constitutes the area where a substantial majority of potential impacts could occur, and beyond this distance, potential impacts would likely be avoided by implementation of Applicant-proposed measures for water resources (see **Appendix G**).

Surface Water. The terrestrial transmission cables would be buried beneath the ground primarily within railroad ROWs, but also within ROWs for state and local roads. This segment of the proposed CHPE Project route parallels the Champlain Canal for the first 25 miles (40 km) and intersects a number of streams and rivers. Two of the surface waters along the proposed CHPE Project route in the Overland Segment are included in the Nationwide Rivers Inventory (NRI). The NRI is a listing of river sections in the United States that are considered to possess outstandingly remarkable natural or cultural values, which are judged to be of more than local or regional significance. Kayaderosseras Creek and Norman's Kill are both listed on the NRI and have stream sections crossed by the proposed CHPE Project. Kayaderosseras Creek is crossed along the CP Railroad ROW near Ballston Spa (MP 158), and Norman's Kill would be crossed along the CSX Railroad ROW near Albany (MP 184). Both of these streams are listed on the NRI for outstanding recreational value due to their proximity to urban centers in Albany, Saratoga, and

Table 3.2.2-1. Intersection of the Proposed CHPE Project Transmission Line Route with Notable Road ROWs in the Overland Segment

Intersections of Transmission Line Route with Notable Road ROWs	
NY State Route 22 between MPs 101 and 112	Glenridge Road near MP 169
U.S. Route 4 between MPs 112 and 113	Alplaus Avenue near MP 170
NY State Route 22 near MP 119	Mohawk River near MP 172
NY State Route 149 near MPs 123 and 127	Erie Boulevard between MPs 173 and 174
Baldwin Corners Road near MP 125	NY State Route 5 near MP 173
New Swamp Road between MP 129	I-890 near MP 174
NY State Route 196 between MPs 131 and 132	NY State Route 337 near MPs 176 and 177
East Street between MPs 134 and 135	NY State Route 159 near MP 178
Canal Street near MP 135	NY State Route 7 near MP 178
NY State Route 4 at MP 135	New York State Thruway (I-90) near MP 179
West River Road near MP 136	NY State Route 158 near MP 180
Clark Road near MP 138	County Line Road between MPs 180 and 181
Mott Road near MP 140	NY State Route 20 near MP 183
Schuylerville Road(County Route 32) near MP 141	Watervliet Reservoir near MP 184
Ballard Road (County Route 33) near144	NY State Route 146 between MPs 184 and 185
Scout Road near MP 145	County Route 201 near MP 186
Edie Road near MP 146	NY State Route 85A between MPs 188 and 189
Jones Road near MPs 148 and 149	NY State Route 85 near MP 190
I-87 between MPs 148 and 149	County Route 308 near MP 191
NY State Route 9 near MP 150	Delaware Turnpike (County Route 443) near MP 192
Clinton Street near MP 151	NY State Route 32 near MP 194
Denton Road near MP 152	NY State Route 396 near MP 198
NY State Route 9N near MP 153	U.S. Route 9W between MPs 199 and 200
NY State Route 29 near MP 153	NY State Route 143 between MPs 203 and 204
County Route 43 between MPs 154 and 155	NY State Route 144 between MPs 206 and 207
NY State Route 50 near MP 156	NY State Thruway (I-87) near MP 208
County Road 45 between MPs 157 and 158	Mansion Street between MPs 211 and 212
County Road 63 near MP 158	Schoharie Turnpike between MPs 216 and 217
East High Street near MP 159	NY State Route 23 near MP 221
NY State Route 67 near MP 161	Main Street between MPs 221 and 222
Outlet Road near MP 162	U.S. Route 9W between MPs 221 and 222
Shore Road between MPs 165 and 166	West Bridge Street between MPs 222 and 223
County Road 110 near MP 167	Alpha Road between MPs 227 and 228

Schenectady; and their diversity of flow gradients, which includes Class IV rapids (NPS 2012b). No portions of the rivers along the Overland Segment are protected as New York State Wild, Scenic, and Recreational Rivers (NYSDEC 2010i).

Construction activities disturbing more than 1 acre (0.4 hectares) of land in New York State require a permit under the New York SPDES and be supported by a Storm Water Pollution Prevention Plan (SWPPP) that must include a hydrologic and hydraulic analysis for all structural components of the storm water management control system and also must identify erosion- and sediment-control measures (NYSDEC 2012d).

Water Quality. In this segment of the proposed CHPE Project route, the majority of the transmission line is terrestrial; however, some surface waters would need to be crossed. New York has applicable narrative water quality standards, NYSDEC Regulations Chapter X Part 703, for these waters. NYSDEC surface water quality classifications for Overland Segment surface waters include Classes A, B, C, and D waters. Classes A and B are defined in **Section 3.1.3**, and are of better water quality than Class C. The best usage for Class C-designated waters is fishing, and the water should be suitable for primary and secondary contact. Class D indicates a best usage of fishing, but these waters will not support fish propagation. With respect to turbidity, the NYSDEC regulations state that a project should not result in an increase that would cause a substantial visible contrast to natural conditions. With respect to phosphorus and nitrogen, these elements should not be present in amounts that would result in growths of algae, weeds, and slimes that would impair the waters for their best usages. In relation to flow, there should be no alteration that would impair the waters for their best usages (NYSDEC 2012f). The proposed CHPE Project route crosses South Bay (MP 110), which is also listed on the 303(d) list as impaired for total phosphorus and excess algal growth (USEPA 2012b).

Floodplains. Based on a review of FEMA Flood Insurance Rate Maps (FIRMs), approximately 11.6 acres (4.7 hectares) of 100-year floodplains associated with rivers, streams, and unnamed tributaries are within the ROI in the Overland Segment (see **Appendix A**). These floodplains include FEMA Zones AE and A. Zone AE is a 100-year floodplain that has an established base flood elevation; Zone A is a 100-year floodplain with no base flood elevation established (FEMA 2012).

All proposed cooling stations within the Overland Segment are proposed to be sited outside of the 100-year floodplain.

Groundwater. Approximately the first 30 miles (48 km) of the Overland Segment are within the Lake Champlain Basin. See **Section 3.1.3** for a discussion of groundwater within this basin. The remaining portion of the route within the Overland Segment is in the Hudson River Basin. Most major aquifers in the Hudson River Basin are primarily composed of surficial sand and gravel deposits, with many of the aquifers consisting of very small areas with little or no hydraulic connection with other aquifers. The upper Hudson River Basin is underlain almost entirely by igneous and metamorphic rock (USGS 1991). The most productive aquifers are generally in unconsolidated sediments and are identified as Primary Aquifers by the state, which are heavily used and capable of yielding a large amount of groundwater. No primary water supply aquifers identified by the state are within the proposed CHPE Project route in the Overland Segment (NYSDEC 2010a).

The proposed CHPE Project route within the Overland Segment crosses over the Schenectady-Niskayuna Sole Source Aquifer in the vicinity of Rotterdam, Schenectady, Glenville, and Clifton Park (USEPA 2012d).

3.2.4 Aquatic Habitats and Species

The ROI for aquatic habitats in the terrestrial portions of the CHPE Project in this segment is 100 feet (30 meters) on either side of the transmission line centerline (see **Figure 3.2.1-1**). This terrestrial ROI was selected based on an expectation that given the construction activities proposed and the impact minimization measures to be employed, the vast majority of impacts to aquatic habitats and species would likely occur within this area. A brief general definition of this resource is provided in **Section 3.1.4**.

Aquatic Habitat and Vegetation. The Overland Segment ROI crosses through more than 230 open water features such as rivers, intermittent and perennial streams, ditches, ponds, pools, and lakes, along with deep marshes and forested wetlands that could support SAV. Some of these features would generally be similar to those described in **Section 3.1.4**. Besides vegetated wetlands, a few scattered small ponds are within and adjacent to the Overland Segment ROI. These wetlands typically contain less than 30 percent vegetation cover, although there could often be emergent or shrubby vegetation bordering the open water areas. SAV associated with ponds include pondweeds, water milfoils, naiad, water lobelia, and bladderworts (Edinger et al. 2002).

The portion of the transmission line route within the New York State Route 22 ROW crosses 17 streams, including unnamed tributaries of Lake Champlain and Pease Brook, Chubb's Brook, Pine Lake Brook, and Long Pond Brook. The portion of the transmission line route within the railroad ROW crosses more than 210 water bodies, including Halfway Creek, Bond Creek, Hudson River, North Branch Snook Kill, Snook Kill, Delegan Brook, Geyser Brook, Kayaderosseras Creek, Mourning Kill, Alplaus Kill, Mohawk River, Normans Kill, Vly Creek, Coeymans Creek, Hannacrois Creek, Coxsackie Creek, Murders Creek, Catskill Creek, and many other named and unnamed perennial and intermittent streams. Apart from storm water management systems, the portion of the proposed CHPE Project route along city streets in Schenectady in the Overland Segment would not cross any surface water features. The portion of the transmission line route along Alpha Road in Catskill would not cross any surface water features prior to entering the Hudson River.

The most abundant submerged aquatic plants are pondweeds (*Potamogeton richardsonii, P. amplifolius, P. spirillus, P. crispus, P. zosteriformis*), coontail (*Ceratophyllum demersum*), chara (*Chara globularis*), water milfoils (*Myriophyllum spicatum, M. sibericum*), pipewort (*Eriocaulon aquaticum*), tapegrass (*Vallisneria americana*), liverwort (*Riccia fluitans*), naiad (*Najas flexilis*), water lobelia (*Lobelia dortmanna*), waterweed (*Elodea canadensis*), water stargrass (*Heteranthera dubia*), and bladderworts (*Utricularia vulgaris, U. intermedia*) (Edinger et al. 2002). Vegetation in intermittent streams needs to be able to tolerate a wide range of hydrologic conditions and includes emergent and submergent bryophytes, and vascular plants such as water-carpet (*Chrysosplenium americanum*) and pennywort (*Hydrocotyle americana*) (NYNHP 1990).

Shellfish and Benthic Communities. The shellfish and benthic communities that inhabit perennial water bodies are generally similar to those described in **Section 3.1.4**. There are at least 40 perennial streams crossed by the proposed CHPE Project within the Overland Segment that would support shellfish and benthic communities.

Benthic macroinvertebrates include aquatic insects, worms, clams, snails, and crustaceans. The composition of the macroinvertebrate community is determined by factors such as habitat, food source, flow regime, temperature, and water quality. Community composition changes with water quality. Macroinvertebrates that indicate good water quality include mayflies, stoneflies, caddisflies, and riffle beetles. Macroinvertebrates that are indicators of poor water quality include midges or bloodworms, black fly larvae, annelids such as leaches and aquatic earthworms, and sowbugs. The NYSDEC Stream Biomonitoring Unit has been monitoring and assessing the state's rivers and streams using benthic macroinvertebrate communities since 1972 (NYSDEC 2012n).

Fauna that inhabit intermittent streams are adapted to survive a wide range of hydrologic conditions. Conditions during a single growing season can range from a coursing stream to remnant ponded sections to completely dry beds. Macroinvertebrates expected in the water bodies crossed by the proposed transmission line route within the Overland Segment include water striders (*Gerris* spp.), water boatman (Corixidae), caddisflies (Trichoptera), mayflies (Ephemeroptera), stoneflies (Plecoptera), midges (Chironomidae), blackflies (Simulidae), crayfish (*Cambarus bartoni*), and clams (*Pisidium* spp.) (NYNHP 2005a).

Fish. The Overland Segment crosses at least 40 perennial streams that could be sizeable enough to contain fish species. Smaller, intermittent streams along the proposed CHPE Project route are unlikely to contain sizeable populations of fish species or habitat (NYNHP 1990). The Overland Segment crosses Normans Kill, which is a perennial, warmwater river on the western side of the Hudson River in Albany County. Normans Kill is an important spawning area for freshwater fish such as smallmouth bass and anadromous fish that migrate from the ocean to spawn in freshwater rivers. Adult anadromous species generally enter the stream in late spring (between April and June) to spawn and then leave the area. Several weeks later, the eggs hatch and the larval fish move into the Hudson River nursery areas, including flats, shoals, and freshwater tidal areas (NYSDOS 2004b, USFWS 1997). As with Normans Kill, Coeymans Creek, also on the western side of the Hudson River in Albany County, is a valuable spawning area for freshwater and anadromous fish (NYSDOS 2004b).

Essential Fish Habitat. There is no EFH designated in the Overland Segment.

Significant Coastal Fish and Wildlife Habitats. The proposed CHPE Project route crosses the Catskill Creek SCFWH in the Overland Segment, and crosses upstream of two SCFWHs, Normans Kill SCFWH and several tributaries to the Coeymans/Hannacroix Creek Complex SCFWH, both in Albany County. Although the proposed CHPE Project would cross Catskill Creek SCFWH, it would be crossed by HDD.

The Catskill Creek SCFWH is an approximate 5-mile (8-km) segment of Catskill Creek, which is a tributary to the Hudson River. It extends upstream from its mouth on the Hudson River to a set of falls downstream from the New York State Route 23 bridge. The habitat covers 156 acres (63 hectares) of relatively large, medium- to high-gradient slopes, perennial, cold water streams with a combined drainage area of more than 270 mi^2 (700 km^2). The lower 1.5 miles (2.8 km) of the creek are within the tidal range of the Hudson River. Beds of SAV dominated by water celery are found at the creek mouth upstream to Kaaterskill Creek. Freshwater tidal marsh, intertidal mudflats, and freshwater tidal swamp are also found in this habitat. The creek and marshes provide a diversity of microhabitats for coastal migratory and resident fishes (NYSDOS 2013). Normans Kill and Coeymans Creek provide valuable spawning area for alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and white perch (*Morone americana*) between April and June. Normans Kill also provides habitat for resident freshwater fish, such as largemouth bass (*Micropterus salmoides)*. The mouth of Coeymans Creek provides spawning habitat for American shad (*Alosa sapidissima*) from mid-April through June (NYSDOS 2012).

3.2.5 Aquatic Protected and Sensitive Species

The ROI for aquatic protected and sensitive species in the terrestrial portions of the proposed CHPE Project is 100 feet (30 meters) on either side of the transmission line. This ROI was selected because habitat for aquatic protected and sensitive species could occur along predominantly terrestrial portions of the proposed CHPE Project route, but, based on the proposed construction activities and the Applicant-proposed measures, the vast majority of impacts on aquatic habitats and species would likely occur within the ROI. The issues analyzed in the Aquatic Protected and Sensitive Species section and the data sources are discussed in **Section 3.1.5**.

Federally Listed Species. Although the Overland Segment route could cross freshwater streams in some locations, no ESA-listed aquatic threatened or endangered species are expected to occur in these water bodies. The dwarf wedgemussel (*Alasmidonta heterodon*) is an endangered freshwater mollusk species that occurs in New York State. However, its extent is limited to a small area within the Delaware River watershed in the upper Delaware River in Sullivan and Delaware counties, and in one of its major downstream tributaries, the lower Neversink River in Orange County (NatureServe 2013, NYSDEC 2013d). Therefore, no ESA-listed species are known to occur in the Overland Segment.

Stated-Listed Species. No state-listed aquatic species, including the state-listed dwarf wedgemussel, occur in the Overland Segment. The transmission line would not cross the Mettawee and Poultney rivers, where the state-listed Eastern sand darter occurs in Washington County (Grandmaison et al. 2004); therefore, this species is not discussed further.

3.2.6 Terrestrial Habitats and Species

This section describes the affected terrestrial environment occurring along the proposed CHPE Project transmission line route in the Overland Segment. Terrestrial biological resources include plant and animal species and their habitats, including terrestrial shoreline portions of SCFWHs, which are described in **Section 3.1.4**. In addition to SCFWHs, the NYNHP has identified significant natural communities, which are locations of rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. Significant natural communities are not protected by regulations, unless protected as wetlands or waters of the United States. Terrestrial species within the ROI include upland and wetland plants, invertebrates, amphibians, reptiles, birds, and marine mammals.

The ROI for terrestrial habitats and species along the terrestrial portions of the proposed CHPE Project, including the Overland Segment, is 100 feet (30 meters) on either side of the transmission line centerline (see **Figure 3.2.1-1**). This area includes the construction corridor in which impacts on terrestrial habitats and species would primarily occur. **Table 2-1** identifies the construction corridors along the proposed CHPE Project route. Outside the ROI, potential impacts would be avoided by implementation of Applicant-proposed measures consisting of BMPs that would be used during construction and operation of the proposed CHPE Project. However, more mobile species that occur within the ROI could have habitat refuges outside of the ROI. Therefore, habitat communities within 0.25 miles (0.4 km) of the centerline of the transmission line are described to provide context for species that could immigrate from these habitats into the ROI.

Vegetation and Habitat. The Overland Segment occurs in the Champlain Valley and the Hudson River Valley, which is a transition zone between the boreal forest and broadleaf deciduous climatic zones of eastern North America. Forests in the Overland Segment are characterized by conifers such as hemlock (*Tsuga canadensis*) and pine (*Pinus* spp.), and varieties of deciduous species such as birch (*Betula* spp.), American beech (*Fagus grandifola*), maple (*Acer* spp.), and, to a lesser extent, oak (*Quercus* spp.). The Champlain Valley represents the northern extent of the range of tree species such as shagbark hickory (*Carya ovata*), red and white oak (*Q. rubra* and *Q. alba*), and hop hornbeam (*Ostrya virginiana*). Conifer or pine-dominated forests tend to be in less favorable habitats with poorer soils, whereas deciduous forest stands are found in locations with good soils. Coniferous habitats include transitional areas between the mountains of the Adirondacks and the Champlain Valley. Important grassland habitat in agricultural areas includes old fields, upland meadows, hayfields, and shrub-dominated fields (NYSDEC 2012o).

Forested habitat in the Adirondacks includes beech-maple forests, hemlock-northern hardwood forest, and spruce-fir (composed of red spruce [*Picea rubens*] and balsam fir [*Abies balsamea*]). Forested habitats of the Hudson River Valley along the Overland Segment include red maple- (*Acer rubrum*) black gum (*Nyssa sylvatica*) swamp, chestnut-oak forest (chestnut oak [*Q. montana*], red oak [*Quercus rubra*]), Appalachian oak-hickory forest, and pitch pine-oak-heath rocky summit. Important grassland habitat in agricultural areas includes old fields, upland meadows, hayfields, and shrub-dominated fields (NYSDEC 2012o).

Because the transmission cables would be installed underground along the existing New York State Route 22 ROW, city streets in Schenectady, Alpha Road in Catskill, and CP and CSX railroad ROWs, forested habitat along the ROI most commonly exists as successional or shrubby forest edge or urban areas. The proposed CHPE Project route would cross several streams and rivers and as a result, some riparian habitat is expected to occur within the ROI.

The only significant natural communities in the Overland Segment that are regulated by New York State are the wetland communities (i.e., deep emergent marsh, silver maple-ash swamp, floodplain forest, freshwater intertidal mudflats, freshwater tidal marsh). Wetlands are described in detail in **Section 3.2.8**. The Saratoga Sand Plains WMA is along the Overland Segment in the Town of Wilton between MPs 144 and 147. This WMA includes deepwater wetlands, rare pine barren vernal ponds, ephemeral wetlands in open areas, and oak-pine savannah, which provide habitat for a wide variety of species, including the Federal- and state-listed Karner blue butterfly (*Lycaeides melissa samuelis*). Other species of interest in this WMA include the state-threatened frosted elfin butterfly (*Callophrys irus*) and Blanding's turtle (*Emydoidea blandingii*); the state-designated species of special concern Eastern spadefoot toad (*Scaphiopus holbrookii*), spotted turtle (*Clemmys guttata*), and Eastern hognose snake (*Heterodon platirhinos*), and prairie warblers (*Dendroica discolor*), a designated species of greatest conservation need (NYSDEC 2012hh). Protected terrestrial species are discussed in **Section 3.2.7**.

The Overland Segment ROI overlaps several significant natural communities in the Saratoga Sand Plains WMA between MPs 144 and 147: successional northern sandplain grassland, red maple-hardwood swamp, and Appalachian oak-pine forest. The transmission line would also be within 0.25 miles (0.4 km) of several significant natural communities that potentially host terrestrial species that could migrate into the ROI. Such natural communities include the following (NYSDEC 2012p):

- Deep emergent marsh
- Silver maple-ash swamp
- Floodplain forest
- Limestone woodland
- Freshwater intertidal mudflats
- Freshwater tidal marsh.

The Applicant identified and mapped habitat along the terrestrial portions of the proposed CHPE Project construction corridor using aerial photography, field observations, and available databases. As the proposed CHPE Project route alignment has changed since the mapping effort was completed, it includes only approximately 359 of the 644 acres (145 of the 261 hectares) (56 percent) within the terrestrial portion of the entire proposed CHPE Project construction corridors as was defined in **Table 2-1**. Ecological communities and land cover types that have been identified within portions of the Overland Segment construction corridors are presented in **Table 3.2.6-1**. The data presented in this table include only a subset of the full construction corridor (i.e., survey corridor). While the survey corridor does not include the whole ROI, the data can be considered representative and used to characterize the habitats and species in the ROI.

Open upland vegetation observed within the survey corridor includes successional old field and successional shrubland. Observed forested uplands include pitch pine-oak forest, Appalachian oak-pine forest, pine-northern hardwood forest, beech-maple mesic forest, hemlock-northern hardwoods forest, successional northern hardwoods, and successional southern hardwoods. In addition to the habitats listed in **Table 3.2.6-1**, open water and rivers/streams compose 0.1 percent of the survey corridor and wetlands

Table 3.2.6-1. Habitats and Land Cover Types Occurring in the Survey Corridor of the Overland Segment

Habitat/Land Cover Type	Acreage of Survey Corridor	Percent of Survey Corridor
Appalachian Oak-Hickory Forest	5.4	1.6
Appalachian Oak-Pine Forest	8.4	2.5
Beech-Maple Mesic Forest	0.2	< 0.1
Brushy Cleared Land	14.5	4.3
Construction/Road Maintenance Spoils	0.9	0.3
Cropland/Field Crops	0.14	0.4
Floodplain Forest	1.3	0.4
Great Lakes Aquatic Bed	0.5	0.2
Hemlock-Northern Hardwood Forest	0.7	0.2
Herbicide-Sprayed Roadside/Pathway	0.5	0.2
Junkyard	1.4	0.4
Landfill/Dump	0.4	0.1
Mine Spoils	0.2	0.1
Mowed Lawn	0.7	0.2
Mowed Lawn with Trees	5.1	1.5
Mowed Roadside Pathway	1.0	0.3
Oak-Tulip Tree Forest	0.6	0.2
Pastureland	0.8	0.2
Paved Road/Path	6.3	1.9
Pine Plantation	0.4	0.1
Pine-Northern Hardwood Forest	11.7	3.5
Pitch Pine-Oak Forest	0.6	0.2
Railroad	160.3	47.8
Red Maple Hardwood Swamp	< 0.1	< 0.1
Rich Mesophytic Forest	3.3	1.0
Riprap/Erosion Control Roadside	0.4	0.1
River/Stream/Open Water	0.5	0.1
Roadcut Cliff/Slope	0.2	0.1
Rock Quarry	0.2	0.1
Silver Maple-Ash Swamp	0.8	0.2
Successional Northern Hardwoods	33.8	10.1
Successional Old Field	1.7	0.5
Successional Shrubland	25.9	7.7
Successional Southern Hardwoods	16.8	5.0
Unpaved Road/Path	3.5	1.0
Urban Structure Exterior	0.1	0.0
Urban Vacant Lot	0.2	0.1
Wetlands*	24.8	7.4

Source: CHPEI 2012aaa

* Note: The source of the wetlands acreage is based on aerial photograph interpretation of a portion of the construction corridor as part of the ecological mapping effort described previously, which is separate from the wetland delineation and acreage calculations conducted as part of the CWA Section 404 permitting process described in **Section 3.2.8**. The wetland acreage presented here is intended to be used only in context with the ecological mapping effort and serves no other purpose.

compose approximately 7.4 percent. Observed terrestrial agricultural communities and urban land include cropland/field crops, pine plantations, spruce/fir plantations, pastureland, mowed lawns, mowed roadside/pathways, unpaved and paved road/paths, railroads, construction/road maintenance spoils, brushy cleared land, and urban vacant lots. Deviation areas outside of the construction corridor could also be affected. The land cover types within 50 feet (15 meters) of the transmission line centerline and within the deviation areas are presented in Land Use Table F.2-1 in **Appendix F**.

Wildlife. Terrestrial fauna are represented by a variety of mammal, amphibian, reptile, birds, and invertebrate species. Wildlife present in the Overland Segment is limited by the amount of available habitat. Old fields, successional shrubs, and agricultural habitats are common along the underground portions of the proposed CHPE Project route. Successional areas, like old fields and shrublands, support woodchuck (*Marmota monax*), deer mouse (*Peromyscus maniculatus*), meadow vole (*Microtus pennsylvanicus*), American toad (*Bufo americanus*), common garter snake (*Thamnophis sirtalis*), and northern watersnake (*Nerodia sipedon*). Forest edges near clearings, agricultural areas, and railroad ROWs typically support mammalian species such as white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), long-tailed shrew (*Sorex dispar*), eastern cottontail rabbit (*Sylvilagus floridanus*), and several bat species (*Myotis* sp. and *Lasiurus* sp.) (NYSDEC 2010k). Amphibians and reptiles also occur in the area, although species diversity is relatively low when compared with other vertebrates. Reptiles and amphibians that occur in the area include the common snapping turtle (*Chelydra serpentina*), garter snake (*Thamnophis sirtalis*), Eastern American toad (*Bufo a. americanus*), gray tree frog (*Hyla versicolor*), green frog (*Rana clamitans melanota*), bullfrog (*Rana catesbeiana),* and northern redback salamander (*Plethodon c. cinereus*). Typical bird species found along open or shrubby forest edges adjacent to old fields; agricultural lands; or roadway, railroad, and utility ROWs include blue-winged warbler (*Vermivora pinus*), brown thrasher, Eastern towhee (*Pipilo erythrophthalmus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), black-billed cuckoo, and gray catbird (*Dumetella carolinensis*) (NYSDEC 2012h).

3.2.7 Terrestrial Protected and Sensitive Species

The ROI for terrestrial protected and sensitive species along the terrestrial portions of the proposed CHPE Project is 100 feet (30 meters) on either side of the transmission line. This area was selected because it encompasses the construction corridors and areas immediately adjacent that would be most affected during installation and construction activities. Outside of this distance, potential impacts would be avoided by implementation of Applicant-proposed measures incorporated into the project design. Background information on issues associated with terrestrial protected and sensitive species are discussed in **Section 3.1.7**.

Federally Listed Species

Federally listed terrestrial species or those proposed for Federal listing that could be encountered in the terrestrial portions of the Overland Segment include the small whorled pogonia (*Isotria medeoloides*), Karner blue butterfly (*Lycaeides melissa samuelis*), bog turtle (*Glyptemys muhlenbergii*), Indiana bat, northern long-eared bat, and New England cottontail (*Sylvilagus transitionalis*) (see **Table 3.2.7-1**). There are also occurrences of breeding bald eagles in this segment. The USFWS has not designated or proposed designation of critical habitat for any threatened or endangered species occurring within the ROI for the Overland Segment.

Small whorled pogonia. The small whorled pogonia is a plant that is a member of the orchid family and was listed as federally threatened under the ESA in 1993 (58 *Federal Register* 53904). Small whorled pogonias inhabit semi-open second-growth deciduous forests or older hardwood stands of beech, birch,

Table 3.2.7-1. Federally Listed Terrestrial Species Occurring within 0.25 Miles of the Overland Segment

Common Name	Scientific Name	Federal Status
Small whorled pogonia	*Isotria medeoloides*	T
Karner blue butterfly	*Lycaeides melissa samuelis*	E
Bog turtle	*Glyptemys muhlenbergii*	T
Bald eagle	*Haliaeetus leucocephalus*	D
Indiana bat	*Myotis sodalis*	E
New England cottontail	*Sylvilagus transitionalis*	C
Northern long-eared bat	*Myotis septentrionalis*	PE

Source: USFWS 2012c, 78 *Federal Register* 61046

Key: T = threatened; E = endangered; D = delisted; C = candidate; PE = Proposed species for listing as endangered

maple, oak, and hickory that have an open understory. Typically the species prefers acidic and mesic soils, often on slopes near small streams (NatureServe 2013, USFWS 2008a). Small whorled pogonia was rediscovered in Schunnemunk Mountain State Park in Orange County, New York, in 2010 by a NYNHP botanist. Prior to this 2010 discovery, the last documentation of the species along the CHPE Project ROI was in Washington County in 1875 (CHPEI 2012x). Botanists have spent decades looking for small whorled pogonia throughout New York, where it had been collected only five times from 1887 to 1923, in five different counties: Washington, Ulster, Rockland, Nassau, and Suffolk (NYS OPRHP 2010).

Karner blue butterfly. The Karner blue butterfly was listed as federally endangered under the ESA in 1992 (USFWS 2012d). The Karner blue butterfly is a small, blue butterfly whose lifecycle depends on the wild blue lupine (*Lupinus perennis*), the larval host plant. Although wild lupine is essential for the Karner blue butterfly larvae, adults also use many nectar plants. Portions of the Overland Segment in Saratoga, Schenectady, and Albany counties are within an area that is known to be inhabited by Karner blue butterfly and its suitable habitat. The Karner blue butterfly prefers extensive pine barrens, oak savannas, or openings in oak woodlands, and unnatural openings such as airports and ROWs that contain wild blue lupine, the sole larval food source. The NYNHP has records of Karner blue butterflies within 0.25 miles (0.4 km) of the proposed CHPE Project route in the Town of Wilton and City of Saratoga Springs in Saratoga County (CHPEI 2012x).

In spring 2010, portions of the Overland Segment were surveyed to identify areas with suitable habitat for Karner blue butterfly (CHPEI 2012cc). Lupine and nectar patches were identified and mapped along the CP railroad ROW portion of the segment (MPs 112–177). No lupine patches were found within surveyed areas along the CSX railroad portion of the route in Schenectady County, and, because the species' lifecycle depends on the lupine flower, it was determined that this area is unlikely to support nectaring adult Karner blue butterflies. The Applicant has coordinated with the USFWS and NYSDEC regarding the delineation of lupine/nectar areas along the CP railroad ROW (CHPEI 2012cc).

During follow-up presence/absence surveys in areas identified as containing suitable lupine habitat, two Karner blue butterflies were observed in lupine patches in the portion of the proposed CHPE Project route crossing through the Town of Wilton in Saratoga County. The NYSDEC and USFWS indicated that lupine patches where butterflies have been observed, and any patches within 656 feet (200 meters) of these patches should be considered occupied. In addition, the NYSDEC considers the Saratoga Rail Yard, between MPs 154 and 155, to be occupied. The Applicant elected to consider all mapped lupine patches to be occupied (CHPEI 2012cc).

Bog turtle. The bog turtle was listed as federally threatened in 1997 (62 *Federal Register* 59605). Bog turtles are small, semi-aquatic turtles that primarily inhabit open wet meadows and calcareous bogs, which can be isolated or part of a larger wetland complex. Frequently, these habitats are dominated by sedges (*Carex* spp.) and mosses (*Sphagnum* spp.) (NYSDEC 2012q).

Freshwater wetland and upland habitats have the potential to be impacted along the Overland Segment ROI in Washington, Saratoga, Schenectady, and Albany counties. Within this area, historic records of bog turtles occur in Albany County. However, according to data from the NYNHP, no historic records of bog turtles occurred within 0.25 miles (0.4 km) of the Overland Segment route (CHPEI 2012x). Although suitable bog turtle habitat associated with open-canopy red-maple hardwood swamps, sedge meadows, and fens could be present along the ROI in these counties, no recent records suggest that bog turtles are likely to occur. Additionally, because the ROI consists primarily of previously disturbed brush and edge habitat associated with the railroad, the likelihood of bog turtle occurring in the ROI is extremely low.

Bald eagle. Bald eagle information is also provided in **Section 3.1.7**. The Upper Hudson River from Lake Luzerne to Albany host eagles each winter. The proposed CHPE Project transmission line would cross the Upper Hudson River at Fort Edward. During a 2010 mid-winter survey, 14 bald eagles were recorded (13 adult, 1 immature) in this stretch. Cohoes Falls, located along the Mohawk River approximately 1 mile (1.6 km) west of the Hudson River, annually attracts a few eagles; a single adult eagle was observed here during the 2010 survey (NYSDEC 2010j). The transmission line would cross the Mohawk River at Schenectady, approximately 6 miles (10 km) upstream from its confluence with the Hudson River.

Based on the NYNHP database, bald eagle breeding areas are located within 0.25 miles (0.4 km) of the transmission line in the Overland Segment in Columbia, Greene, and Washington counties (CHPEI 2012x).

Indiana bat. Indiana bat life history information is also provided in **Section 3.1.7**. According to the USFWS, Indiana bats are present in such low numbers that it is unlikely that they would be present in Saratoga, Albany, and Schenectady counties (USFWS 2012c). In the Overland Segment, the Indiana bat could occur in Washington County during the summer due to the presence of known hibernacula in nearby Warren and Essex counties (CHPEI 2012x). The Warren County hibernaculum is Priority 3 (site with more than 50 but fewer than 1,000 bats) (USFWS 2007a). The Essex County hibernacula are described in **Section 3.1.7**. The summer range of this species extends well beyond the wintering locations since the animals disperse to breeding areas and other habitats to feed and raise their young. In the immediate vicinity of the road and railroad ROWs, much of the habitat consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts; however, large specimens of shagbark hickory (*Carya ovata*), with the potential to serve as maternity or roost trees, were identified along the proposed CHPE Project route (CHPEI 2012q).

Northern long-eared bat. It is assumed that northern long-eared bats would occur in similar or the same areas indicated for the Indiana bat within the Overland Segment. Northern long-eared bat information is also provided in **Section 3.1.7**.

New England cottontail. The New England cottontail (*Sylvilagus transitionalis*) is currently listed as a candidate species for Federal protection under the ESA. The New England cottontail is a medium-sized rabbit that inhabits early-successional forests, frequently described as thickets, from southern Maine to the Hudson River Valley in New York (USFWS 2011). Current populations in southeastern New York can be found in isolated habitat patches that have undergone some form of disturbance, such as agricultural fields and edges, and, occasionally, brushy edges of transportation corridors (NYNHP 2013b). However, New England cottontails are restricted to habitats with dense understory vegetation. This cottontail prefers heavily vegetated sites and is reluctant to venture greater than approximately 16 feet (5 meters) from vegetative cover (Litvaitis and Jakubas 2004). Along the Overland Segment, the New England cottontail could occur in Columbia County; however, this is the point at which the proposed CHPE Project transmission line would enter the Hudson River and become aquatic. Columbia County is on the opposite side of the Hudson River at this point. Therefore, this species is not discussed further in this EIS.

State-Listed Species

In addition to their Federal listing, the small whorled pogonia, Karner blue butterfly, bog turtle, and Indiana bat are also state-listed as endangered. These species have been discussed in detail previously. State-listed species identified along the proposed CHPE Project route are described below. A summary of other state-listed species that have been identified within 0.25 miles (0.4 km) of the Overland Segment, including their status and habitat, is provided in Table H.2-2 in **Appendix H**.

Button-bush dodder. The button-bush dodder (*Cuscuta cephalanthi*) is a state-listed endangered plant species known to occur in scattered parts of eastern New York State and Cayuga and Seneca counties in western New York State. The button-bush dodder prefers wetland habitats of various type, including streamsides and marshes (NYNHP 2013c). The Overland Segment ROI crosses areas mapped by the NYNHP for occurrences of button-bush dodder between approximate MPs 110 and 113.

Cut-leaved evening primrose. Cut-leaved evening primrose (*Oenothera laciniata*) is a state-listed endangered low herb that occurs across Long Island and the Upper Hudson River Valley, although it is possibly extirpated from the valley (NatureServe 2013). The herb prefers dry, sandy sites, including successional old fields, sandy embankments, and disturbed areas of maritime grasslands (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of cut-leaved evening primrose between approximate MPs 198 and 201.

Glaucous sedge. Glaucous sedge (*Carex galucodea*) is a state-listed threatened sedge primarily know to occur in eastern New York from Albany and Rensseleaer counties south to Long Island. The sedge prefers wet to dry-mesic deciduous forests and old fields. These plants can often occur along roads and deer or human paths through forests (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of glaucous sedge between approximate MPs 198 and 200.

Hooker's orchid. Hooker's orchid (*Platanthera hookeri*) is a state-listed endangered orchid primarily known to occur in the Adirondack foothills. This orchid prefers forested areas with open understories or successional forest, generally dominated by poplar and pine trees (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of Hooker's orchid between approximate MPs 135 and 136.

Northern dropseed. Northern dropseed (*Sporobolus heterolepis*) is a state-listed threatened grass that occurs in Albany and Greene counties. The grass is found in mesic prairies, well-drained moraines, rock outcrops, glades, and railroad and roadway ROWs (USFS 2013). The ROI crosses areas mapped by the NYNHP for occurrences of northern dropseed between approximate MPs 203 and 205.

Puttyroot. Puttyroot (*Aplectrum hyemale*) is a state-endangered orchid that is potentially extirpated from most of its historic range and is primarily within a population near the Adirondack foothills in Washington County (NatureServe 2013, NYNHP 2013c). The orchid prefers limestone outcrops or calcareous talus, with soil moisture varying from mesic upland sites to damp low ground areas (NYNHP

2013c). The ROI crosses areas mapped by the NYNHP for occurrences of puttyroot between approximate MPs 197 and 198.

Frosted Elfin. Frosted elfin (*Callophrys irus*) is a state-listed threatened species of butterfly that occurs in the upper Hudson River Valley and Long Island. In the upper Hudson River Valley, it feeds on wild blue lupine associated with pine barrens, oak savannahs, dry oak forests, and disturbed grasslands within ROWs and airports (CHPEI 2012i). Habitat requirements are similar to the Karner blue butterfly and the two species might co-occur. The ROI crosses areas mapped by the NYNHP for occurrences of frosted elfin and Karner blue butterfly in Saratoga County between approximate MPs 144 and 146 in the Town of Wilton.

Persius duskywing. Persius duskywing (*Erynnis persius persius*) is a state-listed endangered species of butterfly that is possibly extirpated from New York. Habitat for these butterflies ranges from pitch-pine-scrub oak barrens to oak savannas and powerlines within these settings. Usually large amounts of lupine (*Lupinus* spp.) or wild indigo (*Baptisia* spp.) are within their preferred habitat (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of Persius duskywing between approximate MPs 144 and 146.

Short-eared owl. The short-eared owl (*Asio flammeus*) is a highly migratory state-endangered bird. Its preferred habitat consists of marshes and open lowland areas, and recent nests have been observed in pastures and agricultural areas in New York State (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of short-eared owl between approximate MPs 212 and 215.

Northern harrier. The northern harrier (*Circus cyaneus*) is a state-threatened raptor that has a breeding range throughout New York State. The northern harrier prefers open marshy and lowland areas, similar to the short-eared owl (NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of northern harrier between approximate MPs 212 and 215.

Migratory Birds

Typical bird species found along open or shrubby forest edges adjacent to old fields, agricultural lands, or ROWs along the Overland Segment ROI include blue-winged warbler (*Vermivora pinus*), brown thrasher, Eastern towhee (*Pipilo erythrophthalmus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), black-billed cuckoo, and gray catbird (*Dumetella carolinensis*), which are all covered under the MBTA (NYSDEC 2012h, USFWS 2012b). The ROI offers little habitat for species that are intolerant of degradation and disturbance.

3.2.8 Wetlands

The ROI for wetlands in the Overland Segment is any wetlands directly crossed by the transmission line and wetlands within 100 feet (30 meters) of either side of the transmission line centerline (see **Figure 3.2.1-1**). The definition of this resource, including the ROI, is provided in **Section 3.1.8**.

Wetland Physical Characteristics and Functions. Within the Overland Segment, approximately 256.7 acres (103.9 hectares) of wetlands were delineated within the ROI (see **Appendix A** for maps showing locations of wetlands). All wetlands were classified as PEM, PSS, PFO, POW, or a mixture of these classifications (CHPEI 2012a).

Approximately 74 acres (30 hectares) of wetlands in the Overland Segment are separately identified as NYSDEC freshwater wetlands, with most wetlands identified as Class I or II. No tidal wetlands were identified in the Overland Segment. There are 152.9 acres (61.9 hectares) of adjacent areas associated with NYSDEC freshwater wetlands within the ROI in the Overland Segment. For most wetlands along the transmission line route, the adjacent area largely consists of the railroad bed, embankment, roadway, and disturbed area along the railroad or roadway (CHPEI 2012ee). Hydrology along the proposed CHPE Project route has been historically altered by railroad or roadside drainage ditches. During the wetland delineations conducted for the proposed CHPE Project, ditches that met the three parameters defining a jurisdictional wetland (i.e., presence of hydrology, hydric soils, and hydrophytic vegetation) and were hydrologically connected to a wetland or stream were identified as a wetland community. Artificial railroad or roadside ditches without hydrologic connectivity to other wetlands, lacking dominant wetland vegetation, or otherwise not meeting the three-parameter approach for most of the length of the ditch were identified in the field, but were not included as jurisdictional wetlands (CHPEI 2012s).

Wetland Habitat and Species. Wetland habitats identified within the Overland Segment include deep and shallow marshes dominated by emergent vegetation, wet meadows, shrub swamps, shrubby wet ditches, floodplain forests, riparian edges, and forested wetlands. Open water areas such as rivers, small streams, ponds, pools, and lakes also occur in the vicinity of the proposed CHPE Project.

In general, because the proposed CHPE Project is routed along existing roadway and railroad ROWs, many wetlands within the ROI are characterized by previous anthropogenic disturbance or the presence of invasive plant species. The proposed CHPE Project is frequently routed along the edge of the disturbed railroad or roadway ROW and more natural vegetated wetland communities that are adjacent to the transmission line route. The wetland boundaries in the Overland Segment ROI are most often defined by the edge of the soil fill for the railroad embankment (CHPEI 2012ee).

From MP 101 to 112, where the transmission line would be buried in the New York State Route 22 ROW, wetland communities in the ROI are generally associated with the Lake Champlain Basin and include marshes, lakeshore grasslands, lakeside floodplain forests, and riverine floodplain forests. Examples of wetland habitat and wildlife species include cattails (*Typha* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), bulrushes (*Scirpus* spp.), spike rushes (*Eleocharis* spp.), bullfrog (*Rana catesbeiana*), common garter snake, and painted turtle.

South of MP 112, where the transmission line would be buried primarily in railroad ROWs, wetlands in the ROI consist of emergent marshes, wet meadows, and pond edges, which are often associated with vegetation such as cattails (*Typha* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), bulrushes (*Scirpus* spp.), and spike rushes (*Eleocharis* spp.). These wetlands could support mammals including the northern short-tailed shrew (*Blarina vervicauda*), star-nosed mole (*Condylura cristata*), meadow vole, moose, beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). Both beaver and muskrat signs were noted during field investigations along portions of the proposed CHPE Project route.

A variety of amphibians typical of these wetland habitats include bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), and northern leopard frog (*Rana pipiens*). Common garter snake, smooth green snake (*Liochlorophis vernalis*), northern water snake (*Nerodia sipedon*), and copperhead (*Agkistrodon contortrix*) are typically associated with these open wetland and aquatic habitats; deeper areas near lakes and ponds can also support painted turtle (*Chrysemys picta*).

Forested wetlands are dominated by species such as red maple, cottonwood, oaks, ashes, elms, and box elder. Wildlife in forested wetlands is often associated with areas of pools and sphagnum moss, thickets, damp leaf litter, floodplains, or river bottoms. Species using these habitats include ermine (*Mustela erminea*), pickerel frog (*Rana aplustris*), gray treefrog, and red-bellied snake.

Seasonal or vernal pools in forested areas support a distinct community of breeding amphibians, which could include spring peeper (*Pseudacris crucifer*), spotted salamander (*Ambystoma maculatum*), and wood frog (see **Sections 3.2.5** and **3.2.7** for a detailed discussion on aquatic and terrestrial threatened and endangered species, respectively) (CHPEI 2012x).

3.2.9 Geology and Soils

Physiography and Topography. The Overland Segment lies in both the Champlain section of the Saint Lawrence Valley Province and the Hudson Valley section of the Valley and Ridge Province, the latter of which extends along the Hudson River south of Albany. The divide between the two provinces, which is also the watershed divide between the Lake Champlain Basin and the Hudson River Valley, is just northeast of Hudson Falls (approximate MP 135). The Valley and Ridge Province is characterized by linear lowlands flanked by high escarpments. Elevations range from near sea level to 1,000 feet (305 meters) above MSL, with gentle slopes accounting for 50 to 80 percent of the area (USFS 2010).

Geology. The Overland Segment is underlain by Cambrian and Ordovician shale and carbonate rocks, over Precambrian-age crystalline igneous and metamorphic basement rocks (USGS 2003a). The Potsdam sandstone also occurs within the ROI. This sandstone formation is of particularly high quality, and is used for building materials (Potsdam 2012). Surficial bedrock is present along the Overland Segment from MPs 122 to 123 and 165 to 166 (CHPEI 2012i).

The road and railroad ROWs along the proposed CHPE Project route in the Overland Segment are composed of disturbed geology and soils that were altered by activities such as excavation, grading, and filling during roadway and railroad construction.

Soils. Soils within the Overland Segment are primarily fine sandy loams, silt loams, silty clay loams, and loamy fine sands, with low slopes. Some soils within this segment are frequently flooded, and hydric soils are present. For a detailed description of soils present in this segment, see **Appendix I.2**.

Prime Farmland. According to NRCS data, approximately 463 acres (187 hectares) of land identified as having prime farmland soil are within the ROI in the Overland Segment (NRCS 2012a). However, a majority of the ROI is within existing roadway or railroad ROWs; therefore, these lands are disturbed and are not available for agriculture.

Seismicity. The seismic hazard rating for the Overland Segment ranges from approximately 8 to 12 percent g, representing a low potential for damage due to seismic activity. The Overland Segment has one of the lowest seismic hazard ratings along the proposed CHPE Project route, and a low liquefaction risk (USGS 2012a, USGS 2013).

3.2.10 Cultural Resources

Four cultural resources investigations of the Overland Segment of the proposed CHPE Project have been completed. In addition to the two studies described in **Section 3.1.10** (Glazer et al. 2010, McQuinn et al. 2010), two more investigations covering additional sections of the Overland Segment and other terrestrial portions of the proposed CHPE Project route were conducted in 2012. These investigations are described in the following paragraphs.

The third investigation, completed in June 2012, was a Phase IB Archaeological Field Reconnaissance and Phase II Archaeological Site Evaluations of the CP ROW (Whitehall to Rotterdam) within the Overland Segment of the proposed CHPE Project route. The length of the study area in this intensive archaeological survey with subsurface testing was approximately 65 miles (106 km), and the width was generally 50 feet (15 meters). The survey identified 10 terrestrial archaeological sites and 4 areas of sensitivity warranting additional archaeological work or monitoring. Four of the 10 terrestrial archaeological sites were recommended for avoidance or additional archaeological work (Kilkenny et al. 2012).

The fourth investigation, completed in December 2012, was a Phase IA Literature Review and Archaeological Sensitivity Assessment Addendum (McQuinn et al. 2012). The purpose of this investigation was to identify previously completed archaeological investigations and previously recorded cultural resources in terrestrial portions of additional sections of the proposed CHPE Project route (i.e., portions that were not investigated by McQuinn et al. 2010). The study area was 71.2 miles (114.4 km) in length and included the proposed CHPE Project transmission line route from the towns of Dresden to Whitehall in Washington County (approximate MPs 101 to 111); the town of Rotterdam in Schenectady County through Albany County to the town of Catskill in Greene County (MPs 174–228); the towns of Stony Point, Haverstraw, and Clarkstown and the Village of Haverstraw in Rockland County (MPs 296–302); and the boroughs of the Bronx and Queens (MPs 330–331 and 333–336). According to the report's Management Summary, the survey identified 12 terrestrial archaeological sites and 4 architectural properties listed or eligible for listing in the NRHP. The study area for this investigation was within 25 feet (8 meters) of the construction corridor centerline. This study area is equivalent to the APE determined for the proposed CHPE Project. The APE is depicted in **Figure 3.2.1.-1**.

There are 34 known terrestrial archaeological sites, 16 known architectural properties that are listed or eligible for listing in the NRHP, and 1 potential historic cemetery (no visible markers; cemetery plotted from a USGS quadrangle map) located in the APE of the Overland Segment. Of these, 23 of the terrestrial archaeological sites and all 16 of the architectural properties were identified by means of an independent GIS analysis based on site data for the proposed CHPE Project route provided by the Applicant. **Table 3.2.10-1** provides a summary of these previously recorded cultural resources and the historic cemetery.

The known archaeological sites would be evaluated to determine whether they are eligible for listing in the NRHP if they cannot be avoided. The 16 known architectural properties are already listed or eligible for listing in the NRHP and, therefore, do not require evaluation.

Additional cultural resources were identified during the Phase IB Archaeological Field Reconnaissance and Phase II Archaeological Site Evaluations of the CP ROW from Whitehall to Rotterdam (Kilkenny et al. 2012). The survey identified the additional 11 terrestrial archaeological sites and 4 recommended areas of additional archaeological work or monitoring. **Table 3.2.10-2** provides a summary of these known cultural resources. Four of the 11 terrestrial archaeological sites had additional recommendations, 2 for avoidance (Gansevoort Shoe Shop and Perry Road) and 2 for additional Phase II archaeological evaluation (Saratoga & Washington Railroad and Waverly House Site). However, independent GIS analysis based on site data provided by the Applicant indicates that one of these sites (Saratoga & Washington Railroad) does not intersect the APE.

Two sections of the Overland Segment have been screened but not yet formally surveyed for cultural resources. The first section extends approximately 11 miles (18 km) along New York State Route 22 from Dresden to Whitehall. The second section extends for approximately 51 miles (82 km) along the CSX ROW from Rotterdam to Catskill. These sections would be surveyed by the Applicant for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. Any previously documented resources of undetermined NRHP eligibility or newly discovered cultural resources in the APE would be evaluated for NRHP eligibility.

3.2.11 Visual Resources

As identified in **Section 3.1.11**, the ROI for visual resources in the Overland Segment is 0.5 miles (0.8 km) from the transmission line route. For terrestrial portions of the proposed CHPE Project, the ROI and viewshed is dictated by vegetative cover and other visible features.

Table 3.2.10-1. Previously Recorded Cultural Resources in the APE of the Overland Segment

Site Type	Site Name and/or State and/or Project Site Number	Description
Terrestrial Archaeological Site	NYSM 5106, Site 101	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 9377, Site 118	Pre-contract traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 7501, Site 127	Pre-contact traces of occupation and trail identified in the 1920s
Terrestrial Archaeological Site	House Ruins/ALB 82 (OPRHP 11505.000007, Site 129)	Historic structural remains of house
Terrestrial Archaeological Site	NYSM 7500, Site 143	Pre-contact traces of occupation and trail identified in the 1920s
Terrestrial Archaeological Site	NYSM 7732, Site 146	No information
Terrestrial Archaeological Site	NYSM 7412, Site 148	Pre-contract traces of occupation and trail identified in the 1920s
Terrestrial Archaeological Site	NYSM 7413, Site 149	Pre-contract traces of occupation and trail identified in the 1920s
Terrestrial Archaeological Site	NYSM 6907, Site 690	Pre-contact camps identified in the 1920s
Terrestrial Archaeological Site	Ballston Lake Electric Traction Powerhouse (OPRHP 09101.000124, Site 694)	Mid 19th-century industrial site with associated sheet midden
Terrestrial Archaeological Site	ALB 104 (OPRHP 09302.000023, Site 703)	Pre-contact and historic site; Normanskill projectile point; two stone foundation walls
Terrestrial Archaeological Site	NYSM 4752 (Site 705)	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 7903 (Site 706)	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 4747 (Site 714)	Contact Period village and fields identified in the 1920s
Terrestrial Archaeological Site	NYSM 6479 (Site 715)	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 2780 (Sites 720 and 722)	Pre-contact camp site identified in the 1920s; registered as two separate sites (720 and 722)
Terrestrial Archaeological Site	ALB 205, South Bay West (OPRHP 11517.000017; Site 731)	Pre-contact site; stray finds/artifacts and debitage collected from the shores of South Bay

Site Type	Site Name and/or State and/or Project Site Number	Description
Terrestrial Archaeological Site	Watervliet Reservoir Expansion #65, Normanskill Hydroelectric Facility Historic Site (Watervliet Dam) within the Upper Normanskill Drainage Historic Farmstead District (OPRHP 00106.000410; Site 746)	Historic (early 20th century) site is the current Watervliet Dam and embankments located on the Normanskill Creek at the extreme southern corner of the reservoir; constructed in 1916
Terrestrial Archaeological Site	The Willow Site (OPRHP 03940.001143; Site 766)	Pre-contact camp identified in 1999; 11 prehistoric artifacts, including flakes and a biface
Terrestrial Archaeological Site	NYSM 8280 (Site 794)	Site identified during a survey in 1963
Terrestrial Archaeological Site	NYSM 8025 (Site 795)	Pre-contact (possibly Archaic) site
Terrestrial Archaeological Site	NYSM 432 (Site 796)	Nine graves identified during a survey in 1963; possible mound; one of two possible locations
Terrestrial Archaeological Site	NYSM 3106 (Site 797)	Site identified in the 1920s
NRHP-listed Architectural Property	Main Street Historic Bridge (multiple OPRHP, NRL 19)	Historic bridge over the Champlain Canal in Whitehall
NRHP-listed Architectural Property	Old Champlain Canal (multiple OPRHP, NRL 22)	Troy to Whitehall
NRHP-listed Architectural Property	Stockade Historic District (OPRHP 09340.000008, NRL 138)	19th-century residences within the bounds of an 18th-century stockade in Schenectady
NRHP-listed Architectural Property	Central Fire Station (OPRHP 09340.001130, NRL 139)	Erie Boulevard in Schenectady
NRHP-listed Architectural Property	Rushmore Family Farm (OPRHP 03902.000279; NRL 146)	Farm at 8748 U.S. Route 9W in Cementon
NRHP-listed Architectural Property	Susquehanna Turnpike (NRL 147)	Turnpike; beginning at Catskill, follows the Mohican Trail (New York State Route 145) and County Road 20 and 22 northwest to the Schoharie County line
NRHP-listed Architectural Property	Flint Mine Hill Archeological District (NRL 148)	District in Cementon

Site Type	Site Name and/or State and/or Project Site Number	Description
NRHP-eligible Architectural Property	McMore Residence (OPRHP 11541.000377, NRE 15)	Broadway (New York State Route 22) in Whitehall
NRHP-eligible Architectural Property	Clay Hill Road Bridge (OPRHP 11546.000015, NRE 27)	Clay Hill Road over Champlain Canal in Fort Ann
NRHP-eligible Architectural Property	Freight Station (OPRHP 11546.000008, NRE 28)	Anne Street east of George Street in Fort Ann
NRHP-eligible Architectural Property	Smith's Basin (OPRHP 11513.000039, NRE 32)	Canal spillway in Kingsbury
NRHP-eligible Architectural Property	Delaware & Hudson Railroad Bridge (OPRHP 11542.000096, NRE 295)	19th-century iron trestle bridge on earthen embankment in Fort Edward
NRHP-eligible Architectural Property	Joseph Yates House and Family Cemetery (OPRHP 09302.000005, NRE 301)	Maple Avenue, north of Alplaus Avenue in Glenville
NRHP-eligible Architectural Property	Erie Crossings (OPRHP 09340.001336, NRE 303)	Erie Boulevard in Schenectady
NRHP-eligible Architectural Property	Liberty Street Bridge (OPRHP 09340.001342, NRE 309)	Liberty Street at Erie Boulevard in Schenectady
NRHP-eligible Architectural Property	Grumman (Aerobuilt)-Olson Plant (OPRHP 03902.000278; NRE 325)	Plant; New York State Route 28
Historic Cemetery	Unidentified (plotted from USGS quadrangle map)	Dresden, Washington County; New York State Route 22, near Steele Road

Sources: Glazer et al. 2010; McQuinn et al. 2010, 2012.
Key: ALB = Albany; NRE = National Register Eligible

Table 3.2.10-2. Additional Cultural Resources in the APE of the Overland Segment Identified during the Phase IB/Phase II Investigation of the CP ROW

Site Name and/or Project Site Number	Description	NRHP Status
Gansevoort Shoe Shop (Site 4)	19th-century shoe shop with 19th-century deposits	Recommended eligible
Schuylerville Road Midden (Site 5)	19th-century deposits	Recommended not eligible
Saratoga & Washington Railroad (Site 6)	Likely 19th-century brush fill	Undetermined
Waverly House Site (Site 10)	19th-century houses, hotel with pre-contact through 20th-century fill	Undetermined
Brumaghim (Site 15)	19th-century house, mill with 19th- and 20th-century deposit	Previously mitigated
Mill Street Midden (Site 16)	Early 20th-century buildings with late 19th- and 20th-century deposit	Recommended not eligible
Main Street Midden (Site 17)	19th century house	Recommended not eligible
Briggs Wagon Shop (Site 18)	1860s house with late 19th- and 20th-century deposit	Recommended not eligible
Perry Road (Site 19)	20th-century house with 19th- and 20th-century deposit	Recommended eligible
East Street Midden (Site 20)	20th-century deposit to rear of early 20th-century house	Recommended not eligible
Whitehall Midden (Site 21)	19th- and 20th-century deposit near 19th-century houses	Undetermined
Fort Edward Yard	Site identified in the 1920s with traces of occupation; 19th-century canal feature	Undetermined
Glenville Yard	17th-century farm and nearby multi-component site	Undetermined
Rogers Island	18th-century military camps and nearby burials	Undetermined
Schenectady	Likely Erie Canal features	Undetermined

Source: Kilkenny et al. 2012

Description of Resources and Viewscape. The Overland Segment of the proposed CHPE Project route would primarily follow existing road and railroad ROWs from where the route exits Lake Champlain until it enters the Hudson River south of Albany. The Green Mountains are to the east of the route and the Adirondack Mountains to the west in the northern portion of this segment. The route would pass near Glens Falls; through Saratoga Springs and Schenectady; and west around Albany before entering the Hudson River near Catskill. This portion of the route would traverse through forested, agricultural, and developed areas. The viewshed along the proposed CHPE Project route in this segment varies depending on the location of the viewer. Overall, the viewshed is dominated by Lake George, the Adirondacks, the Green Mountains, and the Hudson River Valley. This portion of the route contains NRHP-listed cultural resources, National Natural Landmarks, National Scenic Byways, local parks, and state parks. No SASS, National Wildlife Refuges, National Park Service properties, National Historic Sites, state game refuges, wild and scenic rivers, Adirondack Scenic Vistas, Palisades Park property, or New York Bond Act properties are found along this portion of the proposed CHPE Project route (NYSDOS 2004a, CHPEI 2012a, NYSDEC 2012m, NPS 2012a, USDOT-FHWA 2012a). The aesthetic resources found within the ROI for the Overland Segment are described in **Appendix K**. For a discussion of cultural resources found along the proposed CHPE Project route in the Overland Segment, please see **Section 3.2.10**.

The proposed CHPE Project route within the Overland Segment would include construction of cooling stations at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228. The viewshed near MP 110 is dominated by the South Bay Reservoir, and the landscape is a mix of pasture and forested areas with minimal development. No aesthetic resources are found within 0.5 miles (0.8 km) of this potential cooling station. The viewsheds near MPs 112, 145, and 146 between Whitehall and Schenectady consist of gently rolling topography dominated by forested areas and small areas of residential development. No aesthetic resources are found within 0.5 miles (0.8 km) of the cooling stations proposed at these MPs. The viewshed near MP 158 is within the boundaries of Ballston Spa, and contains a mixture of residential and commercial development and forested and open space. The cooling station proposed at this MP would be constructed within 0.5 miles (0.8 km) of Saratoga Spa State Park, Kelly Park, and Spensieri Park.

The viewshed near MP 185 southeast of Schenectady consists of farms, small intermittent forested areas, commercial development, and a large industrial park. The viewsheds near MPs 208, 227, and 228 consist of gently rolling topography dominated by forested areas and small areas of residential development. No aesthetic resources are found within 0.5 miles (0.8 km) of any of these potential cooling stations.

Key Observation Points. A KOP was established for an example location of a proposed cooling station in the Overland Segment (see **Figure 3.2.11-1**). Per NYSDEC guidelines for evaluating visual impacts, a KOP was identified to capture the baseline visual setting in the vicinity of a representative proposed cooling station.

Note: This photograph shows a southwest view of the location of a proposed cooling station near MP 146. The cooling station would be visible on the west (right) side of the railroad tracks.

Figure 3.2.11-1. Example Cooling Station KOP

3.2.12 Infrastructure

Infrastructure systems and lines that intersect with the proposed CHPE Project route (i.e., crossings) in the Overland Segment are described in the following paragraphs.

Electrical Systems. The Overland Segment is within the NYSBPS area. There are many instances of aboveground electrical infrastructure within the proposed CHPE Project route. These include both overhead electrical power transmission and distribution facilities.

Water Supply Systems. Refer to **Section 3.1.12** for general information about New York State water supply systems. No substantial potable water supply systems have been identified within the Overland Segment (CHPEI 2012w). Along more rural areas of the proposed CHPE Project route, such as New York State Route 22 in the Town of Dresden, there are a number of small private water wells used by landowners for primarily residential uses.

Storm Water Management. The Overland Segment is within both the Lake Champlain and the Hudson River watersheds. No utility-scale (large infrastructure system managed by a public utility or local government agency) storm water management systems have been identified along the ROI of the Overland Segment. Smaller common storm water management features that are likely to be within or adjacent to the ROI include retention ponds, infiltration basins, swales, wet detention basins, ditches, culverts, and storm water pipes. See **Sections 3.1.3** and **3.2.3** for general descriptions of the storm water management requirements of New York State.

Solid Waste Management. The closest municipal landfills to the Overland Segment of the proposed CHPE Project are the Albany Rapp Road Sanitary Landfill and the Colonie Sanitary Landfill. These landfills have a collective remaining capacity of 7,221,057 tons as of 2010 (NYSDEC 2010f).

No substantial communications, natural gas, liquid fuel, or sanitary sewer infrastructure have been identified within the ROI of the Overland Segment (CHPEI 2012w).

3.2.13 Recreation

The ROI for recreation in terrestrial portions of the proposed CHPE Project including the Overland Segment is 0.5 miles (0.8 km) on either side of the transmission line route and aboveground facilities. The ROI in terrestrial areas is dictated by vegetative cover and other visible features, and was selected to encompass the majority of recreational resources that could be physically or visually impacted by the proposed CHPE Project. The smaller ROI was selected for terrestrial portions of the proposed CHPE Project because there would be more visual obstructions (i.e., infrastructure, buildings, and trees) than in aquatic areas.

The transmission line in the Overland Segment (MP 101 to 228) would be buried along approximately 13 miles (21 km) of road ROW along New York State Route 22, 114 miles (183 km) of railroad ROWs, and roads and bridges that would pass numerous recreational areas that offer facilities for camping, biking, boating, walking/hiking, bird watching, playgrounds, educational programs, fishing, swimming, tennis, golf, snowshoeing, cross-country skiing, and ice skating (NYSDEC 2012r, NYS OPRHP 2012b, SSHA 2012, WWPP 2012). The ROI within the Overland Segment contains 37 local parks, 7 state parks, 4 state WMAs, 2 scenic areas of statewide significance, 2 New York State nature and historical preserves, 1 state tree nursery, 1 national scenic byway, and 1 outdoor education center. There are two resources (Wilton Wildlife Preserve and Park, and Five Rivers Environmental Education Center) that provide educational opportunities for children and the general public (FFR 2012, WWPP 2012). Saratoga Spa State Park, in Saratoga Springs, is the largest recreational resource within the Overland Segment.

Appendix K lists the visual and recreational resources along the proposed CHPE Project route and the specific recreational opportunities available at each park.

This portion of the proposed CHPE Project route would include construction of cooling stations at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228. The cooling stations near MPs 112, 208, 227, and 228 are not within 0.5 miles (0.8 km) of any recreational resources.

There is one recreational area within the ROI of the transmission line and the cooling stations proposed at MP 110. The South Bay State Boat Launch and Pier, near Whitehall, New York, is a popular fishing area in Lake Champlain. The 300-foot (91-meter)-long fishing pier is on the western side of the South Bay and has benches and a covered area. There is an additional pier, off of Washington County Route 7A, on the eastern side of South Bay. Both piers were components of the former road bridge that crossed South Bay in this location before the current New York State Route 22 bridge was constructed. This is a productive fishing area in Lake Champlain that is popular with sport fishermen (NYSDEC 2012s).

The transmission line and cooling stations at MPs 145 and 146 would be constructed within 0.5 miles (0.8 km) of the Wilton Wildlife Preserve and Park. The cooling station constructed at MP 158 would be constructed within 0.5 miles (0.8 km) of Saratoga Spa State Park, and William S. Kelley Park/Spensieri Park. The cooling station that would be constructed near MP 185 is within 0.5 miles (0.8 km) of Roger Keenholts Park.

In this segment, the proposed CHPE Project route would follow along the corridor of the Champlain Canalway Trail between Whitehall and Fort Edward (MP 112 to 135). The Champlain Canal Trail is a project proposed along the Champlain Canal and Hudson River, and, when completed, the Trail will extend 62 miles (100 km) between Whitehall and Waterford (CCTWG 2011). The trail would connect to existing trail systems in New York and create one of the nation's longest continuous recreational trail systems (CCTWG 2011).

Six additional parks are within 100 feet (30 meters) of the proposed transmission line itself in the Overland Segment. **Table 3.2.13-1** lists the parks along the proposed CHPE Project route in the Overland Segment.

Table 3.2.13-1. Parks within 100 Feet of the Proposed CHPE Project Route in the Overland Segment

Milepost	Park Name	Distance From Proposed Transmission Line
141	Bertha E. Smith Park	50 feet
141	Gansevoort Town Park	50 feet
175	Hillhurst Park	50 feet
184	Roger Keenholts Park	50 feet
188	Jim Nichols Park	40 feet
203	Mosher Park	Abuts park boundary

Source: CHPEI 2012i

The visual resources associated with recreational areas are discussed in **Section 3.2.11**. For a discussion on cultural resources found along the proposed CHPE Project route, please see **Section 3.2.10**.

3.2.14 Public Health and Safety

The issues analyzed in this section, data sources used, and the definition of the ROI for public health and safety are discussed in **Section 3.1.14**.

Safety hazards for the Overland Segment include risks associated heavy construction activities and movement of equipment (i.e., graders, excavators, and dump trucks), trenching, materials deliveries, contact with electrical lines, and potential to sever existing utility lines. Other potential hazards along terrestrial portions of the transmission line route include blasting, construction in road and railroad ROWs and near residences, and motor vehicle accidents. Magnetic field levels at various locations along the transmission line route were calculated by the Applicant to support the CHPE Project impact analysis (CHPEI 2012t, CHPEI 2012ll) (see **Section 5.1.14**). Electric field levels were not calculated because the new HVDC transmission cables would be shielded and generally buried at least 3 feet (0.9 meters) underground in road or railroad ROWs.

3.2.15 Hazardous Materials and Wastes

Section 3.1.15 defines the ROI for hazardous materials and wastes as the area within the construction corridor and construction staging areas and presents additional discussion on the management and handling of hazardous materials and wastes.

Railroad ROWs are generally areas with a high potential for environmental contamination. The primary sources of such contamination include herbicides from vegetation control, releases of creosote and arsenic used to preserve wood ties, drips of petroleum products from trains, deposition of PAHs from the diesel exhaust of locomotives, and metals from industrial waste found in some railroad track crushed stone ballast materials. Additionally, railroad ROWs are typically in the vicinity of and adjacent to industrial areas, which generally have a higher potential for environmental contaminants. While no specific areas of environmental concern have been identified along the railroad ROWs that are within or adjacent to the Overland Segment, the extended use of these areas for railroad operations and the numerous industrial areas adjacent to them indicate the potential for undiscovered environmental contamination.

Numerous industrial and commercial facilities, such as factories, assembly plants, a scrap yard and recycling center, gasoline stations, and automotive repair shops, are adjacent to the roadway ROWs in the Overland Segment. While no specific areas of environmental concern have been identified along these roadway ROWs, there is the potential for undiscovered soil and groundwater contamination to be present from these adjoining industrial and commercial facilities.

3.2.16 Air Quality

The air quality topics and definition of the air quality resource included in **Section 3.1.16** are the same for the Overland Segment. The ROI for the Overland Segment includes the New York counties that are along the proposed CHPE Project route and represents the area where the substantial majority of impacts from emissions could occur: Albany, Columbia, Greene, Rensselaer, Saratoga, Schenectady, and Washington counties. These counties are part of the Hudson Valley Intrastate AQCR, with the exception of Washington County, which is part of the Champlain Valley Interstate AQCR.

The Overland Segment for the proposed CHPE Project includes the transmission line route from the southern end of Lake Champlain to the Town of Catskill in Greene County. **Table 3.2.16-1** lists the most recent emissions inventories for each county in the Overland Segment ROI and the total emissions for Hudson Valley Intrastate and Champlain Valley Interstate AQCRs.

Table 3.2.16-1. Overland Segment Local and Regional Air Emissions Inventory (2008)

Counties and AQCRs	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Albany County	16,224	12,428	59,167	12,573	7,368	2,428
Columbia County	2,226	7,874	16,119	651	3,890	794
Greene County	4,155	7,150	17,292	2,826	3,422	912
Rensselaer County	3,718	8,992	27,604	1,210	5,059	1,258
Saratoga County	6,043	12,621	43,773	1,482	7,663	2,157
Schenectady County	3,852	5,612	23,708	885	2,303	751
Hudson Valley Intrastate AQCR	**71,986**	**127,214**	**407,475**	**42,940**	**69,733**	**17,825**
Washington County	898	7,413	483	25	2,261	379
Champlain Valley Interstate AQCR	**26,873**	**116,999**	**244,437**	**10,069**	**45,933**	**11,422**

Source: USEPA 2012c

Albany, Greene, Rensselaer, Saratoga, and Schenectady counties are further classified by the USEPA as the Albany-Schenectady-Troy Area and are in nonattainment for 8-hour ozone. Washington and Columbia counties are in attainment for all criteria pollutants.

3.2.17 Noise

Within the Overland Segment, the majority of the underground portion of the cable route is proposed within existing CP and CSX railroad ROWs, with portions along road ROWs along New York State Route 22 in Dresden, city streets in Schenectady, and Alpha Road in Catskill. The existing soundscape for the Overland Segment includes natural sources, such as wind, vegetation rustle, and wildlife noises; transportation noise sources, especially the sound from periodic passing trains but also automobile and truck traffic noise on roadways within the ROI; and machinery noise such as facility climate and ventilation equipment and machinery required for local industrial operations. Sound generated along the proposed CHPE Project route varies as some portions of the route are in rural settings and other portions are closer to towns and highways where increases in sound levels occur due to population density.

Noise-sensitive receptors in the Overland Segment include residences, schools, churches, libraries, and hospitals. Areas in which a quiet setting is a basis for recreational use of the area might also be considered noise-sensitive. Given this context and the fact that the Overland Segment spans more than 127 miles (204 km), there are numerous noise-sensitive receptors within the ROI that could be impacted by construction activities and operations of permanent cooling stations proposed along the transmission line route. Sensitive land uses along the proposed CHPE Project transmission line route are discussed in **Section 3.2.1** and identified in **Appendix F.2**.

3.2.18 Socioeconomics

The ROI for the terrestrial portions of the proposed CHPE Project is defined as those counties that are traversed by the transmission line route. The issues analyzed in this section, data sources used, and the reason for selecting the socioeconomics ROI are discussed in **Section 3.1.18**.

Population. The Overland Segment ROI encompasses the counties along the upland portion of the proposed transmission line route and includes Albany, Columbia, Greene, Rensselaer, Saratoga, Schenectady, and Washington counties with a total population of approximately 1 million. This segment contains the City of Albany, which is the capital city of New York State and the largest city within the segment. The metropolitan area around Albany includes two additional cities, the City of Schenectady and the City of Troy, making this the largest population center within the Overland Segment. Counties within the Overland Segment generally experienced increased population growth from 1990 to 2010. The population within Columbia County remained constant between 1990 and 2010, according to U.S. Census Bureau population estimates. Albany County experienced approximately 4 percent growth between the 1990 and 2010 U.S. Census. The population of Washington County increased by 6.5 percent from 1990 to 2010. In Rensselaer (3.2 percent increase) and Schenectady (3.6 percent increase) counties, the population slightly increased from 1990 to 2010. Saratoga and Greene counties experienced double-digit population growth from 1990 to 2010, increasing by 21 and 10 percent, respectively (USCB 2012a). See **Table 3.2.18-1** for complete population data.

Table 3.2.18-1. Population Summary for the Overland Segment, 1990 to 2010

Location	1990	2000	2010*	Percentage Change		
				1990 to 2000	2000 to 2010	1990 to 2010
United States	248,709,873	281,421,906	308,591,917	13.2	9.7	24.1
New York State	17,990,455	18,976,457	19,378,102	5.5	2.1	7.7
Albany County	292,594	294,565	304,204	0.7	3.3	4.0
Columbia County	62,982	63,094	63,096	0.2	0.0	0.2
Greene County	44,739	48,195	49,221	7.7	2.1	10.0
Rensselaer County	154,429	152,538	159,429	-1.2	4.5	3.2
Saratoga County	181,276	200,635	219,607	10.7	9.5	21.1
Schenectady County	149,285	146,555	154,727	-1.8	5.6	3.6
Washington County	59,330	61,042	63,216	2.9	3.6	6.5

Sources: USCB 1990, USCB 2000, USCB 2012a

*Note: 2011 census data were not available for all counties. 2010 data were used for consistent reference.

Employment. The largest industry by percentage of workforce employed in the Overland Segment ROI counties, New York State, and the United States is the educational, health and social services industry. In the seven counties of the Overland Segment ROI, that sector accounted for between 25 and 28 percent of employment by industry. The public administration industry accounts for 14 percent of employment in Albany County, and 12 percent of employment in Rensselear County, making it the second largest industry by percentage of employment in these counties. The retail trade industry represents 11 percent employment in Greene County, 13 percent of employment in Schenectady and Columbia counties, and 12 percent in Saratoga County, making the retail trade industry the second largest industry by percentage of employment in each of these counties. In Washington County, the manufacturing industry is the second largest, representing 15 percent of employment (USCB 2012b). The construction industry within this segment is generally similar to New York State. Washington and Greene counties have the highest percentage of the labor force in the construction industry within this segment at approximately 9 percent. The remaining counties have between 5 and 8 percent of their labor force within the construction industry. Complete employment data for the Overland Segment are displayed in **Table 3.2.18-2**.

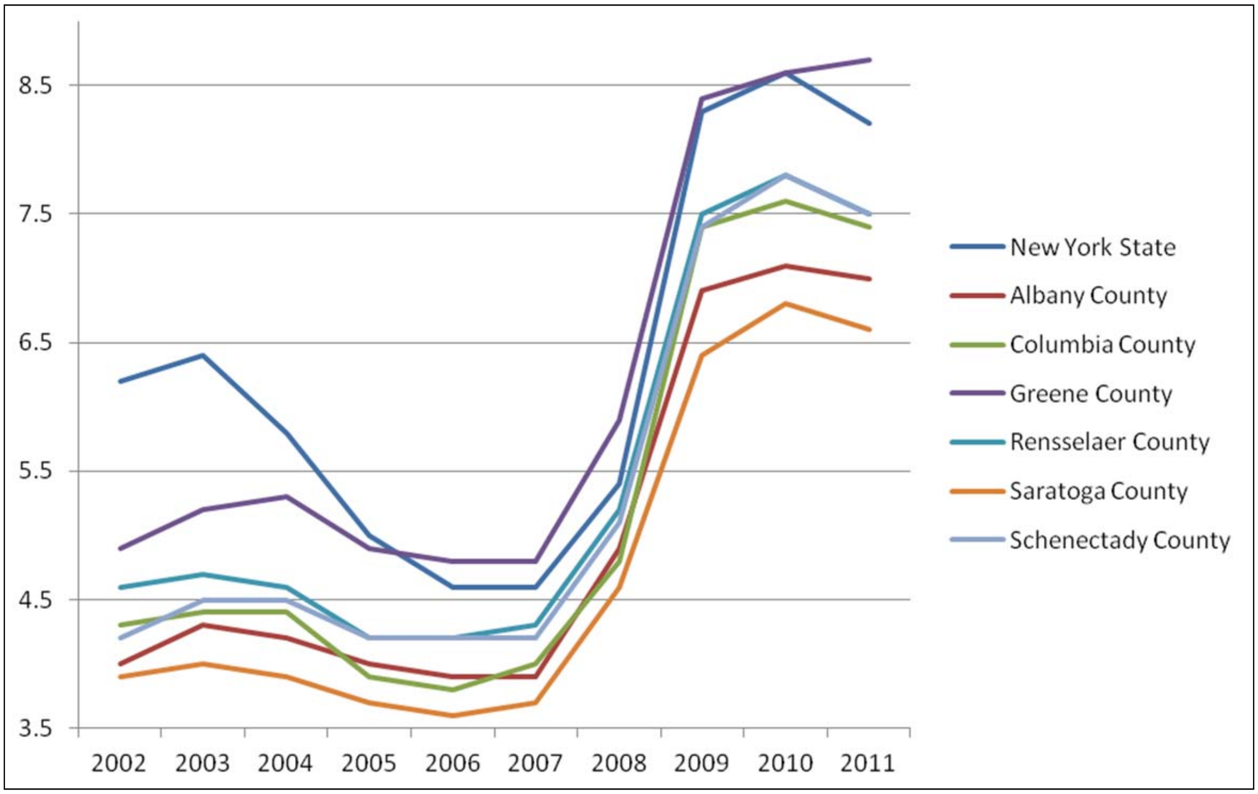
Table 3.2.18-2. Overview of Employment by Industry for the Overland Segment, 2008 to 2010

Industry*	United States	New York State	Albany County	Columbia County	Greene County	Rensselear County	Saratoga County	Schenectady County	Washington County
Population 16 years old and over in labor force	**141,848,097**	**9,075,825**	**153,581**	**30,037**	**20,357**	**80,821**	**113,013**	**74,053**	**29,089**
Agriculture, forestry, fishing and hunting, and mining	1.9%	0.6%	0.4%	4.4%	1.7%	0.8%	0.7%	0.6%	3.8%
Construction	6.8%	5.8%	4.7%	7.9%	9.2%	6.3%	6.2%	4.7%	8.9%
Manufacturing	10.7%	7.0%	5.1%	6.3%	6.75%	6.6%	8.5%	7.1%	15.3%
Wholesale trade	2.9%	2.7%	2.1%	2.6%	1.6%	2.5%	3.0%	2.3%	2.8%
Retail trade	11.6%	10.7%	10.2%	13.0%	10.7%	11.1%	11.7%	13.3%	12.7%
Transportation and warehousing, and utilities	5.0%	5.2%	3.9%	4.1%	4.4%	4.3%	3.6%	3.8%	3.8%
Information	2.3%	3.0%	2.3%	2.3%	2.8%	1.9%	2.1%	2.3%	1.7%
Finance, insurance, real estate, and rental and leasing	6.8%	8.4%	7.9%	5.5%	5.8%	6.2%	8.1%	7.8%	4.1%
Professional, scientific, management, administrative, and waste management services	10.5%	10.9%	9.4%	9.3%	7.6%	9.0%	10.5%	9.3%	5.5%
Educational, health and social services	22.6%	27.1%	28.4%	26.4%	26.4%	27.4%	25.3%	27.7%	24.6%
Arts, entertainment, recreation, accommodation and food services	9.1%	8.6%	8.0%	5.5%	10.4%	8.0%	8.7%	7.9%	8.2%
Other services (except public administration)	4.9%	5.1%	4.1%	5.2%	4.3%	4.2%	4.1%	4.2%	3.6%
Public administration	4.9%	4.9%	13.5%	7.5%	8.4%	11.6%	7.6%	9.0%	5.1%

Source: USCB 2012b

*Note: Data for employment, by industry, are provided using a multi-year estimate because single-year estimates are not provided for populations less than 65,000.

Annual unemployment rates in the seven counties of the Overland Segment ROI ranged from a low of 3.6 percent unemployment in Saratoga County in 2006 to a high of 8.7 percent unemployment in Greene County in 2011 (BLS 2012). Unemployment rates generally tended to be lower in the counties of the Overland Segment ROI than New York State, with the exception of Greene County after 2005 (see **Figure 3.2.18-1**).



Source: BLS 2012

Figure 3.2.18-1. Unemployment in the Overland Segment, 2002 to 2011

Taxes and Revenue. Real property taxes would be generated by properties acquired along portions of the Overland Segment. Property taxes in New York State are determined locally by calculating a tax levy and dividing it by the value of all property in the jurisdiction (NYSDTF 2012).

Housing. An analysis of available rental housing was conducted because a small number of specialized workers could come from areas outside of the active construction area and might need to live in short-term rental units, motels, and campgrounds. Rental unit availability within the Overland Segment varied from 510 units in Washington County to 6,900 in Columbia County. Seasonal, recreational, or occasional use units within the segment ranged from approximately 400 in Schenectady County to 5,500 in Saratoga County in 2010. There are at least 45 hotels, motels, and campgrounds with more than 2,750 units available in this segment (Fodor 2012).

In the Overland Segment ROI, there are approximately 55,000 vacant housing units, representing 12 percent of the 456,000 housing units in the segment. Greene County, with 32 percent vacant housing units, contains the largest percentage of vacant housing units by far among the seven counties in the Overland Segment ROI. The largest number of vacant housing units occurs in Albany County, with 11,500 units. Owner-occupied units make up 60 percent of the occupied units in the Overland Segment ROI (USCB 2012b).

3.2.19 Environmental Justice

The issues analyzed in the Environmental Justice section, data sources used, and the definition of the environmental justice ROI are discussed in **Section 3.1.19**.

Minority and low-income populations in the Overland Segment ROI were identified by using U.S. Census Bureau census tract data. A total of 44 census tracts in the Overland Segment ROI were identified along the proposed CHPE Project corridor. Minority populations within these tracts were predominantly Hispanic or Latino (1 to 13 percent, with a median of 2.5 percent) and Black (0.3 percent to 22.2 percent of the total population, with a median of 1.4 percent). Three census tracts (202, 203, and 810) reported low-income population levels that were higher than the percentage of the state population categorized as low-income. Review of data for all census tracts along this segment's ROI revealed that low-income populations composed up to 43 percent (with a median of 4.9 percent) of the total number of families in the tracts. The median household income within the 44 census tracts in this segment's ROI ranged from $26,563 to $103,162. See **Appendix L** for census tract data populations along the proposed CHPE Project route.

All counties within this segment's ROI reported relatively high White population percentages which ranged between 76 and 93 percent of their respective total county populations; these percentages of White inhabitants were well above the 58 percent reported among the total state population. Reported minority population percentages within the counties in the Overland Segment ROI were generally lower than those reported for New York State. Median household incomes in the Overland Segment ROI ranged from a low of $45,921 in Greene County to a high of $65,613 in Saratoga County; similar to the state median income of $55,217. The percentage of families that earned below the poverty level in the counties in the ROI ranged from a low of 4.2 percent in Saratoga County to a high of 9.3 percent in Washington County; below the percentage of the total number of families that earned below the poverty level in New York State (11 percent). Percentages of minority and low-income populations for each county in the Overland Segment ROI are listed in **Table 3.2.19-1**.

Table 3.2.19-1. Race, Ethnicity, and Poverty Characteristics for the Overland Segment in 2010

	ROI							New York State
	Albany County	Columbia County	Greene County	Rensselaer County	Saratoga County	Schenectady County	Washington County	
Total Population	304,204	63,096	49,221	159,429	219,607	154,727	63,216	19,378,102
Percent White	76.0	88.2	87.1	85.7	92.7	77.2	93.3	58.3
Percent Black or African American	12.0	4.3	5.3	6.0	1.4	8.7	2.7	14.4
Percent American Indian and Alaska Native	0.1	0.1	0.2	0.2	0.1	0.3	0.2	0.3
Percent Asian	4.8	1.6	0.8	2.2	1.8	3.2	0.4	7.3
Percent Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Percent Other Race	0.2	0.2	0.2	0.2	0.1	1.8	0.1	0.4
Percent Two or More Races	2	1.7	1.5	2.0	1.4	3.1	0.9	1.7
Percent Hispanic or Latino	4.9	3.9	4.9	3.8	2.4	5.7	2.3	17.6
Total Percent Minority Population	24.0	11.8	12.9	14.3	7.3	22.8	6.7	41.7
Percent Families below Poverty Level	7.3	5.6	8.8	8.9	4.2	7.9	9.3	11
Median Household Income	$56,424	$52,140	$45,921	$54,261	$65,613	$53,322	$48,565	$55,217

Source: USCB 2012b

Note: Census tract data are available in **Appendix L**.

3.3 Hudson River Segment

3.3.1 Land Use

The issues analyzed in the Land Use section and data sources used are discussed in **Section 3.1.1.1**, and the definition of the land use ROI is discussed in **Sections 3.1.1.1** and **3.2.1**.

Land Uses. The northern portion of the Hudson River Segment runs through relatively rural areas; however, the area surrounding the segment becomes more urban as it approaches the New York City metropolitan area. Land uses within the communities along the Hudson River vary from open space and recreation uses to residential developments and current and former industrial facilities. Residential development along the Hudson River has increased in the past 10 years. In addition, some former industrial facilities on the waterfront are being redeveloped into residential and mixed-use developments (Scenic Hudson 2010).

General uses of the Hudson River include transportation and recreation (e.g., fishing, boating, swimming, and water sports). There is a blue crab commercial fishery in the lower Hudson River (NYSDEC 2012u). Specific facilities within the aquatic portion of the segment include New York Waterway ferry crossings (Haverstraw-Ossining and Newburgh-Beacon), the I-87/Tappan Zee Bridge crossing, and the presence or crossing of utility services infrastructure, such as pipelines and cables (CHPEI 2012b). See **Sections 3.3.13**, **3.3.2**, and **3.3.12** respectively for more information on these uses.

At the Town of Stony Point, the proposed CHPE Project would exit the Hudson River for approximately 8 miles (13 km) in Rockland County to avoid impacts on Haverstraw Bay and the Haverstraw Bay SCFWH. This terrestrial portion of the route is primarily along the CSX ROW and the U.S. Route 9W ROW, except for a segment within the Village of Haverstraw where it exits the railroad ROW to travel under Rockland Lake State Park and Hook Mountain State Park, and other ROW deviations. Land uses within the terrestrial portion of the route are predominantly residential and commercial/industrial uses, and forested and open land/pasture/hay/scrub/shrub land cover types within the Stony Point Battlefield State Historic Site and state parks. Residential and commercial areas exist within the terrestrial ROI in the central portion of the Town of Stony Point and the villages of West Haverstraw and Haverstraw. Several ROW deviations into land owned by private entities (for commercial, residential, recreational [baseball fields], and utility uses), New York State (for roadways and parks), and municipalities (for roadways) would occur (CHPEI 2012f). Three state recreational facilities (Stony Point Battlefield State Historic Site, Rockland Lake State Park, and Hook Mountain State Park) and Haverstraw little league baseball fields would be within the ROI. U.S. Route 9W is designated as a state bicycle route in this area. **Table 3.3.1-1** identifies known sensitive land uses within or adjacent to the ROI of the terrestrial portion of the Hudson River Segment. See **Section 3.3.13** for more information on recreational uses.

Land Use Table F.2-1 in **Appendix F** identifies the amount of each general land use (i.e., land cover type) within the ROI in the Hudson River Segment. See Land Use Table F.2-3 in **Appendix F** for more information on the communities traversed by the proposed CHPE Project within the terrestrial portion of the Hudson River Segment, and the general and specific land uses within and directly adjacent to the ROI within each community.

The proposed CHPE Project would not cross any agricultural districts. See **Section 3.3.9** for more information on soils characterized as important farmland soils within the Hudson River Segment.

Land Use Plans and Policies. Because the proposed CHPE Project would be primarily within the Hudson River, most land use plans would not be relevant. The following plans might be relevant to the Hudson River Segment.

Table 3.3.1-1. Sensitive Land Uses Within or Adjacent to the Terrestrial Portion of the Hudson River Segment ROI

Sensitive Land Use	Within or Adjacent to ROI (Direction)
Residential Uses	
Mountain Shadows Condominiums	Parking Lot Within ROI
Recreational Uses	
Stony Point Marsh (Cedar Pond Brook)	Within ROI
Haverstraw little league baseball fields	Within ROI (west)
Haverstraw Beach State Park	Within ROI
Hook Mountain/Nyack Beach Bikeway	Adjacent (north)
Hook Mountain State Park	Within ROI
Rockland Lake State Park	Within ROI
Religious Uses	
Mt. Repose Cemetery	Adjacent (south/southwest)

Note: Information compiled from commonly available mapping data sources. Adjacent uses identified based on potential for construction period impact.

2009 New York State Open Space Conservation Plan. The Plan identifies two priority conservation projects in Rockland County. These priority projects include Project 32 (Rockland Riverfront Communities/ Palisades Ridge) and Project 38 (Hudson River Corridor Estuary).

Hudson River Estuary Program. The Hudson River Estuary Program (HREP) aims to safeguard and revitalize the Hudson River watershed. The main mission of the HREP is to ensure clean water; protect and restore fish, wildlife and their habitats; provide recreational opportunities and river access; and conserve the Hudson River scenery. The focus area of the HREP includes the tidal Hudson River and its adjacent watersheds from the Federal Dam at Troy to upper New York Harbor. The HREP also includes an Action Agenda, which is a forward-looking plan that provides an ecosystem management approach to addressing issues facing the Hudson River estuary. The Action Agenda is the fundamental planning tool of the HREP (NYSDEC 2013b).

New York Coastal Zone Management Policies. Federal consistency requirements of the CZMA require that Federal activities comply to the greatest extent possible with the enforceable policies of applicable local coastal zone management programs. Under the Federal consistency provision, states have the opportunity to perform a review on Federal agency activities that could affect the state's coastal zone or its coastal resources to determine if it would be consistent with the enforceable policies of approved state coastal zone management plans.

Portions of the proposed CHPE Project within the Hudson River Segment would occur within New York State's coastal area boundary. New York State's coastal area consists of the state's coastal waters and adjacent shorelands. Coastal

> The CZMA was promulgated in 1972 as a means to protect coastal resources from growing demands associated with commercial, residential, recreational, and industrial uses. The CZMA is administered through approved state programs designed in cooperation with the Federal government, and allows a coastal state to develop a coastal zone management plan whereby the state designates permissible land and water use within its coastal zone.

waters in the Hudson River Segment ROI include the Hudson River south of the Town of Catskill to approximately the City of Yonkers; and their connecting water bodies, bays, harbors, shallows, and marshes. Adjacent shorelands include islands, wetlands, beaches, dunes, barrier islands, cliffs, bluffs, inter-tidal estuaries, and erosion-prone areas (Article 42 of New York Executive Law, Section 911). The landward boundary of the coastal area varies, but generally is 1,000 feet (305 meters) from the shoreline in nonurban areas, and 500 feet (152 meters) or less from the shoreline in urbanized areas and other developed locations along the coastline. The applicable coastal area land use plans for the Hudson River Segment are identified in the following paragraphs, and the coastal zone conditional consistency determination and associated documentation for the proposed CHPE Project are provided in the Coastal Zone Consistency Documentation in **Appendix F.1**.

The New York coastal zone management policies (i.e., New York State CMP) and Article 42 of the Executive Law would apply. Thirty-four of New York State's 44 enforceable coastal policies might be relevant to the proposed CHPE Project. The relevant polices include those related to development (Policies 1, 2, 4, and 5), fish and wildlife (Polices 7 and 8), flooding and erosion hazards (Policies 11, 12, 13, 14, 15, and 17), general issues (Policy 18), public access (Policies 19 and 20), recreation (Policies 21 and 22), historic and scenic resources (Policies 23, 24, and 25), agricultural and lands (Policy 26), energy and ice management (Policy 27), water and air resources (Policies 30, 31, 33, 34, 35, 36, 37, 38, 39, 41, and 43), and wetlands (Policy 44). The Applicant must certify to the NYSDOS that the proposed CHPE Project would be consistent with the New York State CMP. DOE cannot authorize the Presidential permit for the proposed CHPE Project prior to NYSDOS's concurrence with the Applicant's certification. NYSDOS issued a conditional consistency determination for the proposed CHPE Project in June 2011. The NYSPSC granted a Certificate for the proposed CHPE Project on April 18, 2013, which indicates that the proposed CHPE Project would be consistent with the New York State CMP based on adherence to certain conditions (NYSPSC 2013) (see **Appendix C**). See the Coastal Zone Consistency Documentation in **Appendix F.1** for the list of enforceable coastal policies that might be relevant, the Applicant's consistency certification assessment, and NYSDOS's conditional consistency determination.

Local Waterfront Revitalization Programs. There are 19 LWRPs that might be relevant to the proposed CHPE Project within the Hudson River Segment. See Land Use Table F.2-5 in **Appendix F** for a list of LWRPs that could be relevant to the Hudson River Segment of the proposed CHPE Project. See the Coastal Zone Consistency Documentation in **Appendix F.1** for the list of enforceable coastal policies within these LWRPs that might be relevant and the Applicant's consistency assessment.

Local Municipal Land Use Plans. The Rockland Tomorrow: Rockland County Comprehensive Plan, Village of Haverstraw Master Plan and Zoning Plan, and Town of Clarkstown Comprehensive Plan might be relevant to the proposed CHPE Project. Only one plan (Village of Haverstraw Master Plan and Zoning Plan) identifies a policy associated with electric transmission projects. The policy includes a requirement for electric power lines to be underground in all land developments. Exhibit 121 in the Joint Proposal includes a full list of policies from these plans that might be relevant.

3.3.2 Transportation and Traffic

This segment is approximately 96 miles (155 km) in length and includes MPs 228 to 324. The northern terminus of this segment is located in the Town of Catskill, and the southern terminus is at the confluence of the Hudson and Harlem rivers in New York City. The route would largely use portions of the bed of the Hudson River. The Hudson River within this segment is composed of regulated and maintained shipping routes that are commercially significant to the area. The transmission cables would not be located within any federally designated channels in this segment. In 2011, waterborne commerce on the Hudson River between the Harlem River and the Federal Dam at Troy consisted of approximately 7,500 round trips (USACE 2011). Larger vessels that use the waterway in the vicinity of the proposed

CHPE Project route currently use existing navigation channels. Within the Hudson River, south of Albany to south of Yonkers, the Federal project depth for the navigation channel is 32 feet (10 meters) (USACE 2012b). Bridges spanning the Hudson River within this segment include the following:

- Kingston-Rhinecliff Bridge (New York State Route 199) near MP 241
- Former Poughkeepsie-Highland Railroad Bridge/existing Walkway over Hudson pedestrian bridge near MP 260
- Mid-Hudson Bridge (U.S. Route 44 and New York State Route 55) near MP 261
- Newburgh-Beacon Bridge (I-84 and New York State Route 52) near MP 275
- Bear Mountain Bridge (U.S. Routes 6 and 202) between MPs 290 and 291
- Tappan Zee Bridge (I-87 and I-287) near MP 310.

Two ferries cross the Hudson River in this segment, the Haverstraw-Ossining ferry and the Newburgh-Beacon ferry, neither of which uses cables.

The USCG has established six permanent safety and security zones within the New York Captain of the Port Zone along the Hudson River. Navigation and marine activities within these zones are restricted. The following four safety and security zones are in the vicinity of the proposed CHPE Project route:

- **Indian Point Nuclear Power Station (IPNPS):** All waters of the Hudson River within a 300-yard (91-meter)-radius of the IPNPS pier in Buchanan.
- **USCG Cutters and Shore Facilities:** All waters within 100 yards (274-meters) of moored or anchored Coast Guard Cutters; Coast Guard Station Sandy Hook, New Jersey; and Coast Guard Station Kings Point.
- **33 CFR Part 105 Facilities:** All waters within 25 yards (23 meters) of each facility identified in 33 CFR Part 105 that are capable of accepting barge, ferry, or other commercial vessels. This includes piers, wharves, docks, and similar structures to which barge, ferry, or other commercial vessels can be secured; areas of land or water under and in immediate proximity to them; buildings on such structures or contiguous to them; and equipment and materials on such structures and in such buildings.
- **Bridge Piers and Abutments, Overhead Power Cable Towers, Piers, and Tunnel Ventilators:** All waters within 25 yards (23 meters) of any bridge, pier, abutment, overhead power cable tower, pier, or tunnel ventilators located south of the Troy Locks. Vessels are allowed to transit through any portion of the zone that extends into the navigable channel, for the sole purpose of direct and expeditious transit through the zone, as long as they remain within the navigable channel and maintain the maximum safe distance from the facility.

In addition to these permanent safety and security zones, temporary safety and security zones may be created by the USCG on an as-needed basis. The regulations allow for temporary, occasional, or intermittent use of safety and security zones, pending notification and permission from appropriate agencies (CHPEI 2012aa).

One terrestrial portion of this segment is in place to avoid the Haverstraw Bay SCFWH. This 8-mile (13-km) bypass would follow the CSX railroad ROW through the towns of Stony Point and Haverstraw and the U.S. Route 9W ROW in the Town of Clarkstown before re-entering the Hudson River south of the bay. Numerous road intersections are present along this bypass. U.S. Route 9W is a two-lane highway that traverses primarily commercial areas with some residential and industrial uses lining the road. The CSX railroad ROW in this area contains both two active sets of tracks and portions where the second set of tracks merges to one or has been removed.

3.3.3 Water Resources and Quality

The definitions of and issues associated with surface waters, floodplains, and groundwater are discussed in **Section 3.1.3**. The ROI for water resources and quality in the Hudson River Segment includes all of the Hudson River in the aquatic portion of the route, and 100 feet (30 meters) from the transmission line centerline in the terrestrial portion. The ROI for the Hudson River portion of the route was selected because localized project activities could result in impacts throughout the width of the waterbody. The ROI for the terrestrial portion of the route was selected because this constitutes the area where a substantial majority of potential impacts could occur, and beyond this distance, potential impacts would likely be avoided through implementation of Applicant-proposed measures for water resources (see **Appendix G**).

Surface Water. The Hudson River is in the 13,400-mi^2 (34,750-km^2) Hudson River Basin, encompassing portions of New York, Vermont, New Jersey, Massachusetts, and Connecticut. The Hudson River Basin consists of three major subbasins: the upper Hudson, the Mohawk, and the lower Hudson. The Hudson River originates from Lake Tear of the Clouds on New York State's highest peak, Mount Marcy, in the Adirondack Mountains in Essex County, New York. From there, the Hudson River traverses 315 miles (507 km) and drops 4,322 feet (1,317 meters) in elevation before emptying into New York Harbor (USGS 2009). The Hudson River is connected to Lake Champlain via the Champlain Canal, which was opened in 1823 to support navigation and commerce (NY Canals 2010). The lower Hudson River begins at the Federal Dam in Troy, just downstream from its confluence with the Mohawk River. The entire 154 miles (248 km) of the lower Hudson River is tidal and can undergo a reversal in the direction of flow four times a day. The Hudson River is used heavily for transportation purposes. Ocean-going vessels can navigate the Hudson River to Albany and the navigation channel in the river is maintained to a depth of at least 32 feet (10 meters) for ship traffic. The widest point of the Hudson River is approximately 3.5 miles (5.6 km) in Haverstraw Bay (USGS 1991).

The proposed CHPE Project route crosses several NRI-listed sections of the Hudson River in portions of Ulster, Columbia, Dutchess, and Greene counties. NRI sections of the Hudson River crossed by the aquatic transmission line are designated for their exceptional historic value, hydrologic value as free-flowing, and significant fish habitat (NPS 2012b). No river sections along the Hudson River Segment are protected as New York State Wild, Scenic, and Recreational Rivers (NYSDEC 2010i).

Public drinking water supplies are largely provided by surface waters in the Hudson River Basin (USGS 1998). The USEPA provided funding to the NYSDOH to monitor public drinking water during the remediation of the Hudson River PCB Superfund site (see **Section 3.3.15**). Although the southernmost point of the Superfund site is the Battery in New York City, the southernmost point for ongoing remediation and dredging activities is at the Federal Dam in Troy. The transmission line would enter the Hudson River at least 30 miles (48 km) south of the Federal Dam. A sampling program was established with public water suppliers. In 2008, the NYSDOH conducted baseline pre-dredging sampling, and all water samples were below the Maximum Contaminant Level (MCL) of 500 parts per trillion (ppt) for PCBs in drinking water. Samples taken at the water suppliers during Phase I of dredging in 2009 were below the PCB MCL for all samples. Ongoing monitoring of drinking water supplies will continue in relation to the Hudson River PCBs Superfund site-dredging project (USEPA 2012e).

Water Quality. The proposed CHPE Project route follows the Hudson River south to the New York City metropolitan area. Portions of the river are listed in the *Final New York State June 2010 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy* (NYSDEC 2010g). Causes of impairment include contaminated sediments; constituents include mercury, PCBs, and other toxins that could include dioxins/furan, PAHs, pesticides, and other heavy metals (NYSDEC 2010g). The most prominent issue is PCB contamination of the bottom sediments in the upper Hudson River, subsequent releases of PCBs to the river water, and the accumulation of PCBs in the food chain. Although part of the Hudson River is being remediated for PCB contamination, the Proposed CHPE Project route portion of the Hudson River is not within the area under remediation (USEPA 2012e).

In the freshwater portion of the Hudson River, surface water quality classifications from the NYSDEC include Classes A, B, and C waters. Because the proposed CHPE Project route enters the estuarine waters of the lower Hudson River at the border of Rockland and Westchester counties (MP 294), surface water quality from this location south to the Harlem River is classified as Class SB. The best usages of Class SB waters are primary and secondary contact recreation (recreational activities where direct contact with raw water occurs to the point of complete body submergence, and where contact with the water is minimal and where ingestion of the water is not probable, respectively) and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. Applicable narrative water quality standards for these water classifications regarding turbidity states that there is to be no increase that will cause a substantial visible contrast to natural conditions (NYSDEC 2012f).

Floodplains. The aquatic transmission cables would primarily be buried below the bottom of the Hudson River to the New York City metropolitan area. The Hudson River itself along the Hudson River Segment is mapped as a FEMA Zone AE, which is within the 100-year floodplain with an established base flood level. Where the transmission line route leaves the Hudson River at MP 295, the ROI for the terrestrial portion of the route under this segment would cross approximately 2.6 acres (1.1 hectares) of Zone A floodplains, which are floodplains without an established base flood level associated with rivers, streams, and unnamed tributaries along the 8-mile (13-km) segment between Stony Point and Clarkstown (see **Appendix A**) (FEMA 2014).

Groundwater. Most aquifers in the Hudson River Basin consist of unconsolidated glacial deposits or bedrock. Unconsolidated deposits of thick sand and gravel underlie floodplains and terraces along the larger tributaries to the Hudson River and occupy many valleys. Most aquifers have little or no hydraulic connection with other aquifers, and thus are considered to be locally confined. Bedrock aquifers in the Hudson River Basin consist of limestone, sandstone, and shale. Groundwater movement in bedrock aquifers is traditionally along fractures or bedding planes (USGS 1991). The proposed CHPE Project route would not cross any primary water supply aquifers or sole-source aquifers in the Hudson River Segment (NYSDEC 2010a).

3.3.4 Aquatic Habitats and Species

The ROI for aquatic habitats in the aquatic portions of the proposed CHPE Project in this segment is the Hudson River from Catskill to Spuyten Duyvil, and the ROI for terrestrial portions is 100 feet (30 meters) on either side of the transmission line centerline. A brief general definition of this resource, including the ROI, is provided in **Sections 3.1.4** and **3.2.4**.

The Hudson River Segment ROI includes the Hudson River and associated estuary from Catskill, south to Spuyten Duyvil and the Harlem River.

Aquatic Habitat and Vegetation. The Hudson River is 315 miles (507 km) long from its source at Lake Tear of the Clouds in the Adirondacks to its mouth at the Battery in New York City. The Hudson River is tidal for 153 miles (246 km) from the mouth to the Federal Dam at Troy. Salt water travels about 60 miles (97 km) up the river to Newburgh (Stanne et al. 1996). The Hudson River is considered part of the New York-New Jersey Harbor Estuary from the Piermont Marsh, which is just south of Haverstraw Bay, south to New York City (NYSDEC 2012o).

Habitat features within the Hudson River Segment include the channel (deep open water portion of the river), flats (expanses of mud or sand in river shallows), bays (coves along the shoreline), and wetlands (plant communities that develop in shallow water habitat [see **Section 3.3.8**]) (Stanne et al. 1996).

Two predominant species of SAV in the Hudson River are the native water celery and the exotic water chestnut. Due to light penetration limits, plants are generally found in water shallower than 10 feet (3 meters) although beds can be deeper in upriver sections. Other native species of SAV in the Hudson River include the clasping leaved pondweed (*Potamogeton perfoliatus*) and slender naiad (*Najas flexilis*). In addition to the water chestnut, other nonnative species include curly pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (Findlay et al. 2006, NYSDEC 2013a).

The Hudson River Segment from Catskill (MP 228) downstream to Kingston (MP 244), is a bifurcating channel-shoal (i.e., having large, shallow areas with many channels). Numerous tributaries enter the river in this area creating shallow sediment deposits. Maximum depths are 49 to 56 feet (15 to 17 meters), and the channel ranges from 0.2 to 0.6 miles (0.3 to 1.0 km) wide. The flats, numerous backwaters, stream mouths, and side channels of this uppermost section of the Hudson River support a wide variety of SAV beds (Findlay et al. 2006).

Several of the largest SAV beds in the Hudson River are between Kingston downstream to Esopus (MP 252) where the river meanders with broad flats and bends. The channel is typically 0.4 to 0.6 miles (0.6 to 1.0 km) wide with maximum depths of 72 to 102 feet (22 to 31 meters). Several tributaries have created shallow sediment deposits.

From Esopus downstream to Chelsea (MP 271), the river is narrow deeper and has few broad flats and shallows for large SAV beds. The river is commonly 0.5 to 0.7 miles (0.8 to 1.2 km) wide with maximum depths from 95 to 138 feet (29 to 42 meters). From Chelsea downstream to Newburgh (MP 275), the Hudson River is often called Newburgh Bay because of its large width (0.6 to 0.9 miles [1.0 to 1.4 km]) and shallower depth (maximum 49 to 59 feet [15 to 18 meters]). Slightly brackish water reaches into this section of the river during dry years and turbidity is relatively high (Findlay et al. 2006).

From Newburgh downstream to Croton Point (MP 302), the water is brackish, the river has large rock formations in the channel, and broad bends create shallow backwaters supporting SAV. Below Peekskill (MP 292), the river emerges into the Haverstraw Bay SCFWH, a broad (0.6 to 0.9 miles [1.0 to 1.5 km]) and shallow (maximum depth about 42 feet [13 meters]) estuary. Large flats extend from shore to the navigation channel, and shoreline features provide protected shallow waters. Despite the shallow water, SAV beds are not common in this reach of the Hudson River, likely because of the generally high turbidity. Further downstream, salinity increases until reaching marine conditions where SAV is composed of seagrasses or macroalgae, which can survive the higher salinities (Findlay et al. 2006).

The terrestrial portion of the Hudson River Segment crosses a number of tributaries of the Hudson River, including Cedar Pond Brook (MP 297.3), Minisceongo Creek (MP 298.5), and several other named and unnamed perennial and intermittent streams.

Shellfish and Benthic Communities. The benthic macroinvertebrates of the Hudson River form a well-documented and diverse community that includes approximately 300 species of annelids, mollusks, crustaceans, and insects. However, the benthic community has been subject to pollution and human alterations in the Hudson River over the past 200 years (Levinton and Waldman 2012). Benthic community structure and population density are dependent on factors including water quality, sediment type, the presence or absence of SAV, and human alterations. Benthic communities vary in distribution in the Hudson River depending on bottom type (i.e., hard or soft substrate), salinity, SAV, and location along the river.

Freshwater snails, clams, chironomids, and insects are present north of Kingston, whereas there is a mixture of freshwater and marine organisms between Poughkeepsie and Stony Point (MPs 260 to 295). South of Poughkeepsie, the benthos are dominated by estuarine worms and crustaceans. The predominant crustaceans in the lower Hudson River estuary include grass shrimp (*Palaemonetes* spp.), sand shrimp (*Crangon septemspinosa*), and blue crab (*Callinectes sapidus*) (Levinton and Waldman 2012).

In the Hudson River, the benthic macroinvertebrate community has undergone substantial change in recent years due to the invasion of the nonnative zebra mussel in the early 1990s. This mussel can withstand salinities up to 10.2 percent (McMahon 1996) and has altered the benthic community upriver from the brackish zone. Native filter-feeding bivalves (Unionidae*: Elliptio complanata*, *Anodonta implicata*, and *Leptodea ocracea*) have also declined upriver from the mouth of the Hudson River due to the decrease in phytoplankton, its food source, which has been over consumed by zebra mussels. Since 1992, native clam densities have declined by 56 percent, and recruitment of young-of-year (YOY) clams has declined by 90 percent (NYSDEC 2012aa).

Historically, extensive oyster beds occurred in the brackish zone of the lower Hudson River to as far north as Haverstraw Bay. Oyster beds occur from near Ossining at MP 305 to south of the Tappan Zee Bridge near MP 310 (NYSDEC 2014, AECOM 2011). Overharvesting and degraded water quality resulted in near extinction of oysters in the lower Hudson River during the early 20th century. There is considerable interest in restoration of oyster beds in the Hudson River and a NYSDEC-sponsored restoration effort is underway (USACE 2007). Potential oyster restoration locations have been identified in the Hudson River with the most suitable locations being in shallow water areas along the western river channel (USACE and Port Authority of NY & NJ 2009). In 2010, several experimental reefs were constructed and installed in the New York portions of the estuary to determine if large-scale oyster restoration is possible. Only one reef restoration project, located near Hastings-on-Hudson (near MP 315), is near the CHPE route in this segment (Hudson River Foundation 2012, NY/NJ Baykeeper 2012).

Separate from the oyster restoration sites, an introduced bivalve native to the Gulf of Mexico coast, the Atlantic rangia (*Rangia cuneata*), has become established in the lower Hudson River estuary and is abundant in the Haverstraw Bay and the Tappan Zee. It is also possible that this species is native to the Atlantic coast of the United States and that its range expands greatly in response to undetermined environmental changes (Verween et al. 2006).

Fish. The Hudson River contains a mixture of freshwater, diadromous (i.e., anadromous and catadromous, the latter spending most of their lives in fresh water, then migrating to the sea to breed), estuarine, and marine species, depending upon location. A total of 210 fish species have been reported from the Hudson River. Of the 210 species, 128 species are found in the main channel of the tidal portion of the Hudson River (Troy Dam south to the mouth of the river); the remaining 81 species are confined to tributaries of the lower Hudson River or from the upper Hudson River or Mohawk River systems. Of the 128 species found in the tidal portion of the river, 49 are primarily marine species and the remaining 80 are either resident freshwater or diadromous species (Daniels et al. 2005). Life history characteristics of representative marine, anadromous, diadromous, and freshwater species of the Hudson River are presented in Table H.2-3 in **Appendix H**.

Anadromous American shad, river herring, striped bass, Atlantic sturgeon (*Acipenser oxyrinchus*) and catadromous American eel (*Anguilla rostrata*) have historically supported important commercial fisheries in the Hudson River (NYSDEC 2012v). During 2012, alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) were among candidate species considered for listing as threatened or endangered. On August 12, 2013, the NMFS issued the ESA Listing Determination that a listing of the alewife and blueback herring under the ESA was not warranted (78 *Federal Register* 48943). Conservation and restoration measures to benefit these species are ongoing. The Hudson River also supports fish that are caught offshore such as Atlantic menhaden, bluefish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), windowpane flounder (*Scopthalmus aquosus*), and winter flounder (*Pseudopleuronectes americanus*). Important recreational fish include striped bass, largemouth bass, and white catfish (*Ameiurus catus*) (Stanne et al. 1996).

Angling surveys conducted in the mid-1990s by NYSDOH included 172 miles (277 km) of the Hudson River south of the Federal Dam at Troy. These surveys showed that anglers were catching mainly white perch, striped bass, white catfish, and American eel (ATSDR 2009).

Essential Fish Habitat. **Table 3.3.4-1** presents the species and lifestages that have EFH in the Hudson River estuary. These include fish that have EFH designated in the mixing zone (i.e., brackish water) and freshwater zone of the Hudson River (NOAA 2012b).

Benthic/demersal and pelagic species occur in the Hudson River Segment. These species are predominantly marine but have one or more life stages that occur in the fresh or brackish waters of the Hudson River estuary (NMFS 2010). EFH is generally composed of pelagic and demersal waters, and benthic substrates. Some species are more structure-oriented and have EFH composed of artificial or natural reefs (e.g., existing infrastructure such as docks), sand/shell fragments, biogenic structures (e.g., algae-covered rocks), and aquatic vegetation. However, many species have soft-bottom EFH composed of sand, mud, or a sand/mud mixture. King mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), and cobia (*Rachycentron canadum*) are coastal migratory pelagic species and suitable habitat is not expected to occur in the Hudson River Segment (NOAA 2012c).

Significant Coastal Fish and Wildlife Habitat. The transmission line would intersect four SCFWHs within the Hudson River Segment. The transmission line is routed on land to avoid the Haverstraw Bay SCFWH, which provides valuable habitat for juvenile and adult freshwater, anadromous, estuarine, and marine species. From north to south, the proposed route crosses the following SCFWHs:

- Esopus Estuary (MPs 234 to 235)
- Kingston-Poughkeepsie Deepwater Habitat (MPs 245 to 267 and MPs 268 to 270)
- Hudson Highlands (MPs 276 to 295)
- Lower Hudson Reach (MPs 317 to 325).

The Esopus Estuary SCFWH includes Esopus Creek, one of the primary freshwater tributaries of the Hudson River. The estuary is a 700-acre (283-hectare) area that includes freshwater tidal wetlands, littoral zone areas, and a deepwater section of the Hudson River. The littoral zones are important spawning grounds. The adjacent deepwater area of the Hudson River is an important post-spawning and wintering habitat for the shortnose sturgeon. Recreational fishing is popular in this area and several bass fishing tournaments are held annually. The tidal marshes and shallow water areas provide habitat for waterfowl year round (NYSDOS 2004b).

The Kingston-Poughkeepsie Deepwater Habitat SCFWH is an approximate 6,350-acre (2,570-hectare) area that includes a 39-mile (63-km) stretch of deepwater habitat in the Hudson River. It is a nearly continuous deepwater section of river, with depths ranging from 30 feet (9 meters) to greater than 50 feet (15 meters), including a small area with a depth of more than 125 feet (38 meters). These areas provide habitat for a variety of fish, including shortnose sturgeon and Atlantic sturgeon. The deepwater areas provide wintering habitat and spawning grounds for shortnose sturgeon. This deepwater section is also significant because it provides refuge for many upriver marine species during periods of low freshwater flows, which primarily occur in the summer (NYSDOS 2004b, 2013).

Table 3.3.4-1. Designated Essential Fish Habitat of the of the Lower Hudson River

Species	Life Stage				
	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Atlantic sea herring *(Clupea harengus)*	--	pelagic waters	pelagic waters	pelagic waters	--
Atlantic butterfish *(Peprilus triacanthus)*	--	pelagic waters	pelagic waters	pelagic waters	--
Black sea bass *(Centropristus striata)*	--	--	demersal waters, sand/shell fragment mix, biogenic structure*	demersal waters, sand/shell fragment mix, biogenic structure*, artificial and natural reefs (including shipwrecks)	--
Bluefish *(Pomatomus saltatrix)*	--	--	pelagic waters	pelagic waters	--
Red hake *(Urophycis chuss)*	--	surface waters	sand/shell fragment mix	sand, silt, and mud	--
Scup (*Stenotomus chrysops*)	pelagic waters in estuaries	pelagic waters in estuaries	demersal waters and inshore estuaries, sand, mussels, and eelgrass beds	demersal waters and inshore estuaries	weedy to sandy substrates
Summer flounder *(Paralicthys dentatus)*	--	surface waters	demersal waters, marsh creeks, biogenic structure*, macrophytes and aquatic vegetation, sand, silt, and mud	demersal waters, macrophytes, and aquatic vegetation	--
Winter flounder *(Pseudopleuronectes americanus)*	rocks, pebbles, gravel, shell fragments, sand, silt, and mud	pelagic and demersal waters	rocks, pebbles, gravel, shell fragments, sand, silt, and mud	rocks, pebbles, gravel, shell fragments, sand, silt, and mud	rocks, pebbles, gravel, shell fragments, sand, silt, and mud
Windowpane flounder *(Scopthalmus aquosus)*	surface waters	pelagic waters	sand, silt, and mud	sand, silt, and mud	sand, silt, and mud
Dusky shark	--	--	pelagic waters	--	--
Clearnose skate (*Raja eglanteria*)	--	--	rocks, gravel, sand, silt, and mud	rocks, gravel, sand, silt, and mud	--
Little skate (*Raja erinacea*)	--	--	rocks, gravel, sand, silt, and mud	rocks, gravel, sand, silt, and mud	--
Winter skate (*Raja ocellata*)	--	--	sand, gravel, or mud	sand, gravel, or mud	--

Sources: NOAA 2012b, NOAA 2012c, NOAA 2012d, NYSDEC 1986, NOAA 1999c
Note: * = Biogenic structure is derived from biological material such as algae-covered rock, aquatic vegetation, shell beds, and sponges.

The Hudson Highlands SCFWH is an extensive area of deep, turbulent river channel with strong currents and rocky substrates. It is the southernmost extent of fresh water in the Hudson River estuary. Because of this, the area supports a major striped bass commercial and recreational fishery, and serves as a major spawning area for the species. Other species such as white perch also favor this area for reproduction, and it is a potentially important nursery area for shortnose sturgeon. Bald eagles (*Haliaeetus leucocephalus*) have been reported here since 1981, with as many as 12 birds occupying the area at one time (NYSDOS 2004b, 2013). **Section 3.3.7** describes in detail terrestrial protected and sensitive species, including the bald eagle.

The Lower Hudson Reach SCFWH is one of only a few large tidal river mouth systems in the northeastern United States and provides a unique range of salinity and other estuarine features. Striped bass and flounder are known to overwinter in this area. Striped bass are also known to spawn in this area from April to June. Significant numbers of summer flounder (*Paralicthys dentatus*), white perch, Atlantic tomcod (*Microgadus tomcod*), Atlantic silversides (*Menidia menidia*), bay anchovy (*Anchoa mitchilli*), hogchokers (*Trinectes maculatus*), American shad, blue crabs, and American eel inhabit the SCFWH. This area of the river could also be important for juvenile bluefish and weakfish, and adult Atlantic and shortnose sturgeon. Numerous bird species also overwinter in this area (NYSDOS 2004b).

In addition to the four SCFWH areas discussed in the previous paragraphs, there are 18 SCFWHs within 1 mile (1.6 km) of the Hudson River Segment. The following SCFWHs are not discussed in detail because the proposed CHPE Project route would not cross them (NYSDOS 2013):

- Inbocht Bay and Duck Cove
- Smith's Landing
- Germantown-Clermont Flats
- North and South Tivoli Bays
- The Flats
- Rondout Creek
- Vanderburgh Cove and Shallows
- Esopus Meadow
- Black Creek
- Wappinger Creek
- Fishkill Creek
- Moodna Creek
- Constitution Marsh
- Manitou Marsh
- Iona Island Marsh
- Haverstraw Bay
- Croton River and Bay
- Piermont Marsh.

3.3.5 Aquatic Protected and Sensitive Species

The ROI for aquatic protected and sensitive species is the Hudson River in the aquatic portion of the proposed CHPE Project route, and the ROI for terrestrial portions of the route is 100 feet (30 meters) on either side of the transmission line. The issues analyzed in the Aquatic Protected and Sensitive Species section, the data sources used, and the definition of the ROI are discussed in **Sections 3.1.5** and **3.2.5**. The ESA describes several categories of Federal status for plants and animals and their critical habitat, as designated by the USFWS or NMFS. In addition to allowing the listing of species and subspecies, the ESA allows listing of DPS of vertebrate species. An endangered species is defined as any species in danger of extinction throughout all or a large portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future. A candidate species is one that is being considered for listing as endangered or threatened under the ESA. Candidate status does not carry any procedural or substantive protection under the ESA. Critical habitat is defined in the ESA as "a specific geographic area that is essential for the conservation of a threatened or endangered species and that could require special management or protection." Critical habitat can include an area that is not occupied by a species, but is needed for the recovery of that species. Neither the USFWS nor the NMFS have designated or proposed designation of critical habitat areas in the Hudson River Segment of the proposed CHPE Project.

NMFS and USFWS share responsibility for implementing the ESA. Generally, the USFWS manages land and freshwater species, while the NMFS manages marine and anadromous (i.e., born in fresh water, spends most of its life in the sea and returns to fresh water to spawn) species. In the case of sea turtles, NMFS has the lead for their conservation and recovery in the marine environment, while USFWS is responsible for sea turtles on the nesting beaches. Federal agencies must consult with NMFS and USFWS, under Section 7(a)(2) of the ESA on activities that might affect a listed species. These interagency consultations, or Section 7 consultations, are designed to assist Federal agencies in fulfilling their duty to ensure Federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat.

Federally Listed Species. Descriptions of ESA-listed fish, whales, and sea turtles with the potential for occurring in the Hudson River Segment ROI are discussed in the following paragraphs.

Fish. **Table 3.3.5-1** shows the federally listed aquatic threatened and endangered fish species that could be encountered in the Hudson River Segment. These species include endangered shortnose sturgeon (*Acipenser brevirostrum*), threatened Gulf of Maine DPS of Atlantic sturgeon (*Acipenser oxyrinchus*), endangered New York Bight DPS of Atlantic sturgeon, and endangered Chesapeake Bay DPS of Atlantic sturgeon.

Table 3.3.5-1. Federally Threatened, Endangered, and Candidate Aquatic Species Occurring in the Hudson River Segment

Common Name	Scientific Name	Federal Status
Shortnose sturgeon	*Acipenser brevirostrum*	E
Gulf of Maine DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	T
New York Bight DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	E
Chesapeake Bay DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	E

Key: DPS = distinct population segment, E = endangered, T = threatened, C = candidate

Shortnose Sturgeon. The shortnose sturgeon was listed as endangered in 1967 under the Endangered Species Preservation Act that pre-dated the ESA (32 *Federal Register* 4001). NMFS manages the species and recognizes 19 separate populations of shortnose sturgeon (NMFS 1998). Individuals occurring in the Hudson River Segment ROI belong to the Hudson River population, which is the largest population of shortnose sturgeon in the United States, with an estimated 65,000 individuals (USFWS 2013b). There is no critical habitat designated for the shortnose sturgeon.

The shortnose sturgeon primarily occurs in freshwater rivers and coastal estuaries. The species is considered freshwater amphidromous, meaning its use of marine waters is limited to the estuaries of its home rivers (Bain 1997). Spawning occurs in upper freshwater areas, while feeding and overwintering activities could occur in both freshwater and saline habitats (NMFS 1998). While the shortnose sturgeon does not undertake the significant marine migrations seen in the Atlantic sturgeon, telemetry data indicate that shortnose sturgeons do make localized coastal migrations. For example, one individual tagged in the Hudson River was recaptured in the Connecticut River (Welsh et al. 2002).

The shortnose sturgeon is a long-lived species (30 to 40 years) that matures at late ages (males attain sexual maturity at 6 to 10 years of age, while females do so between 7 and 13 years) (NMFS 1998). Males spawn approximately every 2 years, while females spawn every 3 to 5 years. Generally, shortnose sturgeons spawn in sand- to boulder-sized substrate in April to May. The spawning period lasts from a few days to several weeks and occurs when freshwater temperatures increase from 46.4 to 48.2 °F (8 to 9 °C), early April through May. Larvae tend to drift downstream and are generally found between

Albany and Poughkeepsie (NatureServe 2013, NYNHP 2013a). Larvae can be found upstream of the saltwater wedge (a wedge-shaped intrusion of salty ocean water into a tidal river; it slopes downward in the upstream direction and salinity increases with depth) in the Hudson River estuary and are most commonly found in deep waters with strong currents, typically in the channel (Dovel et al. 1992, Bain 1997). Most activity of larvae, juveniles, and adults appears to occur at night (NatureServe 2013). Juvenile shortnose sturgeons in the Hudson River typically use the same deep channel habitats throughout the tidal reach as adults (Bain 1997). In New York State, the shortnose sturgeon is found in the Hudson River from the Federal Dam at Troy downriver to the southern tip of Manhattan, over a large portion of the fresh and brackish reaches in deep channel habitats (Bain 1997, Bain et al. 2000). All life stages occur in the lower Hudson River. Non-spawners use overwintering habitat concentrated in brackish waters of the lower Hudson River while spawners (in the upcoming spring) overwinter in a single concentration in deep channel habitats further upstream (Bain 1997). Adults migrate upriver from their middle Hudson River overwintering areas to freshwater spawning sites north of Coxsackie (NYSDEC 2013e).

Spawning grounds extend from below the Federal Dam at Troy downriver to around Coeymans (Dovel et al. 1992). Spawning typically occurs at water temperatures between 50 and 64 °F (10 and 18 °C) (generally early April–May). Shortnose sturgeon eggs are expected to hatch in 8 to 13 days and embryos gradually disperse downstream over much of the Hudson River estuary. Shortnose sturgeon larvae captured in the Hudson River were associated with deep waters and strong currents (Hoff et al. 1988 as cited in Bain 1997). Juvenile shortnose sturgeon are predominantly found in deep channels in the mid-river region during mid-summer (Hoff et al. 1998 and Pekovitch 1979 as cited in Bain 1997). After spawning, adults disperse quickly down river into their summer range. The broad summer range occupied by adult shortnose sturgeon extends from just south of Catskill, downriver to the Palisades area near the border of New York and New Jersey. Similar to non-spawning adults, most juveniles occupy the broad region of Haverstraw Bay by late fall and early winter (Dovel et al. 1992). Migrations from the summer foraging areas to the overwintering grounds are triggered when water temperatures fall below approximately 46 °F (8 °C), which typically occurs in late November (NMFS 1998). Juveniles are distributed throughout the mid-river region during the summer and move back into the Haverstraw Bay region during the late fall.

From late fall to early spring, adult shortnose sturgeon concentrate in a few overwintering areas. Reproductive activity the following spring determines overwintering behavior. The largest overwintering area is just south of Kingston, near Esopus Meadows (Dovel et al. 1992). The fish overwintering at Esopus Meadows are mainly spawning adults. Captures of shortnose sturgeon during the fall and winter from Saugerties to Hyde Park (greater Kingston reach), indicate that additional smaller overwintering areas might be present (Geoghegan et al. 1992). An overwintering site in the Croton-Haverstraw Bay area has also been confirmed (Geoghegan et al. 1992, Dovel et al. 1992). Fish overwintering in areas below Esopus Meadows are mainly thought to be pre-spawning adults. Typically, movements during overwintering periods are localized and fairly sedentary. The shortnose sturgeon prefers deep channel habitats during the winter season.

The temperature preference for shortnose sturgeon is not known, but shortnose sturgeon have been found in waters with temperatures as low as 35.6 to 37.4 °F (2 to 3 °C) and as high as 93.2 °F (34 °C) (Dadswell et al. 1984). Water temperatures above 82.4 °F (28 °C) are thought to adversely affect shortnose sturgeon. Shortnose sturgeon are known to occur at depths of up to 98 feet (30 meters) but are generally found in waters less than 66 feet (20 meters) (Dadswell et al. 1984). Adults occur in both freshwater and upper tidal saline areas all year. Juveniles (age 3–10 years) occur at the saltwater/freshwater interface (i.e., salt front) (Dovel et al. 1992).

In northern rivers (e.g., the Hudson River), the shortnose sturgeon feeds in fresh water during summer and over sand-mud bottoms in the lower estuary during fall, winter, and spring (NMFS 1998). Shortnose sturgeons are bottom feeders; their mouths are designed to suck up prey from the river bottom. Juveniles eat available benthic crustaceans and insects. Adults in freshwater feed on mollusks, crustaceans, and insect larvae depending on availability, and, in estuaries, their primary foods are polychaete worms, crustaceans, and mollusks (NatureServe 2013).

Atlantic Sturgeon. Although as a species the Atlantic sturgeon is not listed as threatened or endangered, there are five DPSs that are listed. Individuals from any of these five DPSs could occur in the ROI in the Hudson River. Based on genetic sampling of Atlantic sturgeon captured within the Hudson River, three are likely to occur in the Hudson River (ranked largest to smallest): endangered New York Bight DPS, threatened Gulf of Maine DPS, and endangered Chesapeake Bay DPS (NMFS 2013a, 77 *Federal Register* 5880–5892). There is no critical habitat designated for any DPS of Atlantic sturgeon.

Based on genetic sampling, the majority of Atlantic sturgeon are likely of the New York Bight DPS. In the New York Bight DPS, the two known spawning populations are the Hudson River and Delaware River populations. The existing spawning population in the Hudson River is estimated to have 870 adults spawning each year (600 males and 270 females), and there is no indication that the population is increasing (77 *Federal Register* 5880–5892). Atlantic sturgeon are long-lived (approximately 60 years), late-maturing, estuarine-dependent, anadromous fish (i.e., adults spawn in fresh water in the spring and early summer and migrate into estuarine and marine waters where they spend most of their lives). In the Hudson River, the Atlantic sturgeon matures at 11 to 21 years (ASSRT 2007). Males spawn approximately every 1 to 5 years and females every 2 to 5 years.

Spawning generally occurs between May and July in the Hudson River (Bain 1997, Bain et al. 2000), between the salt front (where the salt water from the estuary meets the fresh water of the river) and the fall line of the river, when and where optimal flows are 18 to 30 inches per second (46 to 76 cm per second) and depths are 10 to 89 feet (3 to 27 meters) (Greene et al. 2009). While spawning locations of Atlantic sturgeon within the Hudson River are poorly delineated, the majority of spawning occurred between Haverstraw Bay to just north of Coxsackie (Dovel et al. 1992, NMFS and USFWS 1998). However, it has been suggested that these results might be questionable because the saltwater wedge can extend to Newburgh Bay, which is north of Haverstraw Bay and Atlantic sturgeon eggs cannot tolerate high salinity; thus it is more likely that sturgeon spawn above the salt wedge, and not in brackish waters. Ovulating sturgeon have been found just south of Kingston (Van Eenennaam et al. 1996). Sonic-tagging data supported by the Atlantic States Marine Fisheries Commission (ASMFC) revealed three aggregations: (1) near Norrie Point in the spring, (2) in summer in upper Newburgh Bay, and (3) in summer in the Highlands from the Bear Mountain Bridge (ASMFC 2008).

Eggs are deposited on hard-bottom substrate (e.g., cobble, coarse sand, and bedrock) (Greene et al. 2009). Larvae are expected to occur from June through August in the vicinity of the spawning area (Bain et al. 2000). After hatching, larval fish move downstream at night and seek refuge during the day. As larval fish make their way downstream, they grow and become more tolerant of brackish and saline waters, and eventually reside entirely in estuarine waters (for 2 to 6 years) until they reach sub-adulthood and move into the open ocean (Bain 1997). Locations of sonic-tagged juvenile sturgeons revealed that individuals are found most often in dynamic mud habitat (ASMFC 2008). When juveniles begin to emigrate they travel widely along the Atlantic Coast and its estuaries.

Juvenile and adult Atlantic sturgeon frequently congregate in upper estuary habitats around the salt front, and might travel upstream and downstream throughout the summer and fall, and during late winter and spring spawning periods. Sonic-tagged spawning adults were detected in the river as early as April and as late as October (ASMFC 2008). It has also been reported that post-spawn adult sturgeon and older juveniles congregate in deepwater habitat in the Hudson River during the summer (Bain et al. 2000).

After emigration from the natal estuary, sub-adults and adults travel within the marine environment, typically in waters less than 164 feet (50 meters) in depth, using coastal bays, sounds, and ocean waters.

Satellite-tagged adult sturgeon from the Hudson River concentrate in the southern part of the Mid-Atlantic Bight at depths greater than 66 feet (20 meters) during winter and spring, and in the northern portion of the Mid-Atlantic Bight at depths less than 66 feet (20 meters) in summer and fall (Erickson et al. 2011). Atlantic sturgeon adults and sub-adults that are not spawning live in coastal and estuarine conditions, generally in shallow water (33 to 164 feet [10 to 50 meters]) in nearshore areas dominated by gravel and sand (Greene et al. 2009).

Spawning migrations occur during April through May in the mid-Atlantic. Male sturgeons begin upstream spawning migrations when waters reach approximately 43 °F (6 °C), and remain on the spawning grounds throughout the spawning season (Greene et al. 2009). Females begin spawning migrations when temperatures are closer to 54 to 55 °F (12 to 13 °C), make rapid spawning migrations upstream, and quickly depart following spawning (Greene et al. 2009).

Atlantic sturgeons are bottom-feeders that suck food into their mouths. Diets of adult and migrant sub-adult Atlantic sturgeon include mollusks, gastropods, amphipods, annelids, decapods, isopods, and fish such as sand lance (ASSRT 2007). Juvenile Atlantic sturgeon feed on aquatic insects, insect larvae, and other invertebrates (ASSRT 2007).

Marine Mammals. Five federally listed whale species could be found in the Hudson River estuary, including the North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeagliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). Under the ESA, all whale species fall under the jurisdiction of NMFS. Historic unconfirmed records of large whales up the Hudson River have been reported as far north as Troy (Kiviat and Hartwig 1994). However, large whales are uncommon in the Hudson River; individual large whales could be found occasionally at the river mouth. Typically, large whales, including the ESA-listed species, occur offshore in the New York Bight (i.e., the slight indentation in the shoreline from the New Jersey coast to Long Island). The USFWS-managed West Indian manatee (*Trichechus manatus*) could also make a rare appearance. Wide-ranging movements have been documented for some individual manatees. One manatee was sighted in various waters of the northeastern United States during July and August 2006. This individual traveled up the Hudson River to the Harlem River and was also sighted off Cape Cod, Massachusetts, and in Bristol Harbor, Rhode Island (Hamilton and Puckett 2006). It is unlikely that ESA-listed marine mammal species would occur in the Hudson River Segment and there are no designated critical habitat areas for marine mammals in or near the Hudson River; therefore, they are not discussed further in this EIS.

Sea Turtles. Four ESA-listed sea turtle species occur seasonally (June through mid-November) in the offshore waters of New York Bight: leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), and green (*Chelonia mydas*) (CHPEI 2012x). There are limited upriver sightings of sea turtles (NMFS 2011a) and no designated critical habitat areas for sea turtles in or near the Hudson River; therefore, these species are unlikely to occur in the Hudson River Segment and are not discussed further in this EIS.

State-Listed Species. The green, leatherback, and Kemp's ridley sea turtles are state-listed as endangered, while the loggerhead sea turtle is state-listed as threatened. The North Atlantic right whale, humpback whale, fin whale, sei whale, and sperm whale are all state-listed as endangered. As noted above under *Federally Listed Species*, sea turtles and large whales are not expected in the ROI in the Hudson River and are not discussed further in this EIS.

The shortnose sturgeon is state-listed as endangered, and its occurrence in the Hudson River Segment is discussed under *Federally Listed Species*.

Non-threatened/Non-endangered Marine Mammals. All marine mammals in U.S. waters are protected by the MMPA. Some marine mammal species are afforded additional protection due to their listed status under the ESA. The U.S. Department of Commerce, through NMFS, is charged with protecting whales, dolphins, porpoises, seals, and sea lions. The only marine mammal species managed by the USFWS considered for the Hudson River Segment ROI is the West Indian manatee; however, this species is not expected in the Hudson River. Marine mammals extensively use the offshore waters of the New York Bight, and there are occasional records of whales, dolphins, and porpoises in the tidal Hudson River, as far north as Troy (Kiviat and Hartwig 1994) (see whale discussion under *Federally Listed Species*). Marine mammals have the greatest potential to occur in the New York City Metropolitan Area Segment, and as such, are discussed in greater detail in **Section 3.4.5**. The Hudson River does not contain any marine mammal concentration areas or seal haul-out areas. Apart from potential rare occurrences, non-endangered/non-threatened marine mammals are not expected in the Hudson River and are not discussed further in this EIS.

3.3.6 Terrestrial Habitats and Species

Because some terrestrial species (e.g., birds and bats) use aquatic environments, the terrestrial habitat ROI for aquatic portions of the Hudson River Segment is the Hudson River from Catskill to Spuyten Duyvil. The ROI for terrestrial portions of the segment between MPs 295 and 303 is 100 feet (30 meters) on either side of the centerline of the transmission line. Habitat communities within 0.25 miles (0.4 km) of the transmission line centerline are also described to provide context for species that could range from these habitats into the ROI. The issues analyzed in this section, applicable species, and the definition of the ROI are discussed further in **Sections 3.1.6** and **3.2.6**.

Vegetation and Habitat. Upland habitat types within and along the terrestrial section of the proposed CHPE Project within the Hudson River Segment, from Stony Point through Clarkstown, contain urban areas, successional northern hardwoods, old fields, shrublands, and reverting farmland. It could also include red maple-black gum swamp, chestnut-oak forest, Appalachian oak hickory forest, and pitch pine-oak heath rocky summit (NYSDEC 2012o). The majority of the terrestrial habitat within the segment is disturbed due to its location along existing ROWs.

Ecological communities and land cover types that have been identified to date in the terrestrial portions of the Hudson River Segment are presented in **Table 3.3.6-1**. Similar to **Table 3.2.6-1**, the data presented in **Table 3.3.6-1** do not include the entire terrestrial construction corridor, but rather a subset of the full construction corridor (i.e., survey corridor). The survey corridor represents approximately 20 of the 46 acres (19 hectares) (43 percent) in the total terrestrial portion of the Hudson River Segment ROI. While the survey corridor does not include the whole ROI, the data can be considered representative and used to characterize the habitats and species in the ROI. Upland habitats in the ROI include shrublands; hardwood and mixed pine forests; road, railroad, and utility ROWs and shoulders; urban and suburban residential lands; and other disturbed or human-dominated environments. Because the transmission line would be installed underground along the existing CSX railroad or roadway ROWs, forested habitat along the ROI most commonly exists as successional or shrubby forest edge. The proposed CHPE Project route would cross several wetlands, streams, and rivers; as such, some riparian habitat is expected in the project corridor. The land cover types within 50 feet (15 meters) of the transmission line centerline, and within the deviation areas, are presented in Land Use Table F.2-1 in **Appendix F**. The transmission line ROI would overlap one significant natural community, an oak-tulip tree forest on Hook Mountain at MP 302, and be within 0.25 miles (0.4 km) of several significant natural communities that potentially host terrestrial species that could range into the ROI of the terrestrial portions of the Hudson River Segment. Such natural communities include freshwater tidal swamp, freshwater intertidal mudflats, freshwater tidal marsh, freshwater tidal creek, floodplain forest, calcareous cliff community, chestnut oak forest, and oak-tulip tree forest. The wetland communities (i.e., freshwater tidal swamp, freshwater intertidal mudflats, freshwater tidal marsh, freshwater tidal creek, floodplain forest) and WMAs are described in **Section 3.3.8**.

Table 3.3.6-1. Habitats and Land Cover Types Occurring in the Survey Corridor of the Terrestrial Portions of the Hudson River Segment

Habitat/Land Cover Type	Acreage of Survey Corridor	Percent of Survey Corridor
Brushy Cleared Land	6.4	31.8
Herbicide-Sprayed Roadside/Pathway	0.5	2.6
Mowed Lawn	0.1	0.5
Mowed Lawn with Trees	0.6	2.8
Mowed Roadside Pathway	0.7	3.6
Open Water	0.3	1.3
Paved Road/Path	1.9	9.7
Railroad	2.4	12.0
Roadcut Cliff/Slope	< 0.1	0.3
Successional Northern Hardwoods	6.3	31.3
Successional Shrubland	0.6	2.9
Unpaved Road/Path	0.2	0.9
Wetland	< 0.1	0.3

Source: CHPEI 2012aaa

Dominant trees of a chestnut-oak forest are typically chestnut oak and red oak. Characteristic shrubs include black huckleberry, mountain laurel (*Kalmia latifolia*), and blueberry. Herbaceous plants include Pennsylvania sedge (*Carex pensylvanica*), wild sarsaparilla (*Aralia nudicaulis*), wintergreen (*Gaultheria procumbens*), and the moss *Leucobryum glaucum* (NYNHP 2005b).

The dominant trees of an oak-tulip tree forest include a mixture of oaks, tulip tree (*Liriodendron tulipifera*), American beech, black birch (*Betula lenta*), and red maple. A subcanopy of flowering dogwood (*Cornus florida*) is also typically present. Common species in the understory include witch hazel (*Hamamelis virginiana*), sassafras (*Sassafras albidum*), and lowbush blueberries. Characteristic plants of the herbaceous layer include New York fern (*Thelypteris novaboracenis*), white wood aster (*Eurybia divaricata*), and Solomon’s plume (*Maianthemum racemosum*). An oak-tulip tree forest is found on eastern facing slopes of Hook Mountain State Park in Haverstraw (NYNHP 2005b).

The transmission line would be routed under Hook Mountain and Rockland Lake State Parks, which are considered a part of the Rockland State Park Complex. The dominant natural communities of the Rockland State Park Complex are Appalachian oak-hickory forest, chestnut oak forest, and successional southern hardwoods. At the highest elevations on Hook Mountain are small patches of red cedar rocky summit and rocky summit grassland communities. There are also rocky balds and cliff communities on Hook Mountain. A number of rare plants have been known to occur on Hook Mountain due to its unique geology; however, these populations have declined significantly in the past decade primarily due to deer browse. Invasive plant species such as black swallow-wort (*Cynanchum louiseae*) are threatening ecological systems at the park (RPC 2012).

Wildlife. Wildlife present in the terrestrial portions of the Hudson River Segment is limited by the amount of available habitat. Amphibian species that could occur in the terrestrial portions of the Hudson River Segment would be similar to those in the Overland Segment (see **Section 3.2.6**) (NYSDEC 2012o). Terrestrial species that could occur in the aquatic portions of the ROI are bird and bat species that could fly over the Hudson River. A wide variety of songbirds, hawks, and owls can be found along the Hudson River, including various species of passerines, raptors, wading birds, and game birds that use upland, wetland, or riparian habitats. Some of the species of interest include American woodcock (*Scolopax minor*), northern goshawk (*Accipiter gentilis*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), osprey (*Pandion haliaetus*), great black-backed gull (*Larus marinus*), brown thrasher, prairie warbler, and blue winged warbler (NYSDEC 2012h).

The wildlife at the Rockland State Park Complex is also typical of the region, with large populations of white-tailed deer and Canada geese (*Branta Canadensis*). No populations of rare animal species are known to occur in the Rockland State Park Complex; however, peregrine falcons (*Branta canadensis*) historically nested on Hook Mountain and at Nyack Beach State Park (RPC 2012, Rockland Audubon Society 2012).

3.3.7 Terrestrial Protected and Sensitive Species

The issues analyzed in this section and the definition of the ROI for terrestrial protected and sensitive species are discussed in **Sections 3.1.7** and **3.2.7**.

Federally Listed Species

Small whorled pogonia, northern wild monkshood (*Aconitum noveboracense*), bog turtle, New England cottontail, Indiana bat, and northern long-eared bat could occur in Greene, Dutchess, Ulster, Orange, Putnam, or Rockland counties within the Hudson River Segment (USFWS 2012c). Of these species, only Indiana bat and northern long-eared bat would be likely to occur within the terrestrial portion of the Hudson River Segment in Rockland County, as described in the following paragraphs. There is no critical habitat designated within the ROI in the Hudson River Segment.

Small whorled pogonia. Small whorled pogonia information is provided in **Section 3.2.7**. In the Hudson River Segment, the small whorled pogonia could occur in Orange County. However, there is no information to suggest that the species occurs within the proposed CHPE Project area in the Hudson River Segment. The Schunnemunk Mountain State Park is more than 3 miles from the proposed CHPE Project ROI in Orange County, and this portion of the ROI is entirely aquatic and does not contain suitable habitat for the small whorled pogonia. Since the small whorled pogonia does not occur in the proposed CHPE Project area, this species is not discussed further in this EIS.

Northern wild monkshood. Northern wild monkshood is an herbaceous perennial that inhabits cool sites such as stream banks or shaded cliff sides. The northern wild monkshood was listed as federally threatened in 1978 (43 *Federal Register* 17910–17916) and is federally listed in Ulster County. The portion of the Hudson River Segment in Ulster County is entirely aquatic. As such, suitable habitat for this species does not exist in the proposed CHPE Project area. Since the northern wild monkshood does not occur along the proposed CHPE Project route, this species is not discussed further in this EIS.

Bog turtle. Bog turtle information is provided in **Section 3.2.7**. In the Hudson River Segment, the bog turtle could occur in Rockland County. However, according to data from the NYNHP, no historic records exist of bog turtles occurring within 0.25 miles (0.4 km) of the Hudson River Segment ROI. This species is also listed in Dutchess, Orange, Putnam, Ulster, and Westchester counties; however, it is highly unlikely that the bog turtle would be present along the ROI within these counties because the transmission line in this portion of the segment would entirely be in the Hudson River.

Bald eagle. Bald eagle information is provided in **Section 3.1.7**. An aerial survey of the lower Hudson River in January 2010 recorded the second highest numbers of eagles along the river and the highest count since 2001. Forty-three eagles were spotted, and when combined with non-overlapping ground counts conducted at the same time, the daily tally jumped to 79 total eagles (41 adults, 38 immatures).

However, a more significant indicator of Hudson River winter bald eagle populations could be the number of eagles counted during simultaneous evening roost counts within a much smaller area of the lower Hudson River, centered within a 20- to 25-mile (32- to 40-km) stretch of river between Fishkill (north of Stony Point) and Croton Point in the southern portion of Haverstraw Bay. The Hudson River breeding bald eagle population consisted of 27 occupied nests, which yielded approximately 1.1 young for each pair attempting to breed. The total number of young fledged was 30 (NYSDEC 2010j).

Based on the NYNHP database, bald eagle breeding areas are located within 0.25 miles (0.4 km) of the ROI in Dutchess and Ulster counties. Nonbreeding areas are located within 0.25 miles (0.4 km) of the ROI in Putnam, Dutchess, Orange, Ulster, Rockland, and Westchester counties (CHPEI 2012x).

Indiana bat. Indiana bat information is provided in **Section 3.1.7**. In the Hudson River Segment, the Indiana bat could occur in Ulster County during both the summer and winter due to the presence of the known hibernaculum in Ulster County. The Indiana bat could occur in Greene, Dutchess, Orange, Putnam, and Westchester counties during the summer due to the presence of the nearby Ulster County hibernaculum (CHPEI 2012x). The Ulster County hibernaculum is Priority 1 (site that is essential to long-term conservation of the species and that contains a population of greater than or equal to 10,000 bats) (USFWS 2007a). The Indiana bat could occur in Rockland County in the summer. In the immediate vicinity of the road and railroad ROWs, much of the habitat consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts; however, a few areas do have large shagbark hickories or other large trees that could support summer bat colonies (NYNHP 2010, CHPEI 2012i).

New England cottontail. New England cottontail information is provided in **Section 3.2.7**. In the Hudson River Segment, the New England cottontail could occur in Dutchess, Putnam, and Westchester counties. However, the proposed CHPE Project in these counties is completely aquatic and does not contain suitable habitat to support this species. Therefore, this species is not discussed further in this EIS.

Northern long-eared bat. It is assumed that northern long-eared bats would occur in similar or the same areas indicated for the Indiana bat within the Hudson River Segment. Northern long-eared bat information is also provided in **Sections 3.1.7** and **3.2.7**.

State-Listed Species

In addition to their Federal listing, the small whorled pogonia, bog turtle, bald eagle, and Indiana bat are also state-listed. These species are discussed in detail in the preceding paragraphs. State-listed species identified along the proposed CHPE Project route are described below. A summary of the other state-listed species that occur within 0.25 miles (0.4 km) of the Hudson River Segment are presented in Table H.2-4 in **Appendix H** (CHPEI 2012x). With the exception of raptors, which could occur over the Hudson River, only terrestrial species from Greene and Rockland counties are considered because the proposed CHPE Project would be completely aquatic in Ulster, Dutchess, Orange, and Putnam counties. Table H.2-4 in **Appendix H** lists the state-listed species potentially occurring in the Hudson River Segment.

Catfoot. Catfoot (*Pseudognaphalium helleri* ssp. *micradenium*) is a state-listed endangered herb with historic ranges in Rockland County that is potentially extirpated from New York. The plant was potentially identified in an old, partially overgrown pasture between approximate MPs 298 and 299 (NYNHP 2013c).

Wild potato-vine. Wild potato-vine is a state-endangered vine with a scattered range in New York, although it is mostly extirpated from the state. Documented habitats for this species in New York have included old field and road margins, hedgerows, and quarry edges that are dominated by hedges and vines

(NYNHP 2013c). The ROI crosses areas mapped by the NYNHP for occurrences of wild potato vine between approximate MPs 295 and 296.

Migratory Birds

Most of the birds that occur in and around the Hudson River Segment are covered by the MBTA and can be characterized by four categories: swimming birds, wading birds, perching birds, and wide-ranging river birds. Swimming birds include geese and swans, surface-feeding ducks, and diving ducks. Examples include Canada goose (*Branta canadensis*), mute swan (*Cynus olor*), mallard (*Anas platyrhynchos*), greater scaup (*Aythya marila*), and double-crested cormorant (*Phalacrocorax auritus*). Wading birds include shorebirds, herons, egrets, and bitterns. Examples of these include killdeer (*Charadrius vociferous*), spotted sandpiper (*Actitis macularia*), snowy egret (*Egretta thula*), and least bittern (*Ixobrychus exilis*). Perching birds include thrushes, blackbirds, wrens, finches, sparrows, flycatchers, swallows, and jays. Examples include marsh wren (*Cistothorus palustris*), red-winged blackbird (*Aaegelaius phoeniceus*), swamp sparrow (*Melospiza georgiana*), and yellow warbler (*Dendroica petechia*). Wide-ranging river birds include gulls, kingfishers, and raptors. Examples include herring gull (*Larus argentatus*), belated kingfisher (*Ceryle alcyon*), bald eagle (*Haliaeetus leucocephalus*), and osprey (*Pandion haliaetus*) (Stanne et al. 1996).

3.3.8 Wetlands

The ROI for wetlands in the Hudson River Segment is any wetlands directly crossed by the transmission line and wetlands within 100 feet (30 meters) of either side of the transmission line centerline. The definition of this resource, including the ROI, is provided in **Section 3.1.8**.

Wetland Physical Characteristics and Functions. The Hudson River Segment is nearly entirely open water (between MPs 228 and 295 and between MPs 303 and 324), with the exception of an approximately 8-mile (13-km) terrestrial portion between MPs 295 and 303. Within the terrestrial portions of the Hudson River Segment, 0.8 acres (0.3 hectares) of PEM wetlands were identified within the ROI (see **Appendix A**), along with one NYSDEC freshwater wetland, a Class I wetland (CHPEI 2012a, CHPEI 2012ee). The proposed transmission line route crosses "adjacent areas" to these freshwater wetlands and subtidal open water within the Hudson River (CHPEI 2012ee). Adjacent areas for NYSDEC freshwater wetlands compose 3.5 acres (1.4 hectares) in the ROI for the Hudson River Segment. NYSDEC tidal wetlands associated with the Hudson River occur at approximate MPs 317 and 319. Tidal wetlands in the Hudson River Segment ROI include the littoral zone of the river itself, and compose a total of approximately 434.7 acres (175.9 hectares).

In general, tidal wetlands in the proposed CHPE Project area occur along the Hudson River south of landfall in Greene County (MP 228). Tidal wetlands along the Hudson River north of Poughkeepsie (MP 260) are primarily fresh water despite the presence of a tidal influence. Further south, tidal wetlands are brackish, with the plant community changing in response to the increasingly persistent water salinity. Conditions are dependent upon the location of the saltwater-freshwater interface, which fluctuates based on the variable flow volume of the Hudson River. Generally, tidal wetlands located north of the Tappan Zee Bridge (MP 310) are brackish and freshwater, and those located from the Tappan Zee Bridge to New York Bay are tidal estuarine (NYSDEC 2010d).

The underwater transmission line in the Hudson River between Clarkstown and the Bronx (MPs 303 to 324) would occur within 150 feet (46 meters) of areas mapped as freshwater broad-leaved vegetation, coastal shoals, bars, and mudflats. Other wetland areas have been noted in the Hudson River, including the Woodlawn Pine Barrens-Wetlands Complex, the Black Creek Marsh/Valley Swamp (also a WMA), the Iona Island Marsh, and the Premium River-Pine Brook Wetlands complex. However, none of these areas are within the ROI for the proposed CHPE Project.

Wetland Habitat and Species. The wetlands delineated within the ROI for the Hudson River Segment, including NYSDEC freshwater wetlands, likely support least bittern, red-winged blackbird, Virginia rail, song sparrow (*Melospiza melodia*), savannah sparrow (*Passerculus sandwichensis*), and clapper rail (*Rallus longirostris*). Forest edges near clearings, agricultural areas, ROWs, and wetlands typically support species such as white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), Eastern pipistrelle (*Pipistrellus subflavus*), long-tailed shrew (*Sorex dispar*), red bat (*Lasiurus borealis*), Eastern cottontail (*Sylvilagus floridanus*), gray treefrog (*Hyla versicolor*), and milk snake (*Lampropeltis triangulum*) (CHPEI 2012ee).

Tidal wetlands are also present within the Hudson River Segment and are associated with the littoral zone of the Hudson River. Tidal wetlands are typically dominated by marine grasses such as cordgrass, spike grass (*Distichlis spicata*), or saltmeadow hay (*Spartina patens*). Shrubs and trees could also be present in tidal wetlands, particularly in transitional zones or in areas that are only periodically inundated (CHPEI 2012b).

Tidal wetlands provide a rich habitat for many species of marine invertebrates, including fiddler crabs (*Uca pugnax* and *U. pugilator*), grass shrimp (*Palaemonetes* spp.), blue mussel (*Mytilus edulis*), razor clam (*Ensis directus*), hardshell clam (*Mercenaria mercenaria*), Eastern oyster (*Crassostrea virginica*), blue crab (*Callinectes sapidus*), mud crabs (*Panopeus herbstii and Dyspanopeus sayi*), horseshoe crab (*Limulus polyphemus*), softshell clam (*Mya arenaria*), and hard clam (*Mercenaria mercenaria*) (CHPEI 2012b). As with freshwater wetlands, tidal wetlands are important nurseries for fish stock, and they serve as wintering and nesting habitat for many species of shorebirds. The abundance of marine fish and invertebrates provides an important forage habitat for many species of piscivorous birds, including the great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), doublecrested cormorant (*Phalacrocorax auritus*), belted kingfisher (*Megaceryle alcyon*), herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), and black-crowned night heron (*Nycticorax nycticorax*). A variety of fish species are also commonly encountered in tidal wetlands, including piscivorous species such as the bluefish (*Pomatomus saltatrix*) and striped bass (CHPEI 2012b).

The Hudson River National Estuarine Research Reserve is composed of four tidal wetland sites along a 100-mile (161-km)-long stretch of the Lower Hudson River (CHPEI 2012b). These areas provide habitat for a host of species and serve as an important spawning and nursery ground for anadromous and freshwater fish (HRNERR 2009, CHPEI 2012b). The proposed CHPE Project route is within 1 mile (1.6 km) of but would not traverse these wetland sites.

In addition to NYSDEC freshwater and tidal wetlands, woodland pools are also present in the Hudson River Valley. Woodland pools are small, temporary wetlands found in small depressions and floodplains that typically fill from precipitation and groundwater, and are not connected to permanent surface waters (NYSDEC 2012w). These areas provide important breeding areas for amphibians and invertebrates such as mole salamanders, wood frogs (*Rana sylvatica*), and fairy shrimp (*Anostracan* spp.). In addition, the following species could use woodland pool habitat: spotted turtle (*Clemmys guttata*), spring peeper, American toad (*Bufo americanus*), four-toed salamander (*Hemidactylium scutatum*), Blanding's turtle (*Emydoidea blandingii*), spadefoot toad (*Scaphiopus holbrookii*), wood duck, and red-spotted newt (*Notophthalmus viridescens*) (NYSDEC 2012x). These wetland areas are not protected by Federal or state regulations but are often managed through local initiatives, and could be present within the ROI in the terrestrial portions of the segment.

The proposed underwater transmission line would intersect four SCFWHs in the Hudson River Segment: Esopus Estuary, Kingston-Poughkeepsie Deepwater Habitat, Hudson Highlands, and Lower Hudson Reach (CHPEI 2012ee, NYSDOS 2013). Of these SCFWHs, only the Esopus Estuary SCFWH contains wetlands; however, these wetlands would not be intersected by the proposed CHPE Project, as it would cross the SCFWH in deep water where no wetlands are located. Esopus Estuary and associated wetlands are discussed in the following paragraphs; the other SCFWHs within the proposed CHPE Project ROI do not have wetlands and are discussed in **Section 3.3.4**.

The Esopus Estuary contains one of the primary freshwater tributaries of the Hudson River, which was designated an SCFWH in 1987. The estuary is 700 acres (285 hectares), including freshwater tidal wetlands and littoral zone areas, and a deepwater section of the Hudson River. The tidal marshes and shallow water of the Esopus Estuary provide resting and feeding areas for migrating waterfowl, including black duck and mallard. As a result, this area is frequently used for hunting. Additionally, the extensive and varied freshwater tidal wetland at the mouth of adjacent Esopus Creek is important to many species of waterfowl throughout the year. Osprey (listed as threatened in New York State) are known to congregate at the mouth of the creek during spring migration (mid-April through May) and forage in the shallow waters of the area. Several rare plant species, such as grass pink (*Calopogon tuberosus*), pitcher plant (*Sarracenia* spp. *Jonesi*), and rose pogonia (*Pogonia ophioglossoides*), have also been reported in the Esopus Estuary area (USFWS 1997, NYSDEC 2006a).

3.3.9 Geology and Soils

Physiography and Topography. South of the Valley and Ridge Province is the Piedmont Lowlands Province, which lies along the western bank of the Hudson River. This region is characterized as a maturely dissected, low-relief plain that slopes gently towards the coast. It is rolling to hilly terrain, with ridges that reach up to 1,200 feet (366 meters) above MSL. A broad basin forms a lowland plain that crosses the province from southwest to northeast. Elevations range from 300 to 1,200 feet (91 to 366 meters) above MSL (USGS 2003b, USFS 2010).

Geology. Bedrock in the Hudson River Valley includes biotite-quartz-feldspar paragneiss and hornblend granite and granite gneiss; the metasedimentary Austin Glen formation; and the Schenectady Formation composed of metamorphosed sedimentary rock (CHPEI 2012ee).

The Hudson River flows through shales and carbonate rocks from the Lower and Middle Paleozoic Era, and surficial Quaternary period alluvial and glacial deposits. South of Newburgh, the Hudson River flows through the crystalline rocks of the Highlands Province. Rocks beneath the Great Valley are gently to steeply dipping sedimentary rocks that locally have northward-trending faults (USGS 2003b).

Sediments. In the northern portion of the Hudson River traversed by the proposed CHPE Project route, the primary sediments on the riverbed are sand. Downstream of Kingston, particle size increases, and a mixture of bedrock, cobble, and sand predominates, and areas of boulders, bedrock, and cobbles become more frequent (CHPEI 2012p). The proposed CHPE Project route traverses along exposed bedrock at MPs 283.4 and 286.7 (CHPEI 2012m). Portions of the route in this segment are adjacent to the dredged navigation channel in the Hudson River (CHPEI 2012o).

Sediments in the Hudson River are known to be contaminated with PCBs, PAHs, pesticides, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, and silver. Most of these contaminants are below remedial action levels, though in some localities sediment contamination exceeds remedial action levels (CHPEI 2012i). For a more detailed discussion of sediment contamination, please refer to **Section 3.3.15**.

Soils. Soils within the terrestrial portion of the Hudson River Segment are primarily fine sandy loams, silt loams, loamy sands, and urban land, with low to moderate slopes. This portion is also moderately developed, as indicated by the amount of area classified as urban land. Some soils within this segment are frequently flooded, and hydric soils are present. For a detailed description of soils present in this segment, see **Appendix I.2**.

Prime Farmland. According to NRCS data, approximately 19 acres (8 hectares) of land identified as having prime farmland soils are within the ROI (NRCS 2012a) in this segment. However, most of the terrestrial portion of the transmission line corridor itself is within railroad and road ROWs; therefore, these lands are disturbed and not currently available for agriculture.

Seismicity. The Hudson River flows across the Ramapo Fault (at approximate MP 293), a system of northeast striking, southeast dipping faults, which are mapped from southeastern New York to eastern Pennsylvania. The fault is active, and its potential to produce a destructive seismic event is undetermined (Earth Institute 2004). Additionally, the proposed CHPE Project route crosses near the recently discovered Stamford-Peekskill fault line where it intersects with the Ramapo Fault (Earth Institute 2008). The seismic hazard rating for the Hudson River Segment ranges from approximately 8 to 12 percent g, which represents a low potential for damage due to a seismic event. Along with the Overland Segment, the Hudson River Segment has one of the lowest seismic hazard ratings along the proposed CHPE Project route, and has a low risk of liquefaction (USGS 2012a, USGS 2013).

3.3.10 Cultural Resources

Background information on the Section 106 process and the APE of the proposed CHPE Project, and existing cultural resources investigations conducted to date for the proposed CHPE Project are discussed in **Sections 3.1.10** and **3.2.10**.

The independent GIS analysis based on site data provided by the Applicant indicates that eight terrestrial archaeological sites, six underwater sites, seven architectural properties that are listed or eligible for listing in the NRHP, and one historic cemetery are located within the APE of the Hudson River Segment. **Table 3.3.10-1** provides a summary of these known cultural resources.

Two of the architectural resources in the Hudson River Segment APE are more commonly known by the names of their associated state parks. The NRHP-listed Stony Point Battlefield park road is part of the Stony Point State Historic Park. The NRHP-listed Poughkeepsie Railroad Bridge is part of the Walkway over the Hudson State Historic Park.

The boundaries of six of the eight terrestrial sites extend into the Hudson River. The two other terrestrial sites, delineated in the 1920s, are very large areas. These sites would be reexamined to determine whether or not any cultural resources would be affected by the proposed CHPE Project in accordance with the terms of the CRMP developed for the CHPE Project or as directed under the terms of the PA. If cultural resources do extend into the APE, the sites would be evaluated to determine if they are eligible for listing in the NRHP. Of the six underwater sites, one is a confirmed shipwreck. The other five sites are bathymetric anomalies (unknown objects located along the bottom of a body of water as indicated by remote sensing instruments) that resemble known shipwrecks found elsewhere in the Hudson River. These sites would be evaluated to determine if they are in fact shipwrecks and, if so, their eligibility for listing in the NRHP. The seven known architectural properties located within the APE of the Hudson River Segment are already listed or eligible for listing in the NRHP and, therefore, do not require further evaluation.

The terrestrial portion of the Hudson River Segment has been screened but not formally surveyed for cultural resources. The portion that would bypass Haverstraw Bay would be formally surveyed for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. If any previously documented resources of undetermined NRHP eligibility or newly discovered cultural resources are discovered in the APE, they would be evaluated for NRHP eligibility.

Table 3.3.10-1. Known Cultural Resources in the APE of the Hudson River Segment

Site Type	Site Name and/or State and/or Project Site Number	Description
Terrestrial Archaeological Site	NYSM 3158, Site 494	Pre-contract traces of occupation identified in the 1920s
Terrestrial Archaeological Site	Stoneco (NYSM 526, Site 535)	Pre-contact site
Terrestrial Archaeological Site	Crow's Nest Mountain Shelter (NYSM 8097, Site 561)	Pre-contact rockshelter
Terrestrial Archaeological Site	Fisherman's Rock House (NYSM 545, Site 592)	No information
Terrestrial Archaeological Site	NYSM 7915, Site 597	Pre-contact camp site
Terrestrial Archaeological Site	Tompkins Cove (NYSM 7922, Site 619)	Pre-contact camp site
Terrestrial Archaeological Site	NYSM 4653 (Site 726)	Pre-contract traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 4631 (Site 728)	Pre-contract village, camp, shell midden identified in 1922
Underwater Site	HR 28	NYSDEC anthropogenic feature
Underwater Site	HR 29	Alpine M256 (NOAA Charts)
Underwater Site	HR 83	NYSDEC anthropogenic feature
Underwater Site	HR 180	NYSDEC anthropogenic feature, NYSDEC Phase I Shipwreck
Underwater Site	HR 197 (previously Site 278)	NYSDEC anthropogenic feature
Underwater Site	HR 339	NYSDEC
NRHP-listed Architectural Property	Hudson River Heritage District NHL (multiple OPRHP, NHL 69)	Historic district
NRHP-listed Architectural Property	Poughkeepsie Railroad Bridge (OPRHP 02740.000025, NRL 89)	Steel truss railroad bridge built 1876 to 1888; currently used as a pedestrian path
NRHP-listed Architectural Property	U.S. Military Academy NHL (multiple OPRHP, NHL 102)	Military academy established in 1802, includes archaeological sites
NRHP-listed Architectural Property	Bear Mountain Bridge and Toll House (OPRHP 08705.000034, NRL 112)	Steel suspension bridge built between 1923 and 1924
NRHP-listed Architectural Property	Stony Point Battlefield (OPRHP 08705.000031, NRL 115)	Park Road
NRHP-eligible Architectural Property	Mid-Hudson Bridge (OPRHP 02740.000791, NRE 253)	Highway bridge
NRHP-eligible Architectural Property	Tappan Zee Bridge (OPRHP 00950.000388, NRE 256)	Steel cantilever bridge built between 1952 and 1955

Site Type	Site Name and/or State and/or Project Site Number	Description
Historic Cemetery	Waldron Cemetery	Stony Point, Rockland County; entrance on south side of East Main Street, adjacent to railroad tracks

Sources: Glazer et al. 2010; McQuinn et al. 2010, 2012.

Preliminary research indicates that the APE within the 8-mile (13-km) terrestrial portion of the Hudson River Segment around Haverstraw Bay would intersect the Stony Point Battlefield Historic Site and could intersect Waldron Cemetery. Stony Point Battlefield is the location of the Battle of Stony Point, which was one of the last battles of the Revolutionary War, occurring in May 1779 (NYS OPRHP 2012c). Waldron Cemetery, which is located in Stony Point, dates to the late 18th and early 19th centuries (Interment.net 2012). The APE lies very close to standing gravestones at Waldron Cemetery and could intersect unmarked graves. The boundaries of Waldron Cemetery would be determined during the survey of this portion of the proposed CHPE Project in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA (see **Appendix T**). Waldron Cemetery is not recorded as an historic architectural property.

3.3.11 Visual Resources

As identified in **Section 3.1.11**, the ROI for visual resources in aquatic portions of the Hudson River Segment is 1 mile (1.6 km) from the transmission line route and for terrestrial portions the ROI is 0.5 miles (0.8 km).

Description of Resources and Viewscape. The Hudson River Segment of the proposed CHPE Project route would follow the Hudson River Valley through relatively sparsely populated areas before going through Poughkeepsie-Newburgh and into the greater New York City metropolitan area. The Catskill Mountains are west of the project route and the Berkshire Mountains of Massachusetts are east. Along the river, commercial and residential development is common, but much of the area retains a rural feel in the northern portion of this segment. The viewshed along this portion of the route is dominated by the Hudson River, rolling forested hills, and mountainous vistas (Hudson River Valley 2002). Once the route reaches the Poughkeepsie area and moves into the New York City metropolitan area, the area becomes gradually more developed until the environment is completely urbanized in New York City. The viewshed along this portion of the route varies greatly from location to location, but is dominated by urban landscapes, including buildings, shoreline facilities, parks, industry, and other development. This portion of the route contains NRHP-listed cultural resources, National Natural Landmarks, National Historic Sites, local parks, Palisades Park property, and state parks. No National Wildlife Refuges, National Scenic Byways, state game refuges, wild and scenic rivers, or New York Bond Act properties are found along this portion of the proposed CHPE Project route (NYSDOS 2004a, CHPEI 2012a, NPS 2012a, NYSDEC 2012m, USDOT-FHWA 2012a). The existing aesthetic resources found within the ROI for the Hudson River Segment are described in **Appendix K**. For a discussion of cultural resources found along the proposed CHPE Project route in the Hudson River Segment, please see **Section 3.3.10**.

The proposed CHPE Project route would be constructed through Stony Point Battlefield State Park near MP 296, Hook Mountain State Park near MP 301, and Rockland State Park near MP 304. Additionally, cooling stations would be constructed near MPs 296, two at 298, 299, and two at 302. The viewsheds near MP 296 and MP 298 consist of gentle topography covered in forest and the Hudson River. The cooling station proposed near MP 296 would be constructed adjacent to Stony Point Battlefield State Park. No aesthetic resources are found within 0.5 miles (0.8 km) of the cooling station proposed near MP

298. The viewshed south of MP 298 consists primarily of residential development and would be constructed within 0.5 miles (0.8 km) of Babe Ruth Field. The viewshed near MP 299 consists primarily of residential development and would be constructed near Bowline Point Town Park and High Tor State Park. The viewsheds near MP 302 consist of a mixture of forested area within nearby parks, the Hudson River, and nearby residential communities. The cooling stations proposed near these MPs would be constructed within 0.5 miles (0.8 km) of Haverstraw Beach State Park and Rockland Lake State Park.

Key Observation Points. KOPs were not established for the Hudson River Segment because the only aboveground facilities located in this segment would be the small cooling stations, an example cooling station KOP was provided in **Section 3.2.11**.

3.3.12 Infrastructure

Thirty-two commercial and known but unspecified infrastructure systems and line intersections with the proposed CHPE Project ROI (i.e., crossings) in the Hudson River Segment were identified at the following MPs: 228.4, 228.5, 230.0, 245.4, 246.0, 260.1, 261.2, 260.3, 265.4, 265.5, 266.2, 266.3, 271.0, 272.0, 280.9, 288.5, 292.7, 292.8, 293.0, 293.2, 309.1, 311.9, 313.8, 314.0, and 319.4; three crossings at 319.3; and four crossings at 319.5 (CHPEI 2013d). The following paragraphs describe additional crossings by utilities that could be identified with a particular type of infrastructure.

Electrical Systems. The Hudson River Segment is within the NYSBPS area. There are 26 identified underwater electrical power infrastructure crossings in the Hudson River that intersect the proposed CHPE Project ROI at approximate MPs 244, 244.2, 245.4, 245.6, 260.1, 261.2, 262.7, 269.3, 269.9, 270, 270.2, 271, 271.1, 271.2, 274.8 , 275, 275.9, 280, 291, 294.9, 305.2, and 305.9; and two crossings each at MPs 245.3 and 305.1 (CHPEI 2012w, CHPEI 2013d). There are many other minor instances of aboveground electrical infrastructure within the proposed CHPE Project terrestrial route, including a substantial aerial transmission line that parallels the proposed transmission line construction corridor for most of the railroad ROW through Haverstraw.

Water Supply Systems. Drinking water systems that have intakes along the Hudson River Segment include the Rhinebeck, Port Ewen, and Poughkeepsie drinking water intake systems; the Hyde Park Water District; and the Chelsea Emergency Pumping Station (CHPEI 2012dd). Two water line crossings were identified at MPs 270.3 and 295.2 (CHPEI 2013d).

The Town of Rhinebeck operates a drinking water intake on the eastern shore of the Hudson River. Chemical analysis showed the presence of petroleum compounds, PCB congeners (i.e., any single, unique well-defined chemical PCB compound), and heavy metals within the sediment in the vicinity of the intakes. The Port Ewen Water & Sewer District, a municipal department of the Town of Esopus, operates a drinking water intake on the western shore of the Hudson River in the Town of Esopus and serves as the primary source of drinking water for the town. Chemical analysis showed the presence of petroleum compounds, organochlorine pesticides, PCB congeners, and heavy metals within the sediment in the vicinity of the intakes. The Poughkeepsie Water Treatment Facility is located along the eastern shore of the Hudson River in the City of Poughkeepsie and the associated intakes serve as the primary source of drinking water for the town. Chemical analysis showed the presence of petroleum compounds, PCB congeners, and heavy metals within the sediment in the vicinity of the intakes (CHPEI 2012dd). The locations of the water supply intakes have not been identified to ensure the security of these systems.

Storm Water Management. The Hudson River Segment is within the Lower Hudson River Watershed. No utility-scale storm water management systems have been identified along the ROI of the terrestrial portions of the Hudson River Segment. One substantial storm water drainage pipe is present at approximate MP 296.6 where Tompkins Avenue crosses the proposed CHPE Project transmission line construction corridor. Smaller common storm water management features that are likely to be within or adjacent to the ROI include retention ponds, infiltration basins, swales, wet detention basins, ditches, and culverts. See **Sections 3.1.3** and **3.2.3** for general descriptions of the storm water management requirements of New York State.

Communications. Six underwater buried telephone cable crossings were identified and are at MPs 260.2, 309.2, 274.8, 275.1, 285.2, and 285.3 (CHPEI 2013d).

Natural Gas Systems. Fourteen substantial natural gas pipeline crossings have been identified along the Hudson River Segment ROI in the river at approximate MPs 259.8, 259.9, 260.0, 261.0, 261.1, 270.1, 271.3, 275.3, 275.5, 294.0, and 313.5; and three instances near MP 295 (CHPEI 2012w, CHPEI 2013d).

Sanitary Sewer and Wastewater Treatment. One substantial sewer line has been identified as crossing the proposed CHPE Project transmission line construction corridor in Cedar Pond Brook (approximate MP 297.3) between the Towns of Stony Point and Haverstraw.

Solid Waste Management. The closest municipal landfills to the Hudson River Segment are the Albany Rapp Road Sanitary and the Colonie Sanitary Landfills, with a collective remaining capacity of approximately 7,221,000 tons as of 2010 (NYSDEC 2010f). Due to the nearby CSX Railroad and other transportation corridors, counties like Dutchess County often find transporting solid waste to distant landfills to be cost-effective. Dutchess County has been known to transport their solid waste as far away as Jefferson County (Dutchess County 2010).

No substantial communication systems or liquid fuel infrastructure has been identified within the Hudson River Segment, other than minor crossings that occur in the bypass around Haverstraw Bay (CHPEI 2012w).

3.3.13 Recreation

As identified in **Sections 3.1.13** and **3.2.13**, the ROI for recreation in the aquatic portions of the Hudson River Segment is 1 mile (1.6 km) from the transmission line route, and 0.5 miles (0.8 km) for terrestrial portions.

The Hudson River Segment of the proposed CHPE Project route would pass 13 state parks, 32 local parks, 1 state WMA, 4 scenic areas of statewide significance, 6 NRHPs, and 3 NHLs. These recreational areas provide opportunities and facilities for camping, biking, boating, walking and hiking, bird watching, playgrounds, educational programs, fishing, swimming, tennis, golf, snowshoeing, cross-country skiing, and ice-skating. There are three resources (i.e., Tivoli Bays WMA, Stony Point Battlefield State Historic Site, and Philipse Manor Hall) that provide educational opportunities for children and the general public (NYS OPRHP 2012c, NYS OPRHP 2012d, NYSDEC 2012y). **Appendix K** lists the visual and recreational resources along the proposed CHPE Project route and the specific recreational opportunities available at each park.

There are several parks that would be traversed by or are within 100 feet (30 meters) of the transmission line in the Hudson River Segment. **Table 3.3.13-1** lists the parks in the Hudson River Segment. The transmission line within the Hudson River Segment also would be constructed within 0.5 miles (0.8 km) of Riverdale Park (MP 322).

The proposed cooling stations would be constructed near MPs 296, two near 298, 299, and two near 302. The proposed cooling station location north of MP 298 is not within 0.5 miles (0.8 km) of any recreational resources. The cooling station locations south of MP 298 and near MP 299 are approximately 0.5 miles (0.8 km) from Bowline Point Town Park, the Haverstraw little league baseball fields (Babe Ruth Field along Gurnee Avenue), and High Tor State Park. The cooling stations proposed near MP 302 are within 0.5 miles (0.8 km) of Haverstraw Beach State Park, Rockland Lake State Park, and Hook Mountain State Park.

Table 3.3.13-1. Parks Traversed by or within 100 Feet of the Proposed CHPE Project Route in the Hudson River Segment

Milepost	Park Name	Distance From Proposed Transmission Line
235 to 238	Tivoli Bays WMA	50 feet
260	Walkway Over the Hudson State Historic Park	Traverses through park at MP 260
296	Stony Point Battlefield State Historic Site	Traverses through site at MP 296
301	Haverstraw Beach State Park	Traverses through park at MP 301
301 to 303	Hook Mountain and Rockland Lake State Parks	Traverses through parks at MPs 301 and 303

Source: CHPEI 2012i

3.3.14 Public Health and Safety

The issues analyzed in this section, data sources used, and the definition of the ROI for public health and safety are discussed in **Section 3.1.14**.

The USCG provides the primary law enforcement for navigational safety and search and rescue operations along the Hudson River. The New York State Police Marine Detail also patrols the river to enforce navigational and conservation regulations in coordination with the USCG. Potential hazards along aquatic portions of the Hudson River Segment include vessel accidents. Potential hazards along terrestrial portions include trenching, movement of heavy equipment such as excavators and graders, blasting, construction in road and railroad ROWs and near residences, and motor vehicle accidents. Magnetic field levels at various locations along the transmission line route were calculated by the Applicant to support the CHPE Project impact analysis (CHPEI 2012t, CHPEI 2012ll) (see **Section 5.1.14**). Electric field levels were not calculated because the new HVDC transmission cables would be shielded and generally buried at least 3 feet (0.9 meters) underground in road or railroad ROWs or installed in a trench under the river bottom. Additional details on existing conditions for human health and safety that also apply to the Hudson River Segment are provided in **Sections 3.1.14** and **3.2.14**.

3.3.15 Hazardous Materials and Wastes

Section 3.1.15 defines the ROI for hazardous materials and wastes as the area within the construction corridor and construction staging areas and presents additional discussion on the management and handling of hazardous materials and wastes.

The Hudson River from Hudson Falls to the Battery in New York City was designated by the USEPA as a National Priorities List Superfund site for PCB contamination in river sediment (USEPA Identification Number NYD980763841) (CHPEI 2012i). PCBs are mixtures of synthetic organic chemicals that range from oily liquids to waxy solids. PCBs were primarily used in dielectric fluids for industrial electrical equipment, but were also used in hydraulic fluids, fluorescent lamp ballasts, paints, inks, cutting oils, plasticizers, fire retardants, and heat exchange fluids. The USEPA banned most production and use of PCBs in 1979 due to human health concerns. PCBs are considered to be probable human carcinogens and have been linked to human health disorders including low birth weight; thyroid disease; and memory, learning, reproductive, and immune disorders. Humans can be exposed to the Hudson River PCB contamination primarily through the consumption of fish. New York State has monitored PCB concentrations in fish, closed commercial and recreational fisheries along stretches of the Hudson River, and issued advisories restricting the consumption of fish caught in the Hudson River (USEPA 2012f).

The USEPA has traced the Hudson River PCB contamination to the former GE capacitor manufacturing plants at Hudson Falls and Fort Edwards. The manufacturing plants discharged into the Hudson River PCB-contaminated liquids used as an insulating fluid in the manufacture of electrical capacitors. Higher concentrations of PCBs have been found in the sediments of the Upper Hudson River, near the sources of contamination, while lesser concentrations have been recorded in the sediment of the Hudson River below the Federal Dam at Troy, farther from the sources of contamination (CHPEI 2012i, USEPA 2012f).

The USEPA initially determined that no action was warranted regarding the remediation of the PCB-contaminated sediment. However, in 2002, after decades of analysis, the USEPA completed a reassessment and determined that, among other actions, the targeted dredging, removal, and disposal of approximately 2.65 million cubic yards (2 million cubic meters) of PCB-contaminated sediment from the Upper Hudson River and the Champlain Canal would be necessary (CHPEI 2012i). Dredging is being conducted in two phases and is limited to the area between Hudson Falls and Troy. Phase I was conducted during 2009 and included the removal of nearly 300,000 cubic yards (229,400 cubic meters) of dredged material from a 6-mile (10-km) stretch of the Hudson River near Fort Edward. The USEPA evaluated the effectiveness of this effort and then proceeded to Phase II in June 2011. Phase II includes the removal of 2.4 million cubic yards (1.8 million cubic meters) of dredged material and is expected to take approximately 5 to 7 years to complete (USEPA 2012f).

On June 1, 2012, the USEPA issued its first 5-year review report on the ongoing remedial actions. The report found that the remedial actions would be protective of human health and the environment upon completion; however, the exposure pathways would remain a concern until Phase II is completed (USEPA 2012k).

PCBs are not the only contaminant of concern in the Hudson River. A nickel-cadmium battery manufacturing facility in Cold Spring, New York, discharged more than 179,000 kilograms of cadmium-enriched waste into Foundry Cove, an estuary of the Hudson River, from 1952 to 1979. Foundry Cove was designated a Superfund site by the USEPA in 1983 and sediment remediation and habitat restoration was completed in 1994.

Sediment sampling for the proposed CHPE Project has occurred at various places along the length of the Hudson River at approximately 2-mile (3-km) intervals (CHPEI 2012i). Numerous environmental contaminants including PAHs; pesticides; and metals such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, and silver have been detected in localized areas in these sediment samples. Concentrations of most of these contaminants are below remedial action levels; however, some of the sediment samples included contaminants above remedial action levels.

Regarding the terrestrial portions of the Hudson River Segment, as noted in **Section 3.2.15**, railroad ROWs are areas with high potential for environmental contamination. Additionally, environmental contamination is possible in the vicinity of railroad and roadway ROWs from adjoining industrial and commercial facilities. Examples of adjacent facilities where soil and groundwater contamination is present or potentially present in this segment are the former Mirant-Lovett Electric Generating Station, Haverstraw Landfill, Kay-Fries National Priorities List Superfund site (USEPA Identification Number NYD980534564), the former Temco Uniform Factory site, and automobile repair facilities located along U.S. Route 9W in Clarkstown. The former Temco Uniform Factory is a NYSDEC Class 2 Inactive Hazardous Waste Site located at MP 298.4 of the proposed CHPE Project transmission line route in West Haverstraw. This site currently is being investigated by the NYSDEC for environmental contamination resulting from industrial uniform manufacturing, washing, and dry cleaning that occurred from 1985 through 2002 (TRSA 2012).

3.3.16 Air Quality

The air quality topics and definition of the air quality resource included in **Section 3.1.16** are the same for the Hudson River Segment. The ROI for the Hudson River Segment includes the New York counties that are along the proposed CHPE Project route and represents the area where the substantial majority of impacts from emissions would likely occur: Columbia, Dutchess, Greene, Orange, Putnam, Ulster, Rockland, and Westchester counties. These counties are part of the Hudson Valley Intrastate AQCR, with the exception of Rockland and Westchester, which are part of the New Jersey-New York-Connecticut Interstate AQCR.

The Hudson River Segment of the proposed CHPE Project extends the transmission line from Catskill to New York City. **Table 3.3.16-1** lists the most recent emissions inventories for each county in the Hudson River Segment ROI and the Hudson River Intrastate and New Jersey-New York-Connecticut Interstate AQCRs.

Table 3.3.16-1. Hudson River Segment Local and Regional Air Emissions Inventory (2008)

Counties and AQCRs	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Columbia County	2,226	7,874	16,119	651	3,890	794
Dutchess County	6,537	14,666	50,600	2,490	9,321	2,206
Greene County	4,155	7,150	17,292	2,826	3,422	912
Orange County	64,103	13,334	10,013	2,488	16,411	18,938
Putnam County	4,464	7,311	34,018	752	4,564	996
Ulster County	5,627	16,097	39,279	2,419	8,172	1,978
Hudson Valley Intrastate AQCR	**407,475**	**71,987**	**69,733**	**17,825**	**42,940**	**127,214**
Rockland County	6,915	9,383	44,352	2,272	1,931	747
Westchester County	20,566	27,061	154,973	4,412	8,382	2,625
New Jersey-New York-Connecticut Interstate AQCR	**2,212,433**	**415,090**	**100,934**	**43,919**	**70,881**	**453,929**

Source: USEPA 2012c

Greene County (in the further classified Albany-Schenectady-Troy Area) is in nonattainment for 8-hour ozone. Columbia and Ulster counties are in attainment for all criteria pollutants. Dutchess, Orange, and Putnam counties are further classified by the USEPA as the Poughkeepsie Area, and are in moderate nonattainment for 8-hour ozone. Rockland and Westchester counties are further classified by the USEPA as the New York-North New Jersey-Long Island, NY-NJ-CT Area and are in nonattainment for $PM_{2.5}$, moderate nonattainment for 8-hour ozone, and a maintenance area (moderate > 12.7 parts per million [ppm]) for carbon monoxide.

3.3.17 Noise

Within the Hudson River Segment, the transmission cables would be installed primarily in the Hudson River. Existing sound sources include vessel traffic on the water and traffic noise and noise from natural sources on shore. There are also portions of the transmission line route which would be installed on land in railroad and road ROWs around Haverstraw Bay, which has similar natural and man-made sound sources as the Overland Segment.

Noise-sensitive receptors in the Hudson River Segment include residences, schools, libraries, and hospitals primarily along the terrestrial Haverstraw Bay bypass area. Areas in which a quiet setting is a basis for recreational use of the area can also be considered noise-sensitive. Given this context and the fact that the Hudson River Segment spans nearly 100 miles (161 km), and there is high development/population density, there are numerous potential noise-sensitive receptors within the ROI that could be impacted by construction activities and the permanent cooling stations proposed along the transmission line route. Sensitive land uses along the proposed CHPE Project transmission line route are discussed in **Section 3.3.1** and identified in **Appendix F.2**.

3.3.18 Socioeconomics

The issues analyzed in this section, data sources used, and the definition of the socioeconomics ROI are discussed in **Sections 3.1.18** and **3.2.18**.

Population. The ROI for the Hudson River Segment encompasses the counties along the Hudson River portion of the proposed transmission line route and includes Ulster, Dutchess, Orange, Putnam, Rockland, and Westchester counties, with a combined population of approximately 2.2 million. The largest city within this segment is the City of Poughkeepsie, in Dutchess County. The Poughkeepsie-Newburgh-Middletown metropolitan area contains a population of approximately 670,000, making it the largest population center within the Hudson River Segment in 2010. Other cities within the segment's ROI include Yonkers, White Plains, Mount Vernon, and New Rochelle, all within Westchester County. Most counties within the Hudson River Segment experienced double-digit population growth between 1990 and 2010, with Westchester County experiencing 9 percent growth over that time period. Dutchess, Orange, Putnam, Rockland, and Ulster counties each grew between 10 and 21 percent from 1990 and 2010 (USCB 1990, USCB 2000, USCB 2012a). See **Table 3.3.18-1** for complete population data.

Table 3.3.18-1. Population Summary for the Hudson River Segment, 1990 to 2010

Location	1990	2000	2010*	Percentage Change		
				1990 to 2000	2000 to 2010	1990 to 2010
United States	248,709,873	281,421,906	308,591,917	13.2	9.7	24.1
New York State	17,990,455	18,976,457	19,378,102	5.5	2.1	7.7
Dutchess County	259,462	280,150	297,488	8.0	6.2	14.7
Orange County	307,647	341,367	372,813	11.0	9.2	21.2
Putnam County	83,941	95,745	99,710	14.1	4.1	18.8
Rockland County	265,475	286,753	311,687	8.0	8.7	17.4
Ulster County	165,304	177,749	182,493	7.5	2.7	10.4
Westchester County	874,866	923,459	949,113	5.6	2.8	8.5

Sources: USCB 1990, USCB 2000, USCB 2012a

*Note: 2011 census data were not available for all counties. 2010 data were used for consistent reference.

Employment. The largest industry by percentage of workforce employment in the six counties in the Hudson River Segment ROI, New York State, and the United States was the educational, health and social services industry, representing between 23 and 32 percent of all employment. The retail trade industry represented 13 percent of employment in Orange, Columbia, and Ulster counties and 11 percent in Dutchess, Greene, and Rockland counties, making the retail trade industry the second largest industry by percentage of employment in each of these counties. The professional, scientific, management, administrative and waste management services industry accounted for approximately 12 percent of employment in Putnam and Rockland counties and 13 percent of employment in Westchester County

(USCB 2012b). Counties within the Hudson River Segment ROI reported a higher percentage of workers within the construction industry than those in other segments. Putnam County had approximately 9 percent employment in the construction industry, while Dutchess, Orange, Ulster, and Westchester County employments in the construction industry range between 7 and 8 percent. Complete employment data for the Hudson River Segment ROI are provided in **Table 3.3.18-2**.

Annual unemployment rates in the six counties of the Hudson River Segment ROI ranged from a low of 3.4 percent unemployment in Putnam County in 2007 to a high of 8.3 percent unemployment in Orange County in 2011 (BLS 2012). Unemployment rates generally tended to be lower in the counties of the Hudson River Segment ROI in comparison to New York State (see **Figure 3.3.18-1**).

Taxes and Revenue. Real property taxes would be generated by properties acquired along portions of the Hudson River Segment. Property taxes in New York State are determined locally by calculating a tax levy and dividing it by the value of all property in the jurisdiction (NYSDTF 2012).

Housing. An analysis of available rental housing was conducted because a small number of specialized workers could come from areas outside of the active construction area and might need to live in short-term rental units, motels, and campgrounds. Rental unit availability within the Hudson River Segment varied from 500 units in Putnam County to approximately 7,800 in Westchester County. Seasonal, recreational, or occasional use units ranged from 700 units in Westchester County to 6,800 units in Ulster County (BLS 2012). There are at least 86 hotels, motels, and campgrounds with more than 5,100 units available in this segment (Fodor 2012).

In the Hudson River Segment ROI, there were 164,000 vacant housing units, representing 10 percent of the 1.6 million housing units in the segment in 2010. Ulster County contained 15 percent vacant housing units, the largest percentage of vacant housing units among the six counties in the Hudson River Segment ROI. The largest number of vacant housing units occurred in Westchester County, with 23,600 units. Owner-occupied units made up 60 percent of the occupied units in the Hudson River Segment ROI in 2010 (USCB 2012b).

3.3.19 Environmental Justice

The issues analyzed in the Environmental Justice section, data sources used, and the definition of the environmental justice ROI are discussed in **Section 3.1.19**.

Minority and low-income populations in the Hudson River Segment ROI were identified by using census tract data. A total of 56 census tracts in the Hudson River Segment ROI were identified along the proposed CHPE Project corridor. Minority populations within these tracts were predominantly Hispanic or Latino (1.8 to 68.4 percent, with a median of 11.2 percent), Black (0.6 to 54.6 percent of the population, with a median of 6.2 percent), and Asian (0.1 to 12.4 percent, with a median of 2.6 percent). Ten census tracts encompassed low-income population levels that were higher than the percentage of the state population categorized as low-income. Review of data for all census tracts along this segment's ROI revealed that low-income populations composed up to 37.9 percent (with a median of 4.2 percent) of the total number of families in the tracts. The median household income within the 56 census tracts ranged from $25,551 to $211,250 with a median household income of $62,896. See **Appendix L** for census tract data for populations along the CHPE Project route.

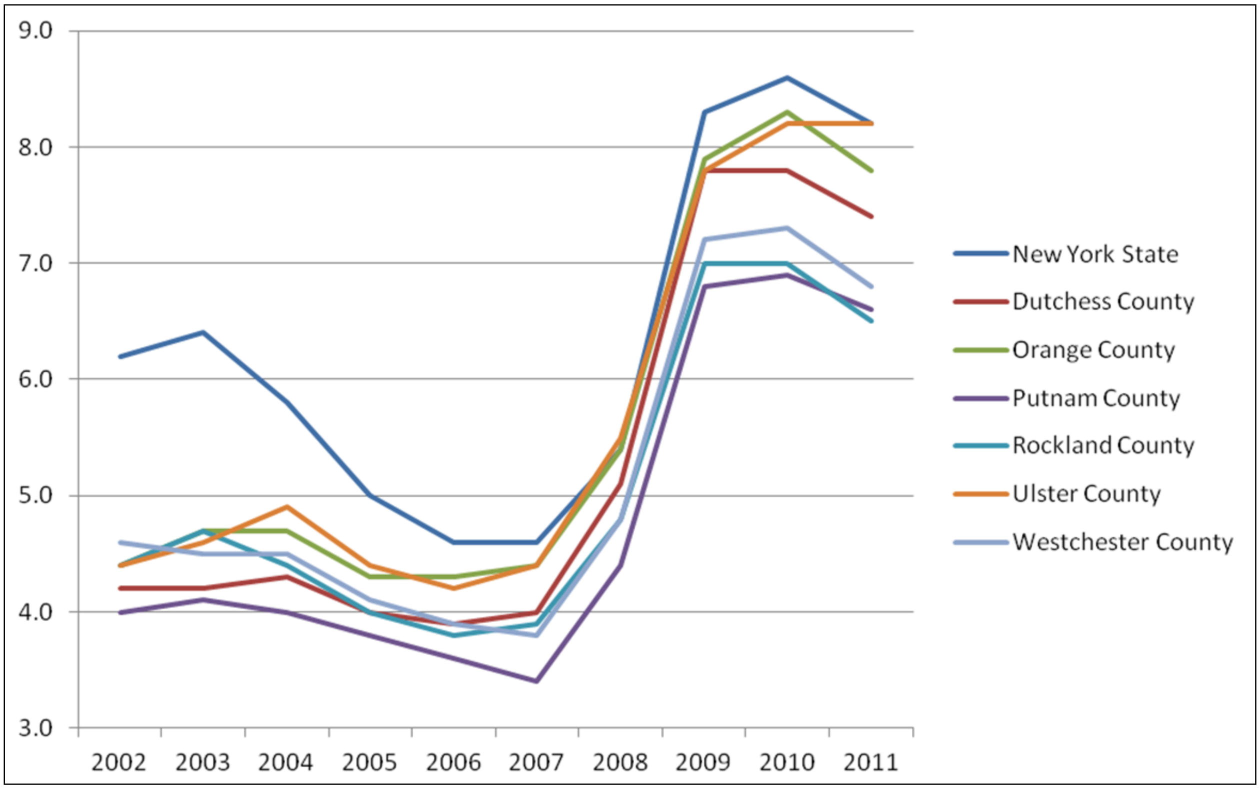
Demographics data indicated relatively high White population percentages, which ranged between 57 and 87 percent of their respective total county populations along the Hudson River Segment ROI. These percentages of White inhabitants were generally greater than the 58 percent reported for the entire New York State population. Minority populations within the counties in the Hudson River Segment ROI were

Table 3.3.18-2. Overview of Employment by Industry for the Hudson River Segment, 2008 to 2010

Industry*	United States	New York State	Dutchess County	Orange County	Putnam County	Rockland County	Ulster County	Westchester County
Population 16 years old and over in labor force	**141,848,097**	**9,075,825**	**142,302**	**172,177**	**49,356**	**143,506**	**88,992**	**455,980**
Agriculture, forestry, fishing and hunting, and mining	1.9%	0.6%	0.6%	1.3%	0.2%	0.1%	1.2%	0.1%
Construction	6.8%	5.8%	7.6%	7.1%	8.5%	6.1%	6.9%	7.3%
Manufacturing	10.7%	7.0%	8.1%	7.7%	4.6%	6.8%	7.1%	4.7%
Wholesale trade	2.9%	2.7%	2.1%	3.2%	2.7%	2.8%	2.5%	2.7%
Retail trade	11.6%	10.7%	10.9%	12.5%	10.0%	11.0%	13.1%	8.9%
Transportation and warehousing, and utilities	5.0%	5.2%	4.4%	5.7%	4.4%	3.9%	5.0%	4.1%
Information	2.3%	3.0%	2.3%	2.6%	3.9%	3.0%	2.1%	3.6%
Finance, insurance, real estate, and rental and leasing	6.8%	8.4%	6.4%	5.8%	8.4%	7.1%	5.4%	10.8%
Professional, scientific, management, administrative, and waste management services	10.5%	10.9%	10.1%	8.4%	12.3%	11.6%	8.8%	13.4%
Educational, health and social services	22.6%	27.1%	29.7%	27.4%	27.4%	31.5%	27.1%	26.9%
Arts, entertainment, recreation, accommodation and food services	9.1%	8.6%	8.0%	7.1%	6.9%	6.4%	9.1%	7.5%
Other services (except public administration)	4.9%	5.1%	4.3%	4.0%	4.6%	4.9%	5.6%	5.9%
Public administration	4.9%	4.9%	5.7%	7.2%	6.1%	4.6%	6.3%	4.0%

Source: USCB 2012b

*Note: Data for employment, by industry, are provided using a multi-year estimate as single year estimates are not provided for populations less than 65,000.



Source: BLS 2012

Figure 3.3.18-1. Unemployment in the Hudson River Segment, 2002 to 2011

generally lower than those reported for New York State. Black population levels in Dutchess and Orange counties (both at 9 percent of the total county population) were below the reported state level (14.4 percent). The Hispanic or Latino population in Orange County (18 percent of the total county population) was nearly identical to the state Hispanic or Latino population level (17.6 percent), while the Hispanic or Latino population in Dutchess (11 percent) and Putnam counties (12 percent) was below the reported state population level. The Black (11 percent) and Hispanic or Latino (16 percent) population levels in Rockland County were similar to those of the state population level. Westchester County reported total population percentages for Black inhabitants at 13.3 percent (similar to the state reported level) and total Hispanic or Latino inhabitants at 21.8 percent (higher than the state's reported level).

Median household incomes reported for total county populations in the Hudson River Segment ROI ranged from a low of $56,434 in Ulster County to a high of $88,619 in Putnam County in 2010. Ulster County reported a median household income similar to the state median income of $55,217, while Dutchess, Orange, Putnam, Rockland, and Westchester counties reported median incomes that were much higher than the state median income level.

Ranging from 3 percent in Putnam County to 8 percent in Rockland County, populations within the Hudson River Segment ROI reported lower percentages of families that earned below poverty level than were reported for the total percentage (11 percent) below the poverty level reported for New York State. Poverty rates for families within the census tracts ranged from a low of 0.7 percent in census tract 9526 to a high of 38 percent in census tract 5.02 (with a median of 4.2 percent). Percentages of minority and low-income populations for each county in the Hudson River Segment are listed in **Table 3.3.19-1**.

Table 3.3.19-1. Race, Ethnicity, and Poverty Characteristics in the Hudson River Segment in 2010

	ROI						New York State
	Dutchess County	Orange County	Putnam County	Rockland County	Ulster County	Westchester County	
Total Population	297,488	372,813	99,710	311,687	182,493	949,113	19,378,102
Percent White	74.6	68.2	82.9	65.3	81.7	57.4	58.3
Percent Black or African American	9.2	9.1	2.1	11.1	5.5	13.3	14.4
Percent American Indian and Alaska Native	0.2	0.2	0.1	0.2	0.2	0.1	0.3
Percent Asian	3.5	2.3	1.8	6.1	1.7	5.4	7.3
Percent Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent Other Race	0.2	0.2	0.2	0.2	0.2	0.4	0.4
Percent Two or More Races	1.8	1.9	1.2	1.4	2.0	1.5	1.7
Percent Hispanic or Latino	10.5	18.0	11.7	15.7	8.7	21.8	17.6
Total Percent Minority Population	25.4	31.8	17.1	34.7	18.3	42.6	41.7
Percent Families below Poverty Level	6.1	7.3	3.0	7.5	7.4	6.3	11
Median Household Income	$69,739	$69,144	$88,619	$82,245	$56,434	$77,881	$55,217

Source: USCB 2012b

Note: Census tract data are available in **Appendix L**.

3.4 New York City Metropolitan Area Segment

3.4.1 Land Use

The issues analyzed in the Land Use section and data sources used are discussed in **Section 3.1.1.1**, and the definition of the land use ROI is discussed in **Sections 3.1.1.1** and **3.2.1**. Portions of the proposed CHPE Project within the New York City Metropolitan Area Segment would occur within New York State's coastal area boundary. Coastal waters in the New York City Metropolitan Area Segment ROI include the Hudson River south of the City of Yonkers; the East River; the Harlem River; and their connecting water bodies, bays, harbors, shallows, and marshes. The Federal consistency requirements of the CZMA and the New York coastal area are discussed in **Section 3.3.1**. The applicable coastal area land use plans for the New York City Metropolitan Area Segment are identified in the following paragraphs, and the coastal zone consistency determination and associated documentation are provided in the Coastal Zone Consistency Documentation in **Appendix F.1**.

The New York City Metropolitan Area Segment is urban. Land Use Table F.2-1 in **Appendix F** identifies the amount of each general land use (i.e., land cover type) within the ROI in the New York City Metropolitan Area Segment. See Land Use Table F.2-4 in **Appendix F** for more information on the communities traversed by terrestrial portion of the New York City Metropolitan Area Segment, and the general and specific land uses within and directly adjacent to the ROI within each community.

Land Uses. The transmission line would exit the Hudson River at approximately MP 324, and travel through Spuyten Duyvil Creek and the Harlem River before making landfall in the Bronx to bypass Hell Gate through the Harlem River Rail Yard. The transmission line would then cross the East River until transitioning to land again in the Borough of Queens, New York City, to connect to the proposed Luyster Creek HVDC Converter Station adjacent to the existing Astoria Annex Substation. Most of the aquatic route through the Harlem and East rivers is within a Federal navigation channel, and there are several locations where utility pipelines and cables would cross the transmission line route. These rivers are used for navigation, including commercial shipping and recreational boating, and the Harlem River is a popular location for rowing. The Peter Jay Sharp Boathouse, a floating boathouse in Swindler Cove at Sherman Creek Park, is located within the proposed CHPE Project ROI in the Harlem River. Land uses adjacent to the aquatic portion of the route are primarily industrial, commercial, and open water.

At approximately MP 330, the transmission cables would exit the Harlem River, make landfall just north of the Willis Avenue Bridge, and traverse the southern portion of the Bronx through the Harlem River Rail Yard for approximately 1 mile (1.6 km) to avoid engineering constraints and environmental conditions that potentially limit constructability in the Hell Gate reach of the East River. According to New York City Department of City Planning land use designations, the primary land use in this area is in the Transportation and Utility land use category, although land at the eastern end of the route in the Bronx is categorized as Industrial/Manufacturing land uses (NYCDCP 2011a). The area primarily consists of NYSDOT railroad tracks and a rail yard with associated structures, private roadways, and undeveloped land. There are two commercial/industrial facilities at the eastern end of the Bronx portion of the route. This area in the Bronx is zoned for manufacturing, and consists of the M3-1 and M2-1 districts. According to The New Waterfront Revitalization Program, this area is also designated as a Significant Maritime and Industrial Area, which are areas particularly well-suited for maritime and industrial development (NYCDCP 2002). Randall's Island is across the Bronx Kill to the south of the proposed CHPE Project route. This area of the Randall's Island has recreational uses (baseball/softball fields). While the proposed CHPE Project parallels railroad tracks within the Bronx, the entire 1-mile (1.6-km) section is outside the railroad ROW, and is owned by the state and a private commercial owner (CHPEI 2012b).

After exiting the Bronx, the proposed CHPE Project route would cross the East River and transition to land in northwestern Queens at the site of the Charles Poletti Power Plant complex. The route would run for approximately 1 mile (1.6 km) underground around the northeast perimeter of the Power Plant complex, terminating at the proposed converter station, which would be constructed on an undeveloped, forested parcel adjacent to existing power-generating facilities and electrical substations within the ConEd energy complex. The site of the proposed converter station and existing substation and the entire 291-acre (118-hectare) parcel in northwestern Queens are classified as Transportation and Utility land uses, and are zoned M3-1 (Manufacturing District) (NYCDCP 2011b, NYC 2012a). The M3 district is a manufacturing district designated for heavy industrial uses that generate noise, traffic, or pollutants (NYC 2012b). Utility substations are permitted within the M3-1 district with no limitations on size (NYC 2011b). There are athletic fields and residential uses outside of the ROI to the south and southwest of the proposed Luyster Creek HVDC Converter Station site.

The 3-mile (5-km)-long high voltage AC transmission line route connecting the Astoria Annex and Rainey substations from approximate MPs 333 to 336 would traverse various streets within Queens. Land uses along this route are varied; a majority of the uses are Residential (One and Two Family Buildings, Multi-Family Buildings, and Mixed Residential and Commercial Buildings), but also include Commercial/Office Buildings, Public Facilities and Institutions, Industrial/Manufacturing, Transportation and Utility, Open Space and Outdoor Recreation, and Parking (NYCDCP 2011b). **Table 3.4.1-1** identifies known sensitive land uses within or adjacent to the ROI, which in this area is 50 feet (15 meters) on either side of the transmission line centerline, along the proposed HVAC transmission line route from the Astoria Annex Substation to the Rainey Substation.

Table 3.4.1-1. Sensitive Land Uses Within or Adjacent to the ROI along the Astoria Annex Substation to Rainey Substation Route

Sensitive Land Use	Within or Adjacent to ROI (Direction)
Educational Uses	
St. Johns Preparatory School	Within ROI (south)
Public School (PS) 122 Mamie Fay (and Pre-Kindergarten)	Within ROI (west)
Hellenic American Neighborhood Action Committee After School Program	Adjacent to ROI (west)
Young Women's Leadership School and Our Lady of Mount Carmel School Day Care	Within ROI (east)
Ideal Islamic School	Adjacent (north)
Long Island City High School (and Global Kids After School Program)	Within ROI (east)
Recreational Uses	
Federation of Italian American Organizations of Queens, Inc., Soccer Field	Adjacent to ROI (east)
Peter Chappetto Memorial Square	Within ROI (west)
Triborough Bridge Playgrounds B and C	Within ROI (west and east)
Astoria Health Playground	Within ROI (west)
Health Care Uses	
Raices Astoria Senior Center	Adjacent to ROI (west)
Ravenswood Senior Center	Adjacent to ROI (east)

Sources: NYCDCP 2011b, CHPEI 2012b, NYC DoITT 2012

Land Use Plans and Policies. The following plans might be relevant to the proposed CHPE Project within the New York City Metropolitan Area Segment.

2009 New York State Open Space Conservation Plan. The Plan identifies two priority conservation projects in New York County (Manhattan). These priority projects are Project 9 (Harlem River Waterfront) and Project 11 (Manhattan Harlem River Greenway).

New York Coastal Zone Management Policies. The proposed CHPE Project would occur within New York State's coastal area, or coastal zone, boundary; therefore, the New York coastal zone management policies (i.e., New York State CMP) and Article 42 of the Executive Law would apply. See **Sections 3.1.1.2** and **3.3.1** for more information on the New York State CMP, and refer to the Coastal Zone Consistency Documentation in **Appendix F.1** for the list of enforceable coastal policies that might be relevant and the Applicant's consistency certification assessment.

Local Waterfront Revitalization Programs. The New York City Waterfront Revitalization Program is New York City's LWRP, which is presented in The New Waterfront Revitalization Program. The New Waterfront Revitalization Program might be relevant to the proposed CHPE Project because it would be within the boundaries of New York City's coastal zone. See **Section 3.1.1.2** for more information on the LWRP, and the Coastal Zone Consistency Documentation in **Appendix F.1** for a list of enforceable policies within the LWRP that might be relevant and the Applicant's New York City Waterfront Revitalization Program Consistency Assessment Form. The New York City Department of City Planning is proposing a series of revisions to the Waterfront Revitalization Program, including the designation of Luyster Creek as a Priority Marine Activity Zone. A Priority Marine Activity Zone is an area with a concentration of water-dependent activity or sites that are key nodes in the waterborne transportation network, and that have the infrastructure to support these uses. This revised Waterfront Revitalization Program is in the draft stage and has not yet been approved (NYCDCP 2012).

Local Municipal Land Use Plans. The Vision 2020: New York City Comprehensive Waterfront Plan might be relevant to the proposed CHPE Project. This plan does not identify policies associated with electric transmission projects. Exhibit 121 of the Joint Proposal has a full list of policies from this plan that might be relevant.

3.4.2 Transportation and Traffic

This segment includes MPs 324 to 336 through the New York City metropolitan area. The transmission cables would exit the Hudson River at approximately MP 324, and travel through Spuyten Duyvil Creek and the Harlem River before making landfall in the Bronx to bypass Hell Gate through the Harlem River Rail Yard. It would then cross the East River until transitioning to land again in the Borough of Queens, New York City, to connect to the existing Astoria Annex Substation. Most of the aquatic route through the Harlem and East rivers is a Federal navigation channel. These rivers are used for navigation, including commercial shipping and recreational boating, and the Harlem River is a popular location for rowing.

The proposed CHPE Project Route under this segment would include portions of the Harlem and East rivers. The East River within this segment has regulated and actively maintained shipping routes that are commercially significant to the area. In 2008, waterborne commerce on the East River consisted of 70,211 northbound trips and 70,040 southbound trips. The Harlem River is shallower and less important to shipping, with only 55 southbound trips reported (USACE 2008). The Harlem River Shipping Canal, Spuyten Duyvil, and Harlem River form a continuous tidal channel with a Federal project depth of 15 feet (5 meters) in the navigation channel and total average depth of approximately 14 feet (4 meters). The navigation channel in the East River has a Federal project depth of 35 feet (11 meters) (CHPEI 2012aa, USACE 2012b).

The Harlem River and East River in this segment are spanned by the following bridges, seven of which are drawbridges:

- Henry Hudson Bridge and Amtrak Bridge (near MP 324)
- Broadway Bridge (near MP 325)
- West 207th Street/University Heights Bridge (near MP 326)
- Washington Bridge and connecting West 181st Street and Amsterdam Avenue (near MP 327)
- Alexander Hamilton Bridge connecting the Trans-Manhattan Expressway and the Cross Bronx Expressway/I-95 (not a drawbridge) (near MP 327)
- Macombs Dam Bridge (between MPs 328 and 329)
- West 145th Street and Madison Avenue Bridges (between MPs 329 and 330)
- Metro North/Park Avenue Bridge and Third Avenue Bridge (near MP 330).

All drawbridges have at least 25 feet (8 meters) of clearance between the water surface and the bridge, with the exception of the Amtrak Bridge (Spuyten Duyvil Bridge), which is a swing bridge for a railroad with 5 feet (1.5 meters) of clearance. All road bridges are required to be closed to accommodate road traffic during commuter rush hours (USCG 2010).

Tunnels accommodating the following New York City subway lines, owned and operated by the MTA New York City Transit, are located under the Harlem River:

- B and D Line (between MPs 328 and 329 near Macombs Dam Bridge)
- 2 Line (between MPs 329 and 330 near West 145th Street Bridge)
- 4 and 5 Line (between MPs 329 and 330 near Madison Avenue Bridge)
- 6 Line (near Third Avenue Bridge at MP 330).

This segment also includes the Luyster Creek HVDC Converter Station, which would be constructed as part of the proposed CHPE Project, and an HVAC interconnection to the Rainey Substation in Queens. The Astoria-to-Rainey interconnection would be a 3-mile (5-km) terrestrial cable, traversing various city streets in the Borough of Queens. The route of the HVAC cables would run from the Astoria Annex Substation along 20th Avenue to 29th Street, then along 29th to 21st Avenue. The cables would then follow 21st Avenue to 23rd Street, running along 23rd Street for approximately 1 mile (1.6 km) to 30^{th} Drive. From 30th Drive, the cables would follow 14th Street to 31st Drive, to 12th Street to 35^{th} Avenue and the Rainey Substation. These roads are all secondary and tertiary arterial streets primarily used by local residents.

3.4.3 Water Resources and Quality

The definitions of and issues associated with surface waters, floodplains, and groundwater are discussed in **Section 3.1.3**. The ROI for water resources and quality for the New York City Metropolitan Area Segment are the Harlem River and East River, as traversed by aquatic portions of the transmission line route, and areas within 100 feet (30 meters) of the transmission line centerline for the terrestrial portion of the route in the Bronx and Astoria. The ROI for aquatic portions of proposed CHPE Project (i.e., the waterbody that would be traversed by the transmission cables) was selected because localized project activities could result in impacts throughout the width of the waterbody. The ROI for the terrestrial portion of the route was selected because this constitutes the area where a substantial majority of potential impacts could occur, and beyond this distance, potential impacts would likely be avoided by Applicant-proposed measures for water resources (see **Appendix G**).

Surface Water. The proposed CHPE Project route in the New York City Metropolitan Area Segment enters the Harlem River from the Hudson River via Spuyten Duyvil Creek and eventually traverses into the East River (see **Figure 2-4**). The Harlem and East rivers are tidal straits, and are, therefore, tidally influenced. The Harlem River is a navigable tidal strait in New York City that flows 8 miles (13 km) between the Hudson River and the East River, separating the boroughs of Manhattan and the Bronx and forming part of the Hudson River estuary system. The East River is a tidal strait between Upper New York Bay and Long Island Sound.

The primary source of drinking water for New York City is a system of surface water reservoirs north of the city.

Water Quality. The City of New York annually collects water quality data for the waters surrounding the five boroughs to assess water quality trends in New York Harbor. Measurements are collected at near-surface and near-bottom environments from a set of stations on a weekly or biweekly basis. Five major indicators of water quality are used to assess the state of water quality in the harbor: dissolved oxygen, TSS, Secchi transparency (i.e., turbidity), chlorophyll-a, and fecal coliform. These data are used to establish long-term baseline data for water quality; however, they do not address the causes of impairment or turbidity directly (NYCDEP 2008).

NYSDEC surface water quality classifications for the Harlem River and East River are Class I, which includes uses for secondary contact recreation and fishing. These waters are suitable for fish, shellfish, and wildlife propagation and survival (NYSDEC 2012e). In addition, water quality standards regarding turbidity for this water classification state there is to be no increase that will cause a substantial visible contrast to natural conditions (NYSDEC 2012f). The Harlem and East rivers are on NYSDEC's 303(d) list of impaired water bodies. The causes of the impairment are PCBs and other toxins. The 303(d) list also notes that, in addition to the contaminants for which there are specific health advisories, other heavy metals have been identified as contributing to fish consumption impairment (NYSDEC 2010g). PCBs are discussed in **Section 3.4.15**.

Floodplains. Where the transmission line leaves the Harlem River to traverse over land before crossing the East River using HDD, it would be in a flood hazard area associated with Bronx Kill. Flood hazard areas include Base Flood Elevations (BFEs) that identify the flood risk for coastal communities in the New York City metropolitan area affected by Hurricane Sandy in 2012. The BFE for a 1 percent chance of inundation in any given year (flood hazard Zone AE) (i.e., 100-year flood event) is at an elevation of 11 feet (3 meters) above MSL on the north side of Bronx Kill, with higher values closer to the shoreline. A portion of the area proposed for construction of the Luyster Creek HVDC Converter Station in Astoria, which is adjacent to a waterway also referred to as Steinway Creek, is at the confluence of the East River and Long Island Sound and is also within Zone AE with similar inundation elevations. The BFE for a 1 percent chance of inundation (i.e., 100-year flood event), at the converter station site is 13 feet (4 meters) above MSL (see **Appendix A**) (FEMA 2013).

Groundwater. The geology of Long Island creates three layers of aquifers that are present within New York City: the Upper Glacial, which is the shallowest; the Magothy, which is the middle aquifer; and the Lloyd, which is the deepest. The aquifers are composed of sand and gravel and separated by clay layers. Sixty-eight groundwater wells in New York City, ranging from 81 to 626 feet (25 to 191 meters) deep, were historically used to supplement drinking water supplies from surface waters. As of 2011, none of the wells were currently used for drinking water (USEPA 2012d).

The proposed CHPE Project route, Luyster Creek HVDC Converter Station site, and the Astoria to Rainey interconnection would be constructed over the area designated by the USEPA as the Brooklyn-Queens Sole Source Aquifer (USEPA 2012d).

3.4.4 Aquatic Habitats and Species

The ROI for aquatic habitats in the aquatic portions of the proposed CHPE Project in this segment is the Harlem and East rivers in the vicinity of the proposed CHPE Project transmission line route, and the ROI for terrestrial portions is 100 feet (30 meters) on either side of the transmission line centerline. A brief general definition of this resource, including the ROI, is provided in **Sections 3.1.4** and **3.2.4**.

Aquatic Habitat and Vegetation. The aquatic portions of the New York City Metropolitan Area Segment ROI occur in Spuyten Duyvil Creek and the Harlem and East rivers in the New York-New Jersey Harbor Estuary from the Hudson River to Astoria. Spuyten Duyvil Creek and the Harlem and East rivers have undergone significant modifications over the course of modern times such as channelization, bulkheading, upland filling, and urbanization.

The aquatic vegetation in the Harlem and East rivers is tolerant of highly variable and harsh conditions. Freshwater and marine phytoplankton are the dominant primary producers in these water bodies. Diatoms are generally the dominant group of phytoplankton. Residence times of phytoplankton species within New York Harbor are short and individuals move quickly through the system. While SAV is not typically found in these water bodies, macroalgae do occur on hard surfaces and sandy or muddy bottoms (MTA 2004).

Shellfish and Benthic Communities. The majority of benthic invertebrate species found in the disturbed habitats of the Harlem and East rivers are tolerant of highly variable conditions. Biological surveys of these areas have found the benthic community to be composed of both suspension and deposit feeders, including polychaetes, crustaceans, and bivalves (Levinton and Waldman 2012).

Numerous surveys of the benthic community in the waters surrounding Manhattan have been conducted. An array of mollusks, crustaceans, polychaetes, and amphipods were detected. Poor species composition indicated that along the proposed CHPE Project route in the East River, the existing benthic community is moderately to highly impacted by decreased water quality, likely due to urban runoff and combined sewer discharges (USEPA 2003).

A 2002 study of the Harlem River identified a dominant presence of polychaete worms, which indicated pollution was present but not in high enough concentrations to displace pollution-sensitive species (AKRF 2002). Benthic sampling by the Applicant in the Harlem River during spring 2010 revealed a community with few species and low abundances, except near its confluence with the East River. Samples indicated that the benthic community was limited in species and species that were present occurred at low densities. Diversity and evenness for these samples was relatively low and samples were dominated by polychaetes (*Scolecolepides viridis*, Capitellidae, and *Streblospio benedicti*). The sample closest to the East River was composed of 14 unique taxa and had a total density of 45,305 individuals per 10.8 square feet (1.0 square meter). Taxa were distributed among annelids, arthropods, and others, including *Actinaria* spp., *Molgula manhattensis*, and Nematoda. Diversity and evenness were still low, mostly due to the large collection of the pollution-tolerant polychaete, *Streblospio benedicti*. This sampling area, despite having a greater taxa richness, was dominated by pollution-tolerant species (72 percent of the assemblage), and only consisted of a few pollution-sensitive individuals (3 percent) (CHPEI 2012o).

The benthic community near North Brother Island (MP 332) consisted of 21 unique taxa with 8,625 individuals per 10.8 square feet (1.0 square meter). Taxa were distributed among 10 annelids, 7 arthropods, 3 mollusks, and 1 Cnidarian (*Actiniaria* spp.). The majority of the individuals collected during the Applicant's spring 2010 survey were annelids (64 percent) followed by arthropods (33 percent). Diversity and evenness indices were high compared to the Harlem River samples. The polychaete family Cirratulidae and the amphipod family Aoridae dominated the sample. Pollution-tolerant taxa composed 7 percent of the assemblage, while pollution-sensitive species composed 2 percent (CHPEI 2012o).

The benthic community near College Point (east of MP 332) consisted of 16 species and had the highest density of the three samples taken in the New York City Metropolitan Area Segment during the Applicant's spring 2010 survey with 38,880 individuals per 10.8 square feet (1.0 square meter). Taxa consisted of 10 annelids, 5 arthropods, and 1 mollusk, the blue mussel (*Mytilus edulis*). Similar to the Brother Island benthic community, the majority of the individuals collected near College Point were the polychaete Cirratulidae (61 percent). The next most abundant species was the polychaete *Sabellaria vulgaris* (22 percent). Diversity and evenness were slightly less at this location, mostly due to Cirratulidae dominating the assemblage. Pollution-tolerant taxa composed 4 percent of the assemblage and no pollution-sensitive taxa were collected (CHPEI 2012o).

Samples collected along the proposed Astoria landfall (MP 332) were hard-substrate-limited sample sites. Both of these samples indicated a highly impacted community, being composed nearly entirely of pollution-tolerant taxa (83 percent and 94 percent) and a complete absence of pollution-sensitive taxa. Seven unique taxa were collected and densities between samples were comparable (3,623 and 3,514 individuals per 10.8 square feet [1.0 square meter]). The pollution-tolerant polychaete *Leitoscoloplos fragilis* dominated the samples, accounting for more than 60 percent of the total catch (CHPEI 2012o).

Overall, the benthic community in the East River was composed of fewer pollution-tolerant species and higher taxa richness than the Harlem River, with the exception of the samples near the Astoria landfall, which was dominated by pollution-tolerant taxa (CHPEI 2012o).

Potential oyster restoration locations have been identified in the Harlem and East rivers, with the most suitable locations being in shallow water areas along the river channels and shallow water bays (USACE and Port Authority of NY & NJ 2009). No reef restoration projects are in the vicinity of the proposed CHPE route in this segment (Hudson River Foundation 2012, NY/NJ Baykeeper 2012).

Two invasive crustaceans are documented in the estuarine portion of the proposed CHPE Project ROI in this segment (i.e., lower Hudson River and the Harlem and East rivers). The Asian shore crab (*Hemigrapsus sanguineus*), native to the western Pacific, began to spread aggressively along the U.S. east coast in the 1990s and is now abundant in many shoreline areas, particularly in the vicinity of jetties or rock revetments and in natural rocky intertidal areas. This crab is an aggressive omnivore and could out-compete native crustaceans, such as blue crabs, for nursery and foraging habitat (Cornell University 2008). Several specimens of the Chinese mitten crab (*Eriocheir sinensis*) have been collected in the lower estuary since 2007. This omnivorous crab can aggressively outcompete other crustaceans while simultaneously undermining shoreline stability by burrowing. NYSDEC has issued a "Mitten Crab Alert," seeking assistance from the public to report sightings or collections in New York waters (USFWS 1989).

Fish. A mixture of habitats in the Harlem and East rivers supports marine, estuarine, anadromous, and catadromous fish. Despite the relatively low value of the East River as resident fish habitat, it serves as a major migratory route for some species from the Hudson River to the Long Island Sound. Winter flounder, scup (*Stenotomus chrysops*), bluefish, Atlantic silverside, striped killifish (*Fundulus majalis*), common killifish (*Fundulus heteroclitus)*, striped bass, Atlantic tomcod, members of the herring family, and American eel are among the species seasonally present in the Harlem and East rivers (MTA 2004).

Table H.2-3 in **Appendix H** identifies the general spawning periods of marine and estuarine fish species in the Hudson River estuary, which includes the Harlem and East rivers.

Essential Fish Habitat. EFH in the New York City Metropolitan Area Segment is the same as those described for the Hudson River Segment (see **Section 3.3.4**).

Significant Coastal Fish and Wildlife Habitat. The proposed CHPE Project route within the New York City Metropolitan Area Segment would intersect with the Lower Hudson Reach SCFWH, which is described in **Section 3.3.4**, and is within 1 mile (1.6 km) of the North and South Brother Islands SCFWH, which is within the East River.

3.4.5 Aquatic Protected and Sensitive Species

The ROI for aquatic protected and sensitive species is the Harlem and East rivers in the aquatic portion of the proposed CHPE Project route, and the ROI for terrestrial portions of the route is 100 feet (30 meters) on either side of the transmission line. The issues analyzed in the Aquatic Protected and Sensitive Species section, the data sources used, and the definition of the ROI are discussed in **Sections 3.1.5** and **3.2.5**. Details on the ESA as it relates to aquatic species are discussed in **Section 3.3.5**.

Federally Listed Species. Descriptions of ESA-listed fish, whales, and sea turtles with the potential for occurring in the New York City Metropolitan Area Segment ROI are discussed in the following paragraphs. There is no critical habitat designated or proposed to be designated within the ROI for this segment.

Fish. The shortnose sturgeon and the Gulf of Maine DPS, New York Bight DPS, and Chesapeake Bay DPS of the Atlantic sturgeon are the only federally listed aquatic threatened and endangered species that could be encountered in the aquatic portions of the New York City Metropolitan Area Segment (see **Table 3.4.5-1**). These species are described in greater detail in **Section 3.3.5**.

Table 3.4.5-1. Federally Listed Threatened, Endangered, and Candidate Aquatic Species Occurring in the New York City Metropolitan Area Segment

Common Name	Scientific Name	Federal Status
Shortnose sturgeon	*Acipenser brevirostrum*	E
Gulf of Maine DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	T
New York Bight DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	E
Chesapeake Bay DPS of Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	E

Key: DPS = distinct population segment; E = endangered; T = threatened; C = candidate.

Marine Mammals. Five federally listed endangered whale species could be found in waters offshore of New York: the North Atlantic right whale, humpback whale, fin whale, sei whale, and sperm whale. While large whales are rare in the New York Harbor region, there are confirmed records of the humpback whale and fin whale within New York Harbor. As noted earlier, the manatees could also make a rare appearance. Apart from potential rare occurrences, no ESA-listed marine mammal species are likely to occur in the New York City Metropolitan Area Segment and the transmission line would be installed under the East River using HDD; therefore, these are not discussed further in this EIS.

Sea Turtles. Sea turtles are not likely to occur in the aquatic portions of the New York City Metropolitan Area Segment. While sea turtles are expected to occur seasonally during warmer months (June through mid-November) in the waters of Long Island Sound, they are less frequently documented in the bays and harbors of the western portion of Long Island Sound when compared to the eastern portion (CHPEI 2012x). Because of their presence in western Long Island Sound, transient sea turtles could occasionally occur in the East River (Kurkal 2009) and they are generally considered extralimital. As such, the Harlem and East rivers are not expected to be a high-use area, and there are no documented sea turtle captures there (CHPEI 2012x). Therefore, because the transmission line would be installed under the East River using HDD and no sea turtles species are likely to occur in the New York City Metropolitan Area Segment, sea turtles are not discussed further in this EIS.

State-Listed Species. The green, leatherback, and Kemp's ridley sea turtles are state-listed as endangered, while the loggerhead sea turtle is listed as threatened. The humpback, sperm, sei, blue, fin, and North Atlantic right whales are all state-listed as endangered. Because the transmission line would be installed under the East River using HDD and, as noted above under *Federally Listed Species*, apart from potential rare occurrences, sea turtles and large whales are not expected in the Harlem or East rivers, these species are not discussed further in this EIS.

The shortnose sturgeon is state-listed as endangered and could occur in the aquatic portions of the New York City Metropolitan Area Segment. This species is discussed in detail in **Section 3.3.5**.

Non-threatened/non-endangered Marine Mammals. Marine mammals extensively use the offshore waters of the New York Bight and occasionally come into the New York Harbor. The most commonly observed marine mammal is the harbor seal (*Phoca vitulina*), which winters in the harbor and hauls out onto islands including Jamaica Bay, Sandy Hook, Staten Island, and the Westchester and Connecticut shorelines of the Long Island Sound Narrows. Historical records indicate that the harbor porpoise (*Phocoena phocoena*) could have once been a regular visitor to the harbor. Small schooling fish are preferred prey for the harbor seal and harbor porpoise. The bottlenose dolphin (*Tursiops truncatus*) was observed in the 1930s but has rarely been observed in the Hudson River Estuary since the 1990s, though there was a sighting in June 2012. The gray seal (*Halichoerus grypus*) is regularly seen in similar locations. Occasional records of whales, dolphins, and porpoises in the New York Harbor are generally of single individuals that are likely unhealthy or lost (USFWS 1997, Kiviat and Hartwig 1994, Lake 2008). The Harlem and East rivers do not contain any marine mammal concentration areas or seal haul-out areas. Because the transmission line would be installed under the East River using HDD, and apart from potential rare occurrences, marine mammals are not expected in the Harlem and East rivers, non-threatened and non-endangered marine mammals are not discussed further in this EIS.

3.4.6 Terrestrial Habitats and Species

Because some terrestrial species (e.g., birds and bats) use aquatic environments, the terrestrial habitat ROI for aquatic portions of the New York City Metropolitan Area Segment are the Harlem and East rivers in the vicinity of the proposed CHPE Project transmission line route. The ROI for terrestrial portions of the segment is 100 feet (30 meters) on either side of the centerline of the transmission line. Habitat communities within 0.25 miles (0.4 km) of the centerline of the transmission line are described to provide context for species that could range from these habitats into the ROI. The issues analyzed in this section, applicable species, and the definition of the ROI are discussed in **Sections 3.1.6** and **3.2.6**.

Vegetation and Habitat. The terrestrial portion of the proposed CHPE Project in the New York City Metropolitan Area Segment traverses through the boroughs of the Bronx and Queens. The habitat along the ROI within these boroughs is primarily disturbed. The disturbed habitat that occurs within the ROI includes urban vacant lots, brushy cleared land, mowed lawns, or railroad lands (USFWS 1997, Edinger et al. 2002). The ROI is primarily developed, consisting of commercial, industrial, transportation, utility, and residential land uses. The proposed Luyster Creek HVDC Converter Station would be constructed on an open parcel within the Charles Poletti Power Plant complex. The proposed site consists of open space and wooded land adjacent to existing power-generating facilities and electrical substations.

Ecological communities and land cover types that have been identified to date in the terrestrial portions of the New York City Metropolitan Area Segment are presented in **Table 3.4.6-1**. Similar to **Tables 3.2.6-1** and **3.3.6-1**, the data presented in **Table 3.4.6-1** do not include the entire construction corridor, but rather a subset of the full construction corridor (i.e., survey corridor). The survey corridor represents approximately 3.5 of the 8.4 acres (1.4 of the 34 hectares) (42 percent) within the total terrestrial area in the New York City Metropolitan Area Segment ROI. While the survey corridor does not include the whole ROI, the data can be considered representative and used to characterize the habitats and species in the ROI. The land cover types within 50 feet (15 meters) of the centerline of the transmission cable, and within deviation areas, are presented in Land Use Table F.2-1 in **Appendix F**. There are no significant natural communities within 0.25 miles (0.4 km) of the terrestrial portions of the New York City Metropolitan Area Segment ROI.

Table 3.4.6-1. Habitats and Land Cover Types Occurring in the Survey Corridor of the Terrestrial Portions of New York City Metropolitan Area Segment

Habitat/Land Cover Type	Acreage of Survey Corridor	Percent of Survey Corridor
Brushy Cleared Land	< 0.1	0.3
Paved Road/Path	2.9	82.1
Railroad	< 0.1	1.5
Urban Vacant Lot	0.6	16.1

Source: CHPEI 2012aaa

Wildlife. Urban and industrial landscapes, such as those within the New York City Metropolitan Area Segment, typically do not have much diversity of wildlife beyond those that are adapted to urban settings. Mammal species typically encountered in urban areas include raccoon (*Procyon lotor*), gray squirrel (*Sciurus Carolinensis*), and eastern chipmunk (*Tamias striatus*). Introduced species, such as the Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*), are common in urban environments and are considered nuisance species in many areas. There are several bats possibly occurring in this segment, all of which are nocturnal and feed on insects: eastern red bat, hoary bat, and little brown bat (*M. lucifugus*) (USFWS 1997).

Some birds are well adapted to residential suburban environments, and forage in lawns, gardens, tree-lined streets, and city parks. The blue jay (*Cyanocitta cristata)*, American robin (*Turdus migratorius*), gray catbird, house wren (*Troglodytes aedon*), American crow (*Corvus brachyrhynchos*), barn owl (*Tyto alba*), northern flicker (*Coloptes auratus*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottus*), and house sparrow (*Passer domesticus*) are often found in residential and urban areas. Terrestrial bird species that use the Harlem and East rivers for foraging habitat include the Canada goose, mallard, double-crested cormorant, great egret (*Ardea alba*), and glossy ibis (*Plegadis falcinellus*), among others (NYSDEC 2012h).

3.4.7 Terrestrial Protected and Sensitive Species

The issues analyzed in this section and the definition of the ROI for terrestrial protected and sensitive species are discussed in **Section 3.1.7** and **3.2.7**.

Federally Listed Species

Terrestrial federally listed species with the potential to occur in the New York City Metropolitan Area Segment ROI are the piping plover (*Charadrius melodus*), roseate tern (*Sterna dougalli dougalli*), rufa red knot (*Calidris canutus rufa*) (henceforth called the red knot), and northern long-eared bat. The terrestrial portions of this segment are highly developed so these terrestrial species would likely not be present in the transmission line corridor. **Table 3.4.7-1** shows the federally listed threatened and endangered species that could occur within the New York City Metropolitan Area Segment. The bald eagle, which is present in counties traversed by the other three segments of the CHPE Project route, is not identified as federally listed in counties in the New York City Metropolitan Area Segment (USFWS 2012c). Neither the USFWS nor the NMFS have designated or proposed designation of critical habitat in the New York City Metropolitan Area Segment of the proposed CHPE Project.

Table 3.4.7-1. Federally Threatened and Endangered Terrestrial Species Occurring or Having the Potential to Occur within 0.25 Miles of the New York City Metropolitan Area Segment

Common Name	Scientific Name	Federal Status
Piping plover	*Charadrius melodus*	T
Roseate tern	*Sterna dougalli*	E
Red knot	*Calidris canutus rufa*	PT
Northern long-eared bat	*Myotis septentrionalis*	PE

Source: USFWS 2012c, 78 *Federal Register* 60024, 78 *Federal Register* 61046

Key: T = threatened; E = endangered; PT = proposed species for listing as threatened; PE = proposed species for listing as endangered

Piping plover. The piping plover was listed as federally threatened in 1985 (50 *Federal Register* 50726–50734). Piping plovers are present along the proposed CHPE Project route from March through September, where they breed on Long Island's sandy beaches from Queens to the Hamptons, in the eastern bays, and in the harbors of northern Suffolk County (NYSDEC 2012j). No potential breeding habitat has been identified along the transmission line route.

Roseate tern. The roseate tern was listed as federally endangered in 1987 (52 *Federal Register* 42064). Recent occurrences of roseate terns have been documented in Queens County (CHPEI 2012x). An important breeding colony of roseate terns occurs at Great Gull Island on Long Island (NYNHP 2005d). Breeding colonies and potential breeding habitat have not been identified along the New York City Metropolitan Area Segment; however, roseate terns could forage in areas of the Long Island Sound that are adjacent to the transmission line route in the East River.

Red knot. The red knot was proposed for listing as threatened under the ESA in September 2013 (78 *Federal Register* 60024). Currently, no critical habitat has been designated for the species. The red knot migrates and winters in large flocks of hundreds of birds and uses spring and summer stopover areas along the Atlantic and Gulf coasts (USFWS 2013c). During its migrations, this species feeds along the sand and muddy shorelines where intertidal invertebrates can easily be found and consumed (Harrington 2009). The species is known to occur in Queens County, New York (USFWS 2013d); however, specific data on occurrences of the red knot in Queens County are not available.

Northern long-eared bat. The northern long-eared bat occurs in every county in New York State, including those of the New York City metropolitan area. There is minimal natural habitat for the northern long-eared bat in this segment. The habitat along the ROI within this segment is primarily disturbed, consisting of urban vacant lots, brushy cleared land, mowed lawns, or railroad lands. The proposed Luyster Creek HVDC Converter Station would be constructed on an open parcel consisting of open space and wooded land adjacent to existing power-generating facilities. Northern long-eared bat information is also provided in **Section 3.1.7**.

State-Listed Species

In addition to their Federal listing, the roseate tern and piping plover are also state-listed as endangered. These species are discussed in detail in the preceding paragraphs. A summary of the other state-listed species that occur within 0.25 miles (0.4 km) of the New York City Metropolitan Area Segment is presented in **Table 3.4.7-2** (CHPEI 2012x). With the exception of raptors, which could occur over the Harlem and East rivers, only terrestrial species from Queens and Bronx counties were analyzed. The Hudson River Valley provides important wintering habitat for concentrations of bald eagles in New York State, particularly along the lower Hudson River (CHPEI 2012i). However, no known nests are present in the New York City metropolitan area. Bald eagles could roost and forage in the vicinity of the proposed CHPE Project particularly closer to the Hudson River (NYSDEC 2013f).

Table 3.4.7-2. State-Listed Species Occurring Within 0.25 Miles of the New York City Metropolitan Area Segment

Common Name	Scientific Name	New York Status	Species Information
Peregrine falcon	*Falco peregrinus*	E	Highly migratory falcon with an expansive foraging range. Arrives in northern breeding areas late April to early May; southern departure begins late August to early September. Prefers open habitat and often nests on ledges or holes on the face of rocky cliffs or crags.
Short-eared owl	*Asio flammeus*	E	Preferred habitat consists of marshes and open lowland areas, and recent nests have been observed in pastures and agricultural areas in New York State.
Bald eagle	*Haliaeetus leucocephalus*	T	Raptor that can be found in scattered areas throughout the United States. The bald eagle generally prefers areas adjacent to large bodies of water that support fish populations. Wintering areas are concentrated in four main areas: the Upper Delaware River, the Saint Lawrence River, the Lower Hudson River, and the Sacandaga River.
Northern harrier	*Circus cyaneus*	T	Raptor with a very large home range, and whose breeding range includes most of New York State. The northern harrier prefers open marshy and lowland areas, similar to the short-eared owl.
Least bittern	*Ixobrychus exilis*	T	Long-distance migratory bird arriving at nesting areas in the northeastern United States in early to mid-April or early May and leaves northern breeding areas by September-October. Considered locally common in marshes of the Hudson Valley, and possibly breeding in the Champlain Valley. Habitats vary throughout North America. Typically breeds in tall emergent vegetation in marshes, primarily fresh water. When least bitterns are alarmed, instead of flying away they often freeze.

Sources: NYNHP 2005d, NatureServe 2012, UW 2012b
Key: T = threatened; E = endangered

Migratory Birds

While birds that occur in the New York City Metropolitan Area Segment are adapted to living in a disturbed environment, most are covered by the MBTA. Examples of birds that occur in this segment that are covered under the MBTA include blue jay (*Cyanocitta cristata*), American robin (*Tardus migratorius*), gray catbird (*Dumtella carolinensis*), house wren (*Trodlodytes aedon*), American crow (*Corvus brachyrhynchos*), barn owl (*tyto alba*), northern flicker (*Colaptes Auratus*), mourning dove (*Zenaida macroura*), and northern mockingbird (*Mimus polyglottos*).

3.4.8 Wetlands

No wetlands were delineated within the ROI for the New York City Metropolitan Area Segment (CHPEI 2012a), including the site of the Luyster Creek HVDC Converter Station, the interconnection with the Astoria Annex Substation, or the Astoria to Rainey Substation interconnection, as part of the wetland delineation conducted by the Applicant for the proposed CHPE Project. No NYSDEC freshwater wetlands were identified. However, there are 18.6 acres (7.5 hectares) of NYSDEC tidal wetlands within the ROI. These NYSDEC tidal wetlands are primarily within the adjacent area and associated with the Harlem and East rivers.

3.4.9 Geology and Soils

Physiography and Topography. The New York City Metropolitan Area Segment lies within the Coastal Plain Province. This region is characterized by a series of moderately dissected, northeast-to southwest-trending terraces that decrease in elevation towards the coastline. A prominent lowland forms the northwestern border of the province. The coastline is characterized by dune fields, beaches, lagoons, embayments, and barrier islands. Elevations range from sea level to 300 feet (91 meters) above MSL, though elevations in most areas are less than 150 feet (46 meters) above MSL (USFS 2010).

Geology. Geology for the New York City Metropolitan Area Segment is similar to that described for the Hudson River Segment. Gneiss bedrock underlies much of the proposed CHPE Project route in this segment, and has been mapped as Fordham Gneiss. The bedrock also potentially contains Yonkers Gneiss, a metavolcanic (i.e., partially metamorphosed volcanic rock) bedrock (CHPEI 2012ee). Bedrock could be present within 3 to 10 feet (0.9 to 3 meters) of the surface (CHPEI 2012b). Surficially, geological material underlying the segment is composed of interbedded gravel, mud, sand, and silt (USFS 2010). The proposed site for the Luyster Creek Converter Station is underlain by the bedrock Fordham Gneiss, and the Hartland Formation, a biotite-muscovite quartz schist of Middle Ordovician to Lower Cambrian age (Baskerville 1992).

Sediments. Surface sediments in the Harlem River portion of the New York City Metropolitan Area Segment are a mixture of sand, gravel, and cobble (CHPEI 2012m). Sediments are coarse and several rock outcrops exist in the northern portion of the Harlem River traversed by the proposed CHPE Project route, while finer sediments dominate downstream (CHPEI 2012o). Surface sediments in the East River are coarser, with occurrences of exposed bedrock due to swift currents removing sediments and as a result of blasting to create the navigation channel (CHPEI 2012m).

Sediments in the Harlem and East rivers contain various amounts of PCBs, metals, pesticides, and PAHs (CHPEI 2012i). For additional discussion of sediment contamination, please refer to **Section 3.4.15**.

Soils. Soils within the New York City Metropolitan Area Segment are characterized primarily as urban land. For a detailed description of soils present within this segment, refer to **Appendix I.2**.

Prime Farmland. No soils along the proposed CHPE Project route within the New York City Metropolitan Area Segment are classified as prime farmland, and all are previously disturbed and unavailable for agricultural purposes due to locations within developed areas.

Seismicity. The seismic hazard rating for the New York City Metropolitan Area Segment ranges from approximately 14 to 18 percent g, which represents a low potential for damage due to a seismic event (USGS 2012a, USGS 2013).

3.4.10 Cultural Resources

Background information on the Section 106 process and the APE determined for the proposed CHPE Project and previous cultural resources investigations conducted to date for the proposed CHPE Project are discussed in **Sections 3.1.10** and **3.2.10**.

The independent GIS analysis based on site data provided by the Applicant indicates that 7 terrestrial archaeological sites and 10 architectural properties that are listed or eligible for listing in the NRHP are located within the APE of the New York Metropolitan Area Segment, which includes the Luyster Creek HVDC Converter Station and the Astoria to Rainey substation interconnection. **Table 3.4.10-1** provides a summary of these known cultural resources.

All 7 of the known archaeological sites, in addition to cultural resources that might be discovered during future surveys, would be evaluated to determine whether they are eligible for listing in the NRHP in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. The 10 known architectural properties are already listed or eligible for listing in the NRHP and, therefore, do not require evaluation.

The terrestrial portions of the New York City Metropolitan Area Segment have been screened but not formally surveyed for cultural resources (Glazer et al. 2010). In particular, the converter station site has been identified as a potentially archaeologically sensitive area associated with the historic operation of the Astoria Gas Works (now the Charles Poletti Power Plant complex) (CHPEI 2012d). The terrestrial portions of the New York City Metropolitan Area Segment would be formally surveyed for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA (see **Appendix T**). Some portions of the New York City Metropolitan Area Segment follow existing surface streets, and formal archaeological surveys might not be practicable or warranted prior to construction. In such instances, the Applicant would conduct archaeological monitoring during construction to identify archaeological resources that could be affected by construction activities (see **Appendix G**). Any previously documented resources of undetermined NRHP eligibility or newly discovered cultural resources in the APE would be evaluated for NRHP eligibility.

3.4.11 Visual Resources

As identified in **Section 3.1.11**, the ROI for visual resources in aquatic portions of the New York City Metropolitan Area Segment is 1 mile (1.6 km) from the transmission line route and for terrestrial portions the ROI is 0.5 miles (0.8 km).

Description of Resources and Viewscape. The New York City Metropolitan Area Segment is nearly completely urbanized. The viewshed along this portion of the proposed CHPE Project route varies greatly from location to location, but is dominated by urban landscapes, including buildings, parks, industry, shoreline facilities, and other development. This portion of the route contains NRHP-listed cultural resources, National Historic Sites, state parks, and local parks. No National Natural Landmarks, Palisades Park property, National Wildlife Refuges, National Scenic Byways, state game refuges, wild

Table 3.4.10-1. Known Cultural Resources in the APE of the New York City Metropolitan Area Segment

Site Type	Site Name and/or State and/or Project Site Number	Description
Terrestrial Archaeological Site	NYSM 5320, Site 639	Pre-contract traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 2838, Site 640	Pre-contact village site identified in the 1920s
Terrestrial Archaeological Site	NYSM 4056, Site 641	Pre-contact Indian trail identified in the 1920s
Terrestrial Archaeological Site	NYSM 4052, Site 649	Pre-contact shell midden identified in the 1920s; destroyed when canal excavated
Terrestrial Archaeological Site	NYSM 7249, Site 658	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 7248, Site 659	Pre-contact traces of occupation identified in the 1920s
Terrestrial Archaeological Site	NYSM 4529, Site 667	Pre-contact shell midden identified in the 1920s
NRHP-listed Architectural Property	Washington Bridge (OPRHP 00501.000738, NRL 127)	Between Amsterdam and Undercliff avenues over Harlem River
NRHP-listed Architectural Property	High Bridge Aqueduct and Tower – Part of Old Croton Aqueduct (OPRHP 00501.000753, NRL 128)	West 170th, 173rd, and 174th streets
NRHP-eligible Architectural Property	Spuyten Duyvil Swing Bridge (OPRHP 06101.007392, NRE 270)	Tip of Manhattan over Harlem River
NRHP-eligible Architectural Property	Henry Hudson Parkway (OPRHP 06101.017139, NRE 271)	Between West 72nd Street and the Bronx-Westchester County border
NRHP-eligible Architectural Property	University Heights Bridge (OPRHP 06101.000387, NRE 272)	West 207th Street over Harlem River
NRHP-eligible Architectural Property	Madison Avenue Bridge (OPRHP 06101.001362, NRE 279)	Over Harlem River to the Bronx
NRHP-eligible Architectural Property	Metro-North Harlem River Lift Bridge (OPRHP 06101.010590, NRE 281)	Park Avenue over Harlem River
NRHP-eligible Architectural Property	Willis Avenue Bridge (OPRHP 06101.008523, NRE 282)	First Avenue and East 125th Street over Harlem River
NRHP-eligible Architectural Property	Macomb's Dam Bridge (OPRHP 00501.000701, NRE 293)	Jerome Avenue at Harlem River to 155th Street
NRHP-eligible Architectural Property	Harlem Yards (OPRHP 00501.000765, NRE 294)	Willis Avenue, East 132nd Street

Sources: Glazer et al. 2010; McQuinn et al. 2010, 2012.

and scenic rivers, or New York Bond Act properties are found near this portion of the proposed CHPE Project route (NYSDOS 2004a, CHPEI 2012a, NYSDEC 2012m, NPS 2012a, USDOT-FHWA 2012a). The existing aesthetic resources found along the New York City Metropolitan Area Segment are described in **Appendix K**. For a discussion of cultural resources found along the proposed CHPE Project route in the New York City Metropolitan Area Segment, see **Section 3.4.10**.

This portion of the proposed CHPE Project route could include construction of a cooling station at MP 331. The viewshed near this MP is within the Hudson River Rail Yard and is primarily industrial but also includes Randall's Island Park, which is 0.5 miles (0.8 km) away.

The Luyster Creek HVDC Converter Station would be constructed in Astoria in an urban environment consisting primarily of industrial development. **Figure 3.4.11-1** shows an aerial photograph of the area surrounding the proposed Luyster Creek HVDC Converter Station site. The viewshed in the immediate vicinity of the converter station site is composed primarily of industrial complexes, including power plants, large parking lots, electric switchyards, and natural gas storage tanks. Residential areas are found on the border of the southern end of the study area along 20th Avenue. No aesthetic resources are found within the study area.

Key Observation Points. KOPs were established near the proposed Luyster Creek HVDC Converter Station along the proposed CHPE Project route. Although construction of the converter station does not have the potential to impact any aesthetic resources within the study area, the converter station would be constructed approximately 500 feet (152 meters) northeast of a residential area. Therefore, per NYSDEC guidelines for evaluating visual impacts, KOPs were identified to capture the baseline visual setting of the area surrounding the proposed converter station (see **Figures 3.4.11-2** to **3.4.11-4**). The analysis in this EIS is adapted from the Visual Assessment Report prepared by the Applicant for the Luyster Creek HVDC Converter Station (CHPEI 2012r); however, this analysis represents an independent evaluation and verification of their findings.

These KOPs were then evaluated to determine which would be the most representative of viewpoints for area users. Of the three KOPs evaluated, KOP #2 (**Figure 3.4.11-3**) was chosen for the photosimulation in **Section 5.4.11** because it was the best location that offered a clear vantage point from which to view the newly constructed Luyster Creek HVDC Converter Station. No KOPs are analyzed from the northwest of the proposed converter station site because although there would be views of the converter station from this direction, these views would be very limited and likely only viewed by the public from a distance on water.

3.4.12 Infrastructure

Fourteen commercial and known but unspecified infrastructure systems and line intersections with the proposed CHPE Project route (i.e., crossings) in the New York City Metropolitan Area Segment were identified at the following MPs: 324.0, 324.2, 324.9, 325.2, 325.3, 325.7, 325.8, 326.7, 326.8, 327.5, 342.2, and 328.5; and two crossings at 324.7 (CHPEI 2013d). The following paragraphs describe crossings for utilities that could be identified with a particular type of infrastructure.

Electrical Systems. The New York City Metropolitan Area Segment is within the NYSBPS area. Eighteen aquatic electrical infrastructure crossings were identified along the New York City Metropolitan Area Segment within the Harlem and East rivers at MPs 324.1, 324.9, 325.1, and 325.9; two at MP 326.0; one at 326.1, 326.2, 326.4, 329.5, 329.0, 329.7, 329.9, 330.0, 330.1, and 330.2; and two at 330.3. One of the crossings at MP 330.3 is a terrestrial crossing (CHPEI 2012w, CHPEI 2013d). There are many other minor instances of aboveground electrical infrastructure within the New York City Metropolitan Area Segment.

Sources: Imagery - (c) 2010 Microsoft Corporation and its data suppliers; KOP locations - TRC.

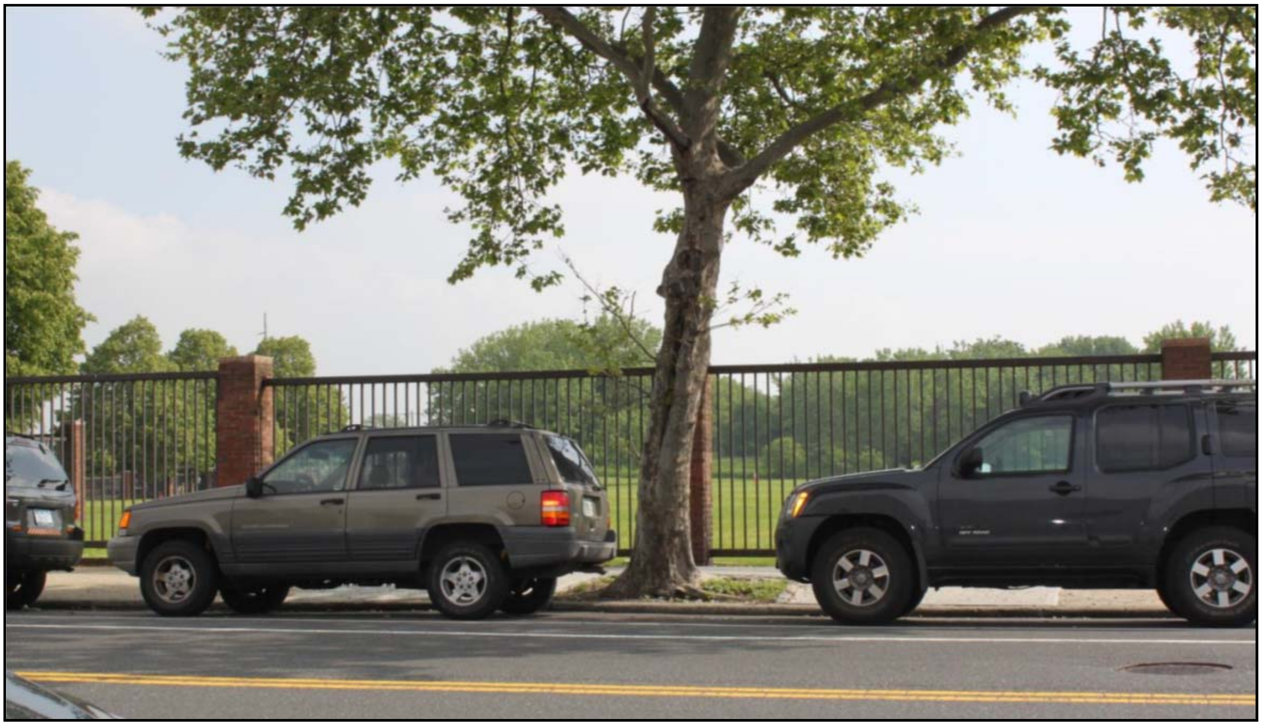
Figure 3.4.11-1. Proposed Luyster Creek HVDC Converter Station Location and Key Observation Points

Note: This photograph shows a northwest view of the proposed Luyster Creek HVDC Converter Station site, taken from Steinway Place. The converter station would be visible on the horizon in the space formed by the alleyway. Generally, views from this side of the converter station would be restricted by existing buildings and infrastructure.

Figure 3.4.11-2. Luyster Creek HVDC Converter Station KOP #1

Note: This photograph shows a north view of the proposed Luyster Creek HVDC Converter Station site, taken from 19th Avenue. The converter station would be placed on the far side of the creek in front of and to the left of the existing transmission lines.

Figure 3.4.11-3. Luyster Creek HVDC Converter Station KOP #2



Note: This photograph shows a northeast view of the proposed Luyster Creek HVDC Converter Station site, taken from 20th Avenue. The converter station would be located behind the trees in the background.

Figure 3.4.11-4. Luyster Creek HVDC Converter Station KOP #3

The Astoria Annex Substation (proposed to be interconnected with the CHPE transmission system) was recently constructed in Astoria by NYPA to support a new 650-MW combined-cycle power plant, the Astoria Energy II Plant. The substation was proposed, permitted, and developed to accommodate additional future interconnections.

Water Supply Systems. Two substantial potable water line crossings were identified and are at MPs 326.4 and 327.1 (CHPEI 2012w, CHPEI 2013d).

Storm Water Management. The New York City Metropolitan Area Segment is within the Lower Hudson River Watershed. No utility-scale storm water management systems have been identified along the ROI of the terrestrial portions of the segment. Smaller common storm water management features that are likely to be within or adjacent to the ROI include retention ponds, infiltration basins, swales, wet detention basins, ditches, culverts, and storm water pipes. See **Sections 3.1.3** and **3.2.3** for general descriptions of New York State storm water management requirements.

Communications. Two underwater buried telephone line crossings were identified and are at MPs 324.1 and 329.0 (CHPEI 2013d). These communications lines are potentially combined with electrical lines.

Natural Gas Systems. There is one substantial natural gas pipeline that has been identified at approximate MP 329.5 (CHPEI 2012w).

Sanitary Sewer and Wastewater Treatment. One sewer line crossing was identified at MP 326.4 (CHPEI 2013d).

Solid Waste Management. Since the closure of Fresh Kills Landfill in 2001, there is no longer any solid waste disposal facility within New York City limits. All solid waste generated within New York City is exported out of the city for disposal (NYSDEC 2012z). Under the City of New York Department of Sanitation's (DSNY) Long Term Export Program, approximately 93 percent of the city's solid waste is transported to landfills throughout a 200-mile (322-km) radius of the city in New York State and Pennsylvania (DSNY 2006). Refer to **Section 3.1.12** for more information on the landfill capacity of New York State.

No substantial communications, liquid fuel, or sanitary sewer infrastructure crossings have been identified within the New York City Metropolitan Area Segment (CHPEI 2012w).

3.4.13 Recreation

As identified in **Sections 3.1.13** and **3.2.13**, the ROI for recreation in the aquatic portions of the New York City Metropolitan Area Segment is 1 mile (1.6 km) from the transmission line route, and 0.5 miles (0.8 km) for terrestrial portions.

The transmission line route in the New York City Metropolitan Area Segment (i.e., MP 324 to 336) would pass by one state park and at least ten local parks, and would be close to several additional parks in Queens along the 12-mile (19-km) length. These recreational areas include Inwood Hill Park, Roberto Clemente State Park, Swindler Cove/Sherman Creek Park, Highbridge Park, Randall's Island Park, Wards Island Park, Astoria Park, Chappetto Square, Triborough Bridge Playgrounds B and C, Astoria Health Playground, and Rainey Park. These parks and recreational areas provide opportunities for walking, bird watching, picnicking, swimming, and educational programs; and facilities including sports fields and courts, dog parks, and playgrounds. In addition, a cooling station is proposed at MP 331, which would be within 0.5 miles (0.8 km) of Randall's Island Park. **Appendix K** lists the visual and recreational resources along the proposed CHPE Project route and the specific recreational opportunities available at each park.

The Luyster Creek HVDC Converter Station would be constructed in Astoria, New York, within 0.2 miles (0.3 km) of two recreational areas. The soccer fields of the Federation of Italian American Organizations of Queens are approximately 500 feet (152 meters) south of the proposed Luyster Creek HVDC Converter Station site, and the Immaculate Conception Youth Program of Astoria baseball fields are 800 feet (244 meters) to the south (FIAOQ 2013, ICYP 2013). The Woodtree Playground and Steinway Park are within 0.5 miles (0.8 km) of the Luyster Creek HVDC Converter Station. These recreational areas provide sports courts and playgrounds (NYC Parks 2013a, 2013b).

3.4.14 Public Health and Safety

The issues analyzed in this section, data sources used, and the definition of the ROI for public health and safety are discussed in **Section 3.1.14**.

Contractor Health and Safety. Potential hazards along aquatic portions of the transmission line include accidents related to cable installation and vessel accidents, and blasting activities in the Harlem River. Potential hazards along terrestrial portions include trenching, movement of heavy equipment such as excavators and graders, blasting, construction in road and railroad ROWs and near residences, and motor vehicle accidents. In addition, the Luyster Creek HVDC Converter Station site is highly industrialized, and highly industrialized areas pose different risks to contractor health and safety than less industrial sites. For example, it is likely that there are higher levels of contaminated materials at the site than in other parts of the proposed CHPE Project route. In addition, industrial sites also carry a higher risk of fire and other industrial accidents than non-industrial areas. Additional details on existing conditions for human health and safety that also apply to the New York City Metropolitan Area Segment are provided in **Sections 3.1.14** and **3.2.14**.

Public Health and Safety. The existing conditions for statewide public health and safety services for the New York City Metropolitan Area Segment are generally the same as those described in **Section 3.1.14**. Emergency services in the New York City area, however, are much more readily available from agencies such as the New York City Police and Fire Departments. In addition to those described under *Contractor Health and Safety* above, potential hazards along terrestrial portions of the transmission line include construction near residences. While the Luyster Creek HVDC Converter Station site is not a residential area, the industrial nature of the site means that any members of the public in the surrounding area might be subject to increased risks of hazardous materials exposure, industrial accidents, and fire.

The New York City Police and Fire Departments serve the residents, commercial establishments, and visitors of the Bronx and Astoria areas (NYC 2011c, NYPD 2012). The USCG provides the primary law enforcement for navigational safety and search and rescue operations along the Harlem and East rivers. The New York State Police Maritime Detail also patrols the river to enforce navigational and conservation regulations in coordination with the USCG.

Magnetic Field Safety. Magnetic field levels at various locations along the transmission line route were calculated by the Applicant to support the CHPE Project impact analysis (CHPEI 2012t, CHPEI 2012ll) (see **Section 5.1.14**). Electrical field levels were not calculated because the new HVDC transmission cables would be shielded and generally buried at least 3 feet (0.9 meters) underground in road or railroad ROWs or installed in a trench under the river bottoms.

3.4.15 Hazardous Materials and Wastes

Section 3.1.15 defines the ROI for hazardous materials and wastes as the area within the construction corridor and construction staging areas and presents additional discussion on the management and handling of hazardous materials and wastes.

Much like the Hudson River, the Harlem and East rivers contain various amounts of PCBs, metals, pesticides, and PAHs in their sediments. Sediment sampling conducted for the proposed CHPE Project has occurred at various places along the lengths of both rivers at approximately 2-mile (3-km) intervals, and in localized areas, contaminants such as those identified in **Section 3.3.15** for the Hudson River exceeded remedial action levels in some of the sediment samples (CHPEI 2012i).

No specific areas of environmental contamination have been identified along the NYSDOT railroad corridor, the rail yards, and the railroad ROW in the Bronx. However, as noted in **Section 3.2.15**, railroad ROWs are high potential areas for environmental contamination.

The proposed location of the Luyster Creek HVDC Converter Station is on the eastern side of an industrial property formerly called the Astoria Gas Works (and currently the Charles Poletti Power Plant complex). The Astoria Gas Works operated a Manufactured Gas Plant on this property from 1906 until the 1960s. Following the closure of the Manufactured Gas Plant, the property contained a Sintering Plant used to process fly ash generated by coal-burning power plants. Currently, the Astoria Gas Works property is an electrical generation and gas storage and transmission facility. The Astoria Gas Works property is being investigated under the RCRA Corrective Action Program (Site Code 241012) to address soil contamination that resulted from the former Manufactured Gas Plant and Sintering Plant operations. Additionally, PCB contamination and contamination from several fuel oil spills at the Astoria Gas Works property are undergoing remedial action. Portions of the Astoria Gas Works property are regulated under the RCRA for the storage of hazardous wastes generated from the site's current use as an electrical generation and gas storage and transmission facility (CHPEI 2012u).

Although the proposed location for the Luyster Creek HVDC Converter Station is within the eastern portion of the Astoria Gas Works property currently being investigated under the RCRA Corrective Action Program, this portion of the property was designated as no further action required in a

2008 RCRA facility investigation report. The RCRA report identified the proposed location for the Luyster Creek HVDC Converter Station as the "Eastern Parcel Area" where only four isolated areas require further investigation (ENSR 2008). All four of these areas are outside of the footprint of disturbance for the proposed converter station.

While no areas of environmental contamination have been identified at the location proposed for the Luyster Creek HVDC Converter Station, this portion of the Astoria Gas Works property has been used since 1959 for a variety of industrial applications including concrete casting operations, storage of materials associated with Con Edison's maintenance and electrical systems, storage and transfer of dielectric fluids, and the storage of maintenance materials (CHPEI 2012u). Therefore, there is the potential for undiscovered soil and groundwater contamination to be present from these industrial activities.

The proposed CHPE Project Astoria to Rainey Interconnection transmission line route traverses residential, commercial, and industrial areas that have been developed since at least the early 1900s. As such, there is the potential for undiscovered environmental contamination to be present along the Astoria-to-Rainey Interconnection route. One facility, Nelson Galvanizing, is adjacent to the interconnection route and is listed as a Toxic Release Inventory site and a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund facility (USEPA ID: NYD001229350). Currently, this facility is subject to Federal enforcement actions (CHPEI 2012h).

3.4.16 Air Quality

The air quality topics and definition of the air quality resource included in **Section 3.1.16** are the same for the New York City Metropolitan Area Segment. The ROI for the New York City Metropolitan Area Segment includes Westchester, New York, Bronx, and Queens counties, and represents the area where the substantial majority of impacts from emissions would likely occur. These counties are part of the New Jersey-New York-Connecticut AQCR.

The transmission line in the New York City Metropolitan Area Segment would extend through the Harlem River, underground in the Bronx, cross the East River, and underground again in Astoria until ending at the ConEd Rainey Substation in Queens. This segment includes the proposed Luyster Creek HVDC Converter Station. **Table 3.4.16-1** lists the most recent emissions inventories for each county in the New York City Metropolitan Area Segment and New Jersey-New York-Connecticut Interstate AQCR.

Table 3.4.16-1. New York City Metropolitan Area Segment Local and Regional Air Emissions Inventory (2008)

Counties and AQCRs	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Bronx County	11,895	20,237	72,474	1,918	2,816	1,722
New York County	29,692	39,224	211,251	7,201	7,548	3,650
Queens County	31,343	37,250	148,404	4,380	5,663	3,344
Westchester County	20,566	27,061	154,973	4,412	8,382	2,625
New Jersey-New York-Connecticut AQCR	**415,090**	**453,928**	**2,212,433**	**70,880**	**100,934**	**43,919**

Source: USEPA 2012c

Westchester, Bronx, New York, and Queens counties are further classified by the USEPA as the New York-North New Jersey-Long Island, NY-NJ-CT Area and are in nonattainment for $PM_{2.5}$, moderate nonattainment for 8-hour ozone, and a maintenance area (moderate > 12.7 ppm) for CO.

3.4.17 Noise

New York City Metropolitan Area Segment Noise Limits. New York City has noise ordinances that would apply to the Luyster Creek Converter Station site. These ordinances are described in the following paragraphs.

New York City Noise Ordinance. The Noise Code and noise-related zoning regulation for New York City are described as follows.

New York City Noise Code. The Luyster Creek HVDC Converter Station site would be subject to the New York City Noise Code (NYC Noise Code Section 24-232), which was revised in 2005 and went into effect in July 2007. Under the New York City Noise Code, construction activity is limited to weekdays between 7:00 a.m. and 6:00 p.m. The code also contains sound level standards for various sources of ambient noise and construction noise, and prohibits unnecessary noise near hospitals, schools, and courthouses.

The sound level standards limit noise levels, as they would be measured in the interior of buildings, not outdoors. **Table 3.4.17-1** provides the applicable limits for the interior of residential structures.

Table 3.4.17-1. New York City Noise Code - Maximum Noise Level (dB) Inside Receiving Room

Building Type	Octave Band Frequency (Hz)								
	31.5	63	125	250	500	1,000	2,000	4,000	8,000
Mixed-use and Residential	70	61	53	46	40	36	34	33	32

Source: CHPEI 2012u

New York City Zoning Resolution. The Luyster Creek HVDC Converter Station site also would require compliance with the 1999 New York City Zoning Resolution Section 42-21, which sets maximum permissible noise levels from any onsite activity according to octave band. The Luyster Creek site is located in a Heavy Manufacturing District (M3-1). The decibel level limits from this zoning district that may not be exceeded at any residential lot line boundary are shown in **Table 3.4.17-2**. Note that the standard presents octave band ranges as shown in the table, which are now obsolete but are still in the Zoning Resolution. **Table 3.4.17-1** also provides the current American National Standards Institute (ANSI)/International Electrotechnical Commission (IEC) standard octave band center frequencies that most closely correspond to the Zoning Resolution ranges.

Transmission Line Route Existing Conditions. Within the New York City Metropolitan Area Segment, the transmission cables would be installed primarily in the Harlem and East rivers. The New York City Metropolitan Area Segment has the highest population density and the highest traffic volumes for all modes of transportation along the proposed CHPE Project route. These conditions generally create higher ambient sound levels. Natural sounds might be present but are not likely to affect the existing noise environment; transportation noise sources and fixed-equipment noise sources would be the dominant existing noise sources.

Table 3.4.17-2. NYC Zoning Resolution Noise Standard

Octave Band Center Frequency (Hz)	Limits for M-3 District (dB)	Limits for M-3 District Adjoining a Residential District (dB)
63	80	74
125	75	69
250	70	64
500	64	58
1,000	58	52
2,000	53	47
4,000	49	43
8,000	46	40

Source: NYC 2011a

Existing noise sources in this area include noise originating from Harlem River Drive, I-87, I-278, and other major transportation routes, and air traffic associated with LaGuardia Airport. Noise-sensitive receptors in the New York City Metropolitan Area Segment include residences, schools, libraries, hospitals, and other sensitive land uses. Sensitive land uses along the proposed CHPE Project transmission line route are discussed in **Section 3.4.1** and identified in **Appendix F.2**. Areas in which a quiet setting is a basis for recreational use of the area might also be considered noise sensitive. Given this context, high transportation traffic volumes, and the fact that the New York City Metropolitan Area Segment spans more than 12 miles (19 km) through a densely developed urban area, there are numerous noise-sensitive receptors within the ROI that could be impacted by construction activities and a permanent cooling station proposed along the transmission line route.

Proposed Converter Station Site Existing Conditions. The Applicant developed a more detailed assessment of the existing conditions due to potential noise concerns in the area surrounding the proposed Luyster Creek HVDC Converter Station site. The area in the vicinity of the converter station site includes a combination of industrial, commercial, and residential land uses. The existing noise environment at the site was characterized through an ambient noise assessment conducted by the Applicant that consisted of short-term monitoring at nearby residential locations (CHPEI 2012ff).

Short-term monitoring (15 minutes in duration at each location) was conducted during the day and repeated late at night. Daytime monitoring was conducted between 7:00 a.m. and 7:00 p.m. Nighttime monitoring was conducted from about 1:00 a.m. through 2:30 a.m. to collect data during hours when there was less activity and traffic. A summary of the overall A-weighted L_{eq} short-term data collected during noise monitoring is presented in **Table 3.4.17-3**. As shown, measured daytime L_{eq} levels ranged from 57 to 61 dBA and nighttime L_{eq} levels ranged between 48 dBA to 53 dBA.

Table 3.4.17-3. Luyster Creek HVDC Converter Station Existing Ambient Noise Levels (dBA)

Location	Daytime L_{eq}	Late Night L_{eq}
20th Avenue and 27th Street	57	53
20th Avenue and 31st Street	61	50
20th Avenue and 37th Street	58	48

Source: CHPEI 2012ff

3.4.18 Socioeconomics

The issues analyzed in this section, data sources used, and the definition of the socioeconomics ROI are discussed in **Sections 3.1.18** and **3.2.18**.

Population. The New York City Metropolitan Area Segment is the most populous of the four segments within the proposed CHPE Project route with 5.2 million people living within the examined counties. The ROI of this segment contains the counties and boroughs of the Bronx, Queens, and New York (Manhattan), and is characterized by the urban area associated with New York City. New York City is the largest city in terms of population in the segment. All counties within the New York City Metropolitan Area Segment ROI experienced an increase in growth between 1990 and 2010. New York County experienced a 6.6 percent increase in growth, between 1990 and 2010. Bronx and Queens counties experienced population growth rates of 15 and 14 percent, respectively, from 1990 to 2010 (USCB 1990, USCB 2000, USCB 2012a). See **Table 3.4.18-1** for complete population data for the New York City Metropolitan Area Segment ROI.

Table 3.4.18-1. Population Summary for the New York City Metropolitan Area Segment, 1990 to 2010

Location	1990	2000	2010*	Percentage Change		
				1990 to 2000	2000 to 2010	1990 to 2010
United States	248,709,873	281,421,906	308,591,917	13.2	9.7	24.1
New York State	17,990,455	18,976,457	19,378,102	5.5	2.1	7.7
Bronx County	1,203,789	1,332,650	1,385,108	10.7	3.9	15.1
New York County	1,487,536	1,537,195	1,585,873	3.3	3.2	6.6
Queens County	1,951,598	2,229,379	2,230,722	14.2	0.0	14.3

Sources: USCB 1990, USCB 2000, USCB 2012a

*Note: 2011 census data were not available for all counties. 2010 data were used for consistent reference.

Employment. The educational, health, and social services industry accounted for the largest percentage of employees in all three of the counties that compose the New York City Metropolitan Area Segment ROI, New York State, and the United States. In Bronx County, the retail trade industry represented approximately 12 percent of employment making it the second largest industry by percentage of employment. In Queens County, the arts, entertainment, recreation, accommodation, and food services industry and the retail trade industry each employed nearly 11 percent of labor force in the county. In New York County, the professional, scientific, management, administrative, and waste management services industry was reported as the second largest employer and represented 19 percent of the workforce (USCB 2012b). The construction industry in this segment was predominantly similar to New York State, except for New York County (approximately 2 percent employed). The remaining counties reported construction industry employment rates ranging from 5 to 7 percent. **Table 3.4.18-2** contains complete employment data for each county in the ROI.

Annual unemployment levels in Bronx County were between 2 and 4 percent higher than those for New York State from 2002 to 2011. The unemployment rate in Queens and New York counties from 2002 to 2005 was greater than New York State, and from 2005 to 2011 the unemployment rates of Queens County and New York State were nearly identical, while the unemployment rate in New York County fell at a faster rate than New York State between 2009 and 2011 (BLS 2012). **Figure 3.4.18-1** displays the unemployment data for the New York City Metropolitan Area Segment.

Table 3.4.18-2. Overview of Employment by Industry for the New York City Metropolitan Area Segment, 2008 to 2010

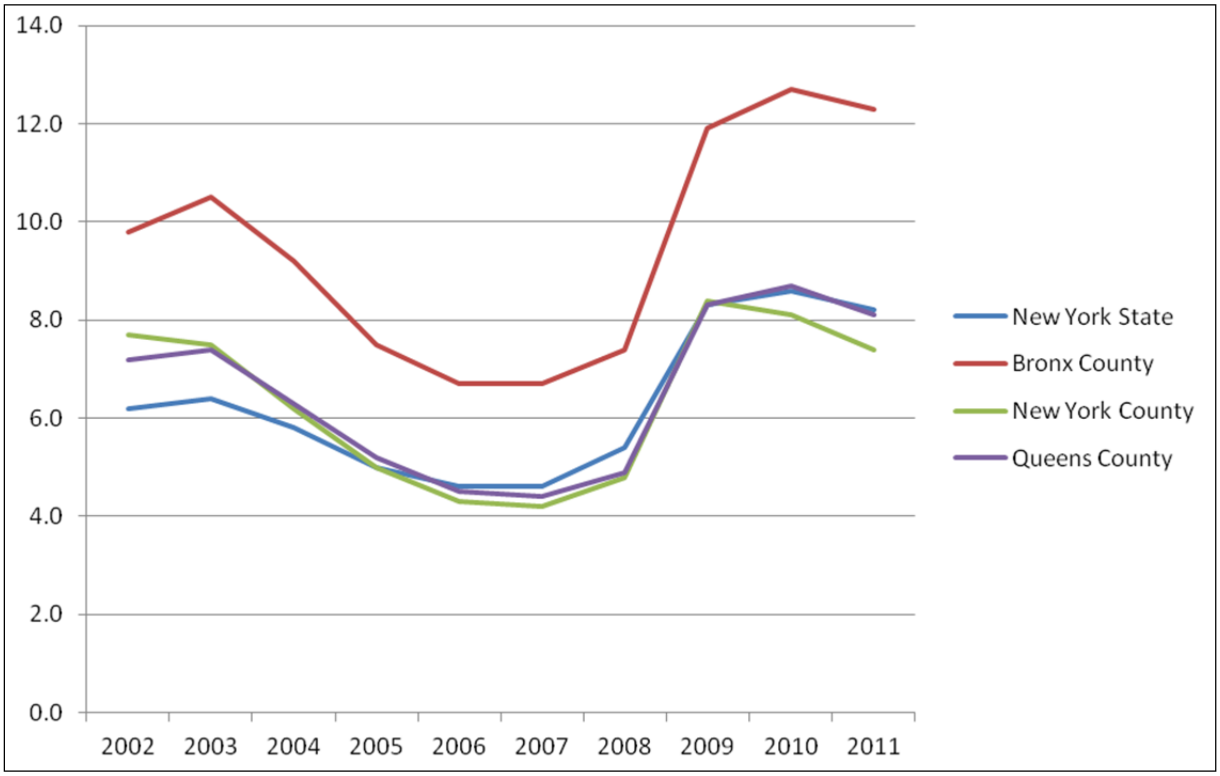
Industry*	United States	New York State	Bronx County	New York County	Queens County
Population 16 years old and over in labor force	**141,848,097**	**9,075,825**	**543,643**	**846,304**	**1,069,699**
Agriculture, forestry, fishing and hunting, and mining	1.9%	0.6%	0.2%	0.1%	0.2%
Construction	6.8%	5.8%	5.1%	1.6%	6.9%
Manufacturing	10.7%	7.0%	3.8%	3.7%	4.8%
Wholesale trade	2.9%	2.7%	2.0%	2.4%	3.0%
Retail trade	11.6%	10.7%	11.6%	7.9%	10.7%
Transportation and warehousing, and utilities	5.0%	5.2%	7.2%	2.5%	7.9%
Information	2.3%	3.0%	2.2%	6.4%	2.8%
Finance, insurance, real estate, and rental and leasing	6.8%	8.4%	7.3%	16.7%	8.8%
Professional, scientific, management, administrative, and waste management services	10.5%	10.9%	8.1%	18.7%	10.1%
Educational, health and social services	22.6%	27.1%	32.3%	22.5%	23.0%
Arts, entertainment, recreation, accommodation and food services	9.1%	8.6%	9.8%	10.4%	10.8%
Other services (except public administration)	4.9%	5.1%	6.6%	4.2%	6.8%
Public administration	4.9%	4.9%	3.8%	3.0%	4.3%

Source: USCB 2012b

*Note: Data for employment, by industry, are provided using a multi-year estimate because single-year estimates are not provided for populations less than 65,000.

Taxes and Revenue. Real property taxes would have been generated by the proposed Luyster Creek HVDC Converter Station and properties acquired along portions of the New York City Metropolitan Area Segment. Property taxes in New York State are determined locally by calculating a tax levy and dividing it by the value of all property in the jurisdiction (NYSDTF 2012).

Housing. An analysis of available rental housing was conducted because a small number of specialized workers could come from areas outside of the active construction area and might need to live in short-term rental units, motels, and campgrounds. Rental unit availability within the New York City Metropolitan Area Segment ROI varied from 17,500 units in Bronx County to approximately 31,000 units in New York County. Seasonal, recreational, or occasional use units ranged from 1,200 units in Bronx County to 28,000 units in New York County (NYSDTF 2012). There are at least 300 hotels, motels, and campgrounds with more than 12,000 units available in this segment's ROI (Fodor 2012).



Source: BLS 2012

Figure 3.4.18-1. Unemployment in the New York City Metropolitan Area Segment, 2002 to 2011

The New York City Metropolitan Area Segment ROI consists of nearly 2.2 million housing units. Approximately 8 percent of those units are vacant. The greatest number and largest percentage of vacant units occur in New York County with 83,000 vacant units in 2010, at a vacancy rate of 10 percent. Owner-occupied units make up only 27 percent of the occupied units in the New York City Metropolitan Area Segment ROI, primarily due to low owner-occupied units rates in Bronx, Queens, and New York counties, at 18, 20, and 40 percent, respectively (USCB 2012b).

3.4.19 Environmental Justice

The issues analyzed in the Environmental Justice section, data sources used, and the definition of the environmental justice ROI are discussed in **Section 3.1.19**. Minority and low-income populations in the New York City Metropolitan Area Segment ROI were identified by using U.S. Census Bureau census tract data. A total of 26 census tracts were identified in the New York City Metropolitan Area Segment ROI along the proposed CHPE Project corridor.

Minority populations within these tracts were predominantly Hispanic or Latino (11.7 to 79.8 percent of the population, with a median of 35.0 percent), Asian (0 to 23.6 percent, with a median of 10.3 percent), and Black (0.9 to 81 percent, with a median of 5.4 percent). Low-income populations were reported in nearly all of the census tracts in this segment's ROI, with population percentages that composed up to 53.9 percent (with a median of 14.3 percent) of the total number of families in the tracts. Of the 26 census tracts within this segment's ROI, 15 reported low-income population levels higher than the percentage of the state population categorized as low-income. The median household incomes reported for census tracts in this segment's ROI ranged from $16,505 to $79,948. See **Appendix L** for census tract data for populations along the CHPE Project route.

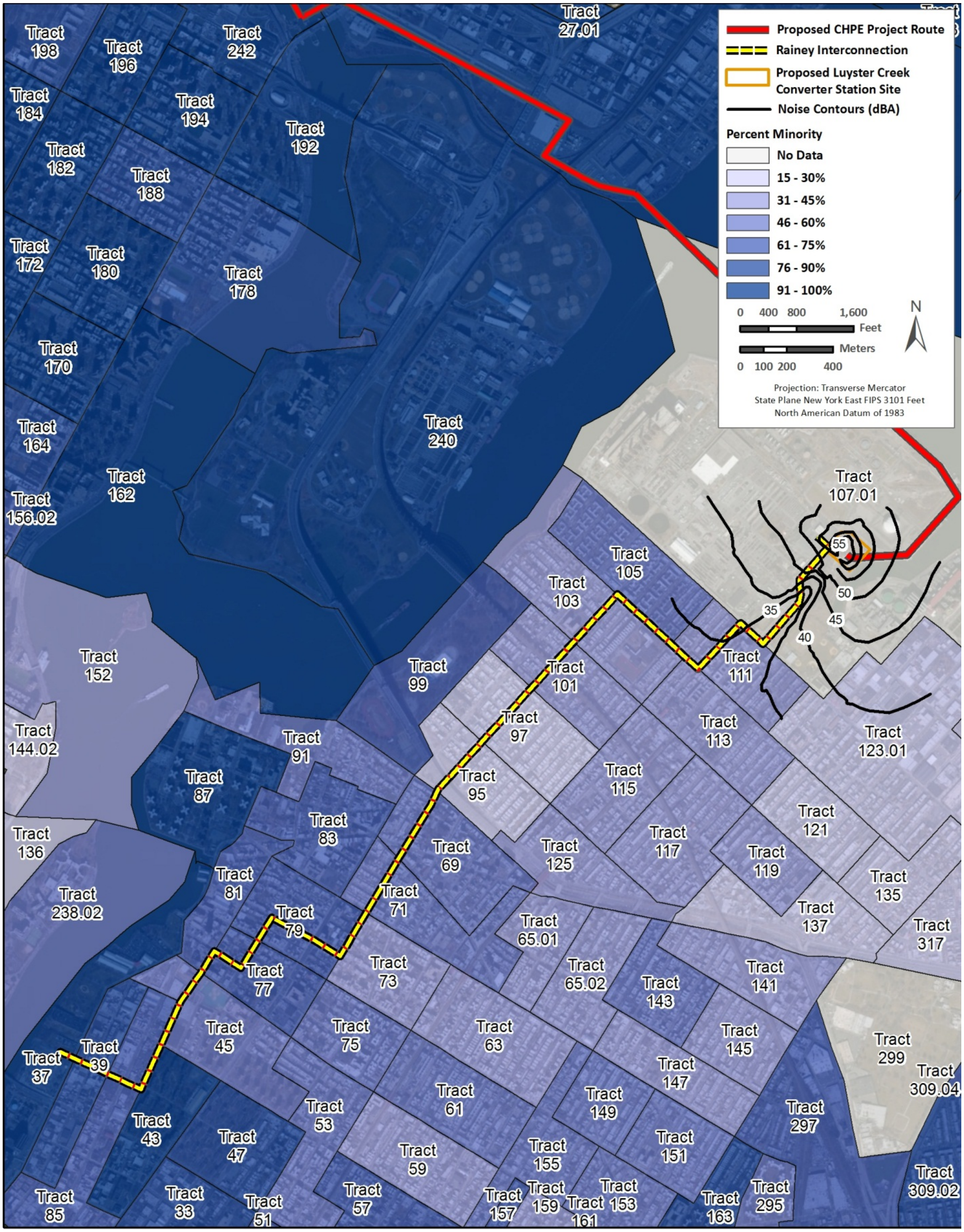
In 2010, the Hispanic or Latino population was either the first or second most abundant population in all of the counties in this segment's ROI, ranging from 25.4 percent of the total population in New York County to 54 percent of the total population in Bronx County, and was generally higher than the Hispanic or Latino percentage of the total population for New York State (18 percent). The Black population level in this segment's ROI was generally similar to the Black population level for New York State (14 percent); however, it is the second largest population in Bronx County (30 percent), well above the state level. The Asian population levels in New York (11 percent) and Queens (23 percent) counties was also higher than that of the state (7 percent).

Figure 3.4.19-1 shows the percent minority of the total populations for all the tracts in the terrestrial portions of the New York City Metropolitan Area Segment ROI and vicinity. Census tract 107.01 in Queens County, where the proposed Luyster Creek HVDC Converter station would be constructed, is zoned as industrial and has no permanent residents, although adjacent census tracts contain residential areas. Census tracts along the Rainey Interconnection are also shown in this figure.

In 2010, county-level median household incomes in the New York City Metropolitan Area Segment ROI ranged from a low of $33,742 in Bronx County to a high of $65,184 in New York County. The reported median household income in Queens County was similar to the reported state median income of $55,217, while New York County was above the state median income level. All census tracts within the New York City Metropolitan Area Segment indicated variable percentages of families that earned below the poverty level. Bronx County reported the highest percentage (26 percent) of families which earned below poverty level in this segment's ROI; far greater than the reported 11 percent of families that earned below poverty level among New York State's total population. The reported percentages of families that earned below the poverty level in New York (14 percent) and Queens (11 percent) counties were similar to levels indicated among New York State's total population. Percentages of minority and low-income populations in counties along the New York City Metropolitan Segment ROI are listed further in **Table 3.4.19-1**.

Table 3.4.19-1. Race, Ethnicity, and Poverty Characteristics in the New York City Metropolitan Area Segment in 2010

	ROI			New York State
	Bronx County	New York County	Queens County	
Total Population	1,385,108	1,585,873	2,230,722	19,378,102
Percent White	10.9	48.0	27.6	58.3
Percent Black or African American	30.1	12.9	17.7	14.4
Percent American Indian and Alaska Native	0.2	0.1	0.2	0.3
Percent Asian	3.4	11.2	22.8	7.3
Percent Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0	0.0
Percent Other Race	0.6	0.3	1.4	0.4
Percent Two or More Races	1.2	1.9	2.5	1.7
Percent Hispanic or Latino	53.5	25.4	27.5	17.6
Total Percent Minority Population	89.1	52	72.4	41.7
Percent Families below Poverty Level	26.2	13.8	11.0	11
Median Household Income	$33,742	$65,184	$54,878	$55,217



Source: Imagery - (c) 2010 Microsoft Corporation and its data suppliers; Diversity - 2010 US Census.

Figure 3.4.19-1. Percent Minority Populations by Census Tract along the Luyster Creek HVDC Converter Station and the Rainey Interconnection

3.5 Incomplete or Unavailable Information

This EIS was developed using information that was available at the time of publication. Collection of data for the proposed CHPE Project transmission system and route by the Applicant is ongoing and will be incorporated into the EIS as it becomes available, as appropriate. Applicable data collection and permitting activities would be completed prior to construction. Such incomplete information sources and data gaps include:

- Partial mapping of ecological communities along terrestrial portions of the transmission line route.
- Completion of cultural resources surveys (including subsurface testing in areas with moderate to high probability for archaeological sites) along the route. The entire transmission line route has been screened, but only a portion formally surveyed, for cultural resources.
- Updated marine surveys along aquatic portions of the route.

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4. Environmental Consequences of the No Action Alternative

The CEQ implementing regulations require that the alternatives analysis in an EIS include the No Action Alternative, which can serve as a baseline against which the potential impacts associated with DOE's Proposed Action are evaluated (40 CFR 1502.14[d]). Under the No Action Alternative, the DOE would not issue a Presidential permit for the proposed CHPE Project to cross the U.S. border. Therefore, environmental impacts resulting from the construction and operation of the proposed CHPE Project transmission line, converter and cooling stations, and substation interconnection would not occur on the 19 environmental resource areas (see detailed analyses in **Section 5**). Alternately, some environmental impacts (discussed in subsequent paragraphs of this section) are expected to result from taking no action.

The NYISO forecasted that the electricity demand in New York State will increase by approximately 0.6 percent annually between 2012 and 2022, from 163,000 GWh per year to approximately 173,000 GWh per year in 2022, even when taking into consideration energy-efficiency measures identified in the 2009 State Energy Plan. For the New York City metropolitan area, NYISO forecasts that energy demand will increase more rapidly than statewide, rising from 54,060 GWh in 2011 to 59,118 GWh in 2022, an increase of 5,058 GWh (9 percent) (NYISO 2012). It is unlikely that forecasted electricity demands would be met through conservation and demand management alone. To serve these future energy needs, the New York State Energy Highway Blueprint outlined a program for new and upgraded transmission lines, repowering or upgrading of existing power plants, and construction of new generating plants including the development of new renewable resources (NYEH 2012).

Foregoing the proposed CHPE Project, the New York City metropolitan area's forecasted energy demand would remain unmet, and development actions would be expected to continue. It is most likely that purchases of power from other generating sources would be required to address the area's electricity needs. Other generating sources could include existing facilities or development of new facilities. **Table 4-1** lists the sources that generated electric power for New York State and New York City during 2012. These facilities, which currently serve the electricity market, are powered primarily by available carbon-based fuels (e.g., natural gas, oil, and coal); however, some are powered by renewable (e.g., wind or solar power) and nuclear energy sources. Under the No Action Alternative, it can be reasonable to assume that these generating sources would continue to provide power (either through existing or future development) to the New York City metropolitan area.

Table 4-1. Electrical Generation Sources for New York State and New York City in 2012

Generation Type	Statewide	New York City
Coal	6%	N/A
Oil-Fired Only	8%	5%
Gas-Fired Only	16%	23%
Gas/Oil-Fired	37%	72%
Nuclear Energy	14%	N/A
Hydropower	15%	N/A
Wind	3%	N/A
Other Renewable	1%	N/A

Source: NYISO 2012

Improvements to the regional electrical transmission system would be required to accommodate transport of any additional generated electricity into the electrical grid. Facility upgrades and new system construction would be required to address antiquated infrastructure, which creates transmission bottlenecks and reduces the system's reliability. The New York State Transmission Assessment and Reliability Study (STARS) Phase II Study concluded that up to 40 percent of existing transmission lines within the state would be deemed antiquated and would need to be replaced over the next 30 years (NY STARS TWG 2012). Potential improvements to the system that were addressed in the study included both the replacement of existing transmission lines and the construction of new transmission lines. Construction activities required to upgrade or develop new electric transmission lines could result in impacts on environmental resources as a result of both construction activities required to upgrade or develop new transmission and operation of those transmission systems.

Environmental impacts would be expected as a result of implementing programs to increase power generation and expand existing electrical transmission systems. Without knowing the generation sources and locations, neither the impacts nor the level of the impacts potentially associated with their operations can be identified. However, it can be reasonably assumed that the environmental impacts would be similar to those that currently result from each power generation method and its associated use of fuel (USEPA 2012g).

In summary, under the No Action Alternative, the DOE would not issue a Presidential permit and the proposed CHPE Project would not be constructed. Environmental impacts related to accommodating current and future electricity demand would continue to occur. Such impacts would be associated with the operation, maintenance, and upgrading of existing electrical generation facilities to accommodate current energy needs; replacement of antiquated generation and transmission infrastructure; and construction and expansion of new facilities and transmission systems required to accommodate future increases in electricity demand that could not be met through conservation and demand management.

5. Environmental Consequences of the Proposed CHPE Project

This section includes an analysis of reasonably foreseeable direct and indirect environmental impacts associated with the proposed CHPE Project. To facilitate analysis of potential environmental impacts of the proposed CHPE Project, the transmission line route has been separated into four segments as identified in **Section 2.4.1**: Lake Champlain Segment (**Section 5.1**), Overland Segment (**Section 5.2**), Hudson River Segment (**Section 5.3**), and New York City Metropolitan Area Segment (**Section 5.4**). Cumulative impacts associated with the proposed CHPE Project are discussed in **Chapter 6**.

As part of its application development process, the Applicant identified a number of measures that it would undertake to avoid or reduce environmental impacts during construction and operation of the proposed CHPE Project (also see **Section 2.4.12**). These impact reduction measures (also referred to as best management practices [BMPs]) are part of the proposed CHPE Project, and have been considered in the analysis of potential environmental impacts presented in this section of the EIS. A listing of specific BMPs proposed by the Applicant as part of the proposed CHPE Project and considered in the EIS evaluation is provided in **Appendix G**.

5.1 Lake Champlain Segment

5.1.1 Land Use

The NYSPSC issued the Certificate for the proposed CHPE Project on April 18, 2013 (see **Appendix C**). As part of the terms of the Certificate, the Applicant would obtain the required proprietary permits, consents, and authorizations (for use of land), including specified New York City permits, prior to the start of construction. The Certificate Conditions state that the Applicant and the proposed CHPE Project would comply with substantive Federal, state, and local laws, regulations, codes, and ordinances (NYSPSC 2013).

Impacts from Construction

During installation activities, the presence and operation of the transmission cable installation vessels would result in additional vessel traffic on Lake Champlain. However, transmission line installation would not prohibit any water-dependent recreational activities such as boating, angling, or water sports, or commercial sightseeing because vessels could either transit around the work site or use a different area of Lake Champlain. Additional vessel traffic would be temporary (i.e., for the duration of construction while vessels and equipment would be present) and localized at the work site. Approximately 1 to 3 miles (2 to 5 km) of transmission cables can be installed per day in an aquatic environment, so the work site, which would be off-limits to other vessels, would not remain at any one location for a long period of time. The presence of cable-laying vessels could also disrupt (i.e., delay, temporarily cancel, or otherwise change) commercial ferry operations on Lake Champlain. The guidance cables for the cable ferry in Lake Champlain would be temporarily removed from the lakebed prior to the installation of the transmission cables, which may put the ferry temporarily out of service. All transmission cable installation activities would be closely coordinated with commercial ferry operators; USACE; USCG; local pilot associations; marinas; and other local, state, and Federal agencies, as necessary, to minimize or avoid impacts. Additionally, an Aquatic Safety and Communications Plan would be provided to the USCG and local waterway users, and stakeholders and interested parties would be notified of transmission cable installation activities. See **Appendix G** for a list of Applicant-proposed measures. See **Sections 5.1.2** and **5.1.13** for more information regarding impacts on transportation and recreation respectively from construction of the proposed CHPE Project.

Minimal land-based support would be required for installation of the aquatic transmission cables in Lake Champlain. Transport of the transmission cables would occur via the cable-laying vessel or supply barge; and other equipment, materials, and supplies would be transported to the work site by resupply barges. The land-based support facility for supplying transmission cable would be located at an existing port with heavy lift facilities, such as the Port of Albany. The project activities that would take place at the Port of Albany would be compatible with adjacent land uses. From the Port of Albany, vessels would transit the New York State canal system to access Lake Champlain. A small (approximately 60,000 square feet [5,574 square meters]) temporary storage area on land in the Lake Champlain Segment might also be required to support the cable installation activities. This site, if needed, would be identified by the Applicant's marine contractor and it is anticipated that an existing commercial marine facility with docking and storage space would be utilized for this purpose.

Because the transmission line would be installed along state-owned submerged lands under Lake Champlain, the Applicant would be required to obtain an easement from the New York State Office of General Services and pay associated fees. Submerged lands easements are typically issued for 25-year terms.

Because the proposed CHPE Project would be completely underwater in the Lake Champlain Segment, most land use plans and policies, which focus on land-based issues, would not apply. The construction phase of the proposed CHPE Project in the Lake Champlain Segment would be compatible with surrounding land uses; therefore, it would be consistent with potentially relevant local plans and policies, including the relevant Local Waterfront Revitalization Programs (LWRP) for the Town of Essex. Exhibit 121 of the Joint Proposal has a full list of plans and policies that might be relevant and the accompanying consistency analysis. Also, see the Coastal Zone Consistency Documentation in **Appendix F.1** for a more detailed list of enforceable LWRP policies that might be relevant and the Applicant's LWRP consistency assessment.

Impacts from Operations, Maintenance, and Emergency Repairs

The location of the transmission line would be marked on navigation charts to aid in identifying its location. The proposed CHPE Project route within the Lake Champlain Segment was designed such that it avoids designated anchorage areas; therefore, limitations on vessel anchorage would be minimized.

Periodic (i.e., occurring once a year or every few years, and not ongoing) inspections of the transmission cables within the Lake Champlain Segment would be performed using vessel-mounted instruments. Inspections would result in a negligible amount of additional intermittent vessel traffic on Lake Champlain for the lifespan of the proposed CHPE Project from the presence of inspection vessels. Inspections of the aquatic transmission cables would occur periodically after installation (at least every 5 years) with more frequent inspections potentially occurring at locations where strong currents exist or abnormalities are identified. No impacts on water-dependent recreational activities such as boating, angling, or water sports, or commercial sightseeing would occur because inspection vessels would only be stationary in one location for short time periods, and other vessels could either transit around the inspection vessel or use a different area of Lake Champlain.

If necessary, emergency repair activities would result in temporary (i.e., for the duration of emergency repairs) impacts on existing commercial and recreational uses of Lake Champlain due to the presence of cable repair vessels at the site of the fault. Repair work would occur over a short time period and repair activities would be limited to the immediate vicinity of the repair site.

Operation, inspections, and emergency repairs of the proposed CHPE Project would be consistent with potentially relevant land use plans and policies, including the LWRP. The transmission line would be completely underwater in Lake Champlain and would not be visible; therefore, it would be compatible with surrounding land uses and consistent with local plans and policies that might be relevant.

5.1.2 Transportation and Traffic

Impacts from Construction

During installation activities, the transmission cable installation vessels would result in additional vessel traffic on Lake Champlain, which could inconvenience and create minor navigational obstacles (e.g., temporary loss of use of portions of waterways) for other commercial and recreational vessels using the lake. However, cables would not be buried in anchorage areas and full use of waterways would resume following installation activities. Transmission cable installation would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the work site or use a different area of Lake Champlain. If conditions do not allow other vessels to transit around the work site, the Applicant would ensure that aquatic construction does not interfere with routine navigation by making adjustments to the work site. Disturbance to recreational and commercial uses would be temporary and localized at the work site. Approximately 1 to 3 miles (2 to 5 km) of transmission cable can be installed per day in an aquatic environment, so the work site, which would be off-limits to other vessels, would not remain at any one location for a long period of time. In addition to creating inconveniences and navigational obstacles, the presence of cable installation vessels could disrupt (i.e., delay, temporarily cancel, or otherwise change) commercial ferry operations on Lake Champlain. The installation activities would be coordinated with the USCG so that work areas are marked properly to ensure safety, and so that current information about the location of work zones can be broadcast to recreational users. This would minimize conflicts with construction activity and allow for advance planning for other users.

The transmission cables would be buried beneath the lakebed at a maximum target depth of 4 feet (1.2 meters) except in soft sediment in the federally maintained (i.e., dredged) navigation channel where the depth would be 8 feet (2.4 meters) below authorized depth, or to a reasonably attainable depth in the event obstacles are encountered. However, in areas where burial to protect the cables from mechanical damage might not be necessary (e.g., waters greater than 150 feet [46 meters] in depth), the cables could be laid on the lake bottom and covered with protective mats (CHPEI 2012q).

Construction would result in short-term impacts on commercial and recreational uses in the Champlain Canal, which would be used to transport and the construction materials from the Port of Albany to Lake Champlain. HVDC cables would be delivered and installed via barge vessels designed to fit within the canal locks system. These vessels could cause temporary delays/disruptions (i.e., cancellations or other changes) to commercial and recreational boating traffic in the area. Purpose-built tugs and barges with appropriate drafts would be used to transit the Champlain Canal where the controlling depth is 9.5 feet (2.9 meters). Close coordination of installation activities would be conducted with the New York State Canal Corporation to avoid or minimize impacts on commercial and recreational use of the canal system and seasonal events occurring in the canal.

Construction activities within this segment would occur over one construction season during the summer and fall months to avoid potentially icy conditions on Lake Champlain. Construction would be coordinated with the USACE and USCG to avoid impacts on aquatic navigation, including avoidance of federally, state, and privately owned navigation aids such as buoys and signs for boaters. Additionally, an Aquatic Safety and Communications Plan would be provided to the USCG and local waterway users, and stakeholders and other potentially interested parties would be notified of transmission cable installation activities. See **Appendix G** for a list of Applicant-proposed measures.

In areas where the transmission cables would cross Federal navigation channels or anchorage areas, the transmission cables would be buried according to the specifications of the USACE as described in **Section 2.4.10.1**. Cable-laying activities on the water are estimated to occur at a rate of 1 to 3 miles (2 to 5 km) of cable per day. During this time and in these immediate areas designated for active cable laying, commercial and recreational boating would be limited for safety reasons. The Applicant would employ a fleet of approximately four vessels, the cable-laying vessel, survey boat, crew boat, and tugboat or tow boat, which would be used to coordinate laying of cable. Impacts on navigation from cable-laying activities would primarily be limited to the immediate area where cable-laying activities occur, and are expected to be short-term.

During construction, the transmission cables would be buried within an existing Federal navigation channel between MPs 98 through 101. The shear plow would be used to bury the cable to a depth of 8 feet (2.4 meters) in the navigation channel. Depending on navigation limitations along the route, it is possible that a dynamically positioned lay barge, tugboat-positioned vessel, or an anchor-positioned vessel such as a spud barge could be used for some or all of the cable installation. In instances where environmental or engineering circumstances suggest that the cables should be laid within or across the navigational channel, coordination would be conducted with the USACE, USCG, local pilot associations, and other agencies as necessary to minimize the impacts on normal navigation activities and ensure cables are installed at the proper depth. Dredging could also have short-term impacts on navigation from barges traversing to and from spoil disposal areas, as required.

Since the proposed aquatic transmission cable in this segment passes under several bridges along the cable route, for each bridge, the Applicant would coordinate with the owner of the bridge regarding clearances, required distance from abutments and existing infrastructure, cable burial, and installation methods. Horizontal and vertical clearances for cable installation would be provided in the final design included in the EM&CP. The Applicant would provide notice to, and coordinate with, NYSDOT for any bridge, regardless of ownership, that provides a crossing for, over, or under any street or highway.

On average, approximately 300 construction workers would be employed over the entirety of the proposed CHPE Project at any given time during the construction period. It is anticipated that these construction workers would be dispersed along the entire proposed CHPE Project transmission line route where work is ongoing, including MPs 0 to 101 in this segment, and would not all be concentrated in any one area.

Minimal land-based support would be required to resupply cable-laying vessels for installation of the aquatic transmission line in Lake Champlain. Existing port facilities (i.e., Port of Albany) would be used to facilitate this land-based support, and might require a temporary staging area no greater than 60,000 square feet (5,574 square meters). Land-based activities would be coordinated with operators of port facilities to avoid disruption (i.e., disturbance or interruption) of other regular port activities. Trucks would be required to support land-based operations; however, the number of vehicular trips generated would likely be negligible and would not affect traffic operations on the roadway network. Since the proposed use of the port facility is consistent with its currently permitted land use, the net difference in port traffic at the site resulting from the proposed CHPE Project compared to typical business operations would be negligible.

In portions of the proposed CHPE Project where the route would intersect with the cable ferry line in Lake Champlain, guidance cables would be temporarily removed from the lakebed prior to the installation of aquatic transmission cables. The ferry guidance cables would be reinstated after the installation of the transmission cables. The ferry operator reports that its chains are replaced every 4 years; therefore, there could be an opportunity to coordinate the transmission line installation schedule with the ferry cable replacement schedule. The scheduling and installation of transmission cables would be coordinated with ferry operators to minimize disruption of ferry service.

The work on the proposed CHPE Project in this segment would be coordinated with the USCG so that work areas are marked properly to ensure safety, and so that current information about the location of work zones can be broadcast to recreational users. This would minimize conflict with construction activity, and allow for advance planning for recreational users. In addition, a list of existing marinas would be developed and the dimensions of their respective marina channels identified and plotted. Locations of existing marinas would be indicated on the EM&CP Plan and Profile drawings. Marina operators would be given advanced notice of cable laying in their area and an opportunity to identify and discuss any concerns with the contractor (CHPEI 2012q).

Since the installation of the aquatic transmission cables would take place from a barge, traffic operations on the U.S. Route 2 Bridge or the Crown Point Bridge would not be impacted.

All installation equipment, including barge cranes used for cable delivery and installation, would comply with established vessel height requirements per the Federal Aviation Administration (FAA) and the regional port authorities, as appropriate (CHPEI 2012aa). Therefore, the proposed CHPE Project would not affect air transportation systems.

Impacts from Operations, Maintenance, and Emergency Repairs

The proposed CHPE Project route within the Lake Champlain Segment was designed such that it avoids designated anchorage areas; therefore, limitations on vessel anchorage would be minimized. In addition, precise cable locations would be established and would be published on nautical charts. Impacts from the operation of the transmission line on the potential for anchor snags would not be expected to be significant. Transmission cables would be buried to the depths prescribed by the USACE (see **Section 2.4.10.1**), thereby avoiding the possibility of vessel anchors hooking onto the transmission line and causing damage to vessels or the transmission line. However, anchors could become snagged on the concrete mats that would be used to cover portions of the transmission line that could not be buried. The total area where concrete mats would be used to cover the transmission line would represent less than 0.001 percent of the acreage of the proposed CHPE Project route in Lake Champlain, and less than 0.001 percent of the acreage of the waterbodies along the entire aquatic portion of the proposed CHPE Project route. Therefore, impacts on vessels or vessel anchors from use of concrete mats would be expected to be minimal. Additionally, in most areas of Lake Champlain, the depth of the water likely would be greater than the length of the anchor chain used by most vessels on the lake. In the event that an anchor snag occurs, the vessel crew would notify the USCG and the Applicant; and the Applicant would repair the cables (if necessary), transport a new anchor to the barge, cut the snagged anchor chain, and, if possible, recover the anchor. A comprehensive Anchor Snag Manual would be developed with stakeholders to address situations in which a vessel's anchor snags the transmission cables or concrete mats placed above the cables, and to identify appropriate protocols. The proposed manual would include a Navigation Risk Assessment prepared for the proposed CHPE Project (see **Appendix U**) that would address expected impacts on current and future commercial vessels. The USCG would have an opportunity to review the Anchor Snag Manual and the associated Navigation Risk Assessment prior to construction. Additionally, the Applicant would commit to meeting with the USCG, along with Applicant's cable installer, prior to construction.

Impacts from the magnetic properties of the transmission line on mechanical navigational compass readings would not be expected to be significant. For cables buried at 4 feet (1.2 meters) and separated by a distance of 6 feet (1.8 meters), the maximum deviance from magnetic north at 19 feet (6 meters) above the water would be an estimated 20 degrees at approximately 20 feet (6 meters) east or west from the cables. The deviance from magnetic north would be reduced to zero at a distance of 50 feet (15 meters) from the cables. This would likely only affect the upper (north of MP 12) and lower (south of MP 68) reaches of Lake Champlain where the transmission line would be buried in waters less than 50 feet in depth. The calculated deviance would be less where the cables are laid in deeper water or where the cables would be spaced closer together (CHPEI 2012ccc).

Regular inspections of visible parts of the transmission cables, landfall, and nearshore protection would be conducted to ensure cable integrity. Inspections of the underwater cables would be performed by vessel-towed instruments. Inspections would result in intermittent inconveniences and navigational obstacles to recreational and commercial traffic on Lake Champlain for the lifespan of the proposed CHPE Project resulting from the presence of inspection vessel traffic. Inspections occur periodically (at least every 5 years) following installation to ensure equipment integrity and protection (e.g., appropriate burial depths, concrete mats, rip-rap) are maintained. In addition, spot checks of the transmission cable protection materials would be performed during or after the first year of operation. These spot checks could occur more frequently at locations where strong currents would be expected or in other areas where abnormalities were identified. The transmission cables within the Lake Champlain Segment would be accessible either by divers or ROVs and, therefore, inspections would be performed from watercraft. Transmission cable inspection would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the inspection vessel or use a different area of Lake Champlain. Disturbances to recreational and commercial uses would be temporary and localized in the vicinity of the inspection vessel. Inspection of the aquatic transmission system as described herein is not anticipated to disrupt normal operations in Lake Champlain.

Emergency repair activities, should they occur, would be expected to result in temporary impacts on existing commercial and recreational uses of Lake Champlain due to inconveniences and navigational obstacles from the presence work barges and other vessels. The frequency of emergency repair activities cannot be predicted, but the repair time would be short-term, and a majority of the repair activities would be limited to the immediate vicinity of the repair site. If damage to the transmission cables occurs at or near the existing ferry cable or utility infrastructure, it is possible that these uses could be disrupted during emergency repair activities. See **Sections 5.1.12** and **5.1.13** for more information regarding impacts on infrastructure and recreation from emergency repairs of the proposed CHPE Project in the Lake Champlain Segment.

In the rare event when emergency repairs are needed, a project-specific Emergency Repair and Response Plan (ERRP) would be implemented. The Plan would be developed after the design is completed. It would identify procedures and contractors that would perform emergency repairs, and would detail activities, methods, and equipment required to repair the transmission system, including the procedures to minimize the impact on the environment. The Applicant would be responsible for ice breaking operations if so required by emergency repair activities. Disruptions on the transportation system due to emergency repairs, if any, are not anticipated to be significant.

Decommissioning of the proposed CHPE Project transmission line would consist of de-energizing and abandoning the transmission line in place. There would be similar minimal impacts on anchorage from potential anchor snags on concrete mats as described for operation of the transmission line. If decommissioning plans change, decommissioning would be conducted in accordance with applicable regulations at that time.

5.1.3 Water Resources and Quality

Impacts from Construction

Surface Water and Water Quality. Installation of the transmission line, including debris removal, in the lake bottom of Lake Champlain would impact the water quality of Lake Champlain during construction. Construction within Lake Champlain and the other surface waters and wetlands along the proposed CHPE Project route would require a Section 404 and Section 10 permit from the USACE. The initial application and supporting information were submitted by the Applicant to USACE in 2010 with supplemental information provided in February 2012 and July 2013 (see **Appendix B**). The Applicant received a CWA 401 Water Quality Certification from the NYSDPS in January 2013.

Between the U.S./Canada border and MP 74, the aquatic transmission cables would be installed within the lakebed sediment at depths of at least 4 feet (1.2 meters) using water-jetting techniques. Impacts on water quality would be caused by temporary localized increases in turbidity (a measurement of the cloudiness or amount of Total Suspended Solids [TSS] in water) and the associated resuspension of sediments resulting from trenching and disturbance within the waterbody. South of MP 74, where the lake is shallower and narrower, shear plow techniques, described in **Section 2.4.10.1**, would be used to bury the transmission cable 4 feet (1.2 meters) deep, except in soft sediment in the federally maintained navigation channel where the depth would be 8 feet (2.4 meters), to minimize turbidity and sediment resuspension and transport to ensure that maximum TSS concentrations do not exceed 200 mg/L (CHPEI 2012ii).

Increased turbidity has the potential to reduce light levels in aquatic habitats and could result in temporary changes to water chemistry, including effects on pH and reduced dissolved oxygen. Reduced dissolved oxygen levels result if lowered light levels decrease the oxygen production of photosynthetic organisms, or biological oxygen demand (BOD) is increased by sedimentation. Fish and other mobile organisms would be expected to avoid areas that are temporarily impacted by construction activities, but less mobile or sessile aquatic organisms could be affected by changes in water quality (CHPEI 2012i). See **Section 5.1.4** for a detailed discussion on impacts on aquatic habitats and species.

HDD technology would be used for the transition from water to land. HDD does have the potential for frac-out (leaks of HDD drilling fluid containing bentonite clay) during HDD operations, which could cause drilling fluid to become suspended or dispersed and could impact water quality. However, a Spill Prevention, Control, and Countermeasures (SPCC) Plan would be developed and any releases of drilling fluid would be contained in the cofferdam area during construction. The sheet pile cofferdam would be installed around the HDD exit point. The area inside the cofferdam would be dredged to create a pit at the end of the HDD conduit to allow the cable to be pulled into the conduit. This dredging would result in suspension of sediment, which would be contained however within the cofferdam area. Silt curtains would be used, as required, around the work area; however, it is not anticipated that any silt would escape from within the cofferdam. The cofferdam would remain in place during the HDD operation to minimize the chance of a release of drilling fluids into the lake.

Water quality modeling was conducted by the Applicant to estimate the dispersion of sediment and other constituents during the cable installation process. A three-dimensional hydrodynamic and water quality model of Lake Champlain was developed for the proposed CHPE Project using the Danish Hydraulic Institute's MIKE3 water quality modeling software. The model was used to simulate the dispersion of 10 contaminants that were present in the sediment cores collected during the 2010 Marine Route Survey: copper, zinc, lead, cadmium, benz(a)anthracene, nickel, chromium, mercury, arsenic, and pyrene. To simulate the cable-laying operation, a series of contaminant load points at approximately 2-mile (3-km) intervals were evaluated. These load points matched the locations where sediment cores were taken. At each point, the contaminant load was sequentially turned on and off to simulate the effect of the continuously moving cable operation. The contaminants loaded at each point were based on the sediment core data and relevant cable installation data. Both dissolved and solid fractions of contaminants were computed in the model (CHPEI 2012hh).

The maximum model-computed concentrations of contaminants along the cable route were graphically presented and compared to New York and Vermont's water quality standards for Lake Champlain. The comparisons showed that the proposed CHPE Project would comply with the New York State and Vermont water quality standards for all of the 10 modeled contaminants. **Table 5.1.3-1** presents the modeling results for copper and zinc. New York State's standards for copper and zinc are based on the dissolved form and Vermont's standards are based on total copper and zinc levels. Based on the modeling results, total copper and zinc concentrations during the cable installation would be below water quality standards for both New York State and Vermont (CHPEI 2012hh, CHPEI 2012ii).

Table 5.1.3-1. Maximum Concentrations of Constituents by Installation Method

Constituents	Jet Plow Method (MP 0 to 74)	Shear Plow Method (MP 74 to 101)	Expected Average in Lake Champlain for Shear Plow	New York Water Quality Standard	Vermont Water Quality Standard
TSS	410 mg/L	15 mg/L	< 200 mg/L	None	None
Copper	0.012 mg/L	0.0004 mg/L	0.011 mg/L	0.013 mg/L	0.0187 mg/L
Zinc	0.065 mg/L	0.0016 mg/L	0.043 mg/L	114.2 mg/L	0.1 mg/L

Sources: CHPEI 2012hh, CHPEI 2012ii

TSS concentrations associated with cable installation were also assessed. While there are no established numerical standards for TSS for New York State, TSS levels are reviewed as a proxy for suspended solids that are typically derived from sewage, industrial wastes, or other wastes that could cause deposition or impact the waters for their best uses (NYSDEC 2012f). However, a 200 mg/L level has been established by New York State as a dissolved solids guideline pursuant to NYSDEC Regulations Chapter X Part 703 and a threshold for TSS during the NYSPSC Article VII environmental review process for other aquatic electric transmission cables in New York State (HTP 2008). Based on the modeling results, the Applicant has proposed to use a jet plow to install the transmission cables north of the Lake Champlain Bridge at Crown Point (between MPs 0 and 74) and use the shear plow south of Crown Point (between MPs 74 and 101). Along nearly all of the route within Lake Champlain, depth-averaged TSS concentrations (the average of concentrations from depths at a single point) associated with cable installation are expected to be less than 200 mg/L. North of Crown Point at MPs 70 to 72, TSS concentrations as modeled would be greater than 200 mg/L for a total of approximately 2 miles (3 km) and for an approximate duration of less than 1 week (CHPEI 2012hh, CHPEI 2012ii). Depending on the sediment particle-size composition, the majority (approximately 70 to 80 percent) of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the plow. With higher currents, more sediment can be transported outside the trench area (HTP 2008, MMS 2009, CHPEI 2012i). Therefore, elevated TSS concentrations from construction activities would result in temporary impacts on water quality. **Table 5.1.3-1** compares the water quality parameters for the water jetting or shear plow installation method.

Applicant-proposed measures to minimize impacts on water quality, including suspended sediment plume and water quality monitoring, are presented in **Appendix G**. As specified in the NYSPSC Certificate for the proposed CHPE Project (Condition 163), the Applicant would conduct additional pre-installation physical and chemical sediment sampling in Lake Champlain for use in post-installation monitoring (NYSPSC 2013).

Floodplains. With respect to floodplains, Lake Champlain is classified as a 100-year floodplain by FEMA (Zone AE, defined as a "High-Risk Area"). Zone AE is a 100-year floodplain that has an established base flood elevation. Burial of transmission line under Lake Champlain would be consistent with and have no effects on current use, property management, and plans for development. Therefore, no effects on floodplains would be anticipated from construction of the proposed CHPE Project transmission line Lake Champlain.

Groundwater. No impacts on groundwater would be anticipated during installation of the transmission line because the area to be disturbed during construction activities would be beneath Lake Champlain.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation of the transmission line would not be expected to result in significant impacts on water temperature for the lifespan of the proposed CHPE Project. The cable generally would be installed to approximately 4 feet (1.2 meters) below the sediment surface. The Applicant calculated thermal impacts on water quality from operation of the transmission line. The predicted increase in temperature at the sediment surface directly above the cables, assuming burial to a depth of 4 feet (1.2 meters) with no cable separation, was estimated to be 1.8 °F (1.0 °C), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C) (CHPE 2012dd, CHPE 2012kk). A slightly greater impact, but still negligible, would be expected in a few places where the transmission line is not buried and is covered with rip-rap or concrete mats to cross other utility infrastructure. The estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C) (Exponent 2014). Because these temperature increases would be within the normal seasonal range of temperature variability in Lake Champlain, no significant impacts on other water quality parameters would be anticipated to occur during operation of the transmission line.

Inspection activities would be non-intrusive; therefore, no impacts from inspection of the transmission line would be expected. During potential emergency repair activities, the cable would have to be exposed, pulled up onto a repair barge, a repair section spliced in, and then lowered to the bottom and reburied. Impacts on water quality would include localized increases in turbidity and resuspension of sediments. While the frequency of emergency repairs cannot be predicted and the repair time would vary, repairs would be short-term and limited to the immediate vicinity of the repair site. The impacts would be similar to the original installation, but with a shorter duration and smaller overall area of disturbance.

No long-term impacts on floodplains, human life, or property would occur from operation or maintenance of the proposed CHPE Project in Lake Champlain. The underground installation and burial of the transmission line within the sediments of the Lake would not impact flood flows, flood storage, or cause a flooding hazard.

5.1.4 Aquatic Habitats and Species

Impacts from Construction

Lake Champlain is a dynamic environment where storms, water currents, wave action, and human activity disturb sediments. Installation of the transmission line is expected to result in a temporary disturbance of the lake bottom. Installation of the transmission line would result in up to 612 acres (248 hectares) of lakebed disturbance in Lake Champlain. This total includes a conservative disturbance area estimate of 25 feet on each side of the transmission line (for a 50-foot construction corridor), which includes settlement zones where a majority of the sediment disturbed by the line would settle. Barge positioning, anchoring, anchor cable sweep, and the pontoons on the jet plow could cause additional sediment disturbance. The collective length of all work areas where anchors might be deployed is projected to be less than 1 percent of the approximately 197-mile (317-km) aquatic portion of the proposed CHPE Project route. Once stabilized following deployment, the anchors would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. Spud anchors would be used during the installation of the cofferdam and cable landing at the water-to-land transition. Each barge would include two spud anchors with 3-foot (0.9-meter) diameters. Anchors also require approximately 200 square feet (18 square meters) (20 feet [6 meters] by 10 feet [3 meters]) to dig in and stabilize. For four anchors, that is a total of 800 square feet (72 square meters) or 0.02 acres (0.01 hectare). Midline buoys would be used to prevent anchor chain sweeps that might otherwise affect benthic habitat.

Debris removal would occur in the fall preceding installation activities the next year. Sediment disturbance associated with debris removal would occur within the area to be disturbed by the actual transmission line installation within the following year.

Depressions in the lake bottom over the installed cable are anticipated after installation, but the contours of the lake bottom are expected to return to pre-installation conditions through natural redeposition of the disturbed material into the trench depression within 3 years (CHPEI 2012b). Impacts from sediment disturbance associated with aquatic transmission line burial would include the displacement of benthic and demersal (i.e., bottom-dwelling) species.

Installation of the underwater transmission lines would disturb sediment, increase turbidity in the water column, and disturb previously settled contaminants, resulting in temporarily increased turbidity in the vicinity of construction within the Lake Champlain Segment. TSS concentrations were estimated for water jetting and shear plow activities. Where water jetting would be used, depth-average TSS concentrations associated with transmission line installation are expected to be less than 200 mg/L along the Lake Champlain route (see **Section 5.1.3** for an explanation of this threshold). South of MP 74 (Crown Point), where turbidity is a greater concern, a shear plow would be used to install the transmission cable to minimize turbidity from sediment resuspension and transport to ensure maximum TSS concentrations do not exceed 200 mg/L (CHPEI 2012ii). See **Section 5.1.3** for additional information on water quality modeling and impacts associated with the various transmission line installation methods.

Re-suspended contaminated sediments have the potential to harm aquatic life and can eventually become ingested by people through consumption of local fish and water. Water quality modeling was also used to simulate the 10 most common contaminants found in sediment cores collected during the Applicant's Spring 2010 Marine Route Survey (CHPEI 2012o), which were copper, zinc, lead, cadmium, benz(a)anthracene, nickel, chromium, mercury, arsenic, and pyrene (CHPEI 2012hh). Based on water quality modeling, no contaminants are expected to exceed New York or Vermont water quality standards. The NYSPSC Certificate for the proposed CHPE Project requires that a water quality monitoring plan be carried out as part of pre-installation trials of the jet and shear plows, and that TSS levels be monitored during transmission line installation to ensure that the 200 mg/L TSS guideline is not exceeded within 500 feet (152 meters) of the installation operation.

Aquatic Habitats and Vegetation. Impacts on aquatic vegetation would result from sediment disturbance (including redeposition) that would cause a reduction of growth and primary production related to burial, coating of plants with fine sediments, and reduced light penetration. These impacts are expected to last just slightly longer than the duration of the plume because of the characteristics of burial and coating. Impacts would be limited because vegetation is primarily present along shoreline areas and in shallow embayments, while cable installation would only occur in deeper waters. Direct disturbance to submerged aquatic vegetation (SAV) in the northern portion of Lake Champlain Segment (i.e., north of Crown Point) would be minimal because the aquatic transmission line would be installed at depths greater than where vegetation grows. SAV is more prevalent in the southern portion of Lake Champlain where the lake is relatively shallow and sunlight can penetrate to the vegetation. Impacts such as crushing, injuring, and uprooting of SAV would occur during the transmission line installation in the southern portion of the Lake Champlain Segment. Other impacts would occur from increases in turbidity, which could reduce light availability and affect rates of photosynthesis (Klein 1997, Nightingale and Simenstad 2001, Eriksson et al. 2004). However, impacts from sediment disturbance would be minimized through adherence to the 200 mg/L TSS guideline as measured through the water quality monitoring program required in Certificate Condition 159 (NYSPSC 2013).

Redeposition of sediments could result in burial of SAV, although different species have different tolerances for sediment accretion. As such, burial of SAV from redeposition of sediments can result in loss of SAV and changes in species composition (Berry et al. 2003). Additionally, any areas containing

SAV where concrete mats or rip-rap would be installed could experience a long-term change in SAV species composition. However, these areas are expected to be limited in number (0.6 miles [1.0 km] in Lake Champlain) and the impacts extremely localized.

Minor releases of hydrocarbons, primarily from potential diesel spills during refueling or breaks in fuel lines, could result in impacts on aquatic vegetation. The impacts from hydrocarbons result from either physical coating of the plants or its toxic chemical effects (USEPA 2011). Small spills of hydrocarbons, particularly diesel fuel, are rapidly dispersed and diluted (NOAA 2006a). Spills in shallow, nearshore areas where aquatic vegetation is closer to the water surface would be expected to have a higher potential for impacts. The majority of the aquatic cable installation activities would occur in areas of deeper water; however, the Applicant would prepare an SPCC Plan that would specify measures to be taken to prevent spills and respond to any spills or releases that might occur.

Shellfish and Benthic Communities. Sediment disturbance from water-jetting, shear plowing, and other cable-laying activities, including the use of anchors or spuds, could result in crushing or injury of shellfish and other benthic invertebrates. The area directly affected by cable installation would be confined to the footprint of the water jet and shear plow, and anchors and spuds. Redeposition of disturbed sediment would eventually return lake bottom contours to their original conditions through the effect of bottom currents, and these areas would recolonize. Recolonization and community composition is dependent upon numerous factors such as the stability of disturbed areas, the tolerance of organisms to physical changes, and the availability of recruits. Midline buoys would be used to prevent anchor chain sweeps that might otherwise affect benthic habitat. Complete recovery times for the benthic communities vary from several months to several years depending on the community composition and severity and frequency of disturbance (Newell et al. 2004, Carter et al. 2008).

> The benthic community of Lake Champlain that could be impacted by the proposed CHPE Project is composed mainly of bivalves, dipterans, amphipods, and worms. The most abundant organisms observed in Lake Champlain are zebra mussels (*Dreissena polymorpha*), chironomid midges (*Tanytarsus* sp.), and pea clams (*Pisidium* sp.). The most abundant organism, zebra mussel, is an invasive species.

An approximated total of 0.6 miles (1.0 km) of concrete mats in the Lake Champlain Segment, representing 0.6 percent of the length of the transmission line route in Lake Champlain, would be installed over the portions of the transmission line that cannot be buried. Although individuals among the existing benthic communities might be impacted, installation of the concrete mats would not preclude the survival of benthic species. Further, because impacts from installation of concrete mats are expected to be small and localized, and the materials to be used would not lead to the introduction of invasive species, significant changes to the benthic community's species composition would not be expected. When the concrete mats are placed in areas of fine sediment, the spaces between the individual concrete elements would be filled by suspended sediment and the surficial habitat would be partially restored. It is likely that some sediment would accumulate on the concrete mats, resulting in some benthic habitat recolonization. New and functional communities would be expected to recolonize these areas over time. Complete recovery times for the benthic communities vary from several months to several years depending on the community composition and severity and frequency of disturbance (Newell et al. 2004, Carter et al. 2008). Post-installation monitoring efforts for the Long Island Replacement Cable in 2010 suggested that concrete mats were not a major disturbance to benthic communities after 2 years (ESS Group 2011). A pre- and post-energizing benthic monitoring program would be developed in accordance with Condition 163 of the NYSPSC Certificate for the proposed CHPE Project to evaluate impacts of construction on benthic communities (NYSPSC 2013).

Redeposition of sediments could also change the existing bottom composition if this composition consists of coarser grains on top of finer grains. The layering could be reversed after sediments are disturbed because finer grains would take longer to settle out of the water column. Such a change would affect the species composition of the benthic community, which would be composed of those that could survive and thrive in this sediment. Mobile species that prefer coarser sediment grains would likely relocate to areas with coarser grains. Sessile (immobile) species would likely die off if they could not adapt to the new sediment conditions (Germano and Cary 2005). These mortalities would not represent significant impacts because they would neither result in population-level impacts nor result in the inability of the species to survive.

Impacts on benthic resources would occur from the resuspension of sediments and increased turbidity. Although not significant, impacts on bivalve mollusks could be both physiological (e.g., reduction of filtering rates and rejection of excess filtered material) and physical (e.g., burial and a reduction in benthic organisms) (Berry et al. 2003, Cordone and Kelley 1961, Clarke and Wilber 2000). Along the route within Lake Champlain, TSS concentrations during cable installation are expected to be less than 200 mg/L on average. Daphnids exposed to 50 to 100 mg/L of TSS for less than 18 days exhibited reduced feeding. Freshwater mussels exposed to 600 to 750 mg/L of TSS for 21 days exhibited a decreased ability to clear their filter feeding mechanisms (Berry et al. 2003). As specified in the NYSPSC Certificate for the proposed CHPE Project (Condition 163), the Applicant would conduct additional pre-installation physical and chemical sediment sampling in Lake Champlain for use in post-installation monitoring (NYSPSC 2013).

Minor releases of hydrocarbons, diesel fuel in particular, could also result in impacts on shellfish and benthic communities. The impacts of hydrocarbons are caused either by the physical nature of the fuel (physical contamination and contact) or by its chemical components (toxic effects and bioaccumulation). Sediments trap the oil and affect the organisms that live in or feed off the sediments (USEPA 2011). Small spills of hydrocarbons are rapidly dispersed and diluted (NOAA 2006a). Spills in shallow, nearshore areas where shellfish and benthic communities are closer to the water surface would be expected to have a higher potential for impacts. Accidental diesel fuel spills (ranging in volume from a few drops to a few gallons) into the water are possible during vessel refueling activities during proposed CHPE Project construction activities. The magnitude of effects resulting from such spills on invertebrates, shellfish and benthic communities depends upon the amount and location of released fuel, remediation requirements, and the timeframe during which the spill is addressed through remediation. Further, depending upon the remediation operations required, damage to shellfish and benthic community habitats is also possible. Considering the small quantities of hydrocarbons that could be released during an accidental spill, strict adherence to the SPCC Plan, and quick response time, impacts on invertebrates, shellfish, and benthic communities would not be significant.

Fish. More than 70 fish species occur along the Lake Champlain Segment. Impacts on demersal and pelagic fish could result from temporary increases in turbidity, water quality degradation, noise, light, and from a hazardous spill. Short-term sediment resuspension would occur from installation and burial of the transmission line and movement of construction vessels.

Installation of the aquatic transmission line is proposed to occur during spawning season, which could have an impact on the adults, eggs, and larvae of spawning species in Lake Champlain; however, migratory species (e.g., alewife, Atlantic salmon, brown trout, steelhead) that spawn in the lake tributaries are not expected to be significantly impacted. The sensitivity of spawning fish to impacts from suspended sediment is species- and life-stage-specific, and depends on abiotic factors of the sediment, sediment concentration, and duration of exposure (Berry et al. 2003). Larvae are more sensitive to suspended sediments than eggs, juveniles, or adult fish. Adult and juvenile fish would likely leave the area to avoid an increase in turbidity. The portion of the Lake Champlain Segment from the U.S./Canada border through Crown Point, New York, would be installed from May 1 through August 31, and the portion from Crown Point to Dresden would be installed from September 1 through December 31. Many species spawn during these periods. However, most either spawn in the shallow shoreline areas (e.g., 6 inches to

40 feet [0.2 to 12 meters] in depth) of Lake Champlain where their eggs can be camouflaged among vegetation and gravel beds or migrate to spawn in such habitats in the streams and rivers in the watershed (Fishbase 2013). Installation of the transmission line would primarily transect the middle (deeper) portions of the lake away from the shoreline and streams and rivers associated with the watershed. The use of HDD for the water-to-land transition of the transmission line out of Lake Champlain would avoid shallower water habitats and impacts on fish spawning are expected to be minimized. Therefore, no significant impacts on spawning species would be expected from installation activities.

Turbidity can have an effect on all life stages of fish. Suspended sediment could make pelagic eggs sink to the bottom. Demersal eggs could also be affected by sediment smothering. Planktonic larvae react to turbidity with reduced growth rates and increased mortalities. Increased mortality rates and reduced breeding success are possible impacts. Impacts from increased suspended sediment on adult fish can be classified as biological, physiological, or behavioral (Berry et al. 2003). Biological and physiological impacts could include abrasion of gill membranes resulting in a reduction in the ability to absorb oxygen, a decrease in dissolved oxygen concentrations in the surrounding waters, and effects on growth rate. Behavioral responses by fish to increased suspended sediment concentrations include impaired feeding, impaired ability to locate predators, and reduced breeding activity.

In addition to being associated with physical disturbances, impacts from turbidity can be related to a reduction in visibility. Impacts could also occur from a reduction in benthic invertebrates, as discussed in *Shellfish and Benthic Communities*, that could in turn affect benthic feeders such as lake sturgeon. However, fish are mobile and generally avoid unsuitable conditions in the water, such as large increases in suspended sediment and noise (Clarke and Wilber 2000). Temporary habitat avoidance is not expected to impact fish because of their ability to move from the impacted area. In general, the distribution of the habitat in Lake Champlain is considerably greater than the predicted extent of increased suspended sediment concentrations and the area of cable installation. See **Table 5.1.4-1** for a description of the effects of TSS on fish species.

The resuspension of contaminated sediments from the installation of the transmission line could expose fish to contaminants that could be mobilized and become bioavailable. Bioavailability refers to the fraction of a contaminant that can be taken into any biological entity (e.g., plant, benthic invertebrate, or fish). If contaminated sediments become bioavailable or biotransferred within food chains, impacts could occur. Depending on the chemical form in which a contaminant occurs, the contaminant can range from being completely bioavailable to virtually unavailable. Water quality modeling for the proposed cable installation methods indicates that no state water quality standards would be exceeded as a result of transmission line installation activities.

Impacts on fish would also occur due to lighting used during transmission line installation. Larval, juvenile, and adult fish could be attracted to lights, making them vulnerable to predation by other fish attracted to concentrated prey. During nighttime construction activities, vessels would be outfitted with identification lights, and working decks would be illuminated for safety. The cable-laying barge would progress at an average rate of 1.5 miles (2.4 km) per day, so any temporary light illumination of waters around the work equipment would be of short duration in any given location, which would reduce impacts from lighting.

Behavioral impacts on fish could occur due to noise during installation of the transmission lines. Following are the NMFS criteria for physiological impacts on fish:

- Peak SPL: 206 decibels relative to 1 micropascal (dB re 1 μPa, the measurement unit for underwater noise in decibels).

Table 5.1.4-1. Species-Specific Impacts from TSS

Species	Concentration and Duration of TSS	Effects
Atlantic salmon (adult)	2,500 mg/L at 24 hours	Potential for increased predation
Rainbow smelt (adult)	3.5 mg/L at 168 hours	Potential for increased predation
Steelhead (egg)	37 mg/L at 1,488 hours	42% hatching success (63% for the controls)
Steelhead (juvenile)	102 mg/L at 336 hours	Reduced growth rate
Steelhead (adult)	500 mg/L at 9 hours 500 mg/L at 3 hours 1,650 mg/L at 240 hours	Change in blood chemistry Sublethal stress Loss of habitat
Lake trout (adult)	3.5 mg/L at 168 hours	Avoidance of turbid areas
Rainbow trout (egg)	6.6 mg/L at 1,152 hours 57 mg/L at 1,488 hours 120 mg/L at 384 hours 1,750 mg/L at 144 hours	40% mortality rate 47% mortality rate 60% to 70% mortality rate Mortality greater than 6%
Rainbow trout (juvenile)	90 mg/L at 456 hours 270 mg/L at 456 hours 810 mg/L at 456 hours	0% to 20% mortality rates 10% to 80% mortality rates 5% to 85% mortality rates
Rainbow trout (adult)	66 mg/L at 1 hour 200 mg/L at 24 hours 250 mg/L at 0.25 hours 665 mg/L at 1 hour 810 mg/L at 504 hours 17,500 mg/L at 168 hours 80,000 mg/L at 24 hours 160,000 mg/L at 24 hours	Fish avoided turbid areas Test fish began to die the first day Rate of coughing increased Fish attracted to turbidity Some fish died; gills of fish that survived had thickened and proliferated epithelium No mortality 100% mortality
Largemouth bass, bluegill, red ear sunfish (adult)	62.5 mg/L at 720 hours 144.5 mg/L at 720 hours	Normal weight gain reduced by 50% Growth was retarded; unable to reproduce

Source: Berry et al. 2003

- Cumulative sound exposure level (cSEL) for fish above 0.07 ounces (2 grams): 187 decibels relative to 1 micropascal-squared second (dB re 1µPa2-s).
- cSEL for fish below 0.07 ounces (2 grams): 183 dB re 1µPa2-s (NMFS 2013b).

Underwater noise generated by the construction vessels used for cable laying would be similar to that of other ships and boats (e.g., tug boats, ferries, fishing vessels, and pleasure boats) already operating in these areas (Popper and Hastings 2009, JASCO Research 2006). There are currently no clear indications that noise impacts related to the installation of transmission lines pose a high risk for harming aquatic fauna (Merck and Wasserthal 2009). Noise from vessel movements and cofferdam installation is not expected to result in injury to fish and it is only considered in terms of behavioral response.

NMFS uses a root-mean-square (rms) SPL of 150 dB re 1 µPa as a conservative indicator of the noise level at which there is the potential for behavioral effects (NMFS 2013b). That is not to say that exposure to noise levels of 150 dB re 1 µPa rms would always result in behavioral modifications or that any behavioral modifications would rise to the level of "take" (i.e., harm or harassment), but that there is the potential, upon exposure to noise at this level, to experience some behavioral response.

Behavioral responses of fish could range from a temporary startle to avoidance of an area affected by noise from a project. Fish have the capability of leaving an area when underwater activities that create noise and sound pressure are occurring and returning when activities cease, thereby further reducing effects. Currently, there are no clear indications that noise impacts related to the installation of transmission cables pose a high risk for harming aquatic fauna (Merck and Wasserthal 2009). It is assumed that this would apply to all aquatic species. Because the anticipated noise levels associated with cable laying are relatively minimal, and because the aquatic route is normally subject to substantial commercial and recreational vessel noise, any incremental increases in sound associated with the cable-laying barge would not cause physical injury from noise and are expected to be negligible (Popper and Hastings 2009). Cable installation is limited with respect to space and time and, therefore, impacts on aquatic fauna from noise would exist in any one location for only a few hours.

Sheet pile cofferdams would be installed with a vibratory hammer. NMFS (2014a) indicates that the footprint of an area where noise greater than 150 dB re 1 μPa rms SPL is experienced is within 33 feet (10 meters) of the sheet pile being installed and it is extremely unlikely that the behavior of any individual sturgeon would be affected by noise associated with the installation of sheet piles with a vibratory hammer. Cofferdam construction would be limited to the five HDD water-to-land transitions along the entire proposed CHPE Project route. Therefore, behavioral effects associated with cofferdams are expected to be localized.

During installation of the aquatic transmission line, four vessels, a cable vessel, survey boat, crew boat, and tugboat with supply barge, would be employed. Each of these vessels contains fuel, hydraulic fluid, and other potentially hazardous materials and, therefore, has the potential for hazardous spills. Minor releases of hydrocarbons (e.g., diesel fuel and lubricants) could result in impacts on fish species. The impacts of hydrocarbons are caused either by the physical nature of the fuel (physical contamination and smothering) or by its chemical components (toxic effects and bioaccumulation). It is anticipated that the immediate response of fish to water contaminated with hydrocarbons would be avoidance. Oil has the potential to impact spawning success because of the physical smothering and the toxic effects on eggs and larvae (USFWS 2010). Minor releases of hydrocarbons could also affect benthic food sources. Benthic communities could also be affected by clean-up operations or through physical damage to their habitats. The SPCC Plan would specify measures to be taken to prevent spills and respond to any spills or releases that might occur.

Essential Fish Habitat. There would be no impacts on EFH because no EFH is designated within the Lake Champlain Segment.

Significant Coastal Fish and Wildlife Habitat. There would be no impacts on SCFWHs because no SCFWHs are present in the Lake Champlain Segment.

Impacts from Operations, Maintenance, and Emergency Repairs

In the Lake Champlain Segment, the transmission line would be installed in a trench at a target depth of approximately 4 to 8 feet (1.2 to 2.4 meters). The Applicant proposes to place the cable bipoles in a single trench, which would serve to reduce magnetic field levels. The sheathing and insulation around the transmission cables and the burial of the cables would effectively eliminate the electric field produced by the cables (Normandeau et al. 2011); therefore, no impacts on aquatic species would be expected. Deeper burial would reduce the magnetic field, but not eliminate it entirely (CMACS 2003, Normandeau et al. 2011, CHPEI 2012b). With a 3.3-foot (1-meter) burial depth, the Applicant has calculated the magnetic field to be approximately 162 mG within 1 foot (0.3 meters) above the lakebed directly over the transmission line (600 mG where the burial depth is less and concrete mats would be used) and approximately 77 mG at 10 feet (3 meters) from the transmission line. See **Section 5.1.14** for more information on magnetic field calculations. In addition, a weak induced electric field would be generated from that magnetic field and this induced electric field can be detected by certain aquatic organisms.

Although there would be a minor change in temperature in the sediment immediately surrounding the cables, the depth of the burial and insulating factors of the cable would minimize impacts on the benthic habitats in the immediate vicinity (CHPEI 2012b). For a cable buried 4 feet (1.2 meters) below the surface, the estimated temperature rise over ambient temperature at 8 inches (20 cm) below the surface of the sediments would be 9 °F (5.0 °C). However, the temperature increase at the sediment surface directly above the cable is estimated to diminish to 1.8 °F (1.0 °C), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C) (CHPEI 2012i, CHPEI 2012kk, CHPEI 2012bbb). It is likely that these are overestimated because they do not take into account the cooling effect from natural water flow, which would result in further heat dissipation, the proposed deeper burial of the transmission line, or the insulation provided by the sheathing surrounding the transmission cables (CHPEI 2012dd). Overall, heat would dissipate in the sediments, just below the sediment and water interface, which is the biologically productive zone in the sediments. Therefore, significant impacts on benthic resources from temperature during operation of the transmission line would not be anticipated.

Where the transmission cables cannot be buried to their full depth and must be covered with concrete mats, the estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C). This is expected to be within the range of seasonal variation of water temperatures experienced in Lake Champlain. The highest increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mat is expected to be 1.26 °F (0.70 °C) or less (Exponent 2014).

As the transmission line itself would be maintenance-free, no significant impacts on aquatic habitat and species would be anticipated as no maintenance activities are proposed in the Lake Champlain Segment.

Impacts resulting during potential emergency repairs of the aquatic transmission line from sediment disturbance and turbidity on aquatic vegetation, shellfish and benthic communities, and fish would be similar to those described during initial installation, but on a smaller scale and for a shorter duration. Impacts associated with emergency repairs, if required, would not be significant and would be localized and temporary, lasting only the duration of emergency repair activities.

Aquatic Habitat and Vegetation. Impacts on aquatic vegetation associated with operation of the transmission line are not likely to occur. The cables would be buried in deeper areas of the lake where SAV is generally not located. Magnetic fields at levels produced by the proposed CHPE Project would not be expected to impact aquatic plant species such as SAV, and temperature increases associated with operation of the transmission line would be small and restricted to the area directly above the transmission line.

Shellfish and Benthic Communities. Impacts on shellfish and benthic communities associated with operation of the transmission line could occur due to magnetic fields and increases in temperature. According to studies, the survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields (Normandeau et al. 2011). Several marine benthic invertebrates, including the blue mussel (*Mytilus edulis*) and North Sea prawn (*Crangon crangon*), survived 37,000 mG with no apparent effects (Bochert and Zettler 2004). However, physiological changes (20 percent decrease in hydration and a 15 percent decrease in amine nitrogen values) were detected in blue mussels exposed to magnetic fields of 58,000, 80,000, and 800,000 mG. Experiments that exposed two freshwater mollusks, the Asiatic clam (*Corbicula fluminea*) and the freshwater snail (*Elimia clavaeformis*), to 360,000 mG showed no evidence of changes in activity (Cada et al. 2011). In these cases, experimental values were much more intense than would be expected from the proposed transmission line in the Lake Champlain Segment, which is estimated to be less than 77 mG 10 feet (3 meters) from the transmission line or 600 mG where concrete mats are used. As such, magnetic field impacts on shellfish behavior or reproduction would not be significant.

Temperature increases associated with operation of the transmission line would not have more than a negligible impact on shellfish and benthic communities. The temperature increase in the top 8 inches (20.3 cm) of sediment where most benthic infauna (bottom-dwelling aquatic animals) occur would be less than 9 °F (5.0 °C), diminishing to 1.8 °F (1.0 °C) above ambient conditions at the sediment surface directly above the cables (CHPEI 2012i, CHPEI 2012dd, CHPEI 2012bbb). Where the cable is covered with concrete mats, the increase in ambient water temperature surrounding the cables covered by the concrete mats would be 0.25 °F (0.14 °C) and the increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mat is expected to be 1.26 °F (0.70 °C) or less (Exponent 2014). The effect of the temperature increases would be extremely localized to the area directly above the cables (CHPEI 2012kk, CHPEI 2012bbb). A pre- and post-energizing benthic monitoring program would be developed in accordance with Certificate Condition 163 to evaluate operational impacts from magnetic fields and heat during the lifespan of the transmission line on benthic communities (NYSPSC 2013).

Fish. As described in the following paragraphs, no significant impacts on fish associated with operation of the transmission line are expected due to induced electric fields, magnetic fields, and changes in temperature.

The movement of charges in a magnetic field can cause an induced electric current (Normandeau et al. 2011). Induced electric fields can be created by water currents such as waves and tides, or the movement of an organism through the Earth's naturally occurring geomagnetic field. Induced electric fields can be increased with the perpendicular movement of an organism or water current relative to a magnetic field associated with a DC transmission line. Induced electric fields can vary with sediment or substrate type (Normandeau et al. 2011). Increases in the induced electric currents would result from operation of the transmission line. Based on the prevailing geomagnetic field in the area of the proposed CHPE Project, a fish moving east to west perpendicular across the transmission cables at a rate of 4.5 feet (1.4 meters) per second (2.7 knots) would incur a naturally occurring induced electric current of 72 x 10^{-5} millivolts/cm (mV/cm); a fish moving north to south at the same rate would incur an induced electric current of 67 x 10^{-5} mV/cm. The maximum induced electric current associated with the transmission cables would be 11.5 x 10^{-5} mV/cm over 1 foot (0.3 meters) over that produced by the geomagnetic field at 1 foot (0.3 meters) above riverbed at the centerline of the cables. The induced electric field would decrease to 2.8 x 10^{-5} mV/cm or less at 10 feet (3 meters) from the cable system and continue to decrease with distance from the centerline. Lake Champlain is fresh water, which has a lower conductivity than marine conditions, and average currents in Lake Champlain are approximately 0.34 feet (0.1 meter) per second (McCormick et al. 2008). The induced electric field from the transmission cables would, therefore, contribute, at most, a 17 percent increase in the total induced electric field at all locations compared to the induced electric field due to earth's geomagnetic field in these scenarios (11.5 x 10^{-5} mV/cm [the maximum induced electric field]/67 x 10^{-5} mV/cm [the ambient induced electric field that results in the maximum percent increase]) (Bailey and Cotts 2012). Fish responses to induced currents have been identified as searching for the source and beginning active foraging, or avoiding the source, as described in the following paragraph.

In experiments based on AC cables, sturgeon (*Acipenser gueldenstaedtii* and *Acipenser ruthenus*) responded to 50-Hz electric fields that ranged from 0.2 to 6.0 mV/cm (Normandeau et al. 2011). At range frequencies of 1.0 to 4.0 Hz and 16 to 18 Hz with field intensities of 0.2 to 3.0 mV/cm, the sturgeon response was to search for the source and begin active foraging. At 50 Hz and field intensities of 0.2 to

0.5 mV/cm, the response was to search for the source and to begin active foraging. At 50 Hz at field intensities of 0.6 mV/cm or greater, the response was to avoid the source (Basov 1999). However, these intensities were higher than any potential induced currents expected from the proposed DC transmission line in Lake Champlain. More recent experiments indicated that sturgeon use both electrosense and olfactory cues to search for prey (Zhang et al. 2012).

The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. The induced electric field from the Earth or the transmission cables is also considerably weaker than the electric field measured over certain marine sediments. Therefore, the increment in the ambient marine electric field even over the buried cable would not be a unique or novel stimulus nor would it be strong enough to produce physiological responses (Bailey and Cotts 2012).

Demersal fish are more likely to be exposed to higher magnetic field strengths, which are closer to the lake bottom where the transmission line would be buried, as compared to pelagic species, which are found higher in the water column (Normandeau et al. 2011). Two examples of demersal fish in the Lake Champlain Segment that could be exposed to magnetic fields and induced electric fields are lake sturgeon and lake trout. Sturgeons are electrosensitive and use electric signals to locate prey. Impacts on lake sturgeon are described in **Section 5.1.5**. Lake trout are a demersal salmonid species and are electrosensitive, but they are much less sensitive than sturgeon.

Information on the impacts of magnetic fields on fish is limited. A number of fish species, including sturgeons, eels, and salmon, are suspected of being sensitive to such fields because they have magnetosensitive or electrosensitive tissues, have been observed to use electrical signals in seeking prey, or use the Earth's magnetic field for navigation during migration (EPRI 2013). Only limited research has been done, so additional studies are required on the potential effects of magnetic fields on demersal species. The current state of knowledge about the potential impacts on fish from magnetic and electric fields emitted by underwater transmission lines is variable and inconclusive (Cada et al. 2011). However, lake sturgeon exhibited temporarily altered swimming behaviors in response to AC-generated EMF that ranged from 35,100 mG to 1,657,800 mG, and EMF responses disappeared below 10,000–20,000 mG (Cada et al. 2011, Bevelhimer et al. 2013). These magnetic fields are much more intense than those that would be produced by the transmission line, which would be approximately 162 mG at the sediment-water interface or 600 mG at the surface of a concrete mat directly above the buried transmission cables. As such, significant impacts from magnetic field strengths generated from the proposed CHPE Project transmission line on lake sturgeon are not expected.

There has been concern about whether anthropogenic magnetic fields could affect salmonids, which are thought to use the Earth's magnetic field, and visual and olfactory cues, to navigate to natal streams to spawn (EPRI 2013). There is very little information on their responses, but no observations indicate an adverse impact (Gill and Bartlett 2010). American eels, which maintain a relatively small home range (approximately 7 acres [3 hectares]) in shallow water along lake shorelines, rely upon their acute senses of smell to find food and use their olfactory sense along with magnetic cues to navigate to feeding and spawning habitats (American Eel Development Team 2000, Fisheries and Oceans Canada 2013). Current knowledge suggests that magnetic and electric fields emitted from buried submarine transmission cables could influence temporary changes in the swimming direction of freshwater eels if their migration routes involved crossing over cables; this impact was especially evident in water depths of less than 66 feet (20 meters) (Gill and Bartlett 2010, Gill et al. 2012). Various field and laboratory studies on eels exposed to weak magnetic and electric fields showed some evidence that eels respond to stimuli by veering from the field source (Normandeau et al. 2011, Gill et al. 2012). Studies on the European eel (*A. anguilla*) in response to subsea AC cables range from no response to a temporary delay and veering from migration, but no change in the overall direction of migration. European eels did not demonstrate any response in a laboratory study simulating the effect of a 2,000-mG magnetic field from an AC cable at 3 feet

(0.9 meters). A study of the Japanese eel (*A. japonica*) indicates glass eels (i.e., eel larval stage) exhibit responses to and can become conditioned to a weak magnetic field. It is hypothesized that this could affect the ability for eels to navigate later during adult stages (e.g., to oceanic spawning grounds) (Gill et al. 2012). However, this is expected to require prolonged exposure to magnetic fields. American eels are not expected to enter the Hudson River until after the glass eel stage. Because magnetic fields decrease dramatically with distance, it is expected eels in the Hudson River would not be exposed to magnetic fields for long periods of time. One study indicated that American eels exposed to magnetic fields 10 times greater than the earth's geomagnetic field for 10 days demonstrated no physiological or behavioral responses (Gill et al. 2012). Results from these studies provided little information to suggest that detection or a temporary veering response correlated further with inhibition of an eel's migrating, homing, or feeding capabilities, but the predicted magnetic fields for this project are below the thresholds at which fish behavioral effects have been observed.

Experiments that exposed fathead minnows (*Pimephales promelas*), juvenile sunfish (*Lepomis* spp.), and juvenile channel catfish (*Ictalurus punctatus*), which occur in Lake Champlain, to 360,000 mG did not indicate changes in activity (Cada et al. 2011, Cada et al. 2012).

Laboratory studies that exposed rainbow trout (*Onchorhynchus mykis*), brown trout (*Salmo trutta*), carp (*Cyprinus carpio*), and northern pike (*Esox lucius*) fish eggs and larvae to magnetic fields ranging from 5,000 mG to 150,000 mG resulted in changes in embryonic development and movement (Formicki and Perkowski 1998, Formicki and Winnicki 1998, Winnicki et al. 2004). However, survivability was not discussed. These species serve as a surrogate for other species expected to occur in the proposed CHPE Project ROI. The increase in magnetic field strength at the sediment surface is approximately 162 mG where the transmission line is buried or 600 mG above concrete mats, and would decrease with an increase in distance from the river bottom (i.e., in the water column). Because laboratory experiments used exposures that are 1 to 3 orders of magnitude higher than the magnetic field strengths of those expected from the proposed CHPE Project transmission line, the effect of the magnetic field on fish eggs and larvae is expected to be negligible, even for benthic eggs and larvae.

Temperature increases associated with operation of the transmission line are not expected to result in more than a negligible impact on fish. As described in **Section 5.1.3**, operation of the underwater cable when buried at 4 feet would result in an increase of 1.8 °F (1.0 °C) at the surface sediment above the cables, and the temperature change in the water column would be less than 0.001 °F (0.0001 °C) (CHPEI 2012dd, CHPEI 2012hh, CHPEI 2012kk). Where the cable is covered with concrete mats, the increase in ambient water temperature surrounding the cables covered by the concrete mats would be 0.25 °F (0.14 °C) (Exponent 2014). These temperature increases are within the range of seasonal variation of water temperatures experienced in Lake Champlain (CHPEI 2012dd, CHPEI 2012hh, CHPEI 2012kk). Therefore, no significant impacts on fish from heat emissions from the transmission line would be expected. In accordance with Certificate Condition 163, the Applicant would complete a pre-installation and post-energizing sediment temperature and magnetic field survey of the transmission line route to assist in evaluation of operational impacts from magnetic fields and heat during the lifespan of the proposed CHPE Project (NYSPSC 2013).

Essential Fish Habitat. There would be no impacts on EFH because no EFH is designated within the Lake Champlain Segment.

Significant Coastal Fish and Wildlife Habitat. There would be no impacts on SCFWHs because no SCFWHs are present in the Lake Champlain Segment.

5.1.5 Aquatic Protected and Sensitive Species

Impacts from Construction

Federally Listed Species. As noted in **Section 3.1.5**, no federally listed aquatic threatened or endangered species are present in the Lake Champlain Segment; therefore, there would be no effects on ESA-listed aquatic species.

State-Listed Species

Fish. As noted in **Section 3.1.5**, the state-listed fish species that occur in the Lake Champlain Segment are the lake sturgeon and mooneye. If any individual state-listed lake sturgeon or mooneye are present during debris removal and construction, they could be affected by sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, temporary noise and vibration, and potential accidental releases of hazardous materials. Impacts on state-listed fish species from transmission line installation would not be significant and would be similar to those described for non-listed fish species in **Section 5.1.4**.

Increased turbidity resulting from transmission line installation could expose state-listed lake sturgeon and mooneye to resuspended sediments. However, water quality modeling computed no exceedances of water quality standards that are based on protecting aquatic life from acute toxicity (see **Sections 5.1.3** and **5.1.4**). Some individual state-listed fishes could be affected, but population-level impacts are not expected. If state-listed lake sturgeon and mooneye would be present in Lake Champlain near the installation activities, they would be expected to avoid the area where the plow is disturbing the sediments. The installation of the aquatic transmission line would cause a temporary disturbance on benthic habitat, which supports benthic prey items for state-listed lake sturgeon, but would remain usable as potential lake sturgeon foraging habitat. Temporary and localized reductions in available benthic food sources are anticipated because some mortality of benthic infaunal organisms that serve as prey for state-listed lake sturgeon would occur (see **Section 5.1.4** for potential impacts on the benthic community). As adults, state-listed sturgeon forage almost exclusively over soft-bottom areas of Lake Champlain.

Impacts on the state-listed lake sturgeon could occur from the installation of concrete mats or rip-rap; however, placement of mats or rip-rap would result in a very small area of overall affected habitat, and sturgeon would be able to utilize adjacent areas for foraging and other activities. Mooneye are pelagic (i.e., occur higher in the water column than sturgeon while foraging) and prefer clear waters. Therefore, mooneye would most likely attempt to avoid waters with disturbed sediments, and would not be close to activities on the lake bottom, as opposed to the state-listed sturgeon that is a benthic species and as it feeds, stirs up the sediment. Proposed installation activities could affect the state-listed lake sturgeon during its spawning season (May through June) and the state-listed mooneye during part of its spawning season (which occurs in May). However, because state-listed lake sturgeon and mooneye prefer rocky bottom or flowing water habitat for spawning, they are not expected to be common in the vicinity of the proposed CHPE Project route as it would be sited in soft-bottom areas (see **Table 3.1.5-1**) (CHPEI 2012b).

The Applicant initiated discussions with USFWS, NMFS, NYNHP, and NYSDEC to gather information and to develop recommendations for the avoidance and minimization of potential impacts on aquatic species, including state-listed fish species, during construction of the proposed aquatic transmission line. Per the NYSPSC Certificate for the proposed CHPE Project, the Applicant has recommended, in consultation with these agencies, and adhere to measures to avoid or minimize impacts on protected and sensitive species, including the use of a shear plow, which is a technique that would reduce the potential dispersal of sediments in the shallow reach of southern Lake Champlain (see **Appendix G**). As specified in Certificate Condition 163, the Applicant would conduct a series of pre-installation studies in Lake Champlain, including benthic macroinvertebrate and sediment sampling and bathymetry surveys, for use in post-installation compliance monitoring (NYSPSC 2013).

If any state-listed lake sturgeon and mooneye are present in Lake Champlain near the installation activities, they would also be exposed to noise during installation of the aquatic transmission line. Exposure of fish to continuous sound could result in a temporary behavioral impacts as described in **Section 5.1.4**. Behavioral responses could include startle response, alarm response, avoidance, and a potential lack of response due to masking of acoustic cues. Most of these impacts would be either temporary or intermittent and it is expected that only a few individuals would be affected relative to the populations, and these individuals would react by moving away from noise sources.

In limited areas (0.6 miles [1.0 km]) of Lake Champlain, the transmission cables would be laid atop the lakebed and would be covered with sloping stone rip-rap or articulated concrete mats for protection. Installation of these structures could cause a permanent change in benthic habitat type from soft sediments to the hard substrate of the concrete mats or rip-rap equal to the area of the footprint of the concrete mats or rip-rap. There is a limited number of utility crossings requiring concrete mats or rip-rap placement resulting in a very small area of overall habitat that would be affected. Impacts on the state-listed sturgeon, which is demersal bottom feeder, could occur from the installation of concrete mats or rip-rap. Stone used in rip-rap structures provides hard substrate habitat, and spaces between rip-rap stones provide velocity refuge and cover for aquatic invertebrates and small fishes (Fischenich 2003), which could include prey for state-listed lake sturgeon and the juvenile stage of state-listed mooneye that preys on benthic items. State-listed lake sturgeon, however, would be able to utilize adjacent areas for foraging and other activities. The mats would alter local hydraulic conditions such that some sediment deposition or scouring could occur around the irregularity the bottom formed by the mats. However, the overall change in bottom topography would be negligible because the mats would extend only approximately 9 to 12 inches (22.9 to 30 cm) above the bottom and functional benthic habitat would develop. The areal extent of the mats is small relative to the sediment layer and bottom hydrography of the lake, and the effect of the mats on bathymetry would not be significant relative to natural levels of fluctuation due to currents, storms, navigational traffic, and other pre-existing factors.

Minor releases of hydrocarbons (e.g., diesel fuel, lubricants) could result in impacts on state-listed fish species. It is anticipated that the immediate response reaction of state-listed fish to water contaminated with hydrocarbon would be avoidance. Oil has the potential to impact spawning success because of the physical smothering and the toxic effects on eggs and larvae (USFWS 2010). Minor releases of hydrocarbons are not anticipated; however, if they occur, spill remediation would be undertaken in accordance with the proposed CHPE Project SPCC Plan.

HDD installation at the shoreline could also result in the spilling of drill fluid into the water. The only impacts from HDD would be increased turbidity (composed of inorganic materials) and associated decreased water quality (see **Sections 5.1.3** and **5.1.4**). The Applicant would develop and implement a Frac-out Contingency Plan that would allow for timely cleanup of any bentonite leaks that might occur and ensure minimal impacts on the environment.

Mussels. As noted in **Section 3.1.5**, two state-listed mussel species are expected to occur in the Lake Champlain Segment: the pink heelsplitter and the giant floater. Individual state-listed pink heelsplitter and giant floater could be lost during installation of the proposed aquatic transmission line in the immediate vicinity of water jetting, dynamic positioning vessels or mooring/anchoring locations of the cable barge, and anchor locations of other vessels. Some individual state-listed mussels could be affected, but population-level impacts are not expected. No significant impacts would be associated with increases in turbidity and associated water quality degradation, sediment redeposition, and potential accidental releases of hazardous materials. Overall impacts from transmission line installation would be similar to those described for non-listed shellfish/benthic species in **Section 5.1.4**. Resuspension of sediments and increased turbidity would disproportionately affect mussels, including the state-listed pink heelsplitter and giant floater, because they are filter feeders and are sensitive to increased turbidity. The shell of the state-listed giant floater is thin and fragile, leaving this mussel vulnerable to excessive current or abrasive substrate. Redeposition of sediments could also affect the state-listed pink heelsplitter and giant floater because they bury themselves into the lakebed, and individuals could become further buried by the settling sediment during and immediately after construction activities.

Although population-level impacts would not be expected, increased sediment in the water column can irritate or clog the gills of individual mussels, thereby suffocating them (Anderson and Kreeger 2010). Increased turbidity can decrease dissolved oxygen levels that might impact mussels. Increased levels of suspended sediment have been shown to impair ingestion rates of freshwater mussels in laboratory studies (Berry et al. 2003). In addition, increased pollution in the form of heavy metals (e.g., mercury, lead, and cadmium), herbicides, and pesticides can interfere with nutrient uptake. Freshwater mussels are typically exposed to greater amounts of both waterborne dissolved contaminants and particle-associated contaminants than other aquatic organisms (Anderson and Kreeger 2010). Additionally, most freshwater mussels, including the state-listed pink heelsplitter and giant floater, have a parasitic life stage during their complex life cycle, depending on host fish species. Mussel larvae (called glochidia) must attach to the gills or fins of fish to metamorphose into juveniles, or they fall to the bottom and quickly die. Sedimentation could affect gill function of host fish, which could result in impacts on glochidia. One study indicated that a suspended clay resulted in fusion of fish gills and a reduction in the number of glochidia, while a more abrasive sediment had less of an effect (Stanne et al. 1996).

The impacts of hydrocarbons on state-listed mussels are caused by either the physical nature of the oil (i.e., physical contamination and smothering) or by its chemical components (toxic effects and bioaccumulation). Because the state-listed mussels depend on fish hosts to metamorphose, mussels would be affected by impacts of oil bioaccumulation in fish species. Mussels could also be impacted by spill remediation activities and physical damage to their habitats. This could, in turn, decrease the foraging ability of state-listed mussel species.

Applicant-proposed measures, including the use of a shear plow in southern Lake Champlain to minimize suspension of fine-grained unconsolidated (silty) sediments, would minimize impacts from the proposed CHPE Project construction activities on state-listed mussel species (see **Appendix G**).

Impacts from Operations, Maintenance, and Emergency Repairs

Federally Listed Species. As noted in **Section 3.1.5**, no federally listed aquatic species are expected to be present in the Lake Champlain Segment; therefore, there would be no effects on federally listed aquatic species.

State-Listed Species

Fish. State-listed lake sturgeon and mooneye occur in the Lake Champlain Segment (see **Section 3.1.5**). Effects from magnetic fields and increases in temperature could occur during operation of the proposed CHPE Project, but these effects are not expected to be significant. No effects would be anticipated from maintenance because the transmission line itself would be maintenance-free. Periodic inspection of the aquatic transmission cables using vessel-mounted instruments would not result in any effects on state-listed fish because the activities would be non-intrusive. Impacts associated with emergency repairs, if necessary, would include sediment disturbance resulting in temporarily increased turbidity that would include biological, physiological, or behavioral impacts, including abrasion of gill membranes resulting in a reduction in the ability to absorb oxygen, a decrease in dissolved oxygen concentrations in the surrounding waters, impairment of feeding, and impaired ability to locate predators (Berry et al. 2003).

Sediment disturbance would result in decreased water quality due to disturbance of contaminated sediments, and behavioral responses due to noise, such as temporarily swimming away from the activity. These effects on state-listed sturgeon and mooneye would not be significant and would be similar to those described for construction but on a smaller scale and over a shorter duration. As specified in Certificate Condition 163, the Applicant would conduct a series of post-energizing studies in Lake Champlain, including sediment temperature and magnetic field surveys or use in post-installation compliance monitoring (NYSPSC 2013).

The transmission cables would be shielded and buried, which would effectively eliminate the electric field from the cables, and avoid potential impacts of heat emanating from the transmission cables (CHPEI 2012dd). For the Lake Champlain Segment, the depth of the transmission line trench is proposed to be 4 to 8 feet (1.2 to 2.4 meters) depending on bottom conditions and presence within the federally maintained navigation channel with 1 foot (0.3 meter) or less of horizontal separation between the two cables, which would be collocated in the same trench. With a 3.3-foot (1-meter) burial depth, magnetic field levels at the Lake Champlain lakebed above the centerline of the transmission cables would be approximately 162 mG (see **Table 5.1.14-1** and **Figure 5.1.14-1**) or up to 600 mG where the burial depth is less and concrete mats are used (CHPEI 2012t, CHPEI 2012ll). Because the magnetic field is strongest at the transmission line itself and declines rapidly with distance, deeper burial would reduce the magnetic field, but not eliminate it entirely (CMACS 2003, Normandeau et al. 2011, CHPEI 2012b). The transmission line would emit magnetic fields, and induced electric fields could be created by water currents or the movement of an animal through the magnetic field. The likelihood of the creation of induced electric fields could increase with the perpendicular movement of an organism or water current relative to a magnetic field associated with a DC transmission line. However, there are uncertainties regarding the effects of magnetic and electric fields on aquatic species, including the state-listed lake sturgeon and mooneye. The current state of knowledge about the magnetic fields emitted by aquatic transmission lines and induced electric fields is sometimes considered too variable and inconclusive to make an informed assessment of the effects on these species (Cada et al. 2011). Research indicates that sturgeon species have an advanced electrosensory system, and use electrical information for navigation and determination of the positions of their prey and location of conspecifics (i.e., the same species) and predators.

Experiments were conducted to test freshwater sturgeon (i.e., sterlet sturgeon [*Acipenser ruthenus*] and Russian sturgeon [*Acipenser gueldenstaedtii*]) responses to AC-generated electromagnetic fields. These freshwater sturgeon species exhibited temporarily altered swimming behaviors to AC-generated electromagnetic fields that ranged from 35,100 mG to 1,657,800 mG (Cada et al. 2011). Juvenile state-listed lake sturgeon displayed temporarily altered swimming behavior in response to variable magnetic fields produced using an AC electromagnet (maximum value of the field at full power was approximately 1,658,000 mG), suggesting a momentary attraction to the variable magnetic field (Cada et al. 2012). However, the electromagnetic fields in these studies that triggered a reaction in the freshwater sturgeon species were much more intense than the magnetic fields that would be produced by the proposed transmission line, which would be approximately 162 mG at the lake bottom (or up to 600 mG where concrete mats are used). Demersal fish (in this case, the state-listed lake sturgeon) are more likely to be exposed to higher field strengths, which are closer to the lake bottom where the proposed transmission cables would be buried, as compared to a pelagic species (in this case, the state-listed mooneye), which is found higher in the water column (Normandeau et al. 2011). No observable changes in activity levels or distribution of fathead minnows (*Pimephales promelas)*, juvenile sunfish (*Lepomis* spp.), juvenile channel catfish (*Ictalurus punctatus*), and juvenile striped bass (*Morone saxatilis*) were observed in response to static (DC) fields using a permanent bar magnet (360,000 mG at the magnet surface) (Cada et al. 2011, Cada et al. 2012). The minnows and sunfish, like the state-listed mooneye, are positioned higher in the water column and, therefore, at a greater distance from the lake bottom where the proposed cable would be buried, than the state-listed lake sturgeon. Based on the foregoing, impacts from magnetic field strengths generated from the proposed CHPE Project transmission line on shortnose and Atlantic sturgeon are not expected to be significant.

Electrosensitive organisms, including the state-listed sturgeon, can detect induced electric fields, and respond by attraction (i.e., temporary investigative behavior) or avoidance (CMACS 2003, Normandeau et al. 2011). The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. The induced electric field from the Earth or the transmission cables is also considerably weaker than the electric field measured over certain marine sediments. Therefore, the increment in the ambient marine electric field even over the buried cable would not be a unique or novel stimulus nor would it be strong enough to produce physiological responses (Bailey and Cotts 2012). There is little information on the responses of fish to magnetic fields, but the predicted magnetic fields for this project are below the thresholds at which fish behavioral effects have been observed. Additionally, given the relatively narrow area within which the induced electric field would be detected by fish and the available information of how induced currents affect fish, no impacts on state-listed fish would be expected (CHPEI 2012dd, Scenic Hudson and Riverkeeper 2013).

As discussed in **Section 5.1.4**, laboratory studies that exposed rainbow trout, brown trout, carp, and northern pike fish eggs and larvae to magnetic fields concluded that the effect of the magnetic field on fish eggs and larvae is expected to be negligible, even for benthic eggs and larvae. These species serve as a surrogate for the state-listed species expected to occur in the proposed CHPE Project ROI.

Increases in temperature associated with the operation of the transmission line at the sediment-water interface would not be expected to affect pelagic fish (in this case, the state-listed mooneye), but could affect demersal fish (such as the state-listed lake sturgeon), which would be closer to the bottom. When electric energy is transported, a certain amount is lost as heat, leading to an increased temperature of the transmission cable surface and subsequent warming of the surrounding environment. Important factors determining the degree of temperature rise are cable characteristics (i.e., the type of cable), transmission rates, and characteristics of the surrounding environment (e.g., thermal conductivity, thermal resistance of the sediment) (Merck and Wasserthal 2009). The proposed transmission line installation would be at a depth of 4 to 8 feet (1.2 to 2.4 meters) in the Lake Champlain Segment. For a cable buried 4 feet (1.2 meters) below the surface, the estimated temperature rise over ambient temperature at 8 inches (20.3 cm) below the surface of the sediments is 9 °F (5.0 °C) (CHPEI 2012i, CHPEI 2012bbb). Where the cable is covered with concrete mats, the increase in ambient water temperature surrounding the cables covered by the concrete mats would be 0.25 °F (0.14 °C) (Exponent 2014). However, as discussed in **Sections 5.1.3** and **5.1.4**, any increase in ambient water temperature would be negligible and within a normal range of seasonal variability. While state-listed lake sturgeon and mooneye use and prefer rocky bottom or flowing water habitat, they are not expected to be as common in the vicinity of the aquatic transmission line route, which would be sited in soft-bottom areas of the lake (CHPEI 2012b). As described in **Section 5.1.3**, operation of the underwater cable would result in only a negligible increase in water temperature (less than 0.001 °F [0.0001 °C]) in the water column (CHPEI 2012i, CHPEI 2012kk). Any measurable amount of local heat generation would not pose a physical barrier to fish passage, and would allow benthic organisms to colonize and demersal fish species (including demersal eggs and larvae) to use surface sediments without being affected. Since pelagic and demersal fish (such as the mooneye and lake sturgeon, respectively) would continue to have unimpeded access to surface waters and sediments, lower reproduction rates or feeding is not anticipated (CHPEI 2012i, CHPEI 2012dd). Therefore, temperature increases of the sediment and water column would not significantly affect these state-listed species.

Mussels. State-listed mussels in the Lake Champlain Segment are the pink heelsplitter and giant floater. It is anticipated that there would be negligible impacts on these species from magnetic fields and increases in temperature during operation of the proposed CHPE Project. According to studies, survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields (Normandeau et al. 2011). Impacts from magnetic fields and increases in temperature could occur during operation of the proposed CHPE Project. No impacts would be anticipated from maintenance because the transmission line itself would be maintenance-free. Periodic inspection of the aquatic transmission cables using vessel-mounted instruments would not result in any impacts on state-listed mussels because the activities would be non-intrusive.

Impacts associated with sediment disturbance, turbidity, and decreased water quality during emergency repairs, if required, could include biological, physiological, or behavioral impacts, including abrasion of gill membranes resulting in a reduction in the ability to absorb oxygen, a decrease in dissolved oxygen concentrations in the surrounding waters, impairment of feeding, temporarily swimming away from the activity, and impaired ability to locate predators (Berry et al. 2003). These impacts would be similar to those described for construction but on a smaller scale and over a shorter duration. Although magnetic and electric field studies have not been conducted for the state-listed pink heelsplitter or giant floater, a study was conducted for blue mussels, a marine mussel species (see **Section 5.1.4** for additional details). Additionally, a laboratory study of the freshwater Asian clam (*Corbicula fluminea*) responses to static magnetic field of 360,000 mG was conducted, and it was determined that the clams did not change their distribution in response to the static magnetic field. Biological effects were reported, but in those cases, experimental static magnetic field values were much more intense than that expected from the proposed transmission line in the Lake Champlain Segment.

As noted in this section under the discussion of potential impacts on state-listed fish species and in **Sections 5.1.3** and **5.1.4**, the cables would produce heat during operation; however, the heat would dissipate within a short distance from the cable and through movement of water over the sediment surface. The estimated increase in ambient temperature at 8 inches (20.3 cm) below the surface of the sediment is 9 °F (5.0 °C); however, the temperature increase at the sediment surface directly above the cable is estimated to diminish to 1.8 °F (1.0 °C) (CHPEI 2012dd, CHPEI 2012bbb). The estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C). The highest increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mat is expected to be 1.26 °F (0.70 °C) or less (Exponent 2014). These increases in temperature would be extremely localized and directly above the cables (CHPEI 2012i, CHPEI 2012kk, CHPEI 2012bbb). Also of relevance to potential impacts from heat produced by the transmission line on state-listed mussels that bury into the sediments would be the sediment type, which is a factor in heat loss. There is greater heat loss through the interstitial water (i.e., subsurface water contained in pore spaces between the grains of rock and sediments) in coarse sediments than would be the case in fine sands or mud. Temperature increases associated with operation of the proposed transmission line are not expected to result in a significant impact on state-listed mussel species. In accordance with Certificate Condition 163, the Applicant would complete a pre-installation and post-energizing sediment temperature and magnetic field survey of the transmission line route to assist in evaluation of operational impacts from magnetic fields and heat during the lifespan of the proposed CHPE Project (NYSPSC 2013).

5.1.6 Terrestrial Habitats and Species

Impacts from Construction

Vegetation and Habitat. No impacts on terrestrial habitat would occur in the Lake Champlain Segment because this portion of the proposed CHPE Project is entirely aquatic.

Wildlife. Because the Lake Champlain Segment is entirely aquatic, the only terrestrial species that could be impacted would be birds and bats. Along the Lake Champlain Segment, construction activities would occur at distances greater than 500 feet (152 meters) from shore except in a few locations. For example, construction would occur within approximately 300 feet (91 meters) from Crown Point State Park (MP 73.8). At this distance, the noise level from construction activities to noise receptors in the park would be approximately 62 dBA. At a distance of 500 feet (152 meters) the expected noise levels would be approximately 56 dBA; a much lower noise level. With an average installation rate of 1.5 miles (2.4 km) per day, noise levels would be increased over baseline noise levels for only a few hours at any one location. Therefore, noise impacts associated with construction are unlikely to result in avoidance of bird and bat forage areas and bird nests and bat roosts adjacent to the proposed CHPE Project route, reduce communication ranges, or interfere with predator/prey detection during the short time period that construction equipment would be operating in a particular area. Birds and bats that forage in habitats within this segment could be disturbed by the noise level fluctuations during construction. However, permanent displacement from the area is unlikely because construction activities would occur in fringe habitats where vehicle and railroad noise are common.

Potentially impacted birds and bats would be expected to resume typical activities following construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Vegetation and Habitat. Because the transmission line would be buried within Lake Champlain rather than on land, no operational impacts on terrestrial vegetation and habitats would occur.

Wildlife. No significant impacts on terrestrial species would occur from operation of the transmission system. If necessary, emergency repairs could require localized vessel operation for a very short duration. Noise associated with these vessels could temporarily result in avoidance of bird and bat forage areas and bird nests and bat roosts adjacent to the proposed CHPE Project route.

5.1.7 Terrestrial Protected and Sensitive Species

The DOE initiated informal consultation with the USFWS in June 2012 for the proposed CHPE Project (see **Section 3.1.5** regarding consultations with USFWS and NYSDEC on protected and sensitive species). DOE prepared a BA to assist in determining the impacts of the proposed CHPE Project and to facilitate ESA Section 7 consultations (see **Appendix Q**). Seven terrestrial ESA-listed species are being assessed for the BA. Of these, the Indiana bat (*Myotis sodalis)* and Karner blue butterfly (*Lycaeides melissa samuelis*) occur in the proposed CHPE Project ROI for terrestrial protected and sensitive species and are analyzed in detail. Because there is no designated or proposed designated critical habitat in the ROI, the proposed CHPE Project would have no effect on designated or proposed designated critical habitat.

Table 5.1.7-1 identifies the federally and state-listed threatened and endangered species and other protected species that could occur within the proposed CHPE Project ROI by segment.

Impacts from Construction

Federally Listed Species

Indiana bat. The Indiana bat is likely to occur in Essex County during both the summer and winter due to the presence of the known hibernaculum in Essex County (USFWS 2007). The Indiana bat is likely to occur in Clinton County during the summer. Suitable foraging habitat for the Indiana bat occurs within and adjacent to the Lake Champlain Segment ROI. Potential effects associated with the construction include disturbance or displacement. Construction activities along the Lake Champlain Segment would generally occur at distances greater than 500 feet (152 meters) from land. However, in a few places,

Table 5.1.7-1. Potential Occurrence of ESA-Listed Species within the Proposed CHPE Project ROI

Common Name	Scientific Name	Status (Federal, State)	Possible Occurrence in Each Segment			
			Lake Champlain	Overland	Hudson River	New York City Metropolitan Area
Mammals						
Indiana bat	*Myotis sodalis*	FE, SE	Yes	Yes	Yes	No
Northern long-eared bat	*Myotis septentrionalis*	FPE	Yes	Yes	Yes	Yes
Birds						
Piping plover	*Charadrius melodus*	FT	No	No	No	Yes
Bald eagle	*Haliaeetus leucocephalus*	FD, ST	Yes	Yes	Yes	Yes
Roseate tern	*Sterna dougallii*	FE	No	No	No	Yes
Red knot	*Calidris canutus rufa*	FPT	No	No	No	Yes
Peregrine falcon	*Falco peregrinus*	SE	Yes	Yes	Yes	Yes
Short-eared owl	*Asio flammeus*	SE	Yes	Yes	Yes	Yes
Northern harrier	*Circus cyaneus*	ST	Yes	Yes	Yes	Yes
Loggerhead shrike	*Lanius ludovicianus*	SE	Yes	Yes	No	No
Least bittern	*Ixobrychus exilis*	ST	No	Yes	Yes	Yes
Reptiles						
Bog turtle	*Clemmys muhlenbergii*	FT, SE	No	Yes	Yes	No
Invertebrates						
Karner blue butterfly	*Lycaeides melissa samuelis*	FE	No	Yes	No	No
Frosted elfin	*Callophrys irus*	ST	No	Yes	No	No
Plants*						
Heartleaf plantain	*Plantago chordate*	ST	No	Yes	Yes	No
Smooth bur-marigold	*Bidens laevis*	ST	No	No	Yes	No
Davis' sedge	*Carex davisii*	ST	No	Yes	Yes	No
Small whorled pogonia	*Isotria medeoloides*	FT	No	No	No	No

Notes:

FE = Federally listed as endangered; FT = Federally listed as threatened; FPE = Proposed species for Federal listing as endangered; FPT= Proposed species for Federal listing as threatened; FD = Federally delisted; SE = State listed as endangered; ST = State listed as threatened

*Due to the number of state-listed plants in the Overland Segment ROI, these were included as a separate table in **Appendix H**. See Table H.2-2 in **Appendix H** for a list of state-listed plants that occur within 0.25 miles (0.4 km) of the Overland Segment.

construction would occur closer to shore. At this distance, the noise level would be less than 60 dBA. With an average installation rate of 1.5 miles (2.4 km) per day, noise levels would be increased over baseline for only a few hours at any one location. Although, the closest Priority 1 or 2 hibernaculum to the proposed CHPE project route in Lake Champlain is approximately 5 miles (8 km) away, there is a Priority 4 hibernaculum within 1 mile (1.6 km) of Lake Champlain. Noise associated with construction activities could disturb Indiana bats using forage areas in the ROI in the Lake Champlain Segment. However, these disturbances are not expected to result in significant effects on the species.

As a result of construction activities, Indiana bats could change foraging areas and seek foraging habitats that are farther away from the construction area. Indiana bats exhibit strong site fidelity to their summer colony areas and foraging habitat (Kurta et al. 2002). The duration and distance that Indiana bats travel to find new habitat if their traditional habitat is lost or degraded is unknown. However, observations of Indiana bats being tolerant of habitat disturbance has been previously documented (USFWS 2008b). It is unknown whether Indiana bats would shift or abandon their foraging areas as a result of the proposed construction activities. Because noise effects on foraging areas would be temporary and only last for up to 2 weeks in any given location, it is possible that any affected Indiana bat would return to the area after construction is completed.

Construction associated with the proposed CHPE Project may affect, but is not likely to adversely affect, the Indiana bat. A BA has been prepared to provide a detailed analysis of the impacts of the proposed CHPE Project on federally listed and candidate and proposed species and to facilitate ESA Section 7 consultations with the USFWS (see **Appendix Q**).

Northern long-eared bat. The northern long-eared bat occurs in every county in New York State. Based upon its habitat preferences during winter and summer, it can be assumed that these bats would occur in similar or the same areas indicated for the Indiana bat along the proposed CHPE Project route, including in the Lake Champlain Segment. Thus, suitable foraging habitat for the northern long-eared bat likely occurs within and adjacent to the Lake Champlain Segment ROI, and impacts on the species from construction activities in the Lake Champlain Segment would be similar to those described for the Indiana bat. Potential effects associated with the construction include disturbance or displacement. Noise associated with construction activities could disturb northern long-eared bats using forage areas in the ROI in the Lake Champlain Segment. It is unknown whether northern long-eared bats would shift or abandon their foraging areas as a result of the proposed construction activities. Because noise effects on foraging areas would be temporary and only last for up to 2 weeks in any given location, it is possible that any affected bat would return to the area after construction is completed. However, these disturbances are not expected to result in significant effects on the species.

Similar to the Indiana bat, construction associated with the proposed CHPE Project may affect, but is not likely to adversely affect, the northern long-eared bat. A BA has been prepared to provide a detailed analysis of the impacts of the proposed CHPE Project on federally listed and candidate and proposed species and to facilitate ESA Section 7 consultations with the USFWS (see **Appendix Q**).

Bald eagle. Based on the USFWS list of known or likely county occurrences of federally listed species in New York State, there is a potential that bald eagles could winter in Clinton County (USFWS 2012c). Because this segment is aquatic, there would be no impacts on perch or nest sites; however, there could be some minor disturbance to nearby eagles during construction activities. Noise disturbance resulting in temporary, non-significant avoidance of foraging near construction would be the same as described for non-listed birds (see **Section 5.1.6**).

State-Listed Species

Because the Lake Champlain Segment is completely aquatic, the only terrestrial species expected to occur within the ROI are bird and bat species. Noise associated with construction could disturb state-listed bird species using forage areas and nests adjacent to the transmission line route in the Lake Champlain Segment. Disturbance could result in avoidance of these areas; however, this effect would be temporary and not significant. Noise disturbance resulting in temporary avoidance of foraging areas near construction could be the same as described for non-listed birds (see **Section 5.1.6**).

Migratory Birds

Temporary, but not significant, impacts on migratory birds could result from the installation of the transmission line in the Lake Champlain Segment. Waterfowl, gulls, and terns using aquatic habitats along the ROI could be disturbed and displaced from foraging habitats due to noise from underwater cable installation techniques and construction vessel traffic. Generally, these birds would be expected to avoid the construction area and move to similar habitats nearby; however, impacts could occur if disturbances result in increased stress, increased travel time to foraging areas from roosts or nest sites, or lower foraging success. Generally, noise disturbance resulting in temporary avoidance of foraging areas near construction would be the same as described for non-listed birds (see **Section 5.1.6**).

Impacts from Operations, Maintenance, and Emergency Repairs

Inspection activities would consist of underwater instrument surveys using a small vessel operating at least 300 feet (91 meters) from shore and, therefore, would not result in significant adverse effects on terrestrial protected or sensitive species. Effects from operations and emergency repair activities are discussed as follows.

Federally Listed Species

Indiana bat. There have been a limited number of studies performed to ascertain the effect of magnetic fields on terrestrial and aquatic ecosystems, and little or no evidence exists suggesting on wildlife, except for some effects near very strong sources of electric and magnetic fields. Buried cables have no electric fields at the ground surface (WHO 2012). Bats have been shown to use magnetic cues for compass heading orientation (Holland et al. 2008). The transmission cables would emit a constant magnetic field, which would decrease with distance from the cable centerline. Indiana bats could forage over Lake Champlain above the transmission line route; however, their exposure would be limited to magnetic fields of less than 10 mG depending on the water depth and foraging level above the water surface. Indiana bats might be able to detect magnetic fields; however, there is no evidence to suggest that the magnetic fields could result in adverse effects (BPA 2010, AUC 2011). Therefore, significant effects on the Indiana bat from its detection of magnetic fields generated by the proposed CHPE Project are not anticipated.

Effects associated with emergency repairs of the transmission line in the Lake Champlain Segment would not be significant, although they would be similar to those impacts occurring during construction, but for a shorter duration and involving disturbance to a smaller area than those for construction activities.

Operations, inspections, and emergency repairs associated with the proposed CHPE Project may affect, but are not likely to adversely affect, the Indiana bat.

Northern long-eared bat. The effects from operation and emergency repairs in the Lake Champlain Segment on northern long-eared bats would be the same as those described for Indiana bat. Significant effects on the Indiana bat from its detection of magnetic fields generated by the proposed CHPE Project and emergency repairs in Lake Champlain are not anticipated. Similar to Indiana bats, northern long-eared bats might be able to detect magnetic fields; however, there is no evidence to suggest that the magnetic fields could result in adverse effects (BPA 2010, AUC 2011). Effects associated with emergency repairs would be similar to those impacts occurring during construction, but for a shorter duration and involving disturbance to a smaller area than those for construction activities. Therefore, operations, inspections, and emergency repairs associated with the proposed CHPE Project may affect, but are not likely to adversely affect, the northern long-eared bat.

Bald eagle. No significant impacts on bald eagles from electric or magnetic fields would be anticipated from operation of the transmission line. Research indicates that some species of animals, including birds, are able to detect magnetic fields at levels that might be associated with electric power transmission lines; however, detection does not imply that the fields result in any effects. Bald eagles could forage over Lake Champlain above the transmission line route; however, their exposure would be limited to magnetic fields of less than 15 mG depending on the water depth. Impacts associated with emergency repairs of the transmission line in the Lake Champlain Segment, if required, would be similar to those occurring during construction, but would be for a shorter duration and would disturb a smaller area.

State-Listed Species

Research indicates that some state-listed species of animals, including birds, are able to detect magnetic fields at levels that can be associated with transmission lines; however, detection does not imply that the magnetic fields could result in any effects (AUC 2011, Holland et al. 2008).

Potential non-significant effects associated with emergency repairs of the transmission line, if required, would be similar to those occurring during construction, but would be of a shorter duration and disturb a smaller area. Noise could disturb bird forage areas adjacent to the transmission line.

Migratory Birds

No significant impacts on migratory birds from magnetic fields would be anticipated during operation of the transmission line. Impacts associated with emergency repairs of the transmission line in the Lake Champlain Segment, if required, would be similar to those occurring during construction, but would be of a shorter duration and disturb a smaller area. Birds could be temporarily disturbed by construction noise level fluctuations and temporarily relocate from foraging habitats. However, permanent displacement would not be likely since repair activities would be for a shorter duration and would disturb a smaller area.

5.1.8 Wetlands

Impacts from Construction

Wetland Physical Characteristics and Functions. No designated wetlands are within the ROI for the proposed CHPE Project within the Lake Champlain Segment and cable installation activities would comply with water quality standards; therefore, no impacts on wetlands and wetland water quality or functions would be anticipated. Loss of wetlands associated with the Lake Champlain Segment and changes in hydrology would not be expected from the proposed CHPE Project.

Wetland Habitat and Species. Because no wetlands would be within the ROI for the proposed CHPE Project within the Lake Champlain Segment, no impacts on wetland habitat and species would be anticipated. The transmission line would be installed approximately 1.5 miles (2.4 km) from two identified wildlife management areas (WMAs) associated with the Lake Champlain Marshes BCA and no significant impacts on these WMAs would be anticipated.

Impacts from Operations, Maintenance, and Emergency Repairs

Wetland Physical Characteristics and Functions. No impacts on wetland physical characteristics and functions would be anticipated during operation, inspection, or potential emergency repairs of the transmission line within the Lake Champlain Segment because no wetlands are present within or adjacent to the ROI.

Wetland Habitat and Species. No impacts on wetland habitat or species would occur during operation or inspection of the transmission line in the Lake Champlain Segment. Impacts from potential emergency repair activities on wetland species would not be expected due to the distance between the transmission line and freshwater wetlands.

5.1.9 Geology and Soils

Impacts from Construction

Physiography and Topography. A jet or shear plow would be used to bury the transmission cables within Lake Champlain. It is expected that the resulting trench would be filled in and the original grade restored over time, as described in **Section 2.4.10.1**. As specified in the NYSPSC Certificate for the proposed CHPE Project (Condition 163), the Applicant would conduct a pre-installation bathymetric survey of the underwater route in Lake Champlain for use in post-installation monitoring (NYSPSC 2013). Placement of concrete mats on the lakebed could result in localized modification of currents, resulting in some limited scouring adjacent to the transmission line over time. The impacts of the mats on bathymetry would be negligible relative to natural levels of fluctuations in surface topography from currents, storms, navigational traffic, and other pre-existing factors.

Geology. No impacts on geology in the Lake Champlain Segment would be expected. In some areas, where the burial depths necessary for the protection of the transmissions cables might not be achievable due to geology (e.g., areas of bedrock) or existing submerged infrastructure, the transmission cables would be laid atop the river bottom and covered with sloping stone rip-rap or articulated concrete mats.

Sediments. During installation of the transmission cables, debris-clearing equipment and barge anchor cables would be expected to sweep the lakebed, causing a negligible disturbance of the underlying sediments and terrain during construction activities. Sediments would be suspended in the water column and displaced. Depending on the sediment particle-size composition, approximately 70 to 80 percent of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the cable plow (HTP 2008). Smaller sediment particles (i.e., silts and clays) would remain in suspension longer than larger particles and, thus, could be transported farther from the original site of deposition depending on the currents within the lake. The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and the mass of the disturbed sediment particles, along with construction methods and ambient lacustrine (lake) conditions.

Sediment concentrations in the turbidity plume could be initially high, and rapidly decrease with distance. Resettling of sediment grains could alter the original stratigraphy of the lakebed, resulting in a localized change in surficial sediment texture and grain size. Load calculation modeling conducted for the proposed CHPE Project determined that the settling rate of suspended sediments varied between 0.3 and 212,778 feet per day (feet/day) (0.1 and 64,855 meters per day [meters/day]), with higher rates at the northern and southern ends of the lake and lower rates in the middle of the lake, which is attributable to increased current movement. The median settling rate for sediments in Lake Champlain was 1.6 feet/day (0.5 meters/day) (CHPEI 2012hh). Use of shear plow cable installation techniques in the southern portion of Lake Champlain would minimize sediment resuspension and transport. The plow does not deposit any new or nonnative sediment or fill material into the trench. As specified in the Certificate Condition 163, the Applicant would conduct additional pre-installation physical and chemical sediment sampling in Lake Champlain for use in post-installation monitoring (NYSPSC 2013) (see **Appendix G**).

Approximately 127,000 cubic yards (97,000 cubic meters) of sediment would be disturbed by the installation of the transmission line in the Lake Champlain Segment (CHPEI 2012m). Sediments in Lake Champlain are known to be contaminated; therefore, disturbance of these sediments could resuspend contaminants in the water column, and allow them to settle in new areas of the lakebed. An estimated 119 cubic yards (91 cubic meters) of silt and clay sediments would be dredged at the proposed HDD cofferdam location at MP 101 (CHPEI 2012m). The cofferdam would help contain sediment disturbed during dredging of the HDD exit pit. The excavated area within the cofferdam would be backfilled at the completion of construction and the surface restored to its original grades. Conventional dredging of the HDD exit point would employ a closed environmental clamshell bucket, and dredge material would not be sidecast or returned to the water. See **Appendix G** for a more detailed description of Applicant-proposed measures to minimize impacts on sediments.

The cable-plowing techniques used to install the transmission line would induce localized fluidization and resettling of soils. The jet plow would be fitted with hydraulic pressure nozzles that create a downward and backward flow within the trench, allowing the transmission cables to settle into the trench under its own weight before the sediments settle back into the trench. However, construction would not substantially alter the sediments within the ROI. See **Section 5.1.3** for a more detailed discussion of the impacts of turbidity in the water column of Lake Champlain.

Seismicity. Construction of the CHPE Project would not increase the risk of seismic hazards. Although the Lake Champlain Segment has a potential for low to moderate damage during a seismic event, the overall probability for seismic activity, including resulting liquefaction, is low (USGS 2012a, USGS 2013).

Impacts from Operations, Maintenance, and Emergency Repairs

Physiography and Topography. No impacts on physiography and topography would be expected from operation or inspection of the transmission line as the transmission line would be designed to be maintenance-free. As specified in Certificate Condition 163, the Applicant would conduct post-installation bathymetric and magnetometer surveys of the underwater route in Lake Champlain to monitor and ensure that required depth of transmission line burial has been achieved and original topography has been re-established (NYSPSC 2013). Emergency repair activities could require the transmission cables to be unearthed; these activities would result in impacts on physiography and topography similar to, but less than, those described for construction activities and would be negligible because they would be intermittent, only occur when required, and would be of a shorter duration.

Geology. No impacts on geology from the operation, inspection, and emergency repairs of the transmission line are expected.

Sediments. No impacts on sediments from the operation or maintenance of the transmission line would be expected, as the transmission line would be designed to be maintenance-free. As specified in Certificate Condition 163, the Applicant would conduct post-energizing physical and chemical sediment sampling in Lake Champlain (NYSPSC 2013). Emergency repair activities could require the transmission cables to be unearthed; these activities would result in impacts on sediments similar to, but less than, those described for construction and negligible because they would be intermittent, only occur when required, and would be of a shorter duration.

Seismicity. Operation of the CHPE Project would not increase the risk of seismic hazards. During a seismic event, which would be rare, it is possible that damage to the transmission line could be sustained. The proposed HVDC transmission cables are insulated and armored, and designed to withstand the necessary mechanical forces experienced during cable installation, which are substantially greater than a seismic event. Furthermore, the transmission cables would not be installed in a straight line and would contain slack to readily accommodate seismic events. The inherent flexibility of the transmission cables would allow the buried transmission line to shift and deform slightly with ground movements associated with seismic events.

If a transmission cable failed due to a seismic event, the protection system would de-energize the transmission system in less than 0.005 seconds. HVDC transmission cables dissipate very limited energy under short circuit (i.e., fault) conditions. Therefore, no direct impacts on the environment, navigation, or public safety would be anticipated. A cable repair procedure that considers navigation and the environment would be implemented as appropriate during any seismic events.

5.1.10 Cultural Resources

The installation of the proposed CHPE Project could result in adverse effects on historic properties within the APE of the Lake Champlain Segment of the proposed CHPE Project (see **Figure 3.2.1-1**). There are two terrestrial archaeological sites, seven underwater sites, and three NRHP-listed architectural properties in the APE of the Lake Champlain Segment.

Impacts from Construction

One of the underwater sites identified in the APE is a NRHP-listed property associated with Fort Montgomery, two are confirmed shipwrecks, and four are possible shipwrecks. The boundaries of the two terrestrial sites would be reexamined in accordance with the terms of the Cultural Resources Management Plan (CRMP) developed for the proposed CHPE Project or as directed under the terms of the Programmatic Agreement (PA) (see **Appendix T**) to determine whether cultural resources do in fact extend into the APE. If the sites do extend into the APE, their NRHP eligibility would be evaluated. Ground-disturbing activities associated with construction could damage archaeological features and would be expected to disturb the context of artifacts in the archaeological sites located in the APE of the Lake Champlain Segment. In the case of the NRHP-listed and -eligible archaeological sites in the APE, this could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation.

One of the three NRHP-listed architectural properties, the Lake Champlain Bridge, was demolished in 2010, and therefore, no adverse effects would be expected on this property. The boundaries of the Fort Crown and Fort Ticonderoga NHLs would be reexamined in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA to determine whether these cultural resources do in fact extend into Lake Champlain Segment construction corridor (i.e., the APE). These cultural resources would be evaluated for their contribution to the significance of the properties if they extend into the APE. If the resources are found to be contributing elements, ground-disturbing activities associated with construction could damage or disturb the context of the contributing elements located in the APE. This could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. If there are no contributing elements in the APE, impacts from construction on the architectural properties would be limited to exposure to temporary noise and short-term visual impacts from the proximity of construction activities and equipment on Lake Champlain.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a CRMP that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known underwater archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of underwater archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. Circumventing known underwater sites or anomalies would avoid potential damage to the integrity of the site. A PA (see **Appendix T**) has been developed pursuant to 36 CFR 800.14(b) and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G.**

Impacts from Operations, Maintenance, and Emergency Repairs

The operation and inspection of the Lake Champlain Segment would have no impacts on cultural resources in the APE. Any emergency repairs would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources; therefore, impacts would not be expected from such activities.

5.1.11 Visual Resources

As described in **Section 3.1.11**, this analysis evaluates the potential for both visual impacts and impacts on aesthetic resources along the proposed CHPE Project route and follows the NYSDEC Program Policy entitled *Assessing and Mitigating Visual Impacts* (NYSDEC 2000).

Impacts from Construction

Construction of the proposed CHPE Project within the Lake Champlain Segment would result in temporary impacts on visual and aesthetic resources from the presence of construction equipment and activities along the project route. Where the proposed CHPE Project transmission cables would be buried beneath the beds of existing waterways, a cable-laying vessel, support vessels, and barges would be visible on the water surface. Minimal land-based support would be used from an existing port such as the Port of Albany. Construction equipment on the water surface would be operating at any one location for a short time period (as little as a few hours) as construction progresses down the waterway.

Impacts from Operations, Maintenance, and Emergency Repairs

No permanent aboveground facilities would be constructed along this portion of the proposed CHPE Project route; therefore, no visual impacts or impacts on aesthetic resources would be expected during operations. Vessels and equipment necessary to support any emergency repair activities would be visible along the project route in the Lake Champlain for a period of a few hours to up to 1 week during any emergency repair events as required. The vessels and equipment necessary for routine inspection activities would be visible for a period of a few hours each time the project route is inspected.

5.1.12 Infrastructure

Impacts from Construction

Electrical Systems. No impacts on the nine underwater electrical lines would be expected where they would be crossed by the proposed CHPE Project. The crossings of these utilities would be carried out in accordance with utility crossing agreements developed by the Applicant in consultation with the utility providers per NYSPSC Certificate Conditions 27 through 29 (CHPEI 2012q, NYSPSC 2013). Adequate utility infrastructure protection measures at crossings would be specified in these agreements.

In general, where the transmission cables would cross an existing utility, they would be laid on the surface of the lake bottom over the existing utility and protective coverings such as grout pillows, or articulated concrete mats would be installed over the cable crossing (see **Figure 2-6**). Articulated concrete mats are typically made of small pre-formed blocks of concrete that are interconnected by cables or synthetic ropes in a two-dimensional grid. A listing of specific Applicant-proposed measures to minimize disruptions (i.e., interruptions) to utility infrastructure, including electrical systems and additional details on concrete mats, is provided in **Appendix G**.

Water Supply Systems. Temporary impacts on drinking water intakes could result from suspended sediment entering the intakes during the installation of aquatic transmission cables. The aquatic transmission cable would be installed and buried using water-jetting and shear plow techniques, which would result in localized sediment suspension and transport. Depending on the sediment particle-size composition, the majority (approximately 70 to 80 percent) of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the plow. With higher currents, more sediment can be transported outside the trench area (HTP 2008, MMS 2009, CHPEI 2012i). Model results indicate that, in conjunction with Applicant-proposed measures including use of the shear plow south of Crown Point (MP 74), TSS levels would be below 200 mg/L within 500 feet (152 meters) of the construction area. Suspended sediment plume and water quality monitoring would be conducted in accordance with the Applicant's Water Quality Monitoring Plan that would be developed as part of the EM&CP. In accordance with Condition 104 of the NYSPSC Certificate for the proposed CHPE Project (NYSPSC 2013), the Applicant would notify and consult with operators of public water supplies for any work within 1 mile (1.6 km) of their water intake structures. Additional details on Applicant-proposed measures to minimize impacts on water supply is provided in **Appendix G**. No impacts would be expected on the two water lines that would be crossed by the proposed CHPE Project.

Storm Water Management. No impacts on storm water management would be expected because the entire Lake Champlain Segment is aquatic and no storm water management infrastructure is present.

Solid Waste Management. Impacts on solid waste management would be expected due to the disposal of excavated sediment from dredging activities. HDD technology would be used at the transition from water to land at MP 101, and the Applicant has estimated that approximately 100 cubic yards (91 cubic meters) of drill cuttings (used bentonite and excess soil) would be generated for disposal at each HDD water-to-land transition. These drill cuttings would be disposed of at an approved disposal location. Sediment from water jetting and use of a shear plow would usually backfill the trench over the cables through deposition, slumping of the trench walls, or wave action (CHPEI 2012q). Therefore, use of water jetting or a shear plow would not require soil disposal.

Conventional dredging would be used to excavate the HDD conduit exit pit at MP 101 in Lake Champlain. At this location, approximately 119 cubic yards (91 cubic meters) of sediment would be excavated, placed on a barge, and stockpiled for reuse to backfill the pit. If the sediment cannot be re-used as backfill, it would be disposed of at an approved site selected based on the results of sediment testing for potential contaminants (CHPEI 2012q).

Communications. No impacts on communications service would be expected where the six telephone system lines would be crossed by the proposed CHPE Project. Wherever possible, the HVDC cables would cross existing fiber optic and telecommunications cables at right angles. The method of embedding and protection would be determined by the burial depth of the existing cables. A minimum separation between the proposed transmission cable and the existing telecommunication cables would be provided by installing a protective sleeve on the transmission cable at each crossing. The protective sleeve would extend for approximately 50 and 80 feet (15 and 24 meters) on each side of the crossing point. The HVDC cables, including the section with sleeve protection, would be buried by water jetting to the specified depth, or as limited by the actual burial depths of the existing communications cables and the minimum separation distance. Utility line crossings would be carried out in accordance with utility crossing agreements (CHPEI 2012q). Adequate utility infrastructure protection measures at crossings would be specified in these agreements. However, if existing telecommunication cables are buried less than 3 feet (0.9 meters), special measures might be used at the crossing site. Potential measures used for crossing shallow-buried existing utilities include the use of protective sleeves that provide sufficient burial depths and separation between the HVDC cables, or cutting and resplicing existing telecommunications cables after installing the HVDC cables for the proposed CHPE Project. The latter would likely result in short-term impacts in the form of interruptions in telephone service.

For shallow buried communications lines, a minimum separation between the HVDC cable and the communications line would be provided by pre-installing a 150-millimeter (mm)-thick, grout-filled mat on top of the infrastructure at each crossing. The HVDC cable and underlying communications line would be post-lay protected by further placement of grout-filled mats or articulated concrete mats. The HVDC cables would be buried using the water-jetting device to the target depth, as close as possible to the grout-filled mats (CHPEI 2012i).

Natural Gas Supply. No impacts on natural gas supply would be expected from the 14 gas line crossings identified within the Lake Champlain Segment (CHPEI 2012w). During construction activities, the protocol and BMPs similar to those described for *Electrical Systems* above would be applied. This protocol would also be used if previously unidentified natural gas infrastructure were to be discovered along the proposed CHPE Project route during surveying or construction.

Liquid Fuel Supply. Minimal amounts of liquid fuel would be consumed by construction equipment. No substantial liquid fuel pipelines or infrastructure have been identified within the Lake Champlain Segment (CHPEI 2012w). If liquid fuel infrastructure were to be discovered during surveying or construction, the protocol and BMPs similar to those described for *Electrical Systems* would be applied.

Sanitary Sewer and Wastewater Systems. For two wastewater infrastructure lines identified in the vicinity of the project route, or if other sewer or wastewater infrastructure were to be discovered during surveying or construction, the protocol and BMPs similar to those described for *Electrical Systems* would be applied.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical Systems. The proposed CHPE Project would likely result in increases in the supply capacity and reliability of electrical power and a decrease in transmission congestion in the NYSBPS over the duration of the project. In addition, the NYSBPS would have a greater percentage of its capacity derived from clean energy resources (see **Section 5.4.16**). Benefits to the NYSBPS are discussed in greater detail in **Section 5.4.12**.

The transmission cables would be designed to be relatively maintenance-free, with only the need for periodic inspections. Spot checks and system performance scans associated with underwater inspections would be performed with a non-intrusive Time Domain Reflectometer. The aquatic transmission cables would include a polyethylene sheath extruded over a lead-alloy sheath to provide mechanical and corrosion protection (see **Figure 2-5**). An armored layer of galvanized-steel wires embedded in bitumen would provide additional protection for the aquatic transmission cables.

Water Supply Systems. No operational impacts on water supply systems would be expected. Periodic surveys and scans associated with underwater inspections would not create any sediment disturbance in the areas of the drinking water intakes. Potential impacts including sediment disturbance and suspension could occur during emergency repair activities in the vicinity of water intakes but would occur only when required and be infrequent and short-term.

Storm Water Management. The Lake Champlain Segment is aquatic and, therefore, no storm water management features would be impacted or required.

Solid Waste Management. No operational impacts on solid waste management would be expected because the transmission line itself would be designed to be relatively maintenance-free and, therefore, would not produce any solid waste.

Communications. No operational impacts on communication systems would be expected because the transmission cables would not create induced voltages or currents that could impact communications equipment such as marine radios, remote telephones, and cellular telephones. The transmission cables would not create any corona discharge and would not be independent sources of radio, telephone, or television interference (CHPEI 2012i). The transmission cables are designed with outer metal layers and would not create an external electric field. Therefore, the magnetic field of the cables would not induce voltages or currents that could impact communications equipment such as marine radios, remote telephones, and cellular telephones. The transmission cables would not create any corona discharge and would not be independent sources of radio, telephone, or television interference (CHPEI 2012i). See **Sections 5.1.14** and **5.2.14** for additional discussion on magnetic and electric fields.

Natural Gas Supply. No operational impacts on natural gas supply would be expected because the transmission system would not consume natural gas and would not be located over natural gas infrastructure.

Liquid Fuel Supply. Negligible impacts on liquid fuel supply would be expected due to the minimal amounts of liquid fuel that would be consumed by boats and automobiles during inspections and potential emergency repairs of the transmission system. Inspection activities would be short-term in duration, but occur multiple times over the operating life of the transmission line. Emergency repairs would only occur on an as-needed basis.

Sanitary Sewer and Wastewater Systems. No operational impacts on sanitary sewer and wastewater systems would be expected because the operation of the transmission system would not increase the generation of wastewater and would not cross any sanitary sewer and wastewater infrastructure.

5.1.13 Recreation

Impacts from Construction

Recreational activities and recreation resource users would be affected slightly by construction of the proposed CHPE Project within the Lake Champlain Segment. See **Appendix K** for a complete list of recreational resources that are within the ROI. During underwater cable installation, there would be increased vessel activity along the transmission line route through Lake Champlain. Significant impacts on recreational activities and users during construction activities would not be expected from the short-term closure of the immediate area around the cable installation vessels. Access to shoreline recreational areas (i.e., boat launches and piers) would be maintained, as feasible, but could be partially restricted for a short period of time during construction for safety reasons when the cable-laying operation is close to shore. The transmission line would be installed by vessels operating on the lake, and minimal land-based support would be required. Further discussion of visual impacts from construction activities can be found in **Section 5.1.11**. Impacts from noise associated with construction activities are discussed in **Section 5.1.17**.

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts on recreation would be expected from operation of the transmission line. Following construction, the transmission line would not be visible and would not affect use of Lake Champlain for recreational purposes. No permanent aboveground facilities would be constructed along this segment of the proposed CHPE Project route that would affect recreational resources. Maintenance activities (i.e., cable inspections by vessel-towed equipment) would be expected to occur throughout the life of the transmission line; however, these activities would occur on an intermittent basis. If emergency repairs of the cable is required, the activities required to recover, splice, and install a new cable section, should that be necessary, would result in similar impacts as those that would occur during initial installation. These would be short in duration and restricted to a discrete area of the lake where the cable repairs would be required.

5.1.14 Public Health and Safety

Impacts from Construction

Contractor Health and Safety. Impacts on health and safety could occur during construction activities for the CHPE Project. The proposed construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal and state safety regulations. Workers would be required to wear protective gear such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear.

The contractor would develop various plans, including activity-specific Health and Safety Plan (HASPs) and an Emergency Contingency Plan, to ensure construction activities for the proposed CHPE Project are conducted in a safe manner. The HASPs would identify requirements for minimum construction buffers (temporary aquatic exclusion areas) for recreational uses on the lake, such as boating. The HASPs would include provisions for worker protection as required under the National Electrical Safety Code (NESC) and OSHA 29 CFR Part 1926, *Safety and Health Regulations for Construction*.

Specialized equipment would be necessary for the installation of the proposed transmission cables in the aquatic environment of Lake Champlain. Construction personnel would be performing the work on a vessel designed solely for the purpose of installing transmission cables. Operation of the aquatic installation equipment and vessels would be performed by personnel specially trained to use this equipment.

Activity-specific HASPs would be developed for each construction activity for the proposed CHPE Project, including installation of the aquatic transmission line in the Lake Champlain Segment. Activity-specific HASPs would contain information on hazard communication, hazard identification, risk assessment, and all other information necessary to perform the work safely (e.g., SDSs, PPE to be used).

An Aquatic Safety and Communications Plan detailing USCG regulations for safely operating vessels and requiring coordination with the USCG Waterways Management and Vessel Traffic Services would be developed to meet regulatory permit conditions, including OSHA 29 CFR 1926.106 regarding working over or near water. **Appendix G** presents additional Applicant-proposed measures for addressing impacts on contractor health and safety.

Public Health and Safety. No impacts on public health and safety would be expected. All construction sites would be managed to prevent harm to the general public. Temporary aquatic exclusion areas would be established around the work barges and operating equipment on Lake Champlain. The public would be notified prior to commencement of project activities.

Magnetic Field Safety. No health and safety impacts from magnetic and electric fields would be expected during the construction phase of the proposed CHPE Project because the transmission line cables would not be connected to a power source during construction activities.

Impacts from Operations, Maintenance, and Emergency Repairs

Contractor Health and Safety. Impacts on contractor health and safety could occur during the operational phase of the proposed CHPE Project. Activities associated with operations, inspection, and emergency repairs (as required) pose a risk of accidents similar to those described for construction, but would be less likely to occur because they would be intermittent and only occur for short durations during occasional inspection activities and emergency repairs, as required. This level of risk would be managed by adhering to established Federal and state safety regulations.

Before the proposed CHPE transmission system would be put into operation, an ERRP would be prepared that identifies procedures necessary to perform maintenance (i.e., inspections) and emergency repairs. The ERRP would detail the activities, methods, and equipment involved in inspection and repairs of the transmission system. Contractors would follow all guidelines detailed in the ERRP when conducting inspections or emergency repair activities.

Public Health and Safety. No health and safety impacts on the public would be expected under the operational phase of the proposed CHPE Project because the transmission cables would be under water and installed in compliance with all Federal and state rules and regulations. Before the proposed CHPE transmission system would be put into operation, the route would be appropriately marked, and the final route and placement of the transmission cable and associated equipment would be provided to the NYSPSC for addition to the "Call Before You Dig" database. This should prevent any accidental contact with the cables once they are operational.

The aquatic HVDC transmission cables require no fluid for insulation and would be buried at depths to prevent disturbance from unrelated operations in Lake Champlain. The potential for anchor snags is discussed in **Sections 5.1.2** and **5.3.2**. Inspections would be performed in accordance with manufacturer's specifications to ensure equipment integrity and protection is maintained. Contractors would follow all guidelines detailed in the ERRP when conducting inspection or emergency repair activities.

Magnetic Field Safety. No health and safety impacts from magnetic fields would be expected during the operational phase of the proposed CHPE Project. Since the transmission line would be buried beneath Lake Champlain, the only foreseeable exposures to magnetic fields would occur during recreational or commercial uses (e.g., diving) of the lake. However, the transmission line would be buried to a depth such that potential for exposure would be highly unlikely or would only occur for very short periods of time. Magnetic fields for the Lake Champlain Segment were calculated using an assumed cable burial depth of 3 to 4 feet (0.9 to 1.2 meters) with 1 foot (0.3 meters) of separation between the two cables, which would be collocated in the same trench. Magnetic field levels at the Lake Champlain lakebed above the centerline of the transmission cables were calculated to be at or below the interim standard of 200 mG established by the NYSPSC (see **Section 3.1.14**) (CHPEI 2012t, CHPEI 2012ll). Neither the NIEHS nor the World Health Organization has identified any known health effects from this level of exposure (NEIHS 2002, WHO 2002, WHO 2012). **Table 5.1.14-1** presents the magnetic field levels for cables at spacing intervals of 1 foot (0.3 meters), 2 feet (0.6 meters), 3 feet (0.9 meters), and 6 feet (1.8 meters) and a burial depth of 3.25 feet (1.0 meter). Magnetic field levels were presented at 5-foot (1.5-meter) increments out to a distance of 30 feet (9 meters) from the edge of the cable (CHPEI 2012ll).

Table 5.1.14-1. Magnetic Field Levels for Transmission Cables

Distance From Cables (feet)	Levels at Various Spacing Between Cables (values in mG)			
	1 foot	**2 feet**	**3 feet**	**6 feet**
+5	161.8	322.7	481.6	932.3
+10	76.9	154.1	231.9	472.1
+15	41.0	82.1	123.5	251.3
+20	24.8	49.6	74.6	151.0
+25	16.4	32.9	49.4	99.6
+30	11.6	23.3	34.0	70.4
+50	4.3	8.6	12.9	25.9

Source: CHPEI 2012ll

Figure 5.1.14-1 shows the distances at which the 200-mG magnetic field strength level would occur for cable spacings of 1 foot (0.3 meters) and 3 feet (0.9 meters) at a burial depth of 3.3 feet (1.0 meter). In the Lake Champlain burial configuration, where the cables are in the same trench with a spacing of 1 foot (0.3 meters), the 200-mG magnetic field strength level occurs at approximately 4 feet (1.2 meters) from the cables, or approximately 1 foot (0.3 meters) above the lake bottom. In limited locations where the cable is installed above existing utilities at the lakebed surface and covered with concrete mats, magnetic field levels would be approximately 600 mG directly above the cables. Since transmission line installation within Lake Champlain would comply with the NYSPSC interim standard and public exposure to magnetic fields would be infrequent and for short durations, no impacts from magnetic fields are expected from operation of the proposed CHPE Project. If emergency repairs of the transmission line were required, it would be de-energized and contractor health and safety measures would be implemented.

As specified in the NYSPSC Certificate for the proposed CHPE Project (Condition 163), the Applicant would conduct post-energizing magnetic field surveys, for use in post-installation monitoring (NYSPSC 2013).

Cardiac Pacemaker Interference. According to the U.S. Food and Drug Administration (FDA), interference from EMF can affect various medical devices, including cardiac pacemakers and implantable defibrillators. Most current research in this area focuses on higher-frequency sources such as cellular phones, citizens band radios, wireless computer links, microwave signals, radio and television transmitters, and paging transmitters. Sources such as welding equipment, power lines at electric generating plants, and rail transportation equipment can produce lower-frequency EMF strong enough to interfere with some models of pacemakers and defibrillators. Non-electronic metallic medical implants (e.g., artificial joints, pins, nails, screws, plates) can be affected by high magnetic fields such as those from magnetic resonance imaging (MRI) devices and aluminum refining equipment, but are generally unaffected by the lower fields from most other sources (AUC 2011).

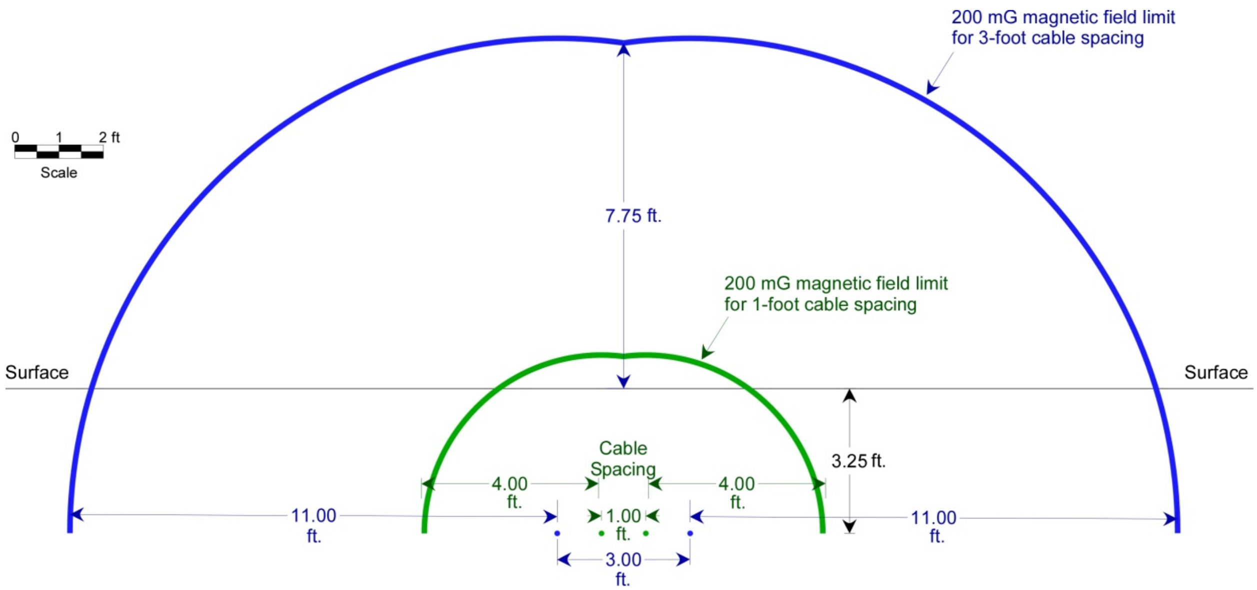

Figure 5.1.14-1. 200-mG Magnetic Field Strengths with Cable Spacings of 1 Foot and 3 Feet

The occupational exposure guidelines developed by the American Conference of Governmental Industrial Hygienists, Inc. (ACGIH) state that workers with cardiac pacemakers should not be exposed to a 60-Hz magnetic field greater than 1,000 mG or a 60-Hz electric field greater than 1 kV/m. In non-occupational settings, special consideration for static magnetic field exposures of individuals with cardiac pacemakers and other electronic medical devices and ferromagnetic implants are recommended, but no impacts would be expected at exposure levels below 5,000 mG (ICNIRP 2009). The predicted magnetic field exposure levels for the proposed CHPE Project would be well below the 5,000-mG guideline level from the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (see **Table 5.1.14-1**); therefore, no cardiac pacemaker interference for workers or the general public would be expected to occur during operation of the transmission line.

Intentionally Destructive Acts and Other Causes of Structural Failure. DOE considered the potential for impacts from intentionally destructive acts and other potential causes of transmission line structural failure. Failures of the transmission line due to accidents could occur as a result of excavations by third parties, train derailments, ships anchors, or dredging. The Applicant would participate in the Dig Safely New York Program to minimize the potential for third-party damage to the transmission line. The Applicant would locate the transmission line within the CP and CSX ROW in concert with those organizations to minimize the chances that a derailment would impact the transmission line. The Applicant also has worked with the USACE and USCG on locating the cables in areas where it would be less likely to be impacted by ship anchoring or channel dredging.

Failures could also occur as a result of intentional destructive acts. In the aftermath of the terrorist attacks that occurred on September 11, 2001, terrorism has become a real issue for the facilities under DOE's jurisdiction. Increased security awareness has occurred throughout the electrical transmission industry and the nation. Due to the various motivations and abilities of terrorist organizations relative to electrical transmission infrastructure within the United States, the likelihood of future acts of terrorism occurring along the proposed CHPE Project route is unpredictable. The proposed CHPE Project would include underground electrical transmission cables, aboveground cooling stations, and the DC to AC converter station. Much of the underground transmission line would be within unfenced ROWs and would, therefore, be accessible to those who want to damage the system. However, the underground nature of the installation provides a degree of protection and hiding that is not associated with aboveground transmission systems.

In general, the proposed transmission line presents no greater target for intentional destructive acts than any other high-voltage transmission lines or power plants in the United States. While the likelihood for intentional destructive acts on the proposed structures is difficult to predict given the characteristics of the proposed CHPE Project, it is unlikely that such acts would occur based on past experience along the thousands of miles of electrical transmission lines in the country. If such an act were to occur and succeed in destroying aboveground infrastructure or other proposed CHPE Project-related equipment, the main consequence for the public would be the temporary loss of 1,000 MWs of electrical service in the New York City metropolitan area from the proposed CHPE Project.

5.1.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the aquatic transmission cables in Lake Champlain would require the transport, handling, use, and onsite storage (i.e., on boats and at construction staging areas) of hazardous materials and petroleum products such as gasoline, diesel, oils, hydraulic fluids, and cleaners. Most of these products would be used in the operation of the vessels, barges, cranes, and other trenching equipment needed for the installation of the aquatic transmission cables. Small amounts of hazardous wastes, primarily used oils, solvents, and lubricants, would be generated as by-products of the aquatic transmission line installation process. To minimize potential impacts from hazardous materials and wastes, the Applicant would require that all contractors follow appropriate hazardous material and waste handling protocols and additional Applicant-proposed measures. These BMPs would include, but are not limited to, establishing an SPCC Plan to prevent, control, and minimize impacts from a spill of hazardous materials, hazardous wastes, or petroleum products; keeping appropriate spill-control equipment such as containment booms, water skimmers, and sorbents on site and ready for use; utilizing secondary containment where applicable; and following all appropriate Federal and New York State regulations regarding management of hazardous materials and wastes. See **Appendix G** for a list of Applicant-proposed measures.

The installation of the aquatic transmission line in Lake Champlain has the potential to disturb contaminants in the sediment of the lake. The water-jetting and mechanical plowing burial techniques would disturb the lake floor and result in temporary, localized sediment suspension and transport. Any contaminants found within these sediments also would be temporarily suspended and transported; however, the majority of the suspended sediment and any potential associated contaminants would fall back into the trench created by the installation of the aquatic transmission line. Sediment disturbances would be localized to small work areas at any one time as the installation process progresses, and the sediment disturbed during the installation of the aquatic transmission line would remain within the area where it originated. The route of the aquatic transmission line would avoid Outer Malletts Bay, Inner Burlington Harbor, and Cumberland Bay, therein avoiding the potential for disturbance and spreading of sediment contaminants associated with these areas. No sediments would be collected for offsite disposal, and no sediments from sources outside of Lake Champlain would be used for backfill. As specified by Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct additional pre-installation chemical sediment sampling in Lake Champlain for use in post-installation monitoring (NYSPSC 2013). The proposed CHPE Project would not include the remediation of existing contaminants within Lake Champlain because the Applicant would not be responsible for remediating contamination caused by others and the transmission line installation process would not exacerbate existing conditions. **Section 5.1.3** contains a discussion on water quality impacts from the suspension and transport of contaminated sediments.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate the vessels, remote diving vehicles, and other equipment needed to conduct routine non-intrusive inspections of the aquatic transmission cables. Such activities would be temporary in duration but occur multiple times over the operating life of the transmission line. Additionally, should any sections of the aquatic transmission cables need to be unearthed for emergency repairs, additional use of hazardous materials and petroleum products and localized disturbances of sediment potentially containing contaminants would be required. However, because the aquatic transmission cables are designed to be maintenance-free and require infrequent inspections, any hazardous materials and waste impacts from inspections and emergency repairs would be negligible. The aquatic transmission cables do not contain any hazardous fluids, thereby eliminating any potential for sediment contamination from the cables themselves.

5.1.16 Air Quality

The impacts of the Proposed CHPE Project on local and regional air quality conditions are determined based upon the increases or decreases in regulated air pollutant emissions, existing conditions and ambient air quality, and whether a proposed action is located in an attainment, nonattainment, or maintenance area for criteria pollutants.

For Federal actions in nonattainment or maintenance areas, the CAA General Conformity Rule applies. With respect to the General Conformity Rule, impacts on air quality are evaluated to determine if a formal General Conformity Determination would be required and the proposed emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or for pollutants for which the area has been redesignated as a maintenance area.

Table 5.1.16-1 presents the General Conformity *de minimis* thresholds, by regulated pollutant. As shown in this table, *de minimis* thresholds vary depending on the severity of the nonattainment area classification.

Impacts on air quality would result from gaseous and particulate emissions caused by construction equipment, vessels, and other vehicles. Detailed lists of construction equipment, the anticipated construction schedule, and associated emissions calculations for the Lake Champlain Segment are provided in Tables M-1 through M-3 in **Appendix M**. The analysis of air quality impacts of the proposed CHPE Project was based on equipment specifications and planning estimates for the various construction activities as detailed in the appendix.

Emissions calculations were performed using the most recent emissions factors published in the USEPA's AP-42, Compilation of Air Pollutant Emission Factors. Additional emissions factors were modeled using USEPA's MOBILE6.2 Mobile Vehicle Emissions Factor Model and NONROAD Model 2008. Due to the limited emissions factor information provided by the USEPA related to marine vessel engine emissions, other sources of information were referenced. References for various emissions factors used in the analysis for the Lake Champlain Segment are included in Table M-2 in **Appendix M**.

Although actual construction is expected to require approximately 3 years of planned work activities, construction could be distributed over a longer period if work stoppages are required because of inclement weather or other factors. Extending the schedule would not affect the air quality analysis because the applicable thresholds are based on annual emissions (tpy). For the purposes of general conformity applicability analysis, conservative estimation methodology assumes continuous construction, whereby the maximum emissions rate would occur during an uninterrupted period of construction. Construction for the proposed CHPE Project would likely not be continuous; therefore, the analysis of air quality impacts discussed is a conservative, worst-case scenario.

Table 5.1.16-1. General Conformity *de minimis* Emissions Thresholds

Pollutant	Status	Classification	*de minimis* Limit (tpy)
Ozone (measured as NO_x or VOCs)	Nonattainment	Extreme Severe Serious Moderate/marginal (inside ozone transport region) All others	10 25 50 50 (VOCs)/100 (NO_x) 100
	Maintenance	Inside ozone transport region Outside ozone transport region	50 (VOCs)/100 (NO_x) 100
CO	Nonattainment/ maintenance	All	100
PM_{10}	Nonattainment	Serious Moderate No Special Classification	70 100 100
	Maintenance	All	100
$PM_{2.5}$ (measured directly, or as SO_2, or NO_x, or VOC as significant precursors)	Nonattainment/ maintenance	All	100
SO_2	Nonattainment/ maintenance	All	100
NO_x	Nonattainment/ maintenance	All	100
VOC	Nonattainment/ maintenance	All	100
Lead	Nonattainment/ maintenance	All	25

Source: 40 CFR 93.153, as of January 9, 2012

Impacts from Construction

The construction activities within the Lake Champlain Segment are entirely water-based. The construction-related air pollutant and GHG emissions within the Lake Champlain Segment would primarily occur from diesel fuel-powered internal combustion engines. Heavy equipment, barges, generators, and boats, including those with diesel fuel-powered internal combustion engines, would emit pollutants such as CO, CO_2, SO_x, PM, NO_x, and VOCs, including aldehydes and PAHs.

Table 5.1.16-2 lists the area nonattainment and maintenance designations in the vicinity of the ROI for air quality for each of the criteria pollutants. The table also lists the *de minimis* threshold levels for the general conformity applicability analysis.

The ROI for the Lake Champlain Segment is in attainment for all pollutants. The Lake Champlain Segment is approximately 101 miles (163 km) long, and the cable installation rate is anticipated to be approximately 1 to 3 miles (1.6 to 4.8 km) per day for jet plow installation and 1 mile (1.6 km) per day

Table 5.1.16-2. Nonattainment and Maintenance Area Designations in the Air Quality ROI

Standard	Nonattainment Counties along the Proposed CHPE Project route	Classification	General Conformity Threshold
$PM_{2.5}$	New York-North New Jersey-Long Island, NY-NJ-CT Area: Bronx, New York, Queens, Rockland, Westchester	Nonattainment (NA)	100 tpy
PM_{10}	New York	Moderate NA	100 tpy
CO	New York-North New Jersey-Long Island, NY-NJ-CT Area: Bronx, New York, Queens, Westchester (attainment)	Maintenance through 2012[1]	100 tpy
1-hour ozone[2]	New York-North New Jersey-Long Island, NY-NJ-CT Area: Bronx, New York, Orange (part–Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, and Woodbury), Queens, Rockland, and Westchester	Severe-17[3] NA	NA
	Poughkeepsie Area: Dutchess, Orange (remainder), Putnam	Moderate NA	NA
	Albany-Schenectady-Troy Area: Albany, Greene, Rensselaer, Saratoga, Schenectady	Marginal NA	NA
8-hour ozone	New York-North New Jersey-Long Island, NY-NJ-CT Area: Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester	Moderate NA	VOC – 50 tpy NO_x – 100 tpy
	Albany-Schenectady-Troy Area: Albany, Greene, Rensselaer, Saratoga, Schenectady,	NA (Former Subpart 1)	VOC – 50 tpy NO_x – 100 tpy
	Poughkeepsie Area: Dutchess, Orange, Putnam	Moderate NA	VOC – 50 tpy NO_x – 100 tpy

Source: 40 CFR Parts 52 and 81

Notes:

1. As of September 27, 2010, all CO areas have been redesignated to maintenance areas.
2. Final Rule signed March 12, 2008. In 1997, the USEPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1. The NYSDEC has petitioned the USEPA to re-designate the New York-North New Jersey-Long Island, NY-NJ-CT Area as attainment for 1-hour ozone.
3. A severe nonattainment area that has a design value of 0.19 to 0.28 ppm and has 17 years to attain this standard.

for shear plow installation, so an average of 1.5 miles (2.4 km) per day was assumed. Taking into account the time for cable splicing, the transition to landfall, and other related installation activities, this portion of the cable is projected to be installed within approximately 5 months. The emissions from this particular activity would be spread over the construction phase and a relatively large area. Although sensitive receptors, including hospitals, schools, daycare facilities, elderly housing, and convalescent facilities, in this region are present along the shorelines, the pollutant emissions from the barge, boats, and other heavy equipment would be temporary in nature. Emissions from construction activities in the Lake Champlain Segment are summarized in **Table 5.1.16-3**. Emissions calculation spreadsheets are provided in Table M-3 in **Appendix M**.

Table 5.1.16-3. Estimated Air Emissions Resulting from Proposed CHPE Project Construction Activities in the Lake Champlain Segment

Project Area	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Lake Champlain Segment	104.75	6.49	30.28	3.46	4.53	4.38
General Conformity *de minimis* Thresholds*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Exceed *de minimis* Thresholds	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Note: *The Lake Champlain Segment is in attainment areas for all pollutants; no *de minimis* thresholds apply for this segment.

All emissions associated with construction would be temporary and spread over approximately 5 months. Applicant-proposed measures to reduce impacts from emissions, such as properly maintaining construction equipment and minimize idling, are provided in **Appendix G**. The Lake Champlain Segment is in attainment for all pollutants; therefore, construction emissions associated with this segment are not subject to a General Conformity Determination. In addition, these construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, or exceed any evaluation criteria established by the SIP.

Impacts from the full proposed CHPE Project on GHG emissions are discussed in **Section 5.4.16**.

Impacts from Operations, Maintenance, and Emergency Repairs

Post-construction activities within the Lake Champlain Segment would consist primarily of transmission cable inspections and emergency repairs, as required. Such activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. The proposed transmission cables would be designed to be maintenance-free and operated within the specified working conditions.

Inspection and potential emergency repairs of the transmission cables in the Lake Champlain Segment would produce a negligible amount of emissions. Regular inspections of the cables, in accordance with the manufacturer's specifications, would be performed to ensure equipment integrity is maintained. In the event of emergency repairs of an aquatic cable and as part of the ERRP, appropriate vessels and qualified personnel would be used to minimize the response time. It is anticipated that equipment and vessels similar to those used in construction activities would be used for short periods as necessary for emergency repairs. Overall, the annual emissions from inspection and emergency repairs along the Lake Champlain Segment would be expected to be considerably less than the annual construction emissions for this segment, and are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, or exceed any evaluation criteria established by the SIP.

5.1.17 Noise

Construction activities could cause an increase in sound that is well above ambient noise levels. Noise sources from proposed CHPE Project construction activities would include equipment that is typically found at large-scale construction sites. A variety of sounds are emitted from graders, loaders, trucks, pavers, and other work activities and processes. Construction equipment usually exceeds the ambient sound levels by 20 to 25 dBA in an urban environment and up to 30 to 35 dBA in a quiet suburban area (USEPA 1971). **Table 5.1.17-1** presents a list of construction equipment that might be used for the proposed CHPE Project and associated noise levels that would result from their use.

Table 5.1.17-1. Noise Level Ranges of Typical Construction Equipment

Construction Equipment	Noise Levels in dBA at 50 feet*
Trucks	82–95
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Vibrator	68–82
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammer	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Front Loader	73–86
Back Hoe	73–95
Pile Driving (peaks)	95–107
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88

Source: USEPA 1971

Note: *Construction equipment equipped with noise control devices would be expected to generate lower noise levels than shown in this table.

The Applicant has received waivers from local laws and ordinances from the NYSPSC to conduct 24-hour-a-day construction activities (Joint Proposal Exhibit 115 and NYSPSC Certificate Condition 131) (NYSPSC 2013). The construction activities with higher noise levels, such pile driving, would primarily be limited to occur only during daytime hours. Some installation and construction activities, such as aquatic cable installation, would occur 24 hours per day. However, with the exception of the converter station and cooling stations, the construction period in the vicinity of any single receptor along the transmission line route would likely last for only a few days to up to 2 weeks, as construction activities move along the construction corridor.

Noise Impact Methodology. A screening model was used to predict sound levels as a function of distance from cable installation operations. The screening modeling was based on sound level reduction over distance because no additional attenuation would be expected over water. This is a reasonable assumption given the relatively short distances (i.e., 500 feet [152 meters] or less) between the installation vessel operation and receptors on the shore in certain locations. NYSDEC recommends that screening-level noise analyses use this methodology (NYSDEC 2001). This methodology uses the principle of hemispherical spreading of sound waves so that every doubling of distance produces a 6 dBA reduction of sound for a point source. For example, a source equal to 80 dBA at 50 feet (15 meters) would have a sound level of 74 dBA at 100 feet (30 meters), 68 dBA at 200 feet (61 meters), and 62 dBA at 400 feet (122 meters). Cable installation noise levels used in the calculations were based on the model described in the *Special Report for Highway Construction Noise: Measurement, Prediction and*

Mitigation (USDOT-FHWA 1976). The modeling conservatively assumed that all sources would be operating simultaneously, that they would be all the same distance from a given receptor (i.e., all collocated at exactly the same point), and that two survey/crew boats would be operating simultaneously. These combined sound levels were then calculated for various distances from the work site.

Impacts from Construction

Construction of the aquatic transmission line in Lake Champlain would generate noise from construction activities that would cause a temporary increase in the noise environment surrounding the active construction area. During construction, the laying of the aquatic transmission cables using water jetting techniques would be a continuous 24-hour-a-day operation. In addition to the cable-laying vessel or barge, there would be other smaller vessels to support crew shift changes, delivery of supplies, refueling, and work supervision. Equipment on barges or vessels that would increase sound levels include main drive engines, diesel generators, pumps, thrusters, and winches.

A majority of the installation activity would be away from the shoreline in the deeper sections of Lake Champlain, but there could be noise impacts on residents along the shoreline due to operation of vessels and heavy equipment where the transmission line would be installed close to the shoreline. Given the nature of the continuous installation progressing at an average rate of 1.5 miles (2.4 km) per day, it is unlikely that nearby receptors on the shoreline would be subject to noticeable sound increases for more than a few hours at any one location. The offshore HDD cofferdam location at MP 101 would be active for approximately 2 weeks and would be approximately 300 feet (91 meters) from shore.

Water-based construction activities include transmission cable installation, ancillary equipment use, and support activities in Lake Champlain. The cable-laying vessel used for transmission line installation would have azimuth units, which are propulsion devices that are steerable throughout almost 360 degrees of rotation. A retractable azimuth unit, which can be raised out of or lowered into the water, could also be used.

The cable-laying vessel would also contain diesel-powered generators to supply electricity to motors used on board for different purposes, including a crane, a cable tensioner that control the cable as it is being laid, and the plow used to trench the transmission line cables into the lake bottom. The transmission line cables would be delivered to the installation vessel via barges that travel through the Champlain Canal.

Table 5.1.17-2 summarizes estimated noise levels associated with aquatic installation activities at distances of 35, 50, 100, and 250 feet (11, 15, 30, and 76 meters) from the sources. Because noise measurements for a purpose-built barge are not readily available, noise estimates for the Hudson River PCB Dredging Program were used as a representative example (Epsilon Associates 2006). These estimates assumed that dredging work would be performed from a barge and ancillary equipment would include a tug, workboat, excavator clamshell dredge, survey/crew boat, onboard generator and lights, and 500-horsepower pump. It is anticipated that the cable-laying vessel or barge would include similar equipment to those modeled for the PCB Dredging Program. Noise levels shown in the table are expressed in dBA, and they represent a peak 1-hour L_{eq}.

Table 5.1.17-2. Water-Based Construction Noise Levels

Sound Level at 35 Feet	Sound Level at 50 Feet	Sound Level at 100 Feet	Sound Level at 250 Feet
80 dBA	77 dBA	70 dBA	62 dBA

Source: Epsilon Associates 2006

Note: Activity-calculated SPL [in dBA] as 1-hour L_{eq}

Within the Lake Champlain Segment, construction activities would generally occur at distances greater than 500 feet (152 meters) from noise-sensitive land uses; therefore, extrapolating from the estimates displayed in the **Table 5.1.17-2** and assuming a 6 dBA decrease in noise levels with each doubling of distance, noise levels from the transmission line installation activities at the shore would generally be less than 56 dBA. However, in a few places, construction would occur closer to shore. For example, construction would occur within approximately 300 feet (91 meters) from Barber Homestead Park (MP 64.5) and at Crown Point State Park (MP 73.8). Overwater construction may occur during nighttime hours, but would only be in any given location for a period of 1 to 2 hours. The HDD cofferdam location at MP 101 would also be approximately 300 feet (91 meters) from shore. At this distance, the noise level would be approximately 62 dBA. New York State does not have regulations that set community noise exposure criteria; however, this level would be below the NYSDEC 65 dBA noise assessment guideline for new noise sources in a non-industrial setting. Work at the cofferdam site would be restricted to daylight hours, construction equipment would be equipped with appropriate sound-muffling devices (i.e., Original Equipment Manufacturer [OEM] or better), and would be maintained in good operating condition at all times.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts from the generation of noise during routine inspection activities would not be expected. A small vessel would be used to tow remote sensing equipment along the transmission line route. The increase in sound levels resulting from the inspection activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. Noise levels generated from emergency repair activities would be similar to those expected during construction, except the work would be restricted to a discrete area where the repairs would be made and would be shorter in duration. **Table 5.1.17-1** summarizes anticipated noise levels associated with aquatic construction activities that would occur during emergency repairs.

5.1.18 Socioeconomics

Impacts from Construction

Population. During the one construction season that would be required for installing the transmission line in Lake Champlain, it is estimated that the proposed CHPE Project would require an average of more than 20 direct construction jobs. Specialized marine industry workers would likely relocate temporarily to the area for the duration of the proposed CHPE Project construction in the Lake Champlain Segment ROI. Given the small labor requirement for the proposed CHPE Project, and the specialized nature of the employees required to install the transmission line, it is unlikely that construction would result in the permanent relocation of workers to the area. As such, population levels within the Lake Champlain Segment ROI are not expected to change due to the proposed CHPE Project.

Employment. Direct jobs include jobs that are required for the construction of a project. Indirect jobs are jobs created by the businesses that provide necessary goods and services to the construction of a project, and jobs that are created by the spending of the wages and salaries of the direct and indirect employees. The construction of the proposed transmission line would require specialized construction equipment and approximately 20 specialized workers and laborers, which would temporarily increase demand for workers and create jobs for laborers in the local construction industry. Any non-specialized construction workers that would be required for the proposed CHPE Project should be available from the counties composing the Lake Champlain Segment ROI, as there are approximately 3,900 construction workers currently living within the ROI. It is likely that, given the low number of workers required for the proposed CHPE Project and specifically for this segment, the existing construction industry would be able to meet the workforce demands of the project.

Taxes and Revenue. Construction expenditures for building materials, construction workers' wages and taxes, and purchases of goods and services in the area would increase tax receipts and revenue for local municipalities. The purchase of construction materials for the proposed CHPE Project would be sourced locally where available and appropriate. Similarly, hiring construction workers in the surrounding area would increase local tax receipts and revenue in this segment. Specialized equipment would be necessary for the installation of the proposed transmission line and might come from both inside and outside the segment, including outside of New York State.

Housing. Workers would primarily be hired locally along the proposed CHPE Project route; however, employees who travel to the area for construction of the project would likely be housed in either hotels or short-term rental options. Considering the small number of employees that would be required during construction of the Lake Champlain Segment of the proposed CHPE Project, available temporary housing supplies would easily accommodate the short-term increase in demand.

The transmission line would be buried along the bottom of Lake Champlain, and would not occur on land. No change in property values would be expected during construction activities.

Impacts from Operations, Maintenance, and Emergency Repairs

Population. The operation, inspection, and emergency repairs of the transmission cables would not lead to an influx of new residents because relatively few direct permanent jobs within the Lake Champlain Segment would be required for the commercial operation of the proposed CHPE Project. Approximately 26 full-time direct employees would be hired to operate the proposed CHPE Project, with 21 being located in the New York City metropolitan area, and the remainder in the Lake Champlain, Overland, and Hudson River segments. A negligible number of contract workers would be required to conduct periodic underwater inspections and possible emergency repairs, which would be infrequent and short-term in duration. It is unlikely that these activities would result in the permanent migration of workers to the area. Specialized workers, if necessary, would temporarily reside in the area for the duration of the inspection or emergency repair activities. These employees could be hired locally but could also move in from outside the area.

Employment. The operational phase of the proposed CHPE Project would be expected to create about five full-time equivalent direct jobs per year to conduct the operations and maintenance activities for the proposed CHPE Project in the Lake Champlain, Overland, and Hudson River segments. Considering the small number of jobs created, the existing workforce within the Lake Champlain Segment ROI would be able to meet the employment demands of the proposed CHPE Project.

Taxes and Revenue. The proposed CHPE Project route within the Lake Champlain Segment would be located on state-owned land and would not produce property tax revenues to municipalities in the ROI for this segment (CHPEI 2012mm). Therefore, no impacts on municipal tax receipts and revenue within this segment would be expected during project operations. Because the transmission cables would be installed under or on top of the state-owned submerged lands under Lake Champlain, the Applicant would be required to obtain an easement from the New York State Office of General Services and pay associated fees. Submerged lands easements are typically issued for 25-year terms.

Few workers would be employed within this segment during the operational phase; however, wages and taxes, and purchases of goods and services in the area would be expected from workers employed in the area.

Annual reductions in wholesale electrical energy market prices would be expected to occur throughout the state, which would reduce the economic burden on the local economy. NYSDPS has considered the LEI-estimated electricity cost savings of up to $654 million per year ($200 million for residents) over the next 10 years as a result of implementing the proposed CHPE Project to be a reasonable estimate (NYSDPS 2012b). The savings for residents would primarily benefit the New York City metropolitan area, which would receive approximately $182 million of the residential cost savings. The remaining $18 million would be distributed to the rest of New York State, including the other three segments, with the Lake Champlain Segment receiving the least benefit because there are fewer businesses and individuals within this segment that could receive benefits and because Clinton County is not projected to receive any savings benefits (NYSDPS 2012a, WSJ 2010). Savings on electric bills overall statewide from reductions in electricity costs could result in households along the Lake Champlain Segment having slightly greater disposable income and businesses having lower production costs, thus becoming more competitive (Frayer 2012); however, this increase in spending would be low compared to the other three segments. Cost of the transmission system has been estimated by NYSDPS to be approximately $2 billion. Costs would be borne by investors as a merchant project and would not be directly passed on to ratepayers (NYSDPS 2012b).

Housing. Of the 26 direct jobs and the indirect full-time equivalent jobs that would be created as a result of the operation of the CHPE project transmission line, the vast majority of employees would be hired for terrestrial portions of the route, which are outside of the Lake Champlain Segment ROI, representing a negligible increase in housing demand for this segment. The number of vacant housing units would more than adequately meet the needs of any new employees that would require housing.

The operations, inspections, and possible emergency repairs associated with this segment would not occur on private property along this segment because it is entirely aquatic; therefore, no change in private property values would be expected.

5.1.19 Environmental Justice

Impacts from Construction

The 15 census tracts that compose the ROI in the Lake Champlain Segment reported percentages of minority or low-income populations that were generally lower than those reported among New York State's total population (see **Appendix L**). Human health and environmental effects from construction on on public health (described in **Section 5.1.14**), air emissions and noise from vessels and construction equipment (described in **Sections 5.1.16** and **5.1.17** respectively), and socioeconomic impacts (described in **Section 5.1.18**) for all populations, including minority and low-income populations, would be small, and occur on a transitory and temporary schedule, solely in aquatic environments and would not be in close proximity to populations residing on land.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation of the transmission line would occur entirely underwater within this segment. No effects from magnetic fields on minority and low-income populations would be expected because the cables would be buried beneath the bottom of the lake, and no known human health effects from exposure to magnetic fields at the level to be emitted by the proposed CHPE Project have been identified (see **Section 5.1.14**). Health and environmental effects associated with maintenance activities (periodic inspections) or potential repairs could include air emissions and noise from vessel traffic and construction equipment. These activities would have a small effect on all populations, including minority and low-income populations, and would occur on an intermittent, temporary schedule, solely in aquatic environments, and at a duration and frequency less than that required for construction.

5.2 Overland Segment

5.2.1 Land Use

Impacts from Construction

The transmission line would exit Lake Champlain via HDD and directly connect with the New York State Route 22 ROW, thereby avoiding interfering with existing land uses in this area, which include residences, railroad tracks, and a municipal road. The site of the HDD staging area would likely be within the New York State Route 22 ROW, which in this area is undeveloped land. Some wooded areas might need to be cleared to accommodate the HDD equipment.

Construction of the proposed CHPE Project within approximately 11 miles (18 km) of the New York State Route 22 ROW in the northern end of the Overland Segment would result in temporary (i.e., for the duration of construction) disturbances to surrounding land uses. Most of the New York State Route 22 ROW is used for vehicular transportation and associated ROW buffer zone; however, scattered residences exist along New York State Route 22, particularly in the hamlets of Dresden Station and Clemons in the Town of Dresden and in the Village of Whitehall. New York State Route 22 in this area is also a designated bicycle route. These uses would experience disturbances from construction activities, such as limitations on property access due to road detours and presence of construction work areas and equipment. Limitations would occur primarily at locations where the New York State Route 22 ROW is adjacent to residences and crosses public roadways. These disturbances would last for the duration of the presence of an active construction zone, which would generally be a few days to up to 2 weeks at any one particular location. HDD would be used at public road crossings in the Dresden to Whitehall section, and trenching across private driveways would be coordinated with the property owner or tenant to minimize impacts on access. The construction schedule would be established to minimize disruption (i.e., disturbances, interruptions, or changes) to land uses along the New York State Route 22 ROW, and the Applicant would provide timely information to affected property owners or tenants regarding construction activities and schedule and coordinate with NYSDOT and local officials. See **Appendix G** for a list of Applicant-proposed measures such as these that would minimize impacts from the CHPE Project.

Use of New York State Route 22 for vehicular and bicycle travel could be impacted from construction activities due to lane closures, reduced shoulders, or the presence of heavy equipment and construction personnel along the roadway. These impacts would be minimized by installing construction signs and use of barriers in accordance with applicable New York State highway regulations and design standards. Restoration of the roadway ROW, driveways, and landscaped areas would be designed in consultation with NYSDOT, municipal officials, and adjacent landowners.

Land uses adjacent to the railroad ROWs would experience similar short-term disturbances to those discussed for construction of the proposed CHPE Project in the New York State Route 22 ROW. Although unlike New York State Route 22, which is used directly (e.g., driving on the road) or indirectly (e.g., using the main road to access an adjacent property) by the general public, construction within the railroad ROWs would generally not affect access to adjacent properties because railroad ROWs are usually only accessible to the railroad companies.

A majority of the adjacent land along the railroad ROW is undeveloped forest or open land/pasture/hay/scrub/shrub land cover types; construction adjacent to these areas would be a compatible use and, therefore, would not result in impacts. However, the transmission line route would traverse several areas with concentrated residential and commercial uses, such as in the Villages of Whitehall and Fort Edward; Town of Ballston; City of Schenectady; and the Villages of Voorheesville, Ravena, Coxsackie, and Catskill. Construction of the transmission line along the railroad ROW could temporarily disrupt (i.e., disturb, interrupt, or change) the normal routines of these residential and commercial uses due to limitations on property access from the presence of construction work areas and equipment and associated lane closures. These impacts would last only for the duration of construction, which would generally be a few days to up to 2 weeks at any particular location. Public road crossings would be carried out by HDD or by bridge attachment. In some locations, HDD would be used to install the transmission cables along the railroad ROWs to minimize temporary disturbances. The construction schedule would be established to minimize disruption to any identified competing land uses along the railroad ROWs, and the Applicant would provide timely information to adjacent property owners or tenants regarding construction activities and schedules, and would coordinate with the appropriate railroad company, NYSDOT, and local officials before and during construction activities as appropriate.

In addition to residences, there are several sensitive land uses along the railroad ROWs. The transmission line route would be immediately adjacent to Saratoga Spa State Park and would be near other local, regional, and state recreational uses. These recreational facilities would not be directly affected during construction activities. It is possible that access to portions of the Ballston Veterans Bikeway, which abuts the railroad ROW in the Town of Ballston, would be temporarily restricted during construction for safety reasons. While the proposed CHPE Project would not traverse any agricultural districts, it would deviate outside the ROW into an agricultural area within the Town of Coxsackie, which could temporarily render the area where the transmission line is installed unavailable for agriculture. In addition to other measures to address impacts in agricultural areas as identified in **Appendix G** (also see **Section 5.2.9**), the Applicant would also reconfirm land use categories within 600 feet (183 meters) of the proposed CHPE Project, with special interest given to areas with sensitive land uses, to verify no additional impacts would occur. Additional inquiry for other sensitive land uses would include notification of construction activities, consultation regarding special events, and consultation regarding special concerns and schedules. See **Section 5.2.13** for more information regarding impacts on recreation from construction of the proposed CHPE Project.

Installation of the transmission line along approximately 1.3 miles (2.1 km) of streets within the City of Schenectady would temporarily disrupt normal routines of residential and commercial uses along the route due to limitations on property access due to the presence of construction work areas and equipment. It is likely that one lane of the street could be closed on a short-term basis to install the transmission cables under the street and access to properties and certain streets could be limited to specific times due to safety reasons. There would be no permanent land use conversions in these locations. To minimize potential impacts on adjacent landowners, the Applicants would develop a Maintenance and Protection of Traffic (MPT) Plan with the City of Schenectady and provide information to adjacent property owners and tenants regarding the planned construction activities and schedule. All surface features (e.g., landscaping, street pavements, curbs, sidewalks, and other features) and underground infrastructure (e.g., utilities such as water and gas services) disturbed during construction would be restored to their preconstruction condition upon completion of transmission cable installation.

The proposed CHPE Project route would also traverse various municipal, county, and state roads; however, most of these roads would be crossed using HDD or via attachment to a bridge, so there would generally be no impacts on roadways. If HDD is not used to span a road, lane restrictions could result. These traffic disturbances would be temporary, lasting only for the duration of construction of that particular crossing.

Nine cooling stations would be required along road and railroad ROWs within the Overland Segment in the Village of Whitehall and the towns of Wilton, Milton, Guilderland, New Baltimore, and Catskill to reduce heat buildup in long conduits installed by HDD. Land uses in the vicinity of the proposed cooling stations in Whitehall are primarily residential and recreational. Construction of the cooling stations in Whitehall could limit property access due to the presence of construction activities. These impacts would be temporary, lasting only for the duration of construction in that particular area. Land uses in the vicinity of the cooling station locations in Wilton, Milton, Guilderland, New Baltimore, and Catskill are rural and largely undeveloped and, therefore, construction of the cooling stations would not disrupt surrounding land uses. Land uses in these areas are generally categorized as residential, forested, or open land/pasture/hay/scrub/shrub land cover types. The Applicant would reconfirm land use categories within 600 feet (183 meters) of the proposed CHPE Project prior to construction activities, with special interest given to areas with sensitive land uses. Additional inquiry for other sensitive land uses would include notification of construction activities and consultation regarding special concerns and schedules.

Temporary staging areas to support terrestrial installation activities would be within existing commercial or industrial areas that would be compatible with the proposed storage and staging activities. Additional workspace could also be required for support facilities and at HDD staging areas, cable jointing locations, areas with steep slopes, or areas where access roads must be constructed. To the extent possible, these workspace areas would be sited within the existing road and railroad ROWs and limited to the minimum space necessary (CHPEI 2012b). If additional workspace outside the road or railroad ROWs is required, it could result in short-term impacts due to temporary conversion of land use to construction-related uses. Specific locations for these workspace areas, including HDD staging areas, have not been identified; however, if they are sited adjacent to sensitive land uses, these uses could be disrupted by possible limits to property access while construction activities are occurring. Additionally, if HDD staging area sites overlap wooded areas, these areas would require clearing of vegetation prior to beginning HDD activities. Impacts would be minimized by using previously disturbed areas or undeveloped areas that are not within agricultural areas or near sensitive land uses. All temporary storage areas or workspaces areas would be regraded and revegetated as required upon completion of their use.

Support facilities, potentially including contractor yards, storage areas, and access roads, would be located along the Overland Segment transmission line route within established roadway and railroad ROWs, such as the ROWs for New York State Route 22, public streets in the City of Schenectady, and the CP and CSX railroads. Additional workspace might be required at HDD staging areas, cable jointing locations, and areas with steep slopes. The road and railroad ROWs would be able to accommodate most construction activities, although the transmission line would occupy other public ROWs (e.g., state and municipal roadways) and private property within several proposed route deviations outside of the established ROWs). The Applicant would be required to obtain authorization to construct in and occupy all areas along the transmission line route, including land within established ROWs and deviation areas. The methods of acquiring authorization would vary based on the property owner. The Applicant would be required to obtain the following authorizations:

- Highway Work Permits and Use and Occupancy Agreements (permits) from NYSDOT (for use of state roadways such as New York State Route 22)
- Revocable permit (for use of the public ROW in the City of Schenectady)
- Leases (for use of the railroad ROWs)
- Applicable permits (e.g., use and occupancy permits), or other agreements (for use of other public ROW such as state and municipal land)
- Easements (for use of private property).

It is anticipated that easements negotiated with private landowners would be bilateral easements in which the Applicant and landowner mutually agree to the easement provisions. In these cases, the landowner would be provided financial compensation for providing the Applicant with the right to construct the transmission line on their property and for future access to the property to conduct maintenance, inspections, and emergency repairs. However, it is possible that easements for some of these deviation areas would need to be obtained via eminent domain as part of the NYSPSC Article VII approval process, but only in the event the property owner and the Applicant are unable to reach a mutually acceptable agreement.

It has been suggested that the transmission line could use a route that is the proposed route of the Champlain Canalway Trail, which is a proposed recreational trail along the former canal towpath. This route would travel adjacent to the west of the proposed CHPE Project route from approximately Poultney Avenue to Ryder Road within the Village and Town of Whitehall (i.e., from MPs 113 to 117), and is primarily within railroad ROW. Land within this area is forested, and includes agricultural and open space uses. Construction of the transmission line in the area proposed for the Champlain Canalway Trail would facilitate development of the recreational trail. The Applicant would further consider accommodating the trail at the time of final engineering design and EM&CP development (NYSPSC 2012).

Construction of the proposed CHPE Project would be consistent with land use plans and policies. Because the transmission line would be primarily within the road and railroad ROWs except for several deviation areas, and would be compatible with surrounding land uses, it would be consistent with potentially relevant local plans and policies. In addition, if the proposed route of the Champlain Canalway Trail would be used for installation of the transmission line within the Town and Village of Whitehall, post-construction restoration activities could facilitate the development of the recreational trail per the 2009 New York State Open Space Conservation Plan. Exhibit 121 of the Joint Proposal has a full list of plans and policies that might be relevant and the accompanying consistency analysis.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts on land use would result from operation of the proposed CHPE Project because future use of the land within the transmission line ROW would be limited for the lifespan of the transmission line. After construction of the proposed CHPE Project, the Applicant would either be granted control of (via fee or easement for private property), or other appropriate interest or rights to use (via use and occupancy permit for public ROWs such as roadways or state land or lease for the railroad ROWs), an up to approximately 20-foot (6-meter)-wide transmission line ROW that would accommodate ROW maintenance, inspection, and emergency repair requirements (CHPEI 2012b). Property owners granting the use of portions of their lands as the transmission line ROW would be prohibited from taking any action on that land that would damage or interfere with the Applicant's ROW maintenance, inspection, and emergency repair activities (CHPEI 2012b). Therefore, operation of the proposed CHPE Project could limit the future use of some property for the lifespan of the transmission line. However, property owners would receive compensation for this loss of use. See **Section 5.2.18** for more information regarding potential impacts on property values.

Generally, there would be no impacts on land use along the New York State Route 22 and railroad ROWs because the transmission cables would be underground within the existing, previously disturbed ROWs. Although the exact locations of cooling stations within the road and railroad ROWs have not been determined, cooling stations would be located in the transmission line ROW and would not result in significant impacts on land use.

No impacts on land use are expected from the periodic inspections of the transmission line ROW and cooling stations because these activities primarily consist of passive visual or instrument assessments of conditions, which would not create any disruptions to adjacent land uses. Similarly, no impacts would result from conducting maintenance on the cooling stations because the activities would be confined to the cooling station sites and would not disturb adjacent land uses.

If necessary, emergency repairs could result in impacts similar to those described for construction of the proposed CHPE Project, but for a shorter duration and within a smaller area. There would likely be fewer land use disruptions, if repairs are needed in undeveloped areas along the road or railroad ROWs. However, if emergency repair activities were required in a residential area or at a roadway or railroad track, these activities could conflict with existing uses, resulting in negligible temporary disturbances.

Operation of the proposed CHPE Project in the Overland Segment would be consistent with potentially relevant land use plans and policies, and compatible with surrounding land uses because the transmission line would be primarily within existing established ROWs, and it would largely not be visible except for the cooling stations. Most impacts on land use would be avoided because the transmission line would be underground. In addition, the proposed CHPE Project would be directly consistent with three plans (Hartford, New York Comprehensive Plan; Town of Ballston Final Draft Comprehensive Plan; and Town of Bethlehem Comprehensive Plan and Generic EIS) that identify policies for preventing visual and aesthetic impacts associated with electric transmission corridors and projects.

5.2.2 Transportation and Traffic

Impacts from Construction

Overland trenching operations would be used to install the HVDC cables within the railroad and road ROWs. In railroad ROWs, railroad traffic coordination plans would be developed by the Applicant in consultation with the railroad companies and implemented.

The transmission cables would exit Lake Champlain via HDD and directly connect with the New York State Route 22 ROW, thereby avoiding interfering with existing railroad tracks and a municipal road. The exact site of the HDD staging area has not yet been finalized; however, it would likely be within the New York State Route 22 ROW, which in this area is primarily used for vehicular transportation.

One of two basic road-crossing methods would be used during construction: trenched (open cut) or trenchless (HDD). The majority of the cable installation along New York State Route 22, along city streets in Schenectady, and along Alpha Road in Catskill, would be parallel to the road and within the roadway ROW (see **Appendix A**). Crossings of side roads and driveways would be necessary, with the majority of crossings completed using trenchless techniques, which would allow for continuous use of the roadway or driveway, resulting in minimal disruption (i.e., delays or other changes) of existing traffic patterns. All crossings would be conducted perpendicular, or as close to perpendicular as feasible, to the roadway being crossed. Where HDD would be performed in urban and residential areas and at road crossings, a Maintenance and Protection of Traffic (MPT) Plan would be developed and implemented by the Applicant in consultation with local government transportation agencies to minimize impacts on traffic. For trenched road crossings, detours, signage, and public notice would be posted no later than 24 hours prior to the initiation of construction. Traffic flow would occur in at least one lane of the road at all times or a detour would be provided. Flaggers or temporary traffic lights would be used where necessary to control traffic flow. All areas of open trench that could not be covered with steel plates would be barricaded and lit with warning lights prior to the end of the construction day. Temporary restoration of the roadway would occur immediately after the cable is installed (CHPEI 2012q). See **Appendix G** for more information on these and other Applicant-proposed measures that would be implemented to reduce or avoid impacts. Duration of construction for installation would be a few days to a maximum of 2 weeks at any given location.

Where New York State highway ROW is to be utilized, all work would be performed in accordance with NYSDOT policies, as applicable (see **Appendix G**).

Highway work permits would be required for any work in, on, over, or above state highway ROW, which includes facilities such as shoulders, guardrails, clear zones, vegetated areas, slopes, and drainage facilities in addition to the paved roadway. Where in-road work would be extensive enough to require detours or road closings, an MPT Plan would be completed in consultation with all affected agencies prior to the start of construction (CHPEI 2012q). NYSDOT has submitted a statement in support of the proposed CHPE Project route, and has stated their satisfaction that the proposed CHPE Project would result in minimal impacts on transportation facilities under its jurisdiction (NYSDOT 2012a).

Since the railroad ROW varies in width, grade, and number of rails over the length of the Overland Segment of the proposed CHPE Project, a variety of installation methods would be employed. The three primary installation methods would be traditional trench and spoil method, series trenching method, and trenchless installation method. Variation among these three installation methods would be prescribed based on site-specific evaluations with the selected contractor and then identified on the EM&CP Plan and Profile drawings. Active rail lines would be crossed using trenchless methods as opposed to open cut trenching. Any temporary or permanent crossing of an intercity rail passenger line or commuter rail service line must be applied for and approved by NYSDOT, pursuant to Section 97 and Section 97-a of the New York State Railroad Law (CHPEI 2012q). The transmission line installation in these areas would be via trenchless methods, which would avoid of disruption to the rail service. In addition, the transmission line would not be installed within commuter rail line ROWs with the exception of the CP railroad ROW north of Schenectady that is used by Amtrak. Impacts on riders, as a result of these crossings, are not anticipated.

During the construction of the proposed CHPE Project, the HVDC cables to be installed along the Overland Segment from the Town of Dresden to the Town of Catskill would be transported by water to the Port of Albany or the Port of New York and New Jersey and then transferred to railcars for delivery to the lay-down areas along the railroad ROWs. The railroad lines are designed to handle this type, volume, and weight of freight. Additional facilities to support the work would be dispersed throughout the proposed CHPE Project route in this segment. These facilities might include contractor yards, storage areas, access roads, and additional workspace (at HDD locations, cable jointing locations, and areas with steep slopes). Supplies and equipment required for terrestrial transmission cable installation would be transported to the construction areas via roadways or railroad. Local roadways would also be used by construction workers to get to and from contractor yards or the railroad ROW, deliver supplies directly to the construction site, or transport equipment (e.g., dewatering pumps, generators, excavators) directly to the site (CHPEI 2010c). Transportation of materials for the terrestrial portion of the CHPE Project is not anticipated to result in impacts on the existing transportation network between the Town of Dresden and Town of Catskill.

Support facilities would be sited within the existing road and railroad ROWs and limited to the minimum space necessary to facilitate safe installation of the transmission cables. To the extent possible, and in normal terrain where the soil consists of unconsolidated rock and earth, the trenches would be excavated and the transmission cables would be installed using rail-mounted equipment along the railroad ROWs, and the construction equipment and materials would be transported by rail. When this is not possible, traditional excavation equipment would be used. Close coordination with the railroad companies during the equipment delivery and installation stages of the proposed CHPE Project would assist in avoiding or minimizing conflict with ongoing railroad operations. Work within the railroad ROWs would be kept outside of specific embankment areas, identified by CP and CSX, to avoid impacts on the continuous use of rail tracks.

The typical and preferred layout is to have each of the two cables installed with a minimum setback from the tracks to prevent impacts on railroad operations. Transmission cables would be installed in accordance with railroad-specific engineering standards. For the CP line, the cables would be installed with a minimum separation distance of 10 feet (3 meters) from the centerline of the outermost track to the cable trench. For the CSX line, the cables would be installed with a minimum separation distance of 25 feet (8 meters) from the centerline of the outermost track.

Trenching techniques—including HDD, horizontal boring, or pipe jacking—would be implemented to avoid disruption of vehicular traffic at at-grade intersections of roadways and railroad ROWs. HDD would be used to cross under almost all roads, which would minimize impacts on traffic, with the exception of nine road crossings throughout the Overland Segment where surface trenching would occur. In advance of the start of construction at any of these locations, coordination would occur between the Applicant and the appropriate agencies, including NYSDOT, county and municipal highway departments, and emergency service providers. Traffic flow would be maintained, and traffic levels of service would likely decrease due to slightly slower speeds through construction zones. It is expected that impacts on traffic would occur for no more than 2 weeks in any given location at a time. To the extent practicable, staging areas for construction equipment would be kept away from the roadways, minimizing the need for lane closures. No more than 3,000 feet (914 meters) of continuous open trench would occur at any given time while laying the transmission line. Therefore, impacts on traffic levels and safety would not be significant.

On average, approximately 300 constructions workers would be employed during the construction period and dispersed throughout the proposed CHPE Project area where work is ongoing, and would not all be concentrated in any one area. Therefore, the number of construction vehicles at any one location would not add noticeably to the number of vehicle trips. Construction-related vehicles parked within railroad ROWs would not affect parking resources in the vicinity of the proposed CHPE Project. Construction vehicles supporting transmission line installation activities in roadway ROWs would be parked within construction zones, but the construction zones would be managed in accordance with the MPT Plan to ensure sufficient parking and access is maintained at all times.

Temporary construction access roads (the width of a one-lane road, approximately 12 to 15 feet (4 to 5 meters) wide would be built as required to facilitate safe access to the construction site for personnel, equipment, and supplies where no access currently exists. Any access roads that require a temporary or permanent access point to a state road, or work within the ROW of a state road, would be undertaken pursuant to a highway work permit issued by NYSDOT. Where practical and with landowner and NYSDPS approval, existing private roads, driveways, and farm lanes would be used. The location of proposed access roads would be shown on the EM&CP Plan and Profile drawings once completed. To ensure that there are no impacts from large construction equipment using roads designed for lighter vehicles, the Applicant would restore these access roads to preconstruction conditions as required (CHPEI 2012q).

Installation of the transmission line through approximately 1.3 miles (2.1 km) of streets in Schenectady (primarily along Erie Boulevard) would result in construction activities in city streets. During this time, traffic on city streets would be restricted to narrower travel lanes. On-street parking spaces on one side of approximately one block could be lost temporarily for up to 2 weeks at any given time. An MPT Plan would be submitted to the city for approval prior to commencement of construction activities. Similar impacts and planning would occur for placing the transmission line along approximately 0.8 miles (1.3 km) of Alpha Road, a private, narrow, two-lane road south of Catskill at MP 228.

Impacts from Operations, Maintenance, and Emergency Repairs

Operational and maintenance activities within this segment would not result in significant impacts on railroad operations and roadway traffic operations. The U.S. Government Accountability Office (GAO) issued a Congressional Address in 2008 entitled *Transmission Lines: Issues Associated with High-Voltage Direct-Current Transmission Lines along Transportation Rights-of Way* (GAO 2008). This report suggested that a potential risk associated with the use of HVDC lines is that electromagnetic fields and stray currents could interfere with railroad signaling systems and operations. In order to ensure that potential interference by EMFs associated with the proposed HVDC technology on railroad signaling systems and operations is avoided, the transmission line would be buried and offset from the active rail lines by at least 10 feet (3 meters). Spacing the two cables in the trench at 1 foot (0.3 meters) apart, as proposed by the Applicant, would result in a magnetic field measure of 76.9 mG at 10 feet (3 meters) from the nearest cable and would be expected to minimize impacts on transportation operations (CHPEI 2012ll). The Applicant would work with the CP and CSX railroad companies to assess the specific track signal and communication equipment in use on nearby sections of existing rail lines, evaluate the potential impacts of the proposed CHPE Project magnetic fields on adjoining railroad equipment, and determine the requirement for suitable design provisions on the adjoining rail lines to prevent interference. Design provisions could include replacement of specific track circuit types on the adjoining rail lines with other types developed for operation on or near electric railways or adjacent to parallel utility power lines. See **Appendix G** for additional Applicant-proposed measures to minimize impacts on railroad operations.

ROW maintenance on land is necessary to protect the terrestrial cables from being disrupted or broken by tree roots, to maintain the function of permanent storm water management or access-control features, and to replace system location and identification markers, as necessary. The ROW Management Plan would be developed in consultation with CP and CSX railroads to ensure conformance with their continual maintenance plans. In addition, any maintenance or operational activities within railroad bridges or structures would be performed in accordance with the applicable conditions of highway work permits, use and occupancy permits, leases, and other agreements.

In the event of emergency repairs, the ERRP would be implemented. Disruptions to the transportation system could occur due to emergency repairs. These disruptions would cause impacts on traffic that include short-term suspension of rail operations in the area of the repairs and result in longer travel times. Vehicular traffic flow would be maintained through emergency repair work zones.

5.2.3 Water Resources and Quality

Impacts from Construction

Surface Water and Water Quality. In this segment, the terrestrial transmission cables would be buried beneath the ground in roadway ROWs and within the CP and CSX railroad ROWs. Ground disturbance from trenching and soil stockpiling would lead to a temporarily increased potential for erosion and runoff into surface waters. The proposed CHPE Project route would cross several streams and rivers, including two Nationwide Rivers Inventory (NRI) listed streams: Kayaderosseras Creek and Norman's Kill. Installation methods proposed could include trenching, HDD, and attaching to existing infrastructure such as bridges and railroad trestles. For intermittent and ephemeral streams that are dry at the time of construction, an open cut would be excavated through the dry streambed. Where perennial or other substantial stream flows are present, a dry-ditch method could be used to isolate the work area from the flow of water. These dry-ditch crossings would typically be completed by installing cofferdams upstream of the work area, and either pumping water around the construction area, or diverting the stream flow into one or more flume pipes. This diversion would temporarily impact the natural water course of the surface water.

The transmission cables would be attached to existing bridge infrastructure or installed by HDD at the crossings over the Hudson River at Fort Edward, the Mohawk River at Schenectady, and Catskill Creek at the Village of Catskill. HDD would also be used at other locations along the transmission line route depending on site-specific requirements and constraints to minimize environmental impacts on sensitive resource areas such as wetlands and other surface waters. During the HDD process, drilling fluid would be used and has the potential for release into surface waters causing water quality impacts. An SPCC Plan would be adopted and employed if needed to contain any spills quickly. HDD would be anticipated to result in lower impacts on water resources, including runoff from exposed soil in HDD staging areas, than the other installation methods such as trenching and dry-ditch crossings because surface waters or stream channels would not be directly disturbed.

HDD operations do have the potential of frac-out, where drilling fluids could be released or dispersed and impact water quality. The Applicant would develop and implement a Frac-out Contingency Plan that would allow for timely cleanup of any bentonite leaks that might occur and ensure minimal impacts on the environment. HDD would also require conventional dredging to create the cofferdam entry and exit pits for the transmission line water-to-land transition areas at MPs 101 and 228. Conventional dredging would cause the suspension of sediments and turbidity in the water column. Impacts on water quality from this activity would be minimized by enclosing the work area with the sheet pile cofferdam.

Vegetation clearing, ground disturbance, and trenching along the railroad and roadway ROWs would increase the potential for soil erosion and resulting water quality impacts on nearby surface waters. The proposed CHPE Project would involve soil disturbances of more than 1 acre (0.4 hectares) and, therefore, would be required to obtain coverage under the SPDES. A total of up to approximately 236 acres (96 hectares) of forest cover could temporarily be cleared to accommodate proposed construction areas for the proposed CHPE Project, most of which would occur within the Overland Segment. Erosion and increased sedimentation in storm water runoff would occur in active construction areas, but would be managed in place with BMPs as described in the EM&CP, which would serve as the SWPPP. The EM&CP would follow New York State Standards and Specifications for Erosion and Sediment Control, which specify BMPs for addressing erosion and sediment control, and would be approved by NYSDEC. Storm water management features and strategies (e.g., French drains, inlet protection, dewatering, and site stabilization and reseeding) would be implemented where and when necessary (CHPEI 2012q). The EM&CP would contain detailed maps depicting contours, slopes, drainage patterns, and locations of erosion-control structures. A list of specific Applicant-proposed measures that would be implemented to minimize impacts on water quality, including use of erosion and sediment control and storm water BMPs during transmission line installation and use of an Environmental Inspector responsible for monitoring construction activities to ensure the EM&CP is followed, is provided in **Appendix G**.

Floodplains. Based on a review of FEMA Flood Insurance Rate Maps (FIRMs), approximately 11.6 acres (4.7 hectares) of 100-year floodplains associated with rivers, streams, and unnamed tributaries are within the ROI (100 feet [30 meters] along either side of the transmission route) in the Overland portion of the proposed CHPE Project route between Dresden and Catskill (see **Appendix A**). These floodplains include FEMA Zones AE and A. Zone AE is a 100-year floodplain that has an established base flood elevation; Zone A is a 100-year floodplain with no base flood elevation established.

Proposed CHPE Project activities along the Overland Segment would result in temporary impacts on floodplains from construction activities related to burying the cables. The cable would be installed at least 3 feet (0.9 meters) below ground and the ground surface returned to its pre-existing level. Cooling stations would be constructed outside the floodplain. Vegetation clearing, ground disturbance, trenching and soil stockpiling, and related construction activity would occur within the floodplains crossed by the proposed CHPE Project. BMPs that would be implemented during construction include use of erosion and sedimentation controls, prohibitions on storing construction equipment or conducting refueling in floodplains, and restoring pre-existing ground grading would minimize any impacts on flood flows, flood storage, or flood hazards during the construction period. In addition, a number of floodplain crossings would be made using HDD methods that would avoid any direct disturbance within floodplain areas. The complete listing of Applicant-proposed measures and considered in this analysis is provided in **Appendix G** of the Final EIS.

Following completion of construction, no permanent aboveground alterations or new impervious surfaces that could impact flood storage, infiltration, or flooding hazard would result from construction or operation of the underground transmission line. Therefore, effects from operation and maintenance of the terrestrial portion of the transmission line are not expected.

A Statement of Finding for floodplains has been prepared in accordance with 10 CFR Part 1022, *Compliance with Floodplain and Wetland Environmental Review* and will be included in the Final EIS (see **Appendix S**).

Groundwater. At some locations, the blasting of bedrock could be required to install the terrestrial transmission cable. Bedrock blasting has the potential to increase bedrock fracturing near the blasting zone. Blasting could result in changes in local hydrology and temporarily increased levels of turbidity in nearby groundwater wells. Therefore, short-term impacts on groundwater quality could occur if blasting of bedrock is required. Blasting activities would be performed in strict adherence to all industry standards applicable to control of blasting and blast vibration limits as specified in a blasting plan to be developed by the Applicant as part of its EM&CP. The Applicant is also developing a private well response plan to address impacts (see **Section 5.2.9**). The route would cross over the Schenectady-Niskayuna Sole Source Aquifer along the CP railroad ROW because the aquifer is generally less than 25 feet below the surface (USEPA 2012d). Construction activities, including trenching, would occur within 4 feet (1.2 meters) of the surface and would not likely result in significant impacts on the aquifer.

HDD would be used at some locations within the Overland Segment to avoid environmental impacts on sensitive resource areas such as wetlands and other water bodies of importance. During the HDD process, drilling fluid would be used and has the potential to percolate to groundwater. Bentonite clay is a solid and is denser than the water with which it is mixed to make drilling fluid. As the drilling fluid percolates through the soil, the bentonite clay particles would become trapped, through absorption, by the soil and would aggregate within soil pore spaces. This natural filtration process would prevent the bentonite clay from entering the groundwater. Therefore, significant impacts on groundwater are not anticipated from HDD operations.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts on water resources would not be expected during operation of the transmission line because there would be no change in water quality, water availability, or elevation changes in floodplains. During potential emergency repair activities, the cables would have to be exposed and then reburied. Potential impacts on water quality related to ground disturbance to uncover and repair damaged lines would increase the potential for erosion and sedimentation to nearby surface waters, and disturbance within surface water would occur if a cable is damaged during operation, thus requiring repairs under water bodies. While the frequency of emergency repairs cannot be predicted and the repair time would vary, repairs likely would be infrequent and short-term and would be limited to the immediate vicinity of the repair site. The impacts would be similar to those described for the original installation, but with a shorter duration and smaller area of disturbance.

5.2.4 Aquatic Habitats and Species

Impacts from Construction

Aquatic Habitat and Vegetation. Significant impacts on SAV would not be expected because the transmission line would be attached to bridges or installed underneath streambeds using dry ditch methods or HDD. Any crossings of SAV impacted from dry ditch methods would be expected to be recolonized following installation. Bentonite clay slurry used as a drilling lubricant during HDD could leak into the waterways (i.e., frac-out) and smother SAV. Development and implementation of a Frac-out

Contingency Plan would allow for timely cleanup of any bentonite leaks that might occur and minimize impacts on the environment.

Shellfish and Benthic Communities. Impacts on shellfish and benthic communities at stream crossings in the Overland Segment would result from sediment disturbance, redeposition of sediments, trenching, water quality degradation, and release of hydrocarbons. These impacts would not be expected to be significant because the transmission line would primarily be attached to bridges or installed underneath streambeds using dry ditch methods or HDD. Any crossings involving communities impacted from dry ditch methods would be expected to be recolonized following installation. Development and implementation of a Frac-out Contingency Plan would allow for timely cleanup of any bentonite leaks that might occur during HDD and minimize impacts on the environment.

Fish. Impacts on fish could result from sediment resuspension, turbidity, and hazardous spills. The impacts from turbidity would be minimized because the transmission line would primarily be installed underneath streambeds using dry ditch methods. Fish would be expected to vacate the site of the crossing at the initial stages of dry ditch installation. The proposed schedule and construction windows for conducting the stream crossings would be established as part of the EM&CP. Storage and use of fuel and pesticides would also be restricted within 100 feet (30 meters) of water bodies.

Essential Fish Habitat. There would be no impacts on EFH because there is no EFH present along the Overland Segment of the proposed CHPE Project.

Significant Coastal Fish and Wildlife Habitat. The proposed CHPE Project would cross Catskill Creek SCFWH via HDD within the Overland Segment, so no impacts on the SCFWH would occur. The proposed CHPE Project would cross Normans Kill and Coeymans Creek at MPs 184 and 201, respectively, in the southern portion of the Overland Segment. These crossings would also be installed via HDD, thereby avoiding potential impacts on these water bodies.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts on aquatic habitat and species from maintenance activities would not be anticipated because the transmission line would be expected to periodic maintenance activities such as inspections and maintenance associated with the cooling stations would not occur within aquatic areas. However, if a fault occurs in a section of the cables crossing a waterbody where it is not attached to a bridge or installed by HDD, the cable might need to be excavated and repaired. Impacts from such emergency repairs, if required, would be expected to be similar to those occurring during initial construction, but of a shorter duration and smaller area of impact.

Aquatic Habitat and Vegetation. Magnetic fields would not be expected to significantly impact SAV in water bodies crossed by the transmission line route (as identified in **Section 5.1.4**), and the sediment temperature increases associated with operation of the transmission line would be less than 2 °F (1 °C) at the sediment surface, not including advection from flowing water, which would reduce the temperature even further. The temperature change in the water column would be less than 0.001 °F (0.0001 °C). Such temperature increases would be negligible given the greater seasonal fluctuations in water temperatures. The area of sediments affected by this slight increase in temperature would be extremely localized (i.e., directly over the transmission line) and would be expected to result in a negligible impact on any SAV that might be present (CHPEI 2012dd).

Shellfish and Benthic Communities. Magnetic fields and temperature changes would potentially impact, but would not significantly impact, shellfish or benthic organisms. Additionally, the temperature increase over ambient temperature at 8 inches (20.3 cm) below the sediment surface would be 9 °F (5.0 °C), diminishing to 1.8 °F (1.0 °C) above ambient conditions at the sediment surface directly above the cables.

Impacts on shellfish and benthic communities would be the same as those described for *Aquatic Habitat and Vegetation*.

Fish. Impacts from operation of the transmission line at waterbody crossings would be associated with temperature increases and magnetic and induced electric fields and would be the same as those described for the Lake Champlain Segment (see **Section 5.1.4**).

Essential Fish Habitat. There would be no impacts on EFH because there is no EFH present along the Overland Segment.

Significant Coastal Fish and Wildlife Habitat. The transmission line would cross Catskill Creek SCFWH via HDD; therefore, operation would not impact the SCFWH. The transmission line would not directly cross the Normans Kill or Coeymans Creek SCFWHs or impact the water bodies that flow into them as previously stated.

5.2.5 Aquatic Protected and Sensitive Species

Impacts from Construction

No federally or state-listed threatened and endangered aquatic species would be present within the Overland Segment; therefore, no effects on those species would be anticipated from construction activities related to the proposed CHPE Project.

Impacts from Operations, Maintenance, and Emergency Repairs

No federally or state-listed threatened and endangered aquatic species would be present within the Overland Segment; therefore, no effects on those species would be anticipated from operation, inspection, and potential emergency repair activities.

5.2.6 Terrestrial Habitats and Species

Impacts from Construction

Vegetation and Habitat. During construction activities in the Overland Segment, impacts on vegetation would include permanent removal of vegetation, vegetation trampling from heavy construction equipment, root damage associated with excavation, soil compaction, and generation of dust. Because the transmission cables and cooling stations would be installed and constructed within existing roadway and railroad ROWs, most vegetation along the Overland Segment route is previously disturbed. Some fringe forest habitat within and immediately adjacent to these ROWs would be converted to shrub habitat as a result of transmission line installation. In areas where the ROW cannot support installation of the transmission line, deviation areas would be constructed. Typically, deviation areas identified along the proposed CHPE Project route in this segment would be located immediately adjacent to existing ROWs and would extend to an outer boundary ranging up to approximately 200 feet (61 meters) away from the ROW. Like the existing ROWs, deviation areas would primarily be composed of forest fringe (i.e., at the edge of the forest) habitat, and would also include some interior forested areas, streams, suburban residential areas, urban developed areas, and highways or roadways with maintained vegetation. Forested habitat in deviation areas could be more suitable to wildlife because it extends away from the ROWs. Therefore, construction in these areas could result in habitat fragmentation impacts greater than those incurred from construction within the ROWs.

In total, approximately 236 acres (96 hectares) of existing forest cover could be temporarily disturbed and 48 acres (19 hectares) changed permanently to managed grasses or shrub habitat along the entire CHPE

Project route, primarily within the Overland Segment ROI, to accommodate proposed construction corridors and any necessary additional workspace (CHPEI 2012i). Studies on forest habitat fragmentation associated with 26-, 48-, and 69-foot-wide (8-, 16-, and 23-meter-wide, respectively) corridors indicated that impacts increased with corridor width and distance into the forested habitat (Rich et al. 1994). The greatest displacement of wildlife species was reported at distances of 300 feet (100 meters) and 900 feet (300 meters) away from the edges of corridor widths measuring 48 and 69 feet (16 and 23 meters), respectively. By comparison, displacement impacts resulting from the 26-foot-wide (8-meter-wide) corridors were minimal. Interior-forest dwelling species did not avoid inhabitance along the corridor's edges; however, species composition was altered as an edge-preferring species abundances in these areas increased. Construction of the up to approximately 20-foot (7-meter)-wide corridor for the proposed CHPE Project would be expected to result in similar localized and temporary changes in community composition (e.g., tree removal and possible displacement of wildlife). However, the presence of the transmission line corridor, which would primarily be a mixture of grasses and shrubs, would not preclude wildlife from crossing the corridor to reach habitat on the other side. Also, construction and habitat conversion would occur primarily in fringe habitat along existing ROWs, where noise, emissions from railroads and cars, and human activity already influence habitat suitability, or result in widening of an already disturbed ROW by up to 20 feet (6 meters) rather than result in fragmented forested habitat. Finally, corridor construction would impact only a small percentage of habitat available for wildlife, and mobile species that currently inhabit and prefer these areas likely would relocate to seek out similar habitat. Therefore, construction of the proposed CHPE Project corridor and installation of the transmission line would not be expected to significantly impact the habitats in these areas.

At this time, the locations of each cooling station are approximate and no specific locations have been determined. If further siting analysis determined that specific impacts would occur, the siting would be adjusted accordingly to minimize impacts on adjacent habitat. Applicant-proposed measures would be implemented to reduce impacts on vegetation (see **Appendix G**).

Soil compaction would have an effect on vegetation by decreasing the rate of water infiltration into the soil, resulting in changes to the soil moisture regime and porosity and potential changes in soil structural characteristics. Construction equipment and foot traffic have the potential to spread invasive plant species as a result of ground disturbance and the introduction of invasive seed stock carried on the boots, clothing, or equipment of construction workers. The movement of construction equipment and soil disturbance can increase the likelihood that invasive plant species that are potentially damaging to native biotic populations become established. Dust generated during construction could also have impacts on downwind vegetation due to interference with pollination and photosynthesis. These impacts would be restricted to the construction corridor and minimized through the use of Applicant-proposed measures such as dust-control methods and the prevention or control of the transport of invasive plant species through implementation of an Invasive Species Management Plan prepared as part of the EM&CP and approved by applicable state agencies. See **Appendix G** for more details on Applicant-proposed measures.

The proposed CHPE Project route in the Overland Segment would cross several streams, rivers, and wetlands. The transmission line would cross water bodies and associated riparian areas via dry-ditch crossing methods (see **Section 2.4.10.2**), HDD, or attachment to bridges. Use of HDD and bridge crossings would avoid or minimize impacts on riparian areas. Dry ditch crossing methods would temporarily result in soil compaction, erosion, loss of vegetation, or change or loss of the physical structure of the ecological community in riparian habitat. Removal of vegetation along stream banks could reduce bank stability and increase erosion and the loss of vegetation would have an impact on plant communities because it would shift the dominant species. Applicant-proposed measures would stabilize disturbed stream banks and re-establish vegetation, limiting potential effects on riparian habitat. Work within streams, wetlands and other jurisdictional waters of the United States would require permits. A discussion of potential wetland impacts are provided in **Section 5.2.8**.

Significant natural communities along the proposed CHPE Project route occur at MPs 144 to 147. Many of these communities that are associated with the Saratoga Sand Plains WMA in this area coincide with Karner blue butterfly habitat, which the Applicant proposes to avoid disturbing through the use of HDD (see **Section 5.2.7**). Significant natural communities in the northern part of the WMA would be avoided because the transmission line would be installed on the opposite side of the railroad tracks from these communities. At MP 147, transmission installation via trenching and the construction of a cooling station would occur in the fringe of red maple-hardwood swamp significant natural community, resulting in loss of vegetation and soil compaction from construction activities. Impacts on vegetation and habitat would be minimized through the use of Applicant-proposed measures (see **Appendix G**), and the Applicant would continue to consult with NYSDEC, NYNHP, and USFWS regarding impact minimization in this area (CHPEI 2012i, NYSPSC 2013). In addition, in accordance with the NYSPSC Certificate for the proposed CHPE Project (Condition 66), all trees over 2 inches (5 cm) in diameter at breast height or shrubs over 4 feet (1.2 meters) in height damaged or destroyed by activities during construction, operation, or maintenance, regardless of where located, would be replaced with the equivalent type of trees or shrubs and in accordance with the EM&CP, state guidelines, and sound railroad and road ROW management practices (NYSPSC 2013).

Wildlife. Although significant impacts on wildlife would not be expected, noise associated with construction activities could result in reduced communication ranges for wildlife, interference with predator/prey detection, or habitat avoidance. Impacts could also be associated with blasting and include behavioral changes, disorientation, or hearing loss. Wildlife response to noise can be dependent on noise type (i.e., continuous or intermittent), prior exposure to noise, proximity to a noise source, stage in the breeding cycle, activity (e.g., foraging), age, and gender. Prior exposure to noise is the most important factor in the response of wildlife to noise because wildlife can become accustomed (or habituate) to the noise. The rate of habituation to short-term construction noise is not known, but the proposed construction activities would primarily occur along road and railroad ROWs, where there is a high level of ambient noise. Wildlife that could be affected include grassland bird species, forest bird species, reptiles, amphibians, and mammals.

In total, approximately 236 acres (96 hectares) of existing forest cover could be temporarily disturbed and 48 acres (19 hectares) permanently changed to accommodate the proposed CHPE Project. Vegetation removal and the reduction of habitat could result in the direct displacement of species, including grassland and forest birds, mammals, reptiles, and amphibians; however, habitat fragmentation and permanent displacement of entire breeding populations would not occur because construction activities would be within previously disturbed habitat or habitat fringes along existing road or railroad ROWs. Wildlife that could be temporarily displaced include birds, burrowing animals, and other species that use forests for foraging, breeding, and nesting. However, studies have indicated that forest wildlife exposed to relatively narrow corridors, similar to the proposed CHPE Project corridor, did not experience significant fragmentation impacts (e.g., permanent displacement or isolation) or have significantly reduced abundances along the corridor (Rich et al. 1994). Also, the presence of the corridor would not preclude wildlife from crossing the corridor to reach habitat on the other side. Therefore, significant fragmentation impacts would not be expected. Mortality of some less mobile species could occur as a result of the inability to avoid construction equipment. Applicant-proposed measures, such as avoiding sensitive habitat using HDD and other measures to the extent practicable, would be implemented to further reduce impacts on wildlife (see **Appendix G**).

Impacts from Operations, Maintenance, and Emergency Repairs

Vegetation and Habitat. Magnetic and electric fields generated by transmission lines have the potential to enhance growth responses in certain plant species; however, the nature of this potential impact on plants are inconclusive (AUC 2011). Operation of the transmission line would increase the temperature of the soil above the transmission line at the sediment surface and at 6 inches (15 cm) below the sediment surface by 1.8 and 9 °F (1.0 and 5.2 °C), respectively, which could alter the composition of the terrestrial vegetation and habitat directly above the cables. However, temperature would quickly dissipate with increasing distance from the transmission line (Burges et al. 2008) and the area affected would be within the maintained transmission line ROW (CHPEI 2012i, CHPEI 2012kk).

The permanent transmission line ROW would be inspected and maintained (i.e., woody vegetation would be trimmed or removed) to protect the buried cables and cooling stations from damage caused by tree roots, maintain the function of access control features, and replace location and identification markers, as necessary. The goal of vegetation management in the ROW would be to establish stable low-growing vegetation with shallow root systems that would not interfere with the transmission line, minimize spread of invasive species, and allow for visual inspections of the ROW and adequate access to cooling stations. Vegetation clearing and selective cutting of large trees would occur on an as-needed basis. Such maintenance activities would be short-term, but would occur periodically over the operating life of the proposed CHPE Project. For most of the Overland Segment, vegetation that would be permanently removed has been previously disturbed or is successional or forest fringe. Much of this habitat would be expected to be highly disturbed due to its proximity with roadway and railroad ROWs. Applicant-proposed measures, such as retention of vegetative buffer zones, leaving tree stumps undisturbed, and following the Invasive Species Management Plan, would be implemented to reduce impacts on vegetation further (see **Appendix G**).

Emergency repairs of the transmission line, if required, could result in the removal of vegetation and vegetation crushing from repair equipment. Vegetation would only be disturbed in the area of the repair site, the ROW would be restored following completion of the repairs, and vegetation would be allowed to return to its prior state. Any emergency repairs undertaken would occur within areas previously disturbed by the original transmission line installation.

Wildlife. Buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface, and the constant magnetic field would decrease with distance from the cable centerline (WHO 2012). While there is evidence that wildlife can detect magnetic fields, species' behaviors would not be affected by relatively small, very localized changes in magnetic fields (AUC 2011). Previous studies have found that magnetic and electric fields associated with transmission lines do not cause any adverse health, behavioral, or productivity effects in animals, including both wildlife and livestock (BPA 2010). Operation of the transmission line would increase the soil temperature, which could slightly alter terrestrial vegetation and habitat thereby affecting foraging, nesting, and avoidance behavior in wildlife that use that habitat directly above the transmission line; however, temperature would quickly dissipate within increasing distance from the transmission line (Burges et al. 2008) and would be restricted to the maintained transmission line ROW.

The transmission line ROW, in general previously disturbed by past activities, would be permanently maintained as scrub-shrub habitat with woody vegetation less than 20 feet (6 meters) tall. Potential non-significant impacts from mowing and vegetation maintenance activities on grassland bird species, forest bird species, reptiles, amphibians, and mammals would be temporary, but would occur periodically over the operating life of the transmission line. The use of heavy equipment would result in permanent damage to the vegetation as a result of crushing, ground disturbance, and root damage to grasses and other plants occurring in the area. Soil compaction and erosion would result in disturbances to burrowing species and effects related to an associated decrease in vegetation cover. Any decrease in vegetation cover would result in potential impacts on species that use that habitat type, due to habitat reduction.

Vegetation maintenance activities would also displace birds, mammals, and other species that use the area for foraging, but use of the transmission line ROW by these species would be limited because the vegetation in the ROW would be regularly maintained and existing disturbance from the adjacent railroad and roadway operations would continue unchanged. The affected habitat is only composed of a small percentage of the habitat available in the region. Much of this habitat would be expected to be highly disturbed due to its proximity to roadway and railroad ROWs. Additionally, significant habitat fragmentation impacts on wildlife species would not be expected because the proposed CHPE Project corridor would be relatively narrow and would be constructed primarily in fringe habitats within or adjacent to existing roadway and railroad ROWs. Therefore, significant fragmentation impacts in forested deviation areas would not be expected.

Emergency repairs of the transmission line, if required, could temporarily result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance by wildlife because of noise disturbance. Vegetation removal and the reduction of habitat could result in the direct displacement of species; however, the areas that would be potentially impacted by emergency repairs would have been previously disturbed during the original construction of the proposed CHPE Project.

5.2.7 Terrestrial Protected and Sensitive Species

Impacts from Construction

Table 5.1.7-1 identified the federally and state-listed threatened and endangered species and other protected species that could occur within the proposed CHPE Project ROI for terrestrial and protected species (see **Figure 3.2.1-1**) by segment.

Federally Listed Species

Karner blue butterfly. The larval host plant of the Karner blue butterfly, wild blue lupine, occurs along the railroad ROW in portions of the Overland Segment in Saratoga, Schenectady, and Albany counties. Because of the uniquely close association that the Karner blue butterfly has with wild blue lupine, the Applicant has proposed that all mapped wild blue lupine colonies are considered occupied by Karner blue butterflies, and the USFWS and NYSDEC have concurred with this approach (CHPEI 2012cc).

Potential effects from vegetation clearing during construction activities include habitat degradation via crushing, removal, or other disturbances to wild lupine and other vegetation; and directly harming, harassing, or killing Karner blue butterflies (all life stages). However, adverse effects on the Karner blue butterfly would be avoided by using HDD to install the buried transmission line under areas of delineated wild blue lupine habitat. There is approximately 1.0 acre of wild blue lupine habitat and 13.2 acres of nectar habitat within 100 feet of the proposed CHPE Project transmission line route where trenching installation methods would be used (CHPEI 2012ddd, NYSDEC 2012jj). Approximately 1.8 acres of mapped Karner blue butterfly nectar habitat only occurs within the 33-foot (10-meter) construction corridor proposed for the transmission line along the CP Railroad ROW. The final work around boundary would be identified in the EM&CP and fenced to keep all construction activities within it. Following construction activities, the impacted nectar habitat would be restored with seeding of species that would provide nectar sources.

Additional impact avoidance and minimization measures specifically developed by the Applicant for Karner blue butterflies and their habitat include avoiding construction within or immediately adjacent to occupied Karner blue butterfly during the adult flight periods (approximately May to August) to avoid and minimize potential mortality of adults. Prior to construction, the Applicant would conduct surveys for the presence of Karner blue butterflies in accordance with the USFWS and NYSDEC guidance document, *Karner Blue Butterfly Survey Protocols within the State of New York* (USFWS and NYSDEC 2008c). The guidance document also includes flagging the boundaries of all lupine patches within or immediately adjacent to construction workspaces or access routes, and training construction personnel on the locations and identification of wild blue lupine to avoid trampling or destruction of wild blue lupine plants. If any previously unknown or unflagged areas containing wild blue lupine are encountered, the Applicant would notify NYSDPS, NYSDEC, and USFWS. If additional protective measures were to be necessary to protect the Karner blue butterfly or occupied habitat for this species, the Applicant would temporarily cease vegetation clearing, construction, ground-disturbing, and vegetation management activities in the area, except any activities that could be necessary for immediate stabilization of the work site, until protective measures can be implemented. In addition, forest-clearing activities could create habitable areas for wild blue lupine plants and subsequently result in beneficial impacts for the Karner blue butterfly. See **Appendix G** for a full list of Applicant-proposed measures to avoid and minimize effects on the Karner blue butterfly.

Based on implementation of the Applicant-proposed measures that would be used to avoid impacts on Karner blue butterfly and blue lupine habitat, the proposed CHPE Project construction activities may affect, but are not likely to adversely affect, the Karner blue butterfly. DOE prepared a BA to provide a detailed analysis of the effects of the proposed CHPE Project on federally listed and candidate species that will help facilitate ESA Section 7 consultations with the USFWS (see **Appendix Q**).

Bog turtle. No significant effects on the bog turtle are expected to occur as a result of the construction activities in the Overland Segment. Freshwater wetland and upland habitats potentially suitable for bog turtle exist along the transmission line route in Washington, Saratoga, Schenectady, and Albany counties. Within this area, historic records show that the bog turtle has occurred in Albany County. However, according to the Bog Turtle Recovery Plan (USFWS 2001), the Albany County population has been extirpated. Additionally, based on data from the NYNHP, there are no historic records of bog turtles occurring within 0.25 miles (0.4 km) of the entire proposed CHPE Project route (CHPEI 2012x). While bog turtles are associated with open-canopy, red-maple, hardwood swamps, sedge meadows, or fens that could occur along the ROI, these habitats are expected to be disturbed and not suitable for bog turtles. As such, impacts on bog turtles from construction activities are highly unlikely. If bog turtles are unexpectedly encountered during construction activities, the Applicant would temporarily halt activities in the vicinity of the discovery, except any activity required for immediate stabilization of the area, to avoid or minimize impacts on the species or habitat. Construction activities in the area would resume after protective measures, developed in consultation with NYSDEC and USFWS, are implemented (see **Appendix G** for a full list of Applicant-proposed measures to avoid or minimize any potential impacts on bog turtles). Based on the unlikely occurrence of the bog turtle within or adjacent to the ROI, the construction activities would have no effect on the bog turtle.

Indiana bat. The Indiana bat could occur in Washington County during the summer due to the presence of known hibernacula in nearby Warren and Essex counties (CHPEI 2012x). Construction noise could affect the behavior of bats foraging or roosting in the area adjacent to the Overland Segment ROI; however, since these bats occur in proximity to an active railroad corridor in the ROI in Washington County, it is assumed that they are already habituated to noise level fluctuations. Therefore, Indiana bats are not likely to become displaced or abandon roosting areas. Additionally, there is a limited availability of summer roosting habitat within and adjacent to the ROI.

Vegetation removal could result in the potential loss of habitat for the Indiana bat. In the immediate vicinity of the road and railroad ROWs, much of the habitat consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts. Forested or open woodland habitats occur adjacent to the proposed transmission line in Washington County; however, vegetation clearing would be conducted primarily within the road and railroad ROWs. There are few large trees within the construction corridor. Applicant-proposed measures to avoid or minimize impacts, such as limiting tree removal to the October to March timeframe; the identification and, where possible, avoidance of large live or dead trees with peeling bark (e.g., shagbark hickory) which could serve as maternity or roost trees for Indiana bats; and site-specific prescriptions for clearing and selective retention of vegetative buffer zones, would be implemented (see **Appendix G**). No habitat containing roost trees is expected to be removed within 20 miles (32 km) of Priority 1 or 2 Indiana bat hibernacula. The BA (**Appendix Q**) contains additional information on hibernacula and analysis of habitat loss on the Indiana bat. Based on the implementation of such measures, the proposed CHPE Project may affect, but is not likely to adversely affect, the Indiana bat.

Northern long-eared bat. Based upon this species' habitat preferences during winter and summer, it can be assumed that northern long-eared bats would occur in similar or the same areas indicated for the Indiana bat along the proposed CHPE Project route, including in the Overland Segment. There are no hibernacula within the Overland Segment ROI; however, construction noise could affect the behavior of any bats foraging or roosting adjacent to the ROI. Because these bats occur in proximity to an active railroad corridor, it is assumed that they are already habituated to noise level fluctuations.

While vegetation removal could result in the potential loss of habitat for the northern long-eared bat, much of the habitat in the immediate vicinity of the existing road and railroad ROWs consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts. There are few large trees within the construction corridor, and most vegetation clearing would occur within the existing road and railroad ROWs. As a result of any loss of forest, northern long-eared bats might alter current flight paths between roosting and foraging habitat that, in turn, could increase their overall flights or they could fly over the construction corridor and continue to use previous foraging areas. However, the northern long-eared bat relies on and prefers edge habitat for safe foraging and movements to and from their roost trees to feed. Therefore, the increase in edge habitat in the Overland Segment could benefit the northern long-eared bat. Applicant-proposed measures to avoid or minimize impacts, such as the identification and, where possible, avoidance of large live or dead trees with peeling bark (e.g., shagbark hickory) which could serve as maternity or roost trees for northern long-eared bats and site-specific prescriptions for clearing and selective retention of vegetative buffer zones, would be implemented (see **Appendix G**). Based on the implementation of such measures, the proposed CHPE Project may affect, but is not likely to adversely affect, the northern long-eared bat.

Bald eagle. Breeding habitat has the potential to occur along portions of the Overland Segment ROI in Washington, Albany, Greene, and Columbia counties. Nest trees typically include pine, spruce, fir, cottonwood, oak, poplar, and beech. However, because the ROI would primarily occur within existing road and railroad ROWs where the vegetation is mostly low-lying herbaceous or scrub-shrub vegetation, and large deciduous or coniferous trees are generally not present, it is anticipated that bald eagles would not be present within the ROI. Although bald eagles might fly over the ROI when they are traveling among the large water bodies located in the surrounding areas, it is likely that they would not use the habitats within the ROI except on a transient basis.

The Applicant has developed and would implement impact avoidance and minimization measures specifically for bald eagles and their habitat, such as identifying and characterizing (e.g., active vs. non-active) all bald eagle nest locations within 0.5 miles (0.8 km) of the construction corridor prior to commencement of activities. If construction would occur within 660 feet (201 meters) of an active nest during the nest-building or breeding season (December to August) per USFWS *National Bald Eagle Management Guidelines* (USFWS 2007b), the Applicant would contact USFWS and NYSDEC for guidance to avoid and minimize the potential for noise-related disturbances. Additionally, construction personnel would be trained to identify eagles and nests, and instructed to report any sightings of potential nests not previously identified. If any previously unidentified eagle nests are discovered during construction, work would discontinue within 600 feet (183 meters) of the nest and the Applicant would report the findings to the NYNHP and consult with the NYSDEC and USFWS for guidance to avoid or minimize the potential for disturbance. See **Appendix G** for a full list of Applicant-proposed measures to avoid impacts on the bald eagle.

State-Listed Species

Potential effects on state-listed plants, as a result of construction along the Overland Segment, would not be significant but would include soil compaction, vegetation crushing, dust, and local permanent loss of some plants. Soil compaction would decrease the rate of water permeating into the soil, resulting in decreased vegetation cover because of desiccation. Heavy equipment and foot traffic could damage plants within the ROI. The Applicant has proposed several measures to avoid or minimize impacts on protected species, including state-listed plants, such as identifying all known locations on EM&CP maps and in the field where protected plants have been observed based on available data. Dust-control strategies (e.g., watering down disturbed soil) would be implemented to minimize impacts from interference with pollination and photosynthesis on downwind vegetation. Construction personnel would be trained to identify known and potential rare, threatened, and endangered plants and follow their protection measures included in the EM&CP. See **Appendix G** for a full list of Applicant-proposed measures to avoid impacts on state-listed plant species.

Effects from construction on state-listed invertebrates, specifically the frosted elfin, would be identical to the impacts on Karner blue butterfly because these two species have identical habitat. These potential effects include habitat degradation and direct disturbance or mortality. The Applicant-proposed avoidance and minimization measures for Karner blue butterflies (see **Appendix G**), including installing the transmission line by HDD, and flagging boundaries of host plant locations, would also apply to frosted elfins.

Noise associated with construction of the transmission corridor could temporarily disturb and displace state-listed birds. Individuals would be displaced, but permanent displacement of an entire breeding population is unlikely (Rich et al. 1994, AUC 2011). Vegetation clearing could result in loss of habitat. Construction of the transmission line would occur in previously disturbed roadway or railroad ROWs. Since birds that occur in the ROWs would be habituated to noise and human disturbance and likely would not avoid the edge habitats created by the relatively narrow corridor, significant fragmentation effects would not be expected. Additionally, most vegetation along the transmission line route likely would not provide suitable habitat for nesting because it would be previously disturbed successional shrubbery or forest fringe habitat, which is subject to frequent disturbance due to traffic noise in the ROWs and emissions from the adjacent road or railroad.

Migratory Birds

No significant effects on migratory birds would be expected from installation of the transmission line. However, potential effects on migratory birds and their occupied habitats include those resulting from noise and vegetation clearing. Most birds along the Overland Segment are expected to move into similar adjacent habitats during a typical construction period of up to 2 weeks in any given location and return to the area after construction is completed. Disturbance could also result in parental abandonment of eggs or young in nests built in habitats immediately adjacent to the construction activities. Permanent displacement of an entire breeding population is unlikely because vegetation clearing would largely occur along disturbed or fringe habitat (AUC 2011).

Some loss of woodlands would occur due to tree clearing along the edge of the ROI in forested areas. The affected habitat only composes a small percentage of the habitat available to migratory bird species in the region. Additionally, significant habitat fragmentation impacts would not be expected because construction would occur within or adjacent to existing, previously disturbed, ROWs and would impact relatively little forested habitat in the deviation areas. If vegetation clearing is conducted during the breeding and nesting season (generally the spring and summer) impacts on migratory birds and bird nests within the ROI could occur. However, most of the vegetation that would be impacted would be in fringe habitat that is subject to frequent noise and emissions from railroad activities, and Applicant-proposed measures, including avoiding sensitive habitats, would be implemented to reduce impacts on migratory birds (see **Appendix G**).

Impacts from Operations, Maintenance, and Emergency Repairs

Federally Listed Species

Karner blue butterfly. Operation of the transmission line would increase the ambient soil temperature 3 feet (0.9 meters) from the transmission line by 2 °F (1 °C), which could impact the wild blue lupine that provides the Karner blue butterfly habitat. However, the transmission cables would be installed by HDD beneath the wild blue lupine areas, and heat from the transmission line cables would be contained within the HDPE conduits and dissipate at greater depths from the surface. In addition, cooling stations would be constructed to serve these HDD segments and excess heat would be removed from the underground conduits through the cooling stations chiller equipment. The cooling stations would be constructed outside of any areas containing wild blue lupine habitat. Impacts on the Karner blue butterfly could occur from vegetation clearing and other activities associated with vegetation maintenance along the transmission line ROW. Both vehicle and foot traffic during maintenance could damage or disturb habitat, and harm or kill individual Karner blue butterflies. Vegetation along the ROW would primarily be managed by brush hogging and mowing or hand cutting. During operation of the transmission line, wild blue lupine habitat would be avoided. However, if any emergency repairs or other operational maintenance activities are required within Karner blue butterfly and frosted elfin blue lupine habitats, they would be implemented in accordance with ongoing consultations between the Applicant and USFWS and NYSDEC, and the results of those consultations will be included in the EM&CP. No operational impacts would occur in wild blue lupine habitat from mowing or vegetation removal activities because the transmission line would be installed via HDD methods to a depth of more than 10 feet (3 meters) below mapped lupine habitat, which would be well below root depths for wild blue lupine, and mowing and vegetation removal would not take place in lupine habitat. Lupine typically grows 8 to 24 inches (20 to 61 cm) in height with taproots approximately 12 to 20 inches (30 to 51 cm) (USFS 2014, PlanetNatural 2012).

No herbicides or pesticides would be used within occupied Karner blue butterfly habitat, except as approved by the USFWS and NYSDEC. If required, emergency repair activities could damage or disturb habitat, or harm or kill individual Karner blue butterflies. Because the cables would be installed in conduits beneath the Karner blue butterfly habitat, the damaged or defective cable would be removed by pulling the cable out of the HDPE conduit, avoiding disturbance to Karner blue butterfly habitat above the conduit. Based on implementation of the Applicant-proposed measures that would be used to avoid impacts on Karner blue butterfly and blue lupine habitat, operation and maintenance activities of the proposed CHPE Project may affect, but are not likely to adversely affect, the Karner blue butterfly. DOE prepared a BA to provide a detailed analysis of the effects of the proposed CHPE Project on federally listed and candidate species that will help facilitate ESA Section 7 consultations with the USFWS (see **Appendix Q**).

Bog turtle. Although potential habitat for the bog turtle exists along the Overland Segment, according to the *Bog Turtle Recovery Plan* (USFWS 2001), the previously recorded bog turtle populations in Albany County have been extirpated. In addition, based on data from the NYNHP, no historic records exist of bog turtles occurring within 0.25 miles (0.4 km) of the proposed CHPE Project route (CHPEI 2012x).

Therefore, no effects on the bog turtle would occur as a result of operation, maintenance, inspection, and emergency repair activities in the Overland Segment.

Indiana bat. No significant effects from magnetic fields would be anticipated from operation of the transmission line. Buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface and the constant magnetic field would decrease with distance from the cable centerline (WHO 2012). The predicted magnetic field along the Overland Segment route would be approximately 200 mG at 1 foot (0.3 meters) above the ground over the cables. While there is evidence that wildlife can detect electromagnetic fields, species behaviors would not be affected by relatively small changes in magnetic fields (AUC 2011). Additionally, literature suggests that electromagnetic fields associated with transmission lines do not result in any adverse effects on the health, behavior, or productivity of animals (Exponent 2009). Indiana bats might be able to detect magnetic fields; however, there is no evidence to suggest that the magnetic fields could result in any effects on the species.

Most of the vegetation that would be impacted along the ROW during vegetation maintenance activities would consist of previously disturbed herbaceous and shrubby cover. Vegetation along the transmission line ROW would primarily be managed by brush hogging and mowing or hand cutting to maintain height of vegetation to less than 20 feet (6 meters). Potential effects from mowing on Indiana bats include noise and dust. Noise created by mowing could affect roosting bats in adjacent forests but several colonies of bats have been found near mowed ROWs of major roads and appear to not be affected by noise created by mowing and traffic (USFWS 2008b). In addition, noise and dust created by mowing would be experienced by roosting or foraging bats for a very short duration because mowers would pass quickly by any area having bats. Effects on the Indiana bat associated with emergency repairs of the transmission line in the Overland Segment, if necessary, would not be significant and would be similar to those occurring during construction, but would be for a shorter duration and disturb a smaller area.

Northern long-eared bat. The effects from operation, vegetation maintenance, inspection, and emergency repairs on northern long-eared bats would not be significant, and would be the same as those described for Indiana bat. While northern long-eared bats might be able to detect magnetic fields, there is no evidence to suggest that the magnetic fields could result in any effects on the species. Maintenance of vegetation along the transmission line ROW would primarily impact previously disturbed herbaceous and shrubby cover, but would result in temporary noise and dust that could affect any roosting or foraging bats in adjacent areas. Effects associated with emergency repairs, if necessary, would be similar to those impacts occurring during construction, but for a shorter duration and involving disturbance to a smaller area than those for construction activities.

Bald eagle. Buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface. No impacts on bald eagles from magnetic fields would be anticipated from operation of the transmission line because the field levels would be approximately 200 mG at the surface directly over the cables and the magnetic field would decrease with distance from the cable centerline (WHO 2012). Research indicates that some species of animals, including birds, are able to detect magnetic fields at levels that might be associated with transmission lines such as those associated with the proposed CHPE Project; however, detection does not imply that the fields could result in adverse impacts on the species' ability to forage, reproduce, and survive (AUC 2011).

Vegetation within the transmission line ROW would be maintained to a height of less than 20 feet (6 meters). This would be accomplished by occasional brush hogging and mowing or hand cutting. Because vegetation higher than 20 feet (6 meters) in height would not be allowed to establish itself on the ROW, the establishment of eagle nests would not occur. No significant impacts on bald eagle would be expected from any emergency repairs, if necessary. If required, impacts from repairs of the transmission line would be similar to those that would have occurred during construction, but would be for a shorter duration and would disturb a smaller area.

State-Listed Species

Operation of the transmission line would increase the soil temperature at the sediment surface directly above the transmission line by 2 °F (1 °C), which could slightly alter terrestrial vegetation and habitat; however, temperature would quickly dissipate from the transmission line (Burges et al. 2008) and the area affected would be within the maintained ROW (CHPEI 2012i). No significant effects from magnetic fields would be anticipated from operation of the transmission line. Buried cables, such as those proposed for the CHPE Project, would have no electric fields at the ground surface (WHO 2012), and the predicted magnetic field level of 200 mG at the ground surface directly above the transmission line cables in the ROWs would decrease with distance from the cable centerline. Electromagnetic fields have the potential to enhance the growth response in certain plant species; however, the effects of such on plants are inconclusive. Research indicates that some species of animals are able to detect magnetic fields at levels that might be associated with transmission lines such as those associated with the proposed CHPE Project; however, detection does not imply that the fields would cause adverse effects on a species' ability to forage, reproduce and survive (AUC 2011).

Vegetation clearing, vehicle and foot traffic, and the use of heavy equipment for vegetation maintenance activities or emergency repairs, if required, in the transmission line ROW can crush, kill, or damage state-listed plant invertebrate species if they occur in the ROI. Vegetation along the ROW would primarily be managed by brush hogging and mowing or hand cutting. A Vegetation Management Plan for the proposed CHPE Project would be developed and provided in the EM&CP. Any vegetation management, emergency repairs, or other operational activities required within frosted elfin habitat would be implemented in accordance with the USFWS Recovery Plan for this species and the Karner blue butterfly (USFWS 2003).

Vehicle and foot traffic associated with vegetation maintenance in the ROW and emergency repairs, if necessary, could disturb state-listed birds. Vegetation clearing and any other associated decreases in vegetation cover would result in habitat loss. No significant habitat fragmentation impacts would be expected because construction would occur within existing ROWs, which is fringe habitat primarily made up of previously disturbed vegetation. Individual birds may be temporarily displaced; however, permanent displacement of an entire breeding population is unlikely because the habitat affected by construction of the proposed CHPE Project corridor only composes a small percentage of the habitat available in the region (Rich et al. 1994, AUC 2011).

Migratory Birds

Impacts on migratory birds could occur as a result of ROW vegetation maintenance and emergency repairs, if necessary. Vehicle and foot traffic and the occasional use of heavy equipment could disturb birds. Vegetation maintenance activities could result in habitat loss. If vegetation maintenance or emergency repair activities in the Overland Segment occurs during migratory bird breeding and nesting season (generally the spring and summer) migratory birds and nests could be disturbed. Applicant-proposed measures, including avoiding sensitive habitats, would be implemented to reduce impacts on migratory birds; therefore, no significant impacts would be expected (see **Appendix G**).

5.2.8 Wetlands

Impacts from Construction

Wetland Physical Characteristics and Functions. The physical characteristics of wetlands and impacts from the Overland Segment of the CHPE Project on wetlands, along with measures to minimize impacts, are discussed in the following paragraphs, followed by an assessment of impacts on wetland functions and values. Tables in **Appendix I.1** list the wetlands delineated during the wetland surveys, the NYSDEC freshwater and tidal wetlands, and the wetland "adjacent areas" along the proposed CHPE Project route, respectively. **Appendix A** shows wetlands delineated along the route. **Section 3.1.8** provides definitions of wetland functions and values and identifies the CWA Section 404 permitting and jurisdictional determination activities for wetland impacts that have taken place to date.

The Overland Segment would traverse approximately 127 miles (204 km) of terrestrial areas and impacts would occur on freshwater wetlands from the transmission line construction activities. Approximately 256.7 acres (103.9 hectares) of wetlands were delineated within the ROI for the Overland Segment. In addition to delineated wetlands intersected by the proposed CHPE Project route, there are approximately 152 acres (62 hectares) of NYSDEC wetland "adjacent areas" within the ROI. Impacts are expected on a total of 77.7 acres (31.4 hectares) of wetlands along the proposed CHPE Project route. The proposed CHPE Project construction activities would result in direct temporary impacts on approximately 67.4 acres (27.3 hectares) of delineated wetlands within the construction corridor of this segment. The widths of the construction corridor along the proposed CHPE Project route are identified in **Table 2-1**. Surface hydrology in disturbed wetland areas would be re-established by backfilling the transmission line trench, restoring the surface to pre-construction contours, and re-establishing vegetative cover would represent temporary impacts. Permanent significant impacts would occur to 2.0 acres (0.8 hectares) of forested wetlands that would be converted to scrub-shrub wetlands and 8.3 acres (3.4 hectares) of non-forested wetlands in the transmission line ROW that would be impacted by vegetation management techniques (CHPEI 2012m).

The construction sequence within wetlands along the proposed CHPE Project route would typically consist of vegetation clearing within the construction corridor (tree stumps would only be removed from the trench line or where necessary), removal and stockpiling of the upper 18 inches (46 cm) of hydric soils, followed by excavation of a trench approximately 3.5 feet (1.1 meters) deep and up to 9 feet (2.7 meters) wide at the surface. The cables would then be placed in the trench, and then the trench would be backfilled. Land restoration would include placing the removed wetland soils back over the top of the excavated trench area to facilitate wetlands restoration, and the disturbed area would be mulched or hydroseeded. Restoration of wetlands would be completed within 24 hours after backfilling is finished.

During construction, wetlands would be impacted by vegetation clearing and alteration of upland and "wetland adjacent areas" within the construction corridor. Disturbance in and adjacent to wetlands would result in temporary, localized changes to wetland hydrology and water quality as local surface hydrology is altered during grading and trenching. Localized increases in turbidity or filling within the wetland could occur due to erosion of soils from disturbed areas being transported into adjacent wetlands. However, Applicant-proposed measures, including installation of silt fencing, minimization of disturbed areas, backfilling trenches and re-establishment of vegetative cover would be implemented to reduce the occurrence of erosion and sedimentation. Cooling stations would not be constructed within wetlands.

HDD would be used in certain locations to reduce the level of impacts on wetlands when compared to trenching. The transmission line route would cross a total of 6.3 miles (10.1 km) of wetlands in the Overland Segment and 0.5 miles (0.8 km) of these wetlands would be crossed using HDD. Where used, the HDD borehole would be drilled outside of and underneath wetlands, a conduit would be pulled into the borehole, and then the cables would be pulled into the conduit. The HDD drilling equipment and drill entry point would be located outside a wetland and the drill would exit outside the opposite boundary of the wetland, thereby avoiding impacts on wetlands at the surface. The Frac-out Contingency Plan would be implemented to respond to any frac-outs of drilling fluid.

Temporary fill would be required in areas where space is constrained and excavated material can only be managed within wetlands to support construction activities. Approximately 20,400 cubic yards (15,597 cubic meters) of temporary fill and 19,200 cubic yards (14,679 cubic meters) of replacement fill consisting of crushed stone or clean sand would be placed within wetlands (CHPEI 2012m). These temporary fills would be placed on filter fabric and would be removed at the completion of construction activities. To minimize impacts, replacement fill would be placed around the transmission cables when the surrounding soil does not have low thermal resistivity (i.e., areas with wet clay, silt, organic matter) or is otherwise physically unsuitable to be used as backfill (e.g., contains large rocks). In this situation, native soils would be excavated and replaced with appropriate backfill materials. The stockpiled native wetland soil would be placed on the surface of the excavated wetland area at the same grade and elevation as surrounding wetlands to match local surface hydrology and drainage patterns.

Hydrological impacts on wetlands could occur from changes in topography or compaction of the adjacent soils along the proposed CHPE Project route. However, the restored ROW would be returned to the same grade as existed prior to construction and long-term changes in surface hydrology would be minimal.

In general, construction equipment would operate primarily from the railroad bed, railroad access road, embankment, or other upland areas. Additional impacts could occur where heavy construction equipment might be required to operate within wetlands or is required to cross wetland areas to get from one location to another. Heavy vehicles and equipment operating within wetlands without impact minimization measures per applicable Federal and state wetland management regulations could compact and rut soils based on conditions at the time of construction, which would affect wetland hydrology and interfere with re-establishment of vegetation. If any construction equipment operates within wetlands, the Applicant would use equipment mats or low-ground-pressure tracked vehicles to minimize impacts on wetland soils. If dewatering is required within the excavated trench, water would be discharged to a well-vegetated upland area, a properly constructed dewatering structure, or a filter bag. Original surface hydrology in disturbed wetland areas would be re-established by backfilling the trench and grading the surface to original contours. Because most of the transmission line would be within existing roadway and railroad ROWs, there would be some flexibility to route equipment movement around wetlands rather than crossing through them. Groundwater hydrology would be maintained by use of trench plugs (i.e., sand bags permanently installed in the trench before backfilling at the base of any steep slopes adjacent to water bodies and wetlands) along the transmission line trench to prevent groundwater flow from flowing preferentially along the cables and through the thermal backfill (where used).

To minimize impacts on wetlands from accidental leaks and spills, a SPCC Plan would be developed and included in the EM&CP in accordance with Condition 159 of the NYSPSC Certificate for the proposed CHPE Project that would contain BMPs to limit potential water quality impacts (NYSPSC 2013). Construction crews would have sufficient supplies of absorbent and barrier materials on site to contain and clean up hazardous materials in the event of a spill. To reduce the likelihood of a spill entering wetland habitat, the Applicant would avoid storing hazardous materials, chemicals or lubricating oils, refueling vehicles and equipment, or parking vehicles overnight within 100 feet (30 meters) of the edge of a wetland, unless no reasonable alternative were available. If no alternative is available, the Applicant's Environmental Inspector would ensure that appropriate protection measures for spill prevention and control per an SPCC Plan would be implemented.

The proposed CHPE Project would result in a short-term diminishment of wetland functions including sediment, toxicant, and pathogen retention; nutrient removal, retention, and transformation; production (nutrient) export; and wildlife habitat due to the disturbance of wetland habitat and clearing of vegetation. Vegetation would be expected to quickly re-establish once the transmission line ROW has been stabilized and restored. Initially, the vegetation would be fast-growing herbaceous species over the course of the first growing season and woody species would re-establish over a longer period of time.

Due to their location along existing roadway and railroad ROWs, the wetlands values of recreation, education/scientific value, uniqueness/heritage, and visual quality would be limited because these wetlands occur in ROWs that have largely been previously disturbed. The wetland values of endangered species habitat would be impacted during and immediately following construction. In general, given that permanent impacts on wetlands already have occurred in relatively disturbed areas, and the proposed CHPE Project would not result in a permanent loss of open space and physical, hydrologic, and ecological characteristics are expected to return to preconstruction conditions following the completion of construction and the restoration of the construction corridor, no long-term impacts on wetland values are expected.

It is anticipated that restoration of wetland functions and values would be achieved after two growing seasons. The Applicant would monitor the success of the wetland restoration and provide a report to the permitting authorities at the conclusion of 2 years of monitoring, which would document the re-establishment of wetlands functions and values and recommend, upon approval from applicable Federal and state agencies, implementation of any corrective actions necessary to achieve full restoration of functions and values.

Wetland Habitat and Species. Impacts on wetland habitat would be expected from temporary disturbances during construction activities (e.g., trenching, soil mixing and removal of vegetation) and from the permanent conversion of forested wetlands (PFO) to scrub-shrub wetlands (PSS). Temporary impacts would occur on 16.2 acres (6.6 hectares) of forested wetlands and 51.2 acres (20.4 hectares) of non-forested wetlands during construction. Permanent significant impacts would occur on 2.0 acres (0.8 hectares) of forested wetlands that would be converted to scrub-shrub wetlands and be subject to vegetation maintenance, and on 8.3 acres (3.4 hectares) of non-forested wetlands that would be subject to vegetation maintenance but remain nonforested wetlands (CHPEI 2012m). This conversion would alter the wetland vegetation from trees greater than 20 feet (6 meters) to woody vegetation less than 20 feet (6 meters), including true shrubs and young trees. No significant impacts on forest-dwelling wetland species would be expected once the wetland has been converted from a forested wetland to a scrub-shrub wetland from a reduction in forested wetland habitat. Mature trees would be removed from the area to be designated as the permanent transmission line ROW during construction and would reduce the canopy. Reduction of the tree canopy could temporarily increase the amount of sunlight reaching the wetland until a scrub-shrub cover establishes. This could temporarily result in a slight increase in summer water temperatures, growth rates of vegetation (including algae), and subsequent increases in BOD. In addition, there could be a reduction in the amount of organic matter, including tree leaves and other detritus falling or washing into wetland areas. The reduction in the tree canopy would result in a reduction in the organic matter used as food sources for bacteria, fungi, amphipods, and filter feeders (LSU 2007).

Forested wetland wildlife, or species that prefer trees that are more than 20 feet (6 meters) in height, could remain on site, avoid the area, or relocate to other forested wetland areas. Once conversion to the scrub-shrub wetland has occurred, species that prefer forested wetlands with trees that are less than 20 feet (6 meters) in height would be expected to return to the area.

Following construction, the Applicant would conduct final grading to restore original contours, and would seed disturbed wetland areas with a seed mixture containing temporary cover species, such as annual rye, to stabilize soils and provide vegetation cover until native species can re-establish. Emergent wetland vegetation would be expected to re-establish quickly following construction, and woody species would return more slowly. Forested wetlands, where not maintained, would be expected to go through several stages of successional vegetation before returning to the preconstruction vegetation cover type. To assist in the recovery of woody species, the Applicant would avoid removing roots and stumps in cleared areas outside of the cable trench, unless required for safety, to allow resprouting of woody species.

Increased sedimentation and storm water runoff into wetlands would be detrimental to water quality by temporarily increasing turbidity levels. Impacts from degraded water quality and disturbed habitat would affect species such as small fish, filter feeders (animals that feed by straining suspended matter and food particles from water through their digestive systems), and other benthic organisms (discussed in **Section 5.2.4**). In addition, any pollutants carried by storm water runoff could more easily enter wetlands because the reduction in vegetation cover would provide a less effective buffer between the wetlands and upland areas. These potential impacts would be avoided or minimized through the use of measures such as silt fences per the EM&CP as required by Certificate Condition 159 (NYSPSC 2013).

If the original topsoil is used to backfill trenched areas within wetlands, and previous plant cover consisted of invasive species such as purple loosestrife and reed canary grass, then those invasive species would most likely become re-established in that area making establishment of native species difficult. Invasive species control measures for construction would also be identified as part of the EM&CP.

Significant impacts on wetland species would not be expected from temporary disturbances caused by noise and heavy equipment used during construction activities. Species in the vicinity would be habituated to frequent disturbances associated with the operation of trains and roadway traffic. Most wetland plant species in the vicinity of construction activities would be expected to recover once construction activities have ceased. Some wildlife species would avoid the area during construction activities and return afterwards. However, many reptiles and amphibians use these wetland habitats and are not mobile enough to move out of the way of construction. Similarly, some fish species use wetlands, particularly the PEM wetlands that occur along the route. Direct mortality of these species would occur during construction. Most of these impacts would be either temporary or intermittent and, because of the small area affected, would not be expected to impact reptiles, amphibians, or fish at the population level (i.e., only a few individuals would be affected relative to the entire population).

As the proposed CHPE Project would result in the permanent conversion of 2 acres (0.8 hectares) of forested wetlands to palustrine scrub-shrub wetlands, a permanent loss of wildlife habitat value could result from the elimination of trees greater than 20 feet (6 meters) from these wetland areas. Because mature trees require a long period of time to re-establish, the temporary clearing of forested vegetation could represent a long-term impact on wildlife habitat until woody vegetation can be re-established. Also, because trees would not be allowed to establish directly over the transmission line following construction, this would also represent a permanent change in vegetation cover for the lifespan of the transmission line.

Clearing of forested wetlands would alter the wildlife habitat function of the wetland by replacing one habitat type with another. This habitat alteration could reduce the quality of the habitat for some wildlife species while increasing the value for others. Due to the distribution and availability of similar forested habitat types along the proposed CHPE Project route that would be undisturbed, and the relatively small area of forested wetlands affected, construction of the transmission would not result in population-level impacts and would not affect the regional distribution or abundance of wildlife species.

As required under Certificate Condition 117 and as per proposed measures contained in the Applicant's Section 404 permit application to the USACE, the Applicant would establish and implement a program to monitor the success of wetland restoration upon completion of construction and restoration activities (NYSPSC 2013 and **Appendix C**). Wetland revegetation would be monitored and recorded annually for the first 2 years (or as required by permit) after construction, or longer, until wetland revegetation is successful. Wetland revegetation would be considered successful when the vegetative cover is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If revegetation is not successful at the end of 2 years, the Applicant would develop and implement (in consultation with a professional wetland ecologist) a plan to revegetate the wetland actively with native wetland herbaceous plant species. As part of its Section 404 permit application, the Applicant submitted a conceptual wetland mitigation plan to the USACE in May 2013 to address this permanent change in habitat type associated with the conversion of forested wetland to scrub-shrub wetland. The conceptual wetland mitigation plan is available on the Document Library on the CHPE EIS Web site (http://www.chpexpresseis.org). To mitigate for permanent impacts on wetlands, per the mitigation plan, the Applicant would establish 1 acre (0.4 hectares) of new wetland and preservation and enhancement of 10 acres (4 hectares) of wetlands for each 1 acre (0.4 hectares) of permanently impacted wetlands.

Impacts from Operations, Maintenance, and Emergency Repairs

Wetland Physical Characteristics and Functions. Significant impacts would not be anticipated on wetlands during operation of the transmission line. Thermal changes to surface water or near-surface groundwater would be negligible, as the thermal backfill would dissipate any heat that would be generated well below the surface. Vegetation management activities as established in the EM&CP Vegetation Management Plan would consist of periodically cutting woody vegetation by hand or by mechanical means. Following completion of the terrestrial transmission line, on-the-ground inspectors would survey and inspect the terrestrial transmission line ROW on approximately an annual basis. These maintenance activities would not be expected to alter wetland hydrology, compact wetland soils, or otherwise change the physical characteristics or functions of the wetlands in the transmission line ROW, since vegetation maintenance would only occur in currently identified wetlands that would be permanently impacted by construction activities.

The transmission line is designed to be maintenance-free; however, trenching or excavation could be required to conduct emergency repairs of defective cable segments located under wetlands. These activities would only occur as required and in accordance with applicable Federal, state, and local permits (CHPEI 2012i). Impacts from these emergency repairs would be similar to the initial construction but over a shorter duration and smaller area of impact.

Wetland Habitat and Species. Significant impacts on wetland habitat and species would not be anticipated during operation or inspection of the transmission line because these activities would be generally non-intrusive. In accordance with the Vegetation Management Plan that would be developed as part of the EM&CP, wetland vegetation would be maintained to prevent trees from growing taller than 20 feet (6 meters). Approximately 10 acres (4 hectares) of wetland area in the transmission line ROW would be subject to periodic vegetation management. This activity would not be expected to alter the habitat of the wetlands in the transmission line ROW, but it would prevent large trees from growing in the transmission line ROW. The wetland habitat that is established following completion of construction would be maintained over the operating life of the transmission line.

Impacts on wetland habitat and species from emergency repairs, if required, would be similar to the initial construction but over a shorter duration and smaller area of impact. The disturbed area would be mulched and seeded, and vegetation and species would re-establish themselves in the repair area. The time between completion of the repairs and full habitat recovery could take up to 1 year or more depending on the season in which construction occurs, and, during that time, species use of the habitat would be limited.

5.2.9 Geology and Soils

Impacts from Construction

Physiography and Topography. Trenching would be required for installation of the transmission line, resulting in temporary and localized changes in surface grading. Following cable installation, disturbed areas would be graded to match the original topography and to be compatible with local drainage patterns, except at locations where permanent changes in drainage would be required to prevent erosion that could ultimately expose the buried line.

Geology. Bedrock blasting and removal could be required in some areas along the Overland Segment to install the transmission line. Exact locations of bedrock blasting are yet to be determined. This would impact local geology, as material would be removed and the surface layer of the bedrock would be modified. Although bedrock along the Overland Segment is primarily hard metamorphic rock, cracking of bedrock from blasting or excavation could alter drainage patterns and allow storm water to infiltrate deeper into bedrock (CHPEI 2010c). Blasting activities would be performed in strict adherence to all industry standards applicable to control of blasting and blast vibration limits as specified in a blasting plan to be developed by the Applicant as part of its EM&CP (also see **Section 5.2.17**).

Soils. Construction activities would temporary disturb approximately 585 acres (237 hectares) of upland area. Increased erosion and sedimentation would result from vegetation removal, trenching, soil stockpiling, and backfilling required to bury the cables within trenches and restore the ground surface. Soils adjacent to the trench would be compacted under the weight of construction equipment. The installation of nine cooling stations along the Overland Segment would slightly increase impervious surfaces. Compacted soils and increased impervious surfaces would result in decreased soil permeability, which could alter local drainage patterns and impede storm water infiltration. Soil erosion- and sediment-control measures specified in the *New York State Standards and Specifications for Erosion and Sediment Control* (SSESC) (NYSDEC 2005) would be included in site plans to minimize long-term erosion and sediment production. See **Appendix G** for more information regarding Applicant-proposed measures to manage soil erosion and sedimentation.

The transmission line would be installed within existing roadway and railroad ROWs, and soils present within these ROWs generally have been previously disturbed. Therefore, no significant impacts on soils would be anticipated. After installation of the underground transmission line, the trench would be backfilled with the same soils that were originally excavated during construction.

HDD technology would be used at transitions from water to land and at certain road crossings within the segment. Use of HDD would reduce impacts on soil erosion and sedimentation when compared to traditional trenching techniques. Bentonite drilling mud used in HDD could be absorbed by fractures in the formation being drilled, and could reach the surface through vertical fractures caused by drilling, known as frac-out (AT&T 2007). The proposed CHPE Project route includes approximately 200 locations covering approximately 17 miles (27 km) where HDD would be used, including approximately 0.8 miles (1.3 km) of the transmission line that would traverse under wetlands using HDD (see **Appendix A**). The Applicant estimates that approximately 100 cubic yards (91 cubic meters) of drill cuttings (used bentonite and excess soil) would be generated for disposal at each of the five major HDD water-to-land transition areas along the transmission line route. Frac-out of bentonite drilling would increase sedimentation at terrestrial sites and turbidity at aquatic sites, though Applicant-proposed measures described in **Appendix G**, including use of straw bales, waddle, silt fencing and gravel bags, would be employed at all HDD sites to reduce sedimentation. The Applicant would also develop and implement the Frac-out Contingency Plan that would allow for timely cleanup of any bentonite leaks that might occur and ensure minimal impacts on the environment. See **Appendix G** for more information regarding Applicant-proposed measures.

Construction vehicles and construction of cooling stations would compress soils, or add impervious surfaces, decreasing permeability and rates of storm water runoff infiltration. Compaction of soils would result in disturbance and modification of soil structure. Soil productivity, which is the capacity of the soil to produce vegetative biomass, would decline in disturbed areas and be eliminated in those areas within the footprint of buildings, pavements, and roadways. Loss of soil structure due to compaction from foot and vehicle traffic could result in changes in drainage patterns but could be minimized by soil decompaction methods.

Prime Farmland. No impacts on prime farmland would be expected within the Overland Segment. Although some soils within the ROI are mapped as prime farmland, these soils have been previously disturbed and are not currently available for agricultural purposes. According to the FPPA, soils designated as prime farmland do not include land that is already in or committed to urban development, or land that occurs in existing easements (i.e., ROWs) purchased on or before August 4, 1984 (7 CFR 658.2).[9] A majority of the land that would be directly impacted by construction activities in the Overland Segment would be within existing roadway or railroad ROWs. Some deviation areas (i.e., minor deviations of the proposed CHPE Project route from established road and railroad ROWs) could cross areas used for agriculture, but the transmission line corridor would only be installed on the edge of such land. The Applicant would negotiate with agricultural landowners to obtain easements to cross farmland, and the landowners would be compensated for such easements. A qualified Agricultural Inspector would be engaged during each phase of the proposed CHPE Project to ensure that construction and follow-up restoration comply with the standards of New York State Department of Agriculture and Markets.

Seismicity. Construction of the CHPE Project would not increase the risk of seismic hazards. The overall probability for seismic activity in the Overland Segment is low (USGS 2012a, USGS 2013).

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts would be expected from the operation of the transmission line in the Overland Segment because there would be no thermal or magnetic field impacts on geology and soil structure. The transmission line itself would be designed to be maintenance-free. Maintenance of the cooling stations and vegetation maintenance within the ROW would occur, but no impacts would be expected from maintenance on physiography, topography, or geology because no excavating, contouring, or blasting would be required for these activities. Impacts on soils from maintenance could occur and are discussed in the following paragraphs. Periodic inspections of the ROW would be non-intrusive; therefore, no impacts would be expected.

Physiography and Topography. Emergency repairs of the transmission line would result in impacts similar to, but less than, those described for initial construction activities because there would be a smaller area disturbed for a shorter duration.

Geology. No impacts on geology would be expected in the Overland Segment because blasting would be not be necessary during emergency repairs.

Soils. Routine ROW mowing or tree-clearing activities could expose soil to erosion from wind and water, resulting in soil erosion and sedimentation. Such activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. Emergency repairs of the transmission line could result in increased erosion and sedimentation that are similar to, but much less than, those described for construction activities because a smaller area would be disturbed for a shorter duration and soils would be retained on site without the use of BMPs. In addition, vegetation along the ROW would be maintained to prevent the establishment of trees and their associated roots close to the transmission line.

Prime Farmland. No impacts on prime farmland would be expected from operation, transmission line ROW maintenance, and emergency repairs. While vegetation in the ROW would be limited to stable low-growing vegetation with shallow root systems so as to not interfere with the transmission line, and vegetation maintenance (i.e., trimming or removal) would occur in the ROW, most of the transmission line would be within existing road and railroad ROWs where vegetation has been previously disturbed

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[9] The prime farmland mapping used for this analysis is based on interpretation of soil types taken off aerial photography and not field surveys, which may have resulted in slightly incorrect soil type boundaries. As such, this could result in some land in the railroad and roadway ROWs being designated as prime farmland when it is not being used as such or is reserved for other uses. Additionally, the FPPA does not apply to Federal permitting for non-Federal activities on private or non-Federal lands, such as the CHPE Project.

due to existing vegetation maintenance activities. Except in a few instances as noted under *Impacts from Construction* above, land in the proposed transmission line ROW is not currently used as farmland.

Seismicity. Operation of the CHPE Project would not increase the risk of seismic hazards. During a seismic event, which would be rare, it is possible that damage to the transmission cables could be sustained.

The proposed HVDC transmission cables are insulated and armored, and designed to withstand mechanical forces experienced during cable installation, which are substantially greater than a seismic event. Furthermore, the transmission cables would not be installed in a straight line and would contain slack to accommodate seismic events readily. The inherent flexibility of the transmission cables would allow the buried transmission line to shift and deform slightly with ground movements associated with seismic events. The cooling stations would be built to conform with seismic hazard standards appropriate for the area.

If a transmission cable failed due to a seismic event, the protection system would de-energize the transmission system in less than 0.005 seconds. HVDC transmission cables dissipate very limited energy under short circuit (i.e., fault) conditions. Therefore, no direct impacts on the environment or public safety would be anticipated. A cable repair procedure that considers the environment would be implemented as appropriate during any seismic events.

5.2.10 Cultural Resources

Ground-disturbing activities associated with the installation of the transmission line could result in adverse effects on historic properties in the APE of the Overland Segment of the proposed CHPE Project (see **Figure 3.2.1-1**). There are 34 known terrestrial archaeological sites, 16 NRHP-listed or -eligible architectural properties, and 1 potential historic cemetery in the APE of the Overland Segment. The independent GIS analysis indicates that one of the terrestrial sites (Saratoga & Washington Railroad) might not intersect the APE of the proposed CHPE Project. This site's boundaries would be reexamined in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA to determine whether cultural materials extend into the APE (see **Appendix T**). All archaeological sites in the APE of the Overland Segment would be evaluated for NRHP eligibility.

The Overland Segment APE also contains four areas that were recommended by previous archaeological surveys as requiring additional archaeological work or monitoring. These areas would be surveyed for archaeological resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. Any cultural resources discovered in the APE of these areas would be evaluated for NRHP eligibility.

Portions of the Overland Segment, including approximately 11 miles (18 km) along New York State Route 22 from Dresden to Whitehall, the CSX ROW, and along Alpha Road in Catskill have not been formally surveyed for cultural resources. These sections would be formally surveyed for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA. Any cultural resources discovered in the APE of these portions would be evaluated for NRHP eligibility.

Impacts from Construction

Ground-disturbing activities associated with construction could damage archaeological features and would be expected to disturb the context of artifacts in archaeological sites and the potential historic cemetery located in the APE. In the case of archaeological sites that are eligible for listing in the NRHP, this could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. Because the proposed CHPE Project transmission line would be underground and would avoid any standing structures, the adverse effects from construction on architectural properties would be limited to exposure to temporary noise, dust, and vibrations and short-term visual effects from the proximity of construction activities and equipment. These adverse effects would not require mitigation.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a CRMP that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known terrestrial archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of terrestrial archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. A PA (see **Appendix T**) has been developed pursuant to 36 CFR 800.14(b) and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G.**

Impacts from Operations, Maintenance, and Emergency Repairs

The operation and inspection of the transmission line and maintenance activities in the Overland Segment of the proposed CHPE Project are not anticipated to have adverse effects on terrestrial archaeological sites in the APE. Because the Overland Segment would involve an underground transmission line, operations would have no adverse effects on 10 of the 12 architectural properties in the APE. The operation of the proposed cooling station at MP 112 could have visual impacts on the McMore Residence (NRE 15) and the Main Street Historic Bridge (NRL 19). Depending on the exact location of the cooling station, these impacts could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. As identified in **Section 5.2.17**, noise levels from the cooling station would be less than 50 dBA, which complies with the statewide noise standard of 65 dBA.

Vegetation maintenance activities and emergency repairs, if necessary, would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources sites; therefore, such activities are not expected to cause adverse effects on these sites.

5.2.11 Visual Resources

Impacts from Construction

Construction of the proposed CHPE Project within the Overland Segment would result in visual impacts and impacts on aesthetic resources from the presence of construction equipment and activities along the project route. Construction equipment would be temporarily visible in the locations of active construction on land along existing road and railroad ROWs. Equipment necessary for clearing, trench excavation, cable installation, backfilling, and restoration would be located briefly at each construction site.

Temporary support facilities also would be established along the terrestrial portions of the proposed CHPE Project route in the Overland Segment. These facilities would be sited within the road or railroad ROWs and use the minimum space required to facilitate safe installation. Applicant-proposed measures such as maintaining existing vegetation buffers at selected road and stream crossings and other potentially visually sensitive locations would be implemented as part of the proposed CHPE Project as appropriate, especially at HDD sites, residential areas, or near historic sites to limit the potential visual impacts. See **Appendix G** for a list of Applicant-proposed measures.

Following construction, impacted areas along the terrestrial portion of the route would be seeded and allowed to revegetate naturally. Depending on the type of vegetation involved, natural conditions could return in a matter of months to a few years, although trees would not be allowed to re-establish themselves over the transmission line along the New York State Route 22 ROW, the railroad ROWs, city streets in Schenectady, and Alpha Road (apart from approved landscaping).

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, the proposed cooling stations at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228 would be permanently visible along the Overland Segment. The ROI for the cooling station at MP 158 contains Saratoga Spa State Park, Kelly Park, and Spensieri Park. However, the cooling station would be located outside the park boundaries and only would result in negligible impacts on these aesthetic resources because the cooling station would be small and would not change the current character of the existing viewshed. The cooling station would be approximately 8 feet (2.4 meters) tall and have a footprint of approximately 128 square feet (12 square meters) surrounded by a security fence. The existing visual environment is a mixture of commercial and residential development; therefore, the constructed facility would be within the context of the existing visual environment. **Figure 5.2.11-1** presents a photosimulation of the proposed cooling station at MP 146, which provides a visualization of an example cooling station along the proposed CHPE Project route. Installation of the transmission line would require clearing and maintenance of vegetative cover, as shown in the photosimulation. The cooling stations at MPs 110, 112, 145, 146, 185, 208, 227, and 228 would not be within the ROI for any aesthetic resources; therefore, no impacts on aesthetic resources would occur at those locations.

Visual impacts during ongoing routine maintenance and inspection activities would be anticipated from the presence of vegetation control equipment (e.g., mowers or brush hogs) and inspection vehicles along the project route. These activities would be visible temporarily and infrequently along the project route. Emergency repair activities would result in visual impacts similar to those occurring during construction, except that they would be shorter in duration and confined to a discrete area.

5.2.12 Infrastructure

Impacts from Construction

Electrical Systems. Impacts on existing underground electrical lines would occur where they would be crossed by the proposed CHPE Project route in a road or railroad ROW due to potential temporary interruptions of services. Each underground infrastructure crossing would be assessed to determine whether open trenching or a trenchless method would be appropriate. Crossings of underground utilities owned by a third party would likely require crossing or collocation agreements per NYSPSC Certificate Conditions 27 through 29 (CHPEI 2012q, NYSPSC 2013). Utility infrastructure protection measures at underground crossings would be subject to these agreements. The collaboration with the infrastructure owners would include developing a construction schedule that coordinates a planned system outage (if required) and avoids conflicts with the internal construction programs of each affected owner and

Figure 5.2.11-1. Photosimulation of the Proposed Cooling Station at MP 146

operator (CHPEI 2012l). The Applicant would join "Dig Safely New York," which would require the Applicant to collaborate on any underground construction work with the members of that organization (CHPEI 2012q). A list of specific Applicant-proposed measures as part of the proposed CHPE Project, including methods to minimize disruptions (i.e., interruptions) to utility infrastructure, including electrical systems, are provided in **Appendix G**.

Because the proposed CHPE Project involves terrestrial transmission cable installation, it would also cross under many overhead electrical facilities. Depending on the type of electrical infrastructure and surrounding conditions, the associated construction equipment could require temporary grounding to comply with the NESC (7 CFR 1755.901[b]), as applicable. If voltages warrant it, no ungrounded vehicles would be permitted within 200 feet (61 meters) of the electric line (CHPEI 2012q). Under these circumstances, construction activities would be coordinated with local utility companies to avoid or minimize impacts. If construction activities cannot be altered and overhead electrical lines might temporarily require shutting off, temporary disruptions in power would be avoided or minimized by rerouting power from other sources to potentially affected local electrical power users.

Water Supply Systems. At the northern end of the Overland Segment at the Town of Dresden, the terrestrial installation would be in NYSDOT ROW along New York State Route 22, municipal road ROW in Schenectady, and in a private road ROW in Catskill. If water pipes were to be encountered, the same protocol and Applicant-proposed measures described for *Electrical Systems* in **Appendix G** would be applied. Trenching to install cables also has a potential to impact private wells at residences in more rural areas along the proposed CHPE Project route such as New York State Route 22. Trench dewatering and blasting could impact quantity and quality of drinking water in these wells. For construction activities near private residential wells along the New York State Route 22 portion of the route, the Applicant would develop a private well response plan that includes identifying wells within 200 feet

(30 meters) of construction corridor, and developing a pre-construction testing program and a response plan for construction period water supply disruptions. Refueling and storage of hazardous or toxic materials would not be permitted within 200 feet (30 meters) of any private water well or within 400 feet (122 meters) of any municipal water well (CHPEI 2012q).

Storm Water Management. Potential impacts on storm water management for the Overland Segment would occur where existing storm sewer inlets or pipes would be crossed by the underground cable installation, primarily along roadway ROWs. Any storm water drains or storm water management features encountered would be restored to previous conditions if disturbed, or would be avoided by minor route alterations or via the use of HDD. A discussion of specific BMPs proposed by the Applicant as part of the proposed CHPE Project, including additional details on storm water management, are provided in **Appendix G**.

Solid Waste Management. Impacts on solid waste management would be expected due to the generation and management of debris, such as excavated soil, brush, tree limbs, logs, slash and stump waste, and blasted rock. The vast majority of the material would be recycled as mulch or other uses and not disposed of in a landfill. During the installation of the terrestrial transmission cables, brush and tree limbs would either be chipped and spread in approved locations or hauled off site for disposal. Timber would be removed as appropriate to be salvaged or disposed of at approved locations. Salvaged timber could be used during construction for wetland access, cribbing, retaining walls, firewood, saw logs, chipping, or other uses. Where sufficient marketable volumes exist, logs would be sold to a third party. Where practical, unsold logs would be hauled to accessible locations for salvage by the general public in accordance with the requirements of 6 NYCRR 192.5 and agreement with landowners. Logs that cannot be sold or salvaged would be chipped on site, piled in upland areas, and spread with fertilizer to minimize soil nitrogen depletion due to cellulose decomposition (CHPEI 2012q).

Slash and stump waste would be disposed of by chipping, hauling, and burial. Hauled slash and stump waste would be disposed of in a NYSDEC-approved landfill or other suitable offsite locations with the approval of the landowner and all applicable permitting agencies. Stumps could be buried on the railroad ROW with landowner agreement and monitored after construction to ensure that settling does not occur (CHPEI 2012q).

Blasted rock would be hauled off site and disposed of in an appropriate manner (CHPEI 2012q). Any excavated soils would be temporarily stockpiled adjacent to the worksite or transported off site if onsite storage is not possible. Excavated soils would not be disposed of in a landfill unless they are contaminated. Excavated soils and used drilling muds disposed of in a landfill (if necessary) would contribute to a permanent reduction of landfill capacity. The disposal of the excavated soil and used drilling mud would be the responsibility of the contractor. The collective remaining capacity of approximately 5,259,600 tons of the Clinton County landfill would be adequate capacity to dispose of the excavated soil and used drilling mud because the Applicant has estimated that 200 cubic yards (183 cubic meters) of drill cuttings would be generated from the HDD water-to-land transitions in the Overland Segment.

Communications. No substantial underground communication lines or infrastructure have been identified within the Overland Segment; therefore, no effects on communications would be expected (CHPEI 2012q). If communication infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs to minimize impacts would be the same as those described for *Electrical Systems*. Because the Overland Segment would involve terrestrial transmission cable installation, it would also cross under many overhead communications lines. However, the construction equipment would be managed in such a way to avoid disturbing these lines and any interruptions in service.

Natural Gas Supply. No substantial natural gas supply lines or infrastructure have been identified within the Overland Segment (CHPEI 2012q). Therefore, no effects on natural gas supply would be expected. If currently unknown natural gas infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs to reduce impacts would be the same as those described for *Electrical Systems*.

Liquid Fuel Supply. Negligible impacts on liquid fuel supply would be expected due to the minimal amounts of petroleum that would be required for construction equipment and vehicles. To the extent possible, the installation of the terrestrial transmission cables along the railroad ROWs would be from rail-mounted equipment, and the construction equipment and materials would be transported by diesel-powered rail. The amounts of fuel that would be needed are assumed to be a small percentage of the supply in the area. No substantial liquid fuel supply lines or infrastructure have been identified within the Overland Segment; therefore, no impacts on liquid fuel infrastructure would be expected (CHPEI 2012q).

Sanitary Sewer and Wastewater Systems. No substantial sewer or wastewater lines or infrastructure have been identified within the Overland Segment (CHPEI 2012q). Therefore, no effects on sanitary sewer and wastewater systems would be expected. If sanitary sewer or wastewater infrastructure were to be discovered during surveying or construction activities, the construction methods used would be the same as those described for *Electrical Systems*.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical Systems. The proposed CHPE Project would likely result in increases in electrical supply capacity and reliability of electric power service and decreases in transmission congestion in the NYSBPS over the duration of the project. In addition, the NYSBPS would have a greater percentage of its capacity derived from clean energy resources (see **Section 5.4.16**). Benefits to the NYSBPS are discussed in greater detail in **Section 5.4.12**.

Significant impacts on electrical systems would not be expected from consumption of electricity from local sources during operation of cooling stations.

Water Supply Systems. Significant impacts on water supply capacity would not occur from initially filling cooling stations from the regional water supply. A chiller unit and pumping system within the cooling stations would circulate chilled water through tubing alongside the HVDC cable within the underground HDPE conduit (TDI 2012a). The cooling stations would be closed-loop systems, so no water would be required after the initial filling nor would any discharges occur. The Applicant has estimated that approximately 245 gallons (927 liters) of water would be required to fill the pipes for the cooling system to cool an HDD segment of 3,000 feet (915 meters) in length. The final design and cooling capacity of the equipment depends on the length of the HDD segment, burial depth, cable losses, and the specified ambient conditions.

Storm Water Management. The operation and maintenance of the cables buried in the railroad and roadway ROWs would have no impact on storm water flows or associated storm water management infrastructure. Any existing storm water management features encountered during transmission cable emergency repairs would be avoided via HDD, replaced, relocated, or restored to like-new conditions.

Solid Waste Management. Short-term, infrequent operational impacts on solid waste management would be expected because inspections and emergency repair activities would produce small amounts of solid waste. The transmission line itself would be designed to be relatively maintenance-free and, therefore, would not produce any solid waste. Generation of such waste would be recycled to the maximum extent practicable, thus minimizing the proposed CHPE Project's contribution to regional landfill capacities.

Communications. No operational impacts on communications systems would be expected because the transmission cables would not create induced voltages or currents that could impact communications equipment such as remote telephones and cellular telephones. The transmission cables would not create any corona discharge and would not be independent sources of radio, telephone, or television interference (CHPEI 2012i)

Natural Gas Supply. No operational impacts on natural gas supply would be expected because the transmission system would not consume natural gas.

Liquid Fuel Supply. Significant operational impacts on liquid fuel supply would not be expected due to the minimal amounts of liquid fuel that would be consumed during the maintenance of the permanent ROW, inspections, and potential emergency repairs of the transmission system. Inspection and maintenance activities would be short-term in duration and occur multiple times over the operating life of the transmission line.

Sanitary Sewer and Wastewater Systems. No operational impacts on sanitary sewer and wastewater systems would be expected because the operation of the transmission system would not be expected to increase the generation of wastewater or affect existing sanitary sewer or wastewater systems.

5.2.13 Recreation

Impacts from Construction

> Recreational areas within 100 feet (30 meters) of the transmission line in the Overland Segment are Bertha E. Smith Park, Gansevoort Town Park, Hillhurst Park, Roger Keenholts Park, Jim Nichols Park, and Mosher Park.

Construction activities along the Overland Segment of the proposed CHPE Project route would be visible from six recreational resources located within 100 feet (30 meters) of the transmission line (see **Table 3.2.13-1**) and could be visible from six additional recreational resources located within 0.5 miles (0.8 km) of the transmission line and proposed cooling stations, depending on the viewsheds of the resources. See **Appendix K** for a complete list of recreational resources within the ROI. The proposed CHPE Project transmission line would be buried underground along existing railroad and roadway ROWs. Equipment involved in clearing the route, trench excavation, cable installation, backfilling, and restoration would be visible and audible during the limited period of construction near these recreational resources. Following completion of construction, the Applicant would restore, mulch, and reseed the areas disturbed by construction and allow it to revegetate. Construction staging areas would be established along the terrestrial portions of proposed CHPE route within the Overland Segment. These staging areas would be sited within the railroad and roadway ROWs and would use the minimum space required to facilitate safe installation.

> Recreational areas in the ROI of cooling stations in the Overland Segment are the South Bay State Boat Launch and Pier, Wilton Wildlife Preserve and Park, Saratoga Spa State Park, William S. Kelley Park/Spensieri Park, and Roger Keenholts Park.

Between MPs 101 and 110 (between Dresden and Whitehall), the route would occur within NYSDOT ROW but adjacent to land administered as Adirondack Park by the APA. In addition, approximately 0.2 miles (0.3 km) of the transmission line would be installed under South Bay near Whitehall via HDD. Use of HDD would avoid impacts on recreational users on the South Bay by allowing installation of the transmission line without disturbing the surface features or uses of park lands. During construction in the South Bay area, open trenching activities and installation of the cooling station at MP 110 could result in use of parking spaces and open areas in or adjacent to the park for construction equipment operation and material storage, and a temporary reduction in the number of traffic lanes (e.g., from two-lane to single-lane) accessing recreational boat launches and piers. Access to the park and boat launch and piers would be maintained, as feasible, but could be partially limited for up to approximately 2 weeks during construction for safety reasons. Transmission line construction activities and construction vehicle traffic would be managed in accordance with an MPT Plan (see **Appendix G**) and a construction management plan developed in consultation with park operators to ensure continuous access to this park, facilities in the park, and other recreational resources throughout the Overland Segment as appropriate. These plans would include measures such as use of traffic flaggers or other traffic management methods during construction activities, specific locations of general construction and HDD staging areas, and restoration of project sites to pre-construction conditions. Construction could be carried out in the off-season (e.g., October or November), which would avoid or minimize impacts.

Construction activities associated with the cooling stations would occur outside but in proximity to access routes for six recreational areas in the Overland Segment. Although construction activities associated with the installation of the cooling stations could be visible and audible from these recreational areas, access would be maintained at all times through implementation of the MPT as required. See **Appendix K** for a complete list of recreational resources within the ROI.

The proposed CHPE Project route would follow along the proposed Champlain Canalway Trail between MPs 112 and 135. The Applicant is consulting with local stakeholders involved in the development of the proposed Champlain Canalway Trail to determine the feasibility of collocating the transmission line and the proposed trail. Collocation of the proposed trail and transmission line would not be expected to impact any recreational resources.

Impacts from Operations, Maintenance, and Emergency Repairs

Operation of the transmission line or cooling stations would not affect recreation. The cables would generally be buried underground and would not interfere with recreational uses. The cooling stations at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228 would be permanently located within the Overland Segment. The cooling stations at MP 112, 208, 227, and 228 would not occur within 0.5 miles (0.8 km) of a recreational area; therefore, no impacts would be expected. The ROIs for the cooling stations at MPs 110, 145, 146, 158, and 185 contain recreational resources; however, operation of the cooling stations would not result in impacts on those resources because access to and use of the recreational areas would not be affected by operation of the cooling stations. Further discussions of visual impacts from the operation of the cooling stations are discussed in **Section 5.2.11**, and potential noise impacts are discussed in **Section 5.2.17**.

Maintenance of the proposed CHPE Project along the Overland Segment would include non-intrusive visual inspections of the transmission line and cooling stations, preventive maintenance at the cooling stations, and routine vegetation management to maintain access in the ROW over the life of the transmission line, none of which would impact recreational resources or their access as these activities would last only a few hours in any one location and access would be provided at all times. Emergency repairs could impact recreational activities through potential interruptions in access to recreational resources or visibility of repair activities from such resources, but repair activities would be infrequent and of short duration.

5.2.14 Public Health and Safety

Impacts from Construction

Impacts on health and safety could occur during construction activities for the proposed CHPE Project. Construction activities pose an increased risks of construction-related accidents, but such risks would be managed by adherence to established Federal and state safety regulations. HASPs and an Emergency Contingency Plan would include measures for safety along the terrestrial portions of the transmission line route. The HASPs would identify requirements for minimum construction distances from residences or businesses and requirements for temporary fencing around staging, excavation, and laydown areas during construction. The HASPs would include provisions for railroad safety training and for general worker protection, as required under the NESC and OSHA 29 CFR Part 1926, *Safety and Health Regulations for Construction*. Blasting activities and safety measures during such activities would be managed with a blasting plan developed as part of the EM&CP.

Impacts from Operations, Maintenance, and Emergency Repairs

Contractor Health and Safety. Maintenance and emergency repair activities generally would pose the same type of accident risks as those that could occur during construction, but this level of risk would be managed by adherence to established Federal and state safety regulations. Because these impacts would be expected only during periodic maintenance or emergency repair activities as required, the risks would be low. The Applicant's contractors would be expected to follow all guidelines detailed in the ERRP when conducting operations, maintenance, or emergency repair activities.

Public Health and Safety. No health and safety impacts on the public would be expected under the operational phase of the proposed CHPE Project because the transmission cables would be underground in railroad or roadway ROWs and installed in compliance with all Federal and state rules and regulations. HASPs would identify measures to be taken during operations to prohibit public access to the proposed facilities, such as permanent fencing around the cooling stations and locked gates at cooling station access road entrances. Before the proposed CHPE transmission system would be put into operation, the route would be appropriately marked, and the final route and placement of the transmission cable and associated equipment would be provided to the NYSPSC for addition to the "Call Before You Dig" database. This would be expected to prevent any accidental contact with the cables once they are buried underground and operational. The terrestrial HVDC and transmission cables would require no fluids for insulation. Inspections would be performed on all terrestrial transmission cables in accordance with manufacturer's specifications to ensure equipment integrity and protection is maintained. The Applicant's contractors would be expected to follow all guidelines detailed in the ERRP when conducting maintenance or emergency repair activities.

Another potential concern would be the risk of electrocution if the cables are damaged by third party construction activities. If the cable were damaged by an outside party, HVDC system protection equipment would reduce the current and voltage to zero in a fraction of a second to reduce the possibility of injury to people or any nearby infrastructure. There would be both fiber optic thermal and communications protection on the equipment that would detect breaks or cuts as well as fault protection equipment at both converter stations to quickly clear any fault. The cable protection equipment would be designed to shut down operation in order to protect life and equipment in the unlikely event that the cable becomes damaged by external equipment (TDI 2012b).

Magnetic Field Safety. Health and safety impacts from magnetic fields associated with the transmission line would not be expected during the operational phase of the proposed CHPE Project. Portions of the transmission line would be buried within existing railroad ROW in the Overland Segment. The proposed CHPE transmission line ROW within the railroad ROW would be 20 feet (6 meters) wide, and access to the railroad ROW would be limited in some areas by fencing and entry restrictions. **Table 5.1.14-1** and **Figure 5.1.14-1** present the magnetic field levels associated with the transmission cables. The magnetic field levels at the edges of the 20-foot (6-meter)-wide transmission line ROW for the Overland Segment were calculated to be 24.8 mG, which is well below the 200-mG magnetic field strength interim standard established by the NYSPSC (CHPEI 2012t). Therefore, no health and safety impacts from EMF would be expected to occur outside of the transmission line ROW to adjacent residents or people at nearby parks. In addition, the cables would be located no closer than 10 feet (3 meters) from the CP railroad tracks or 25 feet (8 meters) from the CSX railroad tracks, so the maximum magnetic field exposure that trains could pass through (and personnel and potential passengers on trains would be exposed to) would be less than 76.9 mG for the CP railroad tracks and less than 16.4 mG for the CSX railroad tracks (see **Table 5.1.14-1**). These exposure levels also would be lower than the 200 mG NYSPSC interim standard. The World Health Organization, DOE, and NIEHS have not identified any known health effects from this level of exposure.

Portions of the transmission line would also be buried in trenches along New York State Route 22 between Dresden and Whitehall, under city streets within Schenectady, and along Alpha Road in Catskill within the Overland Segment. The Applicant has proposed to install the transmission cable bipole within these ROWs with at least 3 feet (0.9 meters) of cover and a spacing of 12 to 15 inches (30 to 40 cm) between cables. With a 1-foot (0.3-meter) cable spacing, the 200 mG interim standard would be met 1 foot (0.3 meters) above the ground directly over the cable. Conservatively assuming a 2-foot (0.6-meter) cable separation, the 200 mG standard would be met within 10 feet (3 meters) from the edge of the nearest cable, as shown in **Table 5.1.14-1**. Because the presence of the transmission line within road ROWs would comply with the NYSPSC interim standard, and public exposure to the resulting magnetic fields would be infrequent and for short durations as people passed while walking on these roads or traveling in vehicles, no impacts from magnetic fields would be expected from operation of the proposed CHPE Project. If emergency repairs of the transmission cables would be required, they would be de-energized and contractor health and safety measures would be implemented.

Impacts from intentionally destructive acts and other causes of structural failure could occur during operation of the proposed CHPE Project and are discussed in detail in **Section 5.1.14**.

5.2.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the terrestrial transmission line in the Overland Segment would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products such as gasoline, diesel, oils, hydraulic fluids, and cleaners. Most of these products would be used in the operation of the graders, trucks, and trenching equipment needed for the installation of the terrestrial transmission line. Small amounts of hazardous wastes, primarily used oils, solvents, and lubricants, would be generated as by-products of the terrestrial transmission cable installation process. Construction of cooling stations at various locations along the terrestrial transmission line route would result in the transport, handling, use, and onsite storage of hazardous materials and petroleum products to support building construction. To minimize the potential impacts from hazardous materials and wastes, the Applicant would require contractors to follow appropriate hazardous materials and waste-handling protocols and additional Applicant-proposed measures that are applicable to upland soil and groundwater resource management activities, such as establishing an SPCC Plan, using secondary containment where applicable, and following all appropriate Federal and New York State regulations regarding management of hazardous materials and wastes. See **Appendix G** for a list of Applicant-proposed measures.

Although no specific areas of contamination have been identified along the proposed route of the terrestrial transmission line in the Overland Segment, due to the extended use of portions of these areas as railroads and the current and former use of nearby areas for industrial and commercial operations, the installation of the terrestrial transmission line could disturb contaminants potentially deposited in the soil. During the trenching and excavation process, if any potentially contaminated areas along the terrestrial portions of the route are identified by visual, olfactory, or other field observations, further evaluation, soil sampling, and notification of appropriate authorities would be accomplished in accordance with the Soil

Management Plan, which would be developed as part of the EM&CP for the proposed CHPE Project. Future construction activities in that area would be conducted in accordance with all conditions issued by the applicable regulatory authorities. Soils extracted during trenching and excavating would be reused on site as backfill material to the extent possible; however, existing contaminated soil excavated from the trench could be removed from the site and properly disposed of, if encountered. Management of excavated soils would be conducted in accordance with the Soil Management Plan. **Appendix G** contains a list of Applicant-proposed measures to minimize the potential impacts if suspected contamination is identified during construction.

If pre-existing contaminants are found in the trench water during dewatering, construction activities would be stopped immediately in that area and appropriate authorities would be notified. Future construction activities in that area would be conducted in accordance with all conditions issued by the applicable regulatory authorities, such as NYSDEC.

Drilling fluid used in the HDD process would be continuously reused in a closed-loop system, and the volume and the pressure of the fluid would be monitored for any release in accordance with an HDD Contingency Plan. Visual observations of drilling fluid or excessive loss of volume or pressure in the borehole would trigger response actions, including halting drilling activities and initiating clean-up procedures for any released bentonite. Used drilling mud would be disposed of at an approved landfill.

The proposed CHPE Project route would not impact the Hudson River PCB Dredging Project, which will be occurring in the Upper Hudson River between Hudson Falls and Troy. The terrestrial transmission line would cross the Upper Hudson River at Fort Edwards near MP 135 on two railroad bridges or via HDD. As this portion of the Hudson River is proposed to be dredged, construction of the terrestrial transmission line would be limited to crossing bridges over the river or HDD under the river and would not be installed within the river; therefore, the PCB dredging project would not be impacted.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate mowing equipment, trucks, and other vehicles needed to conduct maintenance (e.g., control of vegetation in the permanent terrestrial ROW and preventive maintenance on cooling stations), and routine non-intrusive inspections of the terrestrial transmission cables and cooling stations in the Overland Segment. Such activities would be temporary but occur multiple times over the operating life of the transmission line. Additionally, should any sections of the terrestrial transmission cables need to be uncovered for emergency repairs, localized disturbances of soil potentially containing contaminants could occur. However, because the terrestrial transmission cables are designed to be maintenance-free and require infrequent inspections, any hazardous materials and waste impacts from maintenance, inspection, and emergency repairs would be infrequent and not significant. The terrestrial transmission cables do not contain any hazardous fluids, thereby eliminating any potential for soil contamination from the cables themselves.

It is anticipated that cooling stations would be operated at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228 to provide cooling to the transmission cables in places where HDD is used. These cooling stations would have a chiller system and a pumping system within a small building and would circulate chilled water through tubing alongside the transmission cables in the HDD conduit. A refrigerant gas, presumably a non-halogenated hydrocarbon, would be used with the heat exchange process in the chiller system. If released, this refrigerant would vaporize completely and is not expected to result in air, soil, or groundwater contamination adjacent to the cooling stations. Operation of these cooling stations would require limited amounts of hazardous materials and petroleum products for equipment lubrication, cleaning, routine maintenance, and emergency repairs.

5.2.16 Air Quality

An introduction on the analysis of potential impacts on local and regional air quality was provided in **Section 5.1.16**. Detailed lists of construction equipment, the anticipated construction schedule, and associated emissions calculations for the Overland Segment are provided in Tables M-4 through M-9 in **Appendix M**. References for various emissions factors used in the analysis for the Overland Segment are included in Table M-6 in **Appendix M**.

Impacts from Construction

The construction-related air and GHG emissions within the Overland Segment would primarily be from diesel internal combustion engines and fugitive dust from earthmoving activities. Bulldozers, rock trenchers, bucket loaders, and other heavy equipment use diesel internal combustion engines, and would emit air pollutants. Fugitive dust emissions would result as the construction corridor is generally unpaved and most of the heavy equipment use would occur within the construction corridor.

Given the construction activities required to bury the transmission line, including site clearing, earth removal and fill, bedrock blasting, and HDD, particulate emissions would be generated directly from the fuel-fired engines and earth-disturbance activities. The particulate emissions generated along the Overland Segment would be variable due to other factors associated with fugitive air emissions as discussed in the following paragraphs.

The amount of airborne dust generated from construction is relative to the amount of small particle silt and moisture found in the soil. Generally, the coarser the soil material and the higher the moisture content, the lower the amount of surface dust that will enter the air. Soils in the Overland Segment corridor range from fine organic loam and sand to coarser gravel or other unconsolidated material. The drainage along the terrestrial construction corridor ranges from poorly to excessively drained. This area of New York State can have high rainfall, and, depending on the season in which construction would take place, the moisture content of the soil could be high.

Tree clearing, grading, and trenching activities would emit fugitive dust. In normal terrain, a 9-foot (2.7-meter)-wide by 4-foot (1.2 meter)-deep trench would be excavated using construction vehicles along the road or railroad ROW or rail-mounted equipment. To minimize fugitive dust, topsoil would be stripped from the trench and subsoil stockpile area (trench plus spoil side method) and placed on one side of the trench. Subsoil would be placed on the opposite side of the trench. Both stockpile areas would be treated with water as appropriate to prevent dust emissions.

The HDD borehole and terrestrial cable construction could also generate some dust through the removal of soil and hauling by dump trucks. However, the soil removed with the HDD borehole work would likely be saturated with water and would not contribute to dust.

Shallow bedrock has the potential to be encountered along some portions of the terrestrial construction corridor. Dependent on relative hardness, fracture susceptibility, and expected volume of the material, rock encountered during trenching would be removed using conventional excavation with a backhoe, hammering with a pointed backhoe followed by backhoe excavation, or blasting followed by backhoe excavation.

Fugitive air emissions, including dust, associated with blasting would be expected to be isolated and temporary. Additional particulate emissions would be anticipated with the hauling and disposal of blasted rock off-site. Impacts would be minimized using Applicant-proposed measures for managing dust, such as wetting down the blast area prior to initiating the blast, delaying blasting activities during windy events, and covering truckloads during hauling activities (see **Appendix G**).

From the southern end of Lake Champlain to where the cable enters the Hudson River in Catskill, the total length of the buried cable within the Overland Segment is approximately 127 miles (204 km). Portions of this segment are within counties not in attainment with the ozone standard. Based on a transmission line installation rate of approximately 0.5 miles (0.8 km) per day, the line is projected to be installed within approximately 12 months. At some locations along the transmission line route, additional construction equipment would be necessary to perform specific tasks, such as blasting; therefore, the levels of pollutants emitted to the atmosphere would increase. However, with the exception of the landfall areas at the southern end of Lake Champlain and Catskill, work in the proximity of any single location along the segment would likely last no more than a few days up to 2 weeks.

Particulate emissions would vary in accordance with drainage properties, the soil types encountered, and levels of recent precipitation. The emissions would be spread over the 12-month construction phase in this segment, dispersed in a relatively large area, and temporary. Applicant-proposed measures to reduce impacts from emissions and minimize fugitive dust, such as minimization of engine idling and dust-control measures, are provided in **Appendix G**.

Estimated emissions from construction activities in the Overland Segment are summarized in **Table 5.2.16-1**. The table also includes emissions calculated for the Albany-Schenectady-Troy nonattainment area portion of construction within the Overland Segment, and emissions levels for the remaining attainment area. Emissions calculation spreadsheets are provided in Tables M-7 through M-9 in **Appendix M**.

Table 5.2.16-1. Estimated Air Emissions resulting from Proposed CHPE Project Construction Activities in the Overland Segment

	NO_x (tpy)	**VOC (tpy)**	**CO (tpy)**	**SO_2 (tpy)**	**PM_{10} (tpy)**	**$PM_{2.5}$ (tpy)**
Overland Segment	61.35	7.89	39.22	0.07	114.70	34.88
Albany-Schenectady-Troy Area Portion	40.43	4.95	25.12	0.04	65.69	19.92
Remaining Attainment Area Portion	20.92	2.94	14.10	0.03	49.01	14.96

Emissions from construction on portions of the Overland Segment would occur in the Albany-Schenectady-Troy nonattainment area. **Table 5.2.16-2** summarizes these emissions and the corresponding *General Conformity* thresholds. Construction emissions associated with the Overland Segment would not exceed the General Conformity Rule *de minimis* thresholds, and therefore are not subject to a General Conformity Determination. In addition, these construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, increase the frequency or severity of a violation of any ambient air quality standard, exceed any evaluation criteria established by the SIP, or delay the attainment of any standard or other milestone contained in the SIP.

Impacts from Operations, Maintenance, and Emergency Repairs

The Overland Segment includes the operation of nine cooling stations (at MPs 110, 112, 145, 146, 158, 185, 208, 227, and 228) for cooling of long segments of HDD-installed cable. The cooling stations would be anticipated to be operated primarily during peak load and warm weather conditions. These stations would be unmanned and would contain an electric-powered air conditioning unit and pumping station within the building. The proposed cooling stations would be anticipated to require regular inspections and the use of a minor number of worker vehicle trips related to facility preventive maintenance and emergency repairs, if necessary.

Table 5.2.16-2. General Conformity *de minimis* Thresholds for the Albany-Schenectady-Troy Area for the Proposed CHPE Project

Activity	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Albany-Schenectady-Troy Area						
Overland Segment	40.43	4.95	25.12	0.04	65.69	19.92
General Conformity *de minimis* Thresholds	**100**	**50**	**NA**	**NA**	**NA**	**NA**
Exceed *de minimis* Thresholds	**No**	**No**	**NA**	**NA**	**NA**	**NA**

Post-construction activities within the Overland Segment would consist primarily of transmission cable inspections, preventive maintenance, ROW vegetation management, and emergency repairs along the ROW. Such activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. Regular inspections of the cables, in accordance with the manufacture's specifications, would be performed to ensure equipment integrity is maintained. Vegetation management, including tree cutting and mowing, would be performed on a regular basis along the ROW using gasoline- and diesel-powered equipment. In the event of emergency repairs, as addressed in the ERRP, crews of qualified repair personnel would be dispatched to the repair locations. Once the portion of the transmission cable was excavated, specialized jointing personnel would remove the damaged cable and install new cable. It is anticipated that equipment similar to those used in construction activities would be used for short periods during emergency repair activities as required.

Within the Overland Segment, the amounts of criteria air pollutants emitted would be based on internal combustion engine use and fugitive dust. Fugitive dust would be created during activities of earthmoving and from vehicles traveling along unpaved roads and would be minimized through use of Applicant-proposed measures such as wetting exposed soils. Although maintenance and inspection activities would occur and emergency repairs could occur over the life of the proposed CHPE Project, there would not be significant impacts on the regional air quality due to the sporadic small-scale nature and likely short duration (1 to 5 days) in any given location. The types of heavy equipment and vehicles used would be similar to those described for construction; however, their usage would be considerably less. The resulting increase in emissions would not present a potentially significant impact on air quality. In addition, maintenance and repair activities associated with the proposed cooling stations are anticipated to occur regularly; however, the resulting increase in emissions and resultant potential impact on air quality would not be expected to be significant because of the small scale of such activities.

Impacts from the full proposed CHPE Project on GHG emissions are discussed in **Section 5.4.16**.

5.2.17 Noise

Impacts from Construction

Construction of the terrestrial transmission line would cause a temporary increase in noise in proximity to the construction activity. Construction noise is usually made up of intermittent peaks and continuous lower levels of noise from equipment cycling through use. In locations within 100 feet (30 meters) of construction activities, noise levels would be approximately 80 to 85 dBA, similar to those produced by a motorcycle at 50 feet (15 meters). Noise at these levels could result in speech or sleep interference in areas close to the operating construction equipment. Increased noise on adjacent roadways would also be generated by equipment deliveries or normal road traffic potentially being detoured to accommodate temporary work sites along road ROWs. While the noise levels generated during construction are expected to be greater than ambient conditions for most of the receptors in the immediate vicinity, work in any given location would likely last no more than 2 weeks and no single receptor would be exposed to noise levels exceeding any regulatory standard for an extended period. Noise levels associated with HDD use are expected to be high; however, they would be temporary. HDD drill rig operations could occur on an around-the-clock basis while the drill path is being bored. Where warranted, the Applicant would install temporary sound barriers, such as wooden barriers, to reduce noise levels from HDD or, in extreme cases, offer temporary lodging for residents affected (see **Appendix G**). The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line.

Terrestrial transmission cable installation in road and railroad ROWs requires a wide range of site preparation and cable installation activities. Installation of the transmission line and cooling stations on land requires site preparation activities such as vegetation clearing, topsoil removal and storage, preparation of a gravel access path, trench excavation, transmission cable or modular cooling station delivery to the installation site, HDD (in approximately 175 locations within the Overland Segment), transmission cable installation and splicing, backfilling), replacing native backfill soils, removal of excess native fill, replacement of native topsoil, and vegetation/site restoration.

Noise Impact Methodology. Modeling of noise levels associated with construction of the proposed CHPE Project resulting from construction was conducted for certain cases where reasonable noise data from previous studies were not available. Noise levels were determined based upon the types of equipment that would be used and the duration of their use. Noise emissions factors for common construction equipment were obtained from guidance documents from the FHWA or the Federal Transit Administration (FTA) (USFTA 2006, FHWA 2006a, FHWA 2006b), and corresponding sound levels were estimated (Maling et al. 1992) or calculated based on rated construction equipment horsepower (see **Appendix N**). Other construction equipment noise levels were estimated from brake horsepower ratings (Wood 1992). Utilization factors were employed to represent the amount of time each noise source contributed to the potential noise exposure. This approach is considered conservative, and in some cases a more realistic and lower noise estimate was obtained from the FHWA guidance document (FHWA 2006a).

Noise from terrestrial construction activities would vary depending on the type of equipment being used, the area in which the action would occur, and the distance from the noise source. Typical equipment used during cable trenching and installation activities could include excavators, trucks, bulldozers, and loaders. The noise associated with this equipment would be typical of noise produced during normal heavy construction activities (see **Table 5.1.17-1**). To predict how these activities would impact adjacent populations, noise from the probable equipment was estimated. For example, as shown in Table N-1 in **Appendix N**, land-based construction usually involves several pieces of equipment (e.g., trucks and bulldozers) that may be operating simultaneously. The combined noise from the proposed equipment, during the busiest day, was estimated to determine the total impact of noise from construction activities at given distances. Results of calculated construction noise from different construction phases along the Overland Segment during daytime hours are shown in **Table 5.2.17-1** and in greater detail in Table N-1 in **Appendix N**. These sound levels were predicted at 100, 500, 1,000, and 2,000 feet (30, 61, 305, and 610 meters) from the source of the noise and are discussed below.

Along the Overland Segment, construction activities would generally occur at distances greater than 500 feet (152 meters) from noise-sensitive land uses; however, in a few places, construction would occur closer. For example, construction would occur approximately 100 to 500 feet (30 to 152 meters) from residences in Whitehall (MP 112), Fort Edward (MP 135), Gansevoort (MP 141), Ballston Spa (MP 159), and Schenectady (MP 173 to 176). At this 100-foot (30-meter) distance, the noise level would be

Table 5.2.17-1. Land-Based Construction Noise Levels

Activity	Calculated SPL (dBA) as L_{eq} (1 hr) at distance			
	100 feet	500 feet	1,000 feet	2,000 feet
Vegetation Clearing	66	53	46	40
Topsoil Removal and Storage	77	63	57	51
Access Path Preparation (gravel)	73	59	53	47
Excavate Trench	81	67	61	55
Cable Delivery	69	55	49	43
HDD	86	72	66	60
Site Deliver and Pull Cable	81	68	61	55
Splice Cable	78	64	58	52
Deliver and Install Thermal Backfill	76	62	56	50
Install Native Backfill	80	66	60	54
Remove Excess Native Fill from site	70	56	50	44
Replace Topsoil, York Rake Vegetation	80	66	60	54

approximately 66 to 81 dBA. Construction noise levels would decrease over distance. At a distance of 600 feet (183 meters), the peak noise level would less than 72 dBA. Construction equipment would be equipped with appropriate sound-muffling devices (i.e., OEM or better), and would be maintained in good operating condition at all times.

Detailed tables are provided in **Appendix N** showing the noise emissions and utilization factors for each piece of equipment associated with the activity categories.

Some construction activities might be required to be conducted either overnight or on a continuous basis (i.e., 24 hours per day) to minimize disruption (i.e., delays, temporary cancellations, or other changes) of existing rail traffic while using the railway to move heavy equipment and materials to the construction site. This would expose potential nearby receptors, such as residents, to construction noise during nighttime hours, but noise levels would be increased over baseline conditions for only a few hours at any one location as the transmission line trench would be dug, the line installed, and the trench backfilled. Requiring strict adherence to the time limits on construction noise would require the Applicants to forgo or drastically reduce the use of the railway as a means for moving equipment and materials or would extend the construction schedule. To the extent possible, nighttime noise-producing activities would be restricted to equipment and material deliveries, cable splicing, and general site cleanup. In accordance with Certificate Condition 159, the EM&CP would identify nighttime construction provisions, including lighting and noise control. The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line.

Shallow bedrock has the potential to be encountered along some portions of the construction corridor. Typical removal techniques include backhoe excavation, hammering with a pointed backhoe attachment, or blasting. Other equipment used includes track rig drills, rock breakers, jackhammers, rotary percussion drills, core barrels, and rotary rock drills with rock bits. Other routine construction activities associated with the rock removal techniques, such as trucks traveling on uneven surfaces, would result in some minor amounts of ground-borne vibration, though vibration from these sources would attenuate rapidly and generally would not be perceptible outside of the construction corridor.

Blasting would cause intense impulse noise and ground-borne vibration. Blasting would be used where needed to remove hard rock in a manner that would involve less work and disturbance than rock-drilling, rock-breaking, or rock-hammering. Impulse (instantaneous) noise from blasts could range up to 140 dBA at the blast location or more than 90 dBA for receptors within 500 feet (152 meters) (BLM and CPUC 2008). Blasting and its noise and vibration effects on nearby land uses and structures would be managed with a blasting plan for each site. In accordance with Certificate Condition 159, the blasting plan in the EM&CP would include the blasting methods, surveys of existing structures and other built facilities, and distance calculations to estimate the area of impacts from blasting. With proper implementation of a blasting plan, whereby all nearby existing buildings and structures are accounted for, the increase in noise and vibration levels would be managed to minimize noise impacts on potential receptors.

At the transition of the HVDC underwater cables from water to land and at road and railroad crossings, installation would be accomplished through the use of HDD to minimize disturbance to the nearshore area and road and railroad infrastructure. Two water-to-land HDD operations would occur in the Overland Segment at MPs 101 and 228. The typical stationary equipment at the HDD operations staging area would include drilling rig, support air compressor, electrical generator, backhoe, crane, and a mud makeup/recovery system. Each of these pieces of equipment would have an engine. Noise generated from the water-to-land HDD operation would be relatively constant for approximately 2 weeks and, at a level up to 89 dBA within 100 feet (30 meters) of the HDD equipment, slightly louder than typical construction noise levels (DOE 2007). Residents most likely to experience noise from the water-to-land HDD equipment would be found in Dresden (MP 101) (within the Adirondack Park administrative boundary), and in a longer terrestrial HDD segment that would occur in Whitehall (MP 110). Although the increase in noise levels in the immediate vicinity of the HDD operations would be relatively stationary as a result of the HDD activity, the increased noise levels would be temporary. HDD operations at terrestrial HDD sites would have slightly lower noise levels (86 dBA) as smaller equipment is used and operations would also be shorter in duration. The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line. Where warranted, the Applicant would also install temporary sound barriers, such as wooden sound barriers, to reduce noise levels from HDD or, in extreme cases, offer temporary lodging for affected residents (see **Appendix G**). There are no noise-sensitive receptors within 1,000 feet (305 meters) of the proposed HDD operation at MP 228.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from the generation of noise during operations of cooling stations, routine inspection, maintenance, and possible emergency repairs would be expected. The increase in sound levels resulting from routine inspection and maintenance activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. In general, the increase in sound levels related to inspection and maintenance activities would be associated with noise generated from vehicle traffic and maintenance equipment, such as lawn mowers and other equipment needed to maintain the ROW. Noise levels generated from emergency repair activities would be similar to those expected during construction, as shown in **Table 5.2.17-1**, but would only occur as required with less equipment, and be much shorter in duration and limited to the immediate area of repairs.

The Applicant has estimated that the cooling stations would be designed to achieve a noise level of less than 50 dBA at 100 feet (30 meters) away from the source. The statewide noise standard is 65 dBA. Residents most likely to experience noise from the cooling stations would be found in Whitehall (MP 112). Some residences within this area could be within 100 feet (30 meters) of a cooling station, but sound levels at residences would depend on existing traffic noise levels along Main Street, the orientation of the cooling station, and vegetative buffers that currently exist between the cooling station location and residences. In addition, cooling stations would only operate as required to cool the transmission cables, primarily during summer months. Expected noise impacts from the cooling stations are therefore likely to be minimal.

5.2.18 Socioeconomics

Impacts from Construction

Population. Construction of the CHPE Project transmission line and cooling stations would likely not result in the permanent migration of workers to the area to meet the demand of the project. Therefore, population levels within the Overland Segment ROI would not change. However, a small number of specialized workers would likely temporarily reside in the area for the duration of construction in this segment.

Employment. During the approximate 4-year construction period, the proposed CHPE Project is estimated to require an average of more than 210 direct construction jobs, with a peak of more than 420 direct construction jobs in 2015 in the Overland and Hudson River segments. Additional indirect and induced jobs would be associated with supplying materials and providing other services for construction of the CHPE Project (CHPEI 2013b). The construction of the transmission line would require specialized construction workers and equipment, which would temporarily increase demand for workers and create direct and indirect jobs. Any non-specialized construction workers needed for the proposed CHPE Project should be available from the counties composing the Overland Segment ROI, which has approximately 29,600 construction workers.

Taxes and Revenue. Construction expenditures for building materials, construction workers' wages and taxes, and purchases of goods and services in the area would increase tax receipts and revenue for the local economy. The purchase of building materials for the proposed CHPE Project would be sourced locally where available and appropriate. Similarly, hiring construction workers in the surrounding area would increase local tax receipts and revenue in this segment. Specialized equipment would be necessary for the installation of the proposed transmission line and might come from both inside and outside the segment or New York State.

Portions of the Overland Segment ROI would be constructed in roadway ROWs in Whitehall and Schenectady. Temporary interferences with access to local businesses would be possible due to possible detours during construction activities. A Maintenance and Protection of Traffic (MPT) Plan would be developed in consultation with the NYSDOT and the local municipalities to maintain continuous access to businesses, and construction zones would only occur in a given location for less than 2 weeks at a time.

Housing. Workers travelling to the area for construction of the proposed CHPE Project would likely be housed in either hotels or short-term rental options. Given the number of workers required for construction, available housing supplies would be adequate to meet the temporary increase in demand.

Construction activities would not influence property values because such activities would be temporary and property would be returned to pre-construction conditions after completion of construction activities. The transmission line and associated HDD activity would be sited within the railroad ROW and public roadways to the maximum extent practicable. Temporary construction staging areas could occur on private property, with rental payments being made by the construction contractor to the landowner. Easements would be acquired by the Applicant for installation of the transmission line on private property, and easement agreements would identify the limitations of what could be constructed within the easement (e.g., placement of structures in proximity to the transmission line). Easement payments would compensate the landowners for the restrictions placed on a property and would be intended to offset any potential impacts on property values. The Applicant would also pay for any associated land restoration costs. Construction zones would only occur in a given location for 2 weeks or less. Because construction activities would occur over such a short time period, no change in private property values would be expected from construction activities. Construction of cooling stations would not occur on private property apart from railroad ROWs and, therefore, would not be expected to impact property values.

Impacts from Operations, Maintenance, and Emergency Repairs

Population. The operation, maintenance, and emergency repairs of the transmission line would not lead to an influx of new residents because few direct permanent jobs within the Overland Segment would be required for the operation of the proposed CHPE Project. However, maintenance and potential emergency repair activities would require employees that could be hired locally, but could also travel in from outside the area. It is unlikely that these activities would result in the permanent migration of any workers to the area. Specialized workers, if necessary, could be housed temporarily in the area for the duration of the maintenance or emergency repair activities.

Employment. The operational phase of the proposed CHPE Project would be expected to create less than five direct, full-time equivalent jobs, predominantly in the Overland Segment. Indirect jobs associated with the maintenance of the cooling stations and maintenance and potential emergency repairs of the transmission line would also be created in this segment. Considering the low number of jobs that would be created, the existing workforce within the Overland Segment ROI would be able to meet the employment demands of the proposed CHPE Project.

Taxes and Revenue. Use of state lands by the proposed CHPE Project would result in payments from the Applicant to appropriate New York State agencies. According to State of New York Real Property Tax Law (Section 102[12]), some elements of transmission system facilities are subject to taxation as real property in the state. Use of private property, including the railroad ROW, would result in taxes being levied on the proposed CHPE Project transmission system by local municipalities and paid by the Applicant. Washington, Saratoga, Schenectady, Albany, and Greene counties (and applicable municipalities, primarily school districts, within the Overland Segment ROI), would receive tax revenues on the proposed CHPE Project transmission system facilities. Assuming that tax receipt estimates would be approximately 2 percent annually of the assessed property value, estimated annual tax payments to municipalities along the Overland Segment were estimated to be more than $7,500,000 (CHPEI 2012mm). Such payments would be made in some cases directly to municipalities and school districts, or in others, to the municipalities and school districts through a county Industrial Development Agency. This agency would provide a development incentive to the proposed CHPE Project in the form of a “Payment in Lieu of Tax Agreement” or “PILOT.” Agreements would be developed that would detail the amounts of future tax payments. As a merchant project, the costs of the proposed CHPE transmission system would be borne by investors and would not be directly passed on to electrical ratepayers.

Local electrical, cooling system, and landscaping contractors would be hired to conduct periodic maintenance services at the cooling stations and provide vegetation management along the ROWs. If an emergency repair situation arose, a utility contractor would be hired to make the necessary repairs. Increases in wages and tax receipts and purchases of goods and services in the area would be expected from workers employed in the area during proposed CHPE Project maintenance and potential emergency repair activities. Residents and businesses in the Overland Segment would experience cost savings from the annual reductions in wholesale energy market prices that would occur throughout the state as a result of the proposed CHPE Project’s impact on electricity rates (NYSDPS 2012a) (see **Section 5.1.18** for additional information).

Housing. The majority of employees and contractors required for the operation, maintenance, and potential emergency repairs would represent a negligible increase in housing demand in the Overland

Segment. The existing number of temporary housing units would adequately meet the needs of the contractors that would require housing.

The transmission line would typically be buried primarily in road and railroad ROWs along this segment and not visible; therefore, its presence would not present a general detriment to private property values. Easement agreements for deviation areas would identify future land use restrictions within the easement (e.g., restricting development directly above the transmission line). Easement payments would compensate landowners for any restrictions placed on private properties and would offset any potential impacts on property values. Maintenance and emergency repairs, if necessary, could occur on private property; however, the majority of the transmission line ROW would be within existing railroad and roadway ROWs. The Applicant would also pay for any land restoration costs associated with emergency repairs. Because maintenance and emergency repair activities would only occur in a given location for 2 weeks or less, no impacts on private property values would be expected from the proposed CHPE Project.

5.2.19 Environmental Justice

Impacts from Construction

There are 44 census tracts in the Overland Segment ROI, with various minority and low-income population levels that are generally lower than those reported for New York State (see **Appendix L**). Effects would be expected to occur equally among all populations along this segment; on a transitory and temporary schedule; and primarily in existing railroad and road ROWs. Therefore, potential effects from construction on all populations, including minority and low-income populations, including those on public health (described in **Section 5.2.14**), air emissions and dust, and noise from traffic and construction equipment (described in **Sections 5.2.16** and **5.2.17** respectively), and socioeconomic impacts (described in **Section 5.2.18**), would be small, and occur on a transitory and temporary schedule. Cooling stations would be constructed at nine locations in road or railroad ROWs. Noise generated from construction activities, including equipment usage, blasting, and detouring traffic around work sites, would occur on a temporary basis as the transmission line is installed. Work areas would only be present in a given location for 2 weeks or less at a time.

Impacts from Operations, Maintenance, and Emergency Repairs

Operation of the transmission line would create magnetic fields in the Overland Segment. However, no effects from magnetic fields on minority and low-income populations would be expected because the cables would be buried underground in the same trench, and no known human health effects from exposure to magnetic fields at the levels to be emitted by the proposed CHPE Project have been identified. Effects from maintenance and emergency repairs would include air emissions and noise from equipment and would impact all populations, including minority and low-income populations, but would be small because they occur on an intermittent, temporary schedule primarily in existing railroad and roadway ROWs, and over durations and frequencies less than that required for construction. Therefore, potential human health and environmental effects on minority and low-income populations from these activities would not be considered disproportionately high and adverse.

5.3 Hudson River Segment

5.3.1 Land Use

Impacts from Construction

Construction of the proposed CHPE Project in the Hudson River would result in additional vessel traffic in the Hudson River. Transmission line installation would not prohibit water-dependent recreational activities such as boating, angling, or water sports, or commercial sightseeing because vessels could either transit around the work site or use a different area of the Hudson River. Cable-laying vessel traffic would be temporary (i.e., for the duration of construction while vessels and equipment would be present) and localized at the work site. Approximately 1 to 3 miles (2 to 5 km) of transmission cable can be installed per day in an aquatic environment, so the work site, which would be off limits to other vessels, would only remain at any one location for a short time period. The presence of cable installation vessels could disrupt (i.e., delay, temporarily cancel, or otherwise change) commercial ferry operations on the Hudson River. The Applicant would coordinate with the New York Waterway, the operator of the two ferry crossings within the Hudson River Segment, and utility infrastructure operators to minimize potential disruptions to ferry and utility operations. Additionally, an Aquatic Safety and Communications Plan would be provided to the USCG and local waterway users, and stakeholders and interested parties would be notified of transmission cable installation activities. See **Appendix G** for a list of Applicant-proposed measures such as these that would minimize impacts from the CHPE Project.

Minimal land-based support facilities (i.e., temporary storage areas) at existing industrial facilities would be required for installation of the aquatic transmission cables in the Hudson River. This land-based support facility would likely be at an existing port with heavy lift facilities, such as the Port of New York and New Jersey. The temporary storage areas would be compatible with the existing industrial uses.

Because the transmission line would be installed along the state-owned submerged lands under the Hudson River, the Applicant would be required to obtain an easement and construction permit from the New York State Office of General Services and pay associated fees. Submerged lands easements are typically issued for 25-year terms.

The proposed CHPE Project would avoid construction in and near Haverstraw Bay in the Hudson River with a 8-mile (12-km) terrestrial bypass around the bay through the communities of Stony Point, Haverstraw, and Clarkstown, thereby avoiding impacts on water-dependent uses in that area.

The transmission line would exit the Hudson River via HDD and emerge in Stony Point within a deviation area consisting of forested and residential uses before rejoining the CSW railroad ROW. While most of the 8-mile (12-km) terrestrial portion of the Hudson River Segment would be within the railroad ROW where the primary land use is railroad operations, residential areas and other sensitive land uses, such as recreation, would be within and adjacent to the ROI (see **Table 3.3.1-1** and the Land Use tables in **Appendix F.2**). Approximately 0.5 miles (0.8 km) of the transmission line route would be located in U.S. Route 9W in Clarkstown, where the ROI includes commercial and residential uses. Construction of the terrestrial portion of the Hudson River Segment, including installation of the transmission cables and construction of cooling stations, would result in temporary (i.e., for the duration of construction) disturbances to surrounding land uses. These uses would experience disturbances from construction activities, such as limitations on property access due to lane restrictions and the presence of construction work areas and equipment. These disturbances would last for the duration of construction, which would generally be a few days to up to 2 weeks at any one particular location. The construction schedule would be established to minimize disruptions (i.e., disturbances, interruptions, or changes) to any identified competing land uses, and the Applicant would provide timely information to adjacent property owners or tenants regarding construction activities and schedules, and coordinate with the railroad company and local officials. To ensure that all those potentially affected users are notified prior to construction and to verify no additional impacts on competing land uses would occur, the Applicant would reconfirm land use categories within 600 feet (183 meters) of the proposed CHPE Project, with special interest given to areas with sensitive land uses. Residential property owners adjacent to the proposed CHPE Project would be identified and contacted to discuss the proposed CHPE Project, construction schedule, and any potential concerns. Additional inquiry for other sensitive land uses would include notification of construction activities, consultation regarding special events, and consultation regarding special concerns and schedules. See **Section 5.2.1** for additional details on impacts on land use and measures to minimize impacts from terrestrial construction activities.

Installation of the transmission line could result in temporary disturbances (i.e., delays, temporarily cancellations, or other changes) that disrupt railroad operations for the duration of construction. The transmission line would be installed within the railroad ROW in accordance with railroad-specific engineering standards, which would prevent adverse impacts on the integrity of the railroad system. The transmission cables would be buried in trenches using traditional excavation equipment adjacent to the railroad tracks or via HDD. These activities could temporarily delay ongoing railroad operations. However, these impacts would be temporary and minimized through coordination with the appropriate railroad company for all delivery activities, equipment storage, and the timing of construction activities.

Use of U.S. Route 9W for vehicular and bicycle travel could be disturbed from construction activities due to reduced shoulders or the presence of equipment and personnel along the road side. These impacts would be minimized by installing construction signs and the use of barriers in accordance with applicable New York State highway regulations and design standards. Restoration of roadways would be designed in consultation with the appropriate jurisdictional agency. See **Section 5.3.2** for more information regarding impacts on transportation in this segment.

There would be six aboveground cooling stations constructed in this segment. Three of these cooling stations would be within commercial areas that are adjacent to residential areas, and three stations would be adjacent to state parks. Construction of the cooling stations in these areas would not be expected to result in any localized access limitations to the parks or commercial or residential areas.

The railroad and U.S. Route 9W ROWs would be able to accommodate most terrestrial construction activities in the Hudson River Segment; however, the proposed CHPE Project would occupy other public ROWs (e.g., state and municipal roadways) and private property in deviation areas outside of the ROWs. The Applicant would be required to obtain authorization to construct in and occupy all areas along the transmission line route, including land within established ROWs and deviation areas. The method of acquiring authorization would vary based on the property owner. The Applicant would be required to obtain the following authorizations:

- Highway Work Permits and Use and Occupancy Agreements (permits) from NYSDOT (for use of state managed roadways such as U.S. Route 9W)
- Leases (for use of railroad ROWs and private utility ROWs)
- Applicable permits (e.g., use and occupancy permits), other agreements (for use of other public ROW such as state and municipal land)
- Easements (for use of private property).

It is anticipated that these easements negotiated with private landowners would be bilateral easements in which the Applicant and landowner mutually agree to the easement provisions and the landowner would be provided financial compensation. However, it is possible that easements for some of these deviation areas would need to be obtained via eminent domain as part of the NYSPSC Article VII approval process, but only in the event the property owner and the Applicant are unable to reach a mutually acceptable agreement.

Construction of the aquatic and terrestrial portions of the proposed CHPE Project in the Hudson River Segment would be consistent with potentially relevant land use plans and policies, including the New York State CMP and LWRPs. The Applicant submitted a coastal zone consistency certification assessment and accompanying forms to the NYSDOS in December 2010 in accordance with the Coastal Zone Management Act (CZMA). Thirty-four of New York State's 44 enforceable coastal policies might be relevant to the proposed CHPE Project, and the portions of the proposed CHPE Project within the state's coastal zone, such as the Hudson River, were evaluated for consistency with these policies. NYSDOS conditionally concurred with the consistency certification of the proposed CHPE Project under the enforceable policies of the New York State CMP subject to the implementation of certain conditions (NYSDOS 2011a), which were subsequently incorporated by the Applicant into the proposed CHPE Project design (CHPEI 2011, TDI 2012a) and reflected in the NYSPSC Certificate for the proposed CHPE Project (NYSPSC 2013). **Section 2.3.1** of this EIS identifies these conditions.

Section 5.3.5 and the Certificate Conditions have more information regarding construction timeframes in SCFWHs in the aquatic portions of the proposed CHPE Project. As discussed in **Section 5.3.5**, construction in the Hudson River between Cementon and New Hamburg would be restricted to the period between August 1 and October 15, and construction between New Hamburg and Stony Point would be restricted to September 15 to November 30. See the Coastal Zone Consistency Documentation in **Appendix F.1** for the list of potentially relevant enforceable coastal policies including the LWRPs, the Applicant's consistency certification assessment, New York State's conditional concurrence, and the Applicant's response to the concurrence conditions.

The construction of the proposed CHPE Project would be consistent with the Village of Haverstraw Master Plan and Zoning Plan, which indicates that electric power lines should be underground in all land developments as required by state law. The construction of the proposed CHPE Project would be consistent with other potentially relevant local plans and policies because it would be compatible with surrounding land uses. Exhibit 121 of the Joint Proposal has a full list of plans and policies that might be relevant and the accompanying consistency analysis.

Impacts from Operations, Maintenance, and Emergency Repairs

The location of the transmission line would be marked on navigation charts to aid in identifying its location. The proposed CHPE Project route was selected to avoid designated anchorage areas to the maximum extent practicable; therefore, limitations on vessel anchorage would be minimized.

Inspections of the aquatic transmission cables within the Hudson River Segment would be performed at least every 5 years using vessel-mounted instruments. Inspections of the transmission line would result in a negligible amount of additional intermittent vessel traffic for the lifespan of the proposed CHPE Project resulting from the presence of inspection vessels. Inspections would not prohibit water-dependent recreational or commercial vessels from using the Hudson River because inspection vessels would only be stationary in one location for short time periods, and other commercial and recreational vessels could either transit around the inspection vessel or use a different area of the river.

If necessary, emergency repair activities would result in temporary (i.e., for the duration of emergency repairs) impacts on existing commercial and recreational uses of the Hudson River due to additional vessel traffic. Emergency repairs would be limited to the immediate vicinity of the repair site. See **Sections 5.3.2** and **5.3.13** for more information regarding impacts on transportation and recreation from emergency repairs of the proposed CHPE Project.

Operation, maintenance, and possible emergency repairs of the aquatic portion of the proposed CHPE Project in the Hudson River Segment would be expected to be consistent with potentially relevant land use plans and policies, including the New York State CMP and the LWRPs. Impacts would result from operation of the terrestrial portions of the Hudson River Segment because future use of the land within the transmission line ROW would be limited for the lifespan of the proposed CHPE Project. After construction of the proposed CHPE Project, the Applicant would either be granted control of (via fee or easement for private property), or other appropriate interest or rights to use (via use and occupancy permit for public ROWs such as roadways or state land or lease for railroad and private utility ROW), an up to approximately 20-foot (6-meter)-wide transmission line ROW and certain immediately adjacent areas and other deviation areas that would be required for ROW maintenance, inspection, and emergency repair purposes (CHPEI 2012b). Property owners granting the use of portions of their lands as the transmission line ROW would be prohibited from taking any action on that land that would damage or interfere with the Applicant's ROW maintenance, inspection, and emergency repair activities (CHPEI 2012b). Therefore, operation of the proposed CHPE Project would limit the future use of some property for the lifespan of the transmission line. Property owners would receive compensation for this loss of use. See **Section 5.3.18** for more information regarding potential impacts on property values.

No impacts are expected from periodic inspections of the terrestrial transmission line ROW and cooling stations as these activities primarily consist of passive visual or instrument assessments of conditions and would not create any disturbances to adjacent land uses. Similarly, impacts on land use would not be expected to result from conducting maintenance on the cooling stations because the activities would be confined to the cooling station sites and would not disturb adjacent land uses.

Potential impacts from possible emergency repairs in the terrestrial portions of the Hudson River Segment would be similar to those described for construction activities within the terrestrial portion of the Hudson River Segment, but would be for a shorter duration and within a smaller area. If emergency repairs are necessary, they could generate disturbances such as potential temporary limitations on property access due to the presence and operation of repair equipment and lane closures. Sensitive land uses such as residences or recreational areas near roadways and railroad tracks would be more susceptible to disturbances from emergency repair activities, but impacts would not be expected to be significant.

Operation, maintenance, and possible emergency repairs of the terrestrial portion of the proposed CHPE Project in the Hudson River Segment would be expected to be consistent with potentially relevant land use plans and policies, including LWRPs.

5.3.2 Transportation and Traffic

Impacts from Construction

Construction of the proposed CHPE Project in the Hudson River would result in temporary impacts on commercial and recreational water-dependent uses due to inconveniences and navigational obstacles (e.g., temporary loss of use of portions of waterways) from additional vessel traffic in the Hudson River. However, cables would not be buried in anchorage areas and use of waterways would resume following installation activities. Transmission cable installation would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the work site or use a different area of the Hudson River. If conditions do not allow other vessels to transit around the work site, the Applicant would ensure that aquatic construction does not interfere with routine navigation through making adjustments to the work site as required. Disturbance to recreational and commercial uses would be temporary and localized at the work site. Approximately 1 to 3 miles (2 to 5 km) of transmission cable can be installed per day in an aquatic environment, so the work site, which would be off-limits to other vessels, would not remain at any one location for a long period of time. In addition to creating inconveniences and navigational obstacles, the presence of cable installation vessels could result in short-term disruptions (i.e., delays, temporary cancellations, or other changes) to commercial ferry operations on the Hudson River, which would be required to transit around active construction areas on the river. The installation activities would be coordinated with the USCG so that work areas are marked properly to ensure safety, and so that current information about the location of work zones can be broadcast to recreational users. This would minimize conflicts with construction activity, and allow for advance planning for other users.

Aquatic transmission cables for this segment would be supplied by either a purpose-built cable-laying vessel, which would transport the cable to the site and lay the cable in a continuous operation, or a cable lay barge. If a barge is used, the cable would be installed in a similar manner to that used in Lake Champlain. A tug and barge would be used where the barge would go up to the Port of Albany or the Port of New York and New Jersey to take on more cable baskets as it finishes laying the individual cable sections. Impacts on navigation and ferries from cable-laying activities would primarily be limited to the immediate area where cable-laying activities occur, and are expected to be short-term.

Minimal land-based support would be required to resupply cable-laying vessels. Existing port facilities would be used to facilitate this land-based support, and would require staging areas measuring up to 200 by 300 feet (61 by 91 meters). Land-based activities to resupply cable-laying vessels would be coordinated with operators of port facilities to avoid disruption of other regular port activities. The Port of Albany has adequate capacity to accommodate the movement of construction-related materials.

Impacts on navigation from activities in the Hudson River would occur from installing the cable to a burial depth of at least 7 feet (2.1 meters) below the sediment-water interface in the river. Depending on navigation limitations along the route, it is possible that a tugboat-positioned vessel or an anchor-positioned vessel, such as a spud barge, could be used for some or all of the cable installation. Cable-laying activities on the water have been estimated to occur at a rate of 1 to 3 miles (1.6 to 5 km) of cable per day. During this time and in these immediate areas designated for active cable laying, commercial and recreational boating would be limited for safety reasons. The Applicant would use a fleet of approximately four vessels; the cable vessel, survey boat, crew boat, and tugboat or tow boat.

Construction activities within this segment would occur over one construction season during the summer and fall months to avoid potentially icy conditions in the Hudson River. Construction would be coordinated with the USACE and USCG to avoid impacts on aquatic navigation, including avoidance of federally, state, and privately owned navigation aids, such as buoys and signs for boaters. Applicant-proposed measures, including an Aquatic Safety and Communications Plan, would be provided to the USCG and local waterway users, and stakeholders and interested parties would be notified of transmission cable installation activities. Such actions would also avoid or minimize impacts on navigation (see **Appendix G** for details on more measures).

The proposed aquatic transmission line would be attached on up to six bridges along the cable route in this segment or installed by HDD. For each bridge crossing, the Applicant would coordinate with the owner of the bridge regarding clearances, distance from abutments and existing infrastructure, cable burial, and installation methods. Horizontal and vertical clearances for cable installation would be included in the final design in the EM&CP. The Applicant would provide notice to, and coordinate with, NYSDOT and other appropriate agencies for permission to attach the transmission line to any bridge, regardless of ownership, that provides a crossing for, over, or under any street or highway.

Within the terrestrial portion of the Hudson River Segment, the cables would be installed along the railroad ROW and along U.S. Route 9W through the towns of Stony Point, Haverstraw, and Clarkstown between MPs 295 and 303 (see **Figure 2-3**). HDD technology would be used at the transitions from water to land and at several other locations along the route, including intersections of road and railroad

ROWs, which would minimize impacts on traffic. Support facilities would be sited within the existing road and railroad ROWs and limited to the minimum space necessary to facilitate safe installation of the transmission cables.

Since the railroad ROW in the Hudson River Segment varies in width, grade, and number of rails, a variety of installation methods would be employed. The three primary installation methods would be traditional trench and spoil method, series trenching method, and trenchless installation method. Variation among these three installation methods would be prescribed based on site-specific evaluations with the selected contractor and then identified on the EM&CP Plan and Profile drawings. Active rail lines would be crossed using trenchless methods as opposed to open cut trenching.

The typical and preferred layout is to have each of the two cables installed with a minimum setback from the tracks to prevent impacts on railroad operations. Transmission cables would be installed in accordance with railroad-specific engineering standards. For the CSX line, the cables would be installed with a minimum separation distance of 25 feet (8 meters) from the centerline of the outermost track.

A short-term impact during construction would result from placing the transmission line along the U.S. Route 9W ROW in the Town of Clarkstown. During this time, travel lanes would be narrowed to accommodate adjacent construction activities. Restricting lane widths to accommodate construction equipment and workers would include a short-term reduction of traffic speeds through the construction area; therefore, traffic levels of service would likely decrease. Two-way traffic would be maintained to accommodate existing traffic volumes. It is expected that impacts on traffic would occur for no more than 2 weeks in any given location at a time. An MPT Plan would be submitted to NYSDOT for approval prior to commencement of construction activities on U.S. Route 9W. Where New York State highway ROW is to be occupied, all work would be performed in accordance with state regulations and guidance (see **Appendix G**). Highway work permits would be required for any work in, on, over, or above state highway ROW, which includes installed and maintained features such as shoulders, guardrails, clear zones, vegetated areas, slopes, drainage facilities, and the paved roadway. Construction vehicles supporting transmission line installation activities in roadway ROWs would be parked within construction zones, but the construction zones would be managed in accordance with the MPT Plan to ensure sufficient parking and access is maintained at all times. Therefore, impacts on traffic levels and safety would not be significant.

On average, approximately 300 construction workers would be employed during the construction period for the proposed CHPE Project along the 336-mile (541-km) route. Because the number of construction vehicles required to install the transmission line at any one location is limited, the necessary construction vehicles would not noticeably add to the number of vehicle trips or affect existing parking resources.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from operation of the transmission line on anchorage would not be expected to be significant. The transmission line route has been designed to minimize traversing known anchorage basins; therefore, limitations on vessel anchorage would be minimized. Precise cable locations would be established and published on nautical charts. Transmission cables would be buried to the depths prescribed by the USACE (see **Section 2.4.10.1**), thereby avoiding the possibility of vessel anchors hooking the transmission line and causing damage to vessels or the transmission line. Anchors could become snagged on the concrete mats that would be used to cover portions of the transmission line that could not be buried. However, the total area where concrete mats would be used to cover the transmission line represents less than 0.01 percent of the acreage of the proposed CHPE Project route in the Hudson River. Therefore, impacts on vessels or vessel anchors from use of concrete mats would be expected to be minimal. In the event that an anchor snag should occur, the vessel crew would notify the USCG and the

Applicant; and the Applicant would repair the cables (if necessary), transport a new anchor to the ship, cut the snagged anchor chain, and, if possible, recover the anchor. A comprehensive Anchor Snag Manual would be developed with stakeholders to address situations in which a vessel's anchor snags the transmission cables or concrete mats placed above the cables, and to identify appropriate protocols. The proposed manual would include a Navigation Risk Assessment prepared for the proposed CHPE Project (see **Appendix U**) that would address expected impacts on current and future commercial vessels. The USCG would have an opportunity to review the Anchor Snag Manual and the associated Navigation Risk Assessment prior to construction. Additionally, the Applicant would commit to meeting with the USCG, along with Applicant's cable installer, prior to construction.

Decommissioning of the proposed CHPE Project transmission line would consist of de-energizing and abandoning the transmission line in place. There would be similar minimal impacts on anchorage from potential anchor snags on concrete mats as described for operation of the transmission line. If decommissioning plans change, applicable regulations at the time of decommissioning would be met.

Impacts from the transmission line on mechanical navigational compass readings would not be expected to be significant. For cables buried at 4 feet (1.2 meters) and separated by a distance of 6 feet (1.8 meters), the maximum deviance from magnetic north at 19 feet (6 meters) above the water would be an estimated 20 degrees at approximately 20 feet (6 meters) east or west from the cables. The deviance from magnetic north would be reduced to zero at a distance of 50 feet (15 meters) from the cables. The calculated deviance would be less where the cables are laid in deeper water or where the cables would be spaced closer together (CHPEI 2012ccc).

Regular inspections of the underwater cables would be performed by vessel-towed instruments. Inspections would result in intermittent inconveniences and navigational obstacles on recreational and commercial traffic on the Hudson River for the lifespan of the proposed CHPE Project resulting from the presence of inspection vessel traffic. The inspections would occur periodically (at least every 5 years), following installation, and spot checks of the transmission cable protection materials would be performed during or after the first year of operation. These spot checks would occur more frequently at locations where strong currents would be expected or in other areas where abnormalities were identified. Transmission cable inspection would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the inspection vessel or use a different area of the river. Disturbances to recreational and commercial uses would be temporary and localized in the vicinity of the inspection vessel.

In the event of an emergency repairs, the ERRP would be implemented. The ERRP would outline the procedures and contractors that would perform emergency repairs, and would detail activities, methods, and equipment required to repair the transmission system, including the procedures to minimize the impact on the environment. Disruptions to the transportation system due to emergency repairs, if any, are not anticipated to be significant. These disruptions could include short-term suspension of marine traffic in the area of the repairs, potentially resulting in longer travel times. Commuter ferries operating on the Hudson River would be able to transit around the temporary work areas in the vicinity of ferry routes in the river.

Operational and maintenance activities within the terrestrial portion of the Hudson River Segment would not result in significant impacts on railroad operations and roadway traffic operations. There is a potential risk that electromagnetic fields and stray currents could interfere with railroad signaling systems and operations with the use of HVDC transmission lines. To ensure that interference by electromagnetic fields associated with the proposed HVDC technology on railroad signaling systems and operations would be avoided, the transmission line would be buried and offset from the active rail lines by at least 10 feet (3 meters) (see **Section 5.2.2** for additional details).

Terrestrial ROW maintenance is necessary to protect the cables from being disrupted or broken by tree roots, to maintain the function of permanent storm water management or access-control features, and to replace system location and identification markers, as necessary. The ROW Management Plan would be developed in consultation with the CSX railroad to ensure conformance with their continual maintenance plans. In addition, any maintenance activities within railroad bridges or structures would be performed in accordance with the applicable conditions of highway work permits, use and occupancy permits, leases, and other agreements. In the event of emergency repairs, the ERRP would be implemented. Disruptions to the transportation system, such as suspension of rail operations in the area of the repairs, could occur due to emergency repairs resulting in longer travel times. Vehicular traffic flow would be maintained through emergency repair work zones.

5.3.3 Water Resources and Quality

Impacts from Construction

Surface Water and Water Quality. The Hudson River is the primary surface water traversed in this portion of the proposed CHPE Project route, although several other intermittent and perennial surface waters would be crossed, including several NRI-listed areas associated with the Hudson River. The Hudson River Segment of the proposed CHPE Project route is riverine from MP 228 to approximate MP 294 and estuarine or tidal below this point.

During construction, including debris removal, in aquatic portions of the transmission line route, impacts on water quality would be caused by temporary localized increases in turbidity and resuspension and resettling of sediments, some of which might be contaminated, resulting from disturbance within the Hudson River during cable installation. Increased turbidity has the potential to reduce light levels in aquatic habitats and could result in temporary changes to water chemistry, including impacts on pH and dissolved oxygen. Reduced dissolved oxygen levels result if lowered light levels decrease the oxygen production of photosynthetic organisms, or biological demand is increased by sedimentation.

In terrestrial portions of the transmission line route in the Hudson River Segment (i.e., the Haverstraw bypass), vegetation clearing, ground disturbance, and soil stockpiling would be associated with trenching along the railroad and road ROWs. This would increase the potential for erosion and water quality impacts on nearby surface waters. Any surface waters in this 8-mile (12-km) segment would be crossed by dry ditch methods. Erosion and increased sedimentation in storm water runoff would occur in active construction areas, but would be managed in place with BMPs as described in the EM&CP, which would serve as the SWPPP, as fully described in **Section 5.2.3**. A listing of specific Applicant-proposed measures to minimize impacts on water quality, including erosion and sediment control and storm water BMPs that would be implemented during transmission line installation and use of an Environmental Inspector responsible for monitoring construction activities to ensure the EM&CP is followed, is provided in **Appendix G**.

HDD would be used at water-to-land transitions at MPs 228, 295, and 303 and at some locations along the railroad and road ROWs to cross under roads and minimize environmental impacts on sensitive resources such as wetlands and other surface waters. HDD operations have the potential of frac-out, where drilling fluids containing bentonite clay could be released or dispersed into the Hudson River. See **Appendix G** for a list of Applicant-proposed measures, including development and implementation of a Frac-Out Contingency Plan. HDD would also require conventional dredging to excavate a pit behind the cofferdams at transmission line water-to-land transition areas. Impacts on water quality from this activity would be minimized by enclosing the work area with the sheet pile cofferdam.

Similar to water quality modeling conducted for transmission line installation in Lake Champlain, a three-dimensional hydrodynamic and water quality model of the Hudson River was developed for the proposed CHPE Project using the MIKE3 software. The model inputs were based on water jetting as the preferred method in this segment. The model was used to simulate the 10 contaminants that were present in the sediment cores collected during the 2010 Marine Route Survey: arsenic, cadmium, mercury, benz(a)anthracene, pyrene, 4,4-DDE, copper, lead, phenanthrene, and PCBs in the upper Hudson River. Contaminants modeled in the lower Hudson River were 4,4-DDE, copper, lead, phenanthrene, PCB, naphthalene, fluorine, nickel, dioxin, and acenaphthene. The model computed no exceedances of New York State water quality standards for these constituents, established for protecting aquatic life from acute toxicity (CHPEI 2012i, CHPEI 2012oo).

The analysis also included an assessment of whether disturbance of PCBs present in the sediments would be cause or contribute to violations of water quality standards. PCBs do not have an acute standard so predicted PCB levels in the water column were compared to Engineering Performance Standards set by the USEPA for dredging resuspension at the Hudson River PCB's Superfund Site, which is a total PCB concentration of 0.5 µg/L. The modeling showed a maximum concentration for all Hudson River sections in this segment of 0.1 µg/L. This PCB concentration would be below the 0.5 µg/L threshold established by USEPA (CHPEI 2012i, USEPA 2012e). TSS concentrations were modeled for the Hudson River. The modeling results showed that TSS levels would not exceed 50 mg/L during installation of the transmission line, well below the 200 mg/L threshold (CHPEI 2012oo). However, the tidal flow and current of the Hudson River would result in some upstream or downstream resettling of sediment, depending on flow conditions at the time of cable installation. Although the Applicant did not model sediment re-deposition (CHPEI 2012dd), the impacts of resettling likely would not be significant because sediment concentrations well below thresholds in average Hudson River currents of less than 3 miles (5 km) per hour (LDEO 2013) would be re-deposited immediately upstream or downstream of the site of sediment disturbance. Depending on the sediment particle-size composition, the majority (approximately 70 to 80 percent) of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the plow. With higher currents, more sediment can be transported outside the trench area (HTP 2008, MMS 2009, CHPEI 2012i).

The water quality model assumed a 4-foot (1.2-meter) burial depth; however, the USACE New York District Public Notice for the proposed CHPE Project identified the minimum burial depth in the Hudson River to be 7 feet (2.1 meters) (USACE 2013). Using a conservative approach, if the model results were extrapolated by a factor of 1.75 (to account for the difference in burial depths) with a continued assumption of a 30 percent release fraction, the water quality modeling results indicate that the proposed CHPE Project would still comply with New York State water quality standards. This method is considered conservative, as it is reasonable to assume that the release fraction would be reduced as the trench depth increases due to the greater vertical distance that the sediment in the trench would need to traverse to reach the water column.

Applicant-proposed measures to minimize impacts on water quality, including suspended sediment plume and water quality monitoring conducted in accordance with the Applicant's Water Quality Monitoring Plan in the EM&CP and use of an Aquatic Inspector responsible for monitoring construction activities to ensure the EM&CP is followed, are presented in **Appendix G**. As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct additional pre-installation physical and chemical sediment sampling in the Hudson River for use in post-installation monitoring (NYSPSC 2013).

Floodplains. Burial of the transmission line under the Hudson River would have no effects on current use, property management, and plans for development in floodplains. Therefore, no impacts on floodplains would be anticipated from construction of the proposed CHPE Project transmission line in the Hudson River.

The portions of the buried transmission line along the upland section though Stony Point, Haverstraw, and Clarkstown would cross Zone A floodplains (100-year floodplains that have no established base flood elevation) associated with surface waters along the CSX ROW and U.S. Route 9W (see **Appendix A**). The transmission line would be installed at least 3 feet (1.0 meters) below ground and the ground surface returned to its pre-existing level. Cooling stations would be located outside of the floodplain. Proposed CHPE Project activities along this portion of the Hudson River Segment would result in temporary impacts on floodplains from construction activities related to burying the cables. Vegetation clearing, ground disturbance, trenching and soil stockpiling, and related construction activity would occur within the floodplains crossed by the proposed CHPE Project.

BMPs that would be implemented during construction include use of erosion and sedimentation controls, prohibitions on storing construction equipment or conducting refueling in floodplains, and restoring pre-existing ground contours would minimize any impacts on flood flows, flood storage, or flood hazards during the construction period. In addition, a number of floodplain crossings would be made using horizontal directional drilling (HDD) methods that would avoid any direct disturbance within floodplain areas. The complete listing of Applicant-proposed measures and considered in this analysis is provided in **Appendix G** of the Final EIS.

Groundwater. No impacts on groundwater would be anticipated during installation of the aquatic portions of the transmission line because the area to be disturbed during construction activities would be beneath the Hudson River. At some locations along the terrestrial portion of the transmission line route, the blasting of bedrock could be required to install the terrestrial transmission cable. Bedrock blasting has the potential to increase bedrock fracturing near the blasting zone. Blasting could result in changes in local hydrology and increased levels of turbidity temporarily in nearby groundwater wells. Therefore, impacts on groundwater quality could occur if blasting of bedrock is required.

The aquatic cable would be buried in sediments to a depth of approximately 7 feet (2.1 meters) using water-jetting techniques. In three locations in this segment, HDD would be used in water-to-land transition from aquatic to terrestrial areas of the transmission line route and numerous other areas along the Haverstraw bypass. During the HDD process, drilling fluid would be used and has the potential to percolate to groundwater. As described in **Section 5.2.3**, the bentonite clay in the drilling fluid would be filtered from the fluid by the soil and would aggregate into soil pore spaces before it could reach groundwater; therefore, impacts on groundwater are not anticipated from HDD operations. Soil compaction from vehicle and foot traffic during installation activities could result in localized changes in drainage patterns as compacted soil reduces percolation of precipitation into the ground. Significant impacts would not be expected on groundwater recharge from the slight increase in impervious surfaces (such as from the cooling stations) and related decrease in infiltration of precipitation into soils to recharge groundwater. No impacts on primary water supply aquifers or sole-source aquifers would occur, as these resources are not present in this segment.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation of the transmission line would not be expected to result in significant impacts on water temperature for the lifespan of the proposed CHPE Project. During operation of the transmission line, heat would be generated and dissipated into the surrounding environment. The Applicant calculated thermal impacts on water quality from operation of the transmission line. The predicted increase in temperature at the sediment surface from the cables buried 4 feet (1.2 meters) with no separation was estimated to be 1.8 °F (1.0 °C), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C) (CHPE 2012dd, CHPE 2012kk). Because of the volume of water in the Hudson

River, tidal and river currents, and turbulence, this low level of heat is anticipated to dissipate quickly within the water column. As the cables in the Hudson River would be buried to a depth of 7 feet (2.1 meters) or more, the predicted level of temperature increase should be even lower, and no thermal impacts on the Hudson River would be anticipated. A slightly greater, but still not significant impact, would be expected in a few places where the transmission line is buried less than 3 feet (0.9 meters) and is covered with rip-rap or concrete mats. The estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C) (Exponent 2014). Because these temperature increases would be within the normal range of temperature variability in the Hudson River, no impacts on other water quality parameters would be anticipated to occur during operation of the transmission line.

Inspection activities would be non-intrusive; therefore, no impacts from inspection of the transmission line would be expected. If a cable fault occurs during operation, and repairs of the aquatic cable are necessary, the cable would have to be exposed, brought to the surface, a repair section spliced, and then reburied. Localized increases in turbidity and resuspension of sediments, some of which could be contaminated, could result from disturbance within the Hudson River during emergency repairs. The impacts would be restricted to the immediate vicinity of the repairs during the short period of time that the repairs would take to be completed.

No impacts on water resources would be expected during operation of the terrestrial portion of the transmission line in this segment (i.e., the Haverstraw bypass) because there would be no change in water quality, water availability, or elevation changes in floodplains. During potential emergency repair activities, impacts on water quality related to ground disturbance to uncover and repair damaged lines could increase the potential for erosion and sedimentation to nearby surface waters. The cable would have to be exposed and then reburied. While the frequency of emergency repairs cannot be predicted and the repair time would vary, repairs likely would be infrequent and short-term in duration and would be limited to the immediate vicinity of the repair site. The impacts would be similar to those described for the original installation, but with a shorter duration and smaller area of disturbance.

Following completion of construction, no permanent aboveground alterations or new impervious surfaces that could impact flood storage, infiltration, or flooding hazard would result from operation of the underground transmission line. Therefore, potential impacts on floodplains from operation and maintenance of the terrestrial portion of the transmission line are not expected.

5.3.4 Aquatic Habitats and Species

Impacts from Construction

Although no significant impacts are expected from installation of the aquatic transmission lines, installation activities would result in the temporary disturbance of up to 533 acres (216 hectares) of riverbed in the Hudson River, which is approximately 0.9 percent of the surface area of the Hudson River in the vicinity of the proposed CHPE Project (i.e., between MPs 228 and 324). This total includes a conservative disturbance area estimate of 25 feet (7.6 meters) on each side of the transmission line (for a 50-foot [15-meter] construction corridor), which includes settlement zones where a majority of the sediment disturbed by the line would settle. Once stabilized following deployment, vessel anchors used during installation activities would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. Anchors also require approximately 200 square feet (18 square meters) (20 feet [6 meters] by 10 feet [3 meters]) to dig in and stabilize. For four anchors, that is a total of 800 square feet (72 square meters) or 0.02 acres (0.01 hectare). Midline buoys would be used to prevent anchor chain sweeps that might otherwise affect benthic habitat.

Debris removal would occur in the fall preceding installation activities the next year. Sediment disturbance associated with debris removal would occur within the area to be disturbed by the actual transmission line installation within the following year.

Concrete mats would be installed to help protect the transmission line in areas with bedrock at or near the surface and over existing submerged infrastructure lines for approximately 1.8 miles (2.9 km) and 1.7 acres (0.7 hectares) of the 88-mile (151-km) aquatic portion of the project route in the Hudson River. The Applicant is committed to burying the cable where possible, as burial provides the greatest protection against interactions with vessels (e.g., anchor drops or snags). Physical surveys, including diver surveys of each utility, would be performed and possibly reduce this estimate. Rock outcroppings would be avoided wherever possible.

The Hudson River and its tributary estuaries are the major surface waters crossed in this portion of the proposed CHPE Project route. The proposed CHPE Project route crosses several NRI-listed segments of the Hudson River. During construction, potential impacts on water quality could be caused by localized increases in turbidity and downstream sedimentation, and resuspension of contaminated sediments resulting from disturbances within the Hudson River during the installation of the transmission cables by jet plow and use of anchors and spuds.

The impacts on aquatic habitat and species in the Hudson River would result from temporary disturbance of the riverbed, increases in sediment disturbance (including redeposition), increases in turbidity, and associated water quality degradation. Turbidity increases associated with transmission line installation would be less than 200 mg/L of TSSs within 500 feet (152 meters) of the jet plow based on modeling conducted by the Applicant (see **Section 5.3.3**). Additionally, resuspension of contaminants in the Hudson River from the proposed CHPE Project is not expected to exceed New York State water quality standards for aquatic life protection from acute toxicity. With respect to PCBs, the USEPA has established water quality criteria for the protection of aquatic life against chronic exposures. The Criterion Continuous Concentration (CCC) for PCBs for fresh water and salt water are 0.014 micrograms per liter (μg/L) and 0.03 μg/L, respectively. The CCC is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect (USEPA 2012h). The USEPA has not established criteria for acute exposures. New York State has adopted water quality standards for PCBs for the protection of wildlife from long-term (chronic) discharges. These criteria, contained in 6 NYCRR Part 703, establish a standard of 1.2×10^{-4} μg/L for PCB concentrations in fresh or salt water. The USEPA Engineering Performance Standards for dredging resuspension at the Hudson River PCBs Superfund Site set a total allowable PCB concentration of 0.5 μg/L (USEPA 2012f).

Maximum concentrations of PCBs that would result from sediment disturbance by the proposed CHPE Project for the Hudson River are estimated to be 0.1 μg/L (CHPEI 2012i, USEPA 2012e). This concentration would be higher than the chronic exposure standards established by USEPA and New York State. However, these standards have been established to account for long-term, chronic exposures of aquatic life to PCBs. The concentration would be well below the Engineering Performance Standard set by the USEPA for dredging resuspension at the Hudson River PCBs Superfund Site, which is a more relevant guideline for this short-term construction activity.

The proposed CHPE Project aquatic cable installation activities in the Hudson River would result in PCB resuspension over a discrete, limited time period, as opposed to indefinitely, and the resulting concentration levels would comply with the USEPA Engineering Performance Standard.

Aquatic Habitat and Vegetation. Impacts on SAV could occur from the installation of the transmission line including sediment resuspension and turbidity generated by water jetting, moving construction vessels, and anchoring of vessels could affect SAV. However, because the proposed CHPE Project would avoid SAV in the Hudson River Segment, impacts such as crushing and uprooting of SAV would be avoided during the cable installation. Other impacts would occur from increases in turbidity and associated water quality degradation. Reduced light and sediment redeposition would impact SAV. These impacts are described in detail in **Section 5.1.4**. From Coxsackie to Newburgh, the river is generally shallow and supports a wide variety of SAV beds. SAV is generally found in water depths of less than 10 feet (3 meters); however, the transmission line would generally be installed in deeper waters (i.e., greater than 20 feet [6 meters]), minimizing the potential for impact on SAV. SAV is not common in the Hudson River from the Newburgh area south to Haverstraw Bay, perhaps due to higher turbidity (Findlay et al. 2006). Correspondingly, impacts on SAV in this portion of the Hudson River would not be significant, considering existing suspended sediments and turbidity in this area. Any impacted SAV beds would be expected to regrow once construction activities have ceased.

Impacts on aquatic habitat and vegetation would also occur in areas where cable burial cannot be achieved due to bedrock or existing submerged utility lines, requiring installation of concrete mats or rip-rap to protect the transmission line. Concrete mats would cover 1.8 miles (2.9 km) of the transmission line in the Hudson River Segment, representing 2.0 percent of the length of the proposed CHPE Project route in the Hudson River in the vicinity of the proposed CHPE Project. Except for areas where the concrete mats would be installed over exposed bedrock, installation of these mats or rip-rap would cause a change in benthic habitat type equal to the area of their footprint, and would also result in non-significant impacts on SAV (if present), shellfish, and benthic communities. However, the concrete mats or rip-rap would eventually provide additional new hard-bottom habitat for epibenthic organisms to colonize, essentially functioning as small patch reefs.

Shellfish and Benthic Communities. Impacts on shellfish and benthic communities would result from crushing, injuring, removal, and burial of communities during installation of the transmission line. Complete recovery rates of benthic macroinvertebrate communities following dredging range from a few weeks or months to a few years, depend on the type of bottom material, the physical characteristics of the environment, and the timing of disturbance (Hirsch et al. 1978, LaSalle et al. 1991). In a 2-year study in the lower Hudson River, Bain et al. (2006) (as cited in NMFS 2014b) reported that within a few months following dredging, the fish and benthic communities at a dredged location were no different from seven nearby sites that had not been dredged, and that there were no indications of a lasting effect at the dredged site. Other impacts would result from turbidity and potentially from spills or leaks of hazardous materials. These impacts, described in detail in **Section 5.1.4**, are not expected to be significant. Turbidity affects the ability of oysters to filter feed, because sediment loads trigger the oyster to temporarily close and stop filtering (Gonda-King et al. 2010).

As described, installation of rip-rap or concrete mats could result in changes to community composition related to the change in substrate. However, this change would affect only a small portion of available habitat. Additionally, when the concrete mats are placed in areas of fine sediment, the spaces between the individual concrete elements would be filled by suspended sediment and the surficial habitat would be partially restored. It is likely that some sediment would accumulate on the concrete mats, resulting in some benthic habitat recolonization over time. These impacts are described in detail in **Section 5.1.4**.

Benthic communities in the Hudson River are already adapted to human disturbances and other impacts such as degraded water quality, dredging, shoreline hardening, and invasive species. Installation of the transmission line in the Hudson River Segment would occur from August 1 through October 15 and could interfere in localized areas with spawning of some shellfish species, such as blue mussel, northern quahog, and softshell clam. However, because of the widespread available habitat for these species, no significant impacts are expected that would cause spawning failure or would decrease a species' ability to survive. To avoid the spread of zebra mussels farther in the Hudson River, the Applicant would train and educate transmission system contractors and subcontractors to identify aquatic invasive species, and site-specific prescriptions for preventing or controlling their transport throughout or outside of the proposed CHPE Project construction corridor. A pre- and post-energizing benthic monitoring program would be developed in accordance with Condition 163 of the NYSPSC Certificate for the proposed CHPE Project to evaluate impacts of construction on benthic communities (NYSPSC 2013).

Fish. Impacts on fish communities would occur from the installation of the transmission line. Impacts would result from temporary increases in turbidity and associated water quality degradation, noise, lights, and any hazardous material spills. These impacts, described in detail in **Section 5.1.4**, are not expected to be significant.

More than 120 species of fish occur in the Hudson River Segment. If the installation of the aquatic transmission line occurs during spawning season, it could have a greater impact on the spawning adults and eggs and larvae of species that spawn in and migrate through the Hudson River. Impacts could include a behavioral disruption (i.e., interruption or obstruction) of the migration and spawning of adult fish, or physical effects of turbidity on eggs and larvae. Based on the proposed CHPE Project aquatic construction schedule (August 1 through October 15), impacts on many spawning fish would be avoided (see Table H.2-3 in **Appendix H** for fish spawning seasons). However, it would overlap with parts of the spawning season for some forage fish such as bay anchovies, killifish, sticklebacks, and sheepshead minnows, and some commercially or recreationally important fish such as Atlantic menhaden and weakfish. Because available habitat for these species is widespread in the area, no significant impacts are expected that would cause spawning failure or would decrease a species' ability to survive.

Essential Fish Habitat. Impacts on EFH (i.e., the water column and substrates) would result from bottom disturbance, increased turbidity and associated water quality degradation, light and noise impacts on fish, and the potential for release of hazardous materials in sediments during aquatic transmission line burial. Disturbance of sediments would primarily affect sand, silt, and mud, which serve as EFH for various life stages of red hake, scup, summer flounder, windowpane flounder, winter flounder, clearnose skate, and little skate (see **Table 3.3.4-1**). Increased turbidity and any release of contaminated materials would affect demersal, pelagic, and surface waters that serve as EFH for various life stages of black sea bass, summer flounder, winter flounder, Atlantic butterfish, Atlantic sea herring, bluefish, windowpane flounder, dusky shark, and red hake. Winter flounder eggs, and black sea bass, summer flounder, winter flounder, and windowpane flounder larvae are demersal and are susceptible to light, noise, and turbidity-related impacts. These impacts would temporarily degrade EFH and would be localized in scope. A full EFH Assessment document has been prepared by DOE for the proposed CHPE Project for review by appropriate agencies including NMFS and will be included in the Final EIS (see **Appendix R**).

Significant Coastal Fish and Wildlife Habitat. Impacts on SCFWHs would occur in the Hudson River Segment from the proposed CHPE Project. There are four SCFWHs that would be crossed by the transmission line: Esopus Estuary, Kingston-Poughkeepsie Deepwater Habitat, Hudson Highlands, and Lower Hudson Reach. These SCFWHs would be impacted by sediment disturbance, turbidity, and associated water quality degradation. This would impact SAV and spawning fish in these areas. Bald eagles known to forage in the Hudson Highlands SCFWH and take weak and dying fish from the river surface. Turbidity has the potential to hinder detection of prey while in flight or at roost. However, turbidity would be generated on the river bottom in this deeper portion of the river and it is not expected to rise to the surface at levels to impair observation of prey by the eagles. Additionally, reduced in-water pressure and jetting speeds (e.g., less than 4 knots) would be used to reduce turbidity when crossing sensitive areas such as SCFWHs.

Of the 1.8 miles (2.9 km) of concrete mats to be installed in the Hudson River, approximately 1.0 miles (1.6 km) would cover 1.0 acres (0.4 hectares) in SCFWHs, or less than 0.01 percent of the area of the affected SCFWHs. Construction is expected to occur at MPs 228 through 295 (crossing the Esopus Estuary, Kingston-Poughkeepsie Deepwater Habitat, and Hudson Highlands SCFWHs) from August 1 through October 15 to avoid impacts on overwintering, spawning migrations, spawning activity, and larval stages of ESA-listed fish species. Construction is expected to occur at MPs 302 through 324 (crossing the Lower Hudson Reach SCFWH) from July 1 through October 31. The Lower Hudson Reach SCFWH provides important habitat for striped bass from November through April and winter flounder spawning from December through April. Impacts would be avoided during that time period because the construction window is July 1 through October 31. See **Table 2-2** for more information on underwater construction windows. NYSDOS SCFWH narratives generally indicate that habitat disturbances would be most detrimental during fish spawning and incubation periods, which generally extend from April through August for most species. While some fish spawning and incubation periods occur into August, most are finished by July (NYSDOS 2012) (see Table H.2-3 in **Appendix H**).

In addition, another 18 SCFWHs are within 1 mile (1.6 km) of the proposed transmission line, and most of these 18 SCFWHs are adjacent to or within 0.3 miles (0.5 km) of the proposed CHPE transmission line route. However, due to the distance between these SCFWHs and the proposed construction, and the short-term nature of the construction activities, impacts on these adjacent or nearby SCFWHs would not be significant. Furthermore, the transmission line is routed on land to avoid the Haverstraw Bay SCFWH, which provides valuable habitat for juvenile and adult freshwater, anadromous, estuarine, and marine species.

Impacts from Operations, Maintenance, and Emergency Repairs

No significant impacts are anticipated from operation of the transmission system; however, the increased temperature and magnetic fields that would occur would be similar to those impacts described under operational impacts in **Section 5.1.4**, but the species affected would be different. Available information suggests that the impacts from the transmission line's magnetic fields would not be significant. The transmission line cables in the Hudson River would be buried to a minimum depth of 7 feet (2.1 meters), and changes in temperatures in sediment and the water column would be lower than described in **Section 5.1.4** because the cable would be buried deeper than the 3.2-foot (1-meter) burial depth used to describe temperature changes. In accordance with Certificate Condition 163, the Applicant would complete a pre-installation and post-energizing sediment temperature and magnetic field survey of the transmission line route to assist in evaluation of operational impacts from magnetic fields and heat during the lifespan of the proposed CHPE Project (NYSPSC 2013).

No impacts on aquatic habitat and species would be anticipated from periodic non-intrusive inspections of the transmission line. Impacts on SAV, shellfish and benthic communities, and fish associated with sediment disturbance and turbidity from emergency repairs, if required, would be similar to those described during initial construction and installation, but on a smaller scale and for a shorter duration. Additional impacts associated with emergency repairs could include disturbance, contamination, and noise. Most of the impacts associated with emergency repairs are expected to be localized and temporary, lasting only the duration of activities.

Aquatic Habitat and Vegetation. During operation of the transmission line, magnetic fields are not expected to significantly impact SAV. Temperature increases associated with operation of the transmission line are not expected to result in a significant impact on SAV. It is expected that any temperature increase would be negligible at the sediment-water interface and any impact would be extremely localized (CHPEI 2012dd). Additional details on these impacts are described in **Section 5.1.4**. Emergency repairs, if required, could result in impacts in the form of sediment disturbance and turbidity impacts on SAV, although these impacts would not be significant. These impacts would be similar to those associated with construction, but more localized and temporary, lasting only for the duration of activities.

Shellfish and Benthic Communities. For a cable buried 4 feet (1.2 meters) below the surface, the estimated temperature rise at 8 inches (20.3 cm) below the surface of the sediments would be 9 °F (5.0 °C) (CHPEI 2012bbb). However, the temperature increase at the sediment surface directly above the cable is estimated to diminish to 1.8 °F (1.0 °C), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C) (CHPEI 2012i, CHPEI 2012kk). It is likely that these are overestimated because they do not take into account the cooling effect from natural water flow, which would result in further heat dissipation, or the insulation provided by the sheathing surrounding the transmission cables (CHPEI 2012dd). Overall, heat would dissipate in the sediments just below the sediment and water interface, which is the biologically productive zone in the sediments. Therefore, significant impacts on benthic resources from temperature during operation of the transmission line would not be anticipated. Where the transmission cables cannot be buried to their full depth and must be covered with concrete mats, the estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C). The highest increase in ambient temperature in the top 2 inches (5 cm) of sediment along the sides of the concrete mats is expected to be 1.26 °F (0.70 °C) or less (Exponent 2014). During operation of the transmission line, impacts from the slight increase in temperature and magnetic fields would not be significant. Impacts would be localized and directly above the cables (CHPEI 2012i, CHPEI 2012kk, CHPEI 2012bbb).

Experimental exposure values for magnetic fields described in **Section 5.1.4** are much more intense than those expected from the proposed CHPE Project transmission line in the Hudson River Segment, which is calculated at less than 160 mG at the sediment-water interface directly above the buried transmission cables buried at 3.3 feet (1 meter). This field would be extremely localized. According to studies, the survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields (Bochert and Zettler 2004, Normandeau et al. 2011).

No significant impacts associated with sediment disturbance and turbidity would be expected to occur on shellfish and benthic communities during emergency repairs, and effects would be similar to those described for construction activities but of a shorter duration and have a smaller area of impact. Due to the proposed transmission line's burial depth and lack of other suitable conditions for oyster beds, no area where the transmission line would be installed and operated would provide a suitable location for a future oyster restoration project. One current reef restoration project, located near Hastings-on-Hudson (MP 315), would not be impacted by the proposed CHPE Project as turbidity generated would be localized to the deeper areas of the river where the transmission line would be installed.

Pre- and post-energizing monitoring programs for benthic communities, sediment temperature, and magnetic fields would be implemented as required by Certificate Condition 163 (NYSDPS 2013) to evaluate potential operational impacts on benthic communities during the lifespan of the transmission line.

Fish. Impacts from operation of the transmission line associated with temperature increases and magnetic fields could occur. Temperature increases associated with operation of the transmission line are not expected to result in a significant impact on fish, as heat emitted from the cables would largely be dispersed within the sediment. As described in **Section 5.3.3**, operation of the buried underwater cables would result in a temperature increase of less than 0.001 °F (0.0001 °C) in the water column directly above the transmission line. This assumes a 4-foot (1.2-meter) burial depth, whereas the proposed burial depth in the Hudson River would be 7 feet (2.1 meters). Where the cables are covered with concrete mats, the increase in ambient water temperature surrounding the cables covered by the concrete mats would 0.25 °F (0.14 °C) (Exponent 2014). These water temperature increases are within the range of seasonal variability within the Hudson River. Therefore, impacts on finfish behavior and reproduction from temperature increases would not be significant (CHPEI 2012dd).

Evidence indicates that electrosensitive organisms such as sturgeon can detect induced electric fields. However, electric fields used in these experiments were higher than the induced electric fields expected at the sediment bed for the proposed transmission line. The change in the induced electric field calculated from the proposed CHPE Project is a small increase (17 percent) over that produced by the ambient geomagnetic field and quickly diminishes with distance from the transmission cables. The induced electric field from the Earth or the transmission cables is also considerably weaker than the electric field measured over certain marine sediments. Therefore, the increment in the ambient marine electric field even over the buried cable would not be a unique or novel stimulus nor would it be strong enough to produce physiological responses (Bailey and Cotts 2012). Demersal fish are more likely to be exposed to higher field strengths, because they are closer to the river bottom where the transmission line would be buried, as compared to pelagic species, which are found higher in the water column (Normandeau et al. 2011). Atlantic and shortnose sturgeon are both demersal and electrosensitive. Potential impacts on these sturgeon are described in **Section 5.3.5**.

Potential impacts on fish from increases in magnetic fields are discussed in detail in **Section 5.1.4**. Results from experiments evaluating long-term exposure of benthic species (including flounder [*Plathichthys flesus*] to a magnetic field of 37,000 mG showed no statistical differences from non-exposed flounder in survival, condition, or reproductive potential (Bochert and Zettler 2004). These experimental values were much more intense than those expected from the transmission line in the Hudson River segment, which is calculated at less than 160 mG at the sediment-water interface directly above the buried transmission cables. This field would also be extremely localized to the area immediately above the transmission line location in the river. As such, no significant impacts on behavior and reproduction of adult demersal species, such as winter and summer flounder that could occur in the Hudson River Segment, would be expected.

Laboratory studies that exposed rainbow trout, brown trout, carp, and northern pike fish eggs and larvae to magnetic fields ranging from 5,000 mG to 150,000 mG resulted in changes in embryonic development and movement (Formicki and Perkowski 1998, Formicki and Winnicki 1998, Winnicki et al. 2004). However, survivability was not discussed. These species serve as a surrogate for other species expected to occur in the proposed CHPE Project ROI. The increase in magnetic field strength at the sediment surface is approximately 162 mG where the transmission line is buried or 600 mG above concrete mats, and would decrease with an increase in distance from the river bottom (i.e., in the water column). Because laboratory experiments used exposures that are 1 to 3 orders of magnitude higher than the magnetic field strengths of those expected from the proposed CHPE Project transmission line, the effect of the magnetic field on fish eggs and larvae is expected to be negligible, even for benthic eggs and larvae, such as winter flounder eggs.

The American eel maintains a relatively small home range (approximately 7 acres [3 hectares]) in shallow water along the banks of slow moving rivers or streams (American Eel Development Team 2000). Although eels can detect the magnetic and electric emitted from buried submarine cables they could cross over during migration, there is no evidence that these interactions would yield permanent adverse impacts on the species' ability to feed or successfully migrate to or from spawning or feeding habitats (see **Section 5.1.4** for additional information).

Essential Fish Habitat. Impacts from magnetic fields on fish that use EFH would be as described under *Fish*.

Significant Coastal Fish and Wildlife Habitat. Magnetic fields and induced electrical currents have the potential to impact species that use the SCFWHs, although uncertainties surround those potential impacts. Magnetic fields associated with the transmission line are expected to be weak and localized. Impacts from magnetic fields on invertebrates and fish that use EFH are described under *Shellfish and Benthic Communities* and *Fish*.

5.3.5 Aquatic Protected and Sensitive Species

Impacts from Construction

Federally Listed Species

As noted in **Section 3.3.5**, the shortnose sturgeon, three DPSs of Atlantic sturgeon occur in the Hudson River. References to “Atlantic sturgeon” include the three DPSs, with the New York Bight DPS being the most numerically present of the DPSs. Proposed CHPE Project construction activities, including debris removal, may affect, but are not likely to adversely affect, the shortnose sturgeon or the Atlantic sturgeon.

Although effects on Atlantic and shortnose sturgeon in the Hudson River are not expected to be significant, they would be similar to those for state-listed lake sturgeon (also bottom-dwelling fish) in Lake Champlain. Full burial of transmission cables might not be feasible in areas of shallow bedrock and existing utility lines in the Hudson River Segment. In such areas, concrete mats or rip-rap would be installed to help protect the proposed transmission line. Installation of rip-rap or concrete mats would be a permanent alteration of habitat that could impact shortnose and Atlantic sturgeon where the concrete mats or rip-rip replaces soft sediment (forage habitat) with hard-bottom habitat. However, the affected area would be small relative to the available forage habitat in the Hudson River, would not apply to bedrock crossings, and adjacent habitat would still be available. Vessel collisions would impact shortnose and Atlantic sturgeon because the cable installation vessels would be moving slowly, with an average rate of progress of 1.5 miles (2.4 km) per day. Applicant-proposed measures such as operation of vessels at reduced speeds in the construction corridor and shallow waters would minimize impacts from proposed CHPE Project construction activities on shortnose and Atlantic sturgeons (see **Appendix G**). The installation barges would typically operate at 4 knots or less based on restrictions on cable feed equipment, and in areas with significant side scan and magnetometer targets, the speed would be reduced to less than 1 knot. These measures would provide shortnose and Atlantic sturgeon species an opportunity to move out of the way of moving vessels, thereby making it unlikely that a collision would occur.

The Applicant has initiated discussions with USFWS, NMFS, NYSDEC, and NYNHP to gather additional information and to develop recommendations for the avoidance and minimization of potential impacts on aquatic species, including federally listed fish species (see **Appendix G**). A BA has been prepared as part of ESA consultation and to establish a foundation to support the ESA Section 7 consultation for listed species (see **Appendix Q**). The Applicant consulted with NYSDEC, NYSDOS, and NMFS to establish time periods when sensitive species would be utilizing different portions of the Hudson River.

Based on these consultations, the Applicant would use construction windows (see **Table 5.3.5-1**) to avoid impacts on spawning migrations, spawning activity, and larval stages of ESA-listed fish species. The construction windows are August 1 to October 15 for construction in the Hudson River between Cementon and New Hamburg, and September 15 to November 30 for construction between New Hamburg and Stony Point. Spawning seasons for ESA-listed fish species in the Hudson River Segment are April through May for shortnose sturgeon and May through June for Atlantic sturgeon. The construction window is July 1 to October 31 for the area from Clarkstown to the Harlem River. Adult shortnose and Atlantic sturgeon could transit through this area during this construction window. NYSDOS has conditionally concurred with these construction windows as part of its CMP consistency certification for the proposed CHPE Project (see **Appendices F.1** and **G**). Restriction of construction activities to specific windows of time would protect ESA-listed fish species during spawning migrations, which are the most vital and sensitive portions of their lifecycle. Specific impacts on federally listed species are provided in the following paragraphs.

Table 5.3.5-1. Construction Windows and Potentially Impacted Aquatic Protected and Sensitive Species

Segment	MPs	Construction Window	Potentially Impacted Aquatic Protected and Sensitive Species and Lifestage
Hudson River	228–245 (Cementon [Catskill] to New Hamburg)	August 1–October 15*	*Shortnose sturgeon:* spawning adults, eggs, and larvae (spring); adults and juveniles (early summer). *Atlantic sturgeon:* spawning adults, eggs, and larvae and early juveniles (spring and early summer).
Hudson River	269 to 295 New Hamburg to Stony Point	September 15 to November 30	*Shortnose sturgeon:* adults and juveniles (summer). *Atlantic sturgeon:* adults, eggs, larvae, and early juveniles (spring and summer); early juveniles (winter).
Hudson River	303–324 (Clarkstown to Harlem River)	July 1–October 31	*Shortnose sturgeon:* adults and juveniles (winter and early summer). *Atlantic sturgeon:* early juveniles (winter and spring).

Source: Bain 1997, NYSPSC 2013

Notes:

* The transmission line would be installed between MPs 245 and 269 between September 14 and November 30 to avoid impacts on the Kingston-Poughkeepsie Deepwater SCFWH.

Installation of the proposed aquatic transmission line would result in up to 533 acres (216 hectares) of riverbed disturbance in the Hudson River, which is approximately 0.9 percent of the surface area of the Hudson River in the vicinity of the proposed CHPE Project. This total includes a conservative disturbance area estimate of 25 feet on each side of the transmission line (for a 50-foot construction corridor), which includes settlement zones where a majority of the sediment disturbed by the line would settle. The anchors would have a total impact area of approximately 15 square feet (1.4 square meters) per deployment. Midline buoys would be used to prevent anchor chain sweeps that might otherwise affect benthic habitat. For the Hudson River Segment, the depth of the transmission line trench is proposed to be at least 7 feet (2.1 meters) with 1 foot (0.3 meter) or less of horizontal separation between the two transmission cables, which would be collocated in the same trench. Temporary impacts along the cable installation paths are associated with other components of cable installation activities such as barge positioning, anchoring, anchor cable sweep, and the pontoons on the jet plow. Impacts associated with the anchor cables, if used for positioning of the cable lay vessel, such as sediment disturbance and turbidity increases causing fish to move away from the area, are anticipated to be temporary. Therefore, the invertebrate prey community would recover and the physical characteristics of the sediments would not be altered. The proposed transmission line would enter the Hudson River near Catskill, bypassing the Inbocht Bay and Duck Cove SCFWHs, and would exit the Hudson River north of Haverstraw Bay at Stony Point, avoiding the Haverstraw Bay SCFWH. The proposed route, therefore, would avoid directly transiting 18 of the 22 SCFWHs along the Hudson River Segment. In the areas where the proposed transmission line would traverse the Hudson River, the NYSDEC has identified “exclusion zones” of particularly sensitive areas in the Hudson River that would be avoided by installation activities.

Impacts of sediment disturbance and turbidity on shortnose and Atlantic sturgeons would be the same as those for common fish species described in **Section 5.1.4** and for state-listed species in **Section 5.1.5**. Water jetting for the proposed CHPE Project is anticipated to create a plume that would result in temporary suspended sediment levels of less than 200 mg/L in the Hudson River Segment (see **Section 5.3.3**). The Applicant would modify water jetting when crossing sensitive habitats including SCFWHs in the Hudson River, which contain important breeding habitat for ESA-listed fish species, including reductions in water jetting pressure and speed, which would reduce sediment suspension. Jet plowing minimizes dispersal of suspended solids (and any potential sediment contaminants) because the turbidity plume is relatively small compared to conventional dredging. Given the depth and width of the Hudson River and the localized and temporary nature of any sediment suspension, no hindrance of sturgeon passage would be expected during underwater cable installation.

The ESA-listed fish species in the Hudson River are highly mobile during the juvenile and adult life stages and generally would be able to move into adjacent areas away from construction-related activities. The temporary and localized impacts on water quality and turbidity within the SCFWHs would be minimal, because in sensitive habitats like SCFWHs, the Applicant would modify water-jetting activities as noted previously. Turbidity plumes from water jetting would not be expected to extend over long distances or result in any type of barriers to fish movement. Cable installation might temporarily disturb the substrate within the Hudson River; however, given the speed of water-jetting activities (approximately 1.5 miles [2.4 km] a day), this disturbance would be short-term in any one location, and would be localized to the immediate area of the water jetting as habitat would be expected to recover. No permanent losses of habitat would be expected from the proposed underwater cable installation. In areas where deposition of suspended sediments could impact demersal fish eggs, the Applicant would avoid construction during the early spring via the use of construction windows (see **Table 5.3.5-1**), which would avoid or minimize the potential impacts associated with sediments covering these eggs. In recognizing the importance of Haverstraw Bay as important habitat for fish nurseries (including for ESA-listed shortnose and Atlantic sturgeon), the Applicant would bypass Haverstraw Bay and install the approximately 8 miles (13 km) of terrestrial transmission line in railroad and roadway ROWs through the Town of Stony Point, Town and Village of Haverstraw, and the Town of Clarkstown. The installation of the proposed aquatic transmission line would cause a temporary sediment disturbance for benthic habitat, which supports benthic prey items for ESA-listed shortnose and Atlantic sturgeon, but would remain usable as potential shortnose and Atlantic sturgeon foraging habitat. Temporary and localized reductions in available benthic food sources would be anticipated because some mortality of benthic infaunal organisms that serve as prey for ESA-listed shortnose and Atlantic sturgeon would occur (refer to **Section 5.1.4** for potential impacts to the benthic community). Shortnose and Atlantic sturgeon are routinely encountered in turbid waters (Dadswell et al. 1984), and are, therefore, considered to be highly tolerant of suspended sediment at the levels that are generated by marine construction activities. NMFS concluded that the effect of suspended sediment concentrations in the range of 10 to 350 mg/L from dredging, pile driving, and other construction activities for a marina project in the Haverstraw Bay region would not be significant on shortnose sturgeon (FHWA 2012).

As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant is required to conduct a series of pre-installation studies in the Hudson River, including benthic macroinvertebrate and sediment sampling, bathymetry surveys, and Atlantic sturgeon hydrophone surveys, for use in post-installation compliance monitoring (NYSPSC 2013). In-river work south of the Haverstraw Bay SCFWH would occur during the high, or flood tide condition to avoid or minimize impacts of resuspended sediments on Haverstraw Bay, which contains important habitat for ESA-listed fish species. In areas where deposition of suspended sediments could impact demersal fish eggs, the Applicant would avoid construction during the early spring (see **Table 5.3.5-1**), which would avoid or minimize potential impacts associated with sediments covering these eggs. Benthic habitat disturbance would not result in the loss of ESA-listed fish eggs due to the timing of the proposed construction activities (NYSPSC 2013).

Contaminants that occur in the sediments could be mobilized and become bioavailable as a result of sediment disturbance associated with proposed transmission line installation (see **Sections 5.3.3** and **5.3.4**). If contaminated sediments became bioavailable or biotransferred within food chains, impacts such as behavioral alterations, deformities, reduced growth, reduced fecundity, reduced egg viability, reduced survival of larval fish, would occur (Sindermann 1994). Several characteristics of shortnose and Atlantic sturgeon (e.g., long lifespan, extended residence in estuarine habitats, benthic predation) predispose the species to long-term and repeated exposure to environmental contamination and potential bioaccumulation of heavy metals and other toxicants (Dadswell et al. 1984). However, water quality modeling computed no exceedances of water quality standards that are based on protecting aquatic life from acute toxicity (see **Sections 5.1.4** and **5.1.5**). Water quality sampling and monitoring would be conducted during jet plow and shear plow pre-installation trials and during cable installation. In order to avoid the portions of the river associated with the Upper Hudson River PCB Dredging Project and the sensitive habitats found in the upper portion of the lower Hudson River, the cables would follow a terrestrial route before entering the Hudson River at Catskill. Bypassing this portion of the Hudson River would avoid or minimize the potential for resuspending sediments with higher levels of PCBs, thereby avoiding the potential for bioavailability to protected fish species.

In limited areas the transmission line might not be able to be buried due to substrate or utility crossings, and would instead be covered with sloping rip-rap or concrete mats. Placement of concrete mats would bury the underlying benthic community, including potential prey for Atlantic and shortnose sturgeon. However, the area that would require use of concrete mats or rip-rap is expected to be a small relative to the available habitat for ESA-listed fish species. Installation of mats or rip-rap would cause a permanent change in benthic habitat type from soft sediments to the hard substrate equal to the area of the footprint of the concrete mats or rip-rap. Stone used in rip-rap provides hard substrate habitat, and spaces between rip-rap stones provide velocity refuge and cover for aquatic invertebrates and small fishes (Fischenich 2003), which could include benthic prey for shortnose and Atlantic sturgeon. Shortnose and Atlantic sturgeon, however, would be able to use adjacent areas for foraging and other activities.

The mats would alter local hydraulic conditions such that some sediment deposition or scouring could occur around the mats or rip-rap (see **Section 5.1.9**). However, the overall change in bottom topography would be negligible. The concrete mats would extend only a short height above the river bottom and functional benthic habitat is expected to develop (ESS Group 2011). New communities would be expected to recolonize over time. However, the type of organisms recolonizing over the mats could differ from the original benthic community if portions of the original substrate were soft sediment. In some locations, protective mats would only be used in areas where the existing substrate consists of hard bottom, and the communities recolonizing the new hard bottom created by the mats would be expected to be similar to what had occurred previously. Post-installation monitoring efforts conducted for the Long Island Replacement Cable in 2010 (construction completed in Fall 2008) suggested that concrete mats were not a major disturbance to benthic communities. The 2010 monitoring revealed that benthic macroinvertebrate assemblages did not differ significantly in overall abundance or richness between the control and impacted sites, and no major seasonal differences in the macroinvertebrate communities were observed (ESS Group 2011). The placement of the rip-rap or concrete mats would be very limited and generally sporadic within a 1.8-mile (2.9-km) stretch of the Hudson River, and, therefore, would not significantly affect sturgeon foraging or migration (Scenic Hudson and Riverkeeper 2013). In areas where use of concrete mats or rip-rap could extend some distance, the width of the armoring would only extend over a small (less than approximately 20 feet [6 meters]) transmission line ROW in the vicinity of the transmission line, leaving ample undisturbed foraging habitat available on either side of the armoring. Concrete or rip-rap placement would be expected to have negligible impacts on shortnose sturgeon and Atlantic sturgeon given the low probability of occurrence and use of concrete mats or the very small area of the overall habitat that would be affected. Therefore, installation of concrete mats or rip-rap may affect, but is not likely to adversely affect, shortnose and Atlantic sturgeon.

Noise produced during installation of the proposed aquatic transmission line may affect, but is not likely to adversely affect, shortnose and Atlantic sturgeon. As described in **Section 5.1.4**, noise impacts are only expected to result in behavioral impacts on fish. A study for the Vancouver Island Transmission

Reinforcement Project determined that, based on modeling and noise measurements, underwater noise generated by the construction vessels used for cable laying would be similar to that of other ships and boats (e.g., pleasure boats, fishing vessels) already operating in the area (JASCO Research 2006). Similar values would be likely for the vessels used during the proposed CHPE Project. These sound levels from vessel movements is not expected to result in injury to fish, but would elicit temporary behavioral responses by ESA-listed fish species most likely to respond to these sounds based on their hearing capabilities. NMFS uses a rms SPL of 150 dB re 1 μPa as a conservative indicator of the noise level at which there is the potential for behavioral effects (NMFS 2013b). That is not to say that exposure to noise levels of 150 dB re 1 μPa rms SPL would always result in behavioral modifications or that any behavioral modifications would rise to the level of "take" (i.e., harm or harassment), but that there is the potential, upon exposure to noise at this level, to experience some behavioral response. Behavioral responses could range from a temporary startle to avoidance of an area affected by noise. Sturgeon have the capability of leaving an area when underwater activities that create noise and sound pressure are occurring and returning when activities cease, thereby further reducing effects.

Another report discussing the installation of power cables for an offshore wind farm introduced dB_{ht} (Species), a metric that was developed as a means for quantifying the potential for a behavioral impact from noise on a species in the underwater environment (Subacoustech 2012). At 90 dB_{ht} (Species) and above, there would be a strong avoidance reaction to noise by virtually all individuals. At the 75 dB_{ht} (Species) level, about 85 percent of individuals would react to the noise and take avoidance measures (i.e., flee), although the impact would likely be limited by habituation of species to ambient aquatic noise levels. **Table 5.3.5-2** lists the noise avoidance zones for fish species that act as surrogate species for those likely to be encountered during installation of the proposed CHPE Project. The avoidance zone for other species is likely to be less (Subacoustech 2012). Impacts on protected fish species from noise from proposed CHPE Project construction activities would be expected to be similar to reaction within these distances and therefore negligible and limited to avoidance.

Table 5.3.5-2. Fish Noise Avoidance Distances (in Feet)

Fish Species	Cable Laying (Jet Plowing)		Ship Operations (330-foot Cable Ship)	
	90 dB_{ht} *(Species)*	75 dB_{ht} *(Species)*	90 dB_{ht} *(Species)*	75 dB_{ht} *(Species)*
Cod	3	66	7	118
Dab	< 3	3	< 3	7
Herring	26	217	7	95
Salmon	< 3	3	< 3	3

Source: Subacoustech 2012

It is assumed that this would apply to all aquatic species, including shortnose and Atlantic sturgeon; therefore, no significant noise effects would be expected. Because the anticipated noise levels associated with cable laying for the proposed CHPE Project are relatively minimal (Popper and Hastings 2009), and because the Hudson River is normally subject to substantial commercial and recreational vessel noise, any incremental increases in sound associated with the cable-laying barge would not cause physical injury from noise and are expected to be negligible.

Generally, construction activities for the proposed CHPE Project would be scheduled to avoid impacts on spawning migrations, spawning activity, and larval stages of these species. Most of the noise impacts would be either temporary or intermittent and would not impact fish at the population level (i.e., only a few individuals would be affected relative to the entire population). After installation activities have been completed, any displaced shortnose and Atlantic sturgeon would likely return to the area. Use of construction windows would avoid noise effects from proposed construction activities on Atlantic sturgeon and shortnose sturgeon during their spawning migrations.

Increased vessel traffic during construction would impact shortnose and Atlantic sturgeon. Vessel strikes (i.e., entrainment through the propellers of vessels and direct collisions with vessel hulls) of any shortnose or Atlantic sturgeons could be detrimental to the long-term viability of the population. However, there is little evidence of vessel collisions with shortnose and Atlantic sturgeon in the Hudson River. Vessel strikes are less common in the Hudson River in contrast to the other rivers in the eastern United States, such as the Delaware River, which in part has been attributed to the depth of the Hudson River (NMFS 2011b). In addition, the Hudson River shipping channel does not traverse prime Atlantic sturgeon spawning habitat in the river (Greene et al. 2009), and very few Atlantic sturgeon with injuries consistent with vessel strike have been observed in the Hudson River (NMFS 2013b). Although Atlantic and shortnose sturgeon are demersal fishes and spend most of their time at the bottom of the water column, it should be noted that Atlantic sturgeon in some locales, like the Suwannee River (Florida), are known to jump out of the water, and, during jumping episodes, individuals are located at or near the surface of the water, where they are more vulnerable to strikes (Brown and Murphy 2010). Applicant-proposed measures would minimize impacts from construction vessels on shortnose and Atlantic sturgeon. These measures include operating all vessels associated with the proposed CHPE Project at "no wake/idle" speeds (4 knots or less) at all times while in the construction corridor and in water depths where the draft of the vessel provides less than a 4-foot (1.2-meter) clearance from the bottom. The typical draft of a cable installation barge is approximately 12 feet (3.7 meters), and the Hudson River has a maintained depth of at least 32 feet (10 meters) in its navigation channel. In areas with significant side scan and magnetometer targets, the speed would be reduced to less than 1 knot. Reducing vessel speed would reduce the force of collision impacts and would give shortnose and Atlantic sturgeon more time to detect and avoid vessels. Additionally, installation would not occur during spawning migration (see **Table 2-2**), thereby avoiding this vital and sensitive portions of their lifecycle. Based on the relatively shallow drafts of the vessels to be used, which should provide sufficient clearance between vessels and the river bottom, and that sturgeon are generally found within 3.3 feet (1.0 meter) of the bottom in the deepest available water, the chance of vessel-related mortalities to fish is expected to be low.

Minor releases of hydrocarbons (e.g., diesel fuel, lubricants) from spills may affect, but are not likely to significantly affect, federally listed and candidate fish species. It is anticipated that the immediate response reaction of fish would be avoidance. Oil has the potential to impact spawning success, because of the physical smothering and the toxic effects on eggs and larvae (USFWS 2010). Releases and potential spills that might affect their food sources. Benthic communities could also be affected by physical damage to the habitats in which plants and animals live. This could, in turn, decrease the foraging ability of sturgeon species. The Applicant would implement BMPs to prevent such releases, and would implement an SPCC in the case of any accidental spills of chemical, fuel, or other toxic materials (see **Appendix G**).

State-Listed Species

As discussed in **Section 3.3.5**, the shortnose sturgeon is also state-listed. Effects from proposed CHPE Project construction activities on this species were discussed above under *Federally Listed Species*.

Impacts from Operations, Maintenance, and Emergency Repairs

Federally Listed Species

As noted in **Section 3.3.5**, the shortnose sturgeon and Atlantic sturgeon occur in the Hudson River. Increased temperature, magnetic fields, and weak induced electric fields may affect, but are not likely to adversely affect, shortnose sturgeon and Atlantic sturgeon. No effects on ESA-listed fish species would occur from maintenance because the proposed transmission line would be maintenance-free. Periodic inspection of the aquatic transmission cables using vessel-mounted instruments would not result in any significant effects on federally listed fish species because the activities would be non-intrusive.

Emergency repair activities, if required, may affect, but are not likely to adversely affect, shortnose sturgeon and Atlantic sturgeon. During emergency repairs of the aquatic transmission line, the cables would be brought to the surface for repairs, a new section of line would be spliced in, and the line would be reburied. Sediment disturbance resulting in temporarily increased turbidity, decreased water quality due to disturbance of contaminated sediments, and noise could impact shortnose sturgeon and Atlantic sturgeon. These impacts would be non-significant and similar to those described for construction activities, but would occur on a smaller scale and over a shorter duration.

The proposed aquatic transmission cable would emit magnetic fields and a weak induced electric field that could be detected by certain aquatic organisms. There are uncertainties regarding the effect of magnetic and electric fields on aquatic species, including shortnose and Atlantic sturgeons (Cada et al. 2011). As discussed in **Section 5.1.5**, there is little information on the responses of fish to magnetic fields, but the predicted magnetic fields for this project are below the thresholds at which fish behavioral effects have been observed. Therefore, operation of the aquatic transmission line may affect, but is not likely to adversely affect, sturgeon species. For the Hudson River Segment, the depth of the transmission line trench is proposed to be 7 feet (2.1 meters) with 1 foot (0.3 meters) or less of horizontal separation between the two cables, which would be collocated in the same trench. Because the magnetic field is strongest at the transmission line and declines rapidly with distance, deeper burial would reduce the magnetic field, but not eliminate it entirely (CMACS 2003, Normandeau et al. 2011). As shown in **Table 5.1.14-1** and **Figure 5.1.14-1**, the magnetic field levels at the riverbed surface directly over the transmission line centerline when it is buried 3.3 feet (1 meter) below the surface were calculated to be less than 162 mG, and up to 600 mG in the areas where the burial depth is less and concrete mats would be placed over the unburied transmission line (CHPEI 2012t, CHPEI 2012ll).

Sections 5.1.4 and **5.1.5** provide review of studies of fish, and in particular sturgeon, responses to magnetic and electric fields. The electromagnetic fields in those studies that triggered a reaction in freshwater sturgeon species were much more intense than the magnetic fields that would be produced by the proposed aquatic transmission line, which would be less than 160 mG at the river bottom given the deeper than 7-foot (2.1-meter) burial depth for the transmission line in the Hudson River. Lake sturgeon, a state-listed species in New York, exhibited temporarily altered swimming behaviors to AC-generated electromagnetic fields that ranged from 35,100 mG to 1,657,800 mG (Cada et al. 2011), levels greater than the magnetic fields that would be emitted by the proposed CHPE Project. The magnetic fields emitted by the proposed aquatic transmission cable would affect the Earth's magnetic field in a constant fashion along a narrow band of river bottom along the length of the cable (CHPEI 2012dd). Migratory species use multiple stimuli for migration, not magnetic detection alone, and species are also exposed to other natural alterations in the Earth's geomagnetic field such as magnetic anomalies in sediments. Therefore, impacts from magnetic field strengths generated from the proposed CHPE Project transmission line on shortnose and Atlantic sturgeon are expected to be negligible. Additional information on magnetic fields and the calculated magnetic field strength near the transmission line are provided in **Section 5.1.5**.

Evidence indicates that electrosensitive organisms (including all sturgeon species) can detect induced electric fields and respond by attraction or avoidance (CMACS 2003, Normandeau et al. 2011, Cada et al. 2012). However, as described in **Section 5.1.5**, given the relatively narrow area within which the induced electric field would be detected by fish and the available information of how induced currents affect fish, no significant effects on ESA-listed fish would be expected.

While no studies of the impact of magnetic fields on sturgeon eggs and larvae were identified, laboratory studies on rainbow trout, brown trout, carp, and northern pike fish eggs and larvae to magnetic fields ranging from 5,000 mG to 150,000 mG resulted in changes in embryonic development and movement (Formicki and Perkowski 1998, Formicki and Winnicki 1998, Winnicki et al. 2004). However, survivability was not discussed. The increase in magnetic field strength at the sediment surface is approximately 162 mG where the transmission line is buried or 600 mG above concrete mats, and would decrease with an increase in distance from the river bottom (i.e., in the water column). Because laboratory experiments used exposures that are 1 to 3 orders of magnitude higher than the magnetic field strengths of those expected from the proposed CHPE Project transmission line, the effect of the magnetic field on fish eggs and larvae is expected to be negligible, even for benthic eggs and larvae.

Significant adverse effects on reproduction or feeding would not be anticipated from operation of the transmission line (CHPEI 2012i, CHPEI 2012dd). Increases in temperature associated with the operation of the proposed aquatic transmission line at the sediment-water interface would not be expected to affect pelagic fish, but could have the potential to affect demersal fish (such as Atlantic and shortnose sturgeon), which would be closer to the bottom. Although there would be some change in temperature in the sediment immediately surrounding the cable, the cable's burial depth and insulating factors would minimize impacts on the benthic habitats in the immediate vicinity (CHPEI 2012b). The cables would produce heat during operation, but the heat would dissipate with depth so in the top 6 inches (15 cm) of the sediment, where most benthic infauna occur, there would be a negligible temperature increase (CHPEI 2012b). The estimated temperature rise in the top layer of sediment at the riverbed surface at a burial depth of 4 feet (1.2 meters) with the cables less than 1 foot (0.3 meters) apart would be 1.8 °F (1.0 °C), and the temperature change in the water column would be less than 0.001 °F (0.0001 °C). These estimated increases in riverbed surface temperatures are an overestimation of existing natural conditions because burial depths in the Hudson River would be deeper at 7 feet (2.1 meters) and the calculations do not consider the cooling effect from the natural flow of the Hudson River. Any measurable amount of local heat generation would not pose a physical barrier to fish passage, and would allow benthic organisms to colonize and demersal fish species (including demersal eggs and larvae) to use surface sediments without being affected. The small increase in riverbed temperature is considered to be within normal ranges of variation and no residual effects are predicted (SSE 2009). The potential increase in temperature of the riverbed surface would be within the normal temperature range of all life l stages of shortnose and Atlantic sturgeon.

Concrete mats would be placed in areas where full burial of the cable would not be possible due to bedrock or utilities; therefore, the cables would be closer than 7 feet (2.1 meters) to the river bottom. As a result, the mats and the water column above them would be less than 7 feet (2.1 meters) from the cables and would be subject to higher temperature and magnetic field levels than would be otherwise present at the riverbed. As indicated in **Table 5.1.14-1**, the magnetic field levels above the concrete mats directly over the transmission line centerline would be less than 200 mG (CHPEI 2012t, CHPEI 2012ll). The estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C) (Exponent 2014). This is expected to be within the range of seasonal variation of water temperatures experienced in the Hudson River. The heat from the sediment and the underlying cables would dissipate through the mats into the water. The actual temperature increase would be reduced by the river temperature and flow as the moving water increases convection by dissipating heat out of the mats into the overlying water layer, which then would then move away from the heat source by flow induced by the river gradient, tide, or density changes. In addition, the area that would require use of concrete mats or rip-rap for the CHPE Project is expected to be a small relative to the available habitat for ESA-listed fish species.

As noted earlier, there would be exposed gaps in the mats or rip-rap where heat could be released, and the cooling effect of moving water would quickly dissipate this heat. As mentioned under *Construction*

Impacts, previous monitoring surveys have indicated that post-construction colonization of concrete mats has occurred. It is anticipated that a similar result would occur during operation of the proposed CHPE Project. Because any measurable increases in heat would not affect fish migration, feeding, or reproduction, impacts on ESA-listed fish species would not be significant (CHPEI 2012i, CHPEI 2012dd). Ongoing consultations with USFWS and NMFS may result in identification of additional impact minimization and mitigation measures.

The Applicant would implement similar minimization measures to those described for construction activities, including use of an SPCC plan (see **Appendix G**). As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct a series of post-energizing studies, including temperature and magnetic field surveys and Atlantic sturgeon hydrophone surveys, for use in post-installation monitoring (NYSPSC 2013). The Atlantic sturgeon study would document the species' movements in relation to cable operation. All studies would be developed in consultation with appropriate resources agencies. The Applicant also has proposed to establish the Hudson River and Lake Champlain Habitat Enhancement, Restoration, and Research/Habitat Improvement Project Trust. The purpose of the Trust would be to support items such as habitat restoration, enhancement, or protection; habitat research; fish and wildlife species restoration, enhancement, or protection; and water quality improvement.

State-Listed Species

As discussed in **Section 3.3.5**, the shortnose sturgeon is also state-listed. Effects on this species were discussed above under federally listed species.

5.3.6 Terrestrial Habitats and Species

Impacts from Construction

Vegetation and Habitat. The majority of the construction corridor would occur in the Hudson River, and there would be no impacts on terrestrial habitat and vegetation from the installation of the aquatic transmission line. Impacts on vegetation and habitat would occur along the terrestrial portions of the Hudson River Segment between MPs 295 and 303. During construction activities on this portion of the route, impacts on vegetation would include permanent removal of vegetation, vegetation crushing from heavy construction equipment, root damage associated with excavation, soil compaction, and the generation of dust. Installation of the transmission line and construction of the cooling stations would result in temporary and permanent disturbance of vegetation. Approximately 4 acres (1.6 hectares) of existing forest cover could be temporarily disturbed and 1 acre (0.4 hectares) permanently changed in the terrestrial portion of the Hudson River Segment. Some forest habitat would be converted to grasses or shrub habitat, which would result in a localized change in community composition. Mobile species that prefer forested habitat would likely relocate to seek out that habitat. At this time, the locations of cooling stations are approximate and no specific locations have been determined. If further siting analysis determined that specific impacts would occur, the siting would be adjusted accordingly to minimize impacts on adjacent habitat. As described in **Section 5.2.6**, deviation areas identified along the proposed CHPE Project route in this segment would be located immediately adjacent to existing ROWs and would extend to an outer boundary ranging up to 200 feet (61meters) away from the ROW. These areas comprise various habitat types including fringe forest habitat, water bodies, suburban residential areas, urban developed areas, and highways and roadways with maintained vegetation. Whether along the ROWs or in the deviation areas, construction activities would result in localized changes in community composition along the 20-foot (6-meter)-wide proposed CHPE Project corridor that would be constructed and maintained into the future. These impacts would include tree removal and possible displacement of wildlife species. Forested habitat in deviation areas could be more suitable to wildlife because it is farther away from roadway and railroad ROWs. Habitat fragmentation would not occur because the areas to be converted are primarily fringe habitat along ROWs that already require vegetation maintenance. Additionally, mobile species that currently inhabit and prefer these habitats likely would seek out similar habitat. Therefore, impacts on habitats and inhabiting species would not be significant. Further, Applicant-proposed measures, including clearly marking "out of corridor" areas, wetlands and streams, and "no vehicular access" areas; creating vegetative buffer zones; and using appropriate removal methods, would be implemented to further reduce effects on vegetation (for the full list of measures see **Appendix G**). Therefore, impacts on habitats and inhabiting species would not be significant.

Soil compaction would decrease the rate of water infiltration into the soil, resulting in changes to the soil moisture regime and root development and potential changes in soil structural characteristics. Construction equipment and foot traffic have the potential to spread invasive plant species as a result of ground disturbance and the introduction of invasive seed stock carried on the boots, clothing, or equipment of construction workers. Dust generated during construction could interfere with pollination and photosynthesis. These impacts would be minimized through the use of Applicant-proposed measures, such as dust-control methods and developing and following an Invasive Species Management Plan, and would be restricted to the construction corridor. See **Appendix G** for more details on Applicant-proposed measures.

Because the transmission line would be installed underground along existing roadway and railroad ROW, forested habitat along the construction corridor most commonly exists as successional or shrubby forest edge. The proposed CHPE Project route would cross several streams; as such, some riparian habitat would be expected to be present in the construction corridor. Wetlands and water bodies in this terrestrial portion of the route would be crossed using HDD or by bridge attachment; therefore, impacts to riparian habitat would be avoided. Although some wooded areas in railroad and road ROWs would be cleared for transmission line installation, forested areas in state parks in this segment would be bypassed via HDD. The oak-tulip tree forest and calcareous cliff communities on Hook Mountain would not be impacted as the transmission line would be routed through railroad and road ROWs and be installed adjacent to the railroad tunnel beneath Hook Mountain State Park and Rockland Lake State Park via HDD. Additional details regarding existing terrestrial habitats are provided in **Section 3.2.6**.

Wildlife. When installation of the aquatic transmission line would be close to shore, noise from installation vessels and equipment could temporarily result in avoidance of bird and bat forage areas and bird nests and bat roosts that are adjacent to the proposed CHPE Project route. The majority of the underwater portion of the transmission line would be more than 250 feet (76 meters) from shore, and construction noise levels would be less than 62 dBA at this distance. These impacts would be temporary, and would last only during the short time period that construction equipment would be operating in that area.

Noise created during terrestrial construction activities could result in reduced communications ranges for wildlife, interference with predator/prey detection, or habitat avoidance. Impacts could also be associated with blasting and include behavioral changes, disorientation, or hearing loss. Wildlife response to noise can be dependent on noise type (i.e., continuous or intermittent), prior exposure to noise, proximity to a noise source, stage in the breeding cycle, activity (e.g., foraging), age, and gender. Prior exposure to noise is the most important factor in the response of wildlife to noise, because wildlife can become accustomed (or habituate) to the noise. The rate of habituation to temporary construction noise is not known, but the proposed construction activities primarily would occur along road and railroad ROWs, where there is a high level of ambient noise. Wildlife that could be impacted includes grassland bird species, forest bird species, reptiles, amphibians, and mammals.

Vegetation removal and the reduction of habitat could result in the direct displacement of wildlife species including birds, burrowing animals, and other species that use forests for foraging, breeding, and nesting.

However, significant habitat fragmentation impacts would not be expected because the proposed CHPE Project corridor would be relatively narrow and would be constructed primarily in fringe habitats within or adjacent to existing roadway and railroad ROWs, where suitable breeding and foraging habitat is not readily available. Further, studies have indicated that forest wildlife exposed to relatively narrow corridors, similar to the proposed CHPE Project corridor, did not experience significant fragmentation impacts (e.g., permanent displacement or isolation) or have significantly reduced abundances along the corridor (Rich et al. 1994, AUC 2011). Mortality of less mobile species would be expected as a result of their inability to avoid construction equipment. Applicant-proposed measures, such as avoiding sensitive habitat, using HDD, and following an Invasive Species Management Plan, would also be implemented to reduce impacts on wildlife (see **Appendix G** for additional Applicant-proposed measures).

Impacts from Operations, Maintenance, and Emergency Repairs

Vegetation and Habitat. No impacts on terrestrial vegetation and habitats would occur during operations and emergency repair of the aquatic portion of the transmission line because the transmission line would be buried within the Hudson River.

As described in **Section 5.2.6**, operation of the terrestrial transmission line would be restricted to the area within the transmission line ROW and would generate only minor amounts of heat and limited magnetic fields; therefore, impacts on terrestrial vegetation and habitat would not be significant.

Although no significant impacts on vegetation and habitats are expected from maintenance and inspection activities, these activities would involve vegetation management, inspections using vehicles, and pedestrian surveys within the ROW. Such activities would be undertaken on a periodic basis over the operating life of the transmission line. Vegetation within the ROW would be maintained (i.e., woody vegetation would be cut or removed) to establish stable low-growing vegetation with shallow root systems. Such activities could result in crushing of vegetation due to equipment traffic within the ROW. Additional details on impacts from maintenance activities are provided in **Section 5.2.6**.

Emergency repairs of the transmission line would be expected to result in activities similar to those occurring during initial installation but over a smaller scale and shorter duration. If emergency repairs are necessary, the transmission line ROW would only be disturbed for the short duration of time for repair activities in the area where the fault is located, the ROW would be restored following completion of the repairs, and vegetation would be allowed to return to its prior state. However, the areas that would be affected by emergency repairs would have been previously disturbed during initial construction of the proposed CHPE Project.

Wildlife. No significant impacts on terrestrial wildlife would occur from operation of the aquatic portion of the transmission line because it would be buried in the Hudson River. If necessary, emergency repairs on the aquatic transmission line would require localized vessel operation. Noise associated with these vessels could temporarily result in avoidance of bird and bat forage areas and bird nests and bat roosts adjacent to the proposed CHPE Project route.

Buried cables, such as those proposed for the terrestrial portion of the Hudson River Segment, would have no electric fields at the ground surface and the constant magnetic field would decrease with distance from the cable centerline (WHO 2012). While there is evidence that wildlife can detect magnetic and electric fields, species behaviors would not be affected by the relatively small changes in magnetic fields that would be expected immediately above the transmission line (AUC 2011). Previous studies have found that magnetic and electric fields associated with transmission lines do not cause any adverse health, behavioral, or productivity effects in animals, including both wildlife and livestock (BPA 2010). Operation of the transmission line would increase the soil temperature, which could slightly alter terrestrial vegetation and habitat directly above the transmission line, thereby affecting foraging, nesting, and avoidance behavior in wildlife that use that habitat; however, temperature would quickly dissipate within increasing distance from the transmission line (Burges et al. 2008).

Impacts on wildlife from maintenance and inspection activities would occur along the terrestrial portions of the Hudson River Segment. Maintenance would involve vegetation management, including cutting and removal of woody vegetation. Any decrease in vegetation cover would result in impacts on species that use that habitat type, due to habitat reduction. Wildlife that could be affected includes grassland bird species, forest bird species, reptiles, amphibians, and mammals. Vegetation maintenance activities would also displace birds, burrowing animals, and other species that use this area for foraging, but use of the transmission line ROW by these species would be limited because the vegetation in the ROW would be regularly maintained and existing disturbance from the adjacent railroad and roadway operations would continue unchanged. In addition, vegetation maintenance activities would only be undertaken on a periodic basis over the operating life of the transmission line.

Emergency repairs of the transmission line, if required, could result in construction activities similar to those occurring during initial installation. Emergency repairs could temporarily result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance by wildlife because of noise disturbance. Vegetation removal and the reduction of habitat could result in the direct displacement of species; however, the areas that would be affected by emergency repairs would have been previously disturbed during the original construction of the proposed CHPE Project.

5.3.7 Terrestrial Protected and Sensitive Species

Impacts from Construction

Table 5.1.7-1 identified the federally and state-listed threatened and endangered species and other protected species that could occur within the proposed CHPE Project ROI by segment.

Federally Listed Species

Bog turtle. The bog turtle could occur in Rockland County, where the route is terrestrial. However, according to data from the NYNHP and USFWS, there are no historic records of bog turtle within 0.25 miles (0.4 km) of the ROI in Rockland County. Additionally, the proposed CHPE Project route would primarily be constructed in existing road and railroad ROWs, where any potential habitat would be previously disturbed. As such, the potential for the bog turtle to occur along the transmission line route in the Hudson River Segment is extremely low. In addition, the transmission line would be installed by trenching or HDD under the three wetland areas crossed in this portion of the Hudson River Segment. This species is also listed in Ulster, Dutchess, Orange, Putnam, and Westchester counties. However, the route is entirely aquatic (in the main stem of the Hudson River) in these counties, and construction activities would not impact the bog turtle. Therefore, no effects on bog turtle would occur in the Hudson River Segment during construction activities.

Indiana bat. The Indiana bat could occur in Ulster County during the summer and winter due to the presence of the known hibernaculum in the county. The Indiana bat could also occur in Dutchess, Orange, Putnam, Rockland, and Westchester counties during the summer due to the presence of the nearby Ulster County hibernaculum (CHPEI 2012x). In the immediate vicinity of the ROI, much of the available habitat consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts. Forested or open woodland habitats occur alongside the terrestrial route in Rockland County; however, vegetation clearing would be conducted within the construction corridor, which would generally be within the existing road and railroad ROWs. There are few large trees within the construction corridor. Where the proposed CHPE Project crosses forested areas in the Rockland State Park complex, it would be installed by HDD, avoiding vegetation clearing in the parks. Additionally, contractors would minimize impacts on large specimens of shagbark hickory, which could serve as maternity or roost trees. Indiana bats can change roosting and foraging areas, and seek roosts and foraging habitats that are farther away from the construction area. However, there are observations of high Indiana bat tolerance to disturbance in the literature, and it is unknown whether Indiana bats would shift or abandon their roosts/foraging areas as a result of the proposed construction activities (Holland et al. 2006). However, given the current level of disturbance from the actively used road and railroad ROWs, and the limited availability of suitable summer roosting habitat within and adjacent to the ROI, Indiana bats are not likely to become displaced or abandon roosting areas.

The Applicant would continue to consult with the USFWS for recommendations regarding avoidance of any potential effects on Indiana bats. If vegetation removal and tree clearing is conducted in the summer months outside of the Indiana bat hibernation period (October 1 through March 31), the Applicant would coordinate with USFWS prior to clearing any large trees that could support Indiana bats.

Based on implementation of such measures, the proposed CHPE Project may affect, but is not likely to adversely affect, the Indiana bat. A BA has been prepared to provide a detailed analysis of the effects of the proposed CHPE Project and to help facilitate ESA Section 7 consultations (see **Appendix Q**).

Northern long-eared bat. The northern long-eared bat occurs in every county in New York State. Based upon this species' habitat preferences during winter and summer, it can be assumed that these bats would occur in similar or the same areas indicated for the Indiana bat along the proposed CHPE Project route, including in the Hudson River Segment. Although vegetation would be cleared in the construction corridor, much of the habitat in the immediate vicinity of the existing railroad and road ROWs along the terrestrial route in Rockland County consists of disturbed open lands and secondary forest lacking suitable habitat for bat roosts, and there are few large trees within the construction corridor. Additionally, the northern long-eared bat relies on and prefers edge habitat for safe foraging and movements to and from their roost trees to feed. Therefore, the increase in edge habitat could benefit the northern long-eared bat. In addition to effects on vegetation, potential effects associated with the construction could include disturbance or displacement due to noise and dust generation Noise associated with aquatic and terrestrial construction activities could disturb bats using nearby forage areas; however, noise effects would be temporary and insignificant.

Contractors would minimize impacts on large specimens of shagbark hickory, which could serve as maternity or roost trees. The Applicant would consult with the USFWS for recommendations regarding avoidance of any potential effects on northern long-eared bats. Similar to the Indiana bat, construction associated with the proposed CHPE Project may affect, but is not likely to adversely affect, the northern long-eared bat with implementation of such measures. A BA has been prepared to provide a detailed analysis of the impacts of the proposed CHPE Project on federally listed and candidate and proposed species and to facilitate ESA Section 7 consultations with the USFWS (see **Appendix Q**).

Bald eagle. Breeding habitat and winter foraging habitat has the potential to occur throughout the Hudson River Segment, primarily along the Hudson River itself. Breeding habitat has the potential to occur in Dutchess and Ulster counties. Foraging habitat has the potential to occur in Putnam, Dutchess, Orange, Ulster, Rockland and Westchester counties.

Impacts on bald eagles could occur if construction results in disturbance to nesting, foraging, or wintering from construction noise, construction activity, or vehicle traffic. Because the aquatic route would be within the Hudson River, which is used extensively for recreation and shipping traffic, and the terrestrial route would generally be within an existing road and railroad ROWs with frequent traffic, it is expected that nonbreeding eagles in the ROI are likely to be habituated to disturbance and noise from these existing noise sources. Therefore, impacts from construction activities on bald eagles are not expected to be significant.

Depending on whether construction activities would be visible from a nest site, the USFWS National Bald Eagle Management Guidelines (USFWS 2007b) recommend different buffer zones, which could be up to 660 feet (201 meters) for visible construction activities. The Applicant has developed impact avoidance and minimization measures (i.e., Applicant-proposed measures) specifically for bald eagles and their habitat (see **Appendix G**). A survey would be conducted to identify bald eagle nest locations within 0.5 miles (0.8 km) of construction prior to commencement of activities. If construction would occur within 660 feet (201 meters) of an active nest during the nest-building or breeding season (December to August) per USFWS National Bald Eagle Management Guidelines (USFWS 2007b), the Applicant would consult with USFWS and NYSDEC for guidance to avoid and minimize the potential for noise-related disturbance. Additionally, construction personnel would be trained to identify eagles and nests, and instructed to report any sightings of potential nests not previously identified. If any previously unidentified eagle nests are discovered, work within the 660-foot (201-meter) buffer would discontinue and the Applicant would report such findings to the NYNHP, and consult with the NYSDEC and USFWS for guidance to avoid or minimize the potential for disturbance.

State-Listed Species

With the exception of raptors, which could occur over the Hudson River, only terrestrial species from Greene and Rockland counties are considered because the transmission line route would be completely aquatic in Ulster, Dutchess, Orange, and Putnam counties.

Soil compaction, vegetation crushing, and permanent removal of vegetation could affect state-listed plants along the Hudson River Segment. Details on these effects are described further in **Section 5.2.7**.

Effects on state-listed birds as a result of the construction of the Hudson River Segment could occur. Noise associated with construction could disturb and displace birds. However, birds that occur in the ROI, which is generally within existing road and railroad ROWs in Rockland County, would already be habituated to noise and human disturbance. Additionally, vegetation clearing could result in loss of habitat. As described in **Section 5.2.6**, however, construction would occur in previously disturbed road or railroad ROWs where suitable foraging and nesting habitat would likely be limited. Forested habitat in Hook Mountain State Park and Rockland State Park would be crossed by use of HDD, and vegetation clearing would be avoided in these locations; therefore, effects on state-listed species and their habitats are not expected to be significant.

Migratory Birds

No significant effects on migratory birds and their occupied habitats during construction in the Hudson River Segment would result from noise disturbance. In response to construction and noise, birds that prefer and inhabit the affected fringe forest habitat likely would relocate to seek out similar habitat (AUC 2011). Non-significant fragmentation impacts likely would be the same as described for non-protected bird species occurring in fringe forest habitats along this segment. Disturbance could also result in parental abandonment of eggs or young in nests potentially built in habitats within the ROI. Applicant-proposed measures, including avoiding sensitive habitats, using HDD, and following an Invasive Species Management Plan, would be implemented to reduce impacts on migratory birds (see **Appendix G**).

Impacts from Operations, Maintenance, and Emergency Repairs

Federally Listed Species

Bog turtle. No significant effects on the bog turtle would occur in the Hudson River Segment because no suitable habitat exists.

Indiana Bat. No significant effects from magnetic fields would be anticipated from operation of the transmission line. Indiana bats could forage over the Hudson River above the transmission line route; however, their exposure would be limited to magnetic fields of less than 10 mG depending on the water depth and foraging level above the water surface. On land levels would be approximately 200 mG at a location 1 foot (0.3 meters) above ground directly over the transmission line in ROWs. Indiana bats might be able to detect magnetic fields; however, there is no evidence to suggest that the fields could result in any effects, or that these effects are adverse (BPA 2010, AUC 2011). Routine maintenance (i.e., inspection) activities for the aquatic cables would be carried out by a small vessel and on land by vehicle windshield survey. Effects associated with vegetation maintenance and, if required, emergency repairs of the transmission line in the Hudson River Segment would not be significant, would be similar to those occurring during construction, and would be of a shorter duration and disturb a smaller area. Additional details on potential impacts on the Indiana bat are provided in **Section 5.2.7**.

Northern long-eared bat. The effects from operation, vegetation maintenance, inspection, and emergency repairs on northern long-eared bats would not be significant, and would be the same as those described for Indiana bat. While northern long-eared bats might be able to detect magnetic fields, there is no evidence to suggest that the magnetic fields could result in any effects on the species. Maintenance of vegetation along the terrestrial transmission line ROW would primarily impact previously disturbed herbaceous and shrubby cover, but would result in temporary noise and dust that could affect any roosting or foraging bats in adjacent areas. Effects associated with emergency repairs, if necessary, would be similar to those impacts occurring during construction, but for a shorter duration and involving disturbance to a smaller area than those for construction activities.

Bald eagle. No significant effects from magnetic fields would be anticipated from operation of the transmission line. Research indicates that some wildlife species, including birds, can detect magnetic fields, but there is no evidence to suggest that the fields could result in any adverse effects (BPA 2010, AUC 2011). Periodic vegetation management along the upland ROW through Rockland County would prevent the establishment of any vegetation greater than 20 feet (6 meters) in height in the transmission line ROW, and therefore establishment of eagle nests would not occur. Non-significant impacts associated with emergency repairs of the transmission line in the Hudson River Segment, if necessary, would be similar to those occurring during construction but would be of a shorter duration and disturb a smaller area.

State-Listed Species

No significant effects on state-listed species from magnetic fields would be anticipated from operation of the transmission line. As described in **Section 5.2.7**, research indicates that some species of animals are able to detect magnetic fields at levels that could be associated with transmission lines; however, detection does not imply that the fields result in any impacts (BPA 2010, AUC 2011). Impacts on plants could occur from vegetation maintenance and emergency repairs, if necessary, of the transmission line. Vegetation clearing and vehicle and foot traffic can crush, kill, or damage state-listed plant species in the project corridor. Applicant-proposed measures similar to those used during construction would be employed to avoid or minimize impacts on state-listed plants.

Migratory Birds

If vegetation maintenance and emergency repairs of the transmission line in the terrestrial portions of the Hudson River Segment occur during migratory bird breeding and nesting season (generally the spring and summer), migratory birds and nests could be disturbed. Impacts on migratory birds from vegetation maintenance activities would not be significant because impacts would be restricted to the transmission line ROW.

5.3.8 Wetlands

Impacts from Construction

Wetland Physical Characteristics and Functions. Of the 96-mile (155-km)-long Hudson River Segment, 88 miles (142 km) would be located in the Hudson River. In the Hudson River Segment, wetlands are found only in the 8-mile (13-km) terrestrial portion of the segment (see **Appendix A**). There are 0.5 acres (0.2 hectares) of NYSDEC freshwater wetlands in the Hudson River Segment ROI. Three potential Federal jurisdictional wetland areas totaling approximately 0.8 acres (0.3 hectares) were delineated within the terrestrial portion of the Hudson River Segment ROI. Wetland areas at MP 296 (NYSDEC HS-2 along the Hudson River) and MP 297 (Cedar Pond Brook and its associated wetlands in Haverstraw) are classified as PEM and the transmission line would be installed under both wetland areas by HDD. Therefore, construction would not affect either of these wetland areas. A crossing of Minisceongo Creek in Haverstraw would also occur in this segment (at MP 299), but it would be via a bridge attachment or HDD. The transmission line would temporarily impact 0.03 acres (0.01 hectares) of a small wetland on the north side of this creek prior to the bridge attachment. Details on impacts and corresponding measures to address such impacts would be the same as those discussed in **Section 5.2.8**.

Impacts on NYSDEC tidal wetlands adjacent to the underwater transmission line route in the Hudson River Segment would not be expected as the installation activities would occur more than 100 feet (30 meters) from tidal wetlands, would occur over a short period of time, and would comply with water quality standards. Water quality could be affected in the event of an accidental spill or leak from vessels or other construction equipment (see **Section 5.3.3**); however, an SPCC Plan would be prepared and included in the EM&CP in accordance with the NYSPSC Certificate.

Wetland Habitat and Species. No significant impacts on the wetland habitat and species that could be present at MP 299 would be expected. Impacts would the same as those described in **Section 5.2.8**. The remainder of the wetlands in the terrestrial portions of the Hudson River Segment would be bypassed using HDD or bridge attachments.

The proposed CHPE Project route would be on the eastern side of the Hudson River, whereas Esopus Estuary is on the western side of the river. However, the boundary for the Esopus Estuary SCFWH extends across to the eastern side of the river. The transmission line installation activities would be short-term and would comply with water quality standards. Although the proposed CHPE Project would not intersect wetlands in the Esopus Estuary SCFWH, transmission line installation has the potential to result in localized turbidity plumes, which could result in fish avoidance or loss of filter feeders. These plumes would not extend over long distances and would be east of the Esopus Estuary itself; therefore, they would not present a barrier to fish movement (CHPEI 2012i). Impacts on the SCFWH are discussed in **Section 5.3.4**.

No significant impacts would be anticipated on tidal wetland habitat and species along the shore of the Hudson River as the installation activities would occur more than 100 feet (30 meters) from the tidal wetlands, would occur over a short period of time, and would comply with water quality standards. The transition from water to land at MPs 295 and MP 303 would occur by use of HDD. The HDD operations would be set back at least 100 feet (30 meters) from shore and the drill would extend approximately 1,500 feet (457 meters) into the river, thereby avoiding any impact on shore vegetation or emergent vegetation at the water's edge.

Impacts from Operations, Maintenance, and Emergency Repairs

Wetland Physical Characteristics and Functions. No significant impacts on wetland features or functions would be anticipated to occur from operation of the transmission line or cooling stations or maintenance activities, including inspection. The only wetland crossing in the Hudson River Segment would occur at Cedar Pond Brook in Haverstraw, and the conduit containing the transmission line is expected to be at least 10 feet (3 meters) below the bottom of the brook. If emergency repairs would be required, the transmission cables would be cut and pulled out of the conduit and the new cable pulled into it thereby avoiding impact on the wetland. The wetland crossing at MP 299 would largely be restored to pre-construction conditions.

Wetland Habitat and Species. No impacts on wetland habitat and species would be expected to occur during operation of the transmission line. There would be no vegetation maintenance needed for the HDD-installed wetland crossing. No significant impacts would occur from maintenance activities, including inspection, as vegetation maintenance activities would impact 0.001 acres (0.0004 hectares) of the wetland at MP 299 in the transmission line ROW.

5.3.9 Geology and Soils

Impacts from Construction

Physiography and Topography. Jet plowing and trenching would be used during installation of the transmission line in the Hudson River and terrestrial areas, respectively, thereby temporarily altering surface conditions. However, upon completion of cable installation and after trenches have been filled to preexisting elevations, physiography and topography would return to previous conditions. As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct a pre-installation bathymetric survey of the underwater route in the Hudson River for use in post-installation monitoring (NYSPSC 2013).

Placement of articulated concrete mats on the riverbed for cable protection purposes could result in localized modification of currents, resulting in limited scouring adjacent to the transmission line over time. The impacts of the mats on bathymetry would not be significant relative to natural levels of fluctuations in surface topography from currents, storms, navigational traffic, and other pre-existing factors.

Geology. No impacts on geology in the aquatic portion of the Hudson River Segment would be anticipated. In some areas, where the necessary burial depths for the protection of the transmissions lines might not be achievable due to geology (e.g., areas of bedrock) or existing submerged infrastructure, the line would be laid atop the river bottom and covered with sloping stone rip-rap or articulated concrete mats. Therefore, no impacts on river bedrock geology would be anticipated.

Bedrock blasting and removal could be required in some areas along the 8-mile (13-km) terrestrial portion of the Hudson River Segment to install the transmission line. Exact locations of bedrock blasting are yet to be determined. This would impact, but not significantly impact, local geology because material would be removed and the surface layer of the bedrock modified. Although bedrock along the segment is primarily hard metamorphic rock, it could be locally compromised by blasting and excavation (CHPEI 2010c). Cracking of bedrock could alter drainage patterns and allow storm water to infiltrate deeper into bedrock. Blasting activities would be performed in strict adherence to all industry standards applying to control of blasting and blast vibration limits in compliance with the Applicant's blasting plan as part of its EM&CP (also see **Section 5.3.17**).

Sediments. During installation of the aquatic transmission line, a jet plow would be used in the Hudson River to bury the cable to the required depth. Sediments would be suspended in the water column and displaced during the jet plow operation. Depending on the sediment particle-size composition, approximately 70 to 80 percent of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the jet plow (HTP 2008). Smaller sediment particles would remain suspended longer and, thus, be transported further from the original site of deposition. The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and the mass of the disturbed sediment particles, along with construction methods and ambient riverine conditions.

Sediment concentrations in the turbidity plume might be initially high, and would likely rapidly decrease with distance. Resettling of sediment grains could alter the original stratigraphy, resulting in a change in sediment texture and grain size. Load calculation modeling conducted for the proposed CHPE Project determined that the settling rate of suspended sediments in the middle Hudson River (the portion of the river north of Haverstraw Bay) is estimated to be 267 feet/day (81 meters/day) and 106 feet/day (32 meters/day) for the lower Hudson River Estuary (CHPEI 2012oo). Approximately 229,000 cubic yards (175,000 cubic meters) of sediment would be disturbed by the installation of the aquatic transmission line in the Hudson River Segment (CHPEI 2012a). As specified in Certificate Condition 163, the Applicant would conduct additional pre-installation physical and chemical sediment sampling in the Hudson River for use in post-installation monitoring (NYSPSC 2013). Additionally, an estimated 179 cubic yards (137 cubic meters) of silt and clay sediments would be dredged at each HDD cofferdam location at MPs 228, 295 and 302 (CHPEI 2012m). See **Section 5.3.3** for a more detailed discussion on the impacts of turbidity in the water column of the Hudson River.

Soils. Construction activities would temporary disturb approximately 47 acres (19 hectares) of upland area. Increased erosion and sedimentation associated with the installation of the transmission line along the terrestrial portions of this segment south of Stony Point would impact soils. Installation and burial of the transmission line would require vegetation removal and trenching, and excavation would be required to bury the line within trenches. Because a majority of the terrestrial transmission line would be installed within previously developed areas, the soils present within the area have been previously disturbed, and with HDD technology being used at transitions from water to land within the segment, impacts on soil erosion and sedimentation would not be significant.

Upon installation of the transmission cables in the excavated trenches, disturbed surfaces within the ROI would be back-filled, to the extent practicable, with the same soils that were originally excavated during construction. Disturbed areas would be graded to match the original topography and local drainage patterns, except at locations where permanent changes in drainage would be required to prevent erosion that could lead to exposure of the buried line.

Applicant-proposed measures, including erosion controls and other BMPs, would be implemented to minimize storm water runoff, and tractor and disc harrow (or similar methods) would be used where soil compaction occurs to prepare soil for restoration. Gullied or rough sites would be smoothed and shaped to allow the use of equipment for plantings, facilitate effective planting, and increase plant survival rates (see **Appendix G**).

Prime Farmland. No impacts on prime farmland would be expected within the terrestrial portions of the Hudson River Segment. Although soils within the ROI are mapped as prime farmland, these soils have been disturbed previously and are not currently available for agricultural purposes. See **Section 5.2.9** for additional discussion of prime farmland.

Seismicity. Construction of the CHPE Project would not increase the risk of seismic hazards. During a seismic event, which would be a rare occurrence in this segment, it is possible that damage to the transmission line could occur (USGS 2012a, USGS 2013).

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts would be expected from the operation of the transmission line in the Hudson River Segment because there would be no thermal or magnetic field impacts on geology and soil structure. The transmission line itself is maintenance-free. Maintenance of the cooling stations and vegetation maintenance within the ROW would occur, but no impacts would be expected on physiography, topography, geology, soils, or prime farmland because no excavating, contouring, or blasting would be required for these activities. Routine inspection of the ROW would occur periodically and be non-intrusive; therefore, no impacts would be expected. Emergency repairs of the transmission line could be required and those potential impacts are discussed in the following paragraphs.

Physiography and Topography. Emergency repairs of the transmission line would result in impacts similar to, but less than, those described for construction activities because there would be a smaller area disturbed for a shorter duration. As specified in Certificate Condition 163, the Applicant would conduct post-installation bathymetric and magnetometer surveys of the underwater route in the Hudson River to monitor and ensure that required depth of transmission line burial has been achieved and original topography has been re-established (NYSPSC 2013).

Geology. Similar to impacts from construction activities, no impacts would be anticipated on geology from emergency repairs of the aquatic transmission line. No impacts on geology would be expected in the terrestrial portion of the Hudson River Segment because blasting would be unlikely to occur during emergency repairs.

Sediments. Impacts on sediments from emergency repairs of the aquatic transmission line would be similar to, but less than, those described for initial construction activities because there would be a smaller area disturbed for a shorter duration. As specified Certificate Condition 163, the Applicant would conduct post-energizing physical and chemical sediment sampling in the Hudson River (NYSPSC 2013).

Soils. Routine ROW mowing or tree-clearing activities could expose soil to erosion from wind and water, resulting in soil erosion and sedimentation. Such activities would be short-term, but would occur multiple times over the operating life of the transmission line. In addition, vegetation along the ROW would be maintained to prevent the establishment of trees close to the transmission line. Potential impacts on soils from emergency repairs of the terrestrial transmission line would be similar to, but less than, those described for construction activities because there would be a smaller area disturbed over a shorter duration and soils would be retained on site.

Prime Farmland. No impacts on prime farmland would be expected from operation, ROW maintenance, and emergency repairs. While vegetation in the ROW would be limited to stable low-growing vegetation with shallow root systems so as not to interfere with the transmission line, and vegetation maintenance (i.e., trimming or removal) would occur in the ROW, most of the transmission line would be within existing road and railroad ROWs where vegetation has been previously disturbed due to existing vegetation maintenance activities. Land in the proposed transmission line ROW is not currently used as farmland.

Seismicity. Operation of the CHPE Project would not increase the risk of seismic hazards. During a seismic event, which would be rare, it is possible that damage to the transmission line could be sustained, as this segment has a low potential for damage (USGS 2012a, USGS 2013). The proposed aquatic and terrestrial HVDC transmission cables would be insulated and armored cables designed to withstand the necessary mechanical forces experienced during cable installation, which are substantially greater than a seismic event. Furthermore, the aquatic transmission cables would not be installed in a straight line and would contain slack to accommodate seismic events readily. The inherent flexibility of the transmission cables would allow the buried transmission line to shift and deform slightly with ground movements associated with seismic events. The cooling stations would be built to conform with seismic hazard standards appropriate for the area.

If a transmission cable failed due to a seismic event, the protection system would de-energize the transmission system in less than 0.005 seconds. HVDC transmission cables dissipate very limited energy under short circuit (i.e., fault) conditions. Therefore, no direct impacts on the environment, navigation, or public safety would be anticipated. A cable repair procedure that considers navigation and the environment would be implemented as appropriate during any seismic events.

5.3.10 Cultural Resources

Ground-disturbing activities associated with the installation of the transmission line could result in adverse effects on historic properties in the APE of the Hudson River Segment of the proposed CHPE Project (see **Figure 3.2.1-1**). Independent GIS analysis indicates that there are eight terrestrial archaeological sites, six underwater sites, seven NRHP-listed or -eligible architectural properties (including the Hudson River Heritage District and the U.S. Military Academy NHLs and the Stony Point Battlefield Historic Site), and one historic cemetery in the APE of the Hudson River Segment.

The terrestrial portion of the Hudson River Segment south of Stony Point, including Waldron Cemetery, has been screened but not formally surveyed for cultural resources. This section would be surveyed for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA (see **Appendix T**). The exact boundaries of Waldron Cemetery would be determined during the survey of this portion of the proposed CHPE Project. Any resources in the APE of the Hudson River Segment would be evaluated for NRHP eligibility.

Impacts from Construction

Ground-disturbing activities associated with construction could damage archaeological features and would be expected to disturb the context of artifacts of terrestrial archaeological and underwater sites and the historic cemetery located in the APE. In the case of archaeological sites that are eligible for listing in the NRHP, this could constitute an adverse effect under 36 CFR 800.5(a)(1) and would, therefore, require resolution per 36 CFR 800.6(b)(1). Because the transmission line would be underground or underwater and would avoid any standing structures, the adverse effects from construction on the NRHP-listed or -eligible architectural properties in the APE would include exposure to temporary noise, dust, and vibrations and short-term visual impacts from the proximity of construction activities and equipment. These effects would not require mitigation. HDD would be used to install the transmission line under Stony Point Battlefield Historic Park. Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a CRMP that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known terrestrial and underwater archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. Circumventing known underwater sites or anomalies would avoid potential damage to the integrity of the site. Development of a PA pursuant to 36 CFR 800.14(b) is underway and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G**.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation and inspection of the transmission cables and maintenance activities in the Hudson River Segment would have no impacts on terrestrial archaeological sites and underwater sites in the APE. Because the proposed CHPE Project would involve an underground transmission line, operations would have no adverse effects on six of the seven architectural properties in the APE. The operation of the proposed cooling station at MP 296 could have visual impacts on Stony Point Battlefield Historic Park (NRL 115). Depending on the exact location of the cooling station, these impacts could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. As identified in **Section 5.2.17**, noise levels from the cooling station would be less than 50 dBA, which complies with the statewide noise standard of 65 dBA.

Vegetation maintenance activities and emergency repairs, if necessary, would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources sites; therefore, adverse effects would not be expected from such activities.

5.3.11 Visual Resources

Impacts from Construction

Construction of the proposed CHPE Project within the Hudson River Segment would result in temporary impacts on visual and aesthetic resources from the presence of construction equipment and activities along the project route. During aquatic installation, a cable-laying vessel, support vessels, and barges would be visible on the water surface. Minimal land-based support would be required. Construction equipment on the water surface would be visible in one place only for a short time period as construction progresses down the waterway.

The proposed CHPE Project route along the terrestrial portion of the Hudson River Segment would require installation under Stony Point Battlefield State Park, Hook Mountain State Park, and Rockland Lake State Park. As described in **Section 2.4.3**, the Applicant would use HDD techniques, which would allow the installation of the transmission line without disturbing the surface features of the parks. This would avoid any potential impacts on these aesthetic resources from construction activities within park boundaries. Construction equipment would be visible at the HDD staging area site during installation. Applicant-proposed measures, such as maintaining existing vegetation buffers, would be implemented at potentially visually sensitive locations, as appropriate, particularly at HDD sites, residential areas, or near historic sites. When removal of existing vegetative cover in visually sensitive areas cannot be avoided during construction activities, vegetation would be replanted following construction, except where replacement would inhibit or impair the safe operation of the transmission line. Applicant-proposed measures, including timely removal of temporary storm water and erosion controls such as silt fence, straw bales, and mulch; construction debris; or blast rock during the various stages of construction, would limit the potential visual impacts (CHPEI 2012q). Following construction, impacted areas within the terrestrial portion of the route would be seeded and allowed to revegetate naturally. Depending on the type of vegetation, natural conditions could return in a matter of months to a few years although trees would not be allowed to re-establish themselves. See **Appendix G** for a list of Applicant-proposed measures.

Impacts from Operations, Maintenance, and Emergency Repairs

No visual impacts or impacts on aesthetic resources would be anticipated along the aquatic portion of the Hudson River Segment route during operations. No significant visual impacts would be anticipated during aquatic emergency repair activities from the temporary presence of vessels and repair activities that would be visible along the proposed CHPE Project route in the Hudson River.

The cooling stations at MPs 296, 298 (two locations), 299, and 302 (two locations) would be permanently visible along the Hudson River Segment. The ROI for all the cooling stations except the station south of MP 298 contains aesthetic resources. The cooling station near MP 296 would be adjacent to Stony Point Battlefield State Park, the cooling station south of MP 298 would be near Babe Ruth Field, and the cooling stations near MPs 299 and 302 would be within 0.5 miles (0.8 km) of Haverstraw Beach State Park and Rockland Lake State Park. However, the presence of the cooling stations would not result in significant visual impacts on these aesthetic resources because the cooling stations would be small and would not change the existing character of the viewshed. The existing visual environment near these cooling station locations is a mixture of residential development, forested areas, and gentle topography; therefore, the cooling station would be within the context of the existing visual environment. **Figure 5.2.11-1** presents a representative photosimulation of a cooling station. The cooling station north of MP 298 would not be within the ROI of any aesthetic resources; therefore, no impacts are anticipated at that location. Visual impacts during maintenance and emergency repair activities would be anticipated from the presence of equipment along the project route. The activities and equipment necessary for maintenance and repairs would be visible for a short-term duration along the proposed CHPE Project route.

5.3.12 Infrastructure

Impacts from Construction

Electrical Systems. Impacts on existing electrical services would occur during construction where the proposed CHPE Project route would cross buried electrical infrastructure. Potential temporary interruptions of services could occur to accommodate installation of the transmission line. The same protocol for transmission cable installation described in **Section 5.1.12** for aquatic portions of the route and **Section 5.2.12** for terrestrial portions of the route would be followed for electrical infrastructure. As described in those sections, impacts on electrical infrastructure would be avoided through the development of site-specific crossing agreements. The final construction plans would be tailored to existing infrastructure constraints, and infrastructure owners would be consulted early and often in the design phase (NYSDPS 2012a). A list of specific Applicant-proposed measures as part of the proposed CHPE Project, including methods to minimize disruptions (i.e., interruptions) to utility infrastructure, including electrical systems, are provided in **Appendix G**.

Water Supply Systems. Temporary impacts on drinking water intakes could result from suspended sediment entering the intakes during the installation of aquatic transmission cables. The aquatic transmission cable route would be installed and buried using water-jetting techniques, which would result in localized sediment suspension and transport. The presence of contaminants in river bottom sediments and the potential for mobilization of these sediments resulting in increased contamination could have temporary impacts on water quality during transmission cable installation in the vicinity of the Rhinebeck, Port Ewen, and Poughkeepsie drinking water intake systems; the Hyde Park Water District drinking water intake systems; and the Chelsea Emergency Pumping Station. However, the NYSPSC Certificate contains conditions setting forth procedures the Applicant must follow to avoid or minimize impacts on water supply systems along the proposed CHPE Project route.

With respect to PCBs, the USEPA has established water quality criteria for the protection of human health against exposure to PCBs through drinking water and fish ingestion. The Criterion Continuous Concentration (CCC) for PCBs for the protection of human health through water and fish ingestion are 0.000064 μg/L. The CCC is an estimate of the highest concentration of a material in surface water to which humans can be exposed indefinitely without resulting in an unacceptable impact (USEPA 2012h). The State of New York has adopted drinking water quality standards for PCBs for the protection of public health from short-term (acute) discharges. These criteria, contained in 6 NYCRR Part 703, establish a standard of 0.09 μg/L for surface water sources used for potable water.

Maximum concentrations of PCBs that would result from sediment disturbance by the proposed CHPE Project for the Hudson River are estimated to be 0.1 μg/L (CHPEI 2012i, USEPA 2012e). Therefore, PCB concentrations resulting from proposed CHPE Project cable installation activities would be higher than the water quality criteria established by USEPA and New York State water quality standards. However, these criteria and standards have been established to account for long-term ingestion of PCBs through drinking water. A more relevant guideline for this short-term construction activity would be the Engineering Performance Standard set by the USEPA for dredging resuspension at the Hudson River PCBs Superfund Site, which sets a total PCB concentration of 0.5 μg/L (USEPA 2012f).

The proposed CHPE Project aquatic cable installation activities in the Hudson River would result in PCB resuspension over a discrete and limited period, as opposed to indefinitely, and the resulting concentration levels would comply with the USEPA Engineering Performance Standard.

The Applicant has collected information regarding locations and flow rates for intake structures and would coordinate with intake structure owners or operators within 1 mile (1.6 km) of the transmission line route in accordance with Condition 104 of the NYSPSC Certificate for the proposed CHPE Project, and use BMPs during cable installation to minimize impacts (see **Appendix G**) (CHPEI 2012dd, NYSPSC 2013). In addition, TSS levels would be below 200 mg/L within 500 feet (152 meters) of the construction area. Suspended sediment plume and water quality monitoring would be conducted in accordance with the Applicant's Water Quality Monitoring Plan in the EM&CP.

Non-significant impacts on water supply systems would be expected due to temporary interruptions of service. Two water lines were identified along the Hudson River Segment at MPs 270.3 and 295.5. Because Applicant-proposed measures (e.g., mattress pads, grout pillows, articulated concrete mats installed over the water line) would be taken to avoid impacts on infrastructure, impacts would be unlikely. If an interruption in service would be unavoidable, it would be coordinated with area utility owners or operators prior to disconnection to allow the utilities to be able to provide water continuously to its users. No significant impacts on water supply system infrastructure within the terrestrial section of the Hudson River Segment would be expected, as construction activities would be coordinated with local water utilities. If a temporary interruption of services associated with potable water infrastructure were determined to be necessary, any interruption in services would be coordinated with area utility providers prior to the interruption to allow the utilities to be able to provide water continuously to their users.

Storm Water Management. No impacts on storm water management infrastructure would occur in the aquatic sections of the Hudson River Segment as no storm water management infrastructure is present or necessary. Impacts on storm water management for the terrestrial portion of the segment would occur where existing storm sewer inlets or pipes would be crossed by underground cable installation along U.S. Route 9W. Any storm water drains or storm water management features encountered would be restored to previous conditions if disturbed, or would be avoided by minor route alterations or via the use of HDD, as would be the case with the storm water drainage pipe identified at MP 296.6. A discussion and listing of specific BMPs proposed by the Applicant as part of the proposed CHPE Project, including additional details on storm water management, are provided in **Appendix G**.

Solid Waste Management. No significant impacts on solid waste management would be expected due to the potential disposal at local landfills of 200 cubic yards (183 cubic meters) of excavated soils and drill cuttings associated with HDD activities at water-to-land transitions and up to 480 cubic yards (367 cubic meters) of river sediment from conventional dredging to create cofferdams. Refer to **Section 5.1.12** for more details on the solid waste management impacts and BMPs associated with trenching and HDD.

Communications. Temporary impacts on existing communications could occur due to interruptions of services during construction where communication lines would be crossed by the proposed CHPE Project. In some areas of the Hudson River Segment, existing telecommunication cables might be buried less than 3 feet (0.9 meters) deep. At these locations, the Applicant would increase the burial depth of the existing cables by water jetting the crossing point prior to installing the aquatic transmission cables, or, if that is not possible, cutting and re-splicing the telecommunications cables after installing the aquatic CHPE Project transmission line, which could result in temporary interruptions in service. Trenching or HDD methods would be used to cross terrestrial intersections. The protocol and BMPs to minimize impacts on utility customers would be the same as those described in **Section 5.1.12**, and additional information about the Applicant-proposed measures to minimize impacts is presented in **Appendix G**.

Natural Gas Supply. Temporary impacts on existing natural gas infrastructure could occur due to interruptions of services during construction where gas lines would be crossed by the proposed CHPE Project. Underwater, the HVDC cables would cross the existing gas lines as close as possible to right angles and concrete mats or other protection would be added over the crossing point. The method of cable embedding and protection would be determined by the burial depth of the existing infrastructure (CHPEI 2012i). On land, cable installation activities over or near gas lines would be coordinated with the gas utility. The protocol and BMPs to minimize impacts on utility customers would be the same as those described in **Section 5.1.12**, and additional information about the Applicant-proposed measures to minimize impacts is presented in **Appendix G**.

Liquid Fuel Supply. Minimal amounts of liquid fuel would be consumed by construction-related equipment. No substantial liquid fuel pipelines or infrastructure have been identified within the Hudson River Segment (CHPEI 2012w). Therefore, no impacts on liquid fuel pipelines or infrastructure would be expected. If liquid fuel infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs would be the same as those described in **Section 5.1.12**.

Sanitary Sewer and Wastewater Systems. One substantial sewer line has been identified within the Hudson River Segment (CHPEI 2012w) at MP 297.3. However, the proposed CHPE Project transmission line would cross under this sewer line by using HDD. Therefore, no impacts on sanitary sewer and wastewater would be expected. If sanitary sewer and wastewater infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs would be the same as those described in **Section 5.1.12**.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical Systems. The proposed CHPE Project would likely result in increases in the supply capacity and reliability of electrical power and a decrease in transmission congestion in the NYSBPS over the duration of the project. In addition, the NYSBPS would have a greater percentage of its capacity sourced from energy clean resources (see **Section 5.4.16**). Benefits to the NYSBPS are discussed in greater detail in **Section 5.4.12**.

No significant impacts on electrical systems would be expected from operation of the cooling stations. The transmission cables would be designed to be relatively maintenance-free, with only the need for periodic inspections. In addition, increased reliability would reduce contingencies and the need for intervention.

Water Supply Systems. No significant impacts on water consumption would occur from initially filling cooling station chiller systems from the regional water supply. Cooling stations would be constructed at seven locations along this section of the transmission line route. A chiller system and pumping system within the cooling station would circulate chilled water through tubing alongside the HVDC cable (TDI 2012a). The Applicant has estimated that approximately 245 gallons (927 liters) of cooling water would be required to fill initially the piping system of each cooling unit.

Storm Water Management. The operation and maintenance of the cables buried beneath the Hudson River or in railroad and roadway ROWs would have no impact on storm water flows or associated storm water management infrastructure. Any existing storm water management features encountered during transmission cable emergency repairs would be avoided via HDD; or would be replaced, relocated, or restored to like-new conditions.

Solid Waste Management. No significant impacts would be expected on solid waste management because inspections and emergency repair activities would produce small amounts of solid waste, but would be infrequent and short-term. The transmission line itself would be designed to be relatively maintenance-free and therefore would not produce any solid waste. Generation of such waste would be recycled to the maximum extent practicable and would result in minimizing contributions to regional landfill capacities.

Communications. No operational impacts on communications would be expected because the transmission cables would not create induced voltages or currents that could impact communications equipment such as marine radios, remote telephones, and cellular telephones. The transmission cables would not create any corona discharge and would not be independent sources of radio, telephone, or television interference (CHPEI 2012i).

Natural Gas Supply. No operational impacts on natural gas supply would be expected because the transmission system would not consume natural gas.

Liquid Fuel Supply. No significant impacts on the liquid fuel supply would be expected due to the use of minimal amounts of liquid fuel during the maintenance of the ROW, inspections, and potential emergency repairs of the transmission system. Inspection and maintenance activities would be short-term in duration but occur multiple times over the operating life of the transmission line.

Sanitary Sewer and Wastewater Systems. No operational impacts on sanitary sewer and wastewater systems would be expected because the operation of the transmission system would not increase the generation of wastewater.

5.3.13 Recreation

Impacts from Construction

Construction activities along the Hudson River Segment of the proposed CHPE Project route would be visible from six recreational resources located within 100 feet (30 meters) of the transmission line (see **Table 3.3.13-1**) and could be visible from six additional recreational resources located within 0.5 miles

Recreational areas within 100 feet (30 meters) of the transmission line in the Hudson River Segment are Tivoli Bay WMA, Hudson State Historic Park, Stony Point Battlefield State Park, Haverstraw Beach State Park, Hook Mountain State Park and Rockland Lake State Park.

(0.8 km) of the transmission line and proposed cooling stations, depending on the viewsheds of the resources.

Impacts on recreational activities on the Hudson River could occur from the limited closure of the immediate area of the river surrounding the cable installation vessels where recreational use would be limited. However, access to shore-based recreational areas (i.e., boat launches) would not be affected. Additionally, construction activities near recreational resources would only be present for a few hours to a few days at a time as the cable installation progresses down the Hudson River.

The terrestrial portion of the proposed CHPE Project route within the Hudson River Segment would require installation of terrestrial transmission cables under Stony Point Battlefield State Historic Site, Hook Mountain State Park, Rockland Lake State Park, and Haverstraw Beach State Park using HDD. As described in **Section 2.4.3**, the Applicant would use HDD techniques, which would allow installation of the transmission line without disturbing the surface features or uses of the parks; therefore, access restrictions to these recreation areas would not occur. Staging areas for HDD would be outside of park boundaries. HDD operations would be visible and audible from recreational areas during construction; however, these impacts on recreational resources would occur over a short period of time (approximately 2 weeks). Construction activities associated with the cooling stations could be visible and audible at these parks; however, the construction activities for installing the cooling stations also would occur over a short period of time. Access to other local recreational areas via local roadways such as Babe Ruth Field at MP 299 would be maintained during construction through the implementation of the MPT Plan (see **Appendix G**) developed in consultation with park operators to ensure continuous access to recreational areas. The MPT would include measures such as use of traffic flaggers or other traffic management methods during construction activities, specific locations of general construction and HDD staging areas, and restoration of project sites to pre-construction conditions. Construction could be carried out in the off-season (e.g., October or November), which would avoid or minimize impacts. Further discussion of visual impacts from construction activities can be found in **Section 5.3.11** and potential noise impacts are discussed in **Section 5.3.17**.

> Recreational areas in the ROI of cooling stations in the Hudson River Segment are Stony Point Battlefield State Historic Site, Bowline Point Town Park, Hook Mountain State Park, Rockland State Park, the Haverstraw little league baseball fields, and High Tor State Park.

Limited land-based support would be required for the aquatic construction activities. The land-based support facility for the aquatic operations would be expected to be located at the Port of Albany. Therefore, no impacts on recreation areas along the Hudson River Segment would be expected from use of the land-based support facility during construction.

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts on recreation would be expected from operation of the proposed CHPE Project within the Hudson River Segment. The cables would be buried beneath the river bottom and would not interfere with recreational uses on the river. During operations, the cooling stations at MPs 296, 298 (two locations near MP 298), 299, and 302 (two locations near MP 302) would be permanently visible along the Hudson River Segment. The ROI for the cooling stations contains six recreational areas where the cooling stations could be visible. The cooling stations, however, would not be anticipated to affect those recreational areas because each cooling station, with a height of 8 feet (2.4 meters) and a footprint of approximately 128 square feet (12 square meters) would be relatively small in size and would not affect access to, or use of any recreational areas.

Maintenance activities would consist of infrequent non-intrusive inspection surveys of the underwater cable route by vessel-towed instruments, the terrestrial line route, and the cooling stations. If emergency repairs of the cables or cooling stations would be required, the activities needed to recover, splice, and install a new cable section would not impact recreational resources or their access as these activities would last only a few hours in any one location and access would be provided at all times in accordance with an MPT. Further discussion of operation, maintenance, and emergency repair impacts on visual resources can be found in **Section 5.3.11**.

5.3.14 Public Health and Safety

Impacts from Construction

Impacts on health and safety could occur during construction activities for the proposed CHPE Project. Construction activities pose an increased risk of construction-related accidents, but this level of risk would be managed by adherence to established Federal and state safety regulations. Activity-specific HASPs and an Emergency Contingency Plan would include measures for safety along the transmission line route. The HASPs would identify requirements for minimum construction buffers (e.g., temporary aquatic exclusion areas) from active recreational uses on the river such as boating for aquatic portions of the route, and minimum construction distances from residences or businesses and requirements for temporary fencing around staging, excavation, and laydown areas during construction along terrestrial portions of the route. The HASPs would include provisions for railroad safety training and for general worker protection, as required under the NESC and OSHA 29 CFR Part 1926, *Safety and Health Regulations for Construction*. Blasting activities and safety measures during such activities would be managed with a blasting plan. Additional details regarding construction impacts on public health and safety from the proposed CHPE Project are provided in **Section 5.1.14**.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts on contractor and public health and safety could occur during the operational phase of the proposed CHPE Project. Activities associated with periodic maintenance (and emergency repairs as required pose a risk of accidents similar to the types that could occur during construction. However, this level of risk would be managed by adhering to established Federal and state safety regulations and would be low because such activities would be short-term in duration. **Appendix G** presents additional details on Applicant-proposed measures for addressing impacts on contractor and public health and safety. Impacts from intentionally destructive acts and other causes of structural failure could occur during operation of the proposed CHPE Project and are discussed in detail in **Section 5.1.14**.

Magnetic Field Safety. No health and safety impacts from magnetic fields would be expected during the operational phase of the proposed CHPE Project. Because the transmission line would be primarily buried beneath the Hudson River, the greatest foreseeable exposure to magnetic fields potentially would occur to recreational or commercial users of the river, especially divers; however, due to the depth of burial of the transmission lines, this would be highly unlikely. For the Hudson River Segment, the depth of burial was assumed to be 7 feet (2.1 meters) with 1 foot (0.3 meters) or less of separation between the two cables, which would be collocated in the same trench. As shown in **Table 5.1.14-1** and **Figure 5.1.14-1**, the calculated magnetic field levels on the riverbed directly over the transmission line centerline would be less than 162 mG, which is below the 200-mG magnetic field strength interim standard established by the NYSPSC (CHPEI 2012t, CHPEI 2012ll). In locations where the cables would be installed on the riverbed surface above existing utilities and covered with concrete mats, magnetic field levels would be approximately 600 mG directly above the cables. Magnetic field levels would decrease to less than 77 mG at a distance of 10 feet (3 meters) from the transmission line. Due to its location beneath the Hudson River, human exposure to the magnetic fields associated with the proposed CHPE Project are not anticipated.

The transmission cables would be buried in trenches in the railroad ROW within Stony Point and Haverstraw, and within the U.S. Route 9W ROW in Clarkstown. With a 1-foot (0.3-meter) cable spacing, the 200 mG NYSPSC interim standard would be met 1 foot (0.3 meters) above the ground directly over the cable. Conservatively assuming a 2-foot (0.6-meter) cable separation, the 200 mG interim standard would be met within 10 feet (3 meters) from the edge of the nearest cable, as shown in **Table 5.1.14-1**. Because the presence of the transmission line within road ROWs would comply with the NYSPSC interim standard, and public exposure to the resulting magnetic fields would be infrequent and for short durations as people passed while walking on these roads or traveling in vehicles, no impacts from magnetic fields would be expected from operation of the proposed CHPE Project. Because public exposure to the resulting magnetic fields would be infrequent and for short durations as people pass by while walking on these roads or traveling in vehicles, and because the World Health Organization, DOE, and NIEHS have not identified any known health effects from this level of exposure, no impacts from magnetic fields would be expected from operation of the proposed CHPE Project.

If emergency repairs of the transmission line were required, the line would be de-energized and contractor health and safety measures would be implemented.

5.3.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the aquatic and terrestrial transmission line in the Hudson River Segment would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products, and small amounts of hazardous wastes would be generated as by-products of the transmission cable installation process.

The installation of the aquatic transmission line has the potential to suspend and transport contaminants deposited within the sediment. However, suspended sediment from water jetting, some of which might be contaminated, would be re-deposited in close proximity to its source. The installation of the terrestrial transmission cables could disturb contaminants potentially deposited in the soil due to the extended use of portions of these areas as railroads and the current and former use of nearby areas for industrial and commercial operations. To minimize potential impacts from hazardous materials and wastes, the Applicant would require that all contractors follow appropriate Applicant-proposed measures. These BMPs would include, but are not limited to, establishing an SPCC Plan to prevent, control, and minimize impacts from a spill of hazardous materials, hazardous wastes, or petroleum products; keeping appropriate spill control equipment such as containment booms, water skimmers, and sorbents on site and ready for use; using secondary containment where applicable; and following all appropriate Federal and New York State regulations regarding management of hazardous materials and wastes. As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct additional pre-installation chemical sediment sampling in the Hudson River for use in post-installation monitoring (NYSPSC 2013).

For the terrestrial portion of this segment in Stony Point, Haverstraw, and Clarkstown, soil sampling would be conducted in areas where visual or olfactory evidence indicates the potential for elevated levels of contaminants in soil or groundwater. Locations where contamination could be encountered include the vicinity of the former Mirant-Lovett Electric Generating Station, Haverstraw Landfill, Kay-Fries National Priorities List Superfund site, Temco Uniform Factory, and the automobile repair facilities located along U.S. Route 9W in Clarkstown. **Appendix G** contains a list of Applicant-proposed measures to minimize the potential impacts if suspected contamination is identified during construction.

The transmission line would transition from the railroad ROW to the Hudson River at the town of Catskill. Catskill is approximately 45 miles (72 km) downstream of the southern end of the Hudson River PCB Dredging Project. As such, no impacts on the dredging project would be expected from the installation of the aquatic transmission line in the Hudson River. Future dredging of PCB-contaminated sediment is not anticipated along the route of the aquatic transmission line in the Hudson River Segment.

Construction of cooling stations at various locations along the terrestrial transmission line route (i.e., MPs 296, 297, 298, 299, 301, and 302) would not result in significant impacts from the transport, handling, use, and onsite storage of hazardous materials and petroleum products to support building construction. The cooling station to be constructed at MP 298 is in the immediate vicinity of the former Temco Uniform Factory, which is a NYSDEC Class 2 Inactive Hazardous Waste Site. The cooling station would be sited in consultation with the NYSDEC to ensure that it does not conflict with ongoing remedial investigation activities associated with the Temco site.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate the vessels, ROVs, trucks, and other equipment needed to conduct routine performance evaluations of the aquatic and terrestrial transmission cables, and maintenance of vegetation in the ROW of the terrestrial transmission line. Should any sections of the transmission cables need to be unearthed for emergency repairs, localized disturbances of soil and sediment potentially containing contaminants would be required. However, because the transmission cables are designed to be maintenance-free and require infrequent inspections, any hazardous materials and waste impacts from maintenance, inspection, and emergency repairs would not be significant. The transmission cables do not contain any hazardous fluids, thereby eliminating any potential for contamination from the cables themselves. Operation of the cooling stations would require limited amounts of hazardous materials and petroleum products for equipment lubrication, cleaning, routine maintenance, and emergency repairs.

5.3.16 Air Quality

Detailed lists of construction equipment, the anticipated construction schedule, and associated emissions calculations for the Hudson River Segment are provided in Tables M-10 through M-17 in **Appendix M**. References for various emissions factors used in the analysis for the Hudson River Segment are included in Tables M-13 and M-14 in **Appendix M**.

Impacts from Construction

Construction activities for the Hudson River Segment would include both water-based activities related to underwater transmission cable installation within the Hudson River and land-based activities related to the burying of transmission lines on land to avoid sensitive aquatic resources in Haverstraw Bay. Seven cooling stations would be constructed as part of the Hudson River Segment due to the use of the HDD at the additional water-to-land transitions and other long HDD segments.

The construction-related air pollutant and GHG emissions within the Hudson River Segment would primarily occur from diesel fuel-powered internal combustion engines and fugitive dust from earth-moving, blasting, and water-based activities, and would be minimized through use of Applicant-proposed measures such as wetting exposed soils. Heavy equipment, barges, generators, and boats, including those with internal combustion engines, would emit pollutants.

A substantial portion of the Hudson River Segment is in nonattainment with ozone, $PM_{2.5}$, and PM_{10} standards. The proposed CHPE Project length in the Hudson River Segment is approximately 95 miles (153 km), of which 88 miles (142 km) would be aquatic. Based on an installation rate of approximately

1.5 miles (2.4 km) per day for aquatic portions and 0.5 miles (0.8 km) per day for terrestrial portions, and accounting for cable splicing, these cable segments are projected to be installed within approximately 6 months. The construction-related air pollutant and GHG emissions within the Hudson River Segment primarily would be due to diesel internal combustion engines. Heavy equipment, barges, generators, and boats, including those with diesel internal combustion engines, would emit pollutants such as CO, CO_2, SO_x, PM, NO_x, and VOCs, including aldehydes and PAHs. The emissions would be spread over the 6-month construction phase, dispersed in a relatively large area, and temporary. Applicant-proposed measures to reduce impacts from emissions and minimize fugitive dust, such as minimization of engine idling and dust-control measures, are provided in **Appendix G**.

Emissions from construction activities in the Hudson River Segment are summarized in **Table 5.3.16-1**. This includes construction emissions within the Poughkeepsie Area and the New York-North New Jersey-Long Island NY-NJ-CT nonattainment area, and the remaining attainment area. Emissions calculation spreadsheets are provided in Tables M-15 through M-17 in **Appendix M**.

Table 5.3.16-1. Estimated Air Emissions Resulting from Proposed CHPE Project Construction Activities in the Hudson River Segment

	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Hudson River Segment	106.36	6.93	31.31	3.82	13.10	6.65
Poughkeepsie Area Portion	53.49	3.26	15.04	2.15	2.28	2.20
New York-North New Jersey-Long Island, NY-NJ-CT Area Portion	23.23	1.63	6.87	0.95	5.10	2.55
Remaining Attainment Portion	29.64	2.04	9.40	0.95	5.71	2.55

Emissions from construction on portions of the Hudson River Segment would occur in the Poughkeepsie nonattainment area. **Table 5.3.16-2** summarizes these emissions and the corresponding General Conformity thresholds. Construction emissions associated with the proposed CHPE Project in the Hudson River Segment would not exceed the General Conformity Rule *de minimis* thresholds, and therefore are not subject to a General Conformity Determination. In addition, these construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, increase the frequency or severity of a violation of any ambient air quality standard, exceed any evaluation criteria established by the SIP, or delay the attainment of any standard or other milestone contained in the SIP.

Table 5.3.16-2. General Conformity *de minimis* Thresholds for the Poughkeepsie Area for the Proposed CHPE Project

Activity	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Hudson River Segment	45.84	2.79	12.88	1.85	1.95	1.89
General Conformity *de minimis* Thresholds	**100**	**50**	**NA**	**NA**	**NA**	**NA**
Exceed *de minimis* Thresholds	**No**	**No**	**NA**	**NA**	**NA**	**NA**

Emissions from construction on portions of the Hudson River Segment would also occur in the New York-North New Jersey-Long Island, NY-NJ-CT nonattainment area. Summarized emissions for this nonattainment area are also presented in the New York City Metropolitan Area Segment in **Section 5.4.16** because they require adding to this nonattainment area's emissions.

Impacts from Operations, Maintenance, and Emergency Repairs

The operation and maintenance activities within the Hudson River Segment would consist primarily of transmission cable inspections; preventive maintenance, ROW vegetation management, and emergency repairs within the Hudson River, railroad and road ROWs, and at transition areas between upland and submerged portions of the route; and maintenance and possible emergency repairs of cooling stations. Such activities would be short-term, but would occur multiple times over the operating life of the transmission line. The proposed transmission line would be designed to be maintenance-free and operated within the working conditions specified for the cables.

Operation of the transmission line in the Hudson River Segment is anticipated to produce a negligible amount of associated emissions. Vegetation management, including tree cutting and mowing, would be performed on a regular basis along the 8-mile (13-km)-long terrestrial ROW using gasoline- and diesel-powered equipment. Regular inspections of the cables, in accordance with the manufacturer's specifications, would be performed to ensure equipment integrity is maintained. In the event of emergency aquatic or terrestrial cable repairs as addressed in the ERRP, appropriate vessels, equipment, and qualified personnel would be used to minimize the response time. It is anticipated that equipment and vessels similar to those used in construction activities would be used for short periods during emergency repair activities, as required. In addition, maintenance and repair activities associated with the proposed cooling stations are anticipated to occur regularly; however, the resulting increase in emissions would be negligible because of the small scale of such activities. Overall, the annual emissions from operations, maintenance, and emergency repairs along the Hudson River Segment would be expected to be considerably less than the annual construction emissions for this segment.

Impacts from the full proposed CHPE Project on GHG emissions are discussed in **Section 5.4.16**.

5.3.17 Noise

Impacts from Construction

Construction of the aquatic transmission line in the Hudson River Segment would cause a temporary increase to the noise environment in the ROI, particularly the area surrounding active construction activities. During construction, the laying of aquatic transmission cables using a jet plow would be a continuous 24-hour-a-day operation. There would be potential noise impacts on residents along the shoreline due to operation of vessels and heavy equipment closer to the shoreline and other activities such as HDD. Given the nature of the installation progressing at an average rate of 1.5 miles (2.4 km) per day, it is unlikely that nearby receptors on the shoreline would be subject to noticeable sound increases for more than a few hours at any one location. The offshore HDD cofferdam locations at MP 228, 295, and 303 would be active for approximately 2 weeks and would all be at least 300 feet (91 meters) from shore. **Table 5.1.17-1** summarizes anticipated noise levels associated with aquatic installation activities.

Along the Hudson River Segment, construction activities would generally occur at distances greater than 500 feet (152 meters) from noise-sensitive receptors. However, in a few places, construction would occur closer to shore. For example, aquatic construction activities would occur within approximately 500 feet (152 meters) of the shores of the hamlets of Rhinecliff (MP 245), New Hamburg (MP 269), and Tomkins Cove (MP 292). At this distance, the noise level would be approximately 56 dBA. The HDD cofferdam locations at MPs 228, 295, and 303 would all be at least 300 feet (91 meters) from shore, and the noise level at the shore would be less than 62 dBA. These levels would be below the NYSDEC 65 dBA guideline for new noise sources in a non-industrial setting. Construction equipment would be equipped with appropriate sound-muffling devices (i.e., OEM or better), and would be maintained in good operating condition at all times.

Construction of the terrestrial transmission line would cause a temporary increase in noise. Terrestrial transmission cable installation in road and railroad ROWs requires a wide range of site preparation and cable installation activities. **Table 5.2.17-1** summarizes anticipated noise levels associated with terrestrial installation activities. Along this segment, construction activities, cooling station installation, and terrestrial HDD operations at approximately 20 locations would generally occur at distances greater than 500 feet (152 meters) from noise-sensitive receptors; however, in a few places, construction would occur closer. For example, terrestrial construction would occur approximately 100 to 500 feet (152 meters) from residences and recreation users in Stony Point State Park (MP 296), West Haverstraw (MP 297 to 299), Babe Ruth Field (MP 298), and Hook Mountain State Park (MP 302). At these distances, the noise level would be approximately 66 to 86 dBA. Construction equipment would be equipped with appropriate sound-muffling devices (i.e., OEM or better), and would be maintained in good operating condition at all times. Blasting during construction activities could also occur in the terrestrial portion of the Hudson River Segment, and impacts would be the same as those described for the Overland Segment in **Section 5.2.17**. Blasting, if necessary, would be confined to daylight hours.

Noise generated from the water-to-land transition HDD operations would be relatively constant and, at a level up to 89 dBA within 100 feet (30 meters) of the HDD equipment, slightly louder than typical construction noise levels (DOE 2007). Recreation users most likely to experience noise from the water-to-land HDD staging areas would be found near Stony Point State Park (MP 296). Some residents along the transmission line route and recreation users at Hook Mountain State Park (MP 302) would be within 100 feet (30 meters) of terrestrial HDD operations and would experience noise levels of approximately 86 dBA during for up to approximately 2 weeks. HDD drill rig operations could occur on an around-the-clock basis while the drill path is being bored. Where warranted, the Applicant would install temporary sound barriers, such as wooden barriers, to reduce noise levels from HDD or, in extreme cases, offer temporary lodging for residents affected (see **Appendix G**). The Applicant would notify residents ahead of time regarding construction activities in residential areas traversed by the transmission line.

Impacts from Operations, Maintenance, and Emergency Repairs

Significant impacts from the generation of noise during routine inspection of the aquatic transmission line would not be expected as a result of the proposed CHPE Project. A small vessel would be used to tow remote sensing equipment along the transmission line route. The increase in sound levels resulting from the inspection activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. Noise levels generated from emergency repair activities would be similar to those expected during construction, except the work would be restricted to discrete area where the repairs would be made. **Table 5.1.17-1** summarizes anticipated noise levels associated with aquatic construction activities that would be used during emergency repairs.

Impacts from the generation of noise during operations of cooling stations, routine inspection, maintenance, and possible emergency repairs along the terrestrial portions of the segment would be expected. The increase in sound levels resulting from routine inspection and maintenance activities would be short-term in duration, but would occur multiple times over the operating life of the transmission line. In general, the increase in sound levels related to inspection and maintenance activities would be associated with noise generated from vehicle traffic and maintenance equipment, such as lawn mowers and other equipment needed to maintain the ROW. Noise levels generated from emergency repair activities would be similar to those expected during construction as shown in **Table 5.2.17-1** but would only occur as required with less equipment, and be much shorter in duration and limited to the immediate area of repairs. The Applicant has estimated that the cooling stations would be designed to achieve a noise level of 50 dBA at 100 feet (30 meters) away from the source. The statewide noise standard is 65 dBA. Residents and recreation users most likely to experience noise from the cooling stations would be found in the vicinity of the cooling stations adjacent to Stony Point State Park (MP 296), West Haverstraw (MPs 298 and 299), and Hook Mountain State Park (MP 302). Some residences within this area could be within 100 feet (30 meters) of a cooling station, but sound levels at residences would depend on background noise levels, orientation of the cooling station, and vegetative buffers that currently exist between the cooling station location and residences. In addition, cooling stations would only operate as required to cool the transmission cables, primarily during summer months. Noise impacts from the cooling stations are therefore likely to be minimal.

5.3.18 Socioeconomics

Impacts from Construction

Population. Construction of the CHPE Project transmission line and cooling stations likely would not result in the permanent migration of workers to the area to meet the demands of the project. Therefore, population levels within the Hudson River Segment ROI would not change noticeably due to any influx of construction workers. However, a small number of specialized workers would likely relocate temporarily to the area for the duration of construction in this segment.

Employment. During the approximate 4-year construction period, the proposed CHPE Project is estimated to require an average of more than 210 direct construction jobs, with a peak of more than 420 direct construction jobs in 2015 in the Overland and Hudson River segments. Additional indirect and induced jobs would be associated with supplying materials and providing other services for construction of the CHPE Project (CHPEI 2013b). The construction of the proposed CHPE Project would require specialized construction workers, which would increase demand temporarily for workers and create direct and indirect jobs. Any non-specialized construction workers that would be required for construction would be available from the counties composing the Hudson River Segment ROI, which have approximately 75,400 construction workers.

Taxes and Revenue. Construction expenditures for building materials, construction workers' wages and taxes, and purchases of goods and services in the area would increase tax receipts and revenue for the local economy. The purchase of building materials for the proposed CHPE Project would be sourced locally where available and appropriate. Similarly, hiring construction workers in the surrounding area would increase local tax receipts and revenue in this segment. In addition, specialized equipment would be necessary for the installation of the proposed transmission line and might come from both inside and outside the segment or New York State.

A portion of the CHPE Project in the Hudson River Segment would be constructed within the ROW of State Route 9W in Clarkstown. Access to local businesses would be maintained during construction in accordance with a MPT Plan and construction work areas would only be in a given location for 2 weeks or less.

Housing. Workers who would have to travel to the area for construction of the proposed CHPE Project would likely be housed in either hotels or short-term rentals. Relatively few workers would be required for construction activities; therefore, available temporary housing supplies would be able to meet the temporary increase in housing demand.

Construction activities would not influence private property values because the activities would be temporary and property would be restored after completion of construction. The transmission line would be located at the bottom of the Hudson River or primarily along railroads and public roadways in terrestrial portions of the route, and associated HDD activities would be sited along the perimeter of private property to the maximum extent practicable. Temporary construction staging areas could occur on private property, with rental payments made by the construction contractor to the landowner. The Applicant would also pay for any associated land restoration costs. Construction work areas would only be in a single given location for 2 weeks or less. Because construction activities would occur over such a short time period, no change in private property values would be expected from construction activities. Construction of cooling stations would not occur on private property apart from railroad ROWs and, therefore, would not be expected to affect property values.

Impacts from Operations, Maintenance, and Emergency Repairs

Population. The operation, maintenance, and emergency repair of the transmission line would not lead to an influx of new residents because five direct permanent jobs in the Lake Champlain, Overland, and Hudson River segments combined would be required for the commercial operation of the proposed CHPE Project. However, maintenance and potential emergency repair activities would be conducted by contractors who could be required to hire new workers locally, but these workers could also move in from outside the area.

Employment. The operational phase of the proposed CHPE Project would be expected to create five or less direct full-time equivalent jobs in the Hudson River Segment. Indirect jobs would also be created for maintenance inspections and possible emergency repairs that would be conducted by contractors. The indirect jobs created would be associated with the cooling systems and electrical services at the cooling stations, landscaping contractors who would provide vegetation maintenance services, and utility contractors who would conduct potential emergency repairs of the transmission line. Considering the low number of jobs that would be created, the existing workforce within the Hudson River Segment would be able to meet the employment demands of the proposed CHPE Project.

Taxes and Revenue. Rockland County would be expected to receive tax revenues from the Applicant on the proposed CHPE Project transmission system facilities outside state lands. Assuming that tax receipt estimates would be approximately 2 percent annually of the assessed property value, estimated tax revenue to Rockland County from the proposed CHPE Project was estimated at $797,000 (CHPEI 2012mm). Costs of the transmission system would be borne by investors as a merchant project and would not be directly passed on to ratepayers. See **Section 5.2.18** for additional information on taxes and revenue.

The municipalities would not collect real property taxes on any portions of the proposed CHPE Project that would occur on state lands. Because the transmission cables would be installed under or on top of the state-owned submerged lands under the Hudson River, the Applicant would be required to obtain an easement from the New York State Office of General Services and pay associated fees. Submerged lands easements are typically issued for 25-year terms.

Local contractors would be hired to provide periodic maintenance services at the cooling stations and vegetation management along the ROWs. If an emergency repair situation arose, a utility contractor would be hired to make the necessary repairs. Increases in wages and taxes and purchases of goods and services in the area would be expected from workers employed in the area during proposed CHPE Project maintenance and potential emergency repair activities. Residents and businesses in the Hudson River Segment would experience cost savings from the annual reductions in wholesale energy market prices from the proposed CHPE Project that would occur throughout the state (NYSDPS 2012a) (see **Section 5.1.18** for additional information).

Housing. The majority of employees required for the operation, maintenance, and potential emergency repairs within this segment would be hired within the Hudson River Segment ROI, and therefore would represent a negligible increase in housing demand in this segment. The existing number of available residential units at any given time would more than adequately meet the needs of any new employees that would require housing.

The completed transmission line would generally be buried in road and railroad ROWs along terrestrial portions of this segment and not visible; therefore, its presence would not generally be a detriment to private property values. Easement agreements for deviation areas would establish future land use restrictions within the easement (e.g., restricting development directly above the transmission line). Easement payments would compensate landowners for the restrictions placed on private properties and would offset any potential impacts on property values. Maintenance and emergency repairs, if necessary, could occur on private property; however, the majority of the transmission line ROW would be within existing railroad and roadway ROWs. The Applicant would also pay for any land restoration costs associated emergency repairs. Because maintenance and emergency repair activities would only occur in a given location for 2 weeks or less, no change in private property values would be expected.

5.3.19 Environmental Justice

Impacts from Construction

The 56 census tracts identified in this segment's ROI predominantly border the Hudson River and reported minority or low-income population levels that were generally lower than those indicated among New York State's total population (see **Appendix L**). Effects from construction on all populations, including minority and low-income populations, including those on public health (described in **Section 5.3.14**), air emissions and dust, and noise from vessels, traffic, and construction equipment (described in **Sections 5.3.16** and **5.3.17** respectively), and socioeconomic impacts (described in **Section 5.3.18**), would be small, and occur on a transitory and temporary schedule. Further, these effects would occur primarily in aquatic environments removed from populations residing on land and primarily in existing roadway and railroad ROWs. Cooling stations would be constructed at seven locations along this segment in existing railroad and road ROWs. Noise generated from construction activities, including equipment usage, blasting, and detouring traffic around work sites, would occur on a temporary basis as the transmission line is installed. Work areas would only be present in a given location for no more than 2 weeks or fewer at a time.

Impacts from Operations, Maintenance, and Emergency Repairs

Operation of the transmission line would create magnetic fields; however, impacts from magnetic fields on minority and low-income populations would not be expected because the cables would be placed underground in the same trench, and no known human health effects from exposure to magnetic fields at the level to be emitted by the proposed CHPE Project have been identified. Therefore, human health and environmental effects on all populations, including minority and low-income populations, from maintenance and potential emergency repairs, which include air emissions and noise from equipment used for maintenance and repairs, would be small, and occur on a transitory and temporary schedule. Such activities would occur primarily in aquatic environments or existing railroad and roadway ROW; and for durations and at frequencies less than those required for construction.

5.4 New York City Metropolitan Area Segment

5.4.1 Land Use

Impacts from Construction

Construction of the aquatic portion of the proposed CHPE Project within the New York City Metropolitan Area Segment would result in the presence of cable-laying vessels and equipment in the Harlem River and Spuyten Duyvil Creek. Transmission line installation would not prohibit water-dependent recreational activities such as boating, angling, water sports, or commercial sightseeing because vessels could either transit around the work site or use a different area of the rivers. The presence of cable-laying vessels and equipment would be temporary (i.e., for the duration of construction while vessels and equipment would be present in a particular location) and localized at the work site. Approximately 1 to 3 miles (2 to 5 km) of transmission cable can be installed per day in an aquatic environment, so the work site, which would be off limits to other vessels, would not remain at any one location for a long period of time. The construction activities could temporarily disrupt (i.e., disturb, interrupt, or change) use of the Peter Jay Sharp Boathouse, a floating boathouse in Swindlers Cove on the Harlem River, which is within the ROI and directly adjacent to the proposed CHPE Project route. Access to the Harlem River near this facility could be limited for safety reasons while construction occurs in the vicinity. An Aquatic Safety and Communications Plan would be provided to the USCG and local waterway users, and stakeholders and interested parties would be notified of transmission cable installation activities. See **Appendix G** for a list of Applicant-proposed measures such as these that would minimize impacts from the CHPE Project.

Minimal land-based support facilities (i.e., temporary storage areas) at existing industrial facilities would be required for the installation of the aquatic transmission cables in the Harlem and East rivers. This land-based support facility would likely be at an existing port facility with heavy lift capabilities, such as at the Port of New York and New Jersey. Two HDD staging areas, one each in the Bronx and Queens, would be needed to install the transmission cables under the entire East River route (MPs 331 to 332).

Because the transmission line would be installed along state-owned submerged lands under the Harlem and East rivers, the Applicant would be required to obtain an easement and construction permit from the New York State Office of General Services and pay associated fees.

General construction impacts resulting from the installation of the terrestrial portion of the proposed CHPE Project in this segment would result in temporary disturbances to surrounding land uses such as potential temporary limitations on property access due to lane closures in roadways and presence of construction work areas and equipment. These disturbances would last only for the duration of construction, which would generally be a brief time period (e.g., few days to a week) at any one particular location. The construction schedule would be established in consultation with the City of New York and Boroughs of the Bronx and Queens officials to minimize disruption to any affected uses, and the Applicant would provide timely information to adjacent property owners or tenants regarding construction activities and schedule, and would coordinate with the railroad company and local officials. To ensure that all those potentially affected users are notified prior to construction and to verify no additional impacts would occur, the Applicant would reconfirm land use categories within 600 feet (183 meters) of the proposed CHPE Project, with special interest given to areas with sensitive land uses. Residential property owners adjacent to the transmission line would be identified and contacted to discuss the proposed CHPE Project, construction schedules, and any potential concerns. Additional inquiry for other sensitive land uses would include notification of construction activities, consultation regarding special events, and consultation regarding special concerns and schedules. See **Section 5.2.1** for additional details on impacts on land use and measures to minimize impacts from terrestrial construction activities.

Impacts could result from construction of the terrestrial portion of the proposed CHPE Project within the Bronx. Approximately 1 mile (1.6 km) of transmission cable would be installed within the Harlem River Rail Yard in the southern portion of the Bronx. This area is industrial in nature with Transportation and Utility and Industrial/Manufacturing land use categories, and has been zoned within the Manufacturing M3-1 and M2-1 districts (see description of M3-1 and M2-1 districts in **Section 3.4.1**). Installation of transmission cables and the proposed cooling station in this area would be compatible with these existing uses; however, disturbances from construction activities could temporarily disrupt existing uses, including existing railroad operations and industrial facilities. The presence of construction activities and equipment might prevent access to certain areas for safety reasons. The Applicant would coordinate with the appropriate state and private entities, including NYSDOT, to ensure that the disruptions are minimized or avoided.

The transmission cable would make landfall in Queens at the Charles Poletti Power Plant complex, which is within a larger area used for heavy industrial uses (e.g., energy generation and energy-related uses). The proposed Luyster Creek HVDC Converter Station site would be constructed within this industrial area. Zoning at the converter station site is in a Manufacturing M3-1 district. Utility substations are permitted within the M3-1 district with no limitations on size. There are no sensitive land uses within 500 feet (152 meters). Construction of the converter station at this location would therefore be compatible with existing land uses and would not change land use trends in the area. Site access and work activities would be coordinated with the property owner, ConEd, and other tenants.

The proposed interconnection route would follow city streets within Queens for approximately 3 miles (5 km). The land uses along this route consist primarily of high-density residential uses; and commercial, recreational, and light industrial/manufacturing uses. In addition to the predominantly residential nature of the route, there are many sensitive land uses directly adjacent to and in the vicinity of the route, including schools, day care centers, recreational facilities and parks, churches, and health care facilities (see **Table 3.4.1-1** and the Land Use tables in **Appendix F.2**). It is assumed that one lane of the street would be closed in order to install the transmission cables under the street. Residents and property owners would be permitted access during construction, but vehicular traffic would face restrictions from reduced travel lane widths, the use of construction barriers, and the presence of construction personnel. Residents and other users of properties along and in close proximity to the proposed route could experience temporary disturbances such as limited property access associated with construction activities. However, impacts would be temporary and limited to the 2-week construction timeframe in any one location. To minimize potential construction impacts on adjacent uses, the Applicants would provide information to adjacent property owners and tenants regarding the planned construction activities and schedules. All surface features such as pavement and sidewalks and underground infrastructure would be restored to its preconstruction condition after completion of construction. See **Appendix G** for a list of Applicant-proposed measures associated with terrestrial installation of the transmission line. There would be no permanent land use conversions in these locations.

The Applicant would be required to obtain authorization to use and construct the terrestrial portion of the proposed CHPE Project on state and private commercial land within the Bronx, and within city streets in Queens. Based on the type of land ownership, authorization would be obtained through the following authorizations:

- Easements (for use of private property)
- Use and occupancy permits (for use of state land)
- Revocable consent (under streets of the City of New York).

If any additional support facilities or workspace used for other construction activities are sited within or adjacent to sensitive land uses, these land uses could be disrupted for the duration of construction. All surface features (e.g., street pavements, curbs, sidewalks, and other features) and underground infrastructure (e.g., utilities such as water and gas services) disturbed during construction would be promptly restored to landowner satisfaction upon completion of the transmission line installation.

Construction of the aquatic and terrestrial portions of the proposed CHPE Project within the New York City Metropolitan Area Segment would be expected to have no impacts on land use because it would generally be consistent with potentially relevant land use plans and policies, including the New York State CMP and the New York City LWRP (i.e., The New Waterfront Revitalization Program). Exhibit 121 of the Joint Proposal has a full list of plans and policies that might be relevant and the accompanying consistency analysis. Also see the discussion in **Section 5.3.1** for more information regarding the consistency of the proposed CHPE Project with New York State coastal polices, and see the Coastal Zone Consistency Documentation in **Appendix F.1** for the list of potentially relevant enforceable coastal policies including those in The New Waterfront Revitalization Program, the Applicant's consistency certification assessment, and New York State's conditional concurrence.

Impacts from Operations, Maintenance, and Emergency Repairs

The location of the transmission line would be marked on navigation charts to aid in identifying its location. See **Section 5.4.2** for a discussion of impacts associated with operation of the transmission cable in the Federal navigation channel in the Harlem River.

Regular inspections of the aquatic transmission cables would result in a negligible amount of additional intermittent vessel traffic for the lifespan of the proposed CHPE Project due to the inspection vessels. Inspections would not prohibit commercial or recreational use of the Harlem or East rivers because inspection vessels would only be stationary in one location for short time periods, and other commercial and recreational vessels could either transit around the inspection vessel or use a different area of the water bodies.

If necessary, emergency repair activities would be expected to result in temporary (i.e., for the duration of emergency repairs) impacts on existing commercial and recreational uses of the Harlem or East rivers due to the presence of cable repair equipment. Emergency repair activities would be limited to the immediate vicinity of the repair site. See **Sections 5.4.2** and **5.4.13** for more information regarding impacts on transportation and recreation from emergency repairs of the proposed CHPE Project in this segment.

Operation, inspections, and possible emergency repairs of the aquatic portion of the proposed CHPE Project within the New York City Metropolitan Area Segment would be expected to be consistent with potentially relevant land use plans and policies, including the New York State CMP and The New York City Waterfront Revitalization Program.

No impacts would be expected to result from operation of the terrestrial portions of the New York City Metropolitan Area Segment. After construction of the transmission line, the Applicant would have appropriate interest or rights to use (via lease, use and occupancy permit, or revocable consent depending on the location along the transmission line route) the transmission line ROW, but would not have exclusive control of any public land. Generally, there would be no impacts on land use from operation of the transmission line within the terrestrial portion of the New York City Metropolitan Area Segment because the transmission line would be underground. Operation of the cooling station and the Luyster Creek HVDC Converter Station would be compatible with adjacent land uses because both facilities would be located in currently undeveloped areas with similar and compatible industrial, energy generation, and electric transmission uses. No surrounding uses, including railroad operations or energy generation, would be disrupted. See **Section 5.4.18** for more information regarding potential impacts on property values.

No impacts are expected from periodic inspections of the terrestrial transmission cable ROW, cooling stations, and the Luyster Creek HVDC Converter Station because these activities primarily consist of passive visual assessment of conditions and would not create any disturbances to adjacent land uses. Similarly, no land use impacts would result from conducting maintenance on the cooling stations or the Luyster Creek HVDC Converter Station because the activities would be confined to the cooling station and converter station sites and would not disturb adjacent land uses.

If emergency repairs were necessary in the terrestrial portion of the New York City Metropolitan Area Segment, it could generate disturbances such as potential temporary limitations on property access due to the presence and operation of repair equipment and lane closures that could be incompatible with surrounding land uses. Sensitive land uses, such as residences, schools, or recreational areas, would be more susceptible to these disturbances. Due to the urban, high-density development in this segment, there would be a greater likelihood of emergency repairs, if necessary, occurring in areas adjacent to sensitive land uses, but impacts would not be significant.

Operation, maintenance, inspections, and possible emergency repairs of the terrestrial portion of the proposed CHPE Project within the New York City Metropolitan Area Segment would be expected to be consistent with potentially relevant land use plans and policies, including the New York State CMP and The New York City Waterfront Revitalization Program. The proposed CHPE Project would be entirely underground, except for one cooling station and the Luyster Creek HVDC Converter Station, and would not be visible. The operation of the cooling station and the converter station would also be consistent with potentially relevant land use plans and policies. Both the cooling station and converter station would be in areas zoned as M3-1, manufacturing, and designated as the Transportation and Utility land use category. The operation of both facilities would be consistent with uses permitted in the M3-1 zoning district, and would be among other similar industrial uses. The converter station would be visually unobtrusive and designed to blend into the local environment and surroundings and be compliant with architectural design requirements identified in the zoning code.

5.4.2 Transportation and Traffic

Impacts from Construction

Construction activities within the New York City Metropolitan Area Segment would not result in significant impacts on river navigation, safety and security zones, bridge crossings on the Harlem and East rivers, and on traffic operations on roadways. Construction activities within this segment would include construction of the Luyster Creek HVDC Converter Station and connection of HVAC transmission cable to the Astoria Annex Substation, both of which are at the ConEd Charles Poletti Power Plant complex along the East River in Queens. This segment would include installation of a terrestrial HVAC transmission cable from the Astoria Annex to Rainey substations.

The proposed aquatic transmission cable in this segment would pass under several bridges. Therefore, for each bridge, the Applicant would coordinate with the owner of the bridge regarding clearances, distance from abutments and existing infrastructure, cable burial, and installation methods. Drawbridges could be required to be raised to accommodate cable-laying vessel traffic, potentially impacting roadway and rail traffic crossing the bridges, but the bridges would not be raised during commuter rush hours. Horizontal and vertical clearances for cable installation would be included in final design in the EM&CP. The Applicant would provide notice to, and coordinate with, NYSDOT for any bridge, regardless of ownership, that provides a crossing for, over, or under any street or highway.

The transmission line would traverse approximately 8 miles (13 km) of federally maintained (i.e., dredged) navigation channel in this segment (from MPs 324 to 330 in the Harlem River, and from

MPs 331 to 332 in the East River). In the Harlem River, the transmission cables would be installed entirely within the federally maintained navigation channel. The minimum burial depth in the Harlem River channel would be 8 feet (2.4 meters) below the sediment-water interface in sediment and 6 feet (1.8 meters) in rock, except for utility crossings. The transmission line would be installed using HDD under the entire East River, including the navigation channel (from MPs 331 to 332); therefore, burial depth would not apply, and impacts on the Federal navigation channel through this area would be avoided. During construction, the transmission cable route would be within an existing Federal navigation channel in the Harlem River, and the transmission cables would be buried using water jetting techniques to depth required by the USACE, as described in **Section 2.4.10.1**. Dredging procedures in the navigation channel and aquatic impacts would otherwise be similar to those discussed for the Lake Champlain Segment in **Section 5.1.2**. In instances where environmental or engineering circumstances suggest that the cables should be laid within or across the navigational channel, coordination would be conducted with the USACE, USCG, local pilot associations, and other agencies as necessary to minimize the impact on normal navigation activities and ensure the cables are installed at the proper depth. Additionally, an Aquatic Safety and Communications Plan would be provided to the USCG and local waterway users, and stakeholders and interested parties would be notified of transmission cable installation activities. See **Appendix G** for a list of Applicant-proposed measures. Dredging could also have short-term impacts on navigation from barges traversing to and from spoil disposal areas, as required.

Additional vessel traffic associated with installation activities on the Harlem River could inconvenience and create navigational obstacles (e.g., potential for anchor snags and temporary loss of use of portions of waterways) for other commercial and recreational vessels using the rivers. However, cables would not be buried in anchorage areas and full use of waterways would resume following installation activities. Transmission cable installation would not prohibit water-dependent recreational or commercial activities because vessels could either transit around the work site or use a different area of the rivers. If conditions do not allow other vessels to transit around the work site, the Applicant would ensure that aquatic construction does not interfere with routine navigation through making adjustments to the work site as required. Disturbance to recreational and commercial uses would be temporary and localized at the work site.

Installation of the transmission line at MP 324.5 in the Harlem River would require blasting a trench with a length of approximately 460 feet (140 meters) in rock, which would take approximately 10 weeks to complete. Each blast event would only take a few seconds; however, prior to each blast the area would be cleared to a distance determined by the fire marshal and the harbormaster. Clearance of the area could last approximately 2 hours. Blasting activities would be performed in strict adherence to all industry standards applying to control of blasting and blast vibration limits in compliance with the Applicant's blasting plan as part of its EM&CP. This would result in short-term impacts on navigation.

These disturbances would be temporary and localized at the work site. The installation activities in the New York City Metropolitan Area Segment would be coordinated with USCG so that work areas are marked properly to ensure safety, and so that current information about the location of work zones can be broadcast to recreational users. This would minimize conflict with construction activity, and allow for advance planning for recreational users. In addition, a list of existing marinas would be developed, the dimensions of their respective marina channels identified and plotted, and the locations indicated on the EM&CP Plan and Profile drawings. Marina operators would be given advanced notice of cable laying in their area and an opportunity to identify and discuss any concerns with the contractor (CHPEI 2012q).

The Luyster Creek HVDC Converter Station would be adjacent to the Astoria Annex Substation point of interconnection on a large industrial parcel that contains existing power-generating facilities and electrical substations associated with the Charles Poletti Power Plant complex. **Figure 2-13** shows the 4.5-acre (1.8-hectare) site. The site proposed for the Luyster Creek Converter Station is a previously disturbed site and has no parking accommodations on site. The main building would be approximately 165 feet by 325 feet (50 meters by 99 meters), with a height of approximately 70 feet (21 meters). The building would contain 10 bays to provide access for annual maintenance, and truck access for maintenance would be on the eastern side of the building. Construction-related vehicles would be parked at or adjacent to the converter station site, and would not affect parking resources in the vicinity of the proposed CHPE Project in Queens.

On average, approximately 50 trucks per day would be required for the transportation of equipment and construction materials to the Luyster Creek HVDC Converter Station site during peak construction periods. Construction worker vehicles and material deliveries would access the site through the signalized intersection at 31st Street and 20th Avenue. The number of construction-related vehicles in the immediate area at any one location is not anticipated to add noticeable volume to the number of existing vehicle trips in the immediate area or affect existing parking resources. The delivery of oversized equipment by trucks would be coordinated with local agencies to minimize impacts on traffic flow and the surrounding community (CHPEI 2012aa).

Approximately 3 miles (5 km) of transmission cable would be installed beneath city streets in Queens from the Astoria Annex Substation to the Rainey Substation in this segment. Installation of the transmission line within the ROW of city streets would partially close the streets with traffic restricted to narrower travel lanes resulting in a temporary impact during construction. Sidewalks could be closed temporarily; however, one side of the street would be open at all times. Some on-street parking spaces would be temporarily lost during this time. An MPT Plan would be submitted to the City of New York for approval prior to commencement of construction activities. The City of New York and NYSDOT have submitted a statement in support of the proposed CHPE Project route, and have stated their satisfaction that the project would result in minimal impacts on transportation facilities under its jurisdiction (NYC 2012c, NYSDOT 2012a).

Additional impacts and Applicant-proposed measures to minimize impacts in road ROWs would be similar to those discussed for road ROWs traversed by the transmission line discussed under the Overland Segment in **Section 5.2.2**. The majority of the cable installation along the Astoria to Rainey Interconnection would be parallel to the road and within the roadway ROW. Crossings of side roads would be necessary, with the majority of crossings conducted perpendicular, or as close to perpendicular as feasible, to the roadway being crossed. For trenched road crossings, the use of detours, signage, and public notice that would be posted no later than 24 hours prior to the initiation of construction would be employed. Traffic levels of service would likely decrease due to slightly slower speeds through construction zones. Flaggers or temporary traffic lights would be used where necessary to control traffic flow. All areas of open trench that would not be covered with steel plates would be barricaded and lit with warning lights prior to the end of the construction day. Restoration of the roadway would occur immediately after the cable is installed (CHPEI 2012q). Therefore, impacts on traffic levels and safety would not be significant. See **Appendix G** for more information on Applicant-proposed measures. The duration of construction for installation would be a maximum of 2 weeks at any given location.

Impacts from Operations, Maintenance, and Emergency Repairs

Operational and maintenance activities within this segment would not result in significant impacts on marine navigation and bridge crossings on the Harlem and East rivers, and no impacts on traffic operations and parking resources related to the operation of the Luyster Creek HVDC Converter Station and the interconnection to the Astoria Annex Substation.

Periodic inspections of the aquatic transmission cables might result in intermittent impacts on commercial and recreational users of the Harlem or East rivers for the lifespan of the proposed CHPE Project due to temporary inconveniences and navigational obstacles resulting from the presence of the survey vessel. In such circumstances, it is possible that vessels would be restricted from anchoring in certain areas while the survey is occurring. Disturbances to recreational and commercial uses would be temporary and localized in the immediate vicinity of the inspection vessel. Increased vessel traffic associated with routine periodic inspections and maintenance activities would be negligible, occurring intermittently for short durations over the operating life of the transmission line (CHPEI 2012aa). It is anticipated that the survey vessel would be able to conduct its inspections of the Harlem River without requiring bridge openings.

Operation and decommissioning of the CHPE Project within the aquatic portions of the New York City Metropolitan Area Segment would not be expected to result in significant impacts on vessel anchorage. Discussion regarding anchor snagging and other impacts are presented in the Hudson River Segment in **Section 5.3.2**.

Operational and maintenance activities within the terrestrial portion of the New York City Metropolitan Area Segment would not result in significant impacts on railroad operations in Harlem. There is a potential risk that electromagnetic fields and stray currents could interfere with railroad signaling systems and operations with the use of HVDC transmission lines. To mitigate this potential risk, it should be ensured that an HVDC transmission cable's magnetic field does not interfere with a railroad's signaling system (see **Section 5.2.2** for additional details). The transmission line would be buried and offset from the active rail lines by at least 10 feet (3 meters). If the two cables in the trench are spaced 1 foot (0.3 meters) apart as proposed by the Applicant, the magnetic field would measure 76.9 mG at 10 feet (3 meters) from the nearest cable (CHPEI 2012ll).

In the event of emergency repairs, the ERRP would be implemented. Disruptions (i.e., delays, temporary cancellations, or other changes) to the transportation system, such as the temporary suspension of rail or vehicular traffic in the area of the repairs, could occur due to emergency repairs resulting in longer travel times, but emergency repair activities, if required, would be limited in duration.

During normal operations, the Luyster Creek HVDC Converter Station would require minimal onsite personnel that would not affect parking resources or traffic flow. During maintenance activities, there would be a small number of additional vehicles and personnel on the site.

5.4.3 Water Resources and Quality

Impacts from Construction

Surface Water and Water Quality. The Harlem River and a portion of the East River are the surface waters that would be crossed by the transmission line under the New York City Metropolitan Area Segment. During debris removal and construction in the Harlem River, temporary impacts on water quality could be caused by localized increases in turbidity, and resuspension of sediments, some of which are contaminated, resulting from disturbance within these waters during cable installation. Increased turbidity has the potential to reduce light levels in aquatic habitats and could result in temporary changes to water chemistry, including impacts on pH and dissolved oxygen. Reduced dissolved oxygen levels result if lowered light levels decrease the oxygen production of photosynthetic organisms, or biological demand is increased by sedimentation. The entire East River route would be crossed using HDD; therefore, no turbidity would be generated in the East River and there would be no impacts on water quality.

Temporary clearing, ground disturbance, and construction activity would be required for trenching along the transmission line corridor in the Harlem River Rail Yard and in Queens and would increase the potential for erosion and water quality impacts on nearby surface waters. However, much of the terrestrial portions of the route in this segment have been previously disturbed. Nonetheless, erosion and increased sedimentation in storm water runoff would be managed in place with BMPs as described in the EM&CP, which would serve as the SWPPP, as fully described in **Section 5.2.3**. A listing of specific Applicant-proposed measures to minimize impacts on water quality, including erosion and sediment control and storm water BMPs that would be implemented during transmission line installation and use of an Environmental Inspector responsible for monitoring construction activities to ensure the EM&CP is followed, is provided in **Appendix G**.

Conventional dredging techniques could be used to install the aquatic transmission cables across the Harlem River navigational channels at adequate depths if the jet plow is unable to achieve required burial depths. If conventional clamshell dredging would be required, the release of dredge spoil from the bucket into the water column is possible as it travels to the surface and would cause suspension of solids throughout the water column. To minimize suspension of sediments and impacts on water quality, dredging practices would use environmental clamshell buckets, which are closed buckets equipped with sensors to ensure complete closure of the bucket. Decanting barges would be used to manage spoil material and allow settlement prior to dewatering. If contaminated sediments are excavated, they would be disposed of in a state-approved upland disposal site. Dredged material would not be sidecast or returned to the water.

Blasting would be necessary to excavate approximately 460 feet (140 meters) of rock in the Harlem River at MP 324.5 to achieve a trench that is 6 feet below the authorized depth of the federally maintained navigation channel. The process of drilling boreholes would generate a small amount of sediment, and blasting operations would generate turbidity. Impacts would be anticipated to be minimal due to the crystalline nature of the rock and, if necessary, the use of silt curtains to contain the spread of a turbidity plume. Blasting activities would be performed in strict adherence to all industry standards applying to control of blasting and blast vibrations limits in compliance with the Applicant's blasting plan as part of its EM&CP.

HDD would be used at the water-to-land transition at MP 330, to cross under the entire East River route, and at some locations in the Harlem River Rail Yard and in Queens to cross under roads and other infrastructure. HDD operations have the potential of frac-out, where drilling fluids containing bentonite clay might be released or dispersed into the Harlem River. The Applicant would develop and implement a Frac-out Contingency Plan that would allow for timely cleanup of any bentonite leaks that might occur and ensure minimal impacts on the environment. **Appendix G** lists other Applicant-proposed measures that would help to minimize impacts. HDD would also require conventional dredging to excavate a pit behind the cofferdams at transmission line water-to-land transition areas. Impacts on water quality from this activity would be minimized by enclosing the work area with the sheet pile cofferdam.

Similar to the Hudson River modeling, a three-dimensional hydrodynamic and water quality model of the Harlem and East rivers was developed for the proposed CHPE Project using the MIKE3 software. The model inputs were based on water jetting as the preferred installation method in this segment; however, the entire East River route would be crossed using HDD. The model was used to simulate the 10 contaminants that were present in the sediment cores collected during the 2010 Marine Route Survey: 4,4-DDE, copper, lead, phenanthrene, PCB, naphthalene, fluorine, nickel, dioxin, and acenaphthene. The model predicted that the cable installation would not cause a violation of applicable water quality standards that are based on protecting aquatic life from acute toxicity (CHPEI 2012oo). TSS concentrations were modeled for the Harlem and East rivers. The modeling results showed that TSS levels would not exceed 50 mg/L during installation of the transmission line, well below the 200 mg/L threshold (CHPEI 2012oo). However, the tidal flow and current of the river would result in some upstream or downstream resettling of sediment, depending on flow conditions at the time of cable installation. Although the Applicant did not model sediment re-deposition (CHPEI 2012dd), the impacts of resettling would not be significant because sediment concentrations well below thresholds in average waterbody currents and tides of less than 3 miles (5 km) per hour (LDEO 2013) would be re-deposited immediately upstream or downstream of the site of sediment disturbance. Depending on the sediment particle-size composition, the majority (approximately 70 to 80 percent) of the disturbed sediment would be expected to remain within the limits of the trench under limited water movement conditions, with 20 to 30 percent of suspended sediment traveling outside the footprint of the area directly impacted by the plow. With higher currents, more sediment can be transported outside the trench area (HTP 2008, MMS 2009, CHPEI 2012i). Although modeling for installation in the East River was conducted based on use of water jetting, the entire East River route would be crossed using HDD; therefore, no sediment disturbance or dispersion would occur in the East River. As specified in Condition 163 of the NYSPSC Certificate for the proposed CHPE Project, the Applicant would conduct additional pre-installation physical and chemical sediment sampling in the Harlem River for use in post-installation monitoring (NYSPSC 2013).

Floodplains. The proposed CHPE Project transmission line route in this segment would be located within or cross floodplains, but would not impact the functions of the floodplain as it would be buried underground and the ground surface would be returned to its original grade. Vegetation clearing, ground disturbance, trenching and soil stockpiling, and related construction activity would occur within the floodplains crossed by the proposed CHPE Project. BMPs that would be implemented during construction include use of erosion and sedimentation controls, prohibitions on storing construction equipment or conducting refueling in floodplains, and restoring pre-existing ground grades would minimize any impacts on flood flows, flood storage, or flood hazards during the construction period.

An aboveground cooling station would be located at MP 331 in the Bronx borough within a designated floodplain area. This 64 square-foot (6 square-meter) cooling station would be located within a Zone AE area where the 1 percent base elevation has been established at an elevation of 11 feet (4 meters). This cooling station would be associated with a segment of cable that would be installed beneath the Harlem River Rail Yard by HDD. The Harlem River Rail Yard is located within a Zone AE flood area. Supplemental cooling of this specific underground transmission line segment would be required to ensure that the cables operate within design parameters. There is no alternative location for this cooling station that would be outside of the designated floodplain. In accordance with the conditions established in the NYSPSC Certificate for the proposed CHPE Project, the cooling station would be constructed such that the ground floor elevation is at or above the 100-year flood elevation level (NYSPSC 2013). Since the Bronx cooling station would be constructed and operated within the flood hazard area associated with the tidal East River and Bronx Kill, no impacts on flood flows, flood storage, or flood hazards would be anticipated.

The Luyster Creek HVDC Converter Station would be constructed and operated within the 100-year floodplain of the East River (see **Appendix A**). Based on the Preliminary Work Maps prepared by FEMA as part of an evaluation of flood hazards following Hurricane Sandy (FEMA 2013), the converter station site has been designated as Base Flood Elevation (BFE) Zone AE at an elevation of 13 feet (4 meters) above MSL, which has a 1 percent (100-year) chance of inundation. Previous mapping identified the 0.2 percent (500-year) chance of inundation for this location at an elevation of 15 feet (5 meters) above MSL. Alternative locations for siting the converter station were considered and are discussed in detail in **Chapter 2**. Much of the Charles Poletti Power Plant complex is within flood Zone A, and the proposed CHPE Project converter station site is vacant. Use of this vacant area for the proposed converter station site would not interfere with current site operations or plans for future development. Vegetation clearing, grading, and construction activity would occur within this floodplain area. BMPs, including use of erosion and sedimentation controls, restrictions on storing construction equipment, and restoring pre-existing ground grades would minimize any impacts on flood flows, flood storage, or flood hazards during the construction period. A complete listing of BMPs proposed by the Applicant and considered in this analysis is provided in **Appendix G**.

The permanent aboveground converter station and associated facilities would be designed to avoid flood hazard damage and to reduce impacts by grading and raising the first floor above the base flood elevation.

In addressing the post-Hurricane Sandy flood elevation recommendation (see **Section 3.4.3**), the Applicant has identified that the first floor of the Luyster Creek HVDC Converter Station would be raised to an elevation greater than the 500-year storm surge level (FEMA 500-year storm event, plus an additional 2 feet [0.6 meters] for a total of 19 feet [6 meters] above MSL). Additionally, the waterway adjacent to the Luyster Creek HVDC Converter Station site is the confluence of the East River and Long Island Sound. Although this area is subject to tidal influences, it is not a designated floodway.

Groundwater. The majority of the aquatic transmission line route in the Harlem River would be buried in sediments to a depth of approximately 8 feet (2.4 meters) using water-jetting techniques. HDD would be used when the transmission line transitions from aquatic to terrestrial at the shore of the Harlem River and to cross under the East River. During the HDD process, drilling fluid would be used and has the potential to percolate to groundwater. As described in **Section 5.2.3**, the bentonite clay in the drilling fluid would be filtered from the fluid by the soil and would aggregate into soil pore spaces before it could reach groundwater; therefore, no significant impacts on groundwater are anticipated from HDD operations. In addition, the overall shallow depth of line placement and surface construction would not be expected to impact the Brooklyn-Queens Sole Source Aquifer.

Impacts from Operations, Maintenance, and Emergency Repairs

The transmission cables do not contain mineral oils, or dielectric or other fluids; therefore, leaks of hazardous materials to groundwater from the transmission line would not occur. During operation of the transmission line, heat is generated and dissipated into the surrounding environment. The Applicant calculated thermal impacts on water quality from operation of the transmission line buried 4 feet (1.2 meters) with no separation. The predicted increase in temperature at the sediment surface directly above the cables was estimated to be 1.8 °F (1.0 °C) (CHPE 2012kk).

Because of the volume of water in the Harlem and East rivers, tidal and river currents, and turbulence, this small 1.8 °F (1.0 °C) increase is anticipated to dissipate quickly within the water column and the impact would not be significant. Because the cables would be buried to a depth of 6 feet (1.8 meters) or more, the predicted level of temperature increase should be even lower, and no thermal impacts would be anticipated. A slightly greater, but still not significant, impact would be expected in places where the transmission line is buried less than 3 feet (0.9 meters) and is covered with rip-rap or concrete mats to cross other utility infrastructure. The estimated increase in ambient water temperature surrounding the cables covered by the concrete mats is expected to be less than 0.25 °F (0.14 °C) (Exponent 2014). As the transmission line would be buried to a shallower depth under the mats, the temperature increase would occur above the sediment surface, but any heat generated would still be quickly dissipated. No impacts on other water quality parameters would be anticipated to occur during operation of the transmission line.

No impacts on water resources would be expected during operation of the terrestrial portion of the transmission line and converter station in this segment because there would be no change in water quality, water availability, or elevation changes in floodplains. During potential emergency repair activities, impacts on water quality related to ground disturbance to uncover and repair damaged lines could increase the potential for erosion and sedimentation to nearby surface waters. The cable would have to be exposed and then reburied. While the frequency of emergency repairs cannot be predicted and the repair time would vary, repairs likely would be infrequent and short-term in duration and would be limited to the immediate vicinity of the repair site. The impacts would be similar to those described for the original installation, but with a shorter duration and smaller area of disturbance.

No impacts from inspection of the transmission line would be expected, as inspection activities would be non-intrusive. Potential aquatic emergency repair activities could result in sediment disturbance and subsequent temporary degradation of water quality. The impacts from any emergency repair activities would be similar to those occurring during the original installation, but would occur over short time periods and have a smaller area of disturbance and duration than the initial installation.

Following installation of the underground transmission line, no permanent aboveground alterations or new impervious surfaces that could impact flood storage, infiltration, or flooding hazard would result from operation of the underground transmission line. Therefore, impacts from operation and maintenance of the terrestrial portion of the transmission line on floodplains in this segment would not be expected.

The permanent aboveground converter station and cooling station would be designed to avoid flood hazard damage and to reduce impacts by grading and raising the first floor above the base flood elevation. In accordance with the conditions established in the NYSPSC Certificate, the converter station and cooling station would be constructed such that the ground floor elevation is at or above the 100-year flood elevation level (NYSPSC 2013). In addressing the post-Hurricane Sandy flood elevation recommendation, the Applicant has identified that the CHPE Converter Station first floor would be raised to an elevation to greater than the 500-year storm surge level (FEMA 500-year, plus 2 feet [0.6 meters]; or 19 feet [6 meters] above MSL). No significant impacts would be expected as a result of operation of the converter station in the floodplain.

5.4.4 Aquatic Habitats and Species

Impacts from Construction

Installation of the aquatic transmission line would result in up to 36 acres (15 hectares) of riverbed disturbance in the Harlem River, which is approximately 10.4 percent of the surface area of the Harlem River in the vicinity of the proposed CHPE Project (i.e., from MPs 324 to 330). During debris removal and construction, potential impacts on water quality could be caused by localized increases in turbidity and downstream sedimentation, and resuspension of contaminated sediments resulting from disturbance within the Harlem River by the jet plow. The transmission line would be installed under the entire East River route using HDD and, therefore, no impacts on aquatic habitats and species would occur.

Aquatic Habitat and Vegetation. No significant impacts on SAV in the Harlem River would occur because little, if any, SAV is present to be affected during the installation of the aquatic transmission line. However, macroalgae does exist in the Harlem River and temporary sediment resuspension and turbidity generated by water jetting, blasting, moving construction vessels, and anchoring of vessels could reduce the growth rate or smother macroalgae. While blasting can have similar effects on macroalgae, it has been demonstrated that macroalgae can recolonize in a blasting location within 8 weeks (Keevin and Hempen 1997). Because this segment is already exposed to harsh and variable conditions, impacts are not expected to be significant.

Shellfish and Benthic Communities. Minimal impacts on shellfish and benthic communities would occur in the Harlem River because the river is composed of benthic species that can withstand fluctuations in salinity and human disturbance. Biological surveys have found the benthic community to be composed of both suspension and deposit feeders, including polychaetes, crustaceans, and bivalves. The Harlem River is scoured by tidal fluctuations and currents, with exposed bedrock and other coarse substrates in many locations (CHPEI 2010c). If the transmission line cannot be buried under bedrock, it would be installed under flexible concrete mats placed on the bedrock or a trench would be blasted. The placement of concrete mats along 0.6 miles (1.0 km) of the New York City Metropolitan Area Segment, would result in replacing one hard-bottom habitat with another. The benthic communities would be expected to recolonize quickly on and around the concrete mats. Invertebrates are generally insensitive to pressure and other damage related to blasting (Keevin and Hempin 1997). However, it is assumed that some invertebrates would be crushed or damaged in the immediate vicinity of the blasting and mucking.

Because the environment has been highly modified by development, which has changed the river greatly from its original state (AKRF 2002), impacts from the proposed CHPE Project would not be significant.

Fish. The Harlem River contains a mixture of freshwater, diadromous (i.e., anadromous and catadromous), estuarine, and marine fish species depending on location. For the 129 species found in the Hudson River Estuary, 49 are primarily marine species and the remaining 80 are either resident freshwater or diadromous species (Daniels et al. 2005). Impacts on fish would result from temporary increases in turbidity and associated water quality degradation, noise, lights, and any hazardous material spills. Impacts could also include a behavioral disruption (i.e., interruption or obstruction) of the migration and spawning of adult fish, or physical effects of turbidity on eggs and larvae. However, because of the widespread available habitat for these species, impacts are not expected to cause any type of spawning failure or significant population-level impacts. These impacts are described in detail in **Sections 5.1.4** and **5.3.4**.

Installation of the transmission line in the Harlem River would require blasting of approximately 460 feet (140 meters) of rock at MP 324.5. Turbidity, nominal noise, and vibration would be expected from the drilling associated with blasting. Turbidity would be generated during the blasting process; however, impacts would be expected to be minimal because of the crystalline nature of the rock and because silt curtains would be used to avoid the spread of a turbidity plume. Noise would result mainly from air compressors which would be mounted on the barge. Rock drilling, such as that required for blasting in the Harlem River, has been measured at 165 dB re 1 µPa peak SPL and 151 dB re 1 µPa rms SPL at 231 feet (Martin et al. 2012) and is expected to have localized behavioral effects only on fish.

If pre-packaged chemical demolition agent was used to excavate the rock, pressure impacts on fish species would be less than if dynamite, which would produce a shock wave upon detonation. Fish injury and mortality associated with underwater blasting is related to pressure, energy flux density, and impulse (large, rapid pressure variations) (Keevin and Hempen 1997). Energy flux density is the rate of transfer of energy through a surface and determines the intensity of the shock wave (rate of energy transfer per unit area). The most common injury is swim bladder damage, although other organs, such as gills, kidney, liver, and spleen, can also be damaged. In fish with less well-developed swim bladders, neither the kidneys nor air bladder are injured, indicating that the presence of a swim bladder plays an important role in injuries to other organs. The thickness, location, and physiological connections of the swim bladder also play a role in the occurrence of injuries. Fish with swim bladders connected to the circulatory system appear to be more susceptible to injuries than fish with swim bladders connected to the esophagus. External injuries from blasting appear to be species-specific and related to the magnitude of the pressure wave. The presence of the swim bladder might also be related to external injuries. Factors such as size, age, general health, water temperature, and reproductive condition can influence fish mortality related to blasting. Underwater explosions can result in structural abnormalities and mortality of fish eggs. Mortality decreased with distance from the explosion (Keevin and Hempen 1997). Impulse was determined to be the critical factor to result in mortality of larval fish because of the high magnitude over the long distance, although estimates for one project did not predict population level impacts based on the number of larvae potentially killed (Govoni et al. 2008).

All blasting-related activities are anticipated to be completed from July through November outside of overwintering season for young of year, yearling, and older striped bass; spawning season for winter flounder, and spawning migration for river herring. Avoidance of blasting effects on fish can be accomplished by not blasting during slack tides, chasing fish from the site with an air-gun prior to blasts, and surrounding the site with a bubble curtain to minimize fish entry into the shock zone, as conditions dictate. Blasting activities would be performed in strict adherence to all industry standards applying to control of blasting and blast vibrations limits in compliance with the Applicant's blasting plan as part of its EM&CP.

Installation activities in the Harlem River would occur over a short period of time, as the cable installation would advance at an average rate of 1.5 miles (2.4 km) per day. In addition, the construction window is from May 31 through November 30 in the Harlem River (CHPEI 2012l, NYSPSC 2013, CHPEI 2014). Restricting construction to this timeframe would reduce impacts on anadromous species that migrate up the Hudson River to spawn in the spring.

Essential Fish Habitat. Impacts on EFH in the New York City Metropolitan Area Segment would be the same as those in the Hudson River Segment as described in **Section 5.3.4**. Concrete mats placed on top of bedrock would be expected to recolonize quickly. Blasting would disturb exposed or nearly exposed bedrock on the river bottom, and the trench would be backfilled with the blasted aggregate materials, which would provide habitat for species such as winter flounder and skate. In the context that the Harlem River is already subject to routine human disturbance, this would not constitute a significant impact.

Significant Coastal Fish and Wildlife Habitat. Impacts would occur in the Lower Hudson Reach SCFWH (which extends 0.5 miles into the Harlem River to MP 324.5) in which the transmission line would be installed via water jetting and blasting. The SCFWH would be impacted by sediment disturbance, turbidity, and associated water quality degradation as described in **Section 5.3.4**. This SCFWH provides important habitat for striped bass from November through April and winter flounder spawning from December through April. Impacts would be avoided during most of that time period because the construction window is May 31 through November 30. No impacts on the North and South Brothers Island SCFWH would be expected because it is approximately 1 mile (1.6 km) from the proposed installation activities.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from magnetic fields and temperature increases on benthic communities and demersal finfish are not expected to be significant; however, it should be noted that uncertainties remain and additional studies are needed on the potential effects on specific species. Pre- and post-energizing monitoring programs for benthic communities, sediment temperature, and magnetic fields would be developed in accordance with NYSPSC Certificate Condition 163 to evaluate operational impacts on benthic communities during the lifespan of the transmission line (NYSPSC 2013). Operational impacts from increased magnetic fields and temperature increases would be the same as those described under operational impacts in **Section 5.3.4**.

No significant impacts on aquatic habitat and species would be expected during maintenance of the transmission system because the transmission line itself would be designed to be maintenance-free. Inspections of the underwater transmission line would be through non-intrusive instrument surveys and impacts would not be expected from this activity. Maintenance would occur at the converter station and other aboveground features of the system; however, there are no aquatic resources associated with the converter station or other aboveground facilities.

If emergency repairs are required, impacts on SAV, shellfish and benthic communities, and fish associated with sediment disturbance and turbidity during repairs would not be significant and would be similar to those described during initial construction and installation but on a much smaller scale. Most of the impacts associated with emergency repairs would be localized and temporary, lasting only for the duration of activities.

Aquatic Habitat and Vegetation. Impacts on SAV associated with operations and emergency repairs are not anticipated, as SAV is generally not present in this segment.

Shellfish and Benthic Communities. Impacts on shellfish and benthic communities associated with operations and emergency repairs would not be significant and would be the same as the impacts in

Section 5.3.4. A pre- and post-energizing benthic monitoring program would be developed in accordance with Certificate Condition 163 to evaluate operational impacts during the lifespan of the transmission line on benthic communities (NYSPSC 2013).

Fish. Impacts on fish would be anticipated from operations and emergency repairs of the transmission line in this segment. The current state of knowledge about the magnetic fields emitted by aquatic power lines is too variable and inconclusive, but available information indicates that impacts would not be significant (Cada et al. 2011), as described in **Section 5.3.4**. In accordance with Certificate Condition 163, the Applicant would complete a pre-installation and post-energizing sediment temperature and magnetic field survey of the transmission line route to evaluate operational impacts from magnetic fields and heat during the lifespan of the proposed CHPE Project (NYSPSC 2013).

Essential Fish Habitat. Impacts on EFH in the New York City Metropolitan Area Segment from operation and emergency repairs would be the same as those described in **Section 5.3.4**. Concrete mats placed on top of bedrock would be expected to recolonize quickly. In the context that the Harlem River is already subject to human disturbance, this constitutes a negligible impact. Impacts on EFH (i.e., the water column and sandy substrates) associated with any emergency repair activities, if required, would not be significant and would be similar to impacts associated with initial installation. However, repair activities would occur over a shorter duration and would disturb a smaller area than required for construction.

Significant Coastal Fish and Wildlife Habitat. Impacts on the Lower Hudson Reach SCFWH from magnetic fields and induced electrical currents would be the same as those described in **Section 5.3.4**. No impacts on the North and South Brothers Island SCFWH would be anticipated during operations due to its distance from the proposed CHPE Project route.

5.4.5 Aquatic Protected and Sensitive Species

Impacts from Construction

Federally Listed Species

As noted in **Section 3.4.5**, the shortnose sturgeon and Atlantic sturgeon are expected to be rare in New York City Metropolitan Area Segment in the Harlem River. Because HDD would be used to install the transmission line under the East River, no impacts on sturgeon would occur in the East River. Sturgeon species are only considered transient species in the Harlem and East rivers. For example, shortnose sturgeon have been identified near the confluence of the East River and New York Harbor (Verdant Power 2010). Because there is no known overwintering or spawning activity by the shortnose sturgeon in the New York City Metropolitan Area Segment, no construction window for this species in this segment was proposed.

Debris removal and construction activities may affect, but are not likely to adversely affect, shortnose sturgeon and Atlantic sturgeon because the potential for occurrence is so low it is discountable. Sediment disturbance, temporary increases in turbidity and associated water quality degradation, sediment redeposition, noise and vibration, possible shock waves from blasting, and accidental release of hazardous materials could impact shortnose sturgeon and Atlantic sturgeon. Installation of the aquatic transmission line would result in up to 36 acres (15 hectares) of riverbed disturbance in the Harlem River, which is approximately 11 percent of the surface area of the Harlem River in the vicinity of the proposed CHPE Project. The effects of noise on fish are described in **Section 5.1.4**. Rock drilling, such as would be required for blasting in the Harlem River, has been measured at 165 dB re 1 μPa peak SPL and 151 dB re 1 μPa rms SPL at 231 feet (Martin et al. 2012). Effects of blasting, as described in **Section 5.4.4**, on sturgeon are considered to be remote because sturgeon are transient species in this area of the Harlem

River, and sturgeon eggs and larvae are not expected to occur in the Harlem River. However, in addition to detonating the charge in bore holes and stemming the charge with pea gravel, avoidance and minimization of blasting effects on sturgeon could be accomplished by not blasting during slack tides, chasing fish from the site with an air-gun prior to blasts, and surrounding the site with a bubble curtain to minimize fish entry into the shock zone. Vessel strikes associated with construction vessels could also impact shortnose and Atlantic sturgeon but the Applicant would implement measures to decrease vessel speeds to give ESA-listed fish species a chance to detect and move away from vessels. Additional details on impacts on shortnose and Atlantic sturgeon are provided in **Section 5.3.5**.

The Applicant has initiated discussions with NMFS, NYSDEC, and NYNHP to gather additional information and to develop recommendations for the avoidance or minimization of potential impacts on ESA-listed fish during construction of the proposed aquatic transmission line. The Applicant would implement measures to protect aquatic threatened and endangered species and their occupied habitats in the New York City Metropolitan Area Segment (see **Appendix G**). For example, the Applicant would comply with construction windows to prevent construction from occurring during periods when sensitive species might utilize the Harlem River near the proposed CHPE Project.

State-Listed Species. As noted in **Section 3.4.5**, the shortnose sturgeon is also state-listed. Effects from construction on this species within the New York City Metropolitan Area Segment would be the same as those discussed for shortnose sturgeon under *Federally Listed Species*.

Impacts from Operations, Maintenance, and Emergency Repairs

Federally Listed Species

Increased temperatures, magnetic fields, and weak induced electric fields may affect, but is not likely to adversely affect, shortnose sturgeon or Atlantic sturgeon. For the New York City Metropolitan Area Segment, the depth of the transmission line trench is proposed to be 6 feet (1.8 meters) or more with 1 foot (0.3 meters) or less of horizontal separation between the two cables, which would be collocated in the same trench. As shown in **Table 5.1.14-1** and **Figure 5.1.14-1**, the magnetic field levels at the riverbed surface directly over the transmission line centerline were calculated to be less than 162 mG (CHPEI 2012t, CHPEI 2012ll), which is well below levels that triggered a reaction in freshwater sturgeon species (Cada et al. 2011). Additional information on magnetic fields in the Hudson River are discussed in **Section 5.3.5**.

No effects on ESA-listed fish species from maintenance activities would occur because the proposed aquatic transmission line would be maintenance-free. Periodic inspection of the aquatic transmission cables using vessel-mounted instruments would not result in any effects on federally listed fish species because the activities would be non-intrusive. If required, emergency repair activities could affect, but would not adversely affect, shortnose sturgeon and Atlantic sturgeon. During emergency repairs of the proposed aquatic transmission line, the cables would be brought to the surface for repairs, a new section of line would be spliced in, and the line would be reburied. Sediment disturbance resulting in temporarily increased turbidity, decreased water quality due to disturbance of contaminated sediments, and noise could result in impacts on shortnose sturgeon and Atlantic sturgeon. These effects would be similar to those described for construction activities, but on a smaller scale and over a shorter duration.

State-Listed Species. As noted in **Section 3.4.5**, the shortnose sturgeon is also state-listed. Impacts from operation and emergency repairs on this species within the New York City Metropolitan Area Segment would not be significant and would be to the same as those discussed for shortnose sturgeon under *Federally Listed Species*.

5.4.6 Terrestrial Habitats and Species

Impacts from Construction

Vegetation and Habitat. There would be no significant impacts on terrestrial vegetation and habitats from installation of the aquatic transmission line in the New York City Metropolitan Area Segment because it would be buried within the Harlem and East rivers.

Impacts on vegetation and habitats from terrestrial installation and construction activities would be minimal along the New York City Metropolitan Area Segment because the area is largely developed urban land with little natural vegetation and habitat. Ecological communities that would be impacted by temporary disturbance of vegetation during construction activities would include urban vacant lots and a small amount of brushy cleared land.

Wildlife. When installation of the aquatic transmission line would be close to shore, noise from installation vessels and equipment operation could temporarily result in avoidance of bird or bat forage areas that are within the proposed CHPE Project construction corridor. These impacts would be temporary, lasting only during the short time period that such equipment would be operating in these areas.

Urban-adapted wildlife would be disturbed by construction noise along the terrestrial portion of the route in the Bronx and Queens and could be displaced; however, most of these species are adapted to a disturbed environment and impacts would not be significant.

Impacts from Operations, Maintenance, and Emergency Repairs

Vegetation and Habitat. No impacts on terrestrial vegetation and habitats would occur during operation and emergency repair of the aquatic portion of the transmission line because it would be buried within the Harlem and East rivers.

The majority of the vegetation and habitat in the terrestrial portion of the New York City Metropolitan Area Segment is highly disturbed and would be primarily limited to landscaping. Operation of the terrestrial transmission line only would occur along approximately 5 miles (8 km) of predominantly urban landscape. Any heat or magnetic fields would primarily be restricted to the area directly above the transmission line in urban railroad and roadway ROWs and would not impact vegetation or habitat. Vegetation along the transmission line in this segment would be maintained as required, and appropriate, to protect the buried transmission line from damage caused by tree roots, maintain the function access control features, and replace location and identification markers as necessary. Due to the predominantly urban landscape within this segment, periodic inspections would not result in significant impacts on terrestrial vegetation and habitats.

Wildlife. No significant impacts on terrestrial wildlife would be expected to occur from operation of the aquatic portion of the transmission line, as it would be buried in the Harlem and East rivers. If necessary, emergency repairs on the aquatic transmission line would require localized vessel operation. Noise associated with these vessels could temporarily result in avoidance of bird forage areas adjacent to the site of the repair activity.

The transmission line in this segment would be located in a predominantly urbanized landscape. Any heat or magnetic fields would primarily be restricted to previously disturbed railroad and roadway ROWs. Previous studies have found that magnetic and electric fields associated with transmission lines do not cause any adverse health, behavioral, or productivity effects in animals, including both wildlife and livestock (BPA 2010). Noise from operation of the converter station could result in avoidance of the area by some wildlife species. However, the operation of the converter station would be in an industrial area, where there is already a high level of ambient noise.

The transmission line would require periodic inspection and vegetation maintenance over the operating life of the transmission line. Use of the transmission line corridor by wildlife is expected to be limited because of the highly developed urban landscape; therefore, impacts from inspection and maintenance activities on wildlife would be negligible. Impacts from emergency repairs would be similar to those occurring during initial construction except that the impacts would be confined to the area of the fault for the short duration of repair activities.

5.4.7 Terrestrial Protected and Sensitive Species

Impacts from Construction

Table 5.1.7-1 identifies the federally and state-listed threatened and endangered species and other protected species that could occur within the proposed CHPE Project ROI by segment.

Federally Listed Species

Piping plover. No effects on piping plover would occur as a result of construction activities in the New York City Metropolitan Area Segment. No suitable habitat for breeding piping plovers occurs along the transmission line route. The tidal area at the landfall for the transmission line along the northern shore of the Charles Poletti Power Plant complex in Queens connecting to the Luyster Creek Converter Station is also unlikely to support foraging piping plovers. Although shoreline mud flats, which are used by feeding shorebirds, could be exposed during low tide below the rip-rap slope at this location, the habitat is marginal and within a largely urban landscape. Therefore, it is unlikely that this particular area would be used for foraging.

Roseate tern. No effects on roseate tern would occur as a result of construction activities in the New York City Metropolitan Area Segment. Although roseate terns could be present within Long Island Sound, which is adjacent to the East River, impacts from construction activities are not expected to have an effect on foraging terns. Abundant foraging habitats are available within the terns' normal range; therefore, construction activity is not expected to impact its normal foraging activities. No impacts on sand beach habitat are expected from installation of the transmission line and construction of the converter station. No breeding colonies or potential breeding habitat occurs along the New York City Metropolitan Area Segment route or within the converter station site.

Red knot. No effects on red knot would occur as a result of construction activities in the New York City Metropolitan Area Segment. Although, during its migrations the red knot feeds along the sand and muddy shorelines of the type that occur in Queens County, installation of the transmission line and construction of the converter station would not affect the beach or shoreline habitat. No suitable habitat for breeding red knots occurs along the transmission line route.

Northern long-eared bat. No significant effects on northern long-eared bat would occur as a result of construction activities in the New York City Metropolitan Area Segment. The ROI is primarily developed and consisting of disturbed land. Noise from aquatic and terrestrial construction activities could temporarily result in avoidance of bat forage areas that are near the proposed CHPE Project construction corridor. These impacts would be temporary, lasting only during the short time period that such equipment would be operating in these areas. Additionally, it is likely that any northern long-eared bats in the New York City Metropolitan Area Segment would be adapted to a disturbed environment.

State-Listed Species

Significant effects on state-listed bird species, including bald eagles, in the New York City Metropolitan Area Segment would not be expected because the New York City Metropolitan Area Segment is in an urban environment, and habitat is already disturbed. Vegetation clearing that could disturb nests and result in a loss of habitat along the terrestrial portions of the project route would be unlikely to occur because the route is predominantly in an open, developed setting with little suitable habitat. While noise associated with construction could disturb birds and nests along and adjacent to the project route, most species in this area are habituated to higher levels of noise and human disturbance. No known bald eagle nests are present in the New York City metropolitan area. Bald eagles could roost and forage in the vicinity of the proposed CHPE Project particularly closer to the Hudson River. Therefore, no significant impacts on state-listed species would be expected.

Migratory Birds

Effects on migratory birds as a result of construction in the New York City Metropolitan Area Segment would not be significant and would be similar to those described for state-listed species. Vegetation clearing that could disturb nests and result in a loss of habitat along the terrestrial portions of the route would be unlikely to occur, and noise associated with construction could disturb birds and nests along and adjacent to the route. If construction in the New York City Metropolitan Area Segment occurs during migratory bird breeding and nesting season (generally the spring and summer), migratory birds and nests could be disturbed. However, because this segment is in an urbanized environment, habitat is already disturbed and the birds that occur there are habituated to noise and other human disturbances.

Impacts from Operations, Maintenance, and Emergency Repairs

During operations, limited vegetation management would be conducted along the terrestrial transmission line ROW, primarily to ensure that large woody vegetation does not grow over the cables, or in the event that emergency repairs are necessary. Given the urban nature of this segment, management of sporadic vegetation along the route in this segment would not be expected to significantly affect terrestrial protected or sensitive species.

Federally Listed Species

Piping plover. No effects on piping plover would occur as a result of operations, ROW vegetation maintenance, or emergency repairs of the proposed CHPE Project within the New York City Metropolitan Area Segment because no suitable breeding or foraging habitat exists for them there.

Roseate tern. No effects on roseate tern would occur as a result of operations, ROW vegetation maintenance, or emergency repairs of the proposed CHPE Project in the New York City Metropolitan Area Segment because no suitable breeding or foraging habitat exists for them there.

Red knot. No effects on red knot would occur as a result of operations, ROW vegetation maintenance, or emergency repairs of the proposed CHPE Project in the New York City Metropolitan Area Segment because no suitable breeding habitat exists within the ROI.

Northern long-eared bat. No significant effects on northern long-eared bat would occur as a result of operations, ROW vegetation maintenance, or emergency repairs of the proposed CHPE Project in the New York City Metropolitan Area Segment because minimal suitable breeding, foraging, or roosting habitat and no hibernacula exist for them.

State-Listed Species

No significant effects on state-listed species from magnetic fields would be anticipated from operation of the transmission line. As discussed in **Section 5.2.7**, research indicates that some species of animals are able to detect magnetic fields at levels that could be associated with transmission lines; however, detection does not imply that the fields would result in any affects (BPA 2010, AUC 2011). Effects associated with emergency repairs, if necessary, would be similar to those associated with construction, but for a shorter duration and disturbing a smaller area.

Migratory Birds

No significant effects on migratory birds in the terrestrial portions of the New York City Metropolitan Area Segment would be expected from periodic vegetation maintenance or emergency repairs, if required, because this segment is primarily urban and developed with little suitable habitat for migratory birds.

5.4.8 Wetlands

Impacts from Construction

Wetland Physical Characteristics and Functions. No delineated wetlands or NYSDEC freshwater wetlands or adjacent areas were identified within the New York City Metropolitan Area Segment. NYSDEC tidal wetlands and adjacent areas associated with the Harlem and East rivers are present within the ROI. However, no impacts on NYSDEC tidal wetlands would be anticipated to occur because the transmission line would be installed within the riverbeds or on land where it would not cross wetlands. All proposed construction activities in the Harlem and East rivers would occur outside of tidal wetlands and the work would comply with water quality standards. Terrestrial construction activities would be located 100 feet (30 meters) or more from wetland areas and Applicant-proposed measures would be used to prevent runoff and sedimentation from affecting adjacent wetland areas. Therefore, no impacts on wetlands would be anticipated from construction within the New York City Metropolitan Area Segment, including construction of the Luyster Creek HVDC Converter Station and interconnection to the Astoria Annex Substation.

Wetland Habitat and Species. No impacts on wetland habitat and species would be expected during installation of the transmission line because no wetlands occur within the construction corridor in this segment.

Impacts from Operations, Maintenance, and Emergency Repairs

Wetland Physical Characteristics and Functions. No impacts on wetlands would occur during operation of the transmission line and aboveground facilities, or maintenance activities, including inspection, because wetlands are not present within the transmission line ROW in the segment. If emergency repairs of the transmission line were required, repair activities would disturb a limited area. Due to the distance to nearby wetlands, no impacts would be anticipated from emergency repair activities.

Wetland Habitat and Species. No impacts on wetland habitat and species would be anticipated during operation of the transmission line or during maintenance or potential emergency repair activities.

5.4.9 Geology and Soils

Impacts from Construction

Physiography and Topography. Temporary impacts on physiography and topography would be expected in the New York City Metropolitan Area Segment from water jetting to install the transmission line in the aquatic portions of the route and trenching and grading during installation of the terrestrial transmission line and construction of the converter station, thereby temporarily and locally altering existing topography. However, once installation is completed and trenches have been filled to pre-existing elevations, topography would return to previous conditions, and no long-term impacts would be anticipated. As specified in NYSPSC Certificate Condition 163 for the proposed CHPE Project, the Applicant would conduct a pre-installation bathymetric survey of the underwater routes in the Harlem River for use in post-installation monitoring (NYSPSC 2013).

Placement of articulated concrete mats on the riverbed for cable protection purposes could result in localized modification of currents, resulting in limited scouring adjacent to the transmission line over time. The impacts of the mats on bathymetry would not be significant relative to natural levels of fluctuations in surface topography from currents, storms, navigational traffic, and other pre-existing factors.

Geology. No significant impacts on geology in the New York City Metropolitan Area Segment would be expected. Blasting would be necessary to bury the cables for approximately 460 feet (140 meters) in the Harlem River where bedrock is present at the surface at MP 324.5, and if necessary, might be required during excavation activities at the proposed HVDC converter station. Exact locations of bedrock blasting at the proposed HVDC converter station site are yet to be determined. Blasting would impact, but not significantly impact, local geology as material would be removed and the surface layer of the bedrock modified. Blasting activities would be performed in strict adherence to all industry standards applying to control of blasting and blast vibration limits in compliance with the Applicant's blasting plan as part of its EM&CP (see **Section 5.3.17**).

Sediments. A jet plow would be used to install the cables in the Harlem River, while HDD would be used to install the cables under the East River. Approximately 11,000 cubic yards (8,400 cubic meters) of sediment would be disturbed by the installation of the transmission line in the Harlem River (CHPEI 2012m). An estimated 179 cubic yards (137 cubic meters) of silt and clay sediments would be dredged at the HDD cofferdam location at MP 330 (CHPEI 2012m). Load calculation modeling conducted for the proposed CHPE Project determined that the settling rate of suspended sediments in the lower Hudson River Estuary is estimated to be 106 feet/day (32 meters/day) as discussed in **Section 5.3.9**. As specified in Certificate Condition 163, the Applicant would conduct pre-installation physical and chemical sediment sampling in the Harlem River for use in post-installation monitoring (NYSPSC 2013). For a more detailed discussion of the impacts of turbidity in the water column of the Harlem River, see **Section 5.4.3**.

Soils. Construction activities would temporary disturb approximately 14 acres (6 hectares) of upland area. Impacts on soils would be expected during construction of the converter station and trenching of the transmission line. During construction, removal of vegetation from the converter station site, and trenching and other excavation would result in increased erosion and sedimentation. It is also possible that soils would be compacted under the weight of construction activities. Compacted soils would result in decreased permeability, which could alter local drainage patterns and impede storm water infiltration. However, implementation of Applicant-proposed erosion-management measures would minimize or avoid impacts. See **Appendix G** for more information on Applicant-proposed measures.

Prime Farmland. There are no impacts on prime farmland soils because no prime farmland soils are present within the New York City Metropolitan Area Segment.

Seismicity. Construction of the CHPE Project would not increase the risk of seismic hazards. The overall probability for seismic activity, including resulting liquefaction, in the segment is low (USGS 2012a, USGS 2013).

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts would be expected from the operation of the transmission line in the New York City Metropolitan Area Segment on geology or on soil structure because there would be no thermal or magnetic field impacts. The transmission line itself would be designed to be maintenance-free. Maintenance of the cooling station and converter station would be occur, but would not result in impacts on physiography, topography, geology, or soils because no excavating, contouring, or blasting would be required for these activities. Routine inspection of the ROW would occur annually and be non-intrusive; therefore, no impacts would be expected. Emergency repairs could be required, and potential impacts from those activities are discussed in the following paragraphs.

Physiography and Topography. No impacts on area physiography or topography would be anticipated as the transmission line would be underground and the surface would be restored to its previous grade. As specified in NYSPSC Certificate Condition 163, the Applicant would conduct pre- and post-installation bathymetric and magnetometer surveys of the underwater route in the Harlem and East rivers in order to monitor and ensure that required depth of transmission line burial has been achieved and original topography has been re-established (NYSPSC 2013). Emergency repairs of the transmission line would result in impacts similar to, but much less than, those described for construction activities because there would be a smaller area disturbed for a shorter duration.

Geology. No impacts on geology in the New York City Metropolitan Area Segment would be expected.

Soils. Impacts on soils from emergency repairs of the terrestrial transmission line would be similar to, but much less than, those described for construction activities because there would be a smaller area disturbed for a shorter duration and soils would be retained on site.

Sediments. Impacts on sediments from emergency repairs of the aquatic transmission line would be similar to, but much less than, those described for construction activities because there would be a smaller area disturbed for a shorter duration. As specified in Certificate Condition 163, the Applicant would conduct post-energizing physical and chemical sediment sampling in the Harlem and East rivers (NYSPSC 2013).

Prime Farmland. No prime farmland soils are present within the New York City Metropolitan Area Segment; therefore, no impacts on prime farmland soils would be possible.

Seismicity. During a seismic event, it is possible that damage to the transmission line and converter station could be sustained. The proposed HVDC transmission cables are insulated and armored and designed to withstand the necessary mechanical forces experienced during cable installation, which are substantially greater than a seismic event. Furthermore, the aquatic transmission cables would not be installed in a straight line and would contain slack to accommodate seismic events readily. The inherent flexibility of the transmission cables would allow the buried transmission line to shift and deform slightly with ground movements associated with seismic events, but such events would be rare and there is a low potential for damage. The converter station and cooling station would be built to conform with seismic hazard standards appropriate for the area.

If a transmission cable failed due to a seismic event, the protection system would de-energize the transmission system in less than 0.005 seconds. HVDC transmission cables dissipate very limited energy under short circuit (i.e., fault) conditions. Therefore, no direct impacts on the environment, navigation, or public safety would be anticipated. A cable repair procedure that considers navigation and the environment would be implemented, as appropriate, during any seismic events.

5.4.10 Cultural Resources

Ground-disturbing activities associated with the installation of the transmission cables could result in adverse effects on historic properties in the APE of the New York City Metropolitan Area Segment of the proposed CHPE Project (see **Figure 3.2.1-1**). Independent GIS analysis indicates that there are 7 terrestrial archaeological sites and 10 NRHP-listed or -eligible architectural properties (i.e., NRHP-listed Washington Bridge, NRHP-eligible High Bridge Aqueduct and Tower, NRHP-eligible Harlem Yards, and 7 NRHP-eligible bridges that cross the Harlem River) in the APE of the New York City Metropolitan Area Segment.

The terrestrial portions of the New York City Metropolitan Area Segment have been screened but not formally surveyed for cultural resources. These sections would be surveyed for cultural resources in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA (see **Appendix T**). Some portions of the New York City Metropolitan Area Segment follow existing surface streets, and formal archaeological surveys might not be practicable prior to construction. In such instances, the Applicant would conduct archaeological monitoring during construction to identify archaeological resources that could be affected by construction activities (see **Appendix G**). Any cultural resources found within the APE would be evaluated for NRHP eligibility.

Impacts from Construction

Ground-disturbing activities associated with construction could damage archaeological features and would disturb the context of artifacts of terrestrial archaeological sites located in the APE. In the case of sites that are eligible for listing in the NRHP, this could constitute an adverse effect under 36 CFR 800.5(a)(1). Consultation regarding potential adverse effects on historic properties is ongoing through the Section 106 process, and a PA (see **Appendix T**) has been prepared to manage and resolve adverse effects through avoidance, minimization, or mitigation. Because the transmission line would be underground or underwater and would avoid any standing structures, the adverse effects from construction on the NRHP-listed or -eligible architectural properties in the APE, all of which are bridges across the Harlem River, would be limited to exposure to temporary noise and short-term visual effects from the proximity of construction activities and equipment. The proposed blasting activities would comply with the frequently used, more stringent vibration threshold associated with protection of surrounding historic structures (i.e., PPV of 0.5 inches [1.3 cm] per second). As discussed in **Section 2.4.10.1**, peak ground vibrations (i.e., PPV) from each blast event are predicted to be 0.25 inches (0.64 cm) per second at a distance of 200 feet (61 meters) from the trench. The closest NRHP-eligible architectural property is the Henry Hudson Parkway, which is approximately 750 feet (229 meters) west of the area in which blasting would occur. These adverse effects would not require mitigation.

As specified in the conditions of the NYSPSC Certificate for the proposed CHPE Project ("Certificate Conditions"), Part Q, Conditions 107–112 (available at http://www.chpexpresseis.org/docs/NYSPSC_Order.pdf or see **Appendix C** of this EIS), the Applicant shall develop a CRMP that would include an outline of "the processes for resolving adverse effects on historic properties within the APE and determining the appropriate treatment, avoidance, or mitigation of any effects of the [CHPE Project] on these resources." Applicant-proposed measures would be implemented to mitigate the CHPE Project's adverse effects on known terrestrial and underwater archaeological sites found to extend into the APE. Mitigation measures might include minor rerouting to avoid the sites, Phase III data recoveries of terrestrial and underwater archaeological sites that are listed or eligible for listing in the NRHP and cannot be avoided, and documentation following Section 106 of the NHPA for NRHP-listed or -eligible architectural properties that cannot be avoided by project activities. Circumventing known underwater sites or anomalies would avoid potential damage to the integrity of the site. A PA (see **Appendix T**) has been prepared pursuant to 36 CFR 800.14(b) and additional formal surveys and evaluations must be conducted before it can be fully determined in detail what cultural resources require mitigation measures under Section 106 of the NHPA. Measures identified at this time, including development of a CRMP by the Applicant and addressing unanticipated cultural resources discoveries, are discussed in detail in **Appendix G.**

Impacts from Operations, Maintenance, and Emergency Repairs

The operation and maintenance of the New York City Metropolitan Area Segment would have no adverse impacts on cultural resources in the APE. No impacts on cultural resources from the cooling station, Luyster Creek HVDC Converter Station, or substation interconnection have been identified for the New York City Metropolitan Area Segment. Any emergency repairs would occur in areas previously disturbed by construction of the transmission line and, in some cases, in areas purposefully selected to avoid cultural resources; therefore, impacts would not be expected from such activities.

5.4.11 Visual Resources

Impacts from Construction

Construction of the proposed CHPE Project within the New York City Metropolitan Area Segment would result in temporary impacts on visual and aesthetic resources from the presence of construction equipment and activities along the project route. During aquatic installation, a cable-laying vessel, support vessels, and barges would be visible on the Harlem River. Minimal land-based support would be required, and two HDD staging areas, one each in the Bronx and Queens, would be needed to install the transmission line under the East River using HDD. Construction equipment on the water surface would be visible in one place for a short time period, except during the blasting process on the Harlem River that would last approximately 10 weeks, as construction progresses down the waterway.

Construction equipment would be temporarily visible in the locations of active construction in terrestrial portions of the railroad ROW along the Harlem and East rivers and Bronx Kill. Equipment necessary for clearing, trench excavation, cable installation, backfilling, and restoration would be briefly located at each construction site. Applicant-proposed measures, including timely removal of temporary storm water and erosion controls such as silt fences, straw bales, and mulch or construction debris during the various stages of construction, would limit the visual impact (CHPEI 2012q). See **Appendix G** for a list of Applicant-proposed measures.

Construction equipment would be temporarily visible in the locations of active construction in city streets in Queens for the Astoria-to-Rainey interconnection from the Astoria Annex Substation. Equipment necessary for clearing, trench excavation, cable installation, backfilling, and restoration would temporarily be located in various locations along the route for the duration of construction.

Following construction, impacted areas within the terrestrial portion of the route would be regraded and repaved to pre-construction conditions if impervious, or seeded and allowed to revegetate naturally if pervious.

Impacts from Operations, Maintenance, and Emergency Repairs

No visual impacts or impacts on aesthetic resources would be anticipated along the aquatic portion of the New York City Metropolitan Area Segment route during operations. No significant visual impacts would be anticipated during aquatic emergency repair activities from the temporary presence of vessels and repair activities that would temporarily be visible along the proposed CHPE Project route in the Harlem and East rivers.

During operations, the proposed cooling station at MP 331 would be permanently visible along the New York City Metropolitan Area Segment. The ROI for the cooling station would be within 0.5 miles (0.8 km) of Randall's Island Park. However, the cooling station would only result in a minimal visual impact or have an impact on this aesthetic resource because the cooling station would be small and would only minimally change the existing viewshed. The existing visual environment near these cooling station locations is almost completely urbanized and industrial; therefore, the cooling station would be within the context of the existing visual environment.

Construction of the Luyster Creek Converter Station would not be expected to result in any impacts on aesthetic resources because no aesthetic resources are found within the ROI for the converter station. Because there are residential areas within and adjacent to the ROI, daytime photographs were taken from the KOPs for the converter station to help evaluate the changes to the existing visual setting and evaluate visual impacts. Of the three KOPs presented in **Section 3.4.11**, only KOP #2 was chosen for photosimulation evaluation. The other KOPs were eliminated from further evaluation because the converter station would be completely or nearly completely obscured by existing features.

The viewpoint from KOP #2 is not considered a viewpoint of exceptional aesthetic quality; however, it offers one of the only unobstructed viewpoints of the Luyster Creek Converter Station by members of the public. For this reason, it was chosen for the photosimulation presented in **Figure 5.4.11-1**. There would be views of the converter station from the northwest; however, these views would be limited and likely only viewed by members of the public from the water at a greater distance.

Figure 5.4.11-1. Photosimulation of the Luyster Creek Converter Station from KOP #2

Figure 5.4.11-1 shows the constructed Luyster Creek Converter Station relative to existing infrastructure and the creek in the foreground of the photograph. The constructed facility would occupy the existing open space in the central portion of the photograph. The trees shown in **Figure 5.4.11-1** are among the only trees remaining in the vicinity of the converter station site; the rest of the area is industrial. Since the existing visual environment is of an industrial nature, the converter station would not be out of character in this environment. The converter station would be comparable in scale to its surroundings and would not break the existing established horizontal skyline. Additionally, many of the components of the converter station would be enclosed within buildings, reducing some of the scattered vertical and horizontal components to a more visually stable solid shape. The neutral color of the converter station would also reduce any potential contrast. Outdoor lighting at the Luyster Creek Converter Station would be designed to avoid, to the extent feasible, offsite lighting impacts. Exterior lighting design would be based on an assessment of lighting illumination levels needed for worker and workplace safety.

Should emergency repairs associated with the transmission cable be necessary, visual impacts during emergency repair activities would be anticipated from the presence of vehicles and equipment at the repair site. The activities and equipment necessary for emergency repairs would be temporarily visible for the duration of the repairs.

5.4.12 Infrastructure

Impacts from Construction

Electrical Systems. Impacts on existing electrical services would occur during construction where the proposed CHPE Project route would cross buried electrical infrastructure. The same protocol for transmission cable installation described in **Section 5.1.12** for aquatic portions of the route and **Section 5.2.12** for terrestrial portions of the route would be followed for electrical infrastructure. As described in those sections, in most cases potential impacts on electrical infrastructure would be avoided. The final construction plans would be tailored to existing infrastructure constraints, and infrastructure owners would be consulted early and often in the design phase (NYSDPS 2012a). Potential temporary interruptions to existing electrical services could occur where electric power lines would need to be de-energized or relocated due to the proposed CHPE Project construction. Installation of the proposed CHPE Project would occur in accordance with utility crossing or collocation agreements between CHPE and the affected utility.

Water Supply Systems. Non-significant impacts on water supply systems might be expected due to temporary interruptions of service. Water line crossings were identified along the New York City Metropolitan Area Segment at MPs 326.4 and 327.1. Because Applicant-proposed measures (e.g., grout pillows, articulated concrete mats installed over the water line) would be taken to avoid impacts on infrastructure, the likelihood of impacts would be minimized. If an interruption in service would be unavoidable, it would be coordinated with area utility owners/operators prior to disconnection to allow the utilities to be able to provide water continuously to its users.

Storm Water Management. No impacts on storm water management would be expected under the proposed CHPE Project where the cables would be installed beneath the Harlem and East rivers because those areas are aquatic. Approximately 4.5 acres (1.8 hectares) of previously disturbed upland area would be disturbed by cable installation beneath railroad or roadway ROWs and the construction at the converter station site. Storm water management measures, such as erosion and sedimentation controls, dewatering BMPs, and the protection of storm water inlets would be implemented as part of the Storm Water Pollution Prevention Plan (SWPPP) required by the SPDES permit that the Applicant would obtain for the proposed CHPE Project (see **Appendix G**).

Solid Waste Management. Non-significant impacts on solid waste management would be expected due to the potential disposal at local landfills of 280 cubic yards (214 cubic meters) of excavated soils and drill cuttings associated with HDD activities at the water-to-land transition and conventional dredging of river sediment (up to 180 cubic yards [138 cubic meters]) to create a cofferdam. Refer to **Section 5.1.12** for more details on the solid waste management impacts and BMPs associated with trenching and HDD.

Approximately 4.34 pounds (2 kilograms) of debris could be produced for every square foot of facility construction of the Luyster Creek HVDC Converter Station. Therefore, an estimated 65 tons of debris would be generated while constructing the converter station. However, the majority of this debris would consist of recyclable materials and would be diverted from landfills. It is assumed that the remaining capacity of landfills in the 200-mile (322-km) radius that New York City exports to would be adequate to dispose of the excavated soil and construction debris. The vast majority of excavated soils would be recycled and diverted from landfills.

Communications. No impacts on communications services would be expected for the six telephone system lines that would be crossed by the proposed CHPE Project. Wherever possible, the HVDC cables would cross existing fiber optic and telecommunications cables at right angles. The method of embedding and protection would be determined by the burial depth of the existing cables.

No substantial natural gas or liquid fuel infrastructure have been identified as crossing the proposed CHPE Project route within the New York City Metropolitan Area Segment (CHPEI 2012w). Therefore, no impacts on these types of infrastructure would be expected. It is possible that minor rerouting of the transmission cables to avoid infrastructure might occur to avoid the need to install additional cable protection. If infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs would be the same as those described for the Lake Champlain Segment in **Section 5.1.12**.

Sanitary Sewer and Wastewater Systems. One substantial sewer line was identified within the New York City Metropolitan Area Segment (CHPEI 2012w, CHPEI 2013d) at MP 326.4. However, the proposed CHPE Project transmission line would cross under this line by using HDD. Therefore, no impacts on sanitary sewer and wastewater would be expected. If sanitary sewer and wastewater infrastructure were to be discovered during surveying or construction activities, the impacts, protocol, and BMPs would be the same as those described in **Section 5.1.12**.

Impacts from Operations, Maintenance, and Emergency Repairs

Electrical Systems. The proposed CHPE Project would increase the supply capacity and reliability of electrical power and decrease transmission congestion in the NYSBPS. In addition, the NYSBPS would have a greater percentage of its capacity sourced from clean energy resources (see **Section 5.4.16**).

The proposed CHPE Project would add approximately 1,000 MW and 7,640 gigawatt hours (GWh) per year to the New York City metropolitan electricity market via an HVDC electric power transmission line system. This would help satisfy the growing demand for electricity in New York State, which is currently projected to increase at a greater rate than capacity growth. The NYSIO forecasted that electricity demand in New York State would increase from 163,000 GWh in 2011 to approximately 173,000 GWh in 2022 (NYISO 2012).

In addition, the proposed CHPE Project would result in an improvement to the overall reliability of the NYISO's electricity system, as the proposed CHPE Project would provide improved electrical grid capacity at times of high electricity demand (LEI 2010, CHPEI 2012b). The proposed CHPE Project would also improve the efficiency, stability, and reduce congestion of the NYSBPS electric grid serving the New York City metropolitan area due to the highly reliable and controllable nature of HVDC technology and its compatibility with Smart Grid initiatives. The HVDC transmission line system would implement Smart Grid-enabling technologies. In addition, the proposed CHPE Project would facilitate more reliable integration of clean energy sources into NYSBPS's source mix, and would provide a dynamic response to disturbances (CHPEI 2012b).

> A Smart Grid is a digitally enabled electrical grid that acts on information about the behavior of energy sources and demand loads to improve the efficiency, reliability, and sustainability of electricity services.

The transmission system would allow fast voltage control, which has the ability to transmit energy at a lower voltage when demand is low, thus increasing the efficiency of the grid by reducing losses without reducing capacity. The proposed CHPE Project would also have the ability to provide black start service (i.e., the process of restoring a power station to operation without relying on external energy sources such as diesel generators) (CHPEI 2012b). See **Section 1.4** for a detailed description of how the proposed CHPE Project would increase efficiency and reliability and decrease congestion.

To ensure proper reliability, the Applicant would comply with the applicable reliability criteria of NYSPSC, NYPA, ConEd, NYISO, New York State Reliability Council (NYSRC), and their successors. If the transmission system were to fail to meet such reliability criteria at any time, the Applicant would notify NYISO immediately and provide the NYSPSC, NYPA, and ConEd with a copy of the NYISO notice (CHPEI 2012l). The proposed CHPE Project would further improve reliability and efficiency by mitigating the negative impact of hot weather on electrical infrastructure. The heat resistant polyethylene insulation in the cable would enable the cable to operate at higher temperatures with lower dielectric losses, which would improve transmission reliability and reduce the risk of network failure.

The proposed CHPE Project would reduce the dependency of the New York City region on fossil fuels, such as oil and coal, thereby improving the energy security of the NYSBPS's electricity transmission infrastructure. The Applicant stated that it would solicit supply contracts to guarantee that a minimum of 75 percent of the total capacity of electrical energy delivered to the New York City metropolitan area on the proposed CHPE Project system would be derived from clean sources, primarily hydropower and wind.

No impacts on electrical power infrastructure over the duration of the proposed CHPE Project would be expected. The Applicant would engineer, construct, and install the Luyster Creek HVDC Converter Station to make it fully compatible with the continued operation and maintenance of existing infrastructure. As part of the NYSPSC Certificate conditions, the Applicant must provide a study demonstrating that the proposed CHPE Project would not have any adverse impact on infrastructure in the vicinity at the Astoria-Rainey connection (NYSPSC 2013). The consultation and agreement process with other utility owners is described in greater detail in **Sections 5.1.12** and **5.2.12**.

Periodic inspection activities would include vessel-towed instrument and, as required, diver surveys of the underwater cables and visual inspections of the transmission line ROW. These inspection activities would be short-term but would occur multiple times over the operating life of the transmission line.

The transmission system would be fully compatible with the electrical infrastructure of the New York City Metropolitan Area Segment. A System Reliability Impact Study conducted by the NYISO demonstrated that the HVDC transmission system could be connected to the NYSBPS at NYPA's 345-kV bus located at Astoria without adversely affecting the reliability of the New York State Transmission System (NYSDPS 2012a) as described in **Section 1.4**.

Water Supply Systems. No operational impacts on water supply systems would be expected because the cooling station proposed at MP 331 for the HDD segment in that location would operate in a closed-loop system. The Applicant has estimated that approximately 245 gallons (927 liters) of cooling water would be required initially to fill the cooling system, and negligible amounts of water would be needed to maintain this level during operation of the cooling station and the converter station.

Storm Water Management. The operation and maintenance of the cables buried beneath the Harlem and East rivers or in railroad and roadway ROWs would have no impact on storm water flows or associated storm water management infrastructure. Any existing storm water management features encountered during transmission cable emergency repairs would be avoided via HDD; or replaced, relocated, or restored to like-new conditions.

Solid Waste Management. Non-significant impacts on solid waste management would be expected because operation of the Luyster Creek HVDC Converter Station would produce small amounts of solid waste during normal operations. The transmission line itself would be designed to be relatively maintenance-free, and therefore would not produce any solid waste. Inspections and emergency repair activities would be infrequent and short-term in duration, and produce small amounts of solid waste. Such waste would be recycled to the maximum extent practicable, thus minimizing the proposed CHPE Project's contributions to regional landfill capacities.

Communications. No operational impacts on communications would be expected because the transmission cables would not create induced voltages or currents that could impact communications equipment such as marine radios, remote telephones, and cellular telephones. The transmission cables would not create any corona discharge and would not be independent sources of radio, telephone, or television interference (CHPEI 2012i). The Luyster Creek HVDC Converter Station would be designed to meet the requirements of local radio, television, and telephone EMI limits as described in **Section 2.4.9**.

Natural Gas Supply. No operational impacts on natural gas supply would be expected because the transmission system would not consume natural gas.

Liquid Fuel Supply. No significant impacts on liquid fuel supply would be expected due to the use of minimal amounts of liquid fuel by vessel-based surveys or by personnel driving vehicles during the inspection and potential emergency repair of the transmission system. Inspection and maintenance activities would be short-term and would occur multiple times over the operating life of the transmission line.

If the proposed CHPE Project were to provide black start services (i.e., restoring a facility to operation without relying on the external electric power transmission network) as part of its operation, a backup generator would need to be installed at the Luyster Creek HVDC Converter Station. This backup generator might rely on liquid fuels, but would not have significant impacts on liquid fuel supply. Because New York City is a large metropolitan area, there would be adequate liquid fuel supply in the region to supply the backup generator.

Sanitary Sewer and Wastewater Systems. No operational impacts on sanitary sewer and wastewater systems would be expected because the operation of the transmission system would not generate wastewater, apart from negligible amounts at the converter station.

5.4.13 Recreation

Impacts from Construction

In the New York City Metropolitan Area Segment, construction activities, the cooling station proposed at MP 331, the Luyster Creek HVDC Converter Station, and the Astoria to Rainey HVAC interconnection could be visible and audible from at least 15 recreational resources, depending on the viewsheds of the resources. **Appendix K** includes a complete list of recreational resources that are within the ROI in the New York City Metropolitan Area Segment.

During underwater cable installation, there would be increased vessel activity within the Harlem River. The immediate area around active construction would be temporarily unavailable for recreational uses, but access to recreational resources such as the boathouse at Sherman Creek Park at MP 326 would be maintained during the days that construction activities would be in the vicinity. Further discussion on impacts from noise associated with aquatic installation activities can be found in **Section 5.4.17**, and the impacts on visual resources are discussed in **Section 5.4.11**.

Construction activities associated with the cooling station at MP 331 would be visible from Randall's Island Park; however, due to the distance and existing background noise levels, construction activities would not be audible at the park.

Within the Borough of Queens, the proposed CHPE Project transmission line would be buried underground through the Charles Poletti Power Plant complex and within city streets between the Astoria and Rainey substations. Within city streets, equipment necessary for the removal of pavements, clearing the land, trench excavation, cable installation, backfilling, and surface restoration activities could result in a temporary reduction in the number of traffic lanes (e.g., two-lane road reduced to single-lane) along local roadways accessing recreational facilities along the transmission line route. An MPT Plan (see **Appendix G**) would be completed in consultation with the City of New York and other stakeholders to identify measures to be implemented that would maintain access to recreation areas at all times. The MPT would include measures such as use of traffic flaggers or other traffic management methods during construction activities, specific locations of general construction and HDD staging areas, and restoration of project sites to pre-construction conditions. Construction could be carried out in the off-season (e.g., October or November), which would avoid or minimize impacts.

Construction of the Astoria to Rainey interconnection from the Astoria Annex Substation would occur adjacent to Chappetto Square, Triborough Bridge Playgrounds B and C, and Astoria Health Playground, and approximately two blocks from Astoria Park and Rainey Park in Queens. Construction activities could be visible from these parks, but the parks would not be directly affected by construction. Noise from construction equipment at the construction site could affect use of portions of the parks near the transmission line route during the short period of time construction is occurring. Other parks in the ROI but farther away from the transmission line would not be affected by construction activities.

Construction of the Luyster Creek Converter Station would not result in any impacts on recreational resources because the site is approximately 500 feet (152 meters) from the nearest sports field and 1,000 feet (305 meters) from the nearest park along 20th Avenue. Further discussions of visual impacts and noise impacts from terrestrial construction activities can be found in **Section 5.4.11** and **5.4.17**, respectively.

Impacts from Operations, Maintenance, and Emergency Repairs

No impacts on recreation would be expected to occur from operation of the transmission line because it would be buried at the bottom of the Harlem or East rivers, within roadway and railroad ROWs, or on the Charles Poletti Power Plant complex. Maintenance activities (i.e., inspection surveys and routine equipment servicing at the cooling and converter stations) would be expected to occur throughout the life of the transmission line; however, these activities would occur on an intermittent basis. Emergency repairs of the transmission line, converter station, or cooling station would not impact recreational resources or their access because these activities would last a few hours in any one location and access would be maintained at all times in accordance with an MPT. Visual impacts and noise impacts from operational activities are discussed in **Section 5.4.11** and **5.4.17**, respectively.

5.4.14 Public Health and Safety

Impacts from Construction

Impacts on health and safety could occur during construction activities for the proposed CHPE Project. Risks to construction workers and the public at large include those associated with blasting in the Harlem River and those specific to working in an urban area include additional vehicle traffic, which would increase the potential for traffic accidents, and public health hazards arising from unauthorized entry into construction sites. This level of risk would be managed by adherence to established Federal and state safety regulations. Activity-specific HASPs and an Emergency Contingency Plan would include measures to increase safety along the transmission line route. Blasting activities would be performed in strict adherence to all industry standards that apply to control of blasting and blast vibrations limits in compliance with the Applicant's blasting plan as part of its EM&CP. Prior to each blast, the area would be cleared to a distance determined by the fire marshal and the harbormaster. Clearance of the area could last approximately 2 hours. The HASPs would identify requirements for minimum construction buffers (temporary aquatic exclusion areas) from active recreational uses on the river such as boating for aquatic portions of the route; minimum construction distances from residences or businesses and requirements for temporary fencing around staging, excavation, and laydown areas during construction along terrestrial portions of the route. The HASPs would include provisions for railroad safety training and for general worker protection, as required under the NESC and OSHA 29 CFR Part 1926, *Safety and Health Regulations for Construction*. Additional details regarding construction impacts on public health and safety from the proposed CHPE Project are provided in **Section 5.1.14**.

During construction of the proposed CHPE Project, workers would face minor risks involved with construction of the converter station and ring bus. Risks include accidents, falls, electrocution, and minor exposure to electrical and magnetic fields, particularly during powering up and testing of the converter station. A facility-specific HASP for construction activities would be implemented at the converter station that would include accident prevention measures and training to reduce worker risks.

Impacts from Operations, Maintenance, and Emergency Repairs

Contractor Health and Safety. During operations of the proposed CHPE Project, workers would face minor risks involved with operating and maintaining the converter station and ring bus. Risks include accidents, falls, electrocution, and minor exposure to electrical and magnetic fields. The HASPs would also cover operational activities at the converter station. No additional health and safety impacts on contractors from the transmission line would be expected under the operational phase of the proposed CHPE Project because the cables would be underground and would be maintained in compliance with all Federal and state rules and regulations.

Public Health and Safety. Impacts on public health and safety could occur during the operational phase of the proposed CHPE Project. Activities associated with periodic maintenance (i.e., inspection), and emergency repairs pose a risk of accidents similar to those that could occur during construction. The indoor design of the proposed Luyster Creek HVDC Converter Station would limit the need for exterior switchyards, thus reducing audible sound and the risk of flashover (an abnormal electrical discharge that could result in the sudden spread of flames over an area when it becomes heated to the flash point). This design would, therefore, result in lower noise impacts and fire risks to public health and safety. The proposed new ring bus would also be located within a building. The yard of the converter station would be fenced off to contain the transformers, cooling equipment, and power line carrier filters, which would be the only equipment installed outside of the building. Additionally, the converter station would be located within a large industrial complex (i.e., Charles Poletti Power Plant complex) where public access is already restricted. No additional health and safety impacts on the public would be expected under the operational phase of the proposed CHPE Project because the transmission cables would be buried and registered under the Dig Safely New York utility clearance program, and maintained in compliance with all Federal and state rules and regulations. Inspections would be performed on all aquatic and terrestrial transmission cables in accordance with manufacturer's specifications to ensure equipment integrity and protection is maintained.

Magnetic Field Safety. No impacts from magnetic fields would be expected during the operational phase of the proposed CHPE Project. Exposures to magnetic fields from the HVDC cables in the Harlem and East rivers and the Bronx terrestrial section would be similar to those described for the Hudson River Segment in **Section 5.3.14**. Because the transmission line in this segment would be primarily buried beneath the Harlem and East rivers, the greatest foreseeable exposure to magnetic fields potentially would occur to recreational or commercial users of the rivers; however, due to the depth of burial of the transmission lines, any impact would be highly unlikely. For the portion of the transmission line located in the Harlem River, the depth of the trench was assumed to be 6 feet (1.8 meters) deep, with 1 foot (0.3 meters) of separation between the two cables, which would be collocated in the same trench. As shown in **Table 5.1.14-1** and **Figure 5.1.14-1**, the magnetic field levels at the riverbed surface directly over the transmission line centerline were calculated to be less than 162 mG. In locations where the cable is installed on the riverbed surface above existing utilities and covered with concrete mats, magnetic field levels would be approximately 600 mG directly above the cables. Magnetic field levels would decrease to less than 77 mG at a distance of 10 feet (3 meters) from the transmission line. Due to its location beneath the Harlem and East rivers, human exposure to the magnetic fields associated with the proposed CHPE Project are not anticipated.

The proposed CHPE transmission line ROW within the railroad ROW in the Bronx would be 20 feet (6 meters) wide, and access to the railroad ROW is limited in some areas by fencing and entry restrictions. **Table 5.1.14-1** and **Figure 5.1.14-1** present the magnetic field levels for the cables. The magnetic field levels 1 foot (0.3 meters) above the ground over the cables would be less than 200 mG, and 24.8 mG at the edges of the 20-foot (6-meter) ROW, levels that are well below the 200-mG magnetic field strength interim standard established by the NYSPSC (CHPEI 2012t). Therefore, no public health and safety impacts from magnetic fields would be expected to occur from operation of the HVDC transmission line in the New York City Metropolitan Area Segment.

The terrestrial HVAC cable would run 3 miles (5 km) from the Astoria Annex Substation to the Rainey Substation along city streets in Queens. The AC magnetic field levels calculated for the three HVAC cables would be in a typical underground duct bank configuration within city streets for this Astoria-Rainey HVAC interconnection. The HVAC cables would be buried in a trench approximately 5 feet (1.5 meters) deep. Magnetic field levels were calculated at 5-foot (1.5-meter) increments along the 100-foot (30-meter) profile centered on the cable configuration from a point 50 feet (15 meters) east of the cables to a point 50 feet (15 meters) west of the cables. The levels calculated for this HVAC interconnection range from 4.6 to 181.6 mG, with the highest level being calculated at 3.3 feet (1.0 meter) above centerline. All calculated levels would be below the 200-mG magnetic field strength interim standard established by the NYSPSC (CHPEI 2012pp). Therefore, no public health and safety impacts from magnetic fields would be expected to occur to persons walking or traveling within the area or to adjacent residents.

Impacts from intentionally destructive acts and other causes of structural failure could occur during operation of the proposed CHPE Project and are discussed in detail in **Section 5.1.14**.

5.4.15 Hazardous Materials and Wastes

Impacts from Construction

The installation of the aquatic and terrestrial transmission line that would occur in the New York City Metropolitan Area Segment would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products, and small amounts of hazardous wastes would be generated as by-products of the transmission cable installation process. The installation of the aquatic transmission cables has the potential to suspend and transport contaminants deposited within the sediment. However, suspended sediment from water jetting, some of which may be contaminated, would be re-deposited in close proximity to its source. The installation of the terrestrial transmission cables could disturb contaminants potentially deposited in the soil due to the extended use of portions of these areas as railroads and the current and former use of nearby areas for industrial and commercial operations. To minimize potential impacts from hazardous materials and wastes, the Applicant would require that all contractors follow appropriate Applicant-proposed measures for handling hazardous materials and wastes. These BMPs would include, but are not limited to, establishing an SPCC Plan to prevent, control, and minimize impacts from a spill of hazardous materials, hazardous wastes, or petroleum products; keeping appropriate spill control equipment on site and ready for use; using secondary containment where applicable; and following all appropriate Federal and New York State regulations regarding management of hazardous materials and wastes. As specified in NYSPSC Certificate Condition 163 for the proposed CHPE Project, the Applicant would conduct additional pre-installation chemical sediment sampling in the Harlem River for use in post-installation monitoring (NYSPSC 2013). See **Appendix G** for a list of Applicant-proposed measures. The Astoria-to-Rainey Interconnection traverses residential, commercial, and industrial areas that have been developed since at least the early 1900s; therefore, there is the potential for undiscovered environmental contamination to be present along the Astoria-to-Rainey Interconnection route. Soil screening and sampling might be required in the vicinity of the Nelson Galvanizing facility and other sites where visual and olfactory evidence indicates the potential for soil contamination to be present.

Construction of the Luyster Creek HVDC Converter Station in Astoria, Queens, and terrestrial transmission line that interconnect the station to the Astoria Annex Substation would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products such as gasoline, diesel, oils, hydraulic fluids, cleaners, paints, glues, and solvents. Additionally, small amounts of hazardous wastes, primarily used oils, solvents, and lubricants, would be generated from the construction process. Mineral oils and other potentially hazardous substances used to insulate and cool the electrical equipment at the converter station would be handled during construction and facility commissioning. Equipment containing potentially hazardous materials would be handled and used in accordance with manufacturer guidelines and specifications to ensure that an accidental spill or release of these substances would not occur. PCBs would not be used at the Luyster Creek HVDC Converter Station. No areas of environmental contamination have been identified at the site proposed for the Luyster Creek HVDC Converter Station; however, due to the current and former industrial activities occurring on the site and the adjacent RCRA investigation that is ongoing for the former Astoria Gas Works, there is the potential for undiscovered soil and groundwater contamination to be present. Should specific areas of environmental contamination be discovered during the construction process, measures would be conducted in accordance with the Soil Management Plan portion of the EM&CP, as discussed in **Section 5.2.15**. Construction of the Luyster Creek HVDC Converter Station would not interfere with the ongoing RCRA investigations and remedial activities occurring at the former Manufactured Gas Plant or Sintering Plant.

Appendix G contains a list of Applicant-proposed measures to minimize the potential impacts if suspected contamination is identified during the construction of the proposed converter station.

Construction of a cooling station is proposed for MP 331 and would not result in significant impacts from the transport, handling, use, and onsite storage of hazardous materials and petroleum products to support building construction.

Impacts from Operations, Maintenance, and Emergency Repairs

Minimal amounts of hazardous materials and petroleum products would be needed to operate the vessels, ROVs, trucks, and other equipment needed to conduct routine performance evaluations of the aquatic and terrestrial transmission cables. Should any sections of the transmission cables need to be unearthed for emergency repairs, localized disturbances of soil and sediment potentially containing contaminants would be required. However, because the transmission cables are designed to be maintenance-free and require infrequent inspections, any impacts from maintenance, inspection, and emergency repairs would not be significant. The transmission cables do not contain any hazardous fluids, thereby eliminating any potential for contamination from the cables themselves. Operation of the cooling station and Luyster Creek Converter Station would require limited amounts of hazardous materials and petroleum products for equipment lubrication, cleaning, routine maintenance, and emergency repairs. Minimal amounts of hazardous materials would be needed to operate, maintain, and conduct repairs at the Luyster Creek HVDC Converter Station.

5.4.16 Air Quality

An introduction on the analysis of potential impacts on local and regional air quality was provided in **Section 5.1.16**. Detailed lists of construction equipment, the anticipated construction schedule, and associated emissions calculations for the New York City Metropolitan Area Segment are provided in Tables M-18 through M-26 in **Appendix M**. References for various emissions factors used in the analysis for the New York City Metropolitan Area Segment are included in Table M-22 in **Appendix M**.

Impacts from Construction

The construction-related air and GHG emissions with the New York City Metropolitan Area Segment would be primarily due to diesel fuel-powered internal combustion engines from land-based activities related to the installation of the transmissions cables in the Bronx and Queens, a proposed cooling station in the Bronx, and the proposed HVDC converter station in Astoria, and water-based activities related to underwater transmission cable installation within the Harlem and East rivers. Heavy equipment, barges, generators, and support boats, including those with internal combustion engines, would emit pollutants such as CO, CO_2, SO_x, PM, NO_x, and VOCs, including aldehydes and PAHs. Construction in this segment would result in low fugitive dust emissions due to the urban setting of the segment and few travel requirements on unpaved roads. Applicant-proposed measures to reduce impacts from emissions, such as properly maintaining construction equipment and minimizing engine idling, are provided in **Appendix G**.

The projected duration to construct the proposed converter station is 1 year. This includes site clearing, foundation installation, and building erection. There would be another year of minor emissions from vehicles accessing the site bringing personnel to test and commission the converter station. Given the urban setting of the converter station site, there are sensitive receptors nearby; however, the emissions from fuel-fired equipment and from earth-disturbing activities and vehicles would be spread over the 2-year construction and testing phase and would be temporary in nature. The converter station site is about 500 feet (152 meters) from the nearest residential neighborhood.

The fugitive dust generated from the construction of the converter station would not be significant given the relatively small construction area and would be minimized using Applicant-proposed measures, such as covering truck loads during hauling activities (see **Appendix G**). The closest sensitive receptors (e.g., hospitals, schools, daycare facilities, and elderly housing and convalescent facilities) are more than 1,000 feet (305 meters) from the site and would be subject to negligible emissions from construction equipment or fugitive dust.

Emissions from construction activities in the New York City Metropolitan Area Segment are summarized in **Table 5.4.16-1**. The emissions from the entire New York City Metropolitan Area Segment would be in the New York-North New Jersey-Long Island, NY-NJ-CT nonattainment area. Emissions calculation spreadsheets are provided in Tables M-23 through M-25 in **Appendix M**.

Table 5.4.16-1. Estimated Air Emissions Resulting from the Proposed CHPE Project Construction Activities in the New York City Metropolitan Area Segment

Project Area	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
New York City Metropolitan Area Segment	27.13	4.37	36.71	0.14	48.80	10.35

Emissions from construction on portions of both the Hudson River, as discussed in **Section 5.3.16**, and the New York City Metropolitan Area segments, would occur in the New York-North New Jersey-Long Island, NY-NJ-CT nonattainment area. **Table 5.4.16-2** summarizes these emissions and the corresponding General Conformity thresholds. It is anticipated that construction emissions associated with the proposed CHPE Project would not exceed the General Conformity Rule *de minimis* thresholds, and therefore, are not subject to a General Conformity Determination. In addition, these construction emissions are not expected to cause or contribute to a violation of any national or state ambient air quality standard, expose sensitive receptors to substantially increased pollutant concentrations, increase the frequency or severity of a violation of any ambient air quality standard, exceed any evaluation criteria established by the SIP, or delay the attainment of any standard or other milestone contained in the SIP.

Table 5.4.16-2. General Conformity *de minimis* Thresholds for the New York-North New Jersey-Long Island, NY-NJ-CT Area for the Proposed CHPE Project

Activity	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
New York-North New Jersey-Long Island, NY-NJ-CT Area						
Hudson River Segment	23.23	1.63	6.87	0.95	5.10	2.55
New York City Metropolitan Area Segment	27.13	4.37	36.71	0.14	48.80	10.35
Total Emissions	**50.36**	**6.00**	**43.58**	**1.09**	**53.90**	**12.90**
General Conformity *de minimis* Thresholds	**100**	**50**	**100**	**NA**	**100**	**100**
Exceed *de minimis* Thresholds	**No**	**No**	**No**	**NA**	**No**	**No**

Impacts from Operations, Maintenance, and Emergency Repairs

A majority of the emissions related to operation, maintenance, and emergency repair activities within the New York City Metropolitan Area Segment would consist primarily of activities associated with transmission inspections, preventive maintenance, emergency repairs related to the cables, and maintenance and repairs related to the cooling station, converter station, and substation interconnection. Such activities would be short-term, but would occur multiple times over the operating life of the transmission line. The use of motor vehicles, boats, and heavy equipment would result in air pollution and GHG emissions from crews accessing the subject equipment and performing various activities.

Given that the New York City Metropolitan Area Segment of the proposed CHPE Project includes a converter station, personnel-related emissions would be similar to those described for other segments of the proposed CHPE Project. The criteria pollutants emitted primarily would be from use of internal combustion engines from vehicles commuting to and visiting the converter station. Although maintenance, inspection, and emergency repair activities at the converter station would occur for the life of the proposed CHPE Project, as required, they would be sporadic and small-scale in nature in this segment and likely of short duration. Heavy equipment, boat, and vehicle use would be considerably less than required during construction, and the resulting incremental increase in emissions would not be significant.

Should the Applicant decide to install a 1-MW black start generator at the proposed HVDC converter station, it would use diesel as its fuel, and would be used only for emergencies and as required for monthly testing. It is anticipated that there would be regular tests of the generator, and few and intermittent, if any, emergency uses of the generator. Therefore, the generator would not contribute significantly to the nonattainment area's status. As a conservative estimate, **Table 5.4.16-3** lists the estimated emissions for 300 hours of operations per year of the proposed black start generator. An emissions calculation spreadsheet is provided in Table M-26 in **Appendix M**. The installation and operation of a generator would require the operator to obtain an air quality construction permit but would not be subject to more stringent Prevention of Significant Deterioration permitting. Overall, the annual emissions from operations, maintenance, and emergency repairs along the New York City Metropolitan Area Segment would be expected to be considerably less than the annual construction emissions for this segment.

Table 5.4.16-3. Estimated Emissions Resulting from Proposed CHPE Project Operational Activities in the New York City Metropolitan Area Segment

	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	CO_2 (tpy)
Generator emissions	1.821	0.484	0.0512	0.0569	0.575	93.897

New York State currently derives approximately 21 percent of its electricity generation from renewable resources, most of which (i.e., 19 percent) comes from hydroelectric power. The majority of the remaining 79 percent of electric power generation in New York State is fossil fuel-based. The 1,000-MW proposed CHPE Project would facilitate the importing of more than 7.65 TWh per year for New York's consumption. The introduction of 7.65 TWh per year of low-carbon clean energy from the New York/Canada border to New York's power markets would displace SO_2, NO_x, and other pollutants from existing power generating facilities that currently service the area (CHPEI 2012qq). Upon operation of the proposed CHPE Project, it has been estimated that New York State would emit a total of 751 tons less of SO_2, and 641 tons less of NO_x to meet its annual electric power demand (NYSDPS 2012b).

Greenhouse Gas (GHG) Emissions. The Intergovernmental Panel on Climate Change's (IPCC's) Fourth Assessment Report indicates that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system due to increased levels of atmospheric GHGs resulting from human activities (IPCC 2007).

The proposed CHPE Project would include related activities that would emit GHGs, primarily in the form of CO_2. Based on calculations presented in Tables M-3, M-9, M-17, and M-25 in **Appendix M**, the proposed CHPE Project construction activities would emit approximately 34,000 tons of CO_2-equivalent GHG emissions over a 4-year period during construction (see **Tables 5.4.16-4** and **5.4.16-5**).

Table 5.4.16-4. Estimated GHG Emissions Resulting from Construction Activities

Proposed CHPE Project Segment	CO_2 (tpy)	CH_4 (tpy)	N_2O (tpy)	CO_2 eqv (tpy)
Lake Champlain Segment	10,270	0.39	0.11	10,311
Overland Segment	7,832	0.26	0.06	7,855
Hudson River Segment	11,577	0.41	5.69	13,349
New York City Metropolitan Area Segment	4,082	0.16	0.98	4,285

Table 5.4.16-5. Estimated GHG Emissions Resulting from the Proposed CHPE Project Compared to New York State and U.S. GHG Emissions

Action	CO_2 eqv (tpy)
Proposed CHPE Project	
Lake Champlain Segment	10,311
Overland Segment	7,855
Hudson River Segment	13,349
New York City Metropolitan Area Segment	4,285
Total over a 4-Year Construction Period	**35,800**
New York State 2009 GHG Emissions (1-year)	175,600,000
United States 2009 GHG Emissions (1-year)	5,404,000,000

Source: EIA 2011

The 1,000-MW proposed CHPE Project is expected to introduce 7.65 TWh per year of low-carbon renewable energy from the New York/Canada border into New York's power markets (CHPEI 2012qq). Implementation of the proposed CHPE Project would be expected to meet the anticipated electric power demand and lower the annual CO_2 emissions in New York State by an estimated 1.5 million tons (NYSDPS 2012b).

The release of anthropogenic GHGs and their potential contribution to global warming are inherently cumulative phenomena. The estimated GHG emissions from construction of the proposed CHPE Project would be small compared to the 175.6 million tons of CO_2-equivalent GHG emissions emitted in New York State and the 5.4 billion tons emitted in the U.S. in 2009 (EIA 2011) and the 54 billion tons of CO_2-equivalent anthropogenic GHGs emitted globally in 2004 (IPCC 2007). Estimated emissions from the proposed CHPE Project over 4 years would represent 0.020 percent of New York State annual GHG emissions and 0.00066 percent of U.S. annual GHG emissions. Emissions of GHGs from the proposed CHPE Project by themselves would not have a direct impact on the environment in the ROI; neither would these emissions by themselves cause appreciable global warming that would lead to climate changes. However, emissions from the proposed CHPE Project in combination with past and future emissions from all other sources would contribute incrementally to climate change impacts. At present, there is no methodology that would allow DOE to estimate the specific impacts (if any) this increment of climate change would produce near the proposed CHPE Project or elsewhere. In addition, if the power provided by the proposed CHPE Project is generated primarily from renewable sources, any increase in GHG emissions from the construction and operation of the proposed CHPE Project is anticipated to be more than offset by a reduction in emissions associated with power generated from fossil fuels in New York State to meet the state's demand.

The operation of the CHPE Project could result in some of GHG emissions associated with electricity from sources use to power the proposed HVDC converter station and proposed cooling stations. The proposed HVDC converter station would be powered by electricity off the CHPE transmission line itself. In the unlikely event this is not possible, a local utility (i.e., ConEd) or a diesel generator would be used, and such options would undergo all required permitting requirements and approvals prior to installation. GHGs associated with electricity generated at a local utility for the proposed converter station would not be significant. Operation of the proposed cooling stations along the entire transmission line route annually would consume approximately 219,000 kilowatt-hours per year of electricity each. On a worst-case basis, if this power requirement were met by local utilities, this would correspond to approximately 491 tpy of CO_2-equivalent GHG emissions in the Overland Segment, 468 tpy of CO_2-equivalent in the Hudson River Segment, and 67 tpy of CO_2-equivalent in the New York City Metropolitan Area Segment. There would also be small amounts of GHGs emitted as a result of motor vehicle activities related to the facility. The estimated GHG emissions from operation of the proposed CHPE Project would be small compared to the New York State and national GHG emissions estimated for 2009.

5.4.17 Noise

Impacts from Construction

Construction of the aquatic transmission line in the New York City Metropolitan Area Segment would cause a temporary increase in the noise environment surrounding active construction activities. During construction, the laying of aquatic transmission cables would be a continuous 24-hour-a-day operation. Increased noise levels might occur along the shoreline when vessels and heavy equipment are within 100 feet (30 meters) of the shoreline. The HDD cofferdam location at MP 330 would be at least 100 feet (30 meters) from the shoreline. **Table 5.1.17-1** summarizes anticipated noise levels associated with aquatic installation activities. As the area along the Harlem and East Rivers is primarily industrial or commercial in use, cable installation activities would comply with the New York City and NYSDEC 79 dBA noise guidelines for industrial and commercial areas. There are parks located along the Harlem River in Manhattan (Charles Young Playground and Harlem River Park) and the Bronx (Mill Pond Park) that could experience an increase in noise levels from transmission line installation activities. However, these are active use parks and ambient noise levels in the area are elevated due to traffic noise from adjacent Harlem River Drive and Major Deegan Expressway. Given the average daily rate of progression of construction activities during the continuous installation, it is unlikely that these nearby receptors on the shoreline would be subject to noticeable sound increases from the proposed CHPE Project for more than a few hours at a time.

Blasting would be required to excavate approximately 460 feet (140 meters) of rock at MP 324.5 in the Harlem River. Boreholes would be drilled into the rock, and either pre-packaged chemical demolition agent or water gel dynamite would be used to generate the expansive force necessary to fracture the rock. Drilling would likely occur from a barge on spuds, and long-reach hydraulic excavating buckets would be used to clear the muck and deposit in adjacent to the trench or on the barge. Nominal noise and vibration would be expected from the drilling process, and noise would result primarily from air compressors

Table 5.4.17-1. Luyster Creek HVDC Converter Station Construction Noise Sources

Activity	Calculated SPL (dBA) as L_{eq} (1 hr) at distance			
	100 feet	500 feet	1,000 feet	2,000 feet
Site Preparation	84	70	64	58
Site Prep Grading	81	67	61	55
Fence, Paving of street accesses, AC lighting and trailers	84	70	64	58
Converter Building Foundations	83	69	63	57
Converter Building Superstructure	85	71	65	59
Transformer Yard Foundations and Conduits	82	68	62	56
Transformer Yard Structural, Electrical	73	59	53	47
Final Site Preparation, traprock, paving, vegetation plantings	84	70	64	58
HDD	89	75	69	63

mounted on the barge. It is unlikely that blasting would generate appreciable aboveground noise. Blasting in the Harlem River would be estimated to last 10 weeks. Each blast event would be anticipated to last a few seconds, but each event would be preceded and followed by warnings and clearings of the area for inspections, all of which could last approximately 2 hours. Peak ground vibrations (i.e., PPV) from blast events are predicted to range from 4 inches (10.2 cm) per second at 30 feet (9 meters) from the trench to 0.25 inches (0.64 cm) per second at a distance of 200 feet (61 meters) from the trench. The proposed blasting activities would comply with frequently used vibration thresholds for vibration (i.e., PPV of 2.0 inches (5.1 cm) per second at the closest structure to prevent structural damage as identified by the United States Bureau of Mines and PPV of 0.5 inches (1.3 cm) per second associated with more stringent protection of surrounding historic structures) (NYCDEP 2006). Land uses along the Harlem River in this area include the Inwood Hill Park in Manhattan and residential uses and railroad tracks in the Bronx. Blasting and its noise and vibration effects on nearby land uses and structures would be managed with a blasting plan for each site. In accordance with Certificate Condition 159, the blasting plan in the EM&CP would include the blasting methods, surveys of existing structures and other built facilities, and distance calculations to estimate the area of impacts from blasting. With proper implementation of a blasting plan, whereby all nearby existing buildings and structures are accounted for, the increase in noise and vibration levels would be managed to minimize noise impacts on potential receptors.

HDD operations would occur at the transition from water to land in the Harlem River adjacent to the Willis Avenue Bridge (MP 330), and under the East River with HDD staging areas in the Bronx and Queens. HDD operations in each of these three locations would have a duration of approximately 2 weeks; however, these sites are industrial in nature and the closest sensitive receptors are tennis courts more than 700 feet (213 meters) across the Harlem River from the Willis Avenue landing site. Therefore, noise levels from these HDD operations would be less than 65 dBA at the nearest noise receptor.

Along the entirety of the terrestrial portion of the New York City Metropolitan Area Segment, installation of the transmission line would generally occur at distances approximately 100 feet (30 meters) or greater from sensitive receptors. At this distance, the noise level would be approximately 86 dBA (see **Table 5.2.17-1**). However, some noise-sensitive receptors could be closer than 100 feet (30 meters) to construction activities, particularly along the Astoria to Rainey HVAC Interconnection route. In these areas, noise levels could reach 85 dBA at adjacent residences, similar to typical urban construction activities such as water and sewer line installation. Along city streets in Queens, work hours would be restricted primarily to daytime hours to the extent practical to reduce impacts. Construction equipment would be equipped with appropriate sound-muffling devices (i.e., OEM or better), and would be maintained in good operating condition at all times (see **Section 5.2.17** and **Appendix G** for additional information on Applicant-proposed measures to reduce noise impacts).

The terrestrial portion of the New York City Metropolitan Area Segment includes construction of the Luyster Creek HVDC Converter Station and modification to the Astoria Annex Substation. **Table 5.4.17-1** presents a summary of the noise generated from these construction activities, including site preparation, grading, converter station foundation construction, and transformer yard activities.

Based on the values presented in **Table 5.4.17-1**, noise levels due to construction of the Luyster Creek HVDC Converter Station would generally be less than 65 dBA at the nearest sensitive receptor, a residential area approximately 1,500 feet to the southwest. A majority of the increased sound levels would be related to typical construction activities, including site clearing, foundation installation, and building erection.

Shallow bedrock has the potential to be encountered during the construction phase of the converter station, and, if necessary, to create a trench in which to bury the cables in the Harlem River. Blasting could be required to remove bedrock as part of the construction phase. The instantaneous noise from blasts could range up to 140 dBA at the blast location or more than 90 dBA for receptors within 500 feet (152 meters) (BLM and CPUC 2008), and a residential area is present 500 feet (152 meters) from the proposed converter station site. If blasting is required, its noise and vibration impacts on nearby land uses and structures would be managed with a blasting plan (see **Section 5.2.17**). Blasting would be limited in duration and would include advance planning and public notification.

Impacts from Operations, Maintenance, and Emergency Repairs

Impacts from noise generated during operation of the cooling station and the converter station, routine inspection, maintenance, and possible emergency repairs would be expected. The increase in sound levels resulting from routine inspection and maintenance activities would be short-term, but would occur multiple times over the operating life of the transmission line. In general, the increase in sound levels related to inspection and maintenance activities would be associated with noise generated from vehicle traffic and maintenance equipment. Noise levels generated from emergency repair activities would be similar to those expected during construction, as shown in **Table 5.2.17-1**, but would only occur as required with less equipment, and be much shorter in duration and limited to the immediate area of repairs. In addition, the cooling station proposed at MP 331 would generate noise during operations. The Applicant has estimated that the cooling stations would be designed to achieve a noise level of 50 dBA at 100 feet (30 meters) away from the source. Within this distance, land use is entirely industrial; residents are not present within 500 feet (152 meters) of the cooling station location.

The operation of the Luyster Creek HVDC Converter Station would result in a continuous increase in sound levels, which has been evaluated further. To evaluate the potential noise impacts from the operation of the converter station, the Applicant determined project-related noise levels, and compared the projected noise levels to the applicable noise standards in a noise assessment (CHPEI 2012gg). The proposed Luyster Creek HVDC Converter Station would contain four 400-megavolt ampere (MVA) transformers, three of which would operate at any given time, with the fourth available as a backup. Approximately 44 valve coolers and multiple pieces of equipment would be located within the building at this site. Noise level data for the proposed sources and physical dimensions of the equipment were obtained for the analysis. **Table 5.4.17-2** identifies each piece of noise-generating equipment along with its sound power level (SWL).

Table 5.4.17-2. Luyster Creek HVDC Converter Station Operational Source Sound Levels (dBA)

	Number of Sources	Sound Power Level (dBA)
Outdoor Sources		
Converter Transformer	4 (3 running at any time)	98
Transformer Cooler Bank	3	90
Valve Cooler	11	93
Auxiliary Transformer	1	75
Air Conditioner	2	72
Indoor Sources		
Phase Reactor	6	80
Valve Unit	19 per leg	83
Smoothing Reactor	2	80

Source: CHPEI 2012ff

A noise-simulation computer model (Cadna-A) was used to estimate noise at nearby residential and industrial areas due to operation of the proposed converter station. The model accounted for spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is standards-based and the International Organization for Standardization (ISO) 9613 standard was used for air absorption and other noise propagation calculations (ANSI 1993). The model factored in the existing topographic features of the project site and surrounding area and their reflection or barrier effects. Sizes and locations of existing buildings were also factored into the analysis. No credit was taken for the shielding effects of existing buildings (CHPEI 2012ff).

The outdoor sources were built into the Cadna-A model using the sound power data as provided. For the interior converter station building sources, the Applicant calculated the sound level expected inside the building (accounting for reflections that would occur) and included a nominal 15-dBA noise transmission loss value for the building walls. This transmission loss is conservative and is typical of thin sheet metal walls.

New York City Zoning Law - Industrial Property Lines. Estimated Luyster Creek HVDC Converter Station noise levels are compared to the New York City zoning resolution noise standard at the M3 zone industrial property line in **Table 5.4.17-3**. The data demonstrate that estimated converter station noise levels would be in compliance with the New York City zoning noise standard at the M3 zone industrial property line locations.

Table 5.4.17-3. Luyster Creek HVDC Converter Station Calculated M3 Zone Property Line Noise Levels (dB)

	Octave Band Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
New York City Zoning Resolution M3 Standard	**79**	**74**	**69**	**63**	**57**	**52**	**48**	**45**
Project Noise at M3 Property Line – Location 1	66	66	62	61	54	49	42	30
Project Noise at M3 Property Line – Location 2	66	66	62	60	55	48	41	30
Project Noise at M3 Property Line – Location 3	65	65	61	57	54	48	40	27
Project Noise at M3 Property Line – Location 4	64	63	60	56	53	47	39	26

Source: CHPEI 2012ff

New York City Zoning Law – Residential Property Lines. Modeled converter station-related noise levels at the nearest residential receptors are compared to the New York City zoning resolution at residential property lines in **Table 5.4.17-4**. The data demonstrate that estimated noise levels would be in compliance with the New York City zoning exterior standard at residential uses bordering an M3 industrial zone.

Table 5.4.17-4. Luyster Creek HVDC Converter Station Calculated Residential Boundary Noise Levels Compared to New York City Zoning Resolution Standard (dB)

	Octave Band Center Frequency (Hz)							
	63	**125**	**250**	**500**	**1,000**	**2,000**	**4,000**	**8,000**
New York City Zoning Resolution M3-R Standard at Residential Boundary	**73**	**68**	**63**	**57**	**51**	**46**	**42**	**39**
Exterior Project Noise at 20th Avenue and 27th Street	43	43	38	37	29	20	0	0
Exterior Project Noise at 20th Avenue and 31st Street	42	39	33	28	20	10	0	0
Exterior Project Noise at 20th Avenue and 37th Street	47	45	41	36	32	23	3	0

Source: CHPEI 2012ff

New York City Noise Code. As discussed for the New York City Metropolitan Area Segment, the New York City code places limitations on the potential converter station noise levels as measured at interior residential locations. For the purposes of comparison, according to New York City Environmental Quality Regulations (CEQR), "typical construction techniques used in the past (including typical single-glazed windows) provide a minimum of approximately 20 dB(A) of noise attenuation, from outdoor to indoor areas" (MOEC 2012). Although the residential apartment buildings that are present 500 feet (152 meters) southwest of the converter station site are built with masonry construction and are thus expected to provide greater noise attenuation, the minimum noise attenuation value was applied to the converter station noise-level calculations to estimate the sound levels at the interiors of residences. An octave band curve based on a 20-dBA noise transmission loss value was developed, conservatively using the noise transmission loss values for materials used in standard residential construction (wood frame buildings).

Table 5.4.17-5 provides a summary of the estimated converter station noise levels, the 20-dBA noise transmission loss values, calculated interior noise levels, and a comparison to the New York City Noise Code. The data demonstrate that converter station noise levels would be in compliance with the New York City Noise Code standard at all interior residential receptors near the converter station site.

Modeled converter station-related noise levels are compared to the measured nighttime ambient L_{eq} levels in **Table 5.4.17-6**. The data in this table demonstrate that future sound levels from converter station operation would be less than 1 dBA above existing levels and, therefore, would not cause a significant increase in nighttime noise levels at the residential areas.

NYSDEC Noise Policy. The NYSDEC guidance considers a 6 dBA or greater increase over existing ambient noise levels to be significant in most cases, which is less restrictive than the New York City CEQR criterion. Results of the analysis indicate that project-related noise level increases would be less than 6 dBA and comply with the NYSDEC policy.

Table 5.4.17-5. Luyster Creek HVDC Converter Station Calculated Residential Boundary Noise Levels Compared to New York City Zoning Resolution Standard (dB)

	Octave Band Center Frequency (Hz)								
	31.5	63	125	250	500	1,000	2,000	4,000	8,000
New York City Noise Code for Interior of Residential Structures	70	61	53	46	40	36	34	33	32
Exterior Project Noise at 20th Avenue and 27th Street	39	43	43	38	37	29	20	0	0
20 dBA Noise Transmission Loss for Single-Family Home	4	7	15	24	30	33	39	31	27
Interior Project Noise at 20th Avenue and 27th Street	35	36	28	14	7	0	0	0	0
Exterior Project Noise at 20th Avenue and 31st Street	39	42	39	33	28	20	10	0	0
20 dBA Noise Transmission Loss for Single Family Home	4	7	15	24	30	33	39	31	27
Interior Project Noise at 20th Avenue and 31st Street	35	35	24	9	0	0	0	0	0
Exterior Project Noise at 20th Avenue and 31st Street	39	47	45	41	36	32	23	3	0
20 dBA Noise Transmission Loss for Single Family Home	4	7	15	24	30	33	39	31	27
Interior Project Noise at 20th Avenue and 31st Street	35	40	30	17	6	0	0	0	0

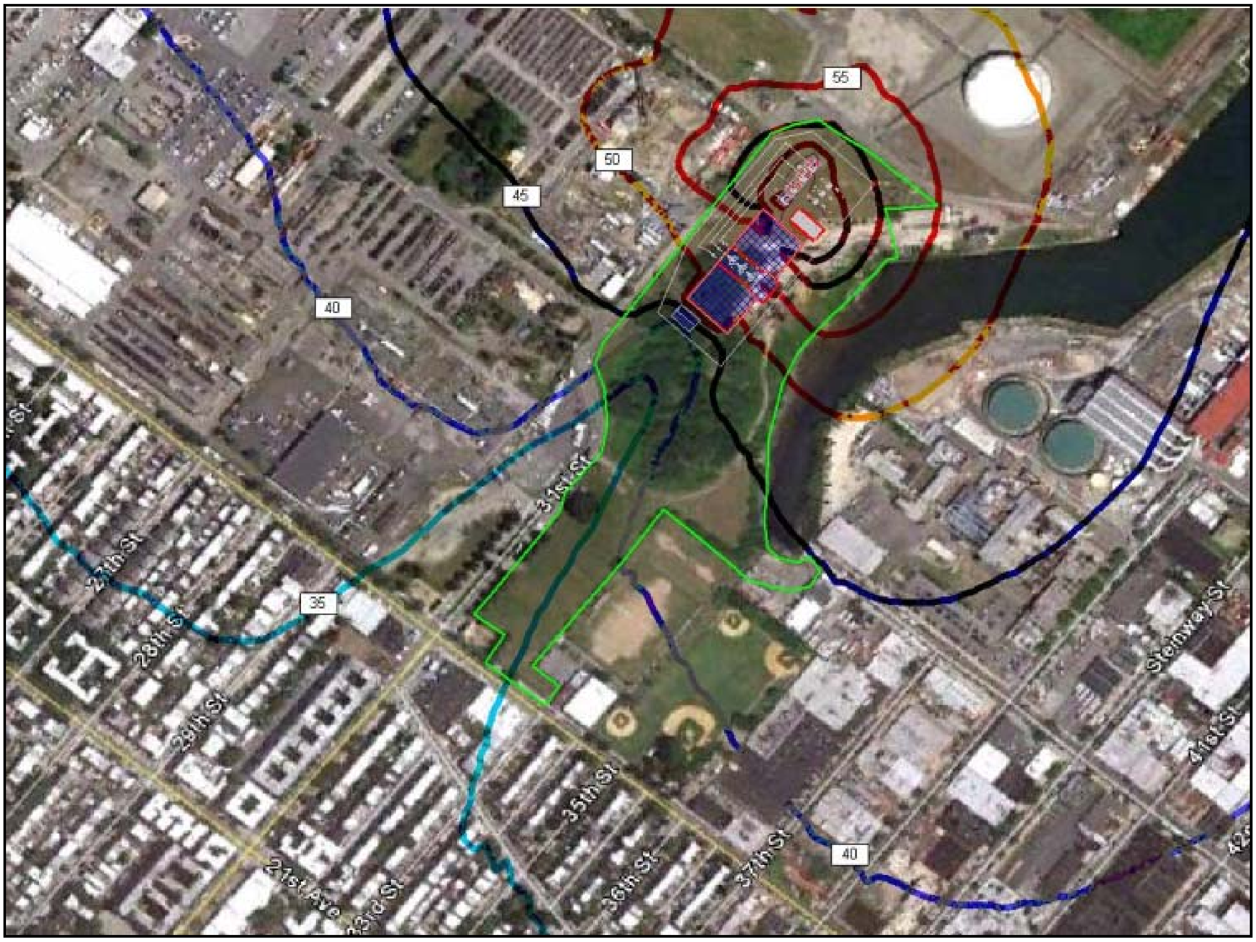
Source: CHPEI 2012ff

Table 5.4.17-6. Luyster Creek HVDC Converter Station Noise Levels (dBA)

Location	Measured Nighttime L_{eq}	Modeled Level	Combined Future L_{eq}	Increase in Nighttime Ambient
20th Avenue and 27th Street	52.6	36.9	52.7	0.1
20th Avenue and 31st Street	50.2	29.6	50.2	0.0
20th Avenue and 31st Street	47.7	38.3	48.2	0.5

Source: CHPEI 2012ff

Noise Contours. A noise contour map that depicts the estimated Luyster Creek HVDC Converter Station noise levels surrounding the proposed site is presented in **Figure 5.4.17-1**. The noise contours, or noise isopleths, connect the points of equal sound levels, and the sound level is equal along a single contour line. The area between two contours has sound levels between the values of the two contours. For instance, the area between the 45 dBA and 50 dBA contours has a sound level ranging between 45 dBA and 50 dBA. **Figure 5.4.17-1** indicates that all residences located to the southwest of the proposed converter station site are outside of the 50-dBA operational noise contour line, which means levels are below 50 dBA and below the New York City Noise Code thresholds for these types of noise sources.



Source: CHPEI 2012ff

Figure 5.4.17-1. Noise Contour Map of Predicted Noise Associated with Operations of the Luyster Creek Converter Station

The noise from operation of the Luyster Creek HVDC Converter Station were evaluated for the presence of prominent discrete tones. Prominent discrete tones are discrete-frequency sounds that stand out from other sounds and have potential to cause annoyance. The general method of testing for prominent tones is based on a time-averaged SPL measured in 1/3 octave bands. If the sound level in any frequency band is a certain number of decibels higher than the adjacent frequency bands, then a prominent tone is present. The number of decibels difference varies by frequency bands and the suggested values are consistent across the standards (ISO 2007):

- Low-frequency 1/3 octave bands (25 Hz to 125 Hz): 15 dB level difference
- Middle-frequency 1/3 octave bands (160 Hz to 400 Hz): 8 dB level difference
- High-frequency 1/3 octave bands (500 Hz to 10,000 Hz): 5 dB level difference.

An analysis was conducted to determine the potential for prominent discrete tone emissions from the project. The transformers and valve coolers, which compose the proposed CHPE Project's major outdoor equipment noise sources, were evaluated for prominent discrete tones. Typical spectral data for each of these sources were estimated based on a review of similar studies (Harris 1991). Each 1/3 octave band was compared to the adjacent bands and the average of the SPLs of the two contiguous bands, to be consistent with legacy analysis methods (CHPEI 2012gg, CHPEI 2012ff). The data indicate that there would be no prominent discrete tones associated with project operation. The results of the analysis for the transformers and coolers are provided in **Appendix N**.

5.4.18 Socioeconomics

Impacts from Construction

Population. Construction of the CHPE Project transmission line, the converter station, and cooling station likely would not result in the permanent migration of workers to the area to meet the demand of the project. Therefore, population levels within the New York City Metropolitan Area Segment ROI would not change noticeably due to migration of construction workers. However, a small number of specialized workers likely would relocate temporarily to the area for the duration of construction in this segment.

Employment. The construction of the proposed CHPE Project would require specialized construction workers, which would temporarily increase demand for workers and create jobs in the local construction industry. During the approximate 4-year construction period, the proposed CHPE Project construction in the New York City Metropolitan Area Segment is estimated to require an average of approximately 70 direct construction jobs, with a peak of approximately 140 direct jobs in 2015. The proposed CHPE Project would also produce, on average, approximately 275 indirect jobs in the New York City metropolitan area. Any non-specialized construction workers that would be needed for construction should be available from the counties composing the New York City Metropolitan Area Segment ROI, which has approximately 115,000 construction workers.

Taxes and Revenue. Construction expenditures for building materials, construction workers' wages and taxes, and purchases of goods and services in the area would increase tax receipts and revenue for the local economy. The purchase of building materials for the proposed CHPE Project would to be sourced locally where available and appropriate. In addition, specialized equipment would be necessary for the installation of the proposed transmission line and might come from both inside and outside the segment.

Some roads in this segment would be within the construction corridor. Detours for these roads could be required. Access to local businesses would be maintained in accordance with an MPT Plan and construction in a given area along the transmission line route would occur for 2 weeks or less.

Housing. Workers travelling to the area for construction of the proposed CHPE Project would likely be housed in either hotels or short-term rentals. However, relatively few workers would be required for construction activities; therefore, available temporary housing supplies would be able to meet the temporary increase in demand.

Construction activities would not influence private property values because the activities would be temporary and property would be restored after completion of construction. The transmission line would be located under the Harlem and East rivers or along railroads and public roadways, and associated HDD activities would be sited along the perimeter of private property to the maximum extent practicable. Temporary construction and HDD staging areas could occur on private property, with rental payments made by the construction contractor to the landowner. The Applicant would also pay for any associated land restoration costs. Construction work areas along the transmission line route would occur in a given location for no more than 2 weeks. Because construction activities would occur over such a short time period, no change in private property values would be expected from construction activities. Construction of the cooling station would occur in an existing industrial area and, therefore, would not be expected to affect property values.

Impacts from Operations, Maintenance, and Emergency Repairs

Population. The operation, maintenance, and emergency repair of the proposed CHPE Project transmission system would not lead to an influx of new residents because only approximately 21 direct permanent jobs in the New York City metropolitan area would be required for the commercial operation of the proposed CHPE Project. Maintenance and potential emergency repair activities would require contractors who could be hired locally, but could also move in from outside the area.

Employment. The operational phase of the proposed CHPE Project would be expected to create 21 direct full-time equivalent jobs in this segment. Direct jobs would primarily be required for the administration, contracting, and operation of the proposed CHPE system. Indirect jobs would also be created in this segment associated with the electrical, cooling system, and landscaping contractors that would provide maintenance and possible emergency repairs of the transmission line, converter station, and cooling station. Considering the low number of jobs that would be created, the existing workforce within the New York City Metropolitan Area Segment ROI would be able to meet the employment demands of the proposed CHPE Project.

Taxes and Revenue. The presence of the transmission system facilities would likely increase tax revenue for New York, Bronx, and Queens counties (and applicable municipalities for those counties). Tax receipt estimates would be approximately 2 percent annually of the assessed property value, and calculated and subject to change per New York State tax regulations (CHPEI 2012mm). Payments would be made by the Applicant to New York State for use of the Harlem River Rail Yard and submerged lands under the Harlem and East rivers, and to New York City for occupancy of city streets in the Bronx and Queens. The Luyster Creek HVDC Converter Station would be constructed and operated on private property; therefore, associated property taxes would be paid to the City of New York. Costs of the transmission system would be borne by investors as a merchant project and would not be directly passed on to electrical ratepayers.

Local contractors would be hired to provide periodic maintenance services at the cooling station and converter station, and for any vegetation management along the ROW. If emergency repairs associated with the transmission line were required, a utility contractor would be hired to make the necessary repairs. Emergency repair contractors could be hired both inside and outside the segment. The Applicant estimates that approximately 21 workers would be employed in the New York City metropolitan area to operate the proposed CHPE transmission system; therefore, minor increases in wages and taxes and purchases of goods and services in the area would be expected.

Approximately $182 million in annual energy savings to residents would occur within the New York City metropolitan area. Counties within this segment's ROI would share those savings with neighboring counties, including Kings, Nassau, Richmond, and Suffolk counties (NYSDPS 2012a) (see **Section 5.1.18** for additional information).

Housing. Relatively few employees would be required for the operation, maintenance, and potential emergency repairs within this segment, representing a negligible increase in housing demand. The existing number of housing units would more than adequately meet the needs of any new employees that would require housing.

The transmission line would be buried within railroad and road ROWs along terrestrial portions of this segment and not visible; therefore, its presence generally would not be a detriment to nearby private property values. Easement agreements for deviation areas would establish future land use restrictions within the easement (e.g., restricting development directly above the transmission line). Easement payments would compensate landowners for the restrictions placed on private properties and would offset any potential impacts on property values. The cooling station and the converter station would be located in industrial areas and be surrounded by facilities related to railroad or power generation activities, and would not affect residential property values.

Maintenance and emergency repairs, if necessary, could occur on private property; however, the majority of the transmission line ROW would be within existing railroad and roadway ROWs. The Applicant would also pay for any land restoration costs associated with emergency repairs. Because maintenance and emergency repair activities would only occur in a given location for 2 weeks or less, no change in private property values would be expected.

5.4.19 Environmental Justice

Impacts from Construction

The 26 census tracts in this segment's ROI (located primarily in Queens County along the East River) generally reported higher percentages of minority and low-income populations than were reported among the state's total population (see **Appendix L**). Despite the higher percentages, particularly in Astoria, constructing the transmission line, cooling station, and converter station would not cause minority or low-income populations to experience disproportionately high and adverse human health or environmental effects as compared to the general population because construction activities would be underwater, or underground in existing railroad or roadway ROWs or industrial areas, and would be temporary and transitory in nature. Portions of the transmission line in this segment would be constructed in aquatic environments, which would further reduce construction related effects on all populations, including minority and low-income populations, because activities would occur farther from populations residing on land. One cooling station would be constructed near MP 330 in an industrial area in the southern portion of the Bronx and the Luyster Creek HVDC Converter Station would be constructed in an industrial area, both of which have no permanent residents in its census tract or within 500 feet (152 meters) of the transmission line route; therefore, no impacts on minority and low-income populations would occur from construction of these aboveground facilities. The Astoria-to-Rainey interconnection would be constructed under city streets through neighborhoods in Astoria and in existing roadway ROWs (see **Figure 3.4.19-1**). Effects from construction of the of the interconnection would be similar to those resulting from routine installations of water, sewer, gas, telephone, and electric distribution lines in city streets. Construction noise and dust from pavement removal, trenching, blasting, detouring traffic around work sites, cable installation, and surface restoration would temporarily affect adjacent areas; however, work areas would only be present in a given location for 2 weeks or fewer at a time.

Impacts from Operations, Maintenance, and Emergency Repairs

Human health and environmental effects in this segment would generally be limited to operation of the converter station and maintenance and emergency repairs of the transmission line. No effects from magnetic fields, including those along the Astoria-Rainey interconnection, on minority or low-income populations would be expected because the cables would be placed underground or underwater in the same trench, and no known human health effects from exposure to magnetic fields at the level to be emitted by the proposed CHPE Project have been identified. Effects on all populations, including minority and low-income populations, from the operation of the converter station, including those on public health (described in **Section 5.1.14**), air quality (described in **Section 5.1.16**), and noise (described in **Section 5.1.17**), would be small because effects would primarily occur in an industrial area with no residential population. Effects on all populations, including minority and low-income populations, from potential maintenance and emergency repair effects, which include emissions and noise from equipment used for repairs, would be small because such activities would be temporary and transitory in nature and would occur in aquatic environments, industrial areas, and existing railroad and roadway ROWs at durations and frequencies less than that required for construction.

6. Cumulative and Other Impacts

6.1 Cumulative Impacts Analysis

Cumulative impacts result from the "incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions"; they can result from "individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). The analysis in this section consists of two parts: identification of other actions, and quantification or qualification of potential cumulative impacts.

6.1.1 Other Actions Considered for Potential Cumulative Impacts

The potential for cumulative impacts depends on both spatial and temporal factors within the environment, which can vary from resource area to resource area. For example, the geographical area of consideration for cumulative impacts could be limited to the area of disturbance for soil resources but include all vantage points for visual resources. The geographic ROI for cumulative impacts includes the areas in which the proposed CHPE Project has direct and indirect impacts on resources, and corresponds to the ROIs described in **Chapters 3** and **5** (see **Figure 3.2.1-1**). The temporal boundaries include past actions, ongoing actions, and reasonably foreseeable future actions to cover the proposed CHPE Project construction period and beginning of operations (i.e., 2014 through 2020).

6.1.1.1 Past Actions

Past actions are those actions, and their associated impacts, that occurred within the geographic ROI of cumulative impacts that have shaped the current environmental conditions of the project area. For the purposes of this EIS, actions that have occurred in the past and their impacts are now part of the existing environment and are included in the affected environment described in **Chapter 3**.

6.1.1.2 Present and Reasonably Foreseeable Future Actions in the Lake Champlain Segment

Lake Champlain Bridge Project. Concern was raised in the 2010 scoping period about potential incremental impacts from the proposed CHPE Project when added to the Lake Champlain Bridge Project. The Lake Champlain Bridge connects Crown Point, New York, to Addison, Vermont. The original Lake Champlain Bridge was demolished in 2009 in preparation for construction of a new bridge. In the interim, motorists used ferries to travel between the New York and Vermont shores. The new bridge opened for traffic in November 2011 (NYSDOT 2012b). Since construction is complete and the project consisted of the replacement of a previous bridge, it is not anticipated that the aquatic portion of the proposed CHPE Project would have any incremental or additive cumulative impacts associated with the new Lake Champlain Bridge.

Grand Isle Intertie. The Grand Isle Intertie Project is a proposed HVAC transmission line that would connect a substation in Plattsburgh, New York, to a new substation in Essex, Vermont, via an aquatic route through Lake Champlain (Rivera 2013). This project would allow for the transport of renewable energy resources, such as wind power generated in upstate New York, into New England. It is anticipated that the 34-mile (55-km) Grand Isle Intertie Project could be in service by 2017. This project is early in the planning process, and no detailed environmental analyses were available; however, it is considered generally in this cumulative impacts analysis because the proposed CHPE Project and the Grand Isle Intertie Project would both occur within Lake Champlain and their routes would cross in Lake Champlain. It is anticipated that the Grand Isle Intertie Project would be constructed in Lake Champlain after the proposed CHPE Project.

New England Clean Power Link. The New England Clean Power Link is a proposed 1,000-MW HVDC underwater and underground transmission line that would bring energy from the U.S./Canada border to Vermont and the New England marketplace (TDI New England 2014). If approved following Federal, state, and local environmental review, the project would install two 6-inch (15-cm)-wide cables for an estimated 150 miles (241 km), all in Vermont. Approximately 100 miles (161 km) of cable are proposed to be buried under Lake Champlain and the balance buried underground in existing ROWs. The transmission line would end at a converter station to be built at a location in Ludlow, Vermont, and connect into the Vermont Electric Power Company transmission grid to serve the State of Vermont and the broader New England electricity market as managed by the Independent System Operator-New England (ISO-NE). Because the proposed New England Clean Power Link would be installed only in Vermont, and the proposed CHPE Project would be installed a distance away across the state border in New York, significant cumulative impacts on the environment would be unlikely.

6.1.1.3 Present and Reasonably Foreseeable Future Actions in the Overland Segment

Champlain Canalway Trail. As part of the Canalway Trail system, the Champlain Canalway Trail corridor extends 71 miles (114 km) from Lake Champlain to the Hudson River Valley. The Champlain Canalway Trail Action Plan, finalized in 2011, conveys a vision and offers recommendations for an attractive and continuous Champlain Canalway Trail route from Waterford to Whitehall, New York, that uses historic towpaths, Champlain Canal shoreline, existing local and regional trails, on-street bicycle routes, and links to regional and community attractions (CCTWG 2011). As of 2010, 24 percent of the Champlain Canalway Trail (including the Glen Falls Feeder Canal Trail, which is separate from but managed with the Champlain Canalway Trail) was complete, 20 percent was planned or under construction, 20 percent was defined, and 36 percent was yet undefined. The proposed CHPE Project route (between roughly MPs 112 and 135) and the planned Champlain Canalway Trail (between roughly trail mile 38.5 and just beyond trail mile 62, which is the terminus) are parallel for approximately 24 miles (39 km) between Whitehall and Fort Edward. Scoping comments for the proposed CHPE Project suggested that a portion of the CHPE Project transmission route, roughly MPs 113 to 117, be rerouted to coincide with the planned Champlain Canalway Trail, which would provide recreational benefits by completing and maintaining that portion of the Champlain Canalway Trail. The Applicant would consider accommodating the trail at the time of final engineering design and EM&CP development (NYSPSC 2012).

High-Speed Rail Program. The original phase of the Northeast Corridor Improvement Project includes high-speed (150 miles [241 km] per hour) Amtrak Acela train service between Washington, D.C., New York, and Boston. The U.S. Department of Transportation is working with states and other stakeholders to upgrade existing lines and construct entirely new lines for high-speed intercity passenger rail corridors. Investments include replacing aging bridges, expanding constrained stations, and upgrading tracks and power systems to reduce trip times and improve reliability. A regional high-speed route, up to 110 miles (177 km) per hour, is planned from New York City to Albany and Albany to Buffalo. Investments in rail corridors within New York State include $246 million for the New York-Albany-Buffalo/Niagara Falls and Albany-Montreal corridors, and a portion of the more than $954 million for the Northeast Corridor, which goes through eight states (including New York State) and the District of Columbia (FRA 2012). Specific high-speed rail improvement projects along the proposed CHPE Project transmission line route have not been identified, and the timeline for when the regional rail lines associated with the High-Speed Rail Program in New York State would be implemented is unknown. Future rail improvement projects are speculative but could include replacing tracks and bridges or constructing new tracks. Considerations could include avoiding the terrestrial portion of the proposed CHPE Project route if new tracks are required. This project is discussed only generally in the cumulative analysis because the timeline is uncertain and specific environmental impacts are unknown.

CSX Track Expansion. CSX plans to expand its River Line along the Hudson River between the Albany region and northern New Jersey (CSX 2013). A total of 18 miles (29 km) of second track is planned for construction between 2013 and 2016. Consistent growth in rail traffic on the line over the past several years, along with growth projections, warrant additional investment to increase the corridor's capacity further. Preliminary site preparation is complete at Ravenna-Coxsackie, Catskill, and Haverstraw, with construction beginning in 2013. This expansion, and possible future expansions, would support the growth of moving crude oil, intermodal shipments, automobiles, and other freight by rail. The CSX expansion would occur within CSX ROW in the existing railbed (Saeed 2013). The CSX track expansion would be in some of the areas affected by the proposed CHPE Project where the transmission line is planned within the railroad ROWs between Ravenna and Catskill and in Rockland County, and construction of these projects could overlap depending on when they are implemented. An estimated 4 miles (6.4 km) of the track expansion would overlap with the proposed CHPE Project route in the Haverstraw and Stony Point area, and the remainder of the track expansion overlap would occur between Catskill and Ravenna.

6.1.1.4 Present and Reasonably Foreseeable Future Actions in the Hudson River Segment

Hudson River Navigation Channel Dredging. The USACE New York District is authorized to maintain the Hudson River Federal Channel between Waterford and New York City to a depth of 32 feet (10 meters). Dredging activities in the Hudson River began decades ago to ensure navigability of the Hudson River, and periodic dredging occurs as needed along various stretches of the river. The North Germantown Reach of the Hudson River occurs at river mile 108, which is at approximately MP 230 of the proposed CHPE Project. The North Germantown Reach was most recently dredged in 2001. The USACE is performing maintenance dredging in this area of the navigation channel where shoals have accumulated above the authorized depth. Up to 200,000 cubic yards (153,000 cubic meters) of dredged material is being disposed of at a USACE-owned upland confined disposal facility. The USACE prepared an Environmental Assessment (EA) for this program in April 2012 (USACE 2012b). This dredging project was partially completed by 2014, with the remainder of the project expected to be completed by 2015 (USACE 2014). According to the EA, similar conditions would exist before and after dredging, except the channel would be dredged to at least the required 32-foot (10-meter) depth. Based on monitoring data of previous dredges in this area, resettlement of solids is anticipated within 1 to 2 hours of completion, most dredged material within the water column would settle out rapidly within a few hundred feet of the site of the dredge, and almost complete recolonization of benthic communities is anticipated within a one-year period following completion of the dredging (USACE 2012b). The extent of the plume would be approximately 750 feet (230 meters), oriented downstream. PCB concentrations in this area of the North Germantown Reach have been measured at 0.04 ppm, although some areas could have greater concentrations (USACE 2012b).

Scoping comments noted that maintenance dredging and possible channel deepening and widening are restricted by buried utilities. As a condition for any permits issued for the proposed CHPE Project, the Applicant would be required to remove, relocate, or alter the transmission line, if required by future dredging operations. As proposed, the CHPE Project would be expected to have minimal impacts on navigation and future dredging of the Hudson River Federal Channel because the minimum bottom cover below the authorized depth, and sufficient bottom cover of existing channel bottom over the transmission cables, would be met (Ryba 2012).

Hudson River PCB Dredging Project. The USEPA traced PCB contamination in the Hudson River to the former GE capacitor manufacturing plants at Hudson Falls and Fort Edwards. The manufacturing plants discharged into the Hudson River PCB-contaminated liquids used as an insulating fluid in the manufacture of electrical capacitors. Among other remediation actions, the USEPA determined that targeted dredging, removal, and disposal of approximately 2.65 million cubic yards (2 million cubic meters) of PCB-contaminated sediment from the Upper Hudson River and the Champlain Canal would be necessary (CHPEI 2012i). Dredging activities are planned to occur in two phases in the area between Hudson Falls and Troy. As discussed in **Section 3.3.15**, the Hudson River PCB Dredging Project is not occurring in the vicinity of the aquatic portions of the proposed CHPE Project route, so cumulative impacts from this project would not be expected.

Redevelopment of Stony Point Waterfront. A site at MP 296 in Stony Point along the Hudson River, currently occupied by the Willow Cove Marina and Stony Point Bay Marina, is being considered for redevelopment into 300 housing units, a new marina with 125 boat slips, yacht clubs, and restaurants (Matsuda 2012). The proposed CHPE Project would generally follow the perimeter of existing marinas in Stony Point and would not preclude redevelopment of the sites of these marinas. This project is discussed only generally in the cumulative analysis because the timeline is uncertain and specific environmental impacts are unknown.

Tappan Zee Hudson River Crossing Project. A replacement Tappan Zee Bridge (I-287/I-87), which crosses the Hudson River between Rockland and Westchester counties, is being planned to address immediate structural and operational deficiencies of the existing bridge. The bridge originally opened to traffic in 1955 as part of the New York State Thruway extension. It has been continually maintained and improved but has now reached the point where major reconstruction and extensive measures are needed. It is anticipated that the replacement bridge would consist of two parallel structures just north of the existing bridge. A Final EIS was completed considering design options and a 2012 ROD identified the selected alternative (FHWA, NSYDOT, and NYSTA 2012). Construction is scheduled to take 4 to 6 years to complete beginning in 2013. Once the new bridge is operational, the old bridge would be removed. The Tappan Zee Hudson River Crossing Project would occur at approximately MP 310 of the proposed CHPE Project, and construction activities for both projects could overlap spatially and temporally in the Hudson River. Anticipated construction overlap could last for approximately 1 to 2 weeks while proposed CHPE transmission cables are installed in this area, which could occur sometime between 2014 and 2017.

Spectra-Algonquin Incremental Market (AIM) Natural Gas Pipeline. Algonquin Gas Transmission, LLC, a wholly owned subsidiary of Spectra Energy Corporation, proposes to create additional pipeline capacity to deliver natural gas to the Northeast market area (Algonquin Gas Transmission 2013). Current plans include construction, installation, ownership, operation, and maintenance of the planned Spectra-AIM Project, which will involve expansion of its existing pipeline and compressor station facilities located in New York, Connecticut, Rhode Island, and Massachusetts along with the abandonment of approximately 0.5 miles (0.8 km) of existing mainline pipeline as a related component of the project. Implementation of the Spectra-AIM Project will create the additional capacity from the Ramapo, New York, and Mahwah, New Jersey, receipt points on Algonquin's systems to various Algonquin city gate delivery points in Connecticut and Massachusetts. If completed, the Spectra-AIM Project would be capable of delivering up to 342,000 dekatherms per day of natural gas (Algonquin Gas Transmission 2013). The planned project includes a combination of replacement and new installation of approximately 37 miles (60 km) of pipeline from New York to Massachusetts, including replacement of approximately 3.3 miles (5.3 km) of pipeline from Haverstraw to Stony Point, New York. An additional 11.7 miles (18.8 km) of pipeline would be replaced from Stony Point to Yorktown Heights, New York. In this segment, the Spectra-AIM Project would use HDD to replace approximately 1.2 miles (1.9 km) of existing gas pipeline measuring 3.5 feet (1.1 meters) in diameter that crosses the Hudson River in the vicinity of MP 295 of the proposed CHPE Project. The target in-service date for the Spectra-AIM Project is November 2016 with construction proposed to begin in the first quarter of 2015 and scheduled to last 1.5 years (Algonquin Gas Transmission 2013).

Haverstraw Water Supply Project. United Water proposes to provide a new water source to meet long-term water supply needs in Rockland County, New York. The proposed Haverstraw Water Supply Project would include the following:

- Water intake structure in the Town of Haverstraw that draws water from the Hudson River
- Water treatment plant near the closed Haverstraw Landfill, that uses reverse osmosis or desalination to remove salt, inorganic compounds, radionuclides, and viruses
- Raw intake water transmission lines between the intake structure and the treatment plant
- New connections from the treatment plant to existing water mains.

Construction of Phase 1, which includes the majority of infrastructure investments, was scheduled to begin in 2013 and be completed by 2015. Phase 2, which would include installation and expansion of process equipment within existing structures, would be in service by 2020, and Phase 3, which would involve additional mechanical equipment and expansion of the water treatment facility, could be in service by 2030. A Draft EIS for the Haverstraw Water Supply Project has been prepared (NYSDEC 2012aa). The proposed CHPE Project would be adjacent to the Haverstraw Water Supply Project between MPs 297 and 298. Construction and installation activities could overlap, spatially and temporally, and so it is included in this cumulative impacts analysis.

Rockland County Quiet Zone Initiative. The Rockland County Planning Department is the lead agency in establishing Quiet Zones at 21 grade crossings over 23 miles (37 km) of the CSX Railroad's West Shore River Line. The train horn must currently blow within 0.5 miles to 0.25 miles (0.8 km to 0.4 km) of approaching an at-grade railroad crossing, and the train horn is approximately 96 to 110 dB. Under this project, Phase 1 safety improvements would be implemented at the majority of public at-grade crossings at the southern project limit at the New Jersey-New York border moving northward to Railroad Avenue in the Village of Haverstraw. Phase 2 safety improvements would be made at the private railroad crossings in the Town of Stony Point. Following safety improvements (e.g., installation of four-quadrant gates, gates with channelization or medians, one-way streets with gates, temporary closures of roads for predesignated periods, or photo enforcement), trains would no longer blow their horns at railroad approaches along the Quiet Zones (RCPD 2013). Geographically, these projects overlap in the vicinity of the Town of Stony Point through Haverstraw, where the proposed CHPE Project would be terrestrial. Construction associated with Quiet Zones is anticipated to occur in the near future, so construction would likely be complete and Quiet Zones in effect by the time the proposed CHPE Project would be installed.

Establishment of a Federal Anchorage Ground in the Hudson River. The USCG proposes to establish a new Federal anchorage ground, Anchorage Ground No. 18, in the Hudson River west of Yonkers (Morrissey 2013, 78 *Federal Register* 44917). The proposed anchorage ground, that would facilitate safe navigation and provide safe and secure anchorages for vessels operating in the area, could be in effect as early as 2013. The proposed CHPE Project would traverse this anchorage ground approximately between MPs 319 and 320, and the Applicant has committed to re-routing the transmission line outside of the designated boundaries of this area as part of the EM&CP development process.

West Point Transmission. The West Point Transmission Project is a proposed 1,000-MW (expandable up to 2,000 MW) electric transmission link that would connect Athens, New York, to Buchanan, New York (WPP 2012). The project would use HVDC voltage source converter technology, which transforms DC voltage into AC or converts an AC signal to DC using technologically advanced semiconductor chips. The HVDC cable would be installed underwater in the Hudson River and connect to existing substations. The earliest in-service date for this project is 2017, and the construction timeline for this project is not known (SBOC 2007). This transmission project is similar in nature to the proposed CHPE Project, and the two projects would occur in overlapping reaches of (and cross at several locations within) the Hudson River from MP 228 where the CHPE transmission line would enter the Hudson River until MP 293 where the West Point project would exit the river. West Point Partners filed an application with the NYSPSC on July 1, 2013. The Article VII application and supplemental information includes environmental analysis and related information regarding this proposed HVDC project. Decision on this application is not expected until 2015. This project is considered generally in this cumulative impacts analysis because these projects could affect similar resources with the Hudson River.

West Point Net Zero Project. This project consists of various types of Net Zero energy technology actions that might be implemented alone or in combination to meet U.S. Army Garrison West Point's requirements for energy (USEPA 2013, USAG West Point and USAEC 2014). Eight technologies determined to be viable are construction and operation of ground-source heat pump units; use of photovoltaic cells; solar hot water heaters on buildings with hot water tanks; thermal solar technologies for space heating; infrastructure cooling using river water; construction and operation of combined heat and power plants; construction and operation of central chiller plants; and construction and operation of combined heating, cooling, and power plants. As part of the project, a water intake pipeline would be installed that would extend approximately 1,500 feet (457 meters) from the Hudson River shoreline between MPs 283 and 284, to be used for terrestrial infrastructure cooling. Installation of this intake pipeline in the middle of the Hudson River would require coordination with the proposed CHPE Project to minimize the potential for cumulative impacts.

6.1.1.5 Present and Reasonably Foreseeable Future Actions in the New York City Metropolitan Area Segment

Hudson Transmission Facility Project. The Hudson Transmission Facility Project (HTF Project), developed by Hudson Transmission Partners, LLC, is a 660-MW electric transmission link between PJM Interconnection, which is a regional transmission organization in New Jersey, and New York City. The HTF Project cable is will be HVDC and entirely underground and underwater, beginning at the site of a new converter station in Ridgefield, New Jersey, following existing railroad ROWs to the edge of the Hudson River in Edgewater, New Jersey, running beneath the Hudson River for 3 miles (5 km) to near Pier 92 in Manhattan, running beneath West Side Highway, and ending at the ConEd West 49th Street Substation. Construction began in 2011, was completed in June 2013, and is currently operational (HTP 2013). The HTF Project is similar in nature to the proposed CHPE Project. The HTF Project is approximately 4 miles (6 km) south of the proposed CHPE Project at its closest; the two projects are not collocated at any point.

Luyster Creek Converter Station Site. The Luyster Creek Converter Station Site is surrounded by utility and industrial facilities and uses, such as the Astoria Energy I and II plants, Astoria Generating Station plants, former Charles Poletti Power Plant, and Bowery Bay Wastewater Treatment Plant. NYPA recently constructed a new substation in Astoria (Astoria Annex Substation) to accommodate new interconnections, including the Astoria Energy II plant and, potentially, the proposed CHPE Project. Astoria Generating Company plans to construct the Luyster Creek Energy Project, which would replace one generating unit at the Astoria Generating Station (see discussion in **Section 6.1.1.6**). Past, present, and reasonably foreseeable uses of this parcel and surrounding areas are for utility and industrial purposes.

ConEd Learning Center. ConEd plans to use a portion of the Luyster Creek parcel for a Learning Center. Currently, ConEd operates a training center in Queens, New York, but a larger facility is needed to meet ConEd's growing needs for training its employees. The Luyster Creek parcel is approximately 21 acres (8 hectares). The Luyster Creek HVDC Converter Station would require approximately 5 acres (2 hectares) in the northeastern portion of the parcel. Through a joint stipulation between ConEd and the Applicant, the Luyster Creek parcel could be developed with both the Luyster Creek HVDC Converter Station and the ConEd Learning Center. Under this stipulation, the HVDC Converter Station and associated facilities would be confined to approximately 5 acres (2 hectares) within a subdivided parcel, and the remainder of the Luyster Creek parcel would be used for the ConEd Learning Center (NYSPSC 2012). Existing setbacks and easements within the Luyster Creek parcel would still be applicable under future development scenarios.

Astoria Energy Project. In 2006, Astoria Energy constructed a natural gas power plant, Astoria Energy I, adjacent to the former Charles Poletti Power Plant in Astoria, Queens. Astoria Energy I produces 500 MW for ConEd into the NYISO market (AE 2012). In 2011, Astoria Energy II, LLC, completed construction of the Astoria Energy II 550-MW natural gas-fueled generating facility in Astoria, Queens (NYPA 2011). The NYPA has a 20-year power supply contract to purchase generating output from the Astoria Energy II plant for government customers (e.g., schools, hospitals, municipal buildings, and subways and commuter trains). Both Astoria Energy plants are in the vicinity of the site for the proposed Luyster Creek HVDC Converter Station for the CHPE Project. The Astoria Energy II project is now part of the existing condition.

Luyster Creek Energy Project. The Astoria Generating Company, L.P., proposes to enhance the existing Astoria Generating Station with a new 440-MW, gas-powered, combined-cycle generating facility in Astoria, Queens. As part of this project, Astoria Generating Company would retire one existing unit and limit emissions from other units at the Astoria Generating Station. It is anticipated that construction could begin in 2013 with operations beginning in 2015, if approvals are granted (USPowerGen 2012). This project is considered in the cumulative impacts analysis because of its proximity to the site for the proposed converter station.

Astoria Rezoning Plan. Surrounding land uses south of 20th Avenue are mixed-use residential and commercial with some open space and recreational. In 2010, the Queens Office of the New York City Department of City Planning presented a rezoning plan for Astoria between Broadway and 20th Avenue. New recommendations for this area of Astoria include replacing existing zoning with districts to encourage predictable development, guiding new housing opportunities towards major corridors and mass transit, and updating commercial overlays for business opportunities (NYCDCP 2010).

Queens East River and North Shore Greenway Master Plan. The Queens East River and North Shore Greenway is a proposed 10.6-mile (17.1-km), urban shared-use trail that is intended to provide shoreline access and improve non-motorized commuting options (NYCDCP and NYS OPRHP 2006). The plan considered the waterfront and surrounding areas in the utility and industrial area surrounding the Luyster Creek Converter Station Site for greenway purposes, but noted that access was unlikely because of the publically inaccessible nature of the existing and planned utility development activities. The North Shore section of the proposed greenway would run along 20th Avenue between Shore Boulevard near Ralph DeMarco Park and Hazen Street and include a shared-use path and bike lanes along the roadway.

6.1.1.6 Present and Reasonably Foreseeable Future Energy Projects

This portion of the cumulative impacts analysis was developed by examining recent transmission and reliability studies for New York that have been prepared to identify current, mid-term, and long-term energy needs and projects for New York, and by considerations brought up during the scoping process for this EIS. The cumulative contribution of the proposed CHPE Project to the New York electrical system infrastructure was a common concern during the scoping process (see **Section 1.7.2**). Reliability studies relevant to the cumulative impacts analysis are presented below.

The 2009 New York State Energy Plan sets forth a vision for a robust and innovative clean energy economy intended to stimulate investment, create jobs, and meet the energy needs of residents and businesses over its 10-year planning horizon. The Energy Plan includes the following five policy objectives (NYSEPB 2009):

- Maintain reliability of energy and transportation systems
- Reduce GHG emissions
- Stabilize energy costs and improve economic competitiveness
- Reduce public health and environmental risks associated with the production of energy

- Improve energy independence by developing in-state energy supply resources.

New York State has adopted energy policies aimed to promote the growth of power supplies from clean and renewable resources, such as wind and solar energy, and increase energy efficiency and demand-side resources (NYISO 2011b). The "45-by-15" program is aimed at meeting 45 percent of New York State's 2007 forecasted energy demand through efficiency and renewable energy by 2015; 15 percent through efficiency, and 30 percent through wind, hydropower, or other renewable resources. The "80-by-50" program is aimed at reducing GHG emissions by 80 percent by 2050, when measured from 1990 baseline levels.

Investments in existing energy infrastructure and development of new infrastructure could further the Energy Plan objectives of maintaining reliability, achieving GHG emission reductions, and controlling energy costs. Currently, there are no major reliability needs in New York State (NYISO 2010a), but ensuring a reliable electrical system in the future is a paramount concern. The NYISO and transmission operators continually assess the ongoing viability of existing resources and planned resource additions. Uncertainties potentially affecting reliability include aging infrastructure, environmental regulatory programs requiring major retrofits or upgrades, and changes in load growth (NYISO 2011a). In April 2012, Governor Cuomo's New York Energy Highway Task Force announced a Request for Information (RFI) seeking ideas for potential projects from private developers, investor-owned utilities, the financial community, and others with the goal of bolstering New York State's aging energy infrastructure while promoting clean energy supplies, jobs, and economic growth. Based on the responses to the RFI, the Governor's Task Force prepared the New York Energy Highway Blueprint, which provides recommendations to unify New York State's efforts to create an energy infrastructure to serve residents and businesses for years to come (NYEH 2012). The four main areas of focus in the Blueprint are expanding and strengthening the Energy Highway, accelerating construction and repair of electric and natural gas delivery systems, supporting clean energy, and driving technology innovation.

Geographically, energy projects that are proposed within the same counties as the proposed CHPE Project are within the cumulative impacts ROI because those projects would have the greatest potential for cumulative impacts. Other energy projects in other parts of New York State (i.e., within the NYCA), New England states, or other surrounding states could contribute to cumulative impacts on energy in New York State because energy could be bought or sold in contracts. However, projects outside the counties traversed by the proposed CHPE Project route would have much less potential for cumulative environmental impacts and so they are not discussed in detail in this analysis.

Energy Forecasts

The NYISO Gold Book forecasts energy loads for the NYCA. According to the 2011 Gold Book, baseline energy demand across New York State is anticipated to increase at an average rate of 0.41 percent annually between 2011 and 2021; summer peak demand is anticipated to increase at a rate of 0.73 percent annually for the same time period. In addition, New York City is anticipated to experience increased energy growth of 0.50 percent annually for the same time period. Energy growth rates are slightly less than the 2010 forecasts because of a lower econometric forecast and because of increases in energy efficiency (NYISO 2011c).

In 2011, the total resource capacity for the NYCA was 42,159 MW. This includes existing in-state capacity and resources, all resource changes, and known purchases and sales with neighboring control areas. Peak load for 2011 was estimated to be 32,712 MW. Resource capacity is greater than the installed reserve margin, which is a criterion used to determine adequacy, for 2011 through 2021 (NYISO 2011c). However, higher than projected load growth is an uncertainty in assessing reliability.

Regulatory Policies

Federal and state environmental regulations could result in power plant retirements or mothballing that could adversely impact electrical system reliability. These include Reasonably Available Control Technology (RACT) for NO_x, which limits NO_x emissions from fossil-fueled power plants by establishing limits for each type of generator, and Best Available Retrofit Technology (BART), which requires an analysis to determine the impacts of SO_2, NO_x, and PM emissions from certain affected units on regional haze. Additionally, the USEPA has issued a proposed rule for Maximum Achievable Control Technology (MACT) for HAPs for coal-fired generators and some heavy oil-fueled generators. NYSDEC is also considering Best Technology Available (BTA) for Cooling Water Intake Structures that prescribe reductions in fish mortality as a result of impingement and entrainment. These regulatory requirements could affect 23,957 MW of capacity in New York State, which represents more than half of the installed generating capacity, by 2015. As retrofitting costs could sometimes be cost-prohibitive, power plant owners of affected facilities could choose to avoid the compliance costs by closing or mothballing facilities sooner than what may be currently planned (NYISO 2011b).

Generation Projects

Table 6.1.1-1 shows the NYISO interconnection queue for generation projects within the cumulative impacts ROI (i.e., Clinton, Essex, Washington, Saratoga, Albany, Schenectady, Rensselaer, Columbia, Greene, Ulster, Dutchess, Orange, Putnam, Rockland, Westchester, New York, Bronx, and Queens counties). In addition to the projects identified in **Table 6.1.1-1**, there are approximately 2,960 MW of summer-rated capacity (2,980 MW of winter-rated capacity) from additional proposed new power generation plants within the remainder of the NYCA (NYISO 2013). The interconnection queue contains an overview of projects awaiting review and connection to the electrical grid and is subject to change, but it provides a real-time snapshot of currently planned projects. Additionally, U.S. Army Garrison West Point has proposed generation projects as part of the West Point Net Zero Energy Initiative.

If the proposed CHPE Project were constructed, the projects identified in **Table 6.1.1-1** could occur within the same timeframe, and so could have the potential for cumulative impacts. However, the proposed CHPE Project is a transmission project, and the generation sources in **Table 6.1.1-1** would not be able to directly interconnect with the CHPE transmission cables. The projects in **Table 6.1.1-1** provide context for future energy in the NYCA. Not all of the projects identified in **Table 6.1.1-1** are discussed in detail in this cumulative impacts analysis. Projects excluded from detailed discussion include those that either do not physically occur within or adjacent to the cumulative impacts ROI or are too early in their planning stages to be considered.

Indian Point Nuclear Power Plant. The Indian Point Nuclear Power Plant, owned and operated by a subsidiary of Entergy Corporation, consists of two reactors and one permanently deactivated reactor in Buchanan, New York (Westchester County), near Peekskill Bay, which is in the Hudson River Segment of the proposed CHPE Project. The two reactors combined can generate up to 2,069 MW (Entergy 2012). Ongoing impacts from operation of this power plant include thermal discharges into the Hudson River. The U.S. Nuclear Regulatory Commission (NRC) is considering whether to relicense Indian Point 2 and Indian Point 3. These licenses were scheduled to expire in 2013 and 2015, respectively; if licenses are not renewed, then the reliability of the bulk power system could be adversely affected (NYISO 2011a). It is not anticipated that the proposed CHPE Project would have any direct bearing on whether or not licenses for the Indian Point Nuclear Power Plant are renewed, though the proposed CHPE Project and other new generation projects identified in **Table 6.1.1-1** could help meet some of the electrical demand if one or both of the reactors are retired.

Table 6.1.1-1. Present and Reasonably Foreseeable Power Generation Projects in the Cumulative Impacts ROI

Owner/ Developer (NYISO Queue Position)	Project Name	Summer Capacity (MW)	Winter Capacity (MW)	Location or County (Proposed CHPE Project Segment)[1]	Interconnection Point	Utility[2]	Proposed In-Service Date
Wind							
Marble River, LLC (161)	Marble River Wind Farm	83	83	Clinton (L)	Willis-Plattsburgh WP-1 230 kV	NYPA	2012 (now in service)
Marble River, LLC (171)	Marble River II Wind Farm	132	132	Clinton (L)	Willis-Plattsburgh WP-2 230 kV	NYPA	2012 (now in service)
Duer's Patent Project, LLC (204A)	Beekmantown Windfarm	20	20	Clinton (L)	Kents Falls-Sciota 115 kV	NYSEG	2013
Noble Environmental Power, LLC (213)	Ellenburg II Windfield	21	21	Clinton (L)	Willis-Plattsburgh WP-2 230 kV	NYPA	N/A
Combined Cycle Natural Gas							
NRG Energy (201)	Berrians GT	200	200	Queens (N)	Astoria West Substation 138 kV	ConEd	2014
NRG Energy, Inc. (224)	Berrians GT II	50	90	Queens (N)	Astoria West Substation 138 kV	ConEd	2014
Cricket Valley Energy Center, LLC (310)	Cricket Valley Energy Center	1,020	1,136	Dutchess (H)	Pleasant Valley- Long Mt. 345 kV	ConEd	2015
CPV Valley, LLC (251)	CPV Valley Energy Center	678	691	Orange (H)	Coopers- Rock Tavern 345 kV	NYPA	2016
NRG Energy, Inc. (266)	Berrians GT III	250	290	Queens (N)	Astoria 345 kV	NYPA	2016
GenOn Energy, Inc. (383)	Bowline Generating Station Unit No. 3	775	775	Rockland (H)	Ladentown Substation 345 kV	O&R/ConEd	2016

Owner/ Developer (NYISO Queue Position)	Project Name	Summer Capacity (MW)	Winter Capacity (MW)	Location or County (Proposed CHPE Project Segment) [1]	Interconnection Point	Utility [2]	Proposed In-Service Date
Combined Cycle							
US PowerGen Co. (361)	Luyster Creek Energy	401	444	Queens (N)	Astoria Substation	ConEd	2015
CPV Valley, LLC (374)	CPV Valley II	820	820	Wawayanda (Orange County) (H)	Rock Tavern to Coopers Corners	NYPA	2017
NRG Energy, Inc. (393)	Berrians-East Repower	500	580	Queens (N)	Astoria East Substation 138 kV	ConEd	2018
Combustion Turbine							
Clover Leaf Power, LLC (369)	Clover Leaf Hollers Avenue	174	193	Bronx (N)	E 179th Street Substation 138 kV	ConEd	2016
Methane							
Albany Energy, LLC (342)	Albany Landfill	6.4	6.4	Albany (O)	34.5kV	NM-NG	2012 (now in service)
Hydroelectric							
Brookfield Renewable Power (355)	Stewarts Bridge Hydro	3	3	Saratoga (O)	Spier Falls-EJ West	NM-NG	2012

Source: NYISO 2013

Notes:

1. Abbreviations are used for the proposed CHPE Project segments in this table. L = Lake Champlain Segment, O = Overland Segment, H = Hudson River Segment, N = New York City Metropolitan Area Segment
2. CHGE = Central Hudson Gas and Electric Corporation, ConEd = Consolidated Edison Company of New York, NM-NG = Niagara Mohawk-National Grid, NYPA = New York Power Authority, NYSEG = New York State Electric and Gas Corporation, RG&E = Rochester Gas and Electric Corporation

Wind Energy Projects. In 2010, NYISO examined the prospect of expanding New York State's wind-power generation from 1,275 MW to 8,000 MW by 2018 (NYISO 2010b). The study concluded that NYISO could allow the integration of the additional wind generation without adverse reliability impacts. Major transmission system upgrades would be necessary to deliver the power. Wind generation also presents challenges in that wind output generally increases in the evening when power use is declining, and it declines in the morning when power use is increasing. The inherent variability of wind power throughout different times of the day, week, and year requires that the balance of conventional generation must remain in service to be available when wind plants are unavailable. Most wind projects in New York are in the northern and western portions of the state, but the target consumers would be in the southeastern portion of New York State where electricity demands are highest. In the short term, substantial increases in wind generation are not likely to displace conventional energy because the current transmission system cannot accommodate it. In the long-term, particularly as existing, aging components of the transmission system are replaced and upgraded, wind energy could become more practical. As shown in **Table 6.1.1-1**, there are several wind energy projects in the cumulative impacts ROI in the NYISO interconnection queue (NYISO 2013). In the ROI, wind energy projects account for approximately 5 percent of the total proposed power generation projects; this is much lower than the entire NYCA, where wind energy projects account for approximately 30 percent of total planned power generation projects.

The New York Energy Highway Blueprint identified offshore wind advances as an important potential component for meeting New York's electricity needs. New York State Energy Research and Development Authority, together with NYSDEC, NYSDOS, New York Power Authority, Long Island Power Authority, and other private sector partners, are working to characterize offshore wind resources and evaluate cost recovery opportunities to advance offshore wind as a viable long-term solution to providing clean energy. Initial studies are planned to be completed by 2014 (NYEH 2012). No specific offshore wind energy projects are currently planned in NYISO interconnection queue, either in the cumulative impacts ROI or in the NYCA in general (NYISO 2013). Cumulatively, all wind energy projects as a group are considered generally as an important factor in the mid- to long-term planning range.

Transmission Projects

Table 6.1.1-2 shows the NYISO interconnection queue for electric transmission projects in the NYCA. As previously stated pertaining to generation projects, projects on the interconnection queue are subject to change but provide a real-time snapshot of currently planned projects. Overall, the existing transmission system in New York State is aging, and 40 percent of the existing system will likely require replacement over the next 30 years. Furthermore, transmission pathways from upstate to downstate New York (i.e., from where most power is generated to where most power is consumed) do not provide enough capacity to meet the demand, resulting in transmission congestion. Expansion of the transmission grid could provide for evolving energy needs in New York State and allow for more energy imports from neighboring control areas (NYISO 2011b).

If the proposed CHPE Project were constructed, the projects identified in **Table 6.1.1-2** could be implemented within the same timeframe, and so could have the potential for cumulative impacts. The West Point Transmission project is discussed in this cumulative impacts analysis because it would also be placed in the Hudson River and cross the proposed CHPE Project at several locations (see **Section 6.1.1.4**). The Grand Isle Intertie and the New England Clean Power Link projects are also in the early planning stages. The Grand Isle Intertie would connect Plattsburgh, New York, to Essex, Vermont, and would be expected to cross the proposed CHPE Project transmission line in Lake Champlain (see **Section 6.1.1.2**). The New England Clean Power Link project would connect Quebec to Ludlow, Vermont, via a 100-mile (161-km) transmission line under Lake Champlain in Vermont.

Table 6.1.1-2. Present and Reasonably Foreseeable Transmission Projects in the Cumulative Impacts ROI

Owner/ Developer (NYISO Queue Position)	Project Name	Capacity (MW)	Type [1]	Location County (Proposed CHPE Segment) [2]	Interconnection Point	Utility [2]	Proposed In-Service Date
West Point Partners, LLC (358)	West Point Transmission	1,000	DC	Greene to Westchester (N)	Leeds - Buchanan North 345kV	ConEd	2017
GII Development LLC (386)	Grand Isle Intertie	400	AC	Clinton, NY – VT (L)	Plattsburgh, NY - Essex, VT 230kV	NYPA	2017
NextEra Energy Transmission (402)	Marcy - PV 345	TBD	AC	Oneida – Dutchess, NY (O)	Marcy - Pleasant Valley 345kV	NM-NG, NYPA, ConEd	2017
Orange & Rockland Utilities (429)	North Rockland Station	TBD	AC	Rockland, NY (H)	Line Y88 345kV	ConEd	2018
TDI New England	New England Clean Power Link	1,000	DC/AC	Grand Isle, VT – Windsor, VT (L)	Ludlow, VT 345kV	VELCO	2019

Source: NYISO 2013, NYISO 2014, TDI New England 2014

Notes:

1. DC = Direct Current, AC = Alternating Current, TBD = To be determined
2. Abbreviations are used for the proposed CHPE Project segments in this table. L = Lake Champlain Segment, O = Overland Segment, H = Hudson River Segment, N = New York City Metropolitan Area Segment
3. ConEd = Consolidated Edison, NYPA = New York Power Authority, NM-NG = Niagara Mohawk – National Grid, VELCO = Vermont Electric Power Company

6.1.2 Cumulative Impacts

Cumulative impacts analysis must be conducted within the context of the resource areas. The magnitude and context of the effect on a resource area depends on whether the cumulative effects exceed the capacity of a resource to sustain itself and remain productive (CEQ 1997b).

6.1.2.1 Land Use

As discussed in **Sections 5.1.1**, **5.2.1**, **5.3.1**, and **5.4.1**, implementation of the proposed CHPE Project could result in possible limitations on future land use in the transmission line ROW. Other projects are planned along the proposed CHPE Project transmission line route, such as the Champlain Canalway Trail, the High-Speed Rail Program, the West Point Transmission Project, and the majority of the CSX Track Expansion in the Overland Segment, and the Haverstraw Water Supply Project, redevelopment of the Stony Point waterfront, and a portion of the CSX Track Expansion in the Hudson River Segment. Considered together, these projects would be expected to be consistent with planned land uses, and no cumulative impacts on land use would be expected.

Construction of the HVDC converter station at the Luyster Creek site for the proposed CHPE Project would be consistent and compatible with existing and planned land use as a utility and industrial area. ConEd plans to construct a Learning Center adjacent to the converter station site. The Luyster Creek Energy Project at the Astoria Generation Station is also proposed in the immediate vicinity of the converter station site. The Astoria Energy II plant is recently completed and operational. The proposed Queens East River and North Shore Greenway includes 20th Avenue south of this area. If the Queens East River and North Shore Greenway project were implemented, more pedestrians and bicyclists could travel along 20th Avenue, but this would not result in land use conflicts with the proposed converter station. Cumulatively, the Luyster Creek HVDC Converter Station and other planned projects would be consistent with the past, present, and future uses of this area for utility and industrial purposes.

6.1.2.2 Transportation and Traffic

As discussed in **Sections 5.1.2**, **5.2.2**, **5.3.2**, and **5.4.2**, construction activities for the proposed CHPE Project would increase traffic to deliver materials for transmission line installation and converter station construction along all segments. Other construction activities in the vicinity of the proposed CHPE Project would also be expected to generate some increased construction traffic, such as the CSX Track Expansion in the Overland Segment; West Point Transmission Project (if they coincided), Tappan Zee Hudson River Crossing Project, the Haverstraw Water Supply Project, and redevelopment of the Stony Point waterfront in the Hudson River Segment; and multiple projects in Astoria near the proposed Luyster Creek Converter Station site. Limited closures in the immediate areas surrounding transmission line installation activities could affect commercial and recreational boating in Lake Champlain and the Hudson River, particularly where the proposed CHPE Project route would intersect or coincide with the navigation channel. Vessels would be able to maneuver around closed areas, and these kinds of closures would be temporary, thereby allowing traffic to pass during construction activities. Projects occurring at the same time and the same place would cumulatively increase traffic in those areas while construction is ongoing. Construction is expected to move quickly along the proposed CHPE Project route, so it would be expected to have temporary contributions to cumulative impacts on localized traffic. Areas that are populated, and would experience construction along public streets, such as in Schenectady, Clarkstown, and Astoria, could experience greater transportation impacts because there are more people using affected roadways and more potential for other minor actions (e.g., other local utility work) to contribute to cumulative traffic impacts.

Construction of the proposed CHPE Project would likely occur during the same period of time when the Tappan Zee Bridge Hudson River Crossing Project is also under construction. Prior to construction, the Applicant would coordinate installation of the proposed CHPE Project transmission line with the USCG as discussed in **Sections 5.1.2** and **5.3.2**. Safety and coordination measures would include issuances of Notices to Mariners, as appropriate, to ensure the safety of vessels transiting near the cable laying barge and its support vessels throughout the Tappan Zee construction zone.

The proposed CHPE Project transmission line would not be installed in any federally maintained channel in the Hudson River, but would traverse the federally maintained navigation channel in the Harlem River. However, if through the additional engineering studies conducted as part of the EM&CP, it is determined that the cables would need to be buried within the limits of the Federal navigation channel, it would be installed in a location and at a depth as prescribed by the USACE. One dredging project, around the North Germantown Reach (approximately MP 230 of the proposed CHPE Project) in the Hudson River, was partially completed by 2014, with the remainder of the project expected to be completed by 2015 (USACE 2014). Future USACE maintenance dredging would occur in various areas of the Hudson River, as needed, to ensure channel navigability. Because the proposed CHPE Project would be buried under the East River navigation channel using HDD, and below the authorized navigation channel depth as required by the USACE in Lake Champlain and the Hudson and Harlem rivers, cumulative impacts are not anticipated from future dredging. However, USACE permits for the proposed CHPE Project would require that the transmission line route could be relocated, if required, for future USACE dredging operations (Ryba 2012).

High levels of vessel traffic on the Hudson River are anticipated to continue in the future, especially in proximity to New York City, resulting in a possibility of ships' anchors damaging the proposed CHPE Project transmission cables. Several scoping comments expressed concerns regarding increased snag hazards from boat anchors. The USCG proposes to establish a new anchorage ground, Anchorage Ground No. 18, along MPs 319 and 320 of the proposed CHPE Project route, west of Yonkers, New York; this new anchorage area would likely be in effect by the time construction would begin on the proposed CHPE Project. The Applicant has proposed to locate the proposed CHPE Project to the east of this area, thereby avoiding the proposed anchorage ground. Transmission cable burial and protection methodologies have been evaluated within this portion of the proposed CHPE Project route by the Applicant, and are being further assessed through the development of a Navigation Risk Assessment study (see **Appendix U**) during the design stage of the proposed CHPE Project in consultation with the USCG and USACE. The Applicant would bury the transmission cables to the maximum depth achievable in this location to avoid anchor snagging, and where full burial is not achievable, the Applicant intends to protect the cables from anchor drops and snags through the use of concrete mats or similar means of protection. The burial depth of the cables and use of protective coverings would minimize the chances that a cable is snagged. In the event that a cable is snagged, the boat's operators would immediately know that a cable attached to a major subsurface feature has been snagged because of the weight of the cable. The cables would have both fiber optic thermal and communications protection on the equipment to detect snags, and fault protection equipment at the converter station to prevent system damage very quickly. The cable protection equipment is designed to shut down operation to protect life and equipment in the very unlikely event that the cable becomes damaged by external equipment (TDI 2012b).

6.1.2.3 Water Resources and Quality

Past development activities and land uses have resulted in varying degrees of environmental contamination in areas along the proposed CHPE Project route. Lake Champlain and the Hudson River are on the 303(d) List of Impaired Waters. **Sections 3.1.3** and **3.3.3** summarize the affected environment for Lake Champlain and the Hudson River, respectively. **Sections 5.1.3**, **5.2.3**, **5.3.3**, and **5.4.3** discuss the impacts of the proposed CHPE Project on water resources and water quality.

Construction schedules and detailed plans associated with the New England Clean Power Link Project, the West Point Net Zero Project, and the West Point Transmission Project are not known with any specificity at this time because these projects are very early in the permitting process. The New England Clean Power Link Project could temporally overlap with the proposed CHPE Project in Lake Champlain. The Spectra-AIM Project and the West Point Transmission Project could overlap with the proposed CHPE Project in the Hudson River; the former could cross the CHPE Project route at approximate MP 295 and the latter could cross the CHPE Project at several points along a 65-mile (105-km) segment of the River. A cooling project proposed as part of the West Point Net Zero Project could result in a water intake pipeline being constructed near the proposed route for the CHPE transmission line in the Hudson River. Impacts of the New England Clean Power Link Project, and the water intake pipeline of the West Point Net Zero Project and the West Point Transmission Project would be expected to be similar to the impacts of the proposed CHPE Project in Lake Champlain and the overlapping areas of the Hudson River (see **Sections 5.1.3** and **5.3.3**). The Spectra-AIM Project would be installed across the Hudson River using HDD; therefore, it would avoid direct construction impacts on water quality of the Hudson River. If construction activities of the proposed CHPE Project and one of the cumulative projects overlap, these projects would be expected to have incremental, additive impacts greater than just one project alone by disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, increasing noise and vibration, creating light sources during nighttime construction, and increasing the potential for spills. Sediment concentrations from the combined activities would fall off rapidly with distance from the disturbances and begin to diminish immediately after activities have ceased.

The USACE New York District maintains the Hudson River Federal Channel through periodic dredging as required due to sedimentation and shoaling as the river attempts to restore itself to natural conditions. One maintenance dredging program has been identified along the proposed CHPE Project route at approximate MP 230 in the North Germantown Reach of the river. Based on monitoring of previous dredging activities at this site, the highest turbidity and concentrations of suspended sediments would be restricted within a narrow plume a few hundred feet downstream of the dredge, and the bulk of suspended materials would settle out within a few hours within the plume. PCB concentrations in this reach of the Hudson River are generally low. Previous post-dredge monitoring in this reach showed that PCB concentrations within the expected plume were not substantially different than concentrations 2 miles (3 km) upstream of the dredge. Levels of mercury and nickel were sampled, and there was no difference between levels inside and outside of the dredge plume for these contaminants (USACE 2012b). Dredging associated with this program is anticipated to be complete prior to construction activities associated with the proposed CHPE Project, so no cumulative impacts would be expected on water quality.

The Tappan Zee Hudson River Crossing Project would occur at the same time and in the same vicinity as the proposed CHPE Project near MP 310. Disturbed sediment, which is likely to contain low levels of PCBs, in the immediate areas of construction would be initially high, and the cumulative impacts of two projects occurring simultaneously would be expected to be greater on water quality. Results of hydrodynamic modeling for the Tappan Zee Hudson River Crossing Project indicated that increases in sediment suspension would be minimal and within the natural range of expected concentrations outside of the immediate construction area (FHWA, NSYDOT, and NYSTA 2012). The Tappan Zee Hudson River Crossing Project and proposed CHPE Project could cumulatively affect suspended sediment levels at MP 310, but the temporal overlap of the projects would likely be less than 2 weeks. Sediment concentrations from the combined activities would fall off rapidly with distance from the disturbances and diminish after activities have ceased.

6.1.2.4 Aquatic Habitats and Species

Aquatic habitats in the cumulative impacts ROI, particularly in urbanized areas, have been significantly altered by dredging, channelization, bulkheading, and other physical modifications and contamination from past land uses. Consequently, many aquatic species present in these kinds of highly altered habitats are fewer in diversity and are generally more pollution-tolerant. Installation of the proposed CHPE Project transmission line would temporarily affect SAV, shellfish and benthic communities, fish, EFH (where present), and SCFWH (where present) by disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, temporarily increasing noise and vibration levels and creating light sources during nighttime construction, and increasing the potential for spills. Refer to **Sections 5.1.4**, **5.2.4**, **5.3.4**, and **5.4.4** for detailed discussions of these potential impacts from the proposed CHPE Project. Impacts on shellfish and benthic communities and fish associated with operation of the proposed CHPE Project could occur for the duration of the CHPE Project from magnetic fields and increased temperature around the transmission line.

Construction schedules and detailed plans associated with the Grand Isle Intertie Project are not known, but it would be expected to cross the proposed CHPE Project in the Lake Champlain at some point between MP 25 and 35. It is anticipated that construction of the Grand Isle Intertie Project would occur after that of the proposed CHPE Project and so it would be installed on top of the proposed CHPE transmission cables. It is likely that the proposed CHPE Project transmission cables would be covered with concrete mats in the location where the Grand Isle Intertie Project would cross, and the Grand Isle Intertie Project cable or cables laid on top of these concrete mats and then covered with concrete mats of their own. The use of concrete mats would permanently convert soft sediment habitat to hard substrate. Cumulatively, this would represent a very small area of overall habitat in Lake Champlain that would be affected. Potential cumulative impacts from magnetic fields associated with the Grand Isle Intertie Project are discussed at the end of this subsection.

Construction schedules and detailed plans associated with the New England Clean Power Link Project, the West Point Net Zero Project, and the West Point Transmission Project are not sufficiently advanced. The New England Clean Power Link Project could temporally overlap with the proposed CHPE Project in Lake Champlain. The Spectra-AIM Project and the West Point Transmission Project could overlap with the proposed CHPE Project in the Hudson River; the former could cross under the CHPE Project route at approximate MP 295 and the latter could overlap with it at several points over the course of an approximately 65-mile (105-km) portion of the River. A cooling project proposed as part of the West Point Net Zero Project could result in a water intake pipeline being constructed near the proposed route for the CHPE transmission line in the Hudson River. Impacts of the New England Clean Power Link, and the water intake pipeline of the West Point Net Zero Project and the West Point Transmission Project would be expected to be similar to the impacts of the proposed CHPE Project in Lake Champlain and the overlapping areas of the Hudson River (see **Sections 5.1.3** and **5.3.4**). The Spectra-AIM Project would be installed under the Hudson River in rock using HDD; therefore, it would avoid direct construction impacts on aquatic habitats and species in the Hudson River. If construction activities of the proposed CHPE Project and one of the cumulative projects overlap, then the construction-related impacts on aquatic habitats and species, such as disturbed substrates, increased turbidity, increased noise and vibration, and the potential for spills, of the projects could be greater than for just one project. Potential cumulative impacts from magnetic fields associated with the New England Clean Power Link project and the West Point Transmission Project are discussed at the end of this subsection.

The Hudson River maintenance dredging program is anticipated to occur prior to implementation of the proposed CHPE Project. Dredging activities could increase suspended solids. The highest turbidity and concentrations of suspended sediments would be restricted within a narrow plume a few hundred feet downstream of the dredge, and the bulk of suspended materials would settle out within a few hours. Based on the method of dredging planned and previous dredging activities in the North Germantown Reach area, any increased turbidity, water pollutants, or decreased levels of dissolved oxygen associated with this project would not be expected to affect fish populations permanently. This dredging project would result in the loss of the benthic population within each dredge reach; losses would be confined to the dredged reaches. However, the benthic population within these dredge reaches is adapted to frequent disturbance and the pollution associated with the surrounding urban environment. The disturbed areas would be expected to be recolonized rapidly and would likely be substantially recolonized within 1 year (USACE 2012b). The proposed CHPE Project would occur after dredging activities have been conducted along the North Germantown Reach, and would not occur directly within the navigational channel in the Hudson River. Impacts from the USACE's maintenance dredging would be limited primarily to the navigational channel and areas within a narrow plume just downstream from dredging activities. It is also anticipated that the area impacted by the dredge plume would be recovered prior to the proposed CHPE Project-related activities in this general area; therefore, no significant cumulative impacts would be expected.

The Tappan Zee Hudson River Crossing Project would be expected to have minimal impacts on aquatic biota and their habitats, and in some cases, might benefit these resources in the long-term by reducing pier areas, diminishing scouring, and reducing pollutant loadings (FHWA, NSYDOT, and NYSTA 2012). Construction- and demolition-related impacts on aquatic habitats and species would be expected from loss of habitat from dredging, pier installation, temporary change in bottom habitat, temporary increases in suspended sediment, and noise. Up to 172 acres (70 hectares) of open water benthic habitat would be dredged during three phases (between August 1 and November 1 to avoid anadromous fish spawning migrations and peak biological activity) over a 4-year period during bridge demolition and construction. Other environmental protection measures, such as using an environmental bucket with no barge overflow during dredging and armoring the channel to prevent resuspension of sediment during construction vessel movement, would also be used. Benthic recovery would be expected to begin within months of dredging activities. As mitigation for the new Tappan Zee Hudson River Crossing Project, 13 acres (5 hectares) of hard bottom/shell oyster habitat restoration and oyster reintroduction in the immediate project area, channel restoration at a secondary location in Columbia County, and enhancement of nearby wetlands would occur. In the short term, approximately 8 acres (3 hectares) of benthic habitat would be lost, though this would be offset following demolition of the existing bridge. The Tappan Zee Hudson River Crossing Project is expected to occur at the same time and in the same vicinity as the proposed CHPE Project; the projects would likely overlap for several weeks in 2014 or 2015 at approximate MP 310 as the proposed CHPE Project transmission line is installed in this area of the Hudson River. Cumulatively, these two projects would be expected to have incremental, additive impacts greater than just one project alone by disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, temporarily increasing noise and vibration and creating light sources during nighttime construction, and increasing the potential for spills. Sediment concentrations from the combined activities would fall off rapidly with distance from the disturbances and diminish after activities have ceased. Recolonization of impacted areas would begin to occur within months after activities have ceased. The proposed CHPE and Tappan Zee River Crossing projects have a limited temporal and spatial overlap for cumulative impacts on aquatic habitats and species.

Numerous existing submerged and buried cables cross over or under the proposed CHPE Project construction corridor at various points. The Applicant has identified all such known utilities and would perform an additional survey prior to construction. **Sections 3.1.2**, **3.3.2**, and **3.4.2** identify known, existing infrastructure crossings associated with each aquatic segment of the proposed CHPE Project. Where the proposed CHPE, Grand Isle Intertie, New England Clean Power Link, and West Point Transmission projects cross utilities or bedrock and cannot be buried to full depth, they would be covered with concrete mats or other protective structures that might convert the soft river bottom to a hard substrate. For the proposed CHPE Project, concrete mats would cover approximately 0.6 miles (1.0 km) and 0.6 acres (0.2 hectares) of the 101-mile (163-km) portion of the route in Lake Champlain, 1.8 miles (2.9 km) and 1.7 acres (0.7 hectares) of the 88-mile (151-km) the project route in the Hudson River, and 0.6 miles (1.0 km) and 0.6 acres (0.2 hectares) of the 6-mile (10-km) route in the Harlem River. This represents approximately 2.6 percent of the aquatic portion of the transmission line route in the Hudson and Harlem rivers and an even smaller proportion of the habitat. While specific information is not available concerning the other transmission line projects, it is reasonable to assume that a similar percentage of their underwater routes would require concrete mats.

When the concrete mats are placed in areas of fine sediment, the spaces between the individual concrete elements would be filled by suspended sediment and the surficial habitat would be partially restored. New and functional communities would be expected to recolonize these areas over time. Complete recovery times for the benthic communities vary from several months to several years depending on the community composition and severity and frequency of disturbance (Newell et al. 2004, Carter et al. 2008). Post-installation monitoring efforts for the Long Island Replacement Cable in 2010 suggested that concrete mats were not a major disturbance to benthic communities after 2 years (ESS Group 2011). Given the limited area that would be impacted, and studies showing that disturbed benthic communities will recover over time, no significant cumulative impacts would be expected from the installation of concrete mats for the proposed CHPE Project and the other proposed underwater electric transmission line projects.

Aquatic telecommunications and power cables are anthropogenic sources of magnetic field emissions, and cumulatively, the proposed CHPE Project would be an additional anthropogenic source of magnetic fields in Lake Champlain and the Hudson, Harlem, and East rivers. The Grand Isle Intertie Project would cross the proposed CHPE Project route in Lake Champlain, the New England Clean Power Link project would be parallel to the CHPE Project in Lake Champlain in Vermont, and the planned West Point Transmission Project would be in the same stretch of the Hudson River between Catskill and Haverstraw Bay as the proposed CHPE Project. If implemented, these transmission lines would be additional sources of magnetic field and heat emissions. The HTF Project is also within the Hudson River; however, magnetic field emissions dissipate over distance, so the proposed CHPE Project would not be expected to have cumulative impacts when considered with the HTF Project 4 miles (6 km) downstream from the closest point to the CHPE Project.

As discussed in **Sections 5.1.4**, **5.3.4**, and **5.4.4**, some species of demersal fish are electrosensitive (e.g., sturgeon species, lake trout, and flounder), and these species, benthic shellfish, and macroinvertebrates, could detect magnetic fields produced by the cables. There are uncertainties regarding the effects of magnetic fields on aquatic species, including those with known sensitivity to magnetic fields. As noted in **Section 5.1.4**, according to studies, the survival and reproduction of benthic organisms are not thought to be affected by long-term exposure to static magnetic fields (Normandeau et al. 2011). It is also believed that the proposed CHPE Project would have a negligible impact on demersal fish species that are sensitive to magnetic and induced electric fields (e.g., eels, salmonids, sturgeons). The West Point Transmission Project and the proposed CHPE Project would both be submerged in the Hudson River. It is anticipated that, generally, the transmission lines would be far enough away that the combined magnetic fields would not be cumulatively stronger, except in instances where the two transmission lines would cross each other. The exact planned route of the West Point Transmission Project is not known at this time.

6.1.2.5 Aquatic Protected and Sensitive Species

The designation of threatened or endangered species at the Federal or state level implies that past activities have had major adverse impacts on these species. Federally and state-listed or candidate aquatic species that could occur in the vicinity of the proposed CHPE Project include the following (refer to **Sections 3.1.5**, **3.3.5**, and **3.4.5** for information about these species, and **Sections 5.1.5**, **5.3.5**, and **5.4.5** for impacts discussions by segment):

- Lake sturgeon (*Acipenser fulvescens*), state-listed, possibly found in the Lake Champlain Segment
- Mooneye (*Hiodon tergisus*), state-listed, possibly found in the Lake Champlain Segment
- Pink heelsplitter mussel (*Potamilus alatus*), state-listed, possibly found in the Lake Champlain Segment
- Giant floater mussel (*Pyganodon grandis*), state-listed, possibly found in the Lake Champlain Segment
- Shortnose sturgeon (*Acipenser brevirostrum*), federally and state-listed as endangered, possibly found in the Hudson River and New York City Metropolitan Area segments
- Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), federally listed as endangered, possibly found in the Hudson River and New York City Metropolitan Area segments.

No impacts on turtles or marine mammals would be expected from the proposed CHPE Project, and so this project would not contribute to cumulative impacts on these species. A BA has been prepared for the proposed CHPE Project (see **Appendix Q**). The proposed CHPE Project may affect but is not likely to adversely affect shortnose sturgeon and Atlantic sturgeon. Consultation under Section 7 of the ESA between DOE and USFWS and NMFS is ongoing.

Construction schedules and detailed plans associated with the New England Clean Power Link Project and the West Point Transmission Project are not known, but these projects could overlap with the proposed CHPE Project in Lake Champlain (although it would be parallel to the CHPE Project in Vermont) and the Hudson River for approximately 100 miles (161 km) and 65 miles (105 km), respectively. Impacts from the New England Clean Power Link Project and the West Point Transmission Project would be expected to be similar to the impacts of the proposed CHPE Project in this area of the Hudson River (see **Sections 5.1.5** and **5.3.5**). If construction activities overlap, then the construction-related impacts on protected aquatic species in Lake Champlain (i.e., state-listed fish [lake sturgeon and mooneye] and mussels [pink heelsplitter and giant floater]) and in the Hudson River (i.e., federally listed shortnose sturgeon [also state-listed] and Atlantic sturgeon), such as disturbed substrate, temporary water quality degradation, sediment redeposition, increased turbidity, increased noise and vibration, and the potential for spills could increase. Potential cumulative impacts from magnetic fields associated with the New England Clean Power Link Project and West Point Transmission Project are discussed at the end of this subsection.

The Hudson River maintenance dredging program is anticipated to occur prior to implementation of the proposed CHPE Project. Based on previous dredging and studies at this site, this project would not adversely affect the shortnose sturgeon as long as seasonal restrictions are adhered to (i.e., no dredging before July 15 between Troy Dam and Castleton, no dredging before August 1 between Castleton and Coxsackie, and no dredging before August 15 between Coxsackie and Kingston). It is likely that dredging activities that adhere to such similar seasonal restrictions would minimize impacts on the Atlantic sturgeon as well (USACE 2012b). The proposed CHPE Project would occur after dredging activities have occurred along the North Germantown Reach, and the proposed CHPE Project would not occur directly within the navigational channel. Impacts from the USACE's maintenance dredging would be limited primarily to the navigational channel and areas within a narrow plume just downstream from dredging activities. It is anticipated that the area impacted by the dredge plume and the benthic community that serve as forage for both sturgeon species would recover prior to proposed CHPE Project-related activities in this general area.

The Tappan Zee Hudson River Crossing Project, analyzed together with the proposed CHPE Project, would be expected to have minimal impacts on protected aquatic biota and their habitats, and in some cases, might benefit these resources in the long term by reducing pier areas, diminishing scouring, and reducing pollutant loadings (FHWA, NSYDOT, and NYSTA 2012). Dredging, construction activities, and demolition activities have the potential to increase sediments and generate noise and acoustic vibrations that could adversely impact shortnose and Atlantic sturgeon. Dredging for the Tappan Zee Hudson River Crossing Project would occur only between August 1 and November 1 to minimize impacts on shortnose and Atlantic sturgeon, and other fish species. Other environmental protection measures, such as using an environmental bucket with no barge overflow during dredging activities and armoring the channel to prevent resuspension of sediment during construction vessel movement, would also be used for the new Tappan Zee Hudson River Crossing Project. Environmental protection measures for the construction of the bridge superstructure include pile-driving limitations with seasonal restrictions during spawning from April 1 through August 1; and comprehensive monitoring of water quality metrics, fish mortalities, benthic community recovery, shortnose and Atlantic sturgeon sonic tagging, and other parameters. The BA for the Tappan Zee Hudson River Crossing Project concluded that while the loss of habitat associated with construction of this project might affect individual shortnose and Atlantic sturgeons, it would not be expected to impact adversely the Hudson River population of either species. The Tappan Zee Hudson River Crossing Project would occur at the same time and in the same vicinity as the proposed CHPE Project; the projects would likely overlap for several weeks in 2014 or 2015 as the proposed CHPE Project transmission line is installed in this area of the Hudson River. Cumulatively, these two projects would be expected to have greater incremental, additive impacts on protected aquatic biota than just one project alone by disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, temporarily increasing noise and vibration and creating light sources during nighttime construction, and increasing the potential for spills. Sediment concentrations from the combined activities would fall off rapidly with distance from the disturbances and diminish after activities have ceased. Recolonization of impacted areas would begin to occur within months after activities have ceased.

The Spectra-AIM Project would be installed across and under the Hudson River using HDD; therefore, no additional cumulative impacts on aquatic protected and sensitive species in the Hudson River would be expected when combined with the proposed CHPE Project.

As discussed in **Sections 5.1.5**, **5.3.5**, and **5.4.5**, lake trout, mooneye (which is a pelagic, not demersal species, and so less likely to encounter magnetic fields), pink heelsplitter mussel, giant floater mussel, shortnose sturgeon and Atlantic sturgeon could be subject to non-significant impacts from magnetic fields. It is expected that the proposed CHPE Project would have a non-significant impact on protected aquatic species based on the data that are available. Other ongoing and proposed projects that would be sources of magnetic fields include the Grand Isle Intertie and New England Clean Power Link Projects in Lake Champlain, and the HTF Project and West Point Transmission Project in the Hudson River. Construction activities associated with the New England Clean Power Link Project and the HTF Project could coincide temporally with the proposed CHPE Project. The distances between the projects would be sufficient to avoid operational overlaps due to temperature and magnetic field increases. However, individuals of a migrant species (e.g., sturgeon) might encounter multiple submerged cables emitting magnetic fields along an entire migratory route. The cumulative impacts of repeated exposures on an individual could be important if enough individuals of that species were affected at a population level. Further evidence for a lack of impact on benthic communities is provided by results of shellfish monitoring studies conducted for the Neptune HVDC cable project located in Long Island Sound and New York Harbor (Ocean Surveys 2005), which found no significant impacts on shellfish beds following 15 months of operation by that HVDC cable project.

The designation of threatened or endangered at either the Federal or state level implies that past activities have significantly impacted these species. Generally, potential threats could include runoff from urban and agricultural areas, degradation of water quality, overfishing, dredging and other channel modifications, displacement by exotic and invasive aquatic species, and vessel strikes. The principal threats to the shortnose and Atlantic sturgeon are habitat degradation and loss, which could result from dams, bridge construction, channel dredging, or pollutant discharges; and mortality, which could occur from impingement on cooling water intake screens, dredging, and by catch or incidental catch in fisheries (NMFS 1998). In addition, commercial fishing has historically contributed notably to the decline of the Atlantic sturgeon (ASSRT 2007). Cumulatively, present and future activities are likely to continue to affect threatened and endangered species adversely.

6.1.2.6 Terrestrial Habitats and Species

Sections 5.2.6, **5.3.6**, and **5.4.6** contain detailed discussions of potential impacts within terrestrial portions of the proposed CHPE Project. In general, impacts on vegetation include permanent removal of vegetation, vegetation crushing, and soil compaction during construction, and impacts on wildlife include noise associated with the operation of equipment and disturbance of habitat. These impacts would be expected during installation and maintenance activities in the transmission line ROW. Most of the terrestrial route would occur within existing railroad ROWs where there is a high level of ambient noise and most vegetation is previously disturbed or successional or shrubby forest and would not fragment habitat additionally.

The Champlain Canalway Trail is planned along the proposed CHPE Project route in the northern section of the Overland Segment (between roughly MPs 112 and 135). The Champlain Canalway Trail could result in minor vegetation clearing for trails or trampling of vegetation by trail users. However, the project would also provide for vegetated buffers for wetlands and trees within the trail corridor, which would be beneficial for wildlife (CCTWG 2011). The proposed CHPE Project would occasionally disturb vegetation and wildlife in the vicinity of the Champlain Canalway Trail as a result of maintaining the ROW, which would include trimming or removing vegetation periodically or establishing low-growing vegetation with shallow root systems. Since the quality of the vegetation along the existing railroad ROWs in this segment would be generally characterized as previously disturbed or successional or scrubby forest edge, the proposed CHPE Project would be expected to have a negligible cumulative impact on the proposed segments of Champlain Canalway Trail in this area. Collocation of the trail and the proposed CHPE Project would require coordination between the project owners and appropriate state agencies to minimize impacts, such as appropriate vegetation management measures, and provide the greatest practicable benefit to trail users.

The West Point Transmission Project has a terrestrial component near the proposed CHPE Project route in the Overland Segment, and cumulatively, these projects would likely similarly affect vegetation and wildlife resources during installation activities. Construction activities associated with the West Point Transmission Project could result in wildlife avoidance or temporary disturbance and an initial reduction in the amount of habitat available to wildlife for breeding, foraging, or resting. The West Point Transmission Project's proposed Northern Converter Station would permanently displace approximately 5 acres (2 hectares) of terrestrial and wetland habitats. While areas adjacent to the Northern Converter Station could support low vegetation that supplements or complements surrounding habitats, the 5-acre (2-hectare) footprint of the converter station is unlikely to function as valuable wildlife habitat. Similarly, the installation of transmission cables in this area would occur in or immediately adjacent to existing roadways and public ROWs. Therefore, cumulative impacts on terrestrial habitats and species would be minor.

Specific high-speed rail improvements have not been identified along the proposed CHPE Project route in the Overland Segment. Future rail improvement projects for high-speed rail are unknown but could include replacing tracks and bridges or constructing new tracks. Projects such as these could require temporary or permanent removal of vegetation and could also affect wildlife by creating noise and removing habitat. Because the rail improvement projects are yet undefined, specific cumulative impacts on terrestrial habitat and species cannot be identified.

CSX plans to add 18 miles (29 km) of second track in segments between Haverstraw and Ravenna. The new track would add sidings or connect to existing second track in CSX ROW along the existing railbed. Vegetation and wildlife habitat within the railroad ROW is sparse to nonexistent (see characterization of the affected environment in **Section 3.2.6**), so the CSX track expansion would not be expected to remove much vegetation or wildlife habitat to accommodate the second track. In areas where the proposed CHPE Project and the CSX track expansion were to occur simultaneously, surrounding wildlife could experience cumulatively increased noise levels while construction activities are occurring.

The Haverstraw Water Supply Project, which is in the terrestrial portion of the Hudson River Segment at approximate MP 297, would include a terrestrial intake pumping station along the Hudson River, a water treatment plant on a 15-acre (6-hectare) site at the former Town of Haverstraw Landfill, and the installation of underground transmission and distribution mains to connect to existing mains. The Draft EIS for the Haverstraw Water Supply Project identified short-term impacts as a result of clearing vegetation during construction at the intake pumping station and water treatment plant sites. Generally, these habitats are sparsely vegetated or already disturbed and impacted by previous land uses and the developed nature of surrounding land uses; wildlife present are similar to those described in **Section 3.3.6** (NYSDEC 2012aa). The water treatment plant site of the Haverstraw Water Supply Project and the proposed CHPE Project would be adjacent and construction could overlap temporally. Cumulatively, these projects would affect similar vegetation and wildlife resources during installation activities. The habitat impacted by the proposed CHPE Project in this area is not considered high-value or unique, and HDD would be used to avoid any sensitive habitat, so it would have a negligible contribution to cumulative impacts on vegetation and wildlife.

Redevelopment of the Stony Point waterfront would occur at developed sites adjacent to the proposed CHPE Project route. Vegetation and wildlife habitat at these sites is sparse (primarily consisting of mowed lawns and scattered trees) and previously disturbed to nonexistent. This project would not be expected to remove much vegetation or wildlife habitat, and any wildlife present would be adapted to the existing disturbed environment. Therefore, this project would have little potential for cumulative impacts on terrestrial resources.

The Tappan Zee Hudson River Crossing Project, which is at MP 310 of the proposed CHPE Project, includes landings, approach spans, and ancillary facilities that would be terrestrial in Rockland and Westchester counties. The proposed CHPE Project transmission line would be underwater in this area (see cumulative analysis in **Sections 6.1.2.4** and **6.1.2.5**) and have little potential for cumulative impacts on terrestrial resources. Potential cumulative impacts on protected terrestrial species are discussed in **Section 6.1.2.7**.

Other projects planned near the site for the proposed Luyster Creek HVDC Converter Station for the proposed CHPE Project include primarily utility- and industrial-centered development and rezoning and greenway plans south of 20th Avenue. As described in **Section 3.4.6**, vegetation in the vicinities of the Luyster Creek HVDC converter station site is successional old fields or shrubland, mowed lawns with ornamental trees, and vacant lots, and wildlife is limited to species adapted to urban environments. Development activities at or near the Luyster Creek site would remove vegetation in areas that are heavily paved and characterized by urban vegetation. The habitat that would be impacted by the proposed construction of the Luyster Creek converter station is not considered high-value or unique, so limited cumulative impacts on vegetation and wildlife would be expected.

The proposed CHPE Project would involve burial of transmission lines; therefore, electric fields would not be emitted at or above the ground surface. As discussed in **Sections 5.2.6**, **5.3.6**, and **5.4.6**, there is limited available information on the effect of magnetic fields on terrestrial animals. Although animals may be able to detect magnetic and electric fields associated with high-voltage transmission lines, detection does not imply that these fields cause adverse effects. Additionally, results from available studies on long-term exposure of birds, bees, and mammals indicated that the animals did not avoid areas near high-voltage transmission lines, or show reduced ability to navigate, find food, feed, reproduce, or survive (Exponent 2009). Other ongoing and future sources of magnetic fields in the vicinity of the proposed CHPE Project could include electric trains and other electric power transmission lines. More research is required to enable greater understanding of the cumulative impacts of magnetic fields on terrestrial species over a lifetime.

6.1.2.7 Terrestrial Protected and Sensitive Species

The designation of threatened or endangered at the Federal or state level implies that past activities have had major adverse impacts on these species. Federally listed or candidate species that could occur in the vicinity of the proposed CHPE Project include the Karner blue butterfly, Indiana bat, northern long-eared bat, and New England cottontail. The federally listed small whorled pogonia, northern wild monkshood, bog turtle, piping plover, roseate tern, and red knot could occur, but are not likely to be present in, the vicinity of the proposed CHPE Project due to a lack of suitable habitats. Many state-listed plant and animal species could also occur. Additionally, migratory birds are protected under the MBTA, and bald and golden eagles are protected under the BGEPA. Refer to **Sections 3.1.7**, **3.2.7**, **3.3.7**, **3.4.7** for more detailed information about terrestrial protected species that could be affected by the proposed CHPE Project.

The proposed CHPE Project would avoid impacts on the Karner blue butterfly during construction and maintenance activities along the Overland Segment through avoidance of wild blue lupine, which is the host plant for the butterfly larvae, or from direct loss of butterflies in all life stages. The Indiana bat and northern long-eared bat could occur along the Lake Champlain, Overland, and Hudson River segments of the proposed CHPE Project. Construction noise and lighting could interfere with foraging and roosting, and vegetation clearing could also result in habitat loss. A BA has been prepared that supports the determination that the proposed CHPE Project may affect but is not likely to adversely affect the Karner blue butterfly and Indiana bat (see **Appendix Q**). Consultation under Section 7 of the ESA with USFWS is ongoing. Refer to **Sections 5.1.7**, **5.2.7**, **5.3.7**, and **5.4.7** for detailed discussions of potential impacts on terrestrial protected and sensitive species.

The greatest potential for cumulative impacts on terrestrial protected and sensitive species would be expected in the Overland Segment because that segment involves the most terrestrial activities. Four other projects are planned in the Overland Segment: the Champlain Canalway Trail, which is roughly between MPs 112 and 135 of the proposed CHPE Project; the West Point Transmission Project, which is adjacent to the proposed CHPE Project at MP 218; high-speed rail improvements; and CSX track expansion. Specific impacts on protected species associated with the Champlain Canalway Trail and the high-speed rail improvement projects have not been identified due to the preliminary nature of these projects. It is anticipated that for these projects, protected species surveys and coordination with USFWS and NYSDEC under NEPA or SEQR would occur prior to project implementation and that potential impacts on protected species would be identified and avoided or minimized. Therefore, at this time, cumulative impacts on protected species as a result of these projects cannot be specifically identified. The planned CSX track expansion would occur in the CSX ROW along existing railbed. Wild blue lupine could occur in the railroad ROW. It is not known whether wild blue lupine, and Karner blue butterflies by association, occur at any of the areas for CSX track expansion. Surveys conducted for the proposed CHPE Project did not identify wild blue lupine in the CSX ROW (see **Section 3.2.7**). However, as the proposed CHPE Project is sited to avoid impacts on the wild blue lupine, it is anticipated that there would be no cumulative impacts on this species.

The Draft EIS for the Haverstraw Water Supply Project did not identify significant adverse impacts on any protected species. Peregrine falcon, short-eared owl, bald eagle, and northern harrier, all state-protected bird species, have the potential to be affected by minor losses of habitat and human disturbance during construction of the Haverstraw Water Supply Project. The proposed CHPE Project, which would be adjacent at approximate MP 297 and possibly overlap temporally, could also affect these species as a result of vegetation clearing and noise during construction and maintenance activities. HDD would be used to avoid any sensitive habitat; therefore, impacts on these species would be expected to be negligible.

Although the timeframe for redevelopment of the Stony Point waterfront is not known, if it overlapped temporally with construction of the proposed CHPE Project it could result in similar negligible cumulative impacts as described for the Haverstraw Water Supply Project.

The Tappan Zee Hudson River Crossing Project includes landings, approach spans, and ancillary facilities that would be terrestrial in Rockland and Westchester counties. Bald eagle (state-listed and protected under BGEPA) and peregrine falcon (state-listed) have the potential to occur in the project area. There is a peregrine falcon nesting box on the existing bridge that would be relocated to the replacement bridge. Nesting is generally from February through August, and the timing of moving the nesting box would be carefully considered to encourage a successful transition. Indiana bat has a low probability of occurring, and the Tappan Zee Hudson River Crossing Project BA determined that the bridge project may affect but is not likely to adversely affect this species under the ESA. The Tappan Zee Hudson River Crossing Project would be occurring at the same time and in the same area as the proposed CHPE Project; the projects would likely overlap for several weeks in 2014 or 2015 as the proposed CHPE Project transmission line is installed in this area of the Hudson River. Cumulatively, noise from construction activities and vehicle traffic required for the two projects could result in increased disturbance to nesting, foraging or wintering birds. However, the temporal overlap of these projects' construction activities would be brief. Further, once installed the proposed CHPE Project transmission line would be fully submerged and buried within the sediments of the Hudson River; therefore, the potential for these projects to impact migratory birds and bats cumulatively is expected to be minimal.

As discussed in **Sections 5.1.7**, **5.2.7**, **5.3.7**, and **5.4.7**, there is limited information available to ascertain the effect of magnetic fields on terrestrial ecosystems. Little to no evidence exists suggesting impacts, except for some effects near very strong sources of magnetic and electric fields. The proposed CHPE Project individually would not be considered a strong source of electric fields. Other ongoing and future sources of magnetic fields in the vicinity of the proposed CHPE Project could include electric trains and other transmission lines. The scientific literature suggests that magnetic and electric fields associated with transmission lines do not result in any adverse effects on the health, behavior, or productivity of animals (Exponent 2009). While there is limited available information on the cumulative impacts of magnetic fields on terrestrial species over a lifetime, there is no evidence indicating that there are long-term life history effects.

There are seven federally listed threatened or endangered terrestrial plant or animal species and one candidate species that could occur within the vicinity of the proposed CHPE Project. Additionally, there are numerous state-protected terrestrial plant and animal species that could occur. However, lack of suitable habitat would be expected to inhibit presence of these species from occurring within and along the proposed CHPE Project corridor. As previously stated, the designation of species as threatened or endangered at either the Federal or state level implies that past activities have significantly impacted these species. Generally, potential threats could include habitat loss from urbanization and road construction, crushing of protected plants, corridor fragmentation, and noise from increasingly urban areas. Threats can also be highly species-specific. Threats to the Indiana bat vary during its annual life cycle; they range from human disturbance of or modifications to hibernacula while hibernating in winter, to loss and degradation of forest habitat used for foraging during summer (USFWS 2007). The Karner blue butterfly is adversely impacted primarily by habitat loss, specifically the loss of wild blue lupine habitat, but it can also be adversely impacted by unusually severe weather or other natural influences that stress the butterfly's larval stages or the presence of wild blue lupine (USFWS 2003). For many rare species, there are information gaps regarding some species' ecologies that hinder full understanding of how to best manage and protect for full recovery. Cumulatively, present and future activities are likely to continue to affect threatened and endangered species. The projects discussed in **Section 6.1.1** and the proposed CHPE Project would contribute to cumulative impacts by increasing noise levels and removing potential, albeit generally unsuitable, habitat for most species. As discussed in the BA (see **Appendix Q**), the proposed CHPE Project may affect, but is not likely to adversely affect, Federal threatened and endangered terrestrial species.

6.1.2.8 Wetlands

NYSDEC estimates that New York State has lost almost half of its historical wetlands due to draining and filling. In 1974, NYSDEC began collecting aerial infrared photographs of tidal areas on Long Island and along the Lower Hudson River. Emerging trends in tidal wetlands losses indicate the main cause of wetlands destruction has shifted from human-induced factors (i.e., permitted and unpermitted draining and filling) to natural causes, such as storms and flow restrictions (NYSDEC 2012bb). **Sections 5.1.8**, **5.2.8**, **5.3.8**, and **5.4.8** detail impacts on wetlands within each segment of the proposed CHPE Project. Generally, the proposed CHPE Project could affect wetlands by disturbing sediment, increasing turbidity, disrupting (i.e., disturbing or damaging) habitat, removing vegetation, and converting forested wetlands to shrub-scrub wetlands.

The Champlain Canalway Trail is planned along the proposed CHPE Project route in the northern section of the Overland Segment (between roughly MPs 112 and 135). The Champlain Canalway Trail would not be expected to have impacts on wetlands; one of the benefits of the trail identified in the Champlain Canalway Trail Action Plan was that the quality of wetland areas would be protected by providing vegetated buffers (CCTWG 2011). The proposed CHPE Project would affect wetlands (around MPs 112, 120, and 131; see **Section 5.2.8**), but there would be no net loss of wetlands in these areas. This project would have a negligible contribution to cumulative impacts on wetlands.

The West Point Transmission Project would require the unavoidable loss of approximately 3.4 acres (1.4 hectares) of wetlands due to the construction of the proposed Northern Converter Station, and temporary and localized impacts (i.e., temporary loss of wetland vegetation and the potential transport of sediment to adjacent wetland areas outside the construction corridor) to the surrounding wetland areas due to installation of the proposed DC transmission cables near the Northern Converter Station (WPP 2013). Although the proposed CHPE Project route would be within approximately 1,000 feet (305 meters) of the West Point Transmission Project's proposed Northern Converter Station at approximate MP 218, it would not affect any wetlands in this area. Therefore, no cumulative impacts would be expected on wetlands as a result of concurrent construction- and dredging-related disturbances. Additionally, the proposed CHPE Project would not be expected to result in impacts on NYSDEC tidal wetlands; therefore, there would be no cumulative impacts.

For the Hudson River maintenance dredging program, the highest turbidity would be restricted within a narrow plume a few hundred feet downstream of the dredge, and the bulk of suspended materials would settle out within a few hours within the plume. Any material that remained suspended would be carried downstream, away from wetlands on the shore, and at concentrations too low to threaten wetlands (USACE 2012b). Dredging is anticipated to be complete prior to construction activities associated with the proposed CHPE Project. For these reasons, no cumulative impacts would be expected on wetlands as a result of concurrent construction- and dredging-related disturbances.

The Haverstraw Water Supply Project would temporarily impact 0.1 acre (0.04 hectares) of wetlands and could permanently impact up to 1.9 acres (0.8 hectares) of wetland habitat (NYSDEC 2012aa). The proposed CHPE Project also is not anticipated to impact wetlands in this area. The potential permanent impacts of the Haverstraw Water Supply Project on wetlands are associated with removal of a temporary storm water management structure that was installed as part of the Post Closure Plan for the Haverstraw Landfill; however, the structure might not be removed by the time the water treatment plant is constructed on that site. Furthermore, the potential wetland in question is described as having wetland characteristics but it is not a jurisdictional wetland. Cumulatively, impacts on wetlands from both projects could result in increased turbidity, habitat disruption, and a small loss in wetlands.

The specific boundaries of the redevelopment of the Stony Point waterfront are not known; however, wetlands are present in the vicinity of the waterfront area and it is unknown if the proposed development would affect these wetlands. However, the proposed CHPE Project would not affect these wetlands, as they would be avoided through use of HDD. Therefore, no cumulative impacts on wetlands would be expected.

The Tappan Zee Hudson River Crossing Project would be occurring at the same time and in the same vicinity as the proposed CHPE Project. The Tappan Zee Hudson River Crossing Project would temporarily impact 0.15 acres (0.06 hectares) of forested wetland in Westchester County during construction activities; wetland mitigation would also occur under this project (FHWA, NSYDOT, and NYSTA 2012). The proposed CHPE Project is not anticipated to impact wetlands in this area, as the transmission line would be buried in the Hudson River in this location. No cumulative impacts on wetlands from these two projects would be anticipated.

6.1.2.9 Geology and Soils

Impacts on sediments in the Lake Champlain and Hudson River segments from the proposed CHPE Project would be expected from cable installation and dredging (see **Sections 5.1.9** and **5.3.9**). Generally, impacts would include disturbed and suspended sediments. The Tappan Zee Hudson River Crossing Project would; and the Spectra-AIM, West Point Transmission, and West Point Net Zero projects could, also be occurring at the same time and in the vicinity as the proposed CHPE Project. The Grand Isle Intertie Project would cross the proposed CHPE Project but would be installed after the CHPE Project transmission line is already in place. The construction timeframe for the New England Clean Power Link Project is not known, and it would be located parallel to the proposed CHPE Project in the Vermont portion of Lake Champlain. If construction were to overlap, these projects would be expected to have incremental, additive impacts greater than just one project alone by disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, temporarily increasing noise and vibration and creating light sources during nighttime construction, and increasing the potential for spills. Sediment concentrations from the combined activities would fall off rapidly with distance from the disturbances and diminish after activities have ceased.

The geology and soils of the road and railroad ROWs in the Overland Segment and other terrestrial segments have been modified, to varying degrees, by previous activities. The CSX Track Expansion, the Haverstraw Water Supply Project, and redevelopment of the Stony Point waterfront are planned adjacent to small area of the proposed CHPE Project route. Implementation of erosion- and sediment-control BMPs (i.e., Applicant-proposed measures for the proposed CHPE Project) would be expected to limit the potential for localized, cumulative impacts.

The Luyster Creek HVDC Converter Station site has a history of heavy industrial use, and soils have been extensively modified to support development. If other construction projects, such as the ConEd Learning Center and the Luyster Creek Energy Project, were to occur concurrently with the proposed CHPE Project, then cumulative impacts on soil resources, such as increased sedimentation and erosion, could occur. Implementation of erosion- and sediment-control BMPs would be expected to limit the potential for localized, cumulative impacts.

6.1.2.10 Cultural Resources

Potentially major, permanent cumulative impacts on archaeological resources have likely occurred from destruction or disturbance of archaeological and architectural resources from past actions. Development activities have occurred, many before the cultural or historical significance of various resources was realized. As discussed in **Sections 5.1.10**, **5.2.10**, **5.3.10**, and **5.4.10**, the proposed CHPE Project could have adverse effects under 36 CFR Part 800 on cultural resources along the aquatic and terrestrial transmission routes. A PA (see **Appendix T**) has been developed to avoid and minimize impacts on cultural resources and consultations between the Applicant, DOE, and the SHPO are continuing.

The Hudson River maintenance dredging project (near MP 230 of the proposed CHPE Project) would occur in previously dredged areas, so it is unlikely that this project would disturb any cultural resources (USACE 2012b). The redevelopment of the Stony Point waterfront (near MP 296) and the Haverstraw Water Supply Project (near MPs 297 and 298 of the proposed CHPE Project) would not be expected to affect cultural resources, though subsurface testing for archaeological resources prior to construction is required (NYSDEC 2012aa). The proposed Northern Converter Station (near MP 218) and associated transmission cable route for the West Point Transmission Project has the potential to impact archaeological resources, and a Phase IB has been recommended for the area (WPP 2013). If submerged resources are encountered during dredging or bridge construction associated with the Tappan Zee Hudson River Crossing Project (near MP 310 of the proposed CHPE Project), then consultation in accordance with that project's signed Memorandum of Agreement would occur (FHWA, NSYDOT, and NYSTA

2012). Thirty-three submerged targets that generated signatures that were suggestive of submerged cultural resources were recommended for avoidance by the West Point Transmission Project route; however, for those targets that cannot be avoided, additional underwater archeological investigations to positively identify the source of the remote sensing signatures would be conducted (WPP 2013). Cultural resources surveys and impact assessments are not available for the other projects identified in **Section 6.1.1**, so potential impacts on cultural resources for those projects are not known. If ground-disturbing or other construction activities from the proposed CHPE Project and other projects resulted in the loss of or damage to archaeological resources, disturbed the context of archaeological resources, or affected an NRHP-eligible architectural resource, this could be an adverse cumulative impact on cultural resources. Additional cultural resources survey work would be required to identify all potentially affected archaeological and architectural resources.

The Tappan Zee Hudson River Crossing Project would also result in the removal of the current Tappan Zee Bridge, which is an NRHP-listed architectural resource; this resource would also be affected by the proposed CHPE Project, as identified in **Table 3.3.10-1**. A Memorandum of Agreement was signed for the Tappan Zee Hudson River Crossing Project with consulting parties establishing mitigation, including preparing Historic American Engineering Record documentation for the bridge, producing educational materials, and possibly including interpretive signage (FHWA, NSYDOT, and NYSTA 2012). Since the bridge is being demolished under a separate project, the proposed CHPE Project would contribute negligibly to cumulative impacts on the Tappan Zee Bridge.

6.1.2.11 Visual Resources

As discussed in **Sections 5.1.11**, **5.2.11**, **5.3.11**, and **5.4.11**, construction associated with the proposed transmission cables would result in visual impacts. The presence of heavy equipment and the removal of vegetation along terrestrial portions would be temporary, except in a few cases where the ROW would remain cleared. The Tappan Zee Hudson River Crossing Project would, and redevelopment of the Stony Point waterfront and the West Point Transmission Project could, also be occurring at the same time and in the same vicinity as the proposed CHPE Project and could contribute cumulatively to impacts on visual resources due to the presence of heavy equipment. HDD would be used in visually sensitive areas along the proposed CHPE Project route (e.g., Stony Point Battlefield State Park, Hook Mountain State Park, and Rockland Lake State Park) to allow installation of the transmission line without disturbing surface features. The construction of cooling stations are planned at intervals along the proposed CHPE transmission route. A cooling station is planned at MP 112, which is in the vicinity of the planned terminus of the Champlain Canalway Trail. Given the size (128 square feet [12 square meters], 8 feet [2.4 meters] tall) of the cooling station and the developed nature of the viewshed, the cooling station would have limited cumulative visual impacts on the Champlain Canalway Trail.

The Luyster Creek HVDC Converter Station would be visible from some vantage points. As discussed in **Section 5.4.11**, the area surrounding the converter station site at Luyster Creek is already industrial in nature. Recent and planned development around the Luyster Creek site includes the new Astoria Annex Substation, the ConEd Learning Center, and the Luyster Creek Energy Project. Future projects in the immediate vicinity would be consistent with utility and industrial uses. The proposed Queens East River and North Shore Greenway along 20th Avenue are south of this area. If the Queens East River and North Shore Greenway projects are implemented, more pedestrians and bicyclists could travel along 20th Avenue, but it is not anticipated that the Luyster Creek Converter Station or other planned utility projects in that area would be visually intrusive. Considering the past, present, and future use of this area for utility and industrial purposes, and that the planned projects would be consistent with these purposes, the Luyster Creek Converter Station would have a negligible contribution to cumulative impacts on visual resources.

6.1.2.12 Infrastructure

The analyses in **Sections 5.1.12**, **5.2.12**, **5.3.12**, and **5.4.12** identify mostly negligible impacts on existing communications, natural gas, liquid fuel, sanitary sewer and wastewater, and solid waste management, and no other projects have been identified to date that would be expected to result in cumulative impacts on these infrastructure systems.

The Haverstraw Water Supply Project would be adjacent to the proposed CHPE Project at MP 297. It is anticipated that these projects could overlap temporally. Operations associated with the Haverstraw Water Supply Project could begin as early as 2015. The water intake site would be in the Hudson River in the vicinity of the U.S. Gypsum Company (NYSDEC 2012aa), which is along a portion of the proposed CHPE Project route that is terrestrial. Therefore, the proposed CHPE Project would not affect the water intake in the Hudson River. No cumulative impacts on water supply systems would be expected.

Energy policies are putting increasing pressure on energy conservation and providing reliable, clean, and renewable sources of energy. NYISO monitors and tracks the implementation of individual planned electric generation and transmission projects, the cumulative effect of new environmental regulations, and the accuracy of the electric load growth forecasts. Federal and state environmental regulations could result in older, more emissive power plants closing because the cost to upgrade or retrofit is too great (NYISO 2011b). The Indian Point Nuclear Power Plant is also facing closure over the next few years if it is not relicensed (NYISO 2011a). The proposed CHPE Project would supply 1,000 MW at full capacity (see **Tables 6.1.1-1** and **6.1.1-2**), serving approximately 3 percent of the New York State peak load (i.e., which was 32,712 MW in 2011) (NYISO 2011c). In light of ongoing potential changes in the New York State electric power market, the proposed CHPE Project would be only one of many projects (including the West Point Transmission and Grand Isle Intertie projects described in **Section 6.1.1**) that could be implemented in the next few years to provide electricity. The proposed CHPE Project would be expected to contribute to cumulative increases in electrical capacity, efficiency, and reliability and decreases in transmission congestion in the NYCA, particularly in the New York City metropolitan area. The New England Clean Power Link could also be implemented in the next few years; however, it would provide electricity to Vermont and the ISO-NE-managed electricity market. Therefore, it would not contribute to cumulative impacts on the New York State electric power market. The West Point Net Zero Project proposes various projects that could reduce energy demand and increase energy generation at U.S. Army Garrison West Point, which could negligibly affect the New York State market.

6.1.2.13 Recreation

As discussed in **Sections 5.1.13**, **5.2.13**, **5.3.13**, and **5.4.13**, implementation of the proposed CHPE Project could result in temporary impacts due to potential reduction of traffic lanes accessing terrestrial recreational areas during construction of the terrestrial transmission cables and the cooling stations. Other projects are planned along the terrestrial portion of the proposed CHPE Project route, such as the Champlain Canalway Trail and the CSX Track Expansion in the Overland Segment, and redevelopment of the Stony Point waterfront and the Haverstraw Water Supply Project in the Hudson River Segment. Redevelopment of the Stony Point waterfront could result in the removal of existing marinas; however, a new marina and yacht clubs are proposed to be constructed. The proposed CHPE Project would not result in impacts on recreational resources in this area and, therefore, no cumulative impacts would be expected. The Draft EIS for the Haverstraw Water Supply Project identified no impacts on recreational resources (NYSDEC 2012aa) and the CSX Track Expansion would occur entirely within the CSX ROW, and so these projects would not be expected to contribute to cumulative impacts on recreational resources. It was suggested during scoping that a portion of the planned Champlain Canalway Trail be collocated with the proposed CHPE Project (roughly MPs 113 to 117). The collocation of these two projects would have long-term, beneficial, cumulative effects on recreational resources by completing and maintaining this portion of the planned Champlain Canalway Trail. The Applicant would consider accommodating the trail at the time of the final engineering design.

The proposed CHPE Project could have temporary impacts on boaters and water recreation during installation of the aquatic transmission line and occasional maintenance or emergency repairs. Limited closures in the immediate areas surrounding active transmission line installation activities could affect recreational watercraft users in Lake Champlain and the Hudson, Harlem, and East rivers, but watercraft would be able to maneuver around closed areas. These kinds of closures would be temporary. Construction activities associated with the New England Clean Power Link Project would be unlikely to, but could, overlap with the proposed CHPE Project in Lake Champlain, the Spectra-AIM Project and the West Point Transmission Project could overlap with the CHPE Project in the Hudson River, and the Tappan Zee Hudson River Crossing Project would overlap with the CHPE Project for up to 2 weeks in 2014 or 2015, depending on actual project schedule overlap. A water intake pipeline proposed as part of a cooling project in the West Point Net Zero Project could occur near the proposed route for the CHPE transmission line in the Hudson River. Multiple aquatic construction activities would cumulatively increase vessel activity and closures in the immediate vicinities around construction activities.

Future projects in the immediate vicinity of the Luyster Creek HVDC Converter Station would be consistent with utility and industrial uses. The proposed Queens East River and North Shore Greenway include 20th Avenue south of this area. If the Queens East River and North Shore Greenway project were implemented, more pedestrians and bicyclists could travel along 20th Avenue, but it is not anticipated that the proposed Luyster Creek Converter Station or other planned utility projects in that area would impact recreation opportunities. Additionally, proposed construction along the Astoria-Rainey interconnection route of the proposed CHPE Project would have negligible impacts on recreation. Although noise from construction could result in temporary reduction in use of areas within the Astoria or Rainey parks, the noise would occur only during an up to 2-week period at any given location during construction activities and full access to the parks would be maintained. Considering the past, present, and future use of this area for utility and industrial purposes, and that the planned projects would be consistent with these purposes, the converter station would have a negligible contribution to cumulative impacts on recreation.

6.1.2.14 Public Health and Safety

Refer to **Sections 5.1.14**, **5.2.14**, **5.3.14**, and **5.4.14** for detailed discussions of the impacts of the proposed CHPE Project on public health and safety.

The Rockland County Planning Department is establishing Quiet Zones at 21 grade crossings starting in the Village of Haverstraw and ending at the New York-New Jersey border. This project coincides with the proposed CHPE Project along the railroad ROW in West Haverstraw just south of MP 298 at Railroad Avenue to approximate MP 301, though Quiet Zone construction, which includes railroad signal upgrades, is anticipated to be complete prior to the proposed CHPE Project. A 2008 GAO Congressional Address suggested that there is a potential risk associated with the use of HVDC lines because magnetic and electric fields and stray currents could interfere with railroad signaling systems and operations (CHPEI 2012ll). Although the 2008 GAO report did not conclusively identify adverse impacts from magnetic fields associated with the transmission line interfering with signaling systems, the potential exists for interference. In established Quiet Zones, this could be a compounded safety risk because train horns will not sound upon approach, which places a greater need on properly working signals to ensure at-grade crossings are safe. The proposed CHPE Project would be buried and offset from active rail lines by at least 10 feet (3 meters), which would minimize possible interference of magnetic fields with signaling systems.

The Tappan Zee Hudson River Crossing Project and the Haverstraw Water Supply Project are anticipated to overlap in construction timeframes with the proposed CHPE Project, while the redevelopment of the

Stony Point waterfront could overlap in construction timeframe. The Luyster Creek HVDC Converter Station could overlap in construction timeframes with the ConEd Learning Center and the Luyster Creek Energy Project at the Astoria Generation Station. Construction activities occurring at the same time and in the same vicinity could have temporary cumulative impacts by increasing local construction traffic accessing sites and creating highly noisy environs that could mask verbal or mechanical warning signals. Installation of the terrestrial portion of the proposed CHPE Project would affect only small areas for short intervals, and then it would progress to the next segment of installation. Construction of the Luyster Creek HVDC Converter Station, the ConEd Learning Center, and the Luyster Creek Energy Project could overlap by several months, but this would depend on when each project is actually implemented. It is anticipated that per standard construction safety practices, construction sites for all projects would be secured, so construction activities would not have a cumulative impact on public health and safety.

The following discussion of cumulative impacts on public health and safety focuses primarily on magnetic fields (versus electric fields) because some epidemiological studies have suggested that there are adverse health risks associated with exposure to certain levels of magnetic fields and only negligible electric fields would be associated with the proposed CHPE Project. However, there are no consistent findings regarding the safety of magnetic fields, and the limited evidence suggesting a link between magnetic field exposure and increased health risk is inconclusive (NIEHS 2002). Some of the studies on possible health risks associated with magnetic fields are discussed in **Section 3.1.14**. The presence of more than one magnetic field would be expected to generate a larger resultant magnetic field. The relationship of multiple magnetic fields in one area is such that one magnetic field only has to be a little larger than another magnetic field, and the resultant field will be closer in magnitude to the largest magnetic field (National Grid 2013). The proposed CHPE Project transmission line would be DC, which has a static magnetic field compared to AC, between the Canada/U.S. border to the Luyster Creek HVDC Converter Station in Astoria. From the converter station to the Astoria Annex Substation to the Rainey Interconnection, the proposed CHPE Project transmission line would be AC. Nearly all the proposed CHPE Project transmission cables would be underground, further reducing any potential impacts.

Other ongoing or planned energy projects in the vicinity of the proposed CHPE Project that would generate magnetic and electric fields include the New England Clean Power Link Project, which would be parallel to the proposed CHPE Project in Lake Champlain in Vermont, the West Point Transmission Project, which would be submerged in the Hudson River in the proposed CHPE Project vicinity, and the Astoria Annex Substation, Astoria Energy Project, and Luyster Creek Energy Project near the Luyster Creek HVDC Converter Station site. Specific estimates of magnetic and electric fields are not known for these other projects and facilities. Like the proposed CHPE Project in this area of the Hudson River, it is anticipated that the West Point Transmission Project cables would be buried to a depth of at least 6 feet (1.8 meters), magnetic fields would be static and the cables close together to reduce the magnetic field strength, and electric fields would be insubstantial due to cable sheathing and insulation, which reduces magnetic and electric field emissions (SBOC 2007). In general, the strongest magnetic and electric fields around the outside of a substation are from power lines entering and leaving the substation; beyond the substation fence or wall, the magnetic field produced by the substation equipment is usually indistinguishable from background levels (NIEHS 2002). The proposed CHPE Project's HVAC 345-kV transmission line to be located in the streets of Astoria was calculated to generate an approximate 182 mG magnetic field directly above the centerline (at 3.3 feet [1.0 meter] above ground) and 4.6 mG at 50 feet (15 meters) from the centerline at the same height (CHPEI 2012pp). Though the proposed CHPE Project would not generate magnetic field emissions above the 200 mG standard at the edge of the ROW as set in the NYSPSC interim standard, the CHPE Project could contribute to emissions greater than 200 mG within the ROW where the proposed HVAC transmission line crosses other electric utility lines. Other sources of magnetic fields in outdoor urban areas include existing power lines and streetlights. People are exposed to numerous sources of magnetic fields on a daily basis from sources like power lines, but also from electric devices in home and office environments. The research available on the health impacts of magnetic field exposure are not definitive. Some research focuses on the average magnetic field strength, while other research focuses on peak exposure or time of exposure (NIEHS 2002). The proposed CHPE Project would be a source of magnetic fields; therefore, it would contribute to cumulative magnetic fields where multiple sources occur. However, there is no evidence to support a conclusion that there were would be any adverse health impacts associated with the expected levels of magnetic fields associated with the proposed CHPE Project.

During scoping for the EIS, several commenters expressed safety concerns about the proposed CHPE Project transmission cables in the event that they would be inadvertently struck during an excavation for installation of new infrastructure or maintenance of existing infrastructure. Numerous submerged and buried cables, pipelines, and other utilities exist within the proposed CHPE Project route. The Applicant has identified all such known utilities and would perform an additional detailed survey prior to construction; **Sections 3.1.12**, **3.2.12**, **3.3.12**, and **3.4.12** identify known, existing infrastructure crossings associated with each segment of the proposed CHPE transmission line. The planned West Point Transmission Project, if implemented, would be an additional transmission line in the Hudson River. The Applicant would engineer, construct, and install the proposed CHPE Project so as to make it fully compatible with the continued operation and maintenance of collocated infrastructure (e.g., aboveground, below ground, and submerged electric, gas, telecommunications, water, wastewater, sewer, and steam infrastructure and appurtenant facilities and associated equipment); and affected railroads and railways, highways, roads, streets, and avenues. Some routing changes have already been incorporated into the proposed CHPE Project to avoid major utilities and infrastructure. Once installed, the proposed CHPE Project transmission line would be primarily within existing ROWs and marked and identified in the "Call Before You Dig" database and nautical charts. In the event that a transmission cable is inadvertently breached by external equipment, the cable protection equipment is designed to shut down operation to protect life and equipment (TDI 2012a). Cumulative impacts on safety due to the coexistence of the CHPE transmission system and other utilities are not expected.

6.1.2.15 Hazardous Materials and Wastes

Refer to **Sections 5.1.15**, **5.2.15**, **5.3.15**, and **5.4.15** for a detailed discussion of proposed CHPE Project impacts from hazardous materials and wastes. Implementation of the proposed CHPE Project would require the storage and use of hazardous materials and wastes during construction activities, the storage and use of refrigerants for the cooling stations along terrestrial portions of the proposed CHPE Project route, and the storage and use of other hazardous materials and petroleum products at the Luyster Creek HVDC Converter Station.

Past development activities and land uses have resulted in varying degrees of environmental contamination in areas along the proposed CHPE Project route, including known areas of contamination in Lake Champlain, the Hudson River, the Harlem River, and the East River. The Hudson River maintenance dredging project and the Tappan Zee Hudson River Crossing Project would occur near aquatic portions of the proposed CHPE Project. The Hudson River maintenance project would not be expected to have any effects on hazardous materials or wastes because all pollutants of concern are below the USEPA and NYSDEC regulatory limits (USACE 2012b). Subsurface investigations would occur for previously unsurveyed areas of the Tappan Zee Hudson River Crossing Project, and remediation would be implemented, if necessary. All other storage and handling of hazardous materials and petroleum projects for the Tappan Zee Bridge project would be in accordance with all applicable regulations (FHWA, NYSDOT, and NYSTA 2012). Cumulatively, the storage and use of hazardous materials and petroleum products would be negligible because each project would transport, store, use, and dispose of these materials according to applicable regulations, which would minimize the potential for spills and contamination. If contamination were encountered during sampling for these projects, then the necessary evaluation and characterization would occur; the cumulative impacts of this could be beneficial if the areas are remediated.

There are several areas along the proposed CHPE Project terrestrial route of known or suspected contamination that are also near projects considered in this cumulative impacts analysis. As discussed in **Section 3.2.15**, while no specific areas of contamination are known along the railroad ROWs, the use of the area for rail and industrial applications make contamination possible. The CSX Track Expansion occurs within the CSX ROW and portions of the proposed CHPE Project could occur in the same areas of the CSX ROW between Ravenna and Haverstraw. If contamination were encountered during sampling for either project, then the necessary evaluation and characterization would occur; the cumulative impacts of this could be beneficial if the areas are remediated.

The Haverstraw Water Supply Project would also be adjacent to the proposed CHPE Project, and these projects would be near the closed Haverstraw Landfill and the Temco Uniform Factory, a NYSDEC Class 2 Inactive Hazardous Waste Site. The Draft EIS for the Haverstraw Water Supply Project identified the potential to encounter subsurface contamination in the project vicinity. This project would require that some of the fill material placed during closure of the Haverstraw Landfill be replaced. Buildings and structures for the water treatment plant would incorporate safeguards to ensure contaminants do not enter the building, and also that chemicals and petroleum products are stored and used properly (NYSDEC 2012aa). Both the Haverstraw Water Supply Project and the proposed CHPE Project would require the storage and use of hazardous materials and petroleum products during construction and minimal use during operations and maintenance, though cumulative impacts would not be expected since all materials would be transported, handled, stored, and disposed of according to regulations. If contamination is encountered during sampling for these projects, then the necessary evaluation and characterization would occur; the cumulative impacts of this could be beneficial if the areas are remediated.

The converter station site at Luyster Creek and surrounding areas in Astoria are intensely developed, and past land industrial uses have resulted in some environmental contamination. There are many other redevelopments occurring in the Astoria area. It is anticipated that all hazardous materials and wastes during construction and operational activities would be handled, stored, transported, and disposed of in accordance with applicable regulations, and all such materials would be confined to the construction site or within the converter station or cooling station (except when in transport). Therefore, the storage and use of hazardous materials and petroleum products for multiple projects would not pose an unacceptable, cumulative risk. It is also anticipated that if contamination is encountered during sampling prior to groundbreaking activities, then the area would be evaluated, characterized, and remediated as appropriate. If contamination were encountered during sampling for any of these projects, then the cumulative impacts of this could be beneficial if the areas are remediated.

6.1.2.16 Air Quality

As discussed in **Sections 5.1.16**, **5.2.16**, **5.3.16**, and **5.4.16**, proposed CHPE Project construction activities would generate criteria pollutant emissions; these emissions would be localized to the area of the proposed CHPE Project route that is under construction. Other projects have been identified along the whole of the proposed CHPE Project route that would be expected to coincide temporally, including CSX Track Expansion, the Tappan Zee Hudson River Crossing Project, the Haverstraw Water Supply Project, and several projects around the Luyster Creek HVDC Converter Station Site. The construction timeframe of the redevelopment of the Stony Point waterfront is not known. Emissions estimates are not available for the CSX Track Expansion or the redevelopment of the Stony Point waterfront. Construction of the Tappan Zee Hudson River Crossing and the Haverstraw Water Supply Project would respectively take approximately 5 years and 3 years (FHWA, NYSDOT, and NYSTA 2012; NYSDEC 2012aa). Each project would involve ground-disturbing activities, use of onsite diesel equipment, supply and haul-away trucks, and construction workers accessing the sites. Air emissions impacts associated with these two projects would be limited to their construction timeframes and activities. The proposed CHPE Project's construction activities are anticipated to move along the route quickly (i.e., installing approximately

1.5 miles [2.4 km] of cable per day in the aquatic sections, and 0.5 miles [0.8 km] per day in the terrestrial sections) and would result in low air emissions for the duration of construction. Therefore, the proposed CHPE Project would be expected to contribute negligibly to cumulative impacts on air quality during construction activities when combined with other construction activities in the same areas.

One of the objectives in the 2009 New York State Energy Plan is to reduce GHG emissions (NYSEPB 2009). In addition to increased policy and regulations concerning reductions in GHG emissions, environmental policy and regulations are moving towards cleaner energy. Air quality regulations currently impacting New York State energy generators include RACT for NO_x; BART for SO_2, NO_x, and PM; and MACT for HAPs. One water quality regulation—BTA for Cooling Water Intake Structures—is also in effect that will impact energy generators (NYISO 2011b). As these regulations are mandated over the next few years, many generating plants not meeting these standards will be forced to upgrade equipment or retire affected generating units earlier than planned. All of these factors could impact the energy generation market over the next few years. As shown in **Table 6.1.1-1**, several proposed energy generation projects in the cumulative impacts ROI are renewable energy or energy storage projects, such as wind and hydroelectric; these projects currently account for approximately 260 MW of capacity in the NYISO interconnection queue. Proposed fossil-fueled plants, which would be newer, cleaner plants than those currently operating, account for approximately 4,870 MW summer capacity (5,230 MW winter capacity) in the cumulative impacts ROI (NYISO 2013). The NYISO interconnection queue is a dynamic list, so these estimates are only a snapshot in time and will change as projects are removed from the queue and others are added. Upgrades in electrical transmission would increase the viability of wind energy as an important source of clean, renewable energy in the long term, though the necessary upgrades to make this happen would not likely occur within the next few years. Proposed HVDC transmission projects, such as the HTF Project, West Point Transmission Project, and the proposed CHPE Project, will also make importing energy into New York City from interstate or Canadian sources more feasible.

The proposed CHPE Project is intended to reduce criteria pollutant and GHG emissions by alleviating the need to operate older, more emissive fossil-fueled power plants (see **Section 1.4**). New York State currently derives approximately 21 percent of its electricity generation needs from renewable resources, most of which (19.2 percent) comes from hydroelectric power, and the majority of the remaining generation is fossil-fuel based. NYSDPS predicted that the proposed CHPE Project would reduce annual emissions of CO_2 by approximately 1.5 million tons, SO_2 by 751 tons, and NO_x by 641 tons (NYSDPS 2012b). A study completed for the Applicant by LEI estimated that the proposed CHPE Project would result in annual emissions reductions of approximately 130 tons of SO_2, 560 tons of NO_x, and 3.5 million tons of CO_2 (LEI 2011, Frayer 2012). As older, more emissive fossil-fueled sources of power generation are retired, the proposed CHPE Project would be expected to have long-term, beneficial, cumulative impacts on air quality, particularly in the New York City area where there are many fossil-fueled generating units and high-energy demand.

6.1.2.17 Noise

As discussed in **Sections 5.1.17**, **5.2.17**, **5.3.17**, and **5.4.17**, the proposed CHPE Project would not be expected to have noticeable long-term impacts on the noise environment. Construction activities could produce elevated noise levels as construction and installation activities move along the project route. Construction activities, such as the West Point Transmission Project and redevelopment of the Stony Point waterfront (if they coincide with the proposed CHPE Project), Haverstraw Water Supply Project, and the Tappan Zee Hudson River Crossing Project, that are occurring at the same time and in the same vicinity as the proposed CHPE Project would generate more noise than one project alone and could have temporary cumulative impacts on the noise environment. These cumulative impacts would last only for several days at a time until construction associated with the proposed CHPE Project moves along the route.

6.1.2.18 Socioeconomics

The socioeconomic impacts of the proposed CHPE Project are discussed in **Sections 5.1.18**, **5.2.18**, **5.3.18**, and **5.4.18**. The proposed CHPE Project would result in beneficial socioeconomic effects including potential energy savings, tax revenue, and creation of jobs. However, the counties in the New York Metropolitan Area Segment are also the most populous (approximately 8.5 million people), so these beneficial effects would be less intense. NYSDPS has estimated that the total electricity savings from the proposed CHPE Project could be $654 million in 2018, which was the test year modeled (CHPEI 2012rr). Most of these savings would be within the New York City Metropolitan Area Segment (i.e., Bronx, New York, Queens, and Westchester counties). As previously described, other generation and transmission projects are planned or underway that would provide new sources of electricity (see **Tables 6.1.1-1** and **6.1.1-2**) and socioeconomic benefits for the area. The combined potential for energy savings from the projects that are planned or underway would be expected to provide long-term, cumulative socioeconomic benefits in the area. The proposed CHPE Project would create an estimated 300 construction jobs, and approximately 26 full-time equivalent jobs during project operations. Additional indirect and induced jobs would be associated with supplying materials and providing other services for construction of the proposed CHPE Project. When weighed against the area's large population, the number of jobs created by the proposed CHPE Project would be considered relatively few. Further, when combined with the numbers of direct, indirect, and induced jobs created by the other projects in the area, the expected cumulative benefit would be negligible. It cannot be known how many of these additional jobs would be filled by people living in the cumulative impacts ROI versus living outside the ROI or even New York State.

6.1.2.19 Environmental Justice

The analyses in **Sections 5.1.19**, **5.2.19**, **5.3.19**, and **5.4.19** did not identify any disproportionately high or adverse effects on minority or low-income populations along the proposed CHPE Project route. Therefore, the proposed CHPE Project would not contribute to adverse cumulative environmental justice impacts.

6.2 Adverse Environmental Effects That Cannot Be Avoided

Unavoidable adverse impacts would result from implementation of the proposed CHPE Project. Unavoidable adverse impacts during construction activities include increases in water turbidity; disturbance and resuspension of sediments; noise and vibrations from bedrock blasting; vegetation clearing; localized habitat degradation; soil disturbance and erosion; storm water runoff into surface water; and increased traffic, air emissions, and noise. Maintenance activities and emergency repairs along the proposed CHPE Project route, once the transmission line is operational, could generate unavoidable adverse impacts similar to those occurring during construction, although these would be confined to the immediate area of disturbance. Adverse impacts would be minimized with implementation of the Applicant-proposed measures as part of the proposed CHPE Project and described in **Appendix G**. Magnetic fields from transmission cables are also unavoidable, though there are no definitive conclusions as to whether these are adverse impacts on human health and safety and on wildlife. Further details of these impacts are discussed in **Section 6.1.2** and in **Chapter 5**.

6.3 Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term uses of the biophysical components of the human environment include impacts, usually related to construction activities, which occur over a period of less than 5 years. Long-term uses of the human environment include those impacts that occur over a period of more than 5 years, including permanent resource loss.

Chapter 5 identifies potential short-term, adverse impacts on the natural environment as a result of construction activities. These adverse impacts include increases in water turbidity; disturbance and resuspension of sediments; vegetation clearing; localized wildlife habitat degradation; soil disturbance and erosion; storm water runoff into surface water; and increased traffic, air emissions, and noise. These kinds of short-term impacts would persist only during construction activities in localized sections, occasional maintenance activities (e.g., vegetation management) in terrestrial sections, or emergency repair activities. Generally, disturbed areas would recover once ground-disturbing activities, noise, and construction vehicles leave the area. Adverse impacts would be minimized as a result of Applicant-proposed measures (see **Appendix G**).

Long-term impacts of the proposed CHPE Project include impacts on local geology that could alter drainage patterns due to localized blasting of bedrock, potentially altering lacustrine and riverine substrate and habitat with rip-rap or concrete mats, conversion of forested wetlands to scrub-shrub wetlands, noise from cooling stations, increases in sediment and water temperature, and magnetic fields from the transmission cables.

The proposed CHPE Project would be expected to have long-term productivity by importing energy into the New York City metropolitan area without increasing transmission congestion, applying downward pressure on electricity prices, and replacing more emissive fossil-fueled sources of energy.

6.4 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable commitments of resources refer to impacts on or losses of resources that cannot be reversed or recovered, even after an activity has ended. Irreversible commitment applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those resources that are renewable only over long time spans, such as soil productivity. Irretrievable commitment applies to the loss of production, harvest, or natural resources. This section discusses irreversible and irretrievable commitments of resources as result of implementing the proposed CHPE Project.

Implementation of the proposed CHPE Project would result in the irreversible and irretrievable commitments of resources; these impacts are permanent.

Protected Species. Activities involving heavy machinery, which could include construction, maintenance, or emergency repairs, in terrestrial portions of the proposed CHPE Project route could result in the direct mortality of species individuals. Most mobile species would be expected to avoid areas undergoing ground-disturbing activities. Along aquatic portions of the proposed CHPE Project, the mortality of benthic infaunal organisms during construction could have indirect impacts on protected species because these are the prey for lake sturgeon, shortnose sturgeon, and Atlantic sturgeon. Along terrestrial portions of the proposed CHPE Project, construction would be avoided within Karner blue butterfly habitat to minimize the potential for species mortality. The loss of an individual of a protected species would be adverse, but it would not be expected to have irreversible or irretrievable impacts on the species as a whole.

In some limited areas, the Applicant has proposed that the transmission cables be covered with artificial substrates (e.g., riprap or articulated concrete mats), which could impact the habitat used by prey species for lake sturgeon, shortnose sturgeon, and Atlantic sturgeon by placing hard substrate (e.g., riprap or concrete mats) on top of soft substrate. However, many areas where riprap or concrete mats would be used would be in areas of bedrock or hard substrate where the cable cannot be buried; thus, the change in habitat in these areas would be negligible (i.e., hard substrate placed on hard substrate). These affected habitat areas would be very small areas as compared to the area of overall habitat, but this would be considered a permanent conversion of soft substrate to hard substrate. Sturgeon would be able to use adjacent areas for foraging.

A BA has been prepared for the proposed CHPE Project (see **Appendix Q**). Consultation under Section 7 of the ESA between DOE and USFWS and NMFS is ongoing.

Wetlands Habitat. Some areas of forested wetland would be permanently converted to scrub-shrub wetland, which is generally of lower value than forested wetland, during installation of the transmission line and then maintained as scrub-shrub during operation of the transmission line. This would be considered an irreversible and irretrievable impact.

Geology. Bedrock blasting, which would be required in some areas along the proposed CHPE Project route to install and protect the transmission cables, would affect local geology through modification of the surface layer of the bedrock. This is a long-term, minor, adverse impact, and an irreversible and irretrievable commitment of those resources. However, impacts would be isolated only to those areas requiring blasting and would not represent significant commitments of geological resources.

Materials. Material resources irretrievably used for the proposed CHPE Project would include copper, lead, steel, concrete, bitumen, and other materials. These materials are not in such short supply that implementation of the CHPE Project would limit other unrelated construction activities. The irretrievable use of material resources would not be considered significant.

Energy. Energy resources used for the proposed CHPE Project would be irretrievably lost. During construction, gasoline and diesel fuel would be used for the operation of boats, train engines, vehicles, and equipment. Long-term operation of cooling facilities and the converter station would consume electricity. Intermittent inspection and emergency repair activities would also require gasoline and diesel fuel. Overall, consumption of energy resources would not place a significant demand on their availability in the region. Therefore, limited impacts would be expected from the consumption of energy.

Landfill Space. The disposal of excavated soils in a landfill would be an irretrievable, adverse impact. There are numerous rubble landfills and construction and demolition processing facilities that could manage the waste generated. However, any waste generated by the proposed CHPE Project that is disposed of in a landfill would be considered an irretrievable loss of that landfill space.

Human Resources. The use of human resources for construction is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources represents employment opportunities and is considered beneficial.

6.5 Conflicts Between the Proposed CHPE Project and the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

The proposed CHPE Project would be consistent with land use plans, policies, and controls. NYSDOS conditionally concurred with the consistency certification of the proposed CHPE Project under the enforceable policies of the New York State CMP subject to the implementation of five conditions, which, along with other measures to minimize impacts, have been incorporated into the proposed CHPE Project by the Applicant. The compatibility of the CHPE Project with land use plans, policies, and controls is discussed in detail in **Sections 5.1.1**, **5.2.1**, **5.3.1**, and **5.4.1**.

6.6 Energy Requirements and Conservation Potential

Construction and operation of the proposed CHPE Project would result in an increase in energy demand over current conditions. Although the required energy demands would be met by the existing utility infrastructure along the proposed transmission line route during the construction and operations periods, energy requirements for facility operations would be subject to established energy conservation practices.

6.7 Natural or Depletable Resource Requirements and Conservation Potential

Resources that would be permanently and continually consumed by implementation of the proposed CHPE Project include water, electricity, and fossil fuels. To the extent practicable, pollution prevention considerations would be included. In addition, sustainable management practices would be in place to protect and conserve natural and cultural resources.

6.8 Effects on Urban Quality, Historical and Cultural Resources, and the Design of the Built Environment, including Reuse and Conservation Potential

Urban quality, historical and cultural resources, and the design of the built environment pertains to human-made spaces that provide the settings for human activities. "Built resources" is a broad term that could include buildings, parks, and even supporting infrastructure systems. Impacts on built resources could include a direct loss of a valued human-made resource, or a change in the setting that diminishes the character or functionality of a human-made resource.

Construction activities along all aquatic and terrestrial proposed CHPE Project segments have the potential to affect historical and cultural resources adversely. The proposed CHPE Project route has been sited to minimize impacts on known historical and cultural resources, though additional survey work is needed. The Fort Crown and Fort Ticonderoga NHLs are near the proposed CHPE Project route in the Lake Champlain Segment, and the boundaries would be re-examined in accordance with the terms of the CRMP developed for the proposed CHPE Project or as directed under the terms of the PA to determine if they are within the APE of the CHPE Project. Noise, dust, vibrations, and visual impacts on these resources would be temporary during construction activities. Operations associated with the cooling station at MP 112 could have visual impacts on the McMore Residence (NRE 15) and the Main Street Historic Bridge (NRL 19). Potential impacts on historic and cultural resources are addressed in **Sections 5.1.10**, **5.2.10**, **5.3.10**, and **5.4.10**.

The aquatic portion of the proposed CHPE Project route has been sited to minimize potential impacts on navigation channels and anchorage areas, which could be considered a part of the built environment. The aquatic transmission cables are designed to be maintenance-free. Once installation is complete, the proposed CHPE Project would not be expected to impact the built environment within Lake Champlain or the Hudson, Harlem, or East rivers, except in the event of emergency repairs.

The proposed CHPE Project route would be terrestrial beginning at Dresden through Catskill, through the urban communities along Haverstraw Bay, and through urban and industrial areas in the Bronx and Queens. The transmission line would be installed underground in the railroad ROWs and under city streets through Schenectady and Queens. As such, the construction-related impacts would be short-lived, and, once construction is complete, would not be visible or noticeable. Therefore, the proposed CHPE Project would not affect urban quality or the design of the built environment. The last section of the terrestrial portion of the proposed CHPE Project in Queens would also be in keeping with the existing urban, industrial character of the area and would not adversely affect urban quality or the design of the built environment despite being visible during both the construction phase and operational phase (for the cooling station and Luyster Creek HVDC Converter Station).

7. Public Participation and Interagency Coordination

7.1 Public Participation

Throughout the NEPA process, the public has had and will continue to have opportunities to comment on the proposed CHPE Project. **Sections 1.5 through 1.7** provide additional information on public participation, including commenting on the Draft EIS, potential issuance of a ROD, and interagency coordination. DOE conducted public scoping twice prior to the release of this Draft EIS as identified below:

- From June 18, 2010, until August 2, 2010
- From April 30, 2012, to June 14, 2012.

The scoping process helps to identify and determine the scope of environmental issues to be addressed in an EIS and is a specific regulatory requirement associated with implementation of NEPA. Scoping allows the public to help define priorities and express stakeholder and local community concerns through oral and written comments.

In addition to public scoping activities and meetings, DOE has maintained a public Web site for the EIS at www.chpexpresseis.org. The Web site has been active since June 2010, and members of the public are able to review project documents, subscribe to an email distribution list for notices about the EIS status, and submit comments via the Web site.

7.1.1 Initial Public Scoping

> 40 CFR 1500.1(b) states "NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken."

On June 18, 2010, DOE published in the *Federal Register* its *Notice of Intent to Prepare an EIS and to Conduct Public Scoping Meetings; Notice of Floodplains and Wetlands Involvement; Champlain Hudson Power Express, Inc.* (75 *Federal Register* 34720). The Notice of Intent (NOI) was sent to interested parties including Federal, state, and local officials; agency representatives; stakeholder organizations; local libraries, newspapers, and radio and TV stations; and private individuals. Issuance of the initial NOI commenced a 45-day public scoping period that ended on August 2, 2010. However, the NOI did note that comments submitted after the deadline "would be considered to the extent practicable."

DOE placed advertisements in 32 local and regional newspapers along the proposed project corridor to invite the public to local scoping meetings, and to announce their times and locations. In addition, press releases were sent out to 10 local radio and 17 television stations and to 26 newspapers prior to the meetings.

During the public scoping period, DOE conducted seven scoping meetings: one in Connecticut and six within the Hudson River Valley corridor of New York State. The meetings occurred between July 8 and July 16, 2010. During the scoping meetings, the public was able to submit oral and written comments and speak with representatives of DOE regarding the CHPE Project.

Comments received during the 2010 scoping period are summarized in the *Summary Scoping Report – Champlain Hudson Power Express Transmission Line Project Environmental Impact Statement* (December 2010) (see **Appendix D**).

7.1.2 Additional Public Scoping

A description of how the CHPE Project Joint Proposal was developed is provided in **Section 2.3.2**. Based on the Joint Proposal, on April 30, 2012, DOE published in the *Federal Register* an *Amended Notice of Intent to Modify the Scope of the Environmental Impact Statement for the Champlain Hudson Power Express Transmission Line Project in New York State* (77 *Federal Register* 25472) (Amended NOI). Issuance of the NOI commenced a supplemental 45-day public scoping period that ended on June 14, 2012. DOE also stated that it will consider comments submitted after June 14, 2012, to the extent practicable.

In the amended NOI of 2012, DOE stated that it did not intend to hold further public scoping meetings, but recognized that comments provided by the public during the NYSPSC's April 2012 public statement hearings might be relevant to the NEPA scoping process. Therefore, DOE explained that it intends to review the Commission's April 2012 public hearing statement transcripts and consider comments received, to the extent matters relevant to the Federal environmental review process arise, as scoping comments for the purposes of the EIS. Comments received during the 2012 scoping period are summarized in the *Summary Scoping Report Addendum – Champlain Hudson Power Express Transmission Line Project Environmental Impact Statement* (September 2012) (see **Appendix D**).

Section 1.7.2 provides a list of general and specific issues and concerns that were raised as a result of the public scoping process.

7.1.3 Draft EIS Public Comment Period

DOE provided a 45-day public review period and held public hearings for the Draft EIS (see **Section 1.7.3**). The public review period was initiated through publication of a NOA in the *Federal Register* by the USEPA. Methods similar to those used during the scoping period were used to notify the public and applicable Federal and state agencies of the public review period for the Draft EIS, including distributing the document to individuals or parties who submitted scoping comments, and to other interested parties that requested a copy of the EIS.

DOE made the Draft EIS available online at the CHPE EIS Web site (http://www.chpeexpresseis.org) and on the DOE NEPA Web site (http://energy.gov/nepa). The Draft EIS was also circulated to Federal, state, and local agencies with jurisdiction by law or special subject matter expertise and to any person, stakeholder organization, or agency that requested a copy (40 CFR 1502.19).

DOE received 107 comment documents on the Draft EIS, which have been categorized into eight series based on the type of commenter as follows:

- 100 series – Public Hearing Transcripts: 45 comment documents
- 200 series – Federal Agencies: 5 comment documents
- 300 series – Federal and State Elected Officials: 6 comment documents
- 400 series – State Agencies: 3 comment documents
- 500 series – Local Elected Officials: 4 comment documents
- 600 series – Local Agencies: 2 comment documents
- 700 series – Stakeholder Groups: 22 comment documents
- 800 series – Other Groups and Members of the Public: 20 comment documents.

The Final EIS includes, in **Appendix P**, all comments on the Draft EIS and responses to the comments. All comments on the Draft EIS received or postmarked during the comment period were considered in preparing the Final EIS. Comments received after the end of the comment period were addressed to the extent practicable. DOE responded to those comments that are within the scope and relevant to the analysis within this EIS.

7.2 Interagency Coordination

Interagency coordination is an integral element of the NEPA process and is intended to promote open communication between DOE, Federal and state regulatory agencies, and Native American tribes. DOE continues to coordinate with agencies during the NEPA process. A list of cooperating agencies contributing to the preparation of this EIS is provided in **Section 1.6.1**. **Sections 1.6.2** and **1.6.3** discuss Federal, state, and municipal authorizations and approvals required for the CHPE Project, and DOE is coordinating with the responsible agencies. There are three key agency coordination efforts associated with Federal compliance of the CHPE Project. These are discussed in the following subsections.

7.2.1 Section 404 of the CWA

DOE is coordinating with the USACE regarding the Applicant's requirements to comply with CWA Section 404(b)(1) permitting activities. The Applicant has received a Section 401 Water Quality Certificate from the NYSPSC (NYSDPS 2013). **Sections 1.6** and **3.1.8** provides information on these activities and **Appendix B** provides the LEDPA analysis from the Section 404 permit that is relevant for inclusion this EIS.

7.2.2 Section 7 of the ESA

DOE is consulting with the USFWS and NMFS regarding potential impacts on species listed, or candidate species proposed for listing, under the ESA and their designated or proposed critical habitat. DOE is also consulting with NYSDEC regarding potential impacts on state-listed species. ESA Section 7 consultations to date are discussed in **Sections 3.1.5**, **3.1.7**, **5.1.5**, and **5.1.7.** Letters submitted by DOE to agencies and responses received are provided in **Appendix H.1**. A Biological Assessment prepared for the proposed CHPE Project is provided in **Appendix Q**.

7.2.3 Section 106 of the NHPA

DOE is consulting with the ACHP, New York SHPO, Native American tribes, and other parties under Section 106 of the NHPA. The New York SHPO, which is under the New York State Office of Parks and Recreation, is authorized to review all projects that could have an adverse effect on historical structures or protected archaeological sites. Letters submitted by DOE to agencies and tribes, responses received, and notices of consultation meetings are provided in **Appendix J**. A Section 106 PA developed for the proposed CHPE Project is provided in **Appendix T**.

7.2.4 CZMA

The Applicant has consulted with the NYSDOS and NYSPSC regarding the CZMA. Under the Federal CZMA, the NYSDOS must issue a CZMA Consistency Certification prior to any Federal agencies approving any action for projects that would occur within and directly affect a state's coastal area. NYSDOS conditionally concurred with the consistency certification for the project under the enforceable policies of the New York State CMP in June 2011. See **Sections 3.3.1** and **5.3.1** for details and **Appendix F.1** for correspondence regarding the CZMA Consistency Certification for the proposed CHPE Project.

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8. List of Preparers

This section lists the individuals who filled primary roles in the preparation of this EIS. Brian Mills of the DOE Office of Electricity Delivery and Energy Reliability directed the preparation of the EIS. The EIS Preparation Team, led by Patrick Solomon of the EIS contractor HDR Environmental, Operations and Construction, Inc. (HDR EOC), provided primary support and assistance to DOE. Other members of the team included Doug Cotton, Senior Technical Advisor; Jeffrey Weiler, Program Manager; and Leigh Hagan, Deputy Project Manager.

DOE provided direction to HDR EOC, which was responsible for developing analytical methodology and assessing the potential impacts of the alternatives, coordinating the work tasks, performing the impact analyses, and producing the document. The DOE was responsible for the scope, content, and organization of the EIS data quality, and issue resolution and direction.

DOE independently evaluated all supporting information and documentation prepared by HDR EOC. Further, DOE retained the responsibility for determining the appropriateness and adequacy of incorporating any data, analyses, and results of other work performed by HDR EOC in the EIS. HDR EOC was responsible for integrating such work into the EIS.

As required by Federal Regulations (40 CFR 1506.5[c]) HDR EOC signed a NEPA Disclosure Statement in relation to the work they performed on this EIS. This statement is provided in **Appendix O**.

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Input from a number of other DOE offices that reviewed internal versions of the EIS was incorporated while it was under development.

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10. Acronyms and Abbreviations

µg/L	micrograms per liter
µV/m	microvolts per meter
AASHTO	American Association of State Highway Transportation Officials
AC	alternating current
ACGIH	American Conference of Governmental Industrial Hygienists Inc.
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
AEII Plant	Astoria Energy II Plant
AIM	Algonquin Incremental Market
ALJ	Administrative Law Judges
ANSI	American National Standards Institute
APA	Adirondack Park Agency
APE	Area of Potential Effect
ASMFC	Atlantic States Marine Fisheries Commission
AST	aboveground storage tank
AQCR	Air Quality Control Region
BA	Biological Assessment
BAPE	Bureau d'audiences publiques sur l'environnement
BART	Best Available Retrofit Technology
BCA	Bird Conservation Area
BFE	base flood elevation
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BOA	Brownfield Opportunity Area
BOD	biological oxygen demand
BTA	Best Technology Available
°C	degrees Celsius
CAA	Clean Air Act
CARIS	Congestion Assessment and Resource Integration Study
CCC	Criterion Continuous Concentration
CEQ	Council on Environmental Quality
CEQR	New York City Environmental Quality Regulations
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHPE	Champlain Hudson Power Express
CHPEI	Champlain Hudson Power Express Inc.
cm	centimeter
CMP	Coastal Management Program
CO	carbon monoxide
CO_2	carbon dioxide
ConEd	Consolidated Edison Company of New York, Inc.
CP	Canadian Pacific
CRMP	Cultural Resources Management Plan
cSEL	cumulative sound exposure level
CSX	CSX Transportation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel
dB re 1 µPa	decibels relative to 1 micropascal
dB re 1µPa2-s	decibels relative to 1 micropascal squared second
dBA	A-weighted decibel
DC	direct current
DDT	dichloro-diphenyl-trichloroethane
D-IRT	Downtown Industrial Research and Technology
D-MX	Downtown Mixed-Use
DOE	U.S. Department of Energy
DPS	distinct population segment
DSNY	New York City Department of Sanitation
EA	Environmental Assessment
EFH	essential fish habitat
EIS	Environmental Impact Statement
ELF	Extremely low frequency
EM&CP	Environmental Management and Construction Plan
EMF	electromagnetic field
EMI	electromagnetic interference
EMT	emergency medical technician
EO	Executive Order

ER-M	Effects Range Median
ERRP	Emergency Repair and Response Plan
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FDA	U.S. Food and Drug Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FIRM	FEMA Flood Insurance Rate Map
FPA	Federal Power Act
FPPA	Farmland Protection Policy Act
feet/day	feet per day
FTA	Federal Transit Administration
FWA	Freshwater Wetlands Act
G	gauss
GAO	U.S. Government Accountability Office
GE	General Electric
GHG	greenhouse gas
GHz	gigahertz
GIS	Geographic Information System
GPS	Global Positioning System
GWh	gigawatt hours
HAP	hazardous air pollutant
HASP	Health and Safety Plan
HDD	horizontal directional drilling
HDPE	high-density polyethylene
HREP	Hudson River Estuary Program
HTF	Hudson Transmission Facility
HVAC	high-voltage alternating current
HVDC	high-voltage direct current
Hz	Hertz
I	Interstate
IARC	International Agency for Research on Cancer
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICYP	Immaculate Conception Youth Program
IEC	International Electrotechnical Commission
IPCC	Intergovernmental Panel on Climate Change
IPNPS	Indian Point Nuclear Power Station
IPPNY	Independent Power Producers of New York, Inc.
IRR	internal rate of return
ISO	Independent System Operator
ISO-NE	Independent System Operator-New England
JFK	John F. Kennedy
kg/m	kilograms/meter
kHz	kilohertz
km	kilometer
km^2	square kilometer
KOP	Key Observation Point
kV	kilovolt
kV/m	kilovolts per meter
L_{eq}	equivalent continuous noise level
lb/ft	pounds per foot
lbs/MWh	pounds per MW hour
LBP	lead-based paint
LC	Lake Champlain
LEDPA	Least Environmentally Damaging Practicable Alternative
LEI	London Economics International
LMP	location marginal price
LNG	liquefied natural gas
LTE	Long Term Emergency
LWRP	Local Waterfront Revitalization Program
meters/day	meters per day
MACT	Maximum Achievable Control Technology
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
mG	milligauss
MGD	million gallons per day
mg/L	milligrams per liter
MHz	megahertz
mi^2	square mile
mg/m^3	milligrams per cubic meter
mm	millimeter
MMPA	Marine Mammal Protection Act
MNCR	Metro-North Commuter Railroad
MNR	Metro-North Railroad
MOU	Memorandum of Understanding
MP	milepost

MPT	Maintenance and Protection of Traffic
MRI	magnetic resonance imaging
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
MTA	Metropolitan Transportation Authority
mV/cm	millivolts per centimeter
MUTCD	Manual of Uniform Traffic Control Devices
MVA	megavolt ampere
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NESC	National Electrical Safety Code
NEPA	National Environmental Policy Act
NH_3	ammonia
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRE	National Register Eligible
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NRL	National Register Listed
NYCRR	New York State Codes, Rules, and Regulations
NYISO	New York Independent System Operator
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSBPS	New York State Bulk Power System
NYS DHSES	Department of Homeland Security and Emergency Services
NYCA	New York Control Area
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSDPS	New York State Department of Public Service
NYSM	New York State Museum
NYS OPRHP	New York State Office of Parks, Recreation and Historic Preservation
NYSPSC	New York State Public Service Commission
O_3	ozone
OEM	Original Equipment Manufacturer
OSHA	Federal Occupational Safety and Health Administration
PA	Programmatic Agreement
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PEM	palustrine emergent
percent g	percentage of the force of gravity
PFO	palustrine forested wetlands
PLC	Power Line Carrier
PM	particulate matter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PM_{10}	particulate matter equal to or less than 10 microns in diameter
POI	point of interconnection
POW	palustrine open water wetlands
PPE	personal protective equipment
ppm	parts per million
ppt	parts per trillion
PSD	Prevention of Significant Deterioration
psi	pounds per square inch

PSS	palustrine scrub-shrub
PSL	Public Service Law
RACT	Reasonably Available Control Technology
RAPID	Research and Public Information Dissemination Program
RCRA	Resource Conservation and Recovery Act
RFI	Request for Information
RGGI	Regional Greenhouse Gas Initiative
rms	root-mean-square
RNA	Reliability Needs Assessment Report
ROD	Record of Decision
ROI	region of influence
ROV	remotely operated vehicle
ROW	right-of-way
SAAQS	State Ambient Air Quality Standards
SASS	Scenic Areas of Statewide Significance
SAV	submerged aquatic vegetation
SCFWH	Significant Coastal Fish and Wildlife Habitat
SDS	Safety Data Sheet
SEQR	State Environmental Quality Review
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxide
SPCC	Spill Prevention, Control and Countermeasures
SPDES	State Pollutant Discharge Elimination System
SPL	Sound Pressure Level
SSESC	New York State Standards and Specifications for Erosion and Sediment Control
SSPP	Strategic Sustainability Performance Plan
STARS	New York State Transmission Assessment and Reliability Study
SWL	sound power level
SWPPP	Storm Water Pollution Prevention Plan
TDI	Transmission Developers, Inc.
Tg	teragrams
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
TOGS	Technical & Operational Guidance Series
tpy	tons per year
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TUHC	TDI-USA Holdings Corporation
TWh	terawatt hours
UF	utilization factor
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMA	United States Military Academy
U.S.C.	United States Code
USCG	U. S. Coast Guard
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound
V/m	volts per meter
V.S.A	Vermont Statutes Annotated
VT-AD	Addison County, Vermont
VTDEC	Vermont Department of Environmental Conservation
VTFWD	Vermont Fish and Wildlife Department
VTrans	Vermont Agency of Transportation
WHO	World Health Organization
WI/PL	Waterbody Inventory and Priority Waterbodies List
WMA	wildlife management area
XLPE	cross-linked polyethylene
YOY	young-of-year

11. Glossary

A-weighted decibel (dBA) – A unit of sound pressure level, adjusted in accordance with the A-weighting scale, which takes into account the increased sensitivity of the human ear at some frequencies.

Alternating current (AC) – Current that varies, or cycles, over time in both magnitude and polarity.

Anadromous – Migrating from saltwater to freshwater to spawn.

Aquifer – An underground body of porous materials, such as sand, gravel, or fractured rock, filled with water and capable of yielding useful quantities of water to a well or spring.

Bedrock – Solid rock beneath the soil and superficial rock.

Benthic – Pertaining to, or occurring at the bottom of a body of water, such as a riverbed or a lakebed.

Bentonite – A naturally-occurring clay that is the principle substance used in horizontal directional drilling fluids, along with water.

Best Management Practices (BMPs) – Industry-standard practices that are implemented to reduce the potential for adverse impacts to occur on a resource.

Bipole – Two transmission cables, one positively charged and the other negatively charged.

Black start – Ability of an electricity generating unit or station to start operating and delivering power without assistance from the electric system.

Capacity – The maximum load that a generator, piece of equipment, substation, transmission line, or system can carry under design service conditions.

Carbon monoxide (CO) – An odorless and colorless gas formed from one atom of carbon and one atom of oxygen.

Catadromous – Living in freshwater and migrating to saltwater to spawn.

Census tract – A small, relatively permanent statistical subdivision of a county that when originally delineated is homogeneous with respect to population characteristics, economic status, and living conditions.

Coastal Zone Management Act (CZMA) – The main objective of the CZMA is to encourage and assist states in developing coastal zone management programs, to coordinate state activities, and to safeguard the regional and national interests in the coastal zone. It requires that any Federal activity directly affecting the coastal zone of a state be consistent with that state's approved coastal zone management program.

Cofferdam – A temporary enclosure built within a waterbody that creates a water-free work environment.

Conductor – A wire or group of wires suitable for carrying an electrical current.

Construction corridor – The limits of construction activity, which include the area needed for excavation, installation of the transmission cables, stockpiling of excavated material, movement of construction equipment, and installation of erosion and sediment control measures.

Converter station – A special type of substation that converts electrical power from direct current to alternating current or vice versa. A converter station connects to a point of interconnection with the regional electrical grid.

Cooling station – Equipment used to disperse accumulated heat in long cable segments installed by horizontal directional drilling.

Corona – An electrical discharge from a conductor caused by the ionization of surrounding gas.

Criteria pollutants – A group of six common air pollutants that are regulated by the National Ambient Air Quality Standards (standards established to protect public health or the environment). The six criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, two size classes of particulate matter (less than 10 micrometers [0.0004 inch] in diameter, and less than 2.5 micrometers [0.0001 inch] in diameter), and sulfur dioxide.

Cross-linked polyethylene (XLPE) – A thermoset resin material that is used to insulate high-voltage electrical cables. Cross-linked polyethylene provides excellent impact and stress cracking resistance.

Cumulative impact – Impact on the environment that results when the incremental impact of a proposed action is added to the impacts from other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Current (Electric) (see also **Alternating current** and **Direct current**) – The amount of electrical charge (i.e., electrons) flowing through a conductor (as compared to voltage, which is the force that drives the electrical charge).

dBA – See **A-weighted decibel**.

de minimis – Conditions that generally do not present a threat to human health or the environment, and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

Decibel (dB) – A unit for expressing the relative intensity of sounds on a logarithmic scale that quantifies sound intensity.

Demersal – Living or occurring in close relation with the bottom of a waterbody (e.g., lake, river or ocean).

Deviation area – An area outside of established rights-of-way (e.g., railroads or roads) that the proposed CHPE transmission line may traverse to accommodate features such as bridges, roadway crossings, or areas where the existing right-of-way is too narrow to permit cable installation while meeting the established clearance criteria.

Dewater – To remove water.

Diadromous (of a fish) – Anadromous and catadromous; migratory between salt and fresh waters.

Dielectric – A nonconductor of direct electric current.

Direct current (DC) – Current that is steady and does not change sinusoidally (periodically) with time.

Easement – A grant of certain rights to the use of a parcel of land (which then becomes a "right-of-way"). This includes the right to enter the right-of-way to build, maintain, and repair the facilities. Permission for these activities is included in the negotiation process for acquiring easements over private land.

Electromagnetic field (EMF) – An extremely low frequency magnetic and electric field, ranging from 3 to 3,000 Hertz (Hz).

Electromagnetic interference (EMI) – An electromagnetic disturbance from an external source that carries rapidly changing electrical currents, such as an electrical circuit or the sun, that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics and electrical equipment.

Electrosensitivity – A condition in which a living receptor experiences physical or psychological symptoms, reportedly aggravated by electromagnetic fields or other electromagnetic waves, at exposure levels that are otherwise generally tolerated by the general public.

Endangered (species) – Plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR Part 424).

Endangered Species Act (ESA) – A 1973 Federal law, amended in 1978 and 1982, to protect troubled species from extinction. The U.S. Fish and Wildlife Service and National Marine Fisheries Service decide whether to list species as Threatened or Endangered. Under the ESA, Federal agencies must avoid jeopardy to and aid the recovery of listed species.

Environmental Impact Statement (EIS) – A detailed, written statement, as required by the National Environmental Policy Act, that analyzes the potential environmental impacts of a proposed major Federal action that could significantly affect the quality of the human environment.

Environmental Management and Construction Plan (EM&CP) – A plan developed by the Applicant that documents environmental and construction management procedures and plans to be implemented during CHPE Project construction activities to avoid or minimize impacts to the environment.

Equivalent continuous noise level (L_{eq}) – A metric that represents an energy-based average (or mean) noise level occurring over a stated time period. The L_{eq} represents a constant sound that, over the specified period, has the same acoustic energy as the time-varying sound. This metric is used as a baseline by which to compare project-related noise levels (noise modeling results, which are also expressed as an hourly L_{eq}) and to assess the potential project-related noise increase over existing conditions.

Essential fish habitat (EFH) – The waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson Fishery Conservation and Management Act).

Federally listed – Species listed as Threatened or Endangered under the Federal Endangered Species Act

Floodplain – That portion of a river valley adjacent to the stream channel which is covered with water when the stream overflows its banks during flood stage.

Frac-out – Term used in horizontal directional drilling for when a fracture in the substrate allows drilling fluid to reach the overlying soil surface or waterbody.

Fugitive dust – Particulate matter or dust that is released into the air from disturbance of granular material (soil) by mechanical equipment or vehicles.

Gauss – A unit of measure, abbreviated as G, that is commonly used to express the strength or intensity of magnetic fields.

Geographic Information System (GIS) – A system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

Greenhouse gas (GHG) – Those gases, such as water vapor, carbon dioxide, nitrous oxide, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride, that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.

Groundwater – Water below the ground surface in a zone of saturation.

Hertz (Hz) – Frequency/oscillatory rate of an alternating electric current, measured in number of cycles per second (1 Hz is equal to one cycle per second).

Hibernaculum (also hibernacula) – A location chosen by an animal for hibernation.

High-voltage – With respect to electric power transmission, high-voltage is usually considered any voltage greater than approximately 35,000 volts. This classification is also based on the design of apparatus and insulation.

Horizontal directional drilling (HDD) – A steerable trenchless method of installing underground pipes, conduits, and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig. This method allows pipes and conduits to be installed under water bodies, parks, roadways, and other features with minimal impact on the resource or surrounding area.

Hydrology – The science dealing with the properties, distribution, and circulation of water.

Insulator – A material that is a very poor conductor of electricity. The insulating material is usually a ceramic or fiberglass when used in the transmission line and is designed to support a conductor physically and to separate it electrically from other conductors and supporting material.

Interconnection – Two or more electric systems having a common transmission line that permits a flow of energy between them. The physical connection of the electric power transmission facilities allows for the sale or exchange of energy.

Invasive species – A non-indigenous plant or animal species that can harm the environment, human health, or the economy.

Invertebrate – Any animal without a backbone or spinal cord; any animal other than a fish, amphibian, reptile, bird, or mammal.

Jet plow (see also **Water jetting**) – A plow that uses water jets in the process of installing an aquatic transmission cable. The jet plow is equipped with hydraulic pressure nozzles that create a downward and backward flow within the trench, fluidizing the sediment, and allowing the transmission cables to settle into the trench under its own weight before the sediments settle back into the trench.

Key observation point – One or a series of points on the transmission line route that are representative of viewpoints for area users that were selected in order to view the proposed changes resulting to a viewshed from a project. These points are chosen based on how representative they are of viewpoints for area users and are used to evaluate how a viewshed from an aesthetic resource would appear before and after a project is completed.

Local Waterfront Revitalization Program (LWRP) – LWRPs supplement the New York State Coastal Management Program by defining area-specific goals and needs at the local level. An LWRP consists of a plan to preserve, enhance, protect, develop and use a community's waterfront in which critical issues are addressed; and a program to implement the plan.

Mechanical plowing (see also **Shear plow**) – One of the proposed installation methods for the aquatic transmission cable route. The mechanical plowing process uses a shear plow in which a plow blade excavates cuts into the lake or river bed and pushes sediment aside as it is pulled by a cable ship or barge. The transmission line cables are then fed into the trench before the sediment collapses back into the trench created by the plow blade.

Milepost (MP) – A method of indicating the distance of the proposed CHPE Project route in miles from its northern to southern endpoints.

Milligauss (mG) – A unit of measure used to express the strength or intensity of magnetic fields; a thousandth of a gauss.

Mitigation – Action taken to reduce the potential for unavoidable adverse impacts caused by the transmission project to resources. Mitigation measures often include the creation of new wetland areas, the purchase of ecologically-sensitive lands, or the funding of environmental research and public education programs.

National Environmental Policy Act (NEPA) – The basic national charter for protection of the environment. For major Federal actions significantly affecting the quality of the human environment, NEPA requires Federal agencies to prepare a detailed environmental impacts statement that includes the environmental impacts of the proposed action and other specified information.

New York Independent System Operator (NYISO) – A not-for-profit company that operates New York's high-voltage transmission network, administers and monitors the wholesale electricity markets, and plans for the state's energy generation and transmission infrastructure.

Non-attainment area – An area that the U.S. Environmental Protection Agency has designated as not meeting (i.e., not being in attainment of) one or more of the National Ambient Air Quality Standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants, but not for others.

Notice of Intent (NOI) – A public notice that an environmental impact statement will be prepared and considered in the decision making for a proposed action.

Outage – The period during which a generating unit, transmission line, or other facility is out of service.

Ozone – A molecule made up of three atoms of oxygen. Occurs naturally in the stratosphere and provides a protective layer shielding the Earth from harmful ultraviolet radiation. In the troposphere, it is a chemical oxidant, a greenhouse gas, and a major component of photochemical smog.

Pelagic – Inhabiting the water column, such as the open waters of the Hudson River Estuary.

Perennial (streams or creeks) – Those with year-round water flow.

Physiographic – Pertaining to the features and phenomena of nature.

Prime Farmland – Federally designated land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses.

Reactive power – A characteristic of alternating current systems, is the energy supplied to create or be stored in electric or magnetic fields in and around electrical equipment

Real power – The form of electricity that powers equipment.

Region of influence (ROI) – The geographic extent being evaluated for each particular resource area in the Environmental Impact Statement. The ROI may vary among resource areas, and is determined based on regulatory requirements combined with the expected maximum area of measurable impacts for that particular resource.

Reliability (electric system) – The ability of a power system to continue operation and provide uninterrupted service, even while that system is under stress.

Revegetate – Re-establishing vegetation on a disturbed site.

Right-of-way (ROW) – A corridor or lands reserved for placement of infrastructure such as a highway, railway, electric transmission line, or pipeline.

Ring bus – A substation switching arrangement that might consist of four or more circuit breakers connected in a closed loop.

Riparian habitat – The zone of vegetation that extends from the water's edge landward to the edge of the vegetative canopy. Associated with watercourses such as streams, rivers, springs, ponds, lakes, or tidewater.

Scoping – An early and open process for determining the scope of issues to be addressed in an environmental impact statement and for identifying the significant issues related to a proposed action.

Sedimentation – The deposition or accumulation of sediment.

Seismicity – The frequency or magnitude of earthquake activity in a given area.

Shear plow (see also **Mechanical plowing**) – Plow used during the mechanical plowing process of installing the aquatic transmission cable. A barge or ship tows the shear plow at a safe distance as the laying and burial operation proceeds. The plow is lowered to the lake or river floor, and the plow blade cuts a trench in the lake or river bed while it is towed along the pre-cleared route. The transmission cables are deployed from the vessel to a funnel on the plow device and then into the trench in a simultaneous lay-and-burial operation.

Significant Coastal Fish and Wildlife Habitat (SCFWH) – Areas of significant coastal fish and wildlife habitat within New York State as evaluated and recommended by the New York State Department of Environmental Conservation and designated by the New York State Department of State. An area designated as a SCFWH is afforded special protection.

Smart Grid – A digitally enabled electrical grid that acts on information about the behavior of energy sources and demand loads within the system and automatically takes corrective actions to improve the efficiency, reliability, and sustainability of electricity services.

Spawn – To produce or deposit eggs.

Species – A group of interbreeding individuals not interbreeding with another such group; similar, and related species are grouped into a genus.

Submerged aquatic vegetation (SAV) – Generally includes rooted vascular plants that grow up to the water surface but not above. The definition of SAV usually excludes algae, floating plants, and plants that grow above the water surface.

Substation – A non-generating electrical power station that transforms voltages to higher or lower levels. Facility equipment that switches, changes, or regulates electric voltage.

Surface Water – Water collecting on the ground or in a stream, river, lake, sea or ocean.

Switches – Devices used to mechanically disconnect or isolate equipment; found on both sides of circuit breakers.

Threatened (species) – Plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures set out in the Endangered Species Act and its implementing regulations (50 CFR Part 424).

Transformer – A device that operates on magnetic principles to increase (step up) or decrease (step down) voltage.

Transmission cable – An insulated conductor used for underground or submarine electric transmission applications. Also see **Transmission line**.

Transmission line – A set of conductors, insulators, supporting structures, and associated equipment used to move large quantities of power at high voltage, usually over long distances between a generating or receiving point and major substations or delivery points.

Turbidity – The state or condition of opaqueness or reduced clarity of a fluid, due to the presence of suspended matter.

Viewshed – The area that is visible from one or more specific locations, or viewing points.

Volt – The unit of electromotive force or electric pressure which, if steadily applied to a circuit having a resistance of one ohm, would produce a current of one ampere.

Voltage – The electrical force, or “pressure,” that causes current to flow in a circuit, measured in Volts.

Water jetting (see also **Jet plow**) – One of the proposed installation methods for the aquatic transmission cable route. The water-jetting process uses a jet plow in which jets of pressurized water fluidize the sediments to enable a cable to be buried.

Watershed – The area that drains to a common waterway.

Wetlands – An area that is inundated or saturated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas (e.g., sloughs, potholes, wet meadows, river overflow areas, mudflats, natural ponds).

XLPE – See **Cross-linked polyethylene**.

Zoning – Regulations used to guide growth and development; typically involve legally adopted restrictions on uses and building sites in specific geographic areas to regulate private land use.

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