Lake Erie Connector Project

Draft Environmental Assessment

Volume 1 – Main Document

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

June 2016

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LAKE ERIE CONNECTOR PROJECT ENVIRONMENTAL ASSESSMENT

Volume 1—Main

Document DOE/EA-2019

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

COOPERATING AGENCY

U.S. ARMY CORPS OF ENGINEERS

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COVER SHEET

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

COOPERATING AGENCIES
U.S. Army Corps of Engineers (USACE), Pittsburgh District

TITLE
ITC Lake Erie Connector Project

LOCATION
Erie County, Pennsylvania

CONTACTS
For additional information on this Draft EA contact:
Mr. Brian Mills
National Environmental Policy Act Document Manager
Office of Electricity Delivery and Energy Reliability, OE-20
U.S. Department of Energy
Washington, DC 20585
Telephone: (202) 586-8267
Brian.Mills@hq.doe.gov

ABSTRACT:
ITC Lake Erie Connector, LLC (ITC Lake Erie) applied to the U.S. Department of Energy (DOE) for a Presidential permit to construct, operate and maintain an approximate 72-mile long, 1,000-megawatt (MW), +/-320-kilovolt (kV), high-voltage direct current (HVDC) electric power transmission system that originates in Haldimand County, Ontario, Canada and terminates in Erie County, Pennsylvania, United States. The United States' portion of the proposed ITC Lake Erie (LEC) Project is approximately 42.8 miles in length. This Environmental Assessment (EA) addresses the potential environmental impacts of the proposed transmission line (Preferred Alternative) and the No Action Alternative. The proposed transmission cable would include both aquatic (underwater) and terrestrial (primarily underground) segments in Pennsylvania. The underwater portions of the proposed transmission cable would be buried in the bed of Lake Erie, and the terrestrial portions would be buried, principally in roadway right-of-way (ROW). The proposed LEC Project would cross the United States-Canadian border in Lake Erie as a submerged cable (approximately 35 miles underwater in Lake Erie within the United States) and would emerge onshore on private property, west of Erie Bluffs State Park. The proposed LEC Project would then track approximately 7 miles underground to a proposed +/- 320-kV new direct current (DC) to 345-kV alternating current (AC) HVDC converter station (new Erie Converter Station) in Conneaut Township, Erie County, Pennsylvania. Approximately 2,153 feet of 345-kV AC underground transmission cables would run between the new proposed Erie Converter Station and the nearby Penelec Erie West Substation. The proposed LEC Project would terminate at the existing Penelec Erie West Substation and interconnect with the transmission system operated by PJM Interconnection, LLC, (PJM), a Regional Transmission Operator (RTO).

PUBLIC COMMENTS: Comments on this Draft EA are accepted through July 5, 2016.

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TABLE OF CONTENTS

LIST OF APPENDICES

TABLE OF FIGURES

TABLE OF TABLES

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1 PURPOSE OF AND NEED FOR THE ACTION

1.1 BACKGROUND

On May 29, 2015, ITC Lake Erie Connector, LLC (ITC Lake Erie or Applicant) applied to the United States (U.S.) Department of Energy (DOE) for a Presidential permit in accordance with Executive Order (EO) 10485, as amended by EO 12038, and the regulations 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."

The proposed Lake Erie Connector Project (LEC or Project) consists of an approximate 72-mile long, 1,000-megawatt (MW), +/-320-kilovolt (kV), high-voltage direct current (HVDC) electric power transmission system that originates in Haldimand County, Ontario, Canada and terminates in Erie County, Pennsylvania, United States. The proposed LEC Project would cross the United States-Canadian border in Lake Erie as a submerged cable and extend approximately 35 miles underwater through Lake Erie and emerge onshore in Erie County, Pennsylvania on private property west of Erie Bluffs Park. The proposed Project would run approximately 7 miles underground to a proposed +/-320-kV new direct current (DC) to 345 kV alternating current (AC) HVDC converter station (Erie Converter Station) in Conneaut Township, Erie County, Pennsylvania. Approximately 2,153 feet of 345 kV AC underground transmission cables would run between the proposed new Erie Converter Station and the nearby Penelec Erie West Substation. The proposed Project would terminate at the existing Penelec Erie West Substation and interconnect with the transmission system operated by PJM Interconnection, LLC, (PJM), a Regional Transmission Operator (RTO).

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." The DOE determines whether issuing a Presidential permit would be consistent with the public interest and assesses the environmental effects of the proposed project, the effect of the proposed project on electric reliability, and other factors that DOE considers relevant to the public interest.

The DOE Office of Electricity Delivery and Energy Reliability (OE) is responsible for reviewing Presidential permit applications and determining whether to grant a permit for electrical transmission facilities that cross the United States' international border. If DOE issues a Presidential permit to ITC Lake Erie (OE Docket Number PP-412, it would authorize ITC Lake Erie to construct, operate, maintain, and connect the United States' portion of the proposed Project where the Project crosses the United States border with Canada.

The DOE Order 451.1B5 requires that each "Secretarial Officer and Head of a Field Organization shall, for matters under the office's purview…(8) determine that an environmental assessment or an environmental impact statement is appropriate or required." On August 28, 2015, DOE determined, after due consideration of the nature and extent of the proposed LEC Project and discussions with the U.S. Army Corps of Engineers (USACE), that the appropriate level of environmental review under the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §4321 et seq.)

would be an Environmental Assessment (EA). The DOE prepared this EA in compliance with NEPA requirements, the Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR Parts 1500-1508), DOE's implementing procedures for NEPA (10 CFR Part 1021), and other applicable regulations, including Compliance with Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022).

This EA has the following key objectives:

- Identify baseline conditions along the proposed LEC Project corridor.
- Identify and assess reasonably foreseeable potential effects on the natural and human environment that may result from implementing the proposed LEC Project in the United States.
- Describe and evaluate reasonable alternatives to the proposed LEC Project in the United States, including the No Action Alternative.
- Identify specific mitigation measures, as appropriate, to minimize environmental effects.
- Facilitate decision-making by DOE and other applicable federal and Pennsylvania regulatory agencies responsible for issuing associated permits and approvals.

Chapter 2: Proposed Action and Alternatives provides detailed information about the proposed LEC Project. Additional information for the proposed LEC Project is located on DOE's website[1] and ITC Lake Erie's website[2].

1.2 DOE'S PURPOSE OF AND NEED FOR AGENCY ACTION

The purpose of and need for DOE's action is to comply with EO 10485, as amended by EO 12038, and the regulations at 10 CFR §205.320 et seq. (2000) by determining whether to issue a Presidential permit for the proposed LEC Project. Although DOE does not have siting or project alignment authority, projects proposed in applications for Presidential permits are evaluated as "connected actions" to the proposed Presidential permit that would authorize the border crossing.

The DOE is using the NEPA process and will consider the effects analysis presented in this EA to assist in deciding whether to issue a Presidential permit to ITC Lake Erie.

1.3 DOE'S PROPOSED ACTION

The proposed action is the issuance of a Presidential permit for the construction, operation, and maintenance of the proposed LEC Project facilities in the United States at the Canadian border. This EA analyzes potential environmental effects of the Proposed Action (Preferred Alternative) and the No Action Alternative. The proposed LEC Project would involve actions in floodplains and wetlands; therefore, in accordance with 10 CFR Part 1022, "Compliance with Floodplain and Wetland Environmental Review Requirements," and EO 11988, this EA includes an analysis of effects on floodplains and wetlands. If granted, a Presidential permit would authorize ITC Lake Erie to construct, operate, maintain, and connect the proposed LEC Project across the international border between the United States and Canada.

1.4 ITC LAKE ERIE'S OBJECTIVES

In the Presidential permit application, ITC Lake Erie noted that the proposed LEC Project would be a merchant transmission facility that would interconnect the Independent Electricity System Operator (IESO) market in Ontario to the PJM market in the United States to facilitate the transfer of electricity,

[1] http://lakeerieconnectorea.com/
[2] http://www.itclakeerieconnector.com/

improve availability, and diversify electric energy supply portfolios for both markets (ITC Lake Erie 2015).

Specifically, ITC Lake Erie stated that the proposed LEC Project would provide improved access to markets and could be used to support energy and environmental policy goals, enhance power system reliability, and provide substantial public benefits. These public benefits include providing the ability to use clean, renewable power, including hydroelectric power, generated in Canada to help support electric demand in Pennsylvania and more broadly in PJM to makeup capacity lost as a result of coal and other fossil fuel plant retirements in the United States (ITC Lake Erie 2015). The proposed LEC Project would also create or preserve employment during construction and operation of the Project, provide public utility services by improving the availability of the electric grid (PJM and IESO) and provide economic benefits in Pennsylvania including tax revenues over the course of the Project's lifetime and the creation of construction and operations jobs.

1.5 PUBLIC PARTICIPATION AND INTERAGENCY COORDINATION

The public participation and interagency coordination elements of the NEPA process promote open communication between the lead federal agency and other regulatory agencies, Native American tribes, stakeholder organizations, and the public. On July 17, 2015, DOE issued a Notice of Application (80 *Federal Register* 42490) inviting any motions to intervene; however, no such motions were filed. In addition, DOE developed the LEC Project website to provide the proposed LEC Project information to the public and provide opportunity for public comment through the website. Publicly available documents about the proposed LEC Project may be downloaded from the Project website. On August 28, 2015, DOE determined that the appropriate level of review for the proposed LEC Project would be an EA and noted that DOE would request that the USACE and other regulating agencies be cooperating agencies. ***Table 1-1*** is a chronology of the Presidential permit application process for the proposed LEC Project and public notices to date.

TABLE 1-1: PROPOSED LEC PROJECT PRESIDENTIAL PERMIT APPLICATION MILESTONES

Date	Action	Summary
May 29, 2015	ITC Lake Erie filed Presidential permit application with DOE	ITC Lake Erie filed application for a 1,000-MW HVDC transmission cable from the United States-Canada border in Lake Erie to a new HVDC converter station in Conneaut Township, Erie County, Pennsylvania.
May 29, 2015	ITC Lake Erie filed Environmental Report	ITC Lake Erie filed an Applicant Prepared Environmental Report as part of the Presidential permit Application
July 17, 2015	DOE issues Notice of Application	DOE issues Notice of the Application; invites any motions to intervene.
March 9, 2016	USACE becomes Cooperating Agency	USACE agrees to become a cooperating agency in the proposed LEC Project EA

1.6 INTERAGENCY COORDINATION

The DOE invited several federal and state agencies to participate as cooperating agencies in preparing this EA because of their special expertise or jurisdiction by law (40 CFR §1501.6). The cooperating agency for the proposed LEC Project is the USACE, Pittsburgh District. The USACE's role relative to this EA is defined below.

The USACE would consider the EA in deciding whether to issue permits required under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA). In accordance with 33 CFR Part 325 Appendix B (8)(c), USACE would coordinate with DOE to ensure that the USACE can adopt the proposed LEC Project EA to support its decision-making requirements regarding the Section 10 and Section 404 permit applications submitted by ITC Lake Erie.

The Endangered Species Act and Section 404 of the Clean Water Act require the USACE to make an Effects Determination under Section 7(c) of the Endangered Species Act of 1972 (as amended). The USACE has determined that the LEC Project may affect, but is not likely to adversely affect endangered species or threatened species, or result in destruction or adverse modification of habitat of such species that have been determined to be critical. The USACE will seek concurrence with the U.S. Fish and Wildlife Service (FWS) during the Public Notice period for Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

ITC Lake Erie filed a Joint Permit Application with the USACE in January 2016. The Joint Permit Application is the Section 404 permit application and supporting documentation, including the wetlands delineation report and functional assessment. These documents can be reviewed at http://www.lakeerieconnectorea.com.

The Federal Coastal Zone Management Act (CZM) requirement that federal actions (regardless of location) that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent with the enforceable policies of a coastal state's federally approved coastal management program, before they can occur. The CZMA federal consistency requirements are found at 15 CFR Part 930.

The Applicant is required to certify that the proposed activity complies with the Commonwealth of Pennsylvania's Coastal Resources Management Program (CRMP) which administers CZM. On January 26, 2016, ITC Lake Erie filed a non-federal applicant's consistency certification, finding that the proposed LEC Project is fully consistent with the enforceable policies of the Pennsylvania CRMP (***Appendix H***). A final consistency determination will be provided in the Final EA.

Additional information on the Pennsylvania Department of Environmental Protection (PADEP) CRMP can be found at the link below: https://www.dep.state.pa.us/river/fedconsistency/fedconsistency.htm.

1.7 ORGANIZATION OF THIS DRAFT EA

This draft EA for the proposed LEC Project addresses the following environmental resource areas in detail:

- Land Use
- Transportation and Traffic
- Water Resources and Quality
- Aquatic Habitats and Species
- Protected and Sensitive Aquatic Species
- Terrestrial Habitats and Species
- Terrestrial Protected and Sensitive Species
- Terrestrial Wetlands
- Geology and Soils
- Cultural Resources
- Infrastructure
- Recreation
- Visual Resources
- Public Health and Safety
- Noise
- Hazardous Materials and Wastes
- Air Quality
- Socioeconomics
- Environmental Justice

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2 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The DOE's Proposed Action (Preferred Alternative) is the issuance of a Presidential permit that would authorize the construction, operation, and maintenance of the proposed LEC Project, which would cross the United States-Canada border. This EA has been prepared to comply with NEPA and to support DOE's decision regarding issuing a Presidential permit for the proposed LEC Project.

2.2 NO ACTION ALTERNATIVE

The No Action Alternative establishes the baseline against which the potential environmental effects of a proposed action can be evaluated. Under the No Action Alternative, DOE would not issue a Presidential permit to ITC Lake Erie for the proposed LEC Project; the transmission system would not be allowed to cross the United States-Canada border, the proposed Project would likely not be constructed in the United States, and potential effects from the proposed LEC Project would not occur. ***Section 4*** provides the No Action Alternative analysis.

2.3 PROPOSED LAKE ERIE CONNECTOR PROJECT OVERVIEW

ITC Lake Erie is proposing to construct and operate an approximate 72-mile, 1,000-MW HVDC bi-directional merchant electric transmission cable to transmit electricity between the United States and Canada. The proposed transmission cable would extend from Haldimand County, Ontario, to Erie County, Pennsylvania and would be the first direct interconnection between the market of PJM in the United States (Mid-Atlantic and Midwest regions) and the market of the IESO in Ontario, Canada (ITC Lake Erie 2015). The purpose of the proposed LEC Project is to facilitate the transfer of electricity, improve reliability, and diversify electric energy supply portfolios for both markets.

The United States Project facilities proposed by ITC Lake Erie include the approximately 42.8-mile portion of the HVDC transmission cable extending from the United States-Canada border in Lake Erie to the proposed new Erie County converter station, and the approximate 2,153 foot long underground 354 kV transmission cable connecting the new Erie Converter Station to the existing Penelec Erie West Substation. The approximate 42.8 miles of the United States' portion of the HVDC transmission cable would include an underwater cable system in the Lake Erie lakebed (Lake Erie Segment), and an underground cable system between the shoreline and the existing Erie West Substation, including the new proposed Erie Converter Station (Overland Segment). Details on the Lake Erie and Overland Segments are provided in ***Sections 3 and 5***.

Figure 2-1 presents a detailed map of the proposed LEC Project indicating the location of the international crossing, as required by DOE's regulations in 10 C.F.R. §205.322(b)(2).

The proposed transmission cable would be buried in the lakebed as it crosses Lake Erie and then buried underground between landfall in Erie County, Pennsylvania and the new Erie Converter Station. The HVDC technology proposed for use by the LEC Project has many advantages over AC technology for long distance power transmission, including the increased ability to control power flows and lower transmission cable losses. Public and environmental risks associated with electric and magnetic fields (EMF) are also lowered with the use of DC electric power. The new proposed Erie Converter Station would include equipment to convert the DC electric power transmitted by the proposed HVDC line, to AC electric power transmitted on the existing grid, and vice versa.

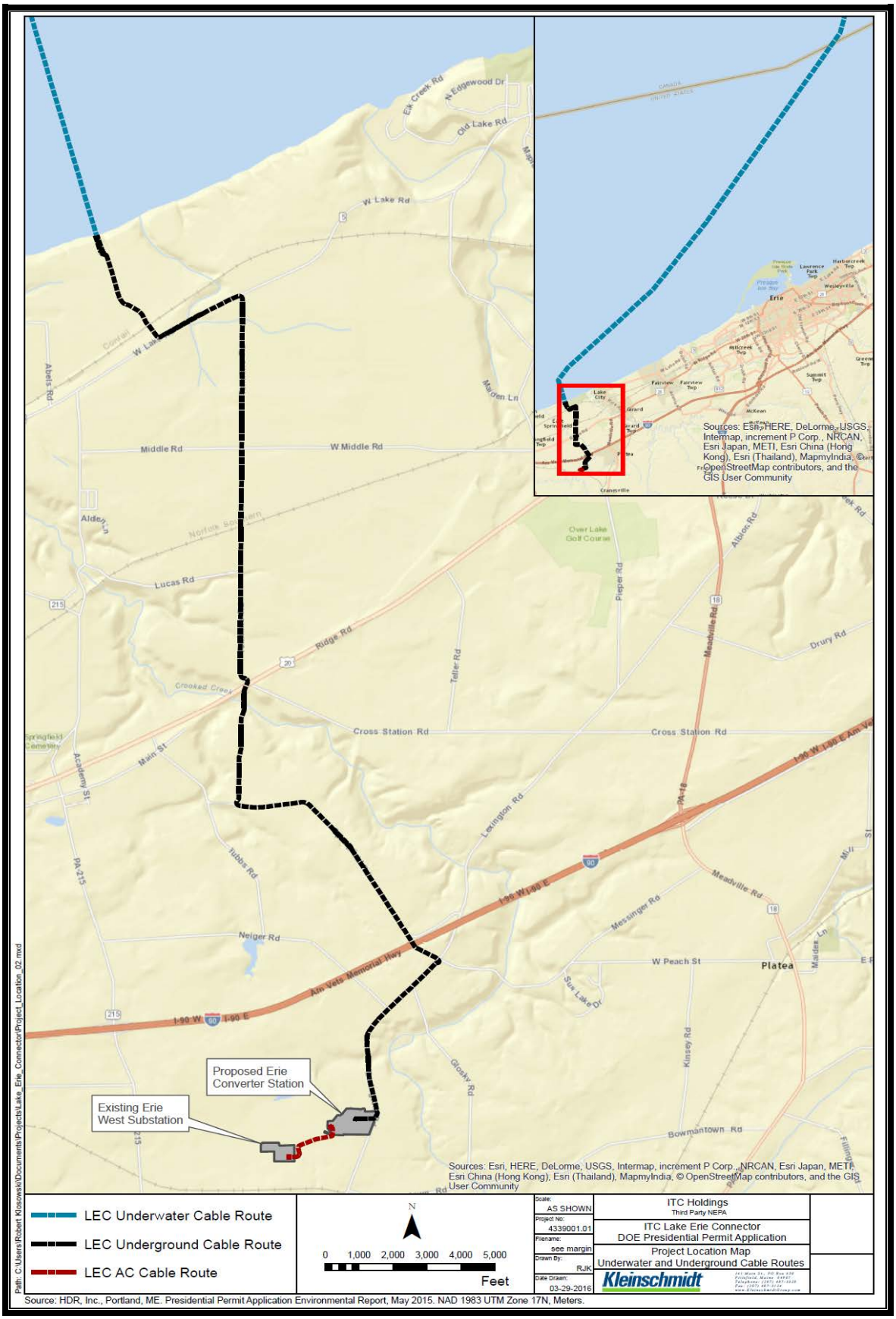


FIGURE 2-1: PROPOSED LEC PROJECT OVERVIEW MAP WITH UNDERWATER AND UNDERGROUND TRANSMISSION CABLE ROUTES

The estimated total capital cost of the proposed LEC Project, including the proposed facilities in both the United States and Canada, is $1 billion, with an anticipated Project in-service date of the fourth quarter of 2019. The proposed LEC Project schedule may be adjusted due to market conditions as a result of the competitive solicitation process that is being conducted for capacity on the line, and/or the timing of the formal engineering design process, or the permitting process.

2.4 PROPOSED PROJECT LOCATION, DESIGN, AND CONSTRUCTION METHODS

The following sections describe the proposed route segments and specific engineering details of the transmission system analyzed in this EA: underwater DC transmission cables; horizontal directional drilling (HDD) methods; terrestrial DC transmission cables; new proposed HVDC converter station in the Conneaut Township, Pennsylvania, and an interconnection at the existing Penelec West Erie substation, Erie County, Pennsylvania. A brief description of HDD is provided here; however, specific details of HDD, jet plow, and shear plow methods are described in ***Section 2.4.5***.

HDD is used to install conduit ducts for cable or wire products and to install pipelines. The technology avoids excavating a trench and is commonly used in a variety of situations, including crossing lakes, wetlands, rivers, and roads and railways. HDD would be used for longer crossings where open trenching is less appropriate, with the largest, most complex HDD operation proposed to occur at the transition points between land and Lake Erie in the proposed LEC Project (HDR 2016). HDD would allow for the avoidance or minimization of disturbance to the Lake Erie shoreline, bluff, and near-shore areas.

The DOE analyzed the technology and construction methods of two similar proposed projects in the Champlain Hudson Power Express (CHPE) Final Environmental Impact Statement (FEIS) (DOE 2014)[3] and the New England Clean Power Link Project (NECPL) Final Environmental Impact Statement (DOE 2015)[4]. These projects are proposed in the states of New York and Vermont, respectively. The proposed LEC Project would use similar technology and construction methods, and Volume 2, pp 2-12 to 2-28, of the CHPE FEIS, and Volume 1, pp 2-8 to 2-20, of the NECPL FEIS are incorporated here by reference. The following short summary of the technology and construction methods provides context for the proposed LEC Project effects analysis in ***Section 5*** and is taken from ITC Lake Erie's Environmental Report (ITC Lake Erie 2016).

2.4.1 DESCRIPTION OF PROPOSED ROUTE SEGMENTS

The proposed transmission cable route would be divided into two segments: a Lake Erie Segment (underwater), and an Overland Segment (terrestrial). ***Table 2-1*** summarizes the proposed LEC Project route, including the corridor type and approximate length for each segment.

[3] http://www.chpexpress.com/
[4] http://www.necplinkeis.com

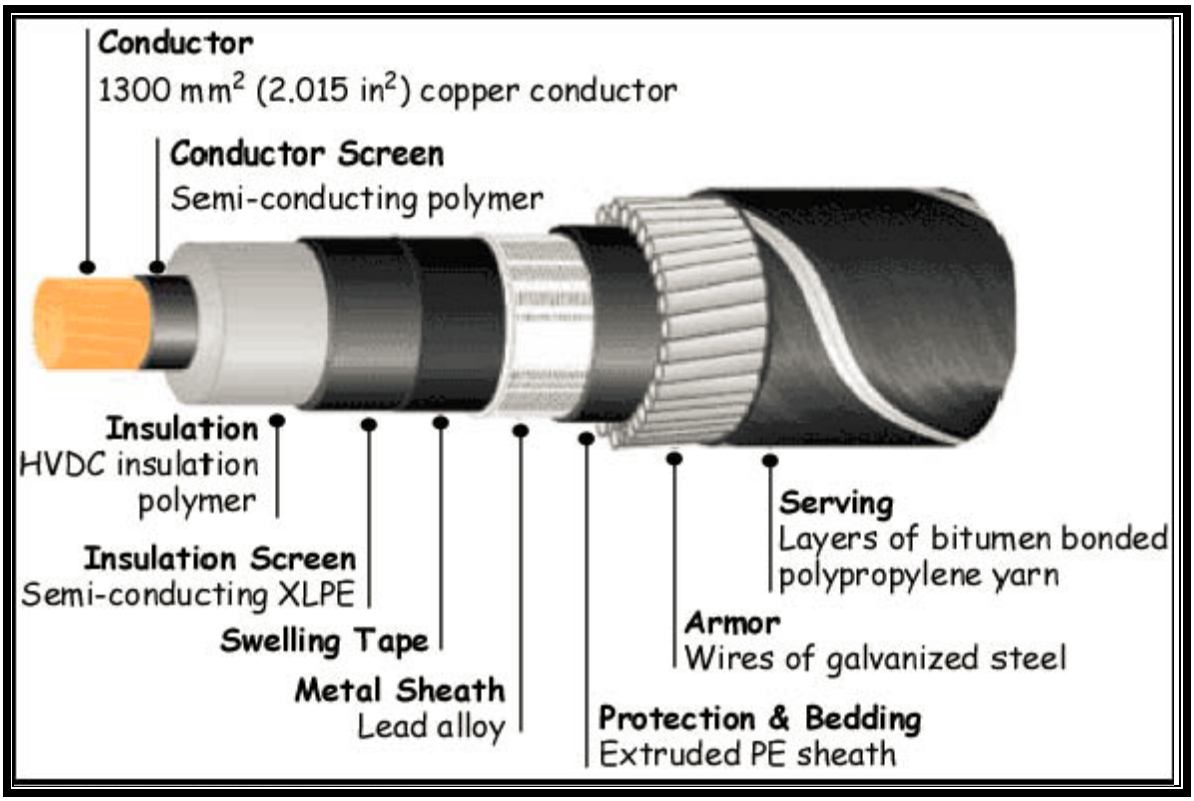
TABLE 2-1: PROPOSED LEC PROJECT ROUTE SUMMARY

Cable Section	Segment	Corridor Type	Approximate Length (miles)
United States-Canada Border in Lake Erie to landfall west of Erie Bluffs State Park, in Springfield Township, Pennsylvania	Lake Erie	Aquatic	35.4
Private property landfall in Erie County, Pennsylvania to West Lake Road	Overland	Terrestrial	0.6
West Lake Road (State Route 5) heading east	Overland	Terrestrial	0.5
South following Townline Road crossing into Girard Township to intersection with Ridge Road (U.S. Route 20)	Overland	Terrestrial	2.3
Ridge Road to Springfield Road	Overland	Terrestrial	0.7
Springfield Road	Overland	Terrestrial	1.6
Lexington Road	Overland	Terrestrial	1.2
Crosses private property to new Erie Converter Station property in Conneaut Township	Overland	Terrestrial	0.1
New Erie Converter Station to Penelec Erie West Substation	Overland	Terrestrial	0.4

Source: ITC Lake Erie, 2016

2.4.2 AQUATIC DIRECT CURRENT TRANSMISSION CABLE

ITC Lake Erie proposes to install transmission HVDC cables rated at +/- 320 kV in the Lake Erie Segment. The underwater HVDC transmission cables would be solid dielectric extruded insulated HVDC cables, which would be deployed with a fiber optic cable. An extruded lead moisture barrier with a polyethylene jacket would be used to protect the insulation system. An armoring system consisting of one layer of galvanized wires with bedding layers would be installed over the polyethylene jacket to protect the cable and provide additional strength during installation. Each cable would be approximately 6 inches in diameter and weigh approximately 41.9 pounds per foot (lb/ft). ***Figure 2-2*** provides an example of a typical aquatic HVDC transmission cable. The two underwater HVDC transmission cables and the fiber optic cable would be bundled together during installation to minimize disturbance and external electrical and magnetic fields (ITC Lake Erie 2016).



Source: DOE 2015

FIGURE 2-2: EXAMPLE AQUATIC HVDC TRANSMISSION CABLE CROSS-SECTION

Through additional surveys in 2015, ITC Lake Erie refined the proposed transmission cable alignment to an approximately 328-foot width in the route corridor. ***Figure 2-3*** shows the proposed LEC Project route in kilometer post (KP), beginning at KP1 from the Ontario, Canada landfall location, to the Canada-United States border at KP 47, and the location of the landfall in Pennsylvania, KP 103.8. The proposed underwater transmission cables would be generally sited to maximize the system's operational reliability while minimizing the costs and potential environmental impacts caused during construction, operation, and maintenance (HDR 2016).

ITC Lake Erie would bury the proposed transmission cables in the lakebed to protect them from shipping traffic, fishing activity, and ice scour damage. A detailed description of the Lake Erie Segment installation is described in ***Section 2.4.5.1***. Typical burial depths in areas where the transmission cable would be installed by jet plow or water jetting range from 3 feet to 10 feet. In the approximately 0.9-mile long area where the transmission cables would be installed in trenches within the bedrock from the end of the HDD borings to the softer lakebed sediments the burial depths would be approximately 6 feet. The HDD segment of the Lake Erie Segment is approximately 0.47 miles in length, approximately 0.37 miles of which is under the Lake, and burial depths would vary from approximately 3 to 100 feet. No existing utility crossings have been identified for the proposed transmission cable route in the United States (ITC Lake Erie 2016).

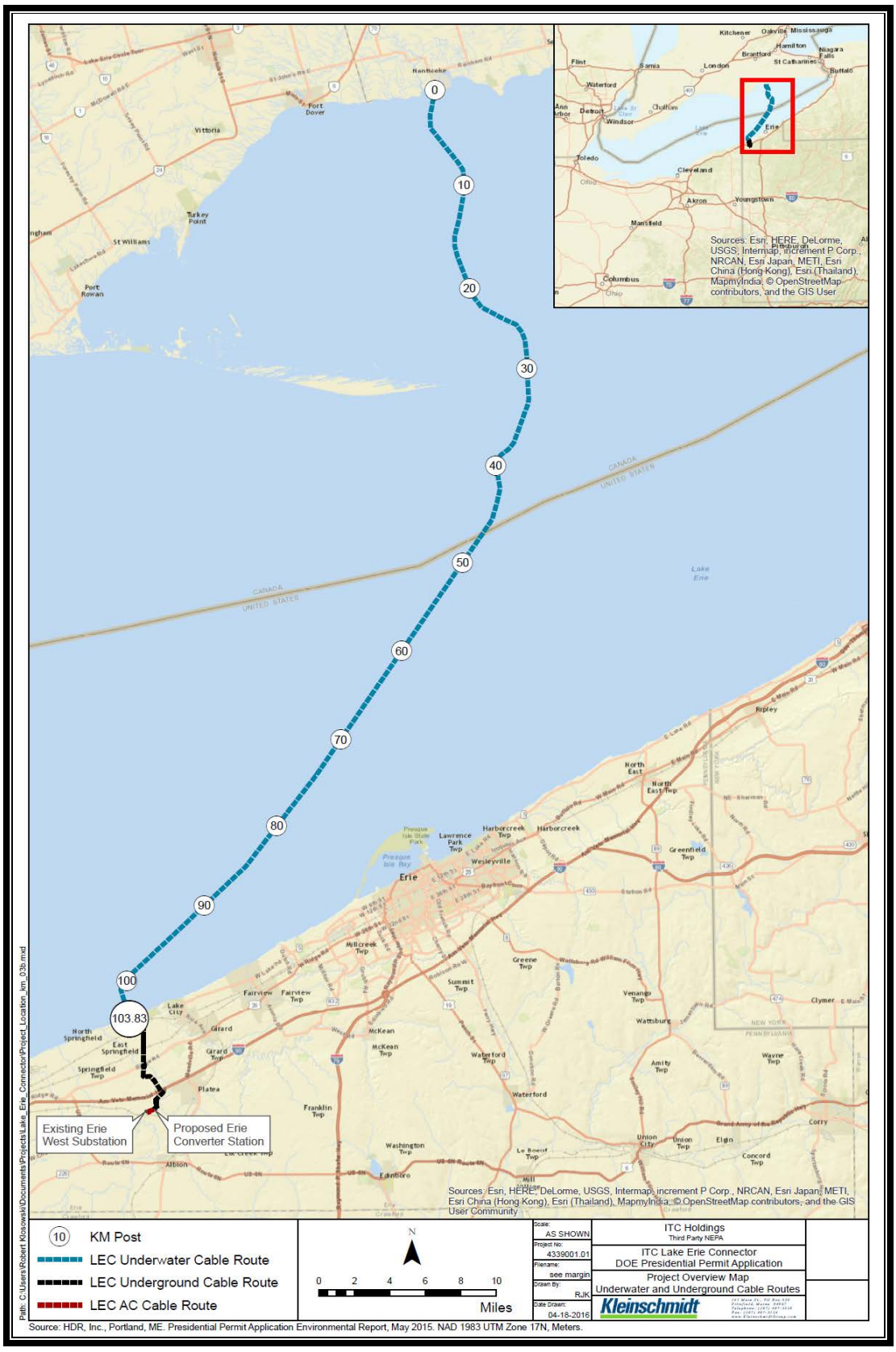
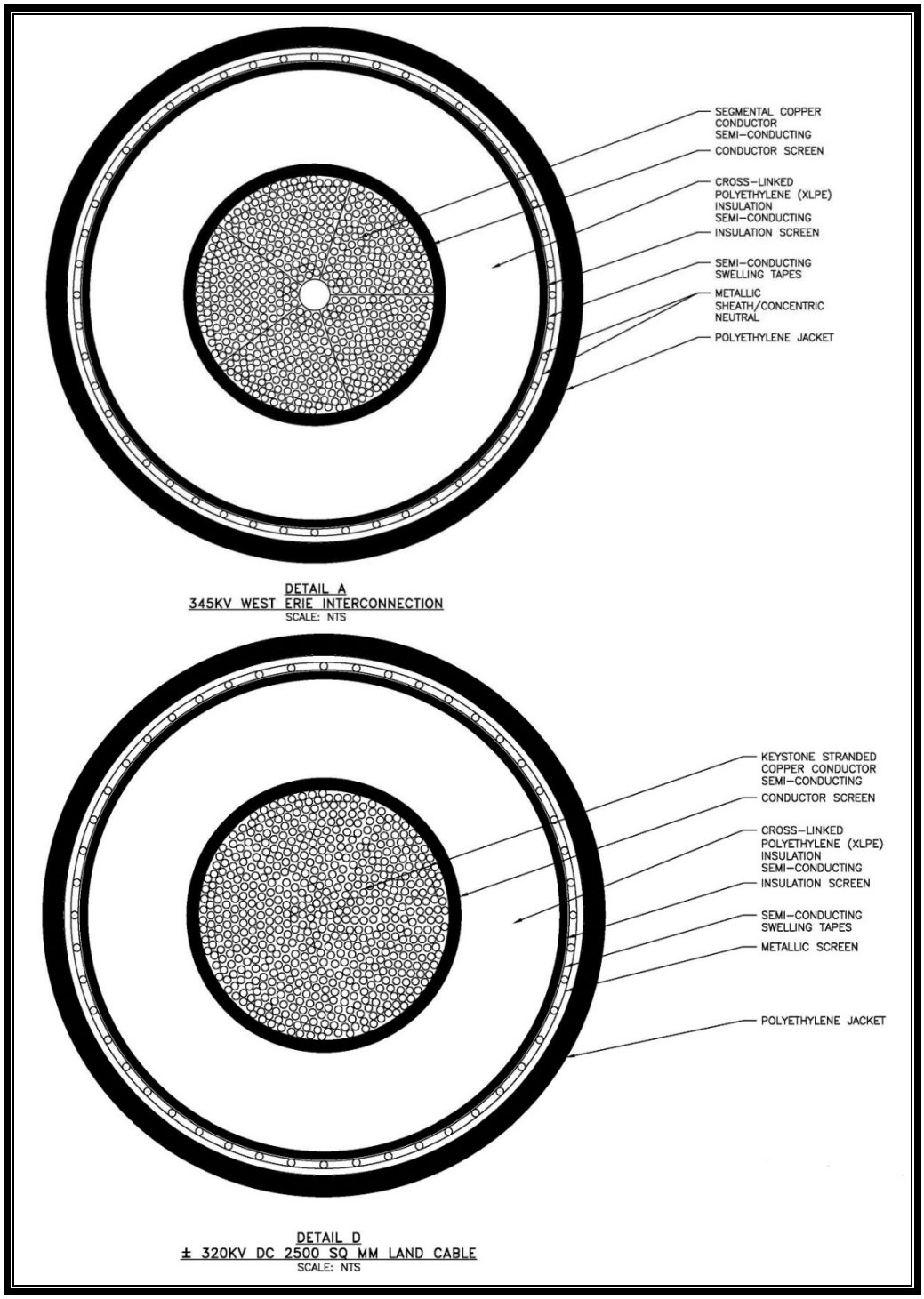


FIGURE 2-3: PROPOSED LEC PROJECT ROUTE IN KILOMETER POST

2.4.3 TERRESTRIAL TRANSMISSION CABLE

The Overland Segment of the LEC Project includes that portion of the HVDC transmission cable that would not be buried in the Lake Erie lakebed. The Overland Segment also includes the underground AC transmission cables that would connect the new Erie Convertor Station to the existing Penelec Erie West Substation. As with the Lake Erie Segment, the Overland Segment HVDC transmission cable would consist of two high-voltage cables, along with a fiber optic communications cable, all of which would be underground. The proposed underground transmission cable route would extend approximately 7 miles from the Lake Erie landfall, which is located on private property west of Erie Bluffs State Park, to the proposed new Erie Converter Station site in Erie County, and to the existing Penelec Erie West Substation. ITC Lake Erie holds a purchase option agreement with respect to property of the proposed landfall location. The majority of the proposed transmission cable route follows existing road right-of-ways (ROW) to minimize environmental disturbance.

The underground HVDC transmission cables would be constructed with a central copper conductor insulated with extruded solid dielectric polymer rated at +/- 320-kV HVDC. The diameter of each proposed underground HVDC transmission cable is approximately 5 inches and weighs approximately 22 lb/ft. The AC cables connecting the new Erie Converter Station to the existing Penelec Erie West Substation would measure approximately 2,153 feet in length. The AC transmission cable would consist of six 345- kV AC cables with solid dielectric polymer insulation. The proposed transmission cables would be placed underground at an approximate depth of 3 feet to 6 feet (somewhat more at stream or culvert crossings) (HDR 2016). ***Figure 2-4*** provides a diagram of both HVDC and AC transmission cables proposed to be used in the Overland Segment.

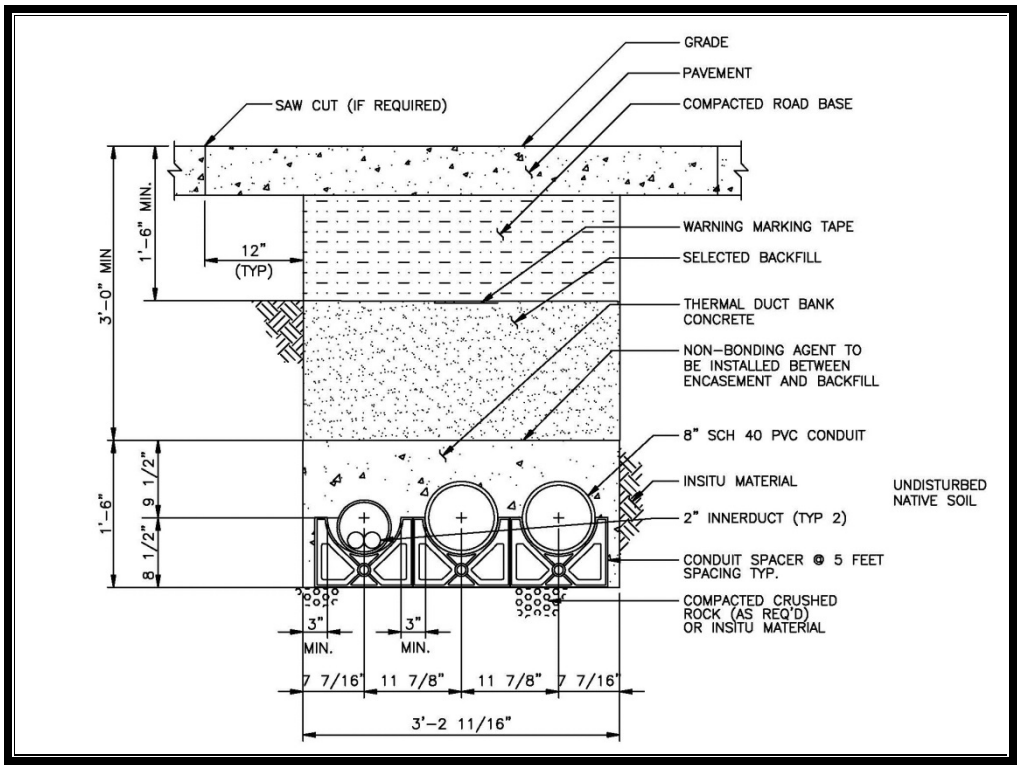


Note: AC (Top) and HVDC (Bottom)

FIGURE 2-4: TYPICAL TRANSMISSION CABLE CROSS SECTIONS

For the underground portions of the proposed HVDC transmission cable route, the two cables would typically be installed along with a fiber optic cable in a concrete-encased polyvinyl chloride (PVC) or high density polyethylene (HDPE) conduit duct bank with a minimum 3 feet of cover. In selected areas, low thermal resistivity material, such as well-graded sand, stone dust, or fluidized thermal backfill

(controlled density low strength concrete) may be used to encase the PVC conduit. A marker tape would then be placed 1 foot to 2 feet above the transmission cables in the trench. The top 1 to 2 feet of the trench would be backfilled to match the surrounding area. A representative cross section of a typical duct bank is provided in ***Figure 2-5*** (HDR 2016).



Source: ITC Lake Erie, 2016
Note: Figure is representative.

FIGURE 2-5: TYPICAL DUCT BANK CROSS SECTION

The proposed transmission cable conduits would be installed by HDD or cased auger boring (jack and bore) where it would be unable to install the duct bank by trenching. This would include significant water crossings, railroad crossings, and certain highway crossings.

The majority of the Overland Segment would be installed within existing roadway ROWs using the methods described in ***Section 2.4.5.2***. Limited portions of the proposed transmission cable would be located on private property. A typical temporary construction area in the roadway ROW would be approximately 24 feet to 38 feet (HDR 2016). The proposed transmission cables would be installed either outside the improved roadway surface but within the ROW, or under the pavement where necessary or appropriate. ITC Lake Erie would coordinate the exact locations of the transmission cables with Pennsylvania Department of Transportation (PennDOT) and the townships. Proposed construction activities, including traffic management and paving restoration, would be coordinated with the PennDOT, the respective townships, and adjacent property owners, as appropriate, to minimize traffic disruption during installation. Construction activity would generally be conducted during daytime hours.

Construction Access and Temporary Workspace

The temporary construction work areas for the proposed cable installation would be primarily in existing roadway ROWs. A typical temporary construction area in the roadway ROW would be approximately 15 feet to 38 feet wide. Transportation of construction equipment and materials over weight-posted roads would be coordinated with PennDOT, applicable local townships, and law enforcement authorities depending on the location.

Excavated soils would be temporarily stockpiled within the worksite or transported to an offsite location if onsite storage is not possible, with topsoil placed separately from excavated subsoils. At wetland and stream crossings, soil stockpiles would be stored in temporary upland workspaces away from the wetland area.

2.4.4 PROPOSED NEW ERIE CONVERTER STATION DESCRIPTION

The proposed new Erie Converter Station site location and layout is shown in ***Figure 2-6***. The location and layout of the new Erie Converter Station is intended to be close to the existing Penelec Erie West Substation, avoid wetland impacts, and minimize other environmental effects.

A permanent developed area of approximately 6 acres would be required for the proposed new Erie Converter Station, associated equipment and access ways. In addition to the permanent area occupied by the new Erie Converter Station facilities, additional area would be occupied by related construction period and post-construction stormwater management facilities. Additional area would be temporarily disturbed during construction for material laydown and staging and to support construction efforts. The total disturbed area (temporary and permanent) associated with the proposed new Erie Converter Station site would be approximately 21.4 acres (***Figure 2-7***). The new Erie Converter Station would have a main building (approximately 370 feet by 110 feet), with a building footprint of approximately 1 acre and a height of approximately 60 feet (***Figure 2-8***). The main building would house HVDC converter modules. In addition to the main building, a service building to contain the control and protection equipment, cooling equipment, and auxiliary distribution panels and a storage building would be located within the 6 acre footprint. The HVDC converter modules would convert the AC power to DC power using Voltage Source Converter (VSC) technology which uses Insulated Gate Bipolar Transistors (IGBTs). The primary equipment installed outside of the buildings would likely include circuit breakers, disconnects, surge arrestors, transformers, cooling equipment, and metering units. The facility would also have an emergency generator. Security fencing would prevent unauthorized access.

A driveway approximately 20 feet wide, with an approximate maximum 3-foot shoulder would provide access to the site from nearby roadways. Culverts would be installed to maintain appropriate conveyance of stormwater flows without adverse impact to upstream or downstream properties.

The new Erie Converter Station would interconnect with the existing electrical power systems at the nearby existing Penelec Erie West Substation POI through underground AC cables (ITC Lake Erie, 2016).

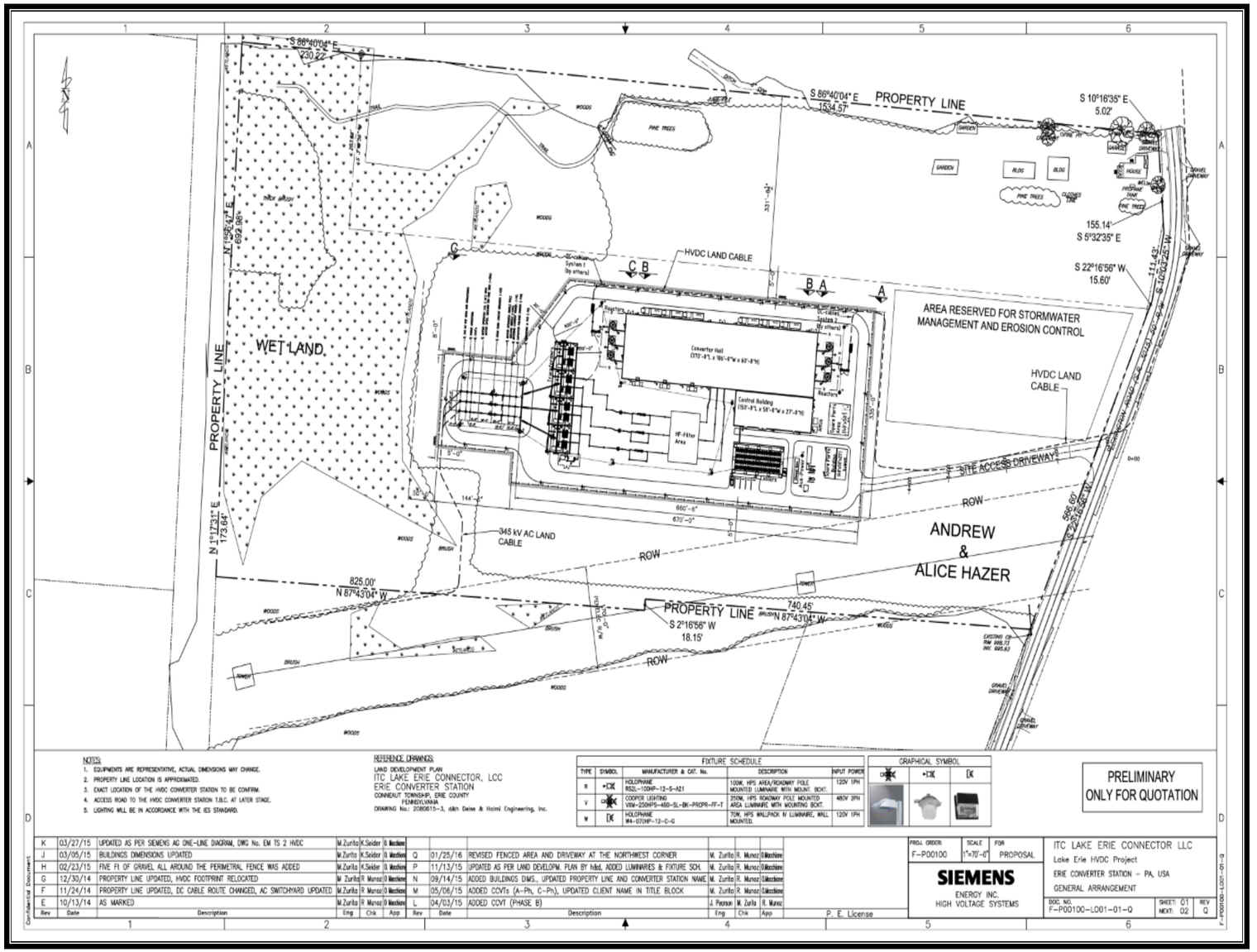


FIGURE 2-6: PRELIMINARY ERIE CONVERTER STATION SITE LOCATION AND LAYOUT

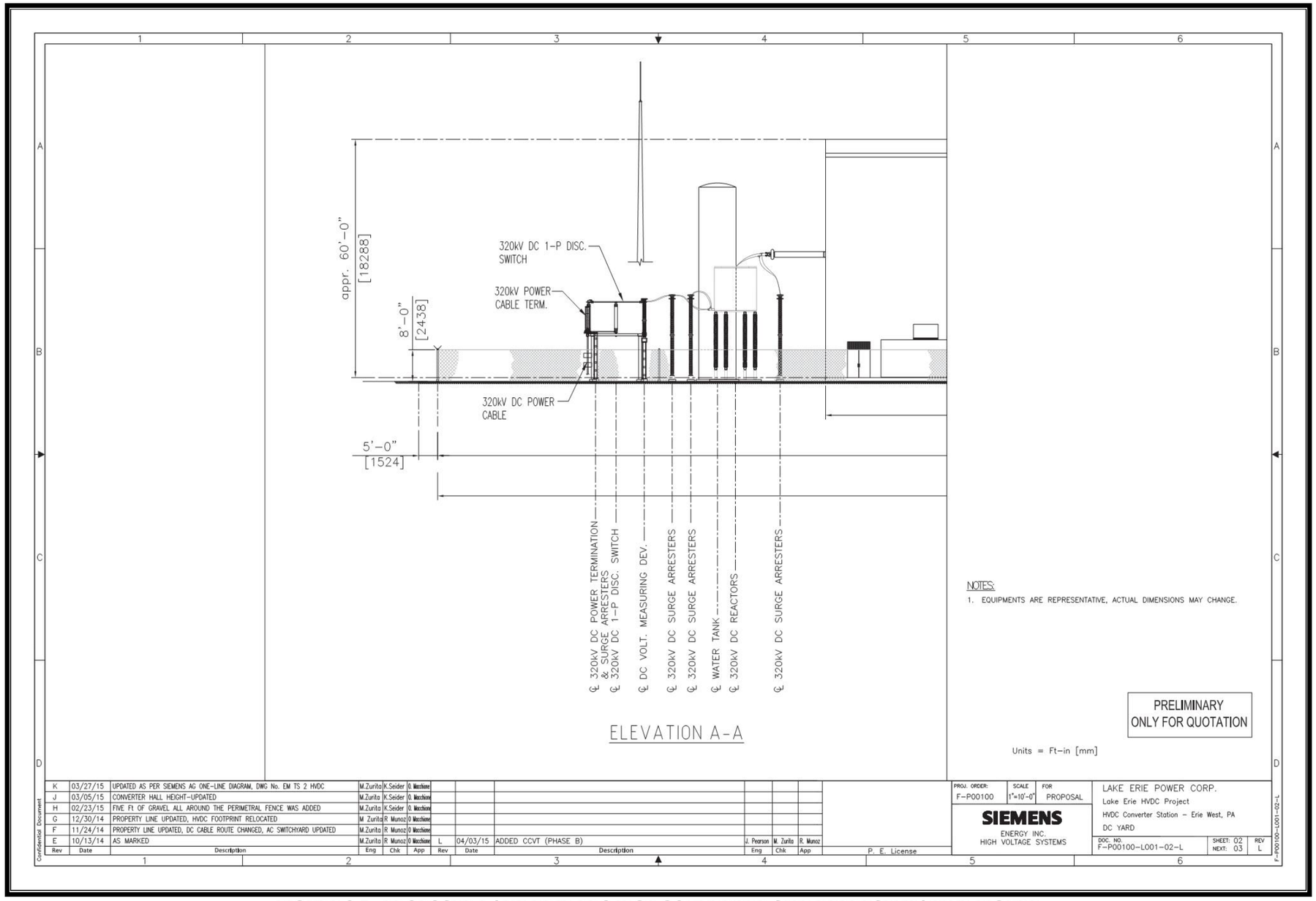


FIGURE 2-7: PROPOSED LAKE ERIE PROJECT CONVERTER SITE REPRESENTATIVE FIGURE

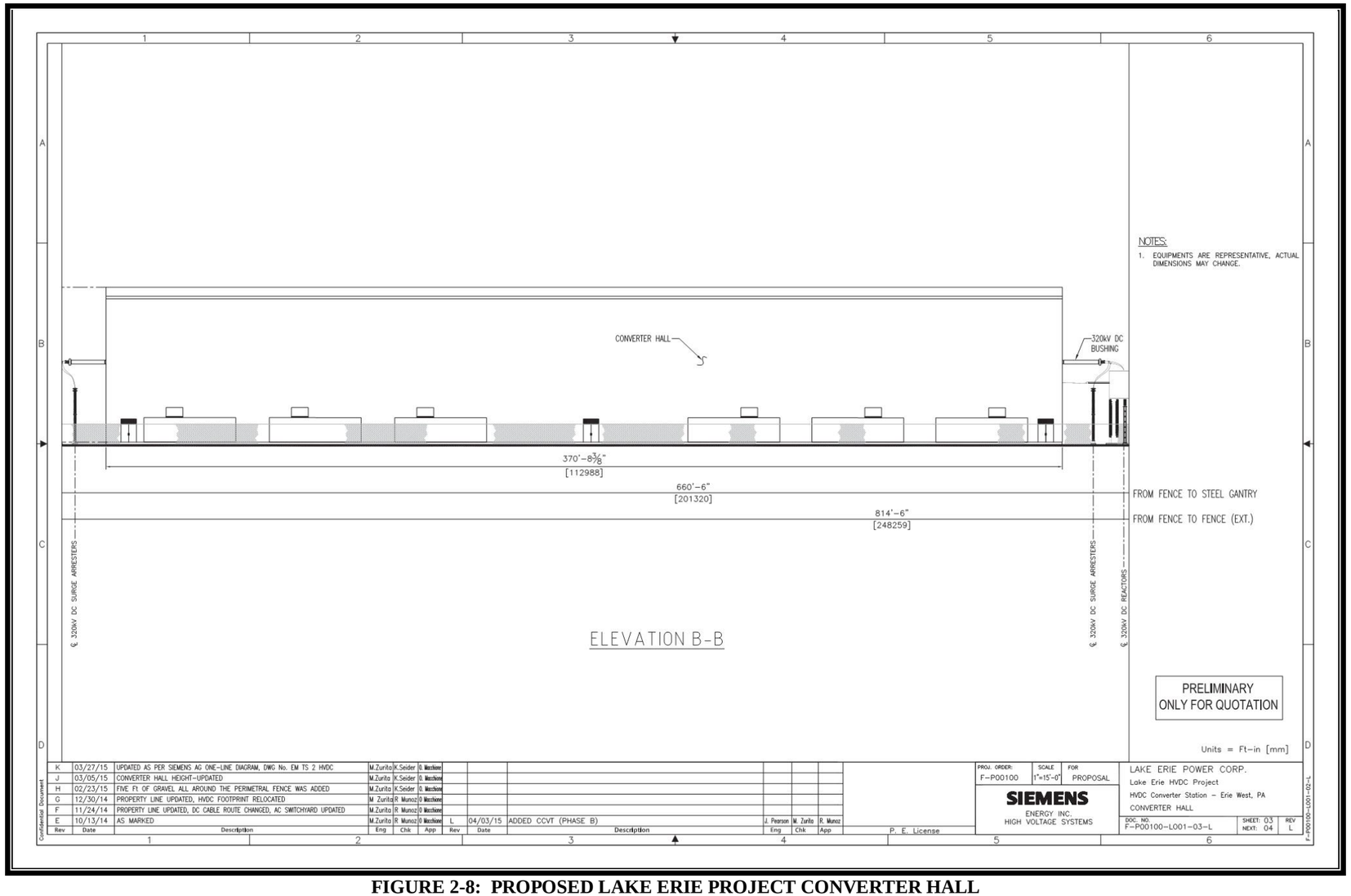


FIGURE 2-8: PROPOSED LAKE ERIE PROJECT CONVERTER HALL

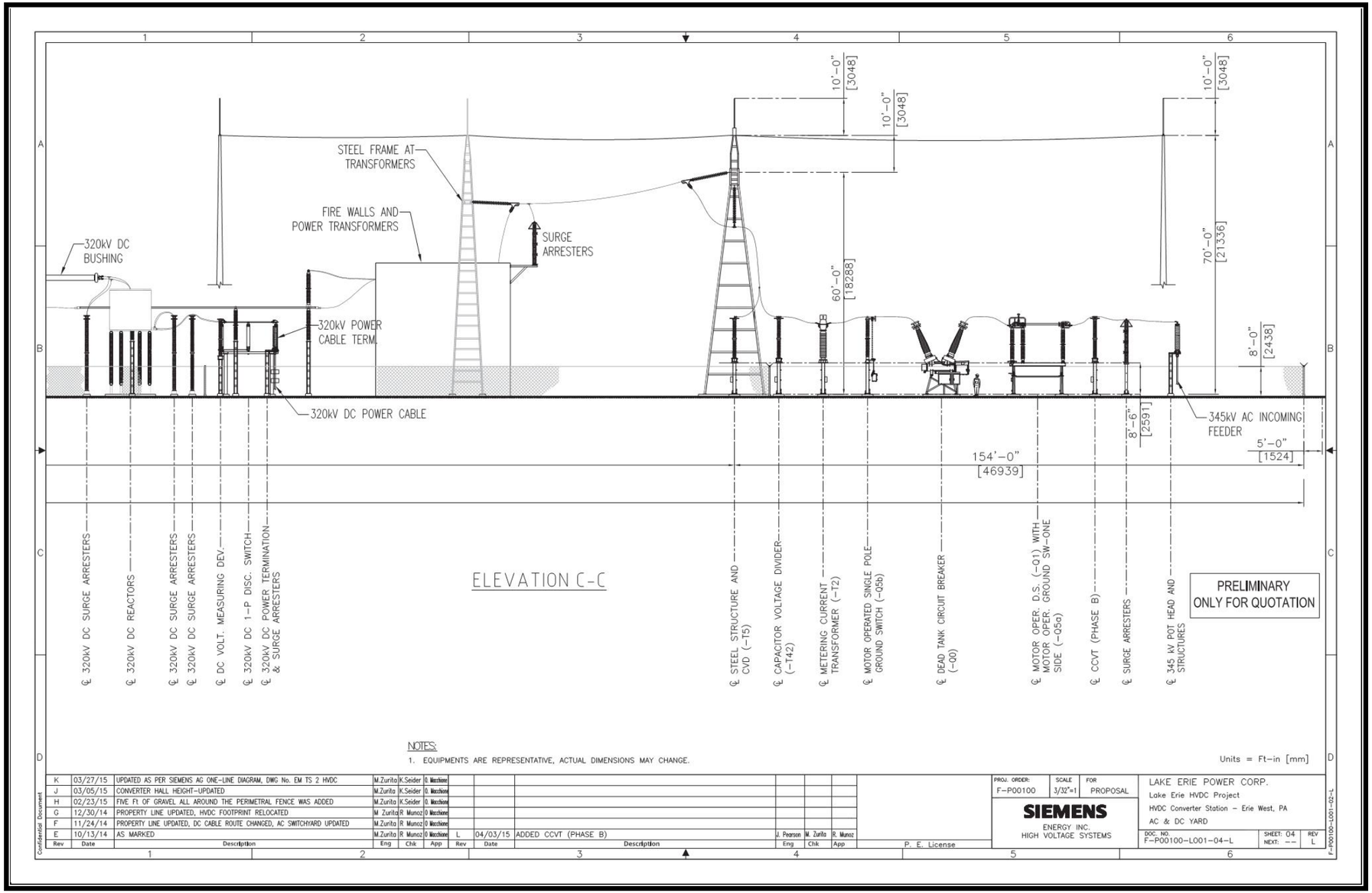


FIGURE 2-9. PROPOSED LAKE ERIE PROJECT HDVC CONVERTER STATION AC AND DC YARD

2.4.5 CONSTRUCTION AND SCHEDULE

2.4.5.1 Aquatic Transmission Cable Installation in Lake Erie Segment

The general sequence for installing the proposed underwater HVDC transmission cables would be as follows:

- install HDD conduit;
- perform pre-lay grapnel run; and
- install cable in lakebed (in trenches within bedrock and via jet plow or water jetting methods in softer sediments).

Specific construction methods are further detailed below.

Horizontal Directional Drilling Method

The equipment used in an HDD operation includes an HDD drilling rig system, a drilling fluid collection and recirculation system, and associated support equipment. The technology avoids excavating a trench and is commonly used in a variety of situations, including crossing lakes, wetlands, rivers, and roads and railways. HDD would be used for longer crossings where open trenching is less appropriate, with the largest, most complex HDD operation proposed to occur at the transition points between land and Lake Erie (HDR 2016). HDD would allow for the avoidance or minimization of disturbance to the Lake Erie shoreline and near-shore areas.

Horizontal directional drilling is accomplished by using a guided drill rig to open a pilot bore. Multiple reaming passes of the pilot bore open the hole to the diameter required to install the pipe bundle into the borehole; the borehole is typically 50 percent larger than the pipe bundle. Drilling fluid would primarily consist of a combination of water and bentonite clay (a naturally occurring nontoxic mineral). In some instances, additives to improve viscosity, improve borehole integrity, and prevent or reduce potential fluid release may be added during drilling operations. These additives may include clays, organic fibers, modified starches, and non-reactive polymers. No petroleum-based additives would be used. All potential additives would be identified in the drilling plan submitted to and approved by the applicable environmental agencies (HDR 2016).

Once the borehole is open and stable, a bundle of fused or welded pipe would be pulled into the borehole. For the proposed LEC Project, the pipe would be HDPE heat fused into a single length before being pulled into the borehole.

For each proposed HDD location, three separate drill holes would be required, one for each cable, including the fiber-optic cable. For the shoreline crossings, a single 14-inch to 18-inch pipe would be installed in each borehole as a casing pipe. Smaller, 10-inch to 12-inch pipe would be used for HDD installations on land, which have smaller-diameter cables. A minimum spacing of approximately 33 feet between the shoreline borehole paths and 15 feet between land borehole paths would be required to minimize interference. (HDR 2016).

The shoreline crossings at Lake Erie would be completed by three separate HDD bores, one bore for each of the two proposed HVDC transmission cables and one bore for the fiber optic cable. ITC Lake Erie estimates that the HDD would exit the Lake Erie lakebed approximately 2,000 feet from the Pennsylvania shoreline, at a water depth of approximately 18 feet (HDR 2016) and the distance between bores at the exit would be approximately 33 feet.

The rocky and steep nature of the bluffs would require an HDD operation with special attention to prevent fluid releases into the nearshore area of Lake Erie. The HDD contractor for each installation

would provide and implement a Drilling Fluid Management Plan. The Drilling Fluid Management Plan would identify the fluid handling, recovery, recycling, and disposal procedures and equipment (HDR 2016)

The shoreline HDD operation would occur in a temporarily cleared work area of approximately 150 feet by 225 feet for large HDD operations; the work area for small HDD operations would be approximately 15 feet wide by 50 feet long such that it may be performed alongside a roadway. Setup for the HDD boring in most cases would be located a minimum of 50 feet from stream and wetland areas. Boring equipment setups would not be staged in wetlands. Generally, small (6 feet by 6 feet by 4 feet) sump pits may be excavated at the drill entry and exit points to accumulate drilling fluid and associated drill spoil to be pumped into tank trucks.

Drilling fluid solids (bentonite clay) and cuttings would be contained and settled in tanks or sediment traps and subsequently disposed of at an approved offsite facility. Bentonite clay is a solid that is denser than the water used to make drilling fluid. As the drilling fluid percolates through the soil, it would filter bentonite clay particles from the fluid. Water used in the drilling fluid would be recovered and reused after filtering out cuttings, and then disposed at an approved facility. Excavated soils would be temporarily stored onsite during the proposed construction and would be used to restore the construction site to its previous grade once the drilling process had been completed, or the excavated soils would be transported for disposal/reuse at an approved location. Once restored to original grade, the disturbed areas would be seeded with an appropriate seed mix for natural revegetation.

Prior to drilling operations, three offshore sump pits would be excavated (in rock) where each HDD bore would exit (one bore for each HVDC transmission cable and one bore for the fiber optic cable). Each pit would be approximately 20 by 10 by 7 feet and designed to contain approximately 10,000 gallons of bentonite should there be an unexpected discharge. The bentonite clay would aggregate in soil pore spaces and would not enter the groundwater. Any bentonite that is discharged would be contained at the bottom of the sump (bentonite clay has a specific gravity greater than water). Divers and video cameras would monitor the sump, and if bentonite is discharged, divers would employ a submersible pump to recover the bentonite slurry into tanks that are located on the support barge (ITC Lake Erie 2016). Using this system would minimize the amount of disposal required and minimize potential impacts to water quality from the release of bentonite. The drilling mud would be returned to shore (in the tanks) for upland disposal.

At the land side terminus of the HDD bore, a pit would be excavated to contain any drilling fluids for later pumping out and disposal and to act as a start point for the proposed transmission cable burial. The HDD installation of the three bores (two for the transmission cables and one for the fiber optic cable) would take three months. Clear access to the end of the bore would be required during the HDD operation, together with calm lake waters and low wind speeds; therefore, the Lake HDD would occur during summer (between June and September) months (ITC Lake Erie 2016).

Pre-Lay Grapnel Run

The purpose of a pre-lay grapnel run is to locate any immovable obstructions, such as large boulders, and to remove any smaller obstructions such as fishing gear, rocks, or wood. During this process a grapnel chain is towed along the lake bottom. The grapnel penetrates the lake bottom to a depth of approximately 3.3 feet depending on sediment type. If an obstacle were to be encountered, the barge would stop and a diver would be dispatched prior to the obstacle being brought to the surface for disposal. Debris recovered and brought to the surface would be disposed of at an approved upland facility. If an object is too large or immovable, the location would be recorded and the route adjusted to avoid the obstacle during the proposed transmission cable installation. It is expected that such route adjustments would be accommodated within a 328 foot corridor (ITC Lake Erie 2016).

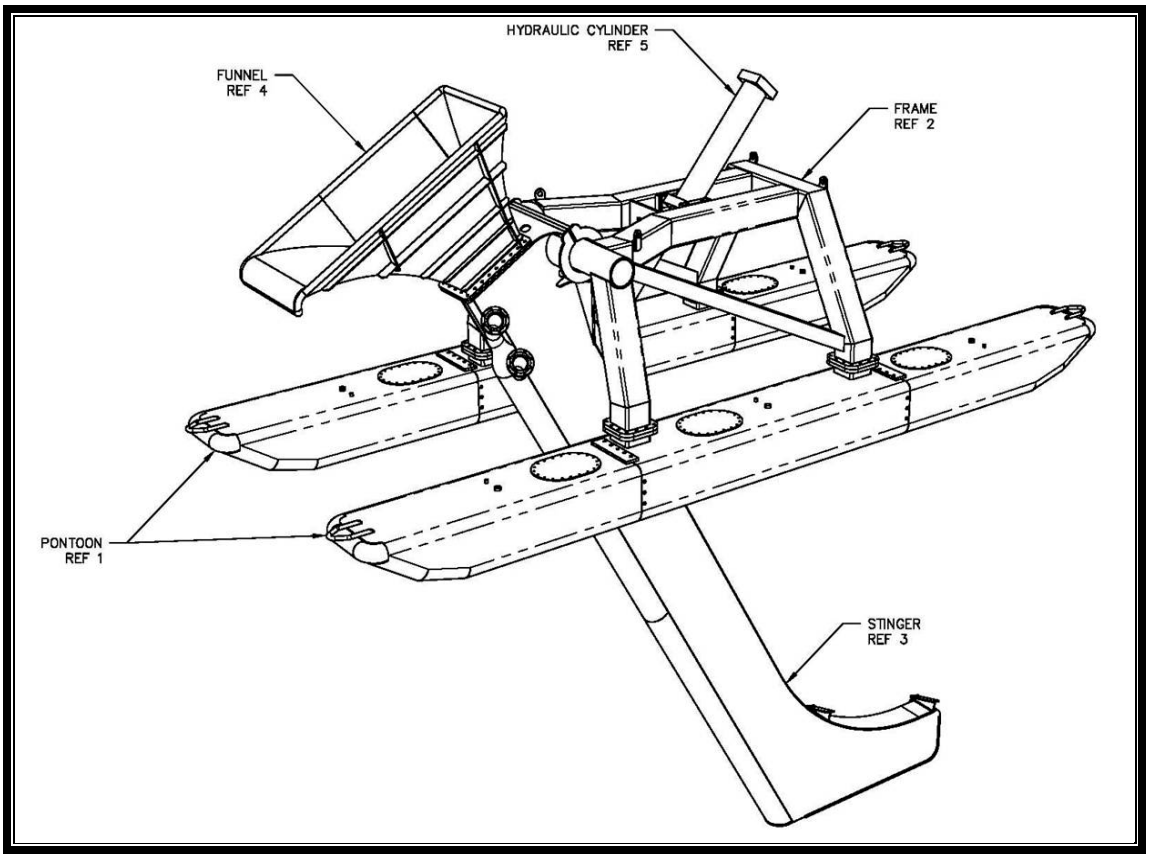
Lakebed Cable Installation

Bedrock is either exposed or very close to the surface of the lakebed for a substantial distance from nearshore to deeper water (approximately 1.3 miles) at the Erie landfall location. In this nearshore area, a trench would be excavated in the bedrock (primarily shale) from the exit of the HDD bore at approximately KP 103.4 to the softer lakebed material where the sediment overlay is deep enough that jet plow burial could be used (approximately KP 102) (***Figure 2-3***). A trench would be excavated in the bedrock approximately 6 feet below the natural top of the bedrock; the width would be approximately 4 feet. Any sediment overburden above the bedrock trench would first be excavated and side cast. A barge-mounted drill would then drill 4-inch stemmed charge blast holes to a depth of 4 feet below planned excavation grade. The holes would be packed with low-level Hydromite emulsion explosive and detonated. The blasted rock would be removed by a barge-mounted excavator and side cast. Side casting refers to the construction method where the cut is placed on the high side balanced by moving the materials to build up the low side, achieving a flat surface for the cable route. The trench in the bedrock would be bedded and backfilled with a sand, gravel, or rock originating from an on-land source.

Beyond the nearer shore areas underlain by shallow bedrock, proposed transmission cable installation would be conducted using a towed jet plow or by water jetting, likely using a remotely operated vehicle (ROV). Jet-plowing is a very common technique for burying submarine cables and uses the combination of a plow share and high pressure water jets to fluidize a trench in the lakebed (***Figure 2-10*** and ***Figure 2-11***). The installation process would be conducted using a dynamically positioned vessel and towed plow device that simultaneously lays and buries the underwater transmission cables in a trench (HDR 2016).

Source: ITC Lake Erie 2016

FIGURE 2-10: PHOTOGRAPH OF A TYPICAL JET PLOW



Source: ITC Lake Erie 2016

FIGURE 2-11: DIAGRAM OF A TYPICAL JET PLOW

Water jetting methods are similar to jet-plow installation methods in that both use water to fluidize sediment within the cable trench to facilitate cable burial. The jet-plow is supported on the lakebed by pontoons or skids and pulled along the sediment surface. The very soft sediment in the deeper areas of Lake Erie (approximately between KP 15 and KP 55[5]) may not support the weight of the jet-plow. Water jetting tools or ROVs are neutrally buoyant and often self-propelled, moving just above the lakebed and pre-laid cable. Unlike the jet-plow, there is no mechanical force used to pull the plow through the sediment and water jetting relies solely on the weight of the cable to sink through the fluidized sediment to the desired burial depth.

Cable laying is a continuous procedure. The majority of material required for the proposed transmission cable installation would be transported and stored on the installation vessel. In the unlikely event that extreme weather conditions cause the cable installation to stop, the cable would either be surface laid along the route, or in extreme cases, the transmission cable would be cut. Following return of appropriate weather conditions, the transmission cable would be retrieved, spliced as necessary, and the installation process would continue.

The proposed transmission cable installation in the United States and Canadian waters would occur over a 2.5 year period. In the first year, HDD and bedrock trenching would be conducted. During the second year, the pre-lay grapnel run and transmission cable installation would occur, including jet

[5] The Canada/United States border is at KP 47, so water jetting may occur in U.S. waters from approximately KP 47 - 55.

plowing or water jetting in soft sediments. These activities are expected to occur between May and November each year. Jet plowing would proceed at approximately 0.9 to 1.2 miles per day.

2.4.5.2 Terrestrial Transmission Cable Installation in Overland Segment

The general sequence for installing the underground terrestrial DC transmission cables along road ROWs would be as follows:

- Initial clearing operations (as necessary) and install stormwater and erosion control measures.
- Excavate trench, install conduit and spacers.
- Backfill the trench 24 hours after encasement and install marking tape or tracer tape.
- Stabilize and restore areas over duct bank sections.
- Install splicing pits or vaults.
- Pull transmission cable into duct bank segment.
- Splice cable to adjacent transmission cable segments.
- Restore construction area to original conditions and install above- or at-grade markers indicating the location of underground HVDC transmission cables.

Most of the supplies and equipment required for installing terrestrial transmission cable within roadway ROWs would be transported via roadways whose ROW is being used. Construction workers would use local roadways to get to and from contractor yards or directly to the site. Construction of the underground transmission cables, both HVDC and AC, would take approximately 6 months (DOE 2015; HDR 2016).

Typical excavation equipment would be used to dig the trench (e.g., excavators, backhoes, loaders). A concrete-encased PVC or HDPE duct bank would be installed in the trench and the proposed transmission cable would be pulled into the duct bank. Due to weight restrictions for over-road hauling of cable reels, the underground transmission cable would be delivered and installed in lengths of not greater than 2,500 feet. Proposed transmission cables would be spliced together in pre-cast concrete splice vaults, which would be installed and backfilled in advance of jointing operations to reduce the duration of open excavations. These vaults would be approximately 9 feet wide by 30 feet long by 9 feet deep and installed with a minimum of 1.5 feet of cover. Splicing vaults typically include permanent access by a pair of 3-foot manhole access risers. Vaults would be designed for full road traffic loadings.

Approximately 20 splice vaults would be required on the United States side. The duct bank would be constructed first by excavating a trench, installing conduit on spacers, and encasing the conduit with thermally acceptable concrete or similar material. The trench would be backfilled and restored. After the full duct bank segment (vault to vault) is complete, the proposed transmission cable would be pulled into the duct bank and spliced to the next cable segment (HDR 2016).

Trenchless construction methods would be used at the Erie landfall location where the transmission cable transitions from the underwater to underground segments and may be used in other locations where open trenching is less appropriate due to either physical constraints (e.g., roadway or railroad crossings) or environmental constraints (e.g., certain wetland and stream crossings). There are two types of trenchless installation that could be used in construction of the proposed Project: jack and bore and HDD methods. These two methods are detailed further, below. (HDR 2016).

Jack and Bore Construction Method

Jack and bore (open-face, cased auger borings) would typically be used for crossings less than 300 feet with uniform, cohesive soils. An elevated water table could result in the need to dewater the jacking

and receiving pits. Closed-face casing installation methods such as micro-tunneling may be required in certain areas with high water tables and non-cohesive soils to prevent running soil conditions (HDR 2016).

Jack and bore installations begin by excavating a launching and receiving pit on either side of an obstacle. The launching pit is typically 10 feet to 15 feet wide and 30 feet to 40 feet long. The receiving pit is typically 10 feet wide by 10 feet long. Once the excavations are open, a hydraulic ram is used to push a steel casing through soil under the obstacle while removing soil inside the casing with an auger. A cutting head on the casing opens the hole; the auger is not advanced ahead of the casing or used for boring (HDR 2016).

Depending on installation conditions, the steel casing would either be left in place or pushed out by a replacement casing of reinforced concrete pipe or other material. Once the permanent casing is in place, PVC conduits would be installed into the casing on rolling spacers. The annular space between the conduits and the casing is filled using a thermally acceptable free-flowing grout before tying the casing installation into the open cut sections (HDR 2016).

Horizontal Directional Drilling Construction Method

All HDD activities for both the Lake Erie and Overland Segments are described in ***Section 2.4.5.1***.

Wetland and Stream Crossing Methods

General procedures in locations to protect wetland and stream resources during the proposed construction would include:

- Complying with permit conditions received from the USACE, PADEP, and other applicable agencies for stream crossing and wetland areas.
- Maintenance of narrow workspace corridors and minimizing intrusion into wetland areas.
- Stockpiling topsoil from wetland areas separately and replacing as cover in wetland areas, to preserve seed stock and provide the best success for wetland restoration.
- Completing work through wetland areas carefully but quickly, with restoration following as soon as it is practicable.
- No assembly area, temporary equipment, or materials storage areas would be allowed within 50 feet of the top of the stream bank or a wetland edge, except for materials and equipment associated with an excavation that would be within 50 feet of the stream or wetland. A sediment barrier would be located between the material and the stream or wetland.
- No vehicle repair or vehicle fueling would occur within 100 feet of a stream or wetland area.

Except where expressly prescribed by permit, spoil from trench excavation would be stockpiled a minimum of 50 feet from wetland edges or streams (except for materials and equipment associated with an excavation that would be within 50 feet of the stream or wetland), and spoil piles would be protected by appropriate erosion and sedimentation control best management practices (BMP) where the potential exists for sediment transport to wetlands or streams. Disturbed upland areas would be re-graded to pre-existing contours and re-seeded with an upland conservation seed or appropriate mix to reduce erosion and sedimentation potential (HDR 2016).

2.5 DECOMMISSIONING

Decommissioning of the proposed LEC Project transmission system would consist of de-energizing and abandoning the transmission cables in place. The effects of decommissioning would be similar to

those described for operation of the transmission cable (***Section 5.1 and Section 5.2***). If decommissioning plans change, applicable regulations at the time of decommissioning would be met.

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER DETAILED ANALYSIS

ITC Lake Erie evaluated several practicable alternatives relative to the proposed LEC Project's purpose, need, and geographic requirements, as well as the practicability and environmental effects of each alternative. The USACE requires, as part of the Section 404 permitting process, an analysis of the practicable alternatives that provides rationale as to why the proposed site plan is the least environmentally damaging practicable alternative (LEDPA). A summary of the practical alternatives to the proposed LEC Project and a discussion of the potential environmental impacts of each alternative (ITC Lake Erie 2016) is presented in ***Appendix C*** and is also contained in ITC's Joint Permit Application found at http://www.lakeerieconnectorea.com.

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3 AFFECTED ENVIRONMENT

The Region of Influence (ROI) for each resource is a geographic area within which the proposed LEC Project may exert some influence. The ROI is the geographic area described and assessed for each resource potentially affected by the Project and the ROI may be different for each resource. ITC Lake Erie provided draft ROIs for area resources. The DOE evaluated these ROIs as described in ***Table 3-1*** for the Lake Erie and Overland segments.

TABLE 3-1: REGION OF INFLUENCE FOR THE PROPOSED LAKE ERIE CONNECTOR PROJECT RESOURCES

Resource	Lake Erie Segment	Overland Segment
Land Use	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Transportation and Traffic	0.25 miles of construction corridor and transmission cable route	Area within the construction corridor and intersections within 0.25 miles of the construction corridor
Water Resources and Quality	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Aquatic Habitats and Species	350 feet total 175 feet either side of centerline of transmission cable	Open water features such as rivers, ephemeral, intermittent and perennial streams, ponds, lakes, and marshes dominated by emergent vegetation; shrub swamps, forested wetlands, areas with lacustrine and palustrine unconsolidated bottom habitat, floodplain forest, riparian edges near construction corridor or areas where transmission cable would pass
Aquatic Protected and Sensitive Species	350 feet total 175 feet either side of centerline of transmission cable	Open water features such as rivers, intermittent and perennial streams, ponds, lakes, and marshes dominated by emergent vegetation; shrub swamps, forested wetlands, areas with lacustrine and palustrine unconsolidated bottom habitat, floodplain forest, riparian edges near construction corridor or areas where transmission cable would pass
Terrestrial Habitats and Species	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Terrestrial Protected and Sensitive Species	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Wetlands	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Geology and Soils	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Cultural Resources	The Area of Potential Effects	The Area of Potential Effects
Infrastructure	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Recreation	1-mile for aquatic portion;	1-mile for terrestrial portion; 0.5 miles either side of centerline of transmission cable

	0.5 miles either side of centerline of transmission cable	
Visual Resources	1 mile for aquatic portion; 0.5 miles either side of centerline of transmission cable	1-mile for terrestrial portion; 0.5 miles either side of centerline of transmission cable
Public Health and Safety	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Noise	1,200 feet total 600 feet on either side of centerline of transmission cable	1,200 feet total – 600 feet on either side of centerline of transmission cable
Hazardous Materials	350 feet total 175 feet either side of centerline of transmission cable	80 feet total 40 feet either side of centerline of transmission cable
Air Quality	Erie County, Pennsylvania	Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships
Socioeconomics	Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships	Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships
Environmental Justice	Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships	Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships

3.1 LAKE ERIE SEGMENT

3.1.1 LAND USE

The ROI for land use for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cables. The ROI includes the permanent easement (i.e., ROW) within which the proposed transmission cable would be operated and maintained and the temporary work areas that would be affected during construction (i.e., construction corridors). The proposed transmission cable would be installed under Lake Erie; therefore, effects on land use during operation of the proposed LEC Project would be restricted to the property containing the transmission cable, which would exit ashore on private property in Springfield Township.

3.1.2 TRANSPORTATION AND TRAFFIC

The ROI for transportation and traffic includes a corridor extending for 0.25 mile from the centerline of the proposed transmission cable and the area that would be used by barge traffic related to construction.

Lake Erie is a navigable waterway and part of an extensive network of shipping lanes, locks, and navigation channels that extends approximately 2,000 miles through the Great Lakes to the Atlantic Ocean. Shipping vessels may pass through Lake Erie or may travel among the various ports within Lake Erie. Vessel traffic typically proceeds within designated navigation routes, the most important of which extends from the Detroit River through the northern part of the island region and Pelee Passage. Navigation routes are primarily within the central portion of Lake Erie in the vicinity of the proposed LEC Project and are published on nautical charts prepared and maintained by the National Ocean Survey. The closest ports to the proposed LEC Project are the Port of Erie, approximately 16 miles east of the proposed transmission cable landfall, and Conneaut Harbor, approximately 8 miles to the west of the landfall. In addition to shipping, Lake Erie serves numerous commercial fishing operations.

Gill nets, impounding nets, and trap nets are used for fishing in areas near the shore. Recreational vessel traffic may also be encountered on Lake Erie, most commonly near the shore in areas surrounding ports (USDOC 2016; NOAA 2016b).

The proposed transmission cable would extend approximately 35 miles in the Lake Erie lakebed from the United States and Canada border to landfall in Erie County, Pennsylvania. Along this proposed route, the transmission cable would cross beneath shipping channels but would not be within a port entry area or a U.S. Coast Guard (USCG)-designated anchorage area (HDR 2016).

3.1.3 WATER RESOURCES AND QUALITY

The ROI for water resources for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cable. Water resources in the Lake Erie Segment of the proposed Project area include surface water; groundwater; floodplains; and the quality, quantity, and availability of water. Surface water and groundwater are regulated separately; however, they are intricately linked. Surface waters, such as rivers, lakes, ponds, streams, and reservoirs) are open to the atmosphere and are restored by groundwater and precipitation. Surface water is used for drinking water, irrigation, cooling equipment used in the thermoelectric power industry, agriculture, mining, and various commercial/industrial and recreational uses (USGS 2014). Groundwater is located beneath the surface in fractures of rocks and pore spaces in soil and is replenished as precipitation reaches the surface and is pulled through the soil until it reaches water-saturated rock (USGS 2014). Groundwater helps maintain flow to rivers and lakes during dry periods and replenishes surfaces waters (VNRC 2012). Floodplains are flat or nearly flat lands adjacent to a river or stream that experience occasional or periodic flooding. Floodplains comprise a floodway, which consists of the stream channel and adjacent areas that carry flood flows; and the flood fringe, which is the area drowned by the flood that does not experience a strong current (DOE 2014).

3.1.3.1 Surface Water

Lake Erie is the fourth largest Great Lake in area (9,700 square miles) and the smallest in volume (116 cubic miles) (CSR 2014; 2015). The lake measures approximately 240 miles long and 57 miles wide and has an average depth of 62 feet (Bolsenga and Herdendorf 1993). The shoreline of Lake Erie is approximately 871 miles long. Lake Erie is naturally segmented into three basins with different average depths: the western basin (24.1 feet); the central basin (60.1 feet); and the deepest, eastern basin (79.3 feet) (Hecky and Stewart 2003; Lake Erie LaMP 2011 as cited in IJC 2013). The proposed LEC Project is located in the eastern basin (***Figure 3-1***). Any overflow from Lake Erie's eastern basin drains into Lake Ontario via the Niagara River; overflow is controlled primarily by a bedrock sill at the head of the river (CSR 2015). In the spring and summer, the lake can warm rapidly; the central and eastern basins can become thermally stratified, leading to anoxia (lack of oxygen) in the central basin (Herdendorf 1984).

A watershed or drainage basin contains all the land that drains toward a body of water. Lake Erie has a drainage basin of 22,700 square miles that includes areas of Indiana, Michigan, Ohio, Pennsylvania, New York, and Ontario (IJC 2013). Lake Erie receives approximately 90 percent of its inflow from Lake Superior, Lake Michigan, and Lake Huron through connecting waterways in southern Lake Huron. Lake Erie is fed at the northwest end by water from Lake Huron via the St. Clair River, Lake St. Clair, and the Detroit River; the only outlet from Lake Erie is at the northeast end through the Niagara River.

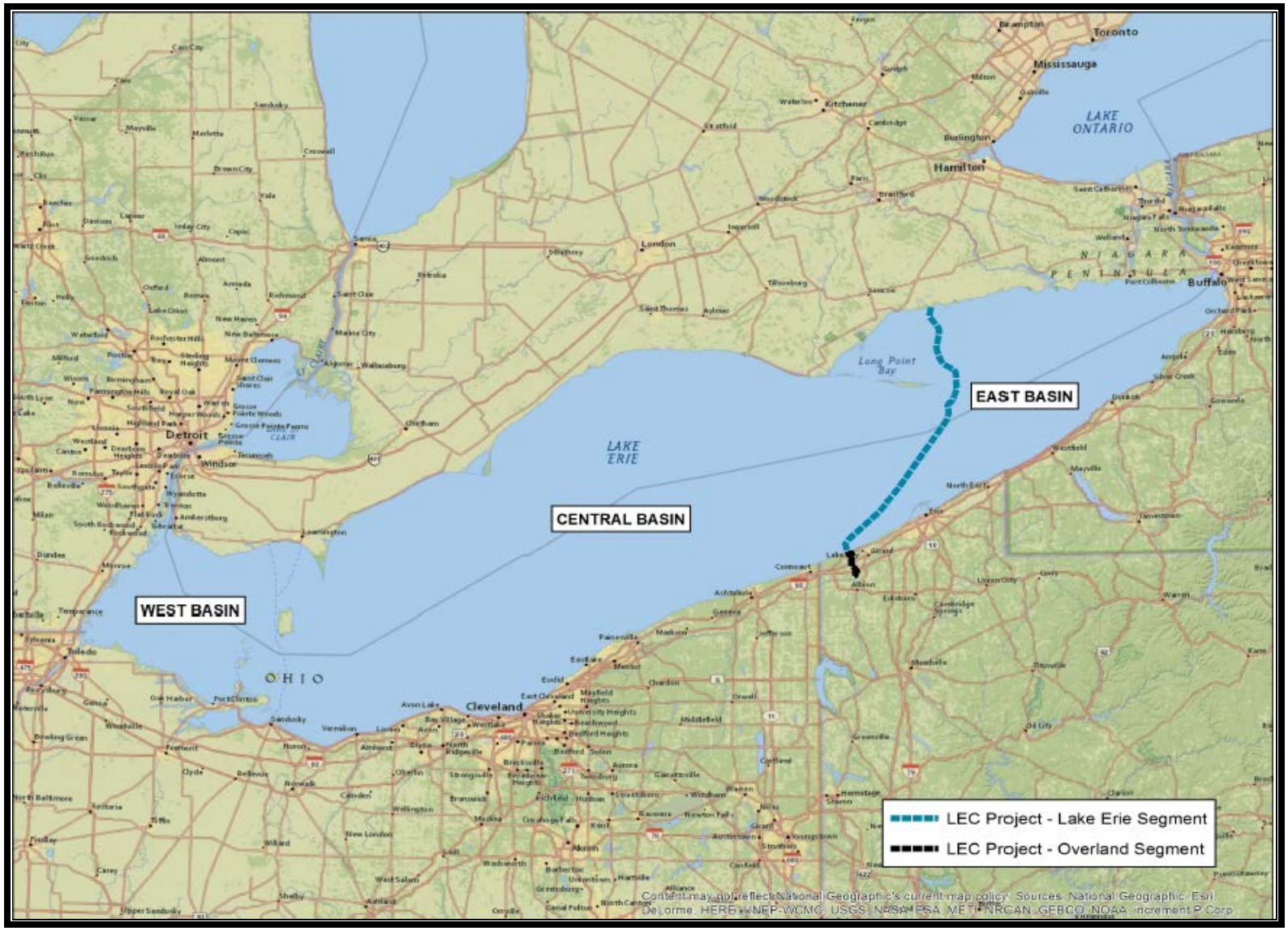

FIGURE 3-1: REGIONS OF LAKE ERIE SEGMENT

Approximately one third of the population of the Great Lakes basin resides within the Lake Erie watershed, amounting to 11.6 million people in the United States and Canada (Lake Erie LaMP 2011). Lake Erie provides many important economic, natural, and recreational uses. The Lake Erie basin ecosystem is a valuable resource that provides important areas for food, forage, spawning, and safe refuge for many species of fish and wildlife as well as providing recreation for surrounding populations including opportunities for swimming, fishing, boating, and tourism (Lake Erie LaMP 2011).

3.1.3.2 Water Quality

The standards for water quality in the state of Pennsylvania are established in 25 Pa. Code Chapter 93. The water quality standards consist of the designated uses of the surface waters of Pennsylvania, the specific numeric and qualitative criteria needed to achieve and preserve those uses, and an antidegradation policy. Statewide water uses include supporting aquatic life and providing water supply and recreational uses as established in 25 Pa Code §93.4. All sections of Lake Erie in Pennsylvania except Outer Erie Harbor and Presque Isle Bay are designated for cold water fishes (25 Pa. Code §93.9). Cold water fishes are protected for the "maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat."

A five-part categorization system is used to designate the water quality status of Pennsylvania waters: Category 1 states "all uses met," and Category 5 states "impairment by pollutants requires a total daily maximum load (TMDL)." Lake Erie is identified as Category 5 waters, which indicates impairment for one or more designated uses by any pollutant, constitutes inclusion on the Section 303(d) list, and requires development of a TMDL (PADEP 2014). Lake Erie was listed as impaired for fish consumption and recreational uses in 2010 because of contamination with unknown polychlorinated biphenyls (PCBs) and pathogens (PADEP 2014).

In 1978, the Great Lakes Water Quality Agreement (GLWQA) was established to reduce and eliminate sources of pollution to Lake Erie and to restore water quality in the Great Lakes. Eutrophication (excessive nutrients), has been an historical problem in Lake Erie causing algal blooms and depleting oxygen. Phosphorus is the primary nutrient causing eutrophication in the Great Lakes. Despite efforts to reduce and eliminate sources of phosphorus entering the lakes, algal blooms continue to occur across the three basins of Lake Erie (Lake Erie LaMP 2009). Offshore algal blooms are more prevalent in the western basin of Lake Erie; blooms are less significant in the central and eastern basins (Lake Erie LaMP 2009). In the eastern basin, a total phosphorous (TP) target load of 10 micrograms a liter (µg/l) was established in 2012 based on interim objectives of the GLWQA. Concentrations often exceed the target during the spring, as in 2007 when the average TP concentration in the eastern basin was 17 µg/l (Lake Erie LaMP 2009).

Turbidity

Approximately 2.99 million metric tons of sediment enters Lake Erie each year, which is the largest sediment load of all the Great Lakes (Richards et al. 2013). The western basin of Lake Erie receives large sediment loads from the Detroit, Maumee, and Portage rivers; the Maumee River discharges more tons of sediment a year than any other tributary in the Great Lakes (LEIA 2012). The eastern basin of Lake Erie is the least turbid and biologically productive (Herdendorf 1984).

Heavy Metals

Lake Erie is surrounded by 17 metropolitan areas and agricultural sectors of southwestern Ontario, Ohio, Pennsylvania, New York, and Michigan. Discharges of liquid and solid waste from these industrial and agricultural areas have introduced toxic substances into Lake Erie (EPA 2014b). Atmospheric deposition is another major source of heavy metals entering the Great Lakes basin. The

International Joint Commission (IJC)[6] estimates that approximately 50 percent of all lead entering Lake Erie comes from the atmosphere. Approximately 200 tons of mercury is deposited in the basin each year, mostly from waste incinerators and factories producing chlorine (Henry 1994; SOGL 1999; Skinner 2002, as cited in Morreale 2002).

Surveys of metal contamination in Lake Erie sediments have shown that concentrations of metals decrease from the western basin to the eastern basin of the lake (Marvin et al. 2004). Concentrations of mercury in Lake Erie increase from shallow areas near shore, where the sediment is coarse, outwards into deeper water where finer sediments have been deposited (Marvin et al. 2004). Studies have shown that concentrations of cadmium, copper, lead, zinc, and mercury are smaller in the eastern basin than in the western or central basins. Surface water concentrations of mercury measured in 2006 were also much smaller in the eastern basin (0.00011 µg/l to 0.0005 µg/l) than in the other basins (EPA 2009).

Organic Contaminants

Contamination with PCBs was first reported in the Great Lakes in the 1960s and has long been a major concern due to the significant toxicity and persistence of those chemicals. Concentrations of PCBs decreased in the decades following the phased ban that began in the 1970s; PCBs have been banned or highly restricted in almost all industrial and commercial uses. From 1971 to 1997, the lake-wide concentration of PCBs in surficial sediments of Lake Erie decreased from 136 nanograms per gram (ng/g) to 43 ng/g (Painter et al. 2001; EPA 2009). Slightly higher average PCB concentrations were measured in 1997, ranging from 2 ng/g to 245 ng/g with a lake-wide average value of approximately 98 ng/g (Marvin et al. 2004). The average concentrations decreased from the western to the eastern basins, measuring 161 ng/g, 97 ng/g, and 36 ng/g, respectively (Marvin et al. 2004). Distributions of organic contaminants (e.g., PCBs and organochlorine) in Lake Erie are similar to the distribution of mercury in that concentrations are larger in deeper waters with fine sediments than in shallower shoreline areas (Painter et al. 2001; Marvin et al. 2002). Despite declining concentrations of PCBs, the fish consumption use of Lake Erie was listed as impaired due to PCBs in 2010 (PADEP 2014).

TABLE 3-2: AVERAGE CONCENTRATIONS OF METALS AND PCBS IN SURFICIAL SEDIMENTS OF LAKE ERIE*

Chemical	Western Basin	Central Basin	Eastern Basin
Cadmium (µg/g)	1.4	1.4	0.45
Chromium (µg/g)	49	46	26
Copper (µg/g)	41	38	27
Lead (µg/g)	44	46	22
Mercury (µg/g)	0.402	0.167	0.069
Nickel (µg/g)	39	42	32
Zinc (µg/g)	170	180	110
Total PCBs (ng/g)	161	97	36

Source: Marvin et al. 2004
*Note: Based upon a 1997 survey

[6] The International Joint Commission is an independent binational organization established by the United States and Canada under the Boundary Waters Treaty of 1909.

3.1.3.3 Floodplains

The PADEP regulates activities within floodways and certain types of activities in the 100-year flood fringe areas in Pennsylvania; municipalities regulate most activities within the flood fringe beyond the floodway. Most Pennsylvania municipalities have flood insurance studies and maps prepared by the Federal Emergency Management Agency (FEMA) that indicate floodway boundaries. In the absence of any FEMA-determined floodway along a watercourse, the floodway is assumed to extend 50 feet landward from the top of each streambank, unless evidence to the contrary is provided and approved as defined by 25 Pa. Code Chapter 105.1.

Coastal flooding in the Great Lakes area is primarily a result of storm surges and waves, but it can also be caused by other conditions, including lake levels and ice cover. Because the current flood insurance Rate Maps for Lake Erie are outdated, the USACE, FEMA, Association of State Flood Managers (ASFPM), and state partners conducted the Great Lakes Coastal Flood Study to obtain the information needed to update flood hazard maps (FEMA 2014). This study may result in delineation of new Special Flood Hazard Areas, designation of Zone VE (coastal high-hazard areas subject to inundation by the 1 percent-annual-chance flood with additional hazards due to storm-induced waves greater than 3 feet high) (FEMA 2014).

3.1.3.4 Groundwater

Roughly one-third of the population of the Great Lakes basin, approximately 11.6 million people, resides in the Lake Erie watershed. The watershed encompasses 17 urban areas. Lake Erie provides drinking water to 11 million people (LaMP 2011). Approximately 12 percent of the 1.8 billion gallons of water used a day used for public and domestic supply comes from groundwater (Myers 2000).

3.1.4 AQUATIC HABITATS AND SPECIES

3.1.4.1 Aquatic Habitat and Vegetation

The ROI for aquatic habitats and species for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cable. In 1982, the FWS published an atlas of fish spawning habitats in the Great Lakes which stated that suitable habitat for several fish species is present throughout the nearshore waters of Lake Erie in Pennsylvania. Habitat containing large rocky substrates off the Pennsylvania shores offer spawning and nursery habitat for species such as lake whitefish (*Coregonus clupeiformis)*, rainbow smelt (*Osmerus mordax)*, emerald shiner (*Notropis atherinoides)*, spottail shiner (*Notropis hudsonius*), fathead minnow (*Pimephales promelas)*, channel catfish (*Ictalurus punctatus)*, stonecat (*Noturus flavus)*, trout-perch (*Percopsis omiscomaycus)*, white bass (*Morone chrysops)*, smallmouth bass (*Micropterus dolomieu)*, rainbow darter (*Etheostoma caeruleum)*, johnny darter (*Etheostoma nigrum)*, yellow perch (P*erca flavescens)*, walleye (*Sander vitreus)*, and freshwater drum (*Aplodinotus grunniens)* (Goodyear et al. 1982). Open lake waters represent pelagic habitats, which are typically cooler and less productive than nearshore areas. Strong thermoclines in the summer provide suitable conditions for the various warmwater, coolwater, and coldwater fishes. Pelagic fish spend most of their life cycles in the open lake, except when spawning.

Demersal habitats include the bottom waters and benthic habitat along the bed of Lake Erie. Benthic habitats support a variety of macroinvertebrates that serve as a food source for many demersal fish species (HDR 2016).

The Lake Erie shoreline in Pennsylvania lacks aquatic vegetation due to frequent, high-energy wave action and the presence of exposed shale bedrock (Rathke 1984; Thoma 1999; Strickland 2010). Exposed shale bedrock prevents the growth of submerged aquatic vegetation (SAV). Rathke (1984) observed no aquatic vegetation at nearshore monitoring sites in surveys conducted during the 1970s. Exposed bedrock in Lake Erie is colonized by filamentous algae of various species including green algae (*cladophora glomerata), (ulothrix zonata),* and red algae (*bangia atropurpurea).*

3.1.4.2 Shellfish and Benthic Communities

Historically, the distribution, composition, and abundance of benthic communities have been used as tools for assessing trophic trends in aquatic systems. Benthic fauna form stable aggregations that integrate and reflect environmental and biological conditions over decades, and changes in the presence or absence of indicator species, species associations, and relative abundances may reveal changes in the benthic community (Pira et al. 1998).

Recent and historical data show that the Lake Erie benthic community has experienced many significant changes during the last half-century. The community showed signs of recovery in conjunction with ecosystem restoration following the pollution and nutrient abatement program; however, it experienced major structural and functional changes following the introduction of dreissenid mussels (e.g., exotic zebra mussel) in the mid-1980s (Burlakova et al. 2014). A significant temporal trend in the benthic community from 1963 to 2012 was due largely to the mussel (*Dreissena)* invasion, which appeared to have a larger effect on the benthic community than all other environmental changes in the lake over the last half-century. The zebra mussel (*Dreissena polymorpha*) and the quagga mussel (*D. bugensis*) were introduced to the Great Lakes in the mid-1980s in the ballast of shipping barges and have nearly extirpated the native mussel communities in the Great Lakes (Schlosser and Nalepa 1994; Edsall and Charlton 1997; Schlosser and Masteller 1999). Despite abundant dreissenid populations, research shows that native freshwater mussels are still present in Lake Erie (Crail et al. 2011).

3.1.4.3 Fish

The aquatic habitats of Lake Erie and the fish communities there have undergone many changes in the last 150 years due to a variety of anthropogenic stressors including intensive and selective commercial fishing practices, erosion along the shoreline and throughout the watershed, nutrient loading, invasive species, destruction of streams, and draining of marshes (Hartman 1973). As a result, the fertility of Lake Erie has increased; average water temperature has increased; phytoplankton density and composition have been altered; summer dissolved oxygen deficits have increased; and the structure of the communities of fish and benthic macroinvertebrates have been modified (Hartman 1973). Most of the Lake Erie waters are classified seasonally as cool water (68°F[7] to 80°F); coldwater habitat (less than 68°F) occurs only in the eastern basin and in a limited depth range offshore in the central basin (Ryan et al. 2003). The Lake Erie fish community comprises a mixture of coldwater and warmwater species (Van Meter and Trautman 1970).

Changes in the Lake Erie fish community have resulted in the loss of many highly valued native species and the proliferation of invasive (non-indigenous) species (Ryan et al. 2003). Affected species include lake trout (*Salvelinus namaycush*), sauger (*Sander canadensis*), and blue pike (*Stizostedion vitreus glaucus*). Native lake trout were once plentiful in the eastern basin but have become scarce since 1940 and are considered extirpated, except for recent efforts to restore lake trout by stocking. The fishery for cisco or lake herring (*Coregonus artedii*) collapsed in the 1920s and recovered somewhat in the mid-1940s, but the species is now rare. Populations of lake whitefish (*C. culpeaformis*) declined to

[7] Fahrenheit

very low numbers, leaving a remnant population that recovered in the mid-1980s. Lake sturgeon (*Acipenser fulvescens*) numbers declined by the turn of the twentieth century and have remained very low, although recent information suggests that sturgeon populations may be recovering. As populations of native predators, planktivores, and benthivores declined, exotic fishes such as rainbow smelt (*Osmerus mordax*), round goby (*Neogobius melanostomus*), white perch (*Morone americana*), and alewife (*Alosa pseudoharengus*), thrived and remain abundant (Hartman 1973; Ryan et al. 2003; PFBC 2008). Other prevalent game fish species found in Lake Erie include the native brook trout (*Salvelinus fontinalis*), which spawns in a few coldwater tributaries and is occasionally found in the open lake. Other salmonid species that have been stocked into Lake Erie and its tributaries include coho (*Oncorhyncus kisutch*), chinook (*O. tshawytscha*), and Atlantic salmon (*Salmo salar*), as well as brown (*S. trutta*) and rainbow trout (*O. mykiss*) (Hartman 1973).

Five states and provincial agencies manage the fisheries of Lake Erie cooperatively through the Lake Erie Committee (Ryan et al. 2003). The Joint Strategic Plan for Management of Great Lakes Fisheries (Joint Plan) directed each lake committee to prepare fish-community objectives for its respective Great Lake. The Lake Erie Committee, which includes the Pennsylvania Fish and Boat Commission (PFBC), uses information collected by the states and provinces to make management decisions.

The PFBC conducts surveys in June and September (gillnet) and October (trawl) to obtain data on perch and walleye populations in the Pennsylvania waters of Lake Erie. Survey data are available through 2007 and include recruitment, age, length, weight, sex, maturity, and diet. Catch rates for yellow perch have remained relatively stable annually; the catch rate for walleye declined slightly (7 percent decrease) from 2006 to 2007 (PFBC 2008). The PFBC conducts gillnet surveys (August) to monitor the success of the lake trout stocking program. Burbot (*Lota lota)* and lake whitefish are caught in these surveys frequently, and in 2007 they were caught at a rate greater than the 18-year average (PFBC 2008). Trawl survey results from 2007 indicate an increase in abundance and diversity of forage fish. The highest catch rates were for emerald shiner (48 percent), round goby (20 percent), yellow perch (14 percent), and rainbow smelt (11 percent). Total forage fish density was 32 percent greater than the 20-year average (PFBC 2008). Quotas set by the PFBC now restrict harvests of yellow perch and walleye. The total 2007 trap net landings were 42,468 pounds for all species and consisted mostly of yellow perch (55 percent) and white perch (16 percent). This trap net harvest increased from years prior but was much smaller than the 445,000-pound annual average caught between 1991 and 1996, when gillnetting was permitted. The amounts of commercially harvested fish by species between 1991 and 2007 are provided in ***Table 3-3*** (PFBC 2008).

The Coldwater Task Group (CWTG), a subgroup of the Lake Erie Committee, provided more recent data on commercial harvests for lake whitefish and burbot in Lake Erie (CWTG 2014). Due to poor recruitment rates[8], lake whitefish harvests were the smallest in 1996 since the species began to recover after the 1980s. All lake whitefish harvested commercially came from waters in Ontario and Ohio. Burbot catch rates also dropped in Pennsylvania, New York, and Ontario over the last several years, and recruitment appears to remain low (CWTG 2014).

The New York State Department of Environmental Conservation (NYSDEC) submits annual reports of fisheries surveys conducted in the eastern basin of Lake Erie to the Lake Erie Committee. These surveys reported successful year classes for walleye in 2003, 2010, and 2012. Populations of smallmouth bass and yellow perch in the eastern basin continue to be successful, although yellow perch recruitment was lower than normal between 2011 and 2013 (NYSDEC 2014).

[8]Recruitment is the process of adding new individuals to a population or subpopulation (as of breeding or legally catchable individuals) by growth, reproduction, immigration, and stocking. Accessed April 2016 at: http://www.merriam-webster.com/dictionary/recruitment.

TABLE 3-3: ANNUAL COMMERCIAL HARVEST OF COMMON FISH SPECIES IN LAKE ERIE*

Year	Walleye	Smelt	Yellow Perch	White Sucker	Redhorse	Carp	Catfish	Bullhead	Drum	Burbot	White Perch	White Bass	Lake Whitefish	TOTAL
1991	10,296	86	159,352	9,211	3,409	10	60	10	13,733	33,382	52,638	895	300,882	**584,100**
1992	14,548	46	77,267	5,014	2,540	45	52	15	21,866	22,210	25,701	620	205,133	**375,057**
1993	29,990	11	28,976	10,557	1,105	0	76	16	11,535	4,197	16,879	834	269,080	**373,256**
1994	28,205	1	58,765	15,945	3,529	0	476	210	25,316	12,059	47,937	686	350,309	**543,438**
1995	42,138	0	30,754	12,719	1,717	75	351	23	22,774	30,945	32,892	4,461	169,747	**348,596**
1996	81	0	5,340	4,125	1,580	0	6,848	872	234	2,262	235	96	2	**21,771**
1997	193	0	7,398	3,223	766	96	3,806	626	1,117	8,910	1,628	386	1,597	**29,696**
1998	417	0	5,281	3,544	1,283	132	2,125	972	628	8,963	701	113	3,496	**27,655**
1999	229	-	2,905	1,864	566	-	1,877	619	677	7,943	201	670	670	**20,220**
2000	183	-	5,950	862	436	-	1,269	861	567	3,529	379	338	-	**20,214**
2001	73	-	2,702	755	287	-	601	594	381	4,359	427	43	-	**10,222**
2002	43	-	2,030	508	142	-	452	18	389	5,177	489	19	25	**9,292**
2003	129	-	5,050	856	467	-	73	30	936	1,821	408	88	93	**9,951**
2004	501	-	7,753	1,402	348	-	72	286	1,486	2,401	459	110	91	**14,909**
2005	830		15,228	3,461	2,111	-	880	868	3,050	2,238	3,844	154	563	**33,227**
2006	2,818		20,517	3,091	2,734	-	292	617	2,775	1,723	4,565	221	363	**39,716**
2007	1,880		23,471	2,052	1,897	-	159	362	3,486	1,088	6,618	771	684	**42,468**
MEAN	8,167	10	27,204	4,821	1,439	26	1,207	415	6,717	9,507	11,836	608	81,378	**161,873**

Source: PFBC 2008
*Note: Harvest is measured in pounds.

The NYSDEC also monitors the populations of salmonids in the New York waters of Lake Erie's eastern basin. Lake Erie has been stocked with lake trout since 1978, and overall abundance in the eastern basin was relatively high in recent years. No indication of naturally spawning lake trout has been observed since restoration efforts began, and adult survival (age 7+) remains very low because of predation by sea lamprey (CWTG 2014; NYSDEC 2014). The rate of occurrence of wounds inflicted by sea lamprey and surveys of sea lamprey nesting indicate that additional control measures are necessary to manage the effect of this invasive species on native fish populations. The populations of steelhead, rainbow trout, and brown trout remain stable, and stocking programs and natural recruitment of steelhead support a quality sport fishery for salmonids. The NYSDEC no longer stocks chinook and coho salmon in Lake Erie because of low success rates (NYSDEC 2014).

The PFBC expressed particular interest in steelhead trout and in the three state-listed species discussed in ***Section 3.1.5.*** Steelhead trout is the anadromous form of rainbow trout (*Oncorhynchus mykiss*). The species is native to the cold waters of the western United States and has been introduced into cold waters throughout the country (ODNR, no date as cited in Exponent 2015a). The PFBC now stocks more than one million steelhead trout into Lake Erie and its tributaries every year. The program began in 1961 with the introduction of 15,000 steelhead fingerlings (Vargason 2013). Adult steelhead can inhabit cool lakes where they feed on various planktonic and benthic invertebrates, larval fish, and fish eggs (USDA 2000). Steelhead spawn in cobbled and graveled habitat of the coldwater tributaries of Lake Erie in the fall, but are found in the lake during the summer months (ODNR no date as cited in Exponent 2015a).

3.1.5 PROTECTED AND SENSITIVE AQUATIC SPECIES

Protected species are those species protected under federal or state laws. Threatened and endangered species are protected under the federal Endangered Species Act (ESA) (16 U.S.C. §1531 et seq.) or Pennsylvania's Endangered Species Regulations. The ROI for aquatic protected and sensitive species for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cable.

In Pennsylvania, the PFBC is responsible for administering the rules and regulations for the protection and management of threatened and endangered species of fish, reptiles, amphibians, and aquatic organisms. At the federal level, the FWS is responsible for listed, proposed, and candidate species under the federal ESA.

3.1.5.1 Federally Listed or Protected Species

According to the FWS, no federally listed endangered, threatened, or candidate aquatic species have been identified in proximity to the proposed LEC Project route.

3.1.5.2 State-listed Species

The PFBC noted the following state-listed endangered species of concern: cisco, lake sturgeon, and eastern sand darter. On August 28, 2015, PFCB stated that it is not concerned with the effects of construction of the proposed LEC Project on cisco and lake sturgeon; however, the potential effects of construction on the eastern sand darter during its spawning period between June and July are of concern.

Cisco

Cisco is a member of the whitefish group of the Salmonidae family along with trout, salmon, char, and whitefish (MNFI 2014). It is a coldwater species that occupies open water habitats of lakes and is usually found schooling in the mid-waters of the central and eastern basin of Lake Erie. Cisco feeds on a variety of prey, including plankton, crustaceans, insects, insect larvae, fish eggs, and small fish (Ebener et al. 2008; ODNR 2014). During late fall and winter, cisco congregates in schools and moves into shallower waters

(3 to 6 feet) to spawn over gravel, rock, or sand substrate. Cisco hatches once the ice thaws in early spring, usually in April on Lake Erie (NOAA 2009; MDNR 2015). The early stages of development are spent feeding and swimming near the surface waters in May and June (Ebener et al. 2008).

Lake Sturgeon

Lake sturgeon is the only sturgeon species endemic to the Great Lakes basin and is the largest freshwater fish native to the system. Its primary habitat is the bottom of large, freshwater rivers and lakes, and it moves back and forth from shallow to deeper waters seasonally, staying within a given "home range" (FWS 2014; NatureServe 2014; PNHP 2014). Lake sturgeon is a benthivore and feeds mostly on small invertebrates such as insect larvae, crayfish, snails, clams and leeches. Food is sucked in along with the sediment, which is screened out through the gills while food is retained within the crop (FWS 2014; PNHP 2014).

Lake sturgeon has unique life history characteristics. It is extremely long lived; females reach sexual maturity between the ages of 14 and 33 years, and males between the ages of 8 and 12 years. Female lake sturgeon spawn only once every 4 to 9 years; males spawn every 2 to 7 years (FWS 2014; PNHP 2015). These characteristics make the species extremely vulnerable to overfishing, habitat loss, pollution and many other anthropogenic influences. Spawning is temperature dependent (preferred 53°F to 64°F) and usually occurs from early April to June. Females lay approximately 4,000 to 7,000 eggs per pound of fish (FWS 2015; GLIMDS 2015). A maximum historical commercial catch of 5.2 million pounds of lake sturgeon was recorded from Lake Erie in 1885. By the late 1970s the reported annual harvest from Lake Erie was approximately 5,000 pounds (FWS 2014). Only a remnant population of lake sturgeon exists in the Great Lakes now, but numbers seem to be rebounding slightly based on signs of natural reproduction and sightings of juveniles. Populations are still impaired by comparison to historical abundances (FWS 2014).

Eastern Sand Darter

The eastern sand darter is a long, narrow fish of the Percidae family distributed throughout much of the United States and into southern Canada. Adults are typically only 2 to 3 inches long (ODNR no date as cited in Exponent 2015a). The eastern sand darter is a visual feeder. It conceals its body in the sand and darts out to capture prey consisting of midge larvae, dipteran larvae, mayfly naiads, oligochaetes, and cladocerans (NatureServe 2014; ODNR no date as cited in Exponent 2015a; PNHP 2015). Within Lake Erie, the eastern sand darter has been found along clean sandy beaches that are protected from waves, in shallow bays, and in island regions, but the species has been known to use deeper regions of the lake up to 50 to 65 feet (Van Meter and Trautman 1970; Grandmaison et al. 2004). Spawning has never been observed in the wild but is believed to occur in June and July in the Pennsylvania waters of Lake Erie (Criswell 2013; PNHP 2015).

3.1.6 TERRESTRIAL HABITATS AND SPECIES

For terrestrial habitats and species, the ROI for the Lake Erie Segment is defined as 175 feet on either side of the proposed transmission cable centerline. Terrestrial habitats and species in the proposed Lake Erie Segment are limited to avian and littoral/shoreline species in the lake section from the Canadian border to the shoreline of Lake Erie in Springfield Township, Erie County, Pennsylvania.

No terrestrial habitats (e.g., emergent wetlands or other wetland types characterized by terrestrial vegetation) occur within the Lake Erie Segment of the proposed Project. This segment is entirely aquatic. Terrestrial wildlife species that may be present within the Lake Erie Segment are limited to those that enter the area by flying over (e.g., birds and bats) or by using aquatic habitat within Lake Erie. Common semi-aquatic species such as star-nosed mole (*Condylura cristata*), muskrat (*Ondatra zibethicus*), and beaver (*Castor canadensis*) may use the near-shore and littoral habitats within the Lake Erie Segment temporarily (PNHP 2016).

A variety of song birds, raptors, passerines, and wading and game birds may be found along the proposed LEC Project route, and many may be found occasionally flying over Lake Erie. Bird species that forage, migrate, and periodically rest within the Lake Erie Segment may include mallard ducks (*Anas platyrhynchos*), black-billed cuckoo (*Coccyzus trythropthalmus*), red-tailed hawk (*Buteo jamaicensis*), red-winged blackbird (*Agelaius phoeniceus*), sparrows, and warblers (HDR 2016). ***Section 3.1.7*** discusses species protected by federal and state regulations

3.1.7 TERRESTRIAL PROTECTED AND SENSITIVE SPECIES

Protected species are those protected under federal or state laws. Threatened and endangered species are animals and plants protected under the federal ESA (16 U.S.C. §1531 et seq.) or Pennsylvania's Endangered Species Regulations that are expected to occur in Lake Erie Segment of the proposed LEC Project. Within the Lake Erie Segment, protected terrestrial species are limited to avian and littoral/shoreline species. The ROI for protected and sensitive terrestrial species includes the area within 175 feet of either side of the centerline of the proposed transmission cable. The proposed transmission cable corridor for the Lake Erie Segment is 328 feet wide (HDR 2016). The Pennsylvania Natural Heritage Program (PNHP) identifies habitats of significance based on rare or high quality wetlands, communities, or other types of habitat or important ecological areas within Pennsylvania. No habitats of significance are located within the Lake Erie Segment (PNHP 2016).

In Pennsylvania, four federal and state agencies are responsible for administering regulations for the protection and management of threatened and endangered species and other species of special concern. The PFBC is responsible for fish, reptiles, amphibians, and aquatic organisms; the Pennsylvania Game Commission (PGC) is responsible for birds and mammals; and the Pennsylvania Department of Conservation and Natural Resources (PADCNR) is responsible for programs relating to native wild plants, terrestrial invertebrates, significant natural communities, and geologic features. The FWS is responsible for threatened or endangered species protected under the ESA (50 CFR Part 17), bird species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C §703-712), and the Bald and Golden Eagle Protection Act (BGEPA) [16 U.S.C. §668 (a-c); 50 Part CFR 22].

ITC Lake Erie's consultation with PGC, PADCNR, and the FWS began in May 2014. On July 28, 2014, ITC Lake Erie submitted a request for a Pennsylvania Natural Diversity Inventory (PNDI) review for the proposed LEC Project (PNDI Environmental Review Large Project Number 22406). On January 23, 2015, and again on March 8, 2016, ITC Lake Erie submitted updates to the PFBC, PGC, PADCNR, and the FWS requesting review of potential effects of changes in the proposed LEC Project route for the transmission cable on rare, threatened, and endangered species (HDR 2016). In a letter dated March 15, 2016, the PGC screened the proposed LEC Project for potential effects on species and resources of concern under PGC's jurisdiction, which include birds and mammals only. The PGC's records indicate that there are no known occurrences of species or resources of concern under PGC's jurisdiction in the vicinity of the proposed LEC Project. In a letter dated March 23, 2016, the PADCNR stated that no Project impact on species or resources of concern under PADCNR's jurisdiction is likely to occur. On April 11, 2016, the FWS responded to a DOE request (dated March 8, 2016) for updated information about federally protected species within the area being considered for the proposed LEC Project. The FWS concluded that bald eagle, protected under the BGEPA, is the only federally protected species potentially affected by the Lake Erie Segment of the proposed Project. The FWS concluded that although the Project was within the range of the northern long-eared bat and Indiana bat, both of which are protected species, the Project was unlike to adversely affect those species. Species specific FWS comments are included under their respective sections, below and within ***Sections 3.2.7, 5.1.7*** and ***5.2.7***.

The following sections provide information about protected and sensitive terrestrial wildlife species that may occur within the Lake Erie Segment of the proposed LEC Project, which are the Indiana bat (*Myotis*

sodalis), northern long-eared bat (*Myotis septentrionalis*), bald eagle (*Haliaeetus leucocephalus*), bank swallow (*Riparia*), and migratory birds (HDR 2016).

3.1.7.1 Indiana Bat

The Indiana bat is an endangered species protected under the federal ESA. The Indiana bat is small and has dark-brown to black fur. Like all insect-eating bats, the Indiana bat can eat up to half of its body weight in insects each night (FWS 2006). The species forages along the shorelines of rivers and lakes and at the edges of forests and clearings. The Lake Erie Segment includes no roosting habitat for Indiana bats because it is aquatic. Within the Lake Erie Segment ROI, Indiana bats are most likely to use the lake shoreline for foraging. Indiana bats hibernate during the winter months in caves or, occasionally, in abandoned mines. The species requires cool, humid caves with stable temperatures cooler than 50°F but not freezing (FWS 2006). After hibernation, Indiana bats migrate to their summer habitat in wooded areas, where they usually roost under loose tree bark on dead or dying trees (AE 2014), typically those with diameters to breast height (DBH) of 5 inches or greater (FWS 2006). During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. The Lake Erie Segment includes no roosting habitat for Indiana bat. The Indiana bat may use near-shore areas for foraging and may migrate over waters of the Lake Erie segment (FWS 2006; AE 2014).

3.1.7.2 Northern Long-eared Bat

The northern long-eared bat is a threatened species protected under the federal ESA. The northern long-eared bat is medium sized with medium to dark brown fur on its back and tawny to pale brown fur on the underside (FWS 2015). Its ears are long compared to those of other bats in the genus *Myotis*. Like the Indiana bat, the northern long-eared bat overwinters in caves or abandoned mines and roosts in the bark or cavities of live and dead trees during the summer; however, the species is more generalist and can roost in trees of 3 inches DBH or greater. The northern long-eared bat may roost individually or in small groups during the summer months (FWS 2015). The Lake Erie Segment includes no roosting habitat for northern long-eared bat. Northern long-eared bats may migrate over waters of the Lake Erie segment. Based on habitat preferences and feeding behavior, the northern long-eared bat may be present within the Lake Erie Segment during foraging periods, especially if summer roosting areas are available in the terrestrial habitats near the shoreline (FWS 2015).

3.1.7.3 Bald Eagle

The bald eagle was delisted from the ESA in 2007 but is protected under the BGEPA [16 U.S.C. §668 (a-c); 50 CFR Part 22]. The bald eagle was also delisted from the Pennsylvania state list. Bald eagles typically breed and winter in forested areas adjacent to large bodies of water (FWS no date). Bald eagles select large, super-canopy roost trees that are open and accessible and are near large inland waterbodies that stay open during the winter. Bald eagles may use the Lake Erie Segment for foraging. The segment does not have roosting or nesting habitat; however, nesting or roosting habitat could be available on the shoreline within terrestrial areas. Terrestrial habitat is discussed further in ***Section 3.2*** (FWS no date).

3.1.7.4 Bank Swallow

The bank swallow is protected by the FWS under the MBTA. This species typically nests in burrows dug near the top of steep banks of sand, dirt, or gravel along the edge of inland water or on the coast, and sometimes in gravel pits and road embankments. Bank swallows are known to inhabit the 90-foot bluffs in the vicinity of the landfall of the proposed LEC Project and the bluffs within Erie Bluffs State Park, east of the landfall location. The proposed transmission cable would be located approximately 560 feet south of the state bluffs (HDR 2016). Individuals tend to return to the same nesting area in successive years.

Swallows typically form nesting colonies loosely clustered together and are generally present in Pennsylvania anytime between late April and early August (McWilliams 2014). The diet consists of flying insects. Some foraging may take place within the proposed LEC Project boundary (NatureServe 2015). One of the largest colonies of bank swallows in the state of Pennsylvania is near the mouth of Duck Run, along the shoreline of Lake Erie (Knopf 2015).

3.1.7.5 Migratory Birds

Migratory birds are regulated by FWS under the MBTA. Most of Pennsylvania includes migration flyways for waterfowl, shorebirds, and birds of prey. Warblers and other songbirds generally pass through the state in large numbers. Three hundred ninety-four species of wild birds are known to inhabit Pennsylvania through the course of the year (Gross 2002), including 186 that nest in the state regularly. Waterbirds, raptors, and shorebirds use Lake Erie and the nearshore areas as a part of their life cycles. The western basin of Lake Erie is critically important for migratory birds as nesting or stopover habitat (HDR 2016).

The Lake Erie Segment of the proposed LEC Project provides suitable stopover habitats for numerous species of waterfowl and wading birds migrating through the region. A five-month survey of Erie Bluffs State Park in 1974 documented 103 different bird species (LERC 2008). Game Land 314, approximately 4 miles west of the proposed LEC Project, is a designated Important Bird Area (IBA). In addition, Presque Isle State Park, 15 miles east of the LEC Project, is recognized by the National Audubon Society as one of several IBAs. The park provides habitat for waterfowl and other shore birds along the shores of Lake Erie, and more than 325 species of birds have been identified within the park (LERC 2008).

Migrating birds of prey expected to pass over the proposed LEC Project include peregrine falcon (*Falco peregrinus*), osprey (*Pandion haliaetus*), bald eagle, and red-tailed hawk (*Buteo jamaicensis*) (HDR 2016). On rare occasions, it is possible that golden eagles (*Aquila chrysaetos*) could pass through the proposed Project area (NatureServe no date).

3.1.8 TERRESTRIAL WETLANDS

Waters of the United States are defined by jurisdictional limits under the CWA and include "All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide" (33 CFR §328.3) as well as the tributaries of, and wetlands adjacent to, such waters. The USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands. The ROI for terrestrial wetlands for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cable.

Pennsylvania's Clean Streams Law (P.L. 1987, Act 394 of 1937, as amended) defines waters of the Commonwealth as "any and all rivers, streams, creeks, rivulets, impoundments, ditches, water courses, storm sewers, lakes, dammed water, ponds, springs and all other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth." The Pennsylvania Dam Safety and Encroachments Act (32 P. S. §§693.1-693.27) defines a body of water as "any natural or artificial lake, pond, reservoir, swamp, marsh or wetland." Under these laws, PADEP regulates water quality and the obstruction and encroachment of waters of the Commonwealth.

No wetlands were identified within the Lake Erie Segment of the proposed LEC Project because the lake is considered open water. According to the wetlands classification system developed for the FWS (Cowardin et al. 1979), Lake Erie is classified as lacustrine, limnetic, unconsolidated bottom, permanently flooded (L1UBH) (FWS 2016). Features that are considered lacustrine include wetlands and deep water

habitats that are positioned in a topographic depression, lack 30 percent or greater vegetative cover (limited to trees, shrubs, persistent emergent, emergent mosses or lichens), and encompass an area greater than 20 acres. Limnetic is a term used to describe the area extending from shallow water (littoral boundary) to deep water within the lacustrine system. Unconsolidated bottom describes the bottom portion of the identified feature (wetland or deep water habitat) that contains a minimum 25 percent cover of particles that are smaller than stones and has not more than 30 percent vegetative cover. The proposed transmission cable would be buried within the Lake Erie sediment; the sediment does not support wetlands. The edge of open water was identified in 2014 and 2015 by the field-determined ordinary-high-water line (HDR 2016; ITC Lake Erie 2016).

3.1.9 GEOLOGY AND SOILS

3.1.9.1 Physiography and Topography

Lake Erie is the fourth largest by surface area and shallowest of the Great Lakes and generally has a gentle bottom relief. The proposed Project route for the Lake Erie Segment of the transmission cable is relatively flat with slopes generally less than 1 percent, except near landfall. The maximum water depth along the route in the United States is approximately 130 feet. Two glacial terminal moraines containing sand, gravel, and clay deposits divide Lake Erie into three basins: the western, central, and eastern basins (CRS 2016). The proposed LEC Project route of the transmission cable passes through the eastern basin, which is covered with a soft, semi-fluid, dark gray, silty clay or clay that was deposited on the lakebed since the last glacial period (CSR 2016). The ROI for geology and soils for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cable.

3.1.9.2 Geology

Lake Erie is underlain by Silurian and Devonian clastic (shale) and carbonate (limestone) strata. Drainage of a river system and glacial activity during the Mesozoic and Cenozoic periods (250 million years ago to present) are believed to have carved and eroded the bedrock of the region. Glacial loading 13,000 to 16,000 years ago pushed down the tectonic crust under Lake Erie, and minor faults and fracture zones are evidence that the region is rising following the retreat of heavy ice sheets during the last glacial period; the weight of more than 300 feet of glacial and post-glacial sediments is believed to be limiting the rise in the eastern basin (CRS 2016).

3.1.9.3 Sediments

Surficial sediments along the proposed LEC Project route were evaluated in 2016 and categorized into three types: post-glacial sand/silt, post-glacial sand that occasionally has a veneer of sit/clay, and glacial sediments. Glacial sediments are made of either glacial till or glacial lacustrine sediment, which is a mixture of silt and clay, sandy material, gravel, cobbles, and boulders. Bedrock was found in the shallow portions of the Lake Erie Segment of the proposed transmission cable route where the cable would make landfall; this bedrock is intermittently covered by a thin layer (less than 1.5 feet deep) of till, sand, cobble, or silt/clay (CRS 2016).

Several “pockmarks” were visible with side scan sonar during the 2016 sediment survey. These pockmarks probably represent places where gas or fluid escaped from the lakebed, which is known to occur in areas of post-glacial sediment cover in eastern Lake Erie. A large pockmark, approximately 800 feet from the proposed Project LEC route, is 200 feet in diameter and 23 feet deep, compared to the surrounding lakebed. Pockmarks closer to the proposed Project route, some within 200 feet, are smaller and range from less than 30 feet to nearly 100 feet in diameter.

3.1.9.4 Seismicity

The proposed LEC Project route is in an area of mild potential for seismic activity. The Lake Erie basin has a history of relatively weak seismic events. Several potential bedrock fractures were identified during the 2016 survey (CRS 2016); however, it is not known if any potential fractures or faults are active.

3.1.10 CULTURAL RESOURCES

The National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470 et. seq.) is the federal law that protects cultural resources and requires federal agencies to consider them when planning actions. Cultural resources include archaeological sites, historical structures and objects, and properties of traditional religious and cultural importance to a Native American tribe. Historic properties are cultural resources that are listed on, or eligible for listing on, the National Register Historic Places (NRHP) because they are significant and retain integrity (36 CFR §60.4). The NRHP addresses several types of historic properties, including prehistoric and historic archaeological sites, building and structures, districts, and objects (DOE 2014).

Section 106 of the NHPA requires federal agencies to consider the potential effects of their proposed actions on historic properties and to develop measures to avoid, minimize, or mitigate those effects by developing an EA. The EA, however, is not intended to substitute for an NHPA Section 106 agreement according to 36 CFR § 800.8(c). On April 11, 2016, DOE formally initiated the NHPA Section 106 consultation process with the Advisory Council on Historic Preservation (ACHP) and the Pennsylvania State Historic Preservation Office (PASHPO) and 15 tribes. The DOE is coordinating with the PASHPO to determine if a Programmatic Agreement (PA) would be required for the proposed LEC Project.

3.1.10.1 Area of Potential Effects

Federal regulations define the Area of Potential Effects (APE) as the geographic area within which the proposed LEC Project may directly or indirectly alter the character or use of historic properties, if any such properties exist [36 CFR § 800.16(d)]. The APE for the proposed LEC Project includes all areas along the construction corridor for the proposed transmission cable where ground-disturbing activities may be conducted and areas outside the proposed transmission corridor that may be affected by construction and operation of the Project, including the proposed site of the new Erie Converter Station, interconnection areas, laydown areas, and access roads.

The total area of the APE will be determined in consultation with the PASHPO and tribes. The ROI for the Lake Erie Segment is the same as the APE. The APE takes into account potential indirect effects on standing historic properties (i.e., buildings, structures, objects, and districts) from the use of heavy equipment, particularly along the terrestrial sections of the proposed LEC Project route. According to HDR (2015), construction activities (e.g., excavation activities and installation of cables) are expected to occur within a 20 to 50-foot wide corridor, or 10 to 25 feet on either side of the proposed Project centerline. The APE might be further refined through additional engineering.[9]

3.1.10.2 Regional Prehistory

The prehistory of the region is generally divided into the Paleoindian, Archaic, and Woodland periods. The Paleoindian period, which was approximately 13,500 to 11,500 years before present (BP), was characterized by hunting for caribou and migratory game (Quinn 1999; LERC 2008).

[9] ROI may vary depending on lay down areas.

During the Archaic period (10,450-2,950 BP) stone tool technology became more prominent and populations grew. Archaic period activities are reported at sites across the Lake Erie watershed (Quinn 1999; LERC 2008).

The Woodland period (2,950 - 400 BP) was characterized by use of ceramic vessels; horticulture; semi-permanent settlements; and a growing structure of mortuary ceremonialism, political systems, and trade networks (Quinn 1999). The groups in northwestern Pennsylvania participated in the Hopewell Interaction Sphere[10] (Quinn 1999; LERC 2008). The most significant sites from the Middle Woodland period that show the Hopewell influence are south of the Lake Erie watershed (Quinn 1999; LERC 2008). During the Late Woodland period, a distinct Lake Erie Plain culture developed. The Erie people relied heavily on fishing but were predominately semi-sedentary horticulturalists. Small fishing stations have been identified on the Lake Erie Plain (Quinn 1999).

3.1.10.3 Regional History

European nations were interested in western Pennsylvania for access to Lake Erie and the headwaters of the Ohio River (Thomas 1999). In 1749, Captain Pierre Joseph Celeron de Blainville claimed the area for the French. He encountered several English fur-trading stations during his expedition (Thomas 1999). To consolidate their control, the French built fortifications along strategic points in western Pennsylvania. The French and Indian War in 1754 broke the French stronghold in the region. At the start of the War of 1812, Erie was a remote settlement of about 500 inhabitants (EMM no date; Ware 2013). After the defeat of the British, the Americans secured control of the Ohio River Valley. By the early nineteenth century, the Great Lakes were the most important transportation system in the United States (Hyde 1979). As shipping increased, so did shipwrecks. Lake Erie contains approximately 2,000 shipwrecked merchant, military, and recreational vessels (Nass 2010). In addition to being a shipping center, Erie became a manufacturing center. Commercial fishing and heavy industries declined in the 1960s; however, Erie emerged as a regional tourist destination (Erie Chamber and Growth Partnership undated).

Examples of historic properties expected within the APE of the proposed LEC Project include:

- 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);
- historic cemeteries; and
- traditional, religious, or culturally significant sites for Native American tribes, including archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that tribes consider essential for the preservation of their traditional culture.

3.1.10.4 Cultural Resources Identified in the Lake Erie Segment Area of Potential Effect

Hartgen Archeological Associates, Inc. (2016) conducted a Phase 1 A literature review and archaeological sensitivity assessment to determine the potential effect of the proposed LEC Project on archaeological sites within the proposed alignment, including both the Overland and Lake Erie segments of the proposed route.

[10] A complex network involving the exchange of goods and information that connected distinct local populations in midwestern United States from around 100 BC to 400 AD. http://www.archaeologywordsmith.com/lookup.php?category=&where=headword&terms=interaction+sphere, accessed April, 2016.

The Phase 1 A study encompassed an area approximately 1 mile on either side of the centerline of the proposed route for the transmission cable and the site proposed for the new Erie Converter Station because the APE for the Project had not yet been defined. Two shipwrecks, *Charles Foster* and the "17 Fathoms Wreck," were identified within 1 mile of the proposed LEC Project route (***Table 3-4***). Other unverified wrecks may be present in the vicinity of the proposed Project (Wachter and Wachter 2007). The bedrock near the shore is either exposed or overlain with a thin deposit of silt/sand/gravel, which indicates low archaeological sensitivity (Hartgen 2016).

TABLE 3-4: KNOWN CULTURAL RESOURCES IN THE APE FOR THE LAKE ERIE SEGMENT

Site Type	Site Name and/or State and/or Project Number	Description
Underwater site	*Charles Foster*	Shipwreck approximately 2,000 feet from proposed LEC Project route; went down on December 8, 1900
Underwater site	17 Fathoms Wreck	Shipwreck approximately 1,950 feet from proposed LEC Project route; reported in 1963, depth of 17.5 fathoms (105 feet)

Source: Wachter and Wachter 2002

3.1.11 INFRASTRUCTURE

Infrastructure is defined as those human-made facilities and systems that are fundamental for serving the needs of a population in a specified area. The specific infrastructure components considered in this EA include electrical power supply, water supply, stormwater drainage, communications systems, natural gas, liquid fuel supply, sanitary sewer and wastewater systems, and solid waste management. The United States' portion of the Lake Erie Segment of the proposed LEC Project would be submerged under Lake Erie for approximately 35.4 miles between the United States and Canadian border with landfall in Springfield Township, Erie County, Pennsylvania. The ROI for infrastructure for the Lake Erie Segment of the proposed LEC Project includes the area within 175 feet of either side of the centerline of the proposed transmission cables. The United States portion of the proposed LEC Project has been sited to avoid any known infrastructure in Lake Erie.

3.1.11.1 Electrical Systems

No electrical system infrastructure has been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

3.1.11.2 Water Supply Systems

Most of the United States' water supply withdrawals from Lake Erie are in Ohio; there are 31 lake-fed water treatment plants on Ohio's North Coast. The two drinking water systems with intakes in Lake Erie that are closest to the Lake Erie Segment of the proposed LEC Project are the Erie City Water Authority and Aqua America (formerly Ohio American Water Company). Erie City Water Authority withdraws approximately 45 million gallons per day (MGD) and has two intakes on Lake Erie, both more than 4 miles from the proposed Project area. Aqua America serves Ashtabula, Ohio, and although the specific location of its intake is not specified, intakes that supply water to Ohio are considered to be outside the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

No industrial water intakes have been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

3.1.11.3 Stormwater Management

The Lake Erie Segment is located within the Lake Erie drainage basin (HUC 0412[11]). No stormwater management infrastructure has been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

3.1.11.4 Communications

No substantial communications infrastructure has been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

3.1.11.5 Natural Gas Supply

No natural gas supply infrastructure has been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project. Although there are several natural gas production areas within Canadian waters, there are none in the United States' portion of Lake Erie.

3.1.11.6 Liquid Fuel Supply

No substantial liquid fuel supply infrastructure has been identified in the potentially affected area associated with the Lake Erie Segment of the proposed LEC Project.

3.1.11.7 Sanitary Sewer and Wastewater Treatment

The Erie City Sewer Authority has two outfalls that discharge effluent totaling 165 MGD to Lake Erie. In addition, North East Borough Sewer Authority has one outfall to Sixteen Mile Creek, which is tributary to Lake Erie. There are several wastewater treatment plant discharges to Elk Creek, which is a tributary to Lake Erie. No sewer line crossings have been identified on the lake bottom in ROI of the proposed LEC Project.

3.1.11.8 Solid Waste Management

No substantial solid waste management infrastructure has been identified in the potentially affected area associated with the ROI of the proposed LEC Project.

3.1.12 RECREATION

Recreational resources are areas and facilities designated by local, state, and federal entities that offer visitors opportunities to enjoy recreational and leisure activities. Recreational resources include diverse opportunities ranging from quiet, undisturbed areas to highly developed sites with permanent infrastructure. Recreational resources in the Lake Erie Segment include fishing, boating, and water sports. The ROI for recreational resources within the Lake Erie Segment is the area within 0.5 mile on either side of the centerline of the proposed transmission cables, including the temporary work areas that may be affected during construction (i.e. construction barge).

[11] HUC 0412--Great Lakes Region 04, Subregion 0412. http://www.esg.montana.edu/gl/huc/04120000.html accessed April 2016.

Lake Erie supports a large freshwater fishery and associated opportunities for commercial and sport fishing. The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation estimates that approximately 639,000 anglers averaged approximately 13 days of fishing for a total of 8,451 fishing-days recorded on Lake Erie (including the Detroit River) in 2011 (FWS and USCB 2011). Lake Erie was the most popular of the Great Lakes among anglers, attracting 38 percent of all Great Lakes anglers. The PFBC historically conducted the Lake Erie Boat Angler Survey to estimate open-lake angling activity on Lake Erie. In 2007, the PFBC conducted 573 interviews and recorded 336,863 angler-hours on Lake Erie; approximately 79 percent of this effort occurred in the central basin. The top targeted species were walleye (51 percent), yellow perch (35 percent), smallmouth bass (6 percent), and steelhead trout (5 percent). Anglers caught 13 different species, but most of the harvest was yellow perch (82 percent) and walleye (16 percent) (PFBC 2008). Since 2005, anglers are required to obtain a Lake Erie Permit to fish for any species in the Lake Erie watershed (including Lake Erie, Presque Isle Bay, and all Lake Erie tributaries). In 2015, a total of 57,549 annual fishing licenses and permits were issued for Erie County, of which 9,244 (16 percent) were Lake Erie Permits (PFBC 2015a). The region is known for hosting a number of fishing tournaments, such as one of the top national bass and walleye fishing tournaments. Since January 2006, boating charters and fishing guides in Pennsylvania must be registered with the PFBC, and more than 20 charters are registered within Erie County (Fisherie.com 2016; PFBC 2016).

Recreational boating is popular in the region. In 2015, the PFBC recorded 10,732 boat registrations in Erie County (PFBC 2015b). In addition, the Erie region hosted Tall Ships Festivals in 2010 and 2013 and is scheduled to host another festival in 2016. The Tall Ships Festival drew approximately 32,000 visitors in 2010, and approximately 58,000 visitors in 2013, to the Erie region (Erie County 2015b).

In 2015, Erie County submitted an application for the proposed Lake Erie Quadrangle National Marine Sanctuary to the National Oceanic and Atmospheric Administration (NOAA). The sanctuary would encompass approximately 759 square miles of Pennsylvania's Lake Erie waters and 76.6 miles of shoreline in Erie County, including land within six townships, two boroughs and the city of Erie. The proposed boundary includes the Lake Erie Segment of the proposed LEC Project. One of the goals of the sanctuary is to create a world-class educational and recreational destination focusing on maritime heritage to enhance and expand the tourism industry. The proposed sanctuary encompasses an area in which 196 vessels are reported to have been lost, and 35 shipwrecks have been identified. The average depth of these shipwrecks is 41 feet, and all but one of the sites can be accessed by recreational self-contained underwater breathing apparatus (SCUBA) divers. Erie County has observed growing interest in diving among people in the Erie region and nearby population centers, noting more than 200 active divers within a 100-mile radius of Erie (Erie County 2015b).

3.1.13 VISUAL RESOURCES

Visual resources include the viewsheds and scenic viewing opportunities within the ROI. The ROI for visual resources within the Lake Erie Segment is the area 0.5 mile on either side of the centerline of the proposed transmission cables.

The Lake Erie Segment of the proposed LEC Project would be submerged in the Lake Erie lakebed extending approximately 35 miles from the border with Canada in the waters of Lake Erie to the landfall location in Pennsylvania. The viewshed in the Lake Erie Segment includes open waters and occasional views of commercial boats and barges, and recreational motorized boats and sailboats. Views of the Pennsylvania shoreline area include shoreline bluffs, beaches, the Presque Isle Bay area, and residential and urban area features, such as the city of Erie skyline (HDR 2016).

3.1.14 PUBLIC HEALTH AND SAFETY

The general standard for a "safe environment" is one in which there is no potential for death, serious bodily injury or illness, or property damage, or in which those risks have been optimally reduced (DOE 2015b). Federal and state public health and safety standards are administered within United States' waters of Lake Erie and in the state of Pennsylvania. These standards apply to the construction, operation, and maintenance of the proposed LEC Project. Risks for health and safety and associated risk-reduction measures are discussed in the context of the health and safety of contractors and the general public. This EA also describes and analyzes risks associated with exposure to EMF.

The effects of the proposed LEC Project would be primarily local within the transmission cable corridor; therefore, the ROI for public health and safety includes 175 feet on each side of the proposed transmission cable centerline. The ROI was defined in this way because public health and safety concerns involve primarily construction safety within the construction corridor. The ROI also encompasses the area of potential maximum exposure to EMF.

3.1.14.1 Contractor Health and Safety

Workers in the construction industry are exposed to a wide range of serious risks to their safety, including fall hazards, unguarded machinery, being struck by construction equipment, and electrocution (OSHA 2016). Occupational hazards for the Lake Erie Segment of the proposed LEC Project include risks associated with aquatic construction activities and water-based heavy equipment (i.e., boats and barges). Federal and state safety regulations are in place to "identify, reduce, and eliminate" hazards associated with construction, maintenance and operation. The Occupational Safety and Health Administration (OSHA) sets and administers safety and health regulations. Provisions for worker protection are required under the National Electric Safety Code (NESC) and OSHA 29 CFR Part 1926, *Safety and Health Regulations for Construction*. These regulations identify health and safety procedures and standards, including the use of personal protective equipment (PPE) and permissible exposure limits for workplace stressors. Industrial hygiene programs address exposure to hazardous materials and the availability of Material Safety Data Sheets (MSDS). Employers and contractors are responsible for complying with worksite safety regulations and ensuring that construction personnel are properly trained.

3.1.14.2 Public Health and Safety

Federal and state safety regulations are set not only to reduce and eliminate risks for workers, but also to reduce risks for the general public in the vicinity of the workplace. Potential hazards to the public along the aquatic portion of the proposed transmission cable include construction accidents related to cable installation and maintenance, the creation of a noisy environment during construction or maintenance, vessel accidents and other navigational hazards. The USCG is the primary federal public health and safety organization with jurisdictional authority in the Lake Erie Segment, and it operates a station on Presque Isle State Park in Erie, Pennsylvania. The USCG performs search, rescue, law enforcement and homeland security operations within approximately 800 square miles of Lake Erie from the shorelines to the international border (USCG 2016). The PFBC's Waterways Conservation officers also provide enforcement of boating laws and regulations on Pennsylvania waters (HDR 2016).

3.1.14.3 Electric and Magnetic Field Safety

Anything that carries an electric current, including electrical transmission cables, produces EMF. Electrical fields are measured in units of kilovolts per meter (kV/m), and magnetic fields are measured in units of gauss (G). Environmental EMF exposures are generally very small and more appropriately measured in milligauss (mG), or thousandths of a gauss. The strength of EMF increases as electric current increases but

generally decreases with increasing distance from the source of the electric current. Public risks associated with EMF also vary with the type of electrical power being produced. Direct current electric power does not induce electric currents in humans; however, AC electric power has been shown to create weak electric currents in humans (NIEHS 2002).

The public is exposed to EMF daily through the Earth's natural geomagnetic field (approximately 536 mG in the proposed LEC Project area) and through the use of common household appliances (DOE 2015b; Exponent 2015a). For comparison purposes, ***Table 3-5*** provides details regarding the typical magnetic field levels at distances of 1 and 2 feet from common household appliances.

TABLE 3-5: MAGNETIC FIELD LEVELS OF VARIOUS HOUSEHOLD APPLIANCES

Appliance	Magnetic Field Strength (mG)	
	1 foot	2 feet
Hair Dryer	Bg to 70	Bg to 10
Window A/C	Bg to 20	Bg to 6
Color TV	Bg to 20	Bg to 8
Dishwasher	6 to 30	2 to 7
Refrigerator	Bg to 20	Bg to 10
Can Opener	40 to 300	3 to 30
Microwave Oven	1 to 200	1 to 30
Washing Machine	1 to 30	Bg to 6
Power Drill	20 to 40	3 to 6

Source: NIEHS 2002
Bg = Measurement indistinguishable from background
mG = milligauss

No federal standards have been established for EMF exposure, and Pennsylvania has no state transmission line standards or guidelines for EMF. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed an exposure limit of 4,000,000 mG for the general public (DOE 2015b).

3.1.15 NOISE

The ROI for noise includes 600 feet on each side of the proposed transmission cable centerline. Sound is defined as tiny fluctuations in air pressure characterized by both their amplitude (how loud it is) and frequency (or pitch); noise is defined as unwanted sound. 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. The A-weighted decibel (dBA) is used to reflect this selective sensitivity in human hearing. The human range of hearing extends from approximately 3 dBA to 140 dBA.

Environmental noise is often expressed as a continuous sound occurring over a period of time, typically one hour. The average sound level is called the equivalent continuous noise level (Leq) and is variable. 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 Leq) and to assess the potential increase in noise expected to result from activities related to the project.

TABLE 3-6: NOISE LEVELS FROM COMMON SOURCES

Sound Pressure Level*	Typical Source
120	Jet aircraft takeoff at 100 feet
110	Jet aircraft takeoff at 400 ft
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
*measured in dBA

Sound within the Lake Erie Segment of the proposed Project area is generated by natural sources, such as wind and waves, and by man-made sources, such as boat and barge traffic. There are no statewide noise limits to control noise emitting sources within the Lake Erie Segment of the proposed Project area.

3.1.16 HAZARDOUS MATERIALS AND WASTES

The ROI encompasses the geographic area (i.e. the construction corridor, construction staging areas, and the route that construction vehicles/vessels would use) that could be affected during construction, operation, and maintenance of the proposed LEC Project, up to 175 feet on either side of the transmission cable centerline.

Hazardous materials are defined under 49 CFR §171.8 and may include liquid fuels, solvents, oils, lubricants, and hydraulic fluids. Hazardous wastes are defined under the Resource Conservation and Recovery Act (RCRA), specifically 42 U.S.C. §6903, and include spent hazardous materials and byproducts of their use. Substances posing special hazards are regulated under 15 U.S.C. Chapter 53 and include asbestos-containing material, PCBs, and lead-based paint (PADEP 2011; DOE 2015b).

The U.S. Environmental Protection Agency (EPA) is the primary federal agency responsible for administering and enforcing laws regarding hazardous wastes and materials. The EPA may delegate authority to states to administer and enforce these federal programs, so long as the state's program is equivalent to, or as stringent as, the federal program. Pennsylvania's hazardous waste regulations are incorporated into Pennsylvania Code under Title 25. The PADEP is the agency responsible for issuing permits, conducting inspections, signing consent orders, gathering and processing data, and implementing corrective actions and other actions necessary to enforce regulations adopted under state environmental laws as codified in Pennsylvania Code Title 25 (PADEP 2011).

The Lake Erie Segment ROI encompasses a corridor extending approximately 35 miles through United States' waters of Lake Erie. The proposed transmission cables would be buried in the lakebed along most of this route. Existing dump and disposal areas within the Lake Erie Segment ROI were assessed using NOAA charts for Lake Erie. NOAA charts identify no disposal or dump areas along the Lake Erie Segment ROI (NOAA 2016b).

Portions of Lake Erie sediments have been documented as containing contaminants such as cadmium, mercury, and other trace metals. Spatial distribution analysis of contaminated sediments in Lake Erie indicates that the largest concentrations occur west of the proposed transmission cable route (HDR 2016).

3.1.17 AIR QUALITY

In accordance with requirements of the federal Clean Air Act (CAA), the air quality of a region is determined by the concentration of criteria air pollutants in the atmosphere. Several factors affect the air quality of a particular region, including the sources of pollutants, the quantity of sources, topography, climate, and the prevailing meteorological conditions. The ROI for the Lake Erie Segment includes Erie County in Pennsylvania; which is part of the Northwest Pennsylvania-Youngstown Interstate Air Quality Control Region (AQCR).

3.1.17.1 Ambient Air Quality Standards

The CAA requires the EPA to establish national ambient air quality standards (NAAQS) for common air pollutants to protect human health, welfare, and the environment. These pollutants are called criteria pollutants. The CAA identifies two types of NAAQS: (1) primary standards designed to protect public health; and (2) secondary standards that protect public welfare, including visibility and damage of plants, animals, and structures. The EPA established NAAQS for eight criteria pollutants:

- ground-level ozone (O_3)
- carbon monoxide (CO)
- nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- lead (Pb)
- total suspended particles (TSP)
- particulate matter with an aerodynamic diameter of ≤ 10 microns (PM_{10})
- particulate matter with an aerodynamic diameter of ≤ 2.5 microns (PM2.5)

Criteria pollutants are further classified as primary or secondary pollutants. Primary pollutants are emitted directly to the atmosphere from a source (e.g., CO, NO_2, SO_2, Pb, TSP, PM10 and PM2.5); secondary pollutants are produced in the atmosphere from precursor pollutants (e.g., O_3, PM, PM2.5). A series of reactions in the atmosphere involving nitrogen oxides (NO_x), volatile organic compounds (VOCs), and sunlight produces secondary pollutants, including O_3 and PM2.5. Emissions of NO_x and VOCs must be controlled to reduce the concentrations of PM2.5 in the air and ground-level concentrations of O_3. Particulate matter includes total suspended particles (TSP), particulate matter equal to or less than 10 microns in aerodynamic diameter (PM10), and even finer particulate matter defined as having an aerodynamic diameter equal to or less than 2.5 microns (PM2.5).

Furthermore, the EPA is required to regulate emissions of hazardous air pollutants (HAPs) from specific categories of sources; HAPs cause serious health effects, such as cancer, and adverse environmental effects. Currently, 187 HAPs are regulated by using control technology to reduce emissions; VOCs constitute one major category of HAPs.

The CAA provides states with the authority to establish air quality rules and standards that are stricter than the federal standards. The PADEP's Bureau of Air Quality has the authority to implement the CAA and maintain compliance with the NAAQS. Pennsylvania adopted all of the federal ambient air quality standards and established standards for beryllium, fluorides, and hydrogen sulfide (Commonwealth of Pennsylvania 2011) (***Table 3-7***).

TABLE 3-7: NATIONAL AND PENNSYLVANIA STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Period	Federal Air Quality Standards[a]				Pennsylvania State Standards[b]	
		Primary Standards		Secondary Standards			
		Level[c]	Form	Level	Form	Level	Form
Carbon Monoxide	8-hour	9 ppmv	Not to be exceeded more than once per year	None		Same as federal standard	
	1-hour	35 ppmv					
Lead	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded	Same as primary			
Nitrogen Dioxide	1-hour	100 ppbv	98th percentile of daily maximum averaged over 3 years	None			
	Annual	53 ppbv	Mean	Same as primary			
Ozone	8-hour	70 ppbv	Annual 4th highest daily maximum averaged over 3 years	Same as primary			
$PM_{2.5}$	24-hour	35 µg/m^3	98th percentile averaged over 3 years	Same as primary			
	Annual	12 µg/m^3	Annual mean averaged over 3 years	15 µg/m^3	Annual mean averaged over 3 years		
PM_{10}	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years	Same as primary			
Sulfur Dioxide	1-hour	75 ppbv	99th percentile of daily maximum concentration averaged over 3 years	None			
	3-hour	None		0.5 ppmv	Not to be exceeded more than once per year		
Beryllium	30-day	None		None		0.01 µg/m^3	Maximum not to be exceeded
Fluorides	24-hour	None		None		5 µg/m^3	Maximum not to be exceeded
Hydrogen Sulfide	1-hour	None		None		0.1 ppmv	Maximum not to be exceeded
	24-hour					0.005 ppmv	Maximum not to be exceeded

Source: https://www3.epa.gov/ttn/naaqs/standards/pm/s_pm_history.html. Accessed May 10, 2016.
[a]40 CFR part 50
[b]Commonwealth of Pennsylvania 2011
[c]ppmv = parts per million by volume; ppbv = parts per billion by volume; µg/m^3 = micrograms per cubic meter of air

3.1.17.2 Attainment versus Nonattainment and General Conformity

The EPA designates each of the criteria pollutants within an AQCR as being:

- in attainment (i.e., pollutant meets or is better than the standard),
- in nonattainment (i.e., pollutant does not meet the standard),
- in maintenance (i.e., region was previously in nonattainment but is now in attainment), or
- unclassifiable (i.e., data are insufficient to determine status, so the region is considered to be in attainment).

The CAA requires each state to develop a State Implementation Plan (SIP) describing how the state would implement, enforce, and maintain compliance with all NAAQS and how the state would attain the standards in each region designated as nonattainment. The SIPs are intended to prevent the deterioration of air quality in regions that are in attainment and to reduce emissions of criteria pollutants in nonattainment areas to levels that comply with all NAAQS.

The densely populated region of the northeast extending from Maine to Northern Virginia was grouped into the Ozone Transport Region (OTR). Regardless of the attainment status of an area in the OTR, all states in the OTR, including Pennsylvania, are required to implement additional emission control measures for the pollutants that produce ozone. More specifically, SIPs in OTR states must use reasonably available control technology (RACT) and reasonably available control measures (RACM) to control emissions of VOCs and Nitrogen Oxides (NO_x). Furthermore, states must comply with permitting programs, such as new-source review and prevention of significant deterioration.

The General Conformity Rule [CAA Section 176(c)(4)] requires that any federal action in nonattainment or maintenance areas must not cause or contribute to new or existing violations of the NAAQS by ensuring that the actions conform to the state NAAQS and SIPs. Furthermore, the rule ensures that federal actions do not delay attainment of any NAAQS or interfere with reaching any milestone in progress toward achieving compliance with the NAAQS. If the emissions from a federal action are below the de minimis levels, then the action is not subject to a conformity determination.

Table 3-8 lists the most recently published emission inventory for Erie County and the Northwest Pennsylvania-Youngstown Interstate AQCR. Erie County is in attainment for all NAAQS, but is located within the OTR and, therefore, is considered to be in moderate non-attainment for ozone.
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TABLE 3-8: 2011 LAKE SEGMENT AIR EMISSIONS INVENTORY*

County and AQCR	CO	NO_x	SO_2	VOC	$PM_{2.5}$	PM_{10}
Erie	44,496	11,373	1,659	15,002	2,444	5,825
Northwest Pennsylvania-Youngtown AQCR	456,703	91,639	58,871	181,211	18,894	49,359

Source: EPA 2011
*figures are listed in tons per year

3.1.17.3 Climate Patterns

Topographical (e.g., mountains, plains) and hydrological (e.g., rivers, streams, lakes) features influence the climate of Pennsylvania. The climate of northwest Pennsylvania is characterized as continental. The region experiences a large temperature range and a strong lake effect from Lake Erie (NCDC 2011). Lakes act as

heat sinks and moderate temperatures of surrounding land, resulting in cooler summers and warmer winters. Furthermore, the moderating influence of Lake Erie extends the freeze-free season, particularly in the fall (NCDC 2011). When a cool air mass passes over a warmer lake, it warms and is able to hold more moisture. In winter, this moisture contributes to lake-effect snow downwind of Lake Erie and contributes to the Lake Erie "snowbelt." Because of its small size (compared to the other Great Lakes), Lake Erie can completely freeze in winter, which prevents lake-effect snow from developing. The prevailing westerly winds transport most weather systems that affect Pennsylvania primarily in the form of warm, humid air from the Gulf of Mexico or cold, dry air from the Arctic (EPA 1995). Pacific air masses can also influence the region in winter.

The Northeast Regional Climate Center (NRCC) maintains climate data from a station at the Erie International Airport (NRCC 2016). ***Table 3-9*** shows the minimum and maximum monthly mean temperatures and the mean monthly temperatures for the periods 1980 through 2010, and 2011 through 2015. ***Table 3-10*** lists the mean total precipitation and snowfall for the period 1980 through 2010 and the minimum and maximum monthly mean total precipitation for the periods 1980 through 2010 and for 2011 through 2015. Minimum temperatures occur in January and February (monthly means of 24.3^0F to 28.3^0F during 1980 through 2010 and 2011 through 2015); maximum temperatures are observed in July and August (monthly means of 70.5^0F to 72.7^0F during 1980 through 2010 and 2011 through 2015) (***Table 3-9***). Monthly precipitation averaged 2.4 to 5.5 inches during 1980 through 2010 and 2011 to 2015 (***Table 3-10***).

TABLE 3-9: MONTHLY TEMPERATURE DATA FOR 1980 THROUGH 2010 AND 2011 THROUGH 2015

Month	1980-2010			2011-2015		
	Minimum Mean Monthly Temperature*	Maximum Mean Monthly Temperature*	Mean Monthly Temperature*	Minimum Mean Monthly Temperature*	Maximum Mean Monthly Temperature*	Mean Monthly Temperature *
January	20.8	33.7	27.2	21.6	32.1	26.1
February	21.1	35.5	28.3	13.1	34.0	24.3
March	27.5	43.8	35.7	28.1	48.9	34.9
April	38.1	56.1	47.1	45.6	47.1	46.7
May	48.2	66.6	57.4	58.4	63.2	61.0
June	58.4	75.7	67.1	66.4	69.5	67.9
July	63.5	79.8	71.7	69.2	75.8	72.7
August	62.5	78.6	70.5	69.8	71.5	70.7
September	55.8	71.9	63.8	62.9	69.1	65.1
October	45.3	60.8	53.0	52.9	55.4	54.1
November	36.6	49.9	43.3	39.2	48.1	43.0
December	26.6	38.1	32.4	31.2	44.0	37.4

*Note: Temperatures are expressed in Fahrenheit (F)

TABLE 3-10: MONTHLY SNOWFALL AND PRECIPITATION DATA FOR 1980 THROUGH 2010 AND 2011 THROUGH 2015

Month	1980-2010		2011-2015		
	Mean Total Snowfall*	Mean Total Precipitation*	Minimum Mean Monthly Precipitation*	Maximum Mean Monthly Precipitation*	Mean Precipitation*
January	29.6	3.0	2.6	4.5	3.3
February	18.2	2.4	1.8	5.3	3.1
March	13.7	3.0	2.0	4.8	3.0
April	3.2	3.3	2.2	6.4	3.6
May	0	3.4	2.9	8.5	4.8
June	0	3.8	1.6	7.3	4.3
July	0	3.5	0.7	5.6	3.1
August	0	3.5	1.5	5.3	3.2
September	0	4.6	2.8	5.2	4.3
October	0.2	4.1	2.2	8.3	5.5
November	8.5	3.9	1.5	4.4	3.2
December	27.5	3.7	2.5	6.0	4.5

*Note: Measurements are in inches

3.1.17.4 Pollutants

Several anthropogenic and natural sources in northwest Pennsylvania emit air pollutants. The major sources of CO and NO_x include on-road and off-road mobile sources, combustion of fossil fuels and wood, wildfires, vegetation, soil, and waste disposal (EPA 2011). The dominant sources of SO_2 emissions in northwest Pennsylvania are commercial marine vessels, fossil-fuel combustion, industrial processes, and mobile sources. The major sources of PM are dust from roads and construction, mobile sources, industrial fossil-fuel combustion, residential wood combustion, waste disposal, agriculture, and industrial processes. Mobile sources, fuel combustion, and industrial processes are the primary sources of lead (EPA 2011). Numerous sources emit VOCs, including vegetation, soil, mobile sources, gasoline, residential fossil-fuel combustion, wildfires, commercial and industrial use of solvents, industrial processes, and waste disposal.

3.1.17.5 Greenhouse Gas Emissions

Greenhouse gases (GHG) trap heat in the atmosphere and are produced by both anthropogenic sources (i.e., fossil-fuel combustion, transportation, industry) and biological processes. The major GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, and fluorinated compounds. In 2012, the total statewide gross GHG emissions for Pennsylvania were 287.38 million metric tons of carbon dioxide equivalent (MMTCO2e); this represents a decrease of approximately 11 percent compared to 322.96 MMTCO2e in 2000 (PADEP 2015).[12] In 2012, the land use and forestry sectors absorbed approximately 34.26 MMTCO2e, resulting in net emissions of 253.12 MMTCO2e. The major sources of GHG in Pennsylvania are electricity production (37 percent), industry (28 percent), and transportation

[12] https://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html. Accessed May 10, 2016.

(23 percent) with smaller contributions from the residential, commercial, agricultural, and waste management sectors (PADEP 2015).

3.1.18 SOCIOECONOMICS

The ROI for socioeconomics for the Lake Erie Segment of the proposed Project is Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships. This ROI includes the communities in which construction would occur and that would be the primary sources of goods, services, and workers for the proposed LEC Project, as well as the primary recipient of economic benefits.

The following sections provide socioeconomic data for the affected townships, Erie County, the state of Pennsylvania, and the United States to characterize the baseline socioeconomic conditions within the proposed LEC Project area in the context of regional, state, and federal trends.

3.1.18.1 Population

Erie County is one of 67 counties in the Commonwealth of Pennsylvania adjacent to Ohio, New York, and Lake Erie. Erie County encompasses 37 municipalities and the City of Erie, which is the county seat and the fourth largest city in Pennsylvania (Erie County Finance Department 2016). In 2014, the population in Erie County was estimated at 278,443, which was slightly reduced from the estimated population in 2000 and 2010, denoting a relatively stable population base between 2010 and 2014. Based on the 2010 Census, Springfield and Conneaut townships experienced modest growth, while Girard Township remained relatively stable. ***Table 3-11*** summarizes populations estimates based on U.S. Census Bureau data for the United States, Pennsylvania, Erie County, and the townships within Erie County where the proposed underground transmission cable would be located (USCB 2000, 2010, and 2016).

TABLE 3-11: POPULATION ESTIMATES FOR THE REGION OF INFLUENCE FOR THE PROPOSED LEC PROJECT

Location	2000	2010	2014	2000 to 2010	
				Population Change	Percent Change
United States	281,421,906	308,745,538	314,107,084	27,323,632	9.7%
Pennsylvania	12,281,054	12,758,729	12,787,209	477,675	3.9%
Erie County	280,843	280,566	278,443	-277	-0.1%
Springfield Township	3,378	3,425	3,407	47	1.4%
Girard Township	5,133	5,102	5,068	-31	-0.6%
Conneaut Township	3,908	4,290	4,348	382	9.8%

Sources: USCB 2000, 2010, 2016; data based on 2010-2014 American Community Survey 5-Year Estimates.

3.1.18.2 Employment

Erie County has a strong history of manufacturing and more recent growth in the healthcare, education, and tourism industries. Erie County is a primary gateway to Lake Erie and associated shipping industries, and the Port of Erie is in the city of Erie east of the proposed LEC Project landfall. Key employers in Erie County include General Electric Company, insurance companies (e.g., Erie Indemnity Company), several healthcare hospital systems (e.g., UPMC Hamot, Saint Vincent Health Center), several colleges and universities, and state and federal government (ERCGP 2016). During 2014, an estimated 62 percent of

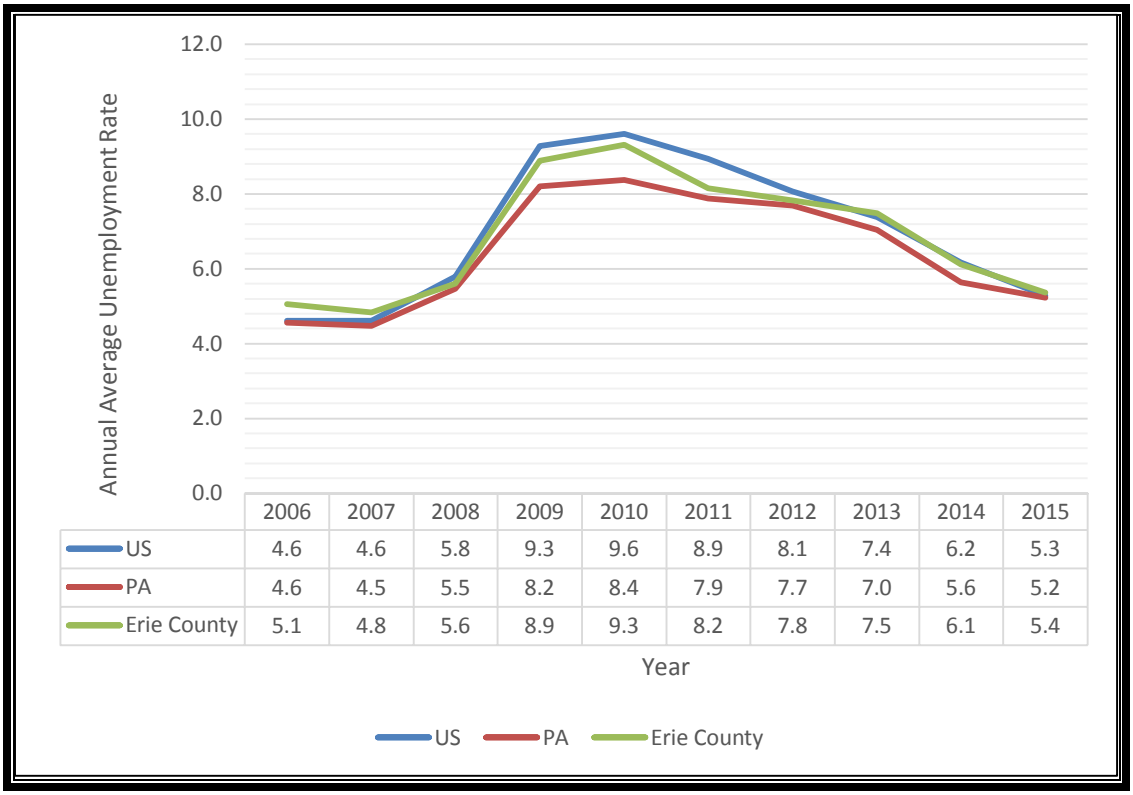
the population 16 years or older was employed in Erie County, which was comparable to the United States percentage of employment for that age group (***Table 3-12***).

TABLE 3-12: ESTIMATED 2014 EMPLOYMENT STATUS FOR THE REGION OF INFLUENCE FOR THE PROPOSED LEC PROJECT

Industry	United States		State of Pennsylvania		Erie County	
	Estimate	Percent	Estimate	Percent	Estimate	Percent
Population 16 years and over	248,775,628		10,351,296		225,520	
In labor force	158,965,511	63.9	6,508,402	62.9	139,716	62.0
Civilian labor force	157,940,014	63.5	6,502,948	62.8	139,631	61.9
Employed	143,435,233	57.7	5,946,480	57.4	127,697	56.6
Unemployed	14,504,781	5.8	556,468	5.4	11,934	5.3
Armed Forces	1,025,497	0.4	5,454	0.1	85	0.0
Not in labor force	89,810,117	36.1	3,842,894	37.1	85,804	38.0

Source: U.S. Census Bureau 2016, data based on 2010-2014 American Community Survey 5-Year Estimates.

The unemployment rate in December 2015 for Erie County was 4.5 percent, down from 4.8 percent for December 2014; the United States unemployment rates were 4.8 percent in December 2015 and 5.4 percent in December 2014 (U.S. Bureau of Labor Statistics 2016a). The average annual unemployment rate for Erie County was 5.6 percent in 2014 and 5.2 percent in 2015; rates for the United States were 6.2 percent in 2014 and 5.3 percent in 2015. ***Figure 3-2*** denotes the average annual unemployment rates from 2006 to 2014 for the United States, Pennsylvania, and Erie County. Trends in Erie County during that period were similar to trends in the United States; unemployment rates peaked during 2009-2010, then steadily dropped to an average annual rate of 5.4 percent in 2014 (U.S. Bureau of Labor Statistics 2016b).



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
US	4.6	4.6	5.8	9.3	9.6	8.9	8.1	7.4	6.2	5.3
PA	4.6	4.5	5.5	8.2	8.4	7.9	7.7	7.0	5.6	5.2
Erie County	5.1	4.8	5.6	8.9	9.3	8.2	7.8	7.5	6.1	5.4

Source: U.S. Bureau of Labor Statistics 2016b

FIGURE 3-2: AVERAGE ANNUAL UNEMPLOYMENT RATE FOR THE REGION OF INFLUENCE FOR THE PROPOSED LEC PROJECT

Table 3-13 summarizes employment by aggregate industry for Erie County, the United States, and Pennsylvania. The largest percentage of the civilian labor force in Pennsylvania and Erie County is employed in the educational, health, and social services industry at 28 percent in Erie County and 26 percent in Pennsylvania. For Erie County, the manufacturing (17.5 percent); retail trade (11.7 percent); and arts, recreation, and accommodations (10.1 percent) industries are the other key industries with the largest employment (USCB 2016).

TABLE 3-13: ESTIMATED 2014 EMPLOYMENT BY INDUSTRY FOR THE REGION OF INFLUENCE FOR THE PROPOSED LEC PROJECT

Industry	United States		Pennsylvania		Erie County	
	Estimate	Percent	Estimate	Percent	Estimate	Percent
Agriculture, forestry, fishing and hunting, and mining	2,807,292	2.0%	85,917	1.4%	1,356	1.1%
Construction	8,843,718	6.2%	339,420	5.7%	5,814	4.6%
Manufacturing	14,955,235	10.4%	725,132	12.2%	22,297	17.5%
Wholesale trade	3,937,598	2.7%	166,806	2.8%	2,859	2.2%
Retail trade	16,598,718	11.6%	699,680	11.8%	14,896	11.7%
Transportation and warehousing, and utilities	7,066,666	4.9%	301,443	5.1%	4,621	3.6%
Information	3,064,078	2.1%	103,669	1.7%	1,762	1.4%
Finance and insurance, and real estate and rental and leasing	9,467,555	6.6%	381,790	6.4%	6,975	5.5%
Professional, scientific, and management, and administrative and waste management services	15,618,627	10.9%	580,495	9.8%	8,155	6.4%
Educational services, and health care and social assistance	33,297,237	23.2%	1,544,371	26.0%	35,748	28.0%
Arts, entertainment, and recreation, and accommodation and food services	13,610,162	9.5%	494,546	8.3%	12,834	10.1%
Other services, except public administration	7,112,579	5.0%	276,619	4.7%	5,992	4.7%
Public administration	7,055,768	4.9%	246,592	4.1%	4,388	3.4%
Total civilian employed population 16 years and over	**143,435,233**		**5,946,480**		**127,697**	

Source: USCB 2016, data based on, 2010-2014 American Community Survey 5-Year Estimates

3.1.18.3 Housing

Based on 2010 U.S. Census data, total housing units in Erie County were estimated at approximately 120,000 units, and an estimated 8,725 units were vacant; approximately 7 percent of 2,700 rental units were vacant. Total housing remained fairly consistent between 2010 and 2014 for Erie County and for Springfield, Girard, and Conneaut townships (***Table 3-14***). Erie County provides a variety of short-term housing options, including hotel and motel, bed and breakfast, cabin and cottage rental units, and campground facilities (VisitErie 2016).

TABLE 3-14: ESTIMATED HOUSING DATA FOR THE REGION OF INFLUENCE FOR THE LEC PROJECT

Location	Erie County	Springfield Township	Girard Township	Conneaut Township
Total housing units (2010)	119,138	1,567	2,228	861
Occupied housing units	110,413	1,317	2,086	786
Vacant housing units	8,725	250	142	75
Rental units	2,771	28	15	6
Homeowner vacancy rate	1.5	0.7	1.0	1.2
Rental vacancy rate	7.0	11.1	4.2	3.9
Total housing units (2014)	119,506	1,482	2,180	899

Source: USCB 2016; data based on 2010-2014 American Community Survey 5-Year Estimates; USCB, 2010 Census.

3.1.18.4 Taxes and Revenue

In 2014, Erie County had a total revenue of $325.9 million, including $290.7 million from governmental activities and $35.2 million from business activities. Revenue for the governmental activities included 9 percent from charges for services, 65 percent from operating grants and contributions, and 26 percent from general revenues. General revenues included $69.2 million from property taxes and $4.3 million from hotel room tax; the remaining general revenues came from interest and other income (Erie County Finance Department 2016).

Property taxes in Pennsylvania are levied by county, municipality, and school district and apply to only real estate (land and buildings). Property taxes for the counties are determined through the real estate assessment process, which is governed by the Consolidated County Assessment law and implemented through the county assessment office. Property tax revenues within the ROI, therefore, would vary by township and school district (Local Government Commission of Pennsylvania 2016). Sales tax within Erie County is at the state of Pennsylvania rate of 6 percent (Sale-Tax 2016).

3.1.19 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environment effects of their actions on minority and low-income populations. Minority populations are those identified in census data as Native American or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; Hispanic; some other race; or two or more races (CEQ 1997). Low-income populations are identified as individuals and families that are living at or below the United States poverty level. There are no populated areas within or bordering the Lake Erie Segment; therefore, the ROI for environmental justice is discussed in relation to the proposed LEC Project Overland Segment (***Section 3.2.19***).

3.2 OVERLAND SEGMENT

3.2.1 LAND USE

The proposed underground transmission cable route travels primarily within roadway ROWs and outside of existing roadway ROWs in certain areas to avoid sensitive natural resources and infrastructure or to account for limitations of the transmission cable installation. The proposed LEC Project route would leave the ROW at five locations where the road turns and in two other areas: approximately 3,953 feet to avoid a wooded area near Lake Erie landfill and approximately 3,885 feet near Route 20 (HDR 2015).

Land use along the proposed LEC Project Overland Segment is primarily low-density residential and agricultural. The proposed cable route crosses private property, municipal and state property (i.e., along roadways and interstates), and railroad property (HDR 2016). Open, wooded, vacant lots and water, as well as, agricultural lands account for the majority of the land use (in square miles) in Erie County (***Table 3-15***). No places of worship, schools, or health care facilities were identified along the proposed LEC Project Overland Segment (HDR 2015).

The proposed site of the new Erie Converter Station lies in an agricultural field that includes a wooded area. This site is located in Conneaut Township, which has no zoning regulations; however, the Conneaut Township area is subject to land development plan approval procedures administered by Erie County.

TABLE 3-15: LAND USES IN ERIE COUNTY OVERLAND SEGMENT

Land Uses	Square Miles
Residential	68.85 (8.6%)
Commercial	7.99 (1.0%)
Industrial	6.85 (0.9%)
Public/Recreational/Institutional	13.79 (1.7%)
Open/Wooded/Vacant/Water	434.6 (54.2%)
Agricultural Land	213.6 (26.5%)
State Game Lands	28.69 (3.6%)
Roads and Highways	25.3 (3.19%)
Other Transportation	3.45 (0.4%)

Source: Erie County Land Use Plan[13]

3.2.1.1 Land Use Plans and Policies

Zoning Ordinances

Under both Springfield Township Zoning Ordinance and Girard Township Zoning Ordinance, the Project's electric transmission line constitutes an "essential service" that is a permitted use in every zoning district within the township. Conneaut Township, where the proposed new Erie Converter Station would be located, does not have a zoning ordinance.

Bluff Recession and Setback Program

As required by the Pennsylvania Bluff Recession and Setback Act, ITC Lake Erie will obtain a zoning variance from Springfield Township for the proposed construction activities within the bluff setback area.

[13] https://www.eriecountypa.gov/media/19675/erieco_landuse_plan_dec_03.pdf; accessed April 22, 2016.

Erie Country Comprehensive Plan
The proposed LEC Project is consistent with the Erie County Comprehensive Plan, which contains the following sections: Housing Plan, Demographic Study, Transportation Plan, Citizen Survey, Land Use Plan, Community Facilities and Utilities Plan, and Natural and Historic Resources Plan. The Erie County Comprehensive Plan is currently being updated.

Subdivision and Land Development Ordinances
The proposed underground transmission cables of the Project in Springfield and Girard townships do not require subdivision or land development plan approvals because no buildings are being developed. For the proposed new Erie Converter Station facility in Conneaut Township, ITC Lake Erie has applied for a preliminary land development plan approval from Erie County because Conneaut Township does not have its own subdivision and land development ordinance (SALDO). The 30-day public comment period on the preliminary land development plan has expired, and approval of the preliminary land development plan by the Erie County planning staff is pending (HDR 2016). After approval of the preliminary land development plan, the Project will follow a similar process for obtaining Erie County approval of the final land development plan for the converter station.

Farmland Preservation Program
In the Springfield, Girad, and Conneaut townships near the proposed LEC Project Overland Segment, approximately 12,968 acres are in the state of Pennsylvania's Farmland Preservation Program, which protects agricultural land through the formation of Agricultural Security Areas and Agricultural Conservation Easements (Erie County no date).

3.2.2 TRANSPORTATION AND TRAFFIC

The ROI for transportation and traffic is within 0.25 mile of the construction corridors for the proposed LEC Project and intersections, which would include some sections of roadways and railway crossings. ***Table 3-16*** describes the character of each relevant roadway and route beginning with the proposed LEC Project landfall in Erie County, Pennsylvania, and continuing approximately 7 miles to the proposed new Erie Converter Station, and another approximately 2,153 feet to the Erie West Substation. Proposed transmission cables would be buried primarily in ROWs for state and municipal roads, except for two areas where the route follows easements across private property consisting of woods and agricultural fields. Moreover, the proposed route would briefly leave the adjacent roadway ROW at seven locations to account for turns in the transmission cable alignment.

The proposed transmission cables would exit Lake Erie at a one-half-acre site on a bluff adjacent to Lake Erie in Springfield Township The proposed cables would be installed in this area using HDD and would extend approximately 0.6 mile underground along an existing private road serving several houses and pass beneath one railroad crossing (two tracks) owned by CSX. The proposed transmission cables would then run northeast for 0.5 mile along West Lake Road/PA Route 5 (PennDOT jurisdiction). Annual average daily traffic volume along PA Route 5 in the vicinity of the proposed Project route is 2,300 vehicles (PennDOT 2016). The proposed transmission cable corridor would turn south, along Townline Road (Girard Township and Springfield Township jurisdiction) for 2.3 miles, crossing the intersection of West Middle Road (Girard Township and Springfield Township jurisdiction), intersecting with Lucas Road (Girard Township and Springfield Township jurisdiction), and passing beneath Norfolk-Southern Railroad (one track). The proposed transmission cable corridor would then cross U.S. Route 20 (PennDOT jurisdiction) and extend through forested property and follow a farm road for approximately 0.75 mile until the route would intersect with Springfield Road (Girard Township and Springfield Township jurisdiction). Annual average daily traffic volume in the vicinity of the Route 20 crossing is approximately 3,200 vehicles (PennDOT 2016). The proposed transmission cable corridor would then continue along Springfield Road for 1.6 miles, cross beneath Interstate 90 (PennDOT jurisdiction) and continue along Springfield Road for

0.15 miles to its intersection with Lexington Road (PennDOT jurisdiction). Annual average daily traffic volume along Interstate 90 in the vicinity of the proposed LEC Project is approximately 20,000 vehicles (PennDOT 2016). The proposed transmission cable corridor would continue within the Lexington Road ROW for 1.2 miles, crossing private property for 0.1 miles, before reaching the proposed site of the new Erie Converter Station. Annual average daily traffic volume along Lexington Road in the vicinity of the proposed new Erie Converter Station is 600 vehicles (PennDOT 2016). From the proposed new Erie Converter Station, the LEC Project would extend approximately 2,153 feet through the existing powerline ROWs to the Erie West Substation.

TABLE 3-16: PROPOSED LEC PROJECT ROUTE

Cable Section	Segment	Corridor Type	Approximate Length*
Private property landfall in Erie County, Pennsylvania to West Lake Road	Overland	Terrestrial	0.6
West Lake Road (State Route 5) heading east	Overland	Terrestrial	0.5
South following Townline Road crossing into Girard Township to intersection with Ridge Road (U.S. Route 20)	Overland	Terrestrial	2.3
Ridge Road to Springfield Road	Overland	Terrestrial	0.7
Springfield Road	Overland	Terrestrial	1.6
Lexington Road	Overland	Terrestrial	1.2
Crosses Private property to new Erie Converter Station property in Conneaut Township	Overland	Terrestrial	0.1
New Erie Converter Station to Penelec Erie West Substation	Overland	Terrestrial	0.4

* Length indicated in miles

Six temporary construction laydown areas would be created along the proposed LEC Project route: the HDD Lake Erie exit area, U.S. Route 5 and private access way, Norfolk-Southern Railroad and Townline Road, private road 0.15 mile south of Ridge Road, Springfield Road and Trail, and; Springfield Road and Interstate 90 (HDR 2016).

TABLE 3-17: LAYDOWN AREAS FOR THE PROPOSED LEC PROJECT

Laydown Area	Location	Area Size*
1	HDD Exit Area	0.8
2	U.S. Route 5 and private access way	1.6
3	Norfolk-Southern Railroad and Townline Road	3.6
4	Private road (0.15 miles south of Ridge Road)	0.6
5	Springfield Road and Trail	6.0
6	Springfield Road and I-90	0.8
Total		13.4

*Area size is in acres

3.2.3 WATER RESOURCES AND QUALITY

Section 404 of the CWA provides the USACE with jurisdiction over (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) non-navigable tributaries of traditional navigable waters that are relatively permanent (i.e., the tributaries typically flow year round or have continuous flow at least seasonally), and (4) wetlands that directly abut such tributaries. Under the Pennsylvania Clean Streams Law, PADEP regulates water quality in relation to "waters of the Commonwealth, which are defined to include all rivers, streams, creeks, rivulets, impoundments, ditches, water courses, lakes, ponds, springs and other bodies of water, whether natural or artificial." Under the Dam Safety and Encroachments Act, PADEP regulates water obstructions and encroachments in, along, or across, or affecting the course, current, and cross-section of any watercourse or body of water, including any natural or artificial land, pond, reservoir, swamp, marsh, or wetland.

3.2.3.1 Surface Water

Fifteen streams and one pond were delineated within the survey corridor along the proposed and alternate Project routes (***Table 3-18***). The streams at the northern end of the proposed LEC Project route are unnamed tributaries (UNT) to Lake Erie. The remaining streams include Crooked Creek and UNTs to Crooked Creek.

Crooked Creek and its tributaries are classified as High Quality-Cold Water Fisheries (HQ-CWF) under 25 Pa. Code Ch. 93, and are subject to special protection / antidegradation requirements under Pennsylvania's water quality standards.

The UNTs to Lake Erie are classified as coldwater fisheries and migratory fishery passageways (25 Pa. Code Ch. 93). The Pennsylvania designation of a coldwater fishery under the federal CWA is any waterbody where fish and other aquatic flora and fauna prefer colder waters. A migratory fishery passageway is a waterbody where anadromous or catadromous fish or fish with a similar life history migrate through flowing waters to breed (Walsh et al. 2007).

None of the streams in the proposed LEC Project area have been identified by the PADEP as impaired for water quality (PADEP 2014).

TABLE 3-18: WATERBODIES ALONG THE PROPOSED AND ALTERNATE ROUTES FOR THE LAKE ERIE CONNECTOR PROJECT

Unique Field Identifer[1]	Waterbody	Watershed Hydrologic Unit Code	Stream Type	Chapter 93 Classification[2]	Class A Wild Trout Waters[3], Wild or Scenic River[4], Streams that Support Natural Reproduction of Trout[5]	Stocked Trout or Approved Trout Waters[6]	Potential USACE Classification[7]	Bank-to-Bank Width (feet)	Ordinary High Water Mark (feet)
SPA-KAS-001	UNT to Lake Erie	Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	CWF, MF	No	No	RPW	23.7	0.67
SPA-KAS-002	UNT to Lake Erie	Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	CWF, MF	No	No	RPW	5.1	0.50
SPA-KAS-004	UNT to Lake Erie	Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	CWF, MF	No	No	RPW	5.1	0.33
SPA-KAS-005	UNT to Lake Erie	Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	CWF, MF	No	No	RPW	10.0	1.00
SPA-KAS-006	UNT to Lake Erie	Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	CWF, MF	No	No	RPW	5.2	2.00
SPA-KAS-016	Crooked Creek Crossing #1	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	8.0	1.00
SPA-KAS-016	Crooked Creek Crossing #2	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	30.0	1.00
SPA-KAS-017	UNT to Crooked Creek	Crooked Creek; 041201010701	Intermittent	HQ-CWF, MF	No	Yes	RPW	1.0	0.17
SPA-KAS-018	UNT to Crooked Creek	Crooked Creek; 041201010701	Intermittent	HQ-CWF, MF	No	Yes	RPW	3.3	0.17
SPA-KAS-020	UNT to Crooked Creek	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	3.7	0.50
SPA-KAS-021	UNT to Crooked Creek	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	3.5	0.50
SPA-KAS-025	UNT to Crooked Creek #1	Crooked Creek; 041201010701	Intermittent	HQ-CWF, MF	No	Yes	RPW	6.9	0.17
SPA-KAS-025	UNT to Crooked Creek #2	Crooked Creek; 041201010701	Intermittent	HQ-CWF, MF	No	Yes	RPW	4.9	0.17
SPA-KAS-025	UNT to Crooked Creek #3	Crooked Creek; 041201010701	Intermittent	HQ-CWF, MF	No	Yes	RPW	3.3	0.17
SPA-KAS-026	UNT to Crooked Creek	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	4.0	0.50
SPA-KAS-027	UNT to Crooked Creek	Crooked Creek; 041201010701	Perennial	HQ-CWF, MF	No	Yes	RPW	2.0	0.25
SPA-KAS-030	UNT to Crooked Creek	Crooked Creek; 041201010701	Ephemeral	HQ-CWF, MF	No	Yes	Non-RPW	2.0	0.25
SPA-KAS-031	UNT to Crooked Creek	Crooked Creek; 041201010701	Ephemeral	HQ-CWF, MF	No	Yes	Non-RPW	0.5	0.25
PPA-KAS-002	-	Crooked Creek; 041201010701	Pond	HQ-CWF, MF Watershed	No	No	-	-	-

Source: HDR 2016

1. Unique identifier assigned to feature during field surveys; correlates with mapping nomenclature
2. Based on Chapter 93 Water Quality Standards available at: http://www.pacode.com/secure/data/025/chapter93/chap93toc.html. Accessed August 2014.
3. Based on the PFBC's Class A Wild Trout Waters created December 16, 2013; available at: http://fishandboat.com/classa.pdf. Accessed August 2014.
4. Based on the National Wild and Scenic River System available at: http://www.rivers.org/. Accessed August 2014.
5. Based on the PFBC's Stream Sections Supporting Natural Reproduction of Trout. May 2014. Available at: http://fishandboat.com/trout_repro.htm. Accessed August 2014.
6. Based on the PFBC's Regulated Trout Waters website available at: http://fishandboat.com/fishpub/summary/troutregs_sw.htm. Accessed August 2014.
7. Jurisdictional classification must be confirmed by USACE.

Notes: UNT = unnamed tributary
CWR = coldwater fishery
HQ-CWF = high quality, coldwater fishery
MF = migratory fishery passageway
RPW = relatively permanent water

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3.2.3.2 Groundwater

Groundwater contains subsurface hydrologic resources and is estimated to be more than twice as abundant as the amount of water that flows annually in Pennsylvania's streams (Penn State 2014). When water penetrates the ground, it reaches a saturated layer of sand, gravel, or rock known as an aquifer. Aquifers may be present only a few feet below the land surface, but in some parts of Pennsylvania, they are found at depths greater than 100 feet (Penn State 2014). The Overland Segment is within the Lake Erie watershed, which is underlain by unconsolidated sand and gravel aquifers at depths ranging from 20 to 200 feet that can yield 100 to 1,000 gallons a minute (Penn State 2014). No public water distribution lines occur along the proposed LEC Project route; residences get water from private wells.

3.2.4 AQUATIC HABITATS AND SPECIES

Communities of fish in the streams crossed by the Overland Segment include species from the coldwater and coolwater communities shown in ***Table 3-19***. None of the streams crossed by the proposed LEC Project is listed as wild trout/natural reproduction, or Class A Wild Trout waters. Streams in the proposed LEC Project area are stocked trout fisheries. Watersheds with natural land covers (as opposed to urbanized streams) tend to host coldwater fish communities (Walsh et al. 2007). Communities of fish in coolwater streams tend to be more general in their habitat selection and are more pollutant tolerant. Coolwater streams that harbor these communities typically occur in agricultural areas. Coolwater habitat is an important link between cold headwater streams and larger warm streams (Walsh et al. 2007).

TABLE 3-19: FISH SPECIES IN WATERBODIES CROSSED BY THE OVERLAND SEGMENT OF THE PROPOSED LEC PROJECT

Coldwater		Coolwater	
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Cottus bairdii	Mottled sculpin	*Catostomus commersoni*	White sucker
Oncorhynchus mykiss	Rainbow trout	*Clinostomus elongatus*	Redside dace
Salmo trutta	Brown trout	*Margariscus margarita*	Pearl dace
Salvelinus fontinalis	Brook trout	*Pimephales promelas*	Fathead minnow
		Rhinichthys atratulus	Blacknose dace
		Rhinichthys cataractae	Longnose dace
		Salmo trutta	Brown trout
		Semotilus atromaculatus	Creek chub
		Catostomus commersoni	White sucker

Source: Walsh et al. 2007

3.2.5 PROTECTED AND SENSITIVE AQUATIC SPECIES

3.2.5.1 Federally Listed or Protected Species

According to the FWS, no federally listed endangered, threatened, or candidate aquatic species have been identified in the proposed LEC Project route.

3.2.5.2 State-listed Species

No state-listed aquatic species have been identified in proximity to the proposed LEC Project route.

3.2.6 TERRESTRIAL HABITATS AND SPECIES

The Overland Segment crosses several significant natural communities, such as deciduous hardwood forests, mesic hardwood forests, northern hardwood forests, disturbed forests, old fields, hay fields, and agricultural fields. The proposed LEC Project route would cross several streams (***Section 3.2.3***); consequently, some riparian habitat is expected within the Overland Segment. The ROI for the Overland Segment is defined as 40 feet on either side of the proposed transmission cable centerline.

ITC Lake Erie identified and mapped habitat along the terrestrial portions of the proposed construction corridor using aerial photography, field observations, and available databases. Ecological communities and land cover types have been identified within portions of the Overland Segment. Significant natural communities in the Overland Segment are regulated by PADEP, USACE, and PADCNR. Terrestrial habitats and vegetation along the Overland Segment include sparsely vegetated beach, agricultural vegetation, and mixed deciduous broadleaf upland terrestrial forests (HDR 2016).

The shore of Lake Erie where the proposed LEC Project exits the Lake Erie Segment is dominated by sparsely vegetated beach. These beaches are dominated by sand or gravel shores that extend from the normal high water line of Lake Erie to the upper limit of winter storms. The substrate within this community is very unstable and subject to wave action and ice scour. The habitat is sparsely vegetated, usually with less than 25 percent total cover. Characteristic vegetation within this habitat is American beachgrass (*Ammophila brevigulata*), sea-rocket (*Cakile edentula*), Canada wild-rye (*Elymus canadensis*), silverweed (*Potentilla anserina*), and cocklebur (*Xanthium strumarium var. canadense*) (HDR 2016).

A portion of the proposed LEC Project would be installed along existing local and state highways. Habitat along these roadway ROWs is mostly successional forest edge and agricultural fields. The agricultural vegetation along the Overland Segment varies, but the areas surveyed include vineyards, corn fields, soybeans, shrubs for landscaping (e.g., boxwoods, goldthread, and arborvitae), and fallow fields. The portion of the proposed LEC Project that occurs within the Lake Plain region of Erie County is heavily dominated by the production of fruits and vegetables (PNHP 2012).

The upland mixed deciduous broadleaf forests of Erie County are dominated by a variety of species, including beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), white ash (*Fraxinus anadensi*), basswood (*Tilia anadensi*), sugar maple (*Acer saccharum*), oaks (*Quercus spp.*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga anadensis*), mockernut hickory (*Carya tomentosa*), shagbark hickory (*C. ovata*), and red maple (*Acer rubrum*) (HDR 2016). Shrubs often include northern arrowwood (*Viburnum recognitum*), southern arrowwood (*V. dentatum*), maple-leaved viburnum (*V. acerifolium*), smooth serviceberry (*Amelanchier laevis*), shadbush (*A. arborea*), mountain laurel (*Kalmia latifolia*), hornbeam (*Carpinus caroliniana*), hop hornbeam (*Ostrya virginiana*), witch hazel (*Hamamelis virginiana*), and spicebush (*Lindera benzoin*). The herbaceous vegetation is highly variable. Representative species include wild oats (*Uvularia sessilifolia*), false Solomon's seal (*Smilacina racemosa*), mayapple (*Podophyllum peltatum*), pipissewa (*Chimaphila maculata*), teaberry (*Gaultheria procumbens*), Indian cucumber root (*Medeola virginiana*), blue cohosh (*Caulophyllum thalictroides*); and on richer sites, wood ferns (*Dryopteris spp.*) and hayscented fern (*Dennstaedtia punctilobula*) (HDR 2016).

Wildlife within the Overland Segment may include a variety of mammals, amphibians, reptiles, birds, and invertebrate species. Wildlife that may occur within the ROI is limited by the amount of available habitat. Most of the Overland Segment is dominated by maintained areas or areas with current or historic anthropogenic influences. Mammalian species potentially occurring within the Overland Segment are habitat generalists common throughout their ranges and may include woodchuck (*Marmota monax)*, house mouse (*Mus musculus*), and meadow vole (*Microtus pennsylvanicus)*. Forest edge or early successional habitats may support white-tailed deer (*Odocoileus virginianus*), Eastern coyotes (*Canis latran)*, red foxes (*Vulpes fulvus)*, and bats (PNHP 2012). Herptiles may include snapping turtles (*Chelydra serpentina)*, common garter snake, American toad (*Anaxyrus americanus*), grey tree frog (*Hyla versicolor*), green frog (*Lithobates clamitans*), bullfrog (*Lithobates catesbeianus*), pickerel frog (*Lithobates palustris*), and redback salamander (*Plethodon cinereus*) (PNHP 2016b). Birds that may occur within the Overland Segment typically include species that prefer forest edges or shrubby early successional habitats, such as American woodcock (*Scolopax minor*), grey catbird (*Dumetella carolinensis*), mourning dove (*Zenaida macroura*) and a variety of songbirds (PNHP 2012).

State Game Land 314, an IBA approximately 4 miles from the proposed LEC Project, regularly supports migrating and breeding American woodcock. PGC's spring surveys indicate a minimum estimate of 50 pairs (LERC 2008). Game Land 314 also encompasses important wetland and early successional habitat for species like mourning warbler. Presque Isle State Park, an IBA 15 miles to the east of the proposed LEC Project, provides habitat for waterfowl and other shore bird species along the shores of Lake Erie; more than 325 species of birds have been identified within the park (LERC 2008). Although these IBAs are outside of the ROI, they are both located adjacent to the proposed LEC Project and migration could occur across the ROI, to and from the protected lands.

3.2.7 TERRESTRIAL PROTECTED AND SENSITIVE SPECIES

The FWS is responsible for threatened or endangered species protected under the federal ESA (50 CFR Part 17). The protection of birds is regulated by the MBTA and the BGEPA. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the FWS [50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668 (a)]. At the state level, the PGC is responsible for birds and mammals; the PFBC is responsible for fish, reptiles, amphibians, and aquatic organisms; and the PADCNR is responsible for programs relating to native wild plants, terrestrial invertebrates, significant natural communities, and geologic features. No protected species covered by the PGC and PFBC exist within the proposed Overland Segment.

Consultation between ITC Lake Erie and the PGC, PADCNR, and FWS began in May 2014. On July 28, 2014, ITC Lake Erie submitted a request for a PNDI review for the proposed LEC Project. On January 23, 2015, and again on March 8, 2016, ITC Lake Erie submitted updates to the PFBC, PGC, PADCNR, and FWS requesting review of potential effects of changes in the proposed routing for the transmission cable on rare, threatened, and endangered species and is awaiting agency input (ITC Lake Erie 2016). In a letter dated March 15, 2016, the PGC screened the proposed Project for potential effects on species and resources of concern under PGC's jurisdiction, which include birds and mammals only. The PGC's records indicate no known occurrences of species or resources of concern under PGC's jurisdiction in the vicinity of the proposed LEC Project. In a letter dated March 23, 2016, the PADCNR stated that no Project impact on species or resources of concern under PADCNR's jurisdiction is likely to occur. On April 11, 2016, the FWS responded to a DOE request (dated March 8, 2016) for updated information about federally protected species within the area being considered for the proposed LEC Project. The FWS concluded that bald eagle, protected under the BGEPA, is the only federally protected species potentially affected by the proposed Project. The FWS concluded that although the Project was within the range of the northern long-bared Bat and Indiana bat, which are

federally protected species, the Project was unlikely to adversely affect the bats. Species specific FWS comments are included under their respective sections, below and within ***Sections 3.1.7, 5.1.7*** and ***5.2.7***.

3.2.7.1 Protected Plant Species

No federally listed or protected terrestrial plant species were identified by FWS. The PADCNR provided information regarding known and potential occurrences of state-listed protected plant species associated with the proposed Project route. In February of 2015, PADCNR specifically requested surveys for the following sensitive species: northern water-plantain (*Alisma triviale*), small beggar-ticks (*Bidens discoidea*), large toothwort (*Cardamine maxima*), soft-leaved sedge (*Carex disperma*), log fern (*Dryopteris celsa*), variegated horsetail (*Equisetum variegatum*), pumpkin ash (*Fraxinus profunda*), umbellate hawkweed (*Hieracium umbellatum*), larger Canadian St. John's-wort (*Hypericum majus*), Virginia blue flag (*Iris virginica*), Richardson's rush (*Juncus alpinoarticulatus* ssp. *nodulosus*), small-headed rush (*Juncus brachycephalus*), lupine (*Lupinus perennis*), common hop-tree (*Ptelea trifoliata*), Shumard's oak (*Quercus shumardii*), pineland pimpernel (*Samolus parviflous*), and great-spurred violet (*Viola selkirkii*) (HDR 2016).

Environmental Solutions & Innovations, Inc. (ES&I) conducted surveys in spring and summer of 2015 for potential occurrences of the identified state-listed plant species. No species listed by the PADCNR were identified within the ROI for the proposed LEC Project (ES&I 2015). In a letter dated December 4, 2015, PADCNR stated that no effects are anticipated in accordance with the survey, assuming employment of specified conservation measures. These measures include voluntary protection and avoidance of shellbark hickory (*Carya laciniosa*), Canada yew (*Taxus canadensis*), and American chestnut (*Castanea dentate*). In a letter dated March 23, 2016, the PADCNR stated that no Project impact on species or resources of concern under PADCNR's jurisdiction is likely to occur.

Shellbark hickory does not currently have a legal status under PADCNR; however, this agency is currently conducting review for potential future listing of this tree. The Canada yew is identified by PADCNR as tentatively undetermined, which includes plants believed to be in danger of population decline, and require additional taxonomic review or data for determination. The American chestnut is not identified by PADCNR in the Natural Heritage Program species of concern list; however, its population has been decimated by Chestnut blight, a disease that prohibits mature growth of the plant, and the State Forest Resource Management Plan identifies reintroduction of this species as an objective.

3.2.7.2 Federally Listed or Protected Wildlife Species

Federally listed or protected terrestrial species that could be encountered in the Overland Segment include the Indiana bat, northern long-eared bat, bald eagles, bank swallows, and migratory bird species (HDR 2016). The FWS has not designated or proposed designation of critical habitat for any threatened or endangered species occurring along the Overland Segment.

Indiana Bat
In their April 11, 2016 letter, the FWS indicated that the proposed LEC Project Overland Segment is within the range of the endangered Indiana bat; however, the proposed Project is not located near known Indiana bat summer or winter habitat.

Northern Long-eared Bat
In their April 11, 2016 letter, the FWS indicated that the proposed LEC Project Overland Segment is within the range of the threatened northern long-eared bat; however, the proposed Project is not located within 0.25 mile of a known northern long-eared bat hibernaculum or within 150 feet from a known, occupied maternity roost tree.

Bald Eagle
Life history information is provided in ***Section 3.1.7.3.*** The bald eagle is protected under the BGEPA rather than the ESA. In their April 11, 2016 letter, the FWS noted that they are aware of a bald eagle nest within approximately 2,000 feet of the proposed Project.

Bank Swallow
Life history is provided in ***Section 3.1.7.4.*** Bank swallows are protected by the FWS under the MBTA. The proposed transmission cable would be located approximately 560 feet south of the state bluffs (HDR 2016). The seasonal abundance and occurrence of bank swallows recorded in Erie County is from early May to late August (McWilliams 2014).

Migratory Birds
Based on habitat preferences and foraging behavior, migratory birds may occur within the Overland Segment. Two important resource areas near the ROI for the proposed LEC Project are state Game Land 314, an IBA that covers the northwest corner of Springfield Township (PNHP 2016b); and Presque Isle State Park, an IBA 15 miles to the east of the proposed LEC Project (HDR 2016). These areas may attract protected bird species to migrate and forage, which could result in bird species crossing over the ROI for the proposed LEC Project.

3.2.8 TERRESTRIAL WETLANDS

The USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands; and the PADEP regulates water quality and the obstruction and encroachment of waters of the Commonwealth. ITC Lake Erie delineated the jurisdictional limits of these water resources within the Overland Segment including the proposed new Erie Converter Station boundary, in 2014 and 2015 (HDR 2016, ITC 2016). The investigators followed the methods presented in the USACE Wetland Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the USACE Wetland Delineation Manual: *Northeast and North Central Region Version 2.0* (USACE 2011).

The wetland survey encompassed a 150-foot-wide corridor centered on the proposed transmission cable route. The investigators documented approximately 13.8 acres of wetlands that fall under the following wetland types according to the classification system developed for the FWS (Cowardin et al. 1979): palustrine emergent wetlands (PEM), palustrine scrub-shrub (PSS), palustrine forested wetlands (PFO), or wetlands that contained a mixture of these types. ***Table 3-20*** shows the wetlands within a survey corridor of 150 feet (75 feet on either side of the roadway centerline). There are no documented wetlands within the proposed new Erie Converter Station footprint (21.4 acres). Most of the documented wetlands are along roadway ROWs. At two locations, wetlands were characterized by altered hydrology associated with private driveways, and wetland boundaries were defined by the edge of fill (soil) along roadway embankments.

The predominant wetland type observed within the proposed Project area is PEM wetlands. The species composition in these wetlands varies and includes reed canary grass (*Phalaris arundinacea*), black bulrush (*Scirpus atrovirens*), sensitive fern (*Oenoclea sensibalis*), swamp milkweed (*Asclepias incarnata*), Joe Pye-weed (*Eupatorium fistulosum*), orange touch-me-not (*Impatiens capensis*), rice cut grass (*Leerizia orzoides*), and broadleaf cattail (*Typha latifolia*). Reed canary grass, an invasive exotic plant, dominated some of the emergent wetlands observed.

The southern portion of the proposed LEC Project route near Lexington Road encompasses PSS wetlands dominated by pussy willow (*Salix discolor*), diamond willow (*Salix eriocephala*), buttonbush (*Cephalanthus occidentalis*), and silky dogwood (*Cornus amomum*). Understory species were

dominated by narrow-leaved cattail (*Typha angustifolia*), orange touch-me-not, sensitive fern, skunk-cabbage, Virginia knotweed (*Polyganum virginiana*), and black bulrush.

The area of the Overland Segment from the landfall to West Lake Road (Route 5) encompasses PFO wetlands dominated by an overstory of red maple (*Acer rubrum*) and a shrub canopy of silky dogwood, common elderberry (*Sambucus nigra*), spicebush (*Lindera benzoin*), and multiflora rose (*Rosa multiflora*). Additional tree canopy species include sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*); were observed within these wetlands. Understory herbaceous plants included: orange touch-me-not, sensitive fern, "…wood nettle (*Laportea canadensis*), skunk cabbage (*Symplocarpus foetidus*), clearweed (*Pilea pumila*), black bulrush, Virginia wild rye (*Elymus virginicus*), riverback wild rye (*Elymus raparius*), smooth goldenrod (*Solidago gigantea*), wrinkle-leaf goldenrod (*Solidago rugosa*), hop sedge (*Carex lupulina*), bottlebrush sedge (*Carex lurida*), fowl manna grass (*Glyceria striata*), lizard's-tail (*Saururus cernuus*), and short-hair sedge (*Carex crinita*)" (HDR 2016).

TABLE 3-20: WETLANDS IDENTIFIED WITHIN THE SURVEY COORIDOR OF THE OVERLAND SEGMENT OF THE PROPOSED LEC PROJECT

Unique Identifier	Dominant FWS Classification[1]	Associated Stream	High Quality Watersheds	Proposed to be Crossed by the Project	Delineated Acres
WPA-KAS-001	PFO	Abutting SPA-KAS-001 (UNT to Lake Erie)	No	Yes	0.32
WPA-KAS-002	PFO, PEM	Adjacent to SPA-KAS-001 (UNT to Lake Erie)	No	Yes	PEM: 0.34 PFO: 3.92
WPA-KAS-004	PFO	Adjacent to SPA-KAS-006 (UNT to Lake Erie)	No	Yes	3.91
WPA-KAS-012	PFO	Abutting Unidentified Stream (UNT to Crooked Creek)	Yes	Yes[2]	1.64
WPA-KAS-018	PEM	Abutting to UNT to Crooked Creek	Yes	Yes	0.66
WPA-KAS-023	PFO	Abutting WPA-KAS-023 PSS	Yes	Yes,	0.05
WPA-KAS-028	PEM, PSS, PFO	Abutting SPA-KAS-016 (Crooked Creek)	Yes	Yes[2]	PEM: 0.27 PSS: 0.17 PFO: 0.27
WPA-KAS-029	PEM, PSS	Abutting SPA-KAS-017 (UNT to Crooked Creek)	Yes	Yes[2]	PEM: 0.11 PSS: 0.03
WPA-KAS-030	PEM	Isolated	Yes	Yes[2]	0.03
WPA-KAS-034	PEM	Abutting SPA-KAS-020 (UJNT to Crooked Creek)	Yes	Yes	0.02
WPA-KAS-035	PEM	Abutting SPA-KAS-021 (UNT to Crooked Creek)	Yes	Yes	0.13
WPA-KAS-036	PFO	Abutting SPA-KAS-026 (UNT to Crooked Creek)	Yes	Yes	0.32
WPA-KAS-040	PEM	Abutting Crooked Creek	Yes	Yes	0.54
WPA-KAS-041	PEM	N/A	Yes	Yes	0.55
WPA-KAS-042	PFO	N/A	Yes	Yes	0.59

Source: HDR 2016

Notes:

1. Palustrine Emergent (PEM), Palustrine Scrub-shrub (PSS), Palustrine Forested (PFO), Unnamed Tributary (UNT).
2. Wetland would be crossed by the proposed cable or is located within the cable route corridor; however, the HDD or jack and bore construction methods would avoid affecting the wetland.

3.2.9 GEOLOGY AND SOILS

3.2.9.1 Physiography and Topography

The Overland Segment of the proposed LEC Project is in the Eastern Lake Section of the Central and Lowland physiographic province. The ROI for geology and soils for the Overland Segment of the proposed LEC Project includes the area within 40 feet of either side of the centerline of the proposed transmission cable. Unconsolidated surficial materials deposited during the most recent deglaciation of the area created ridges oriented parallel to Lake Erie. The ridges are cut by steep-sided and narrow valleys. The elevation at Lake Erie is 570 feet, and it rises southward to a high of 1,000 feet (PADCNR 2016).

3.2.9.2 Prime Farmland

Approximately 41.2 acres of land identified as having prime farmland soil is within the ROI of the Overland Segment (USDA/NRCS 2013 as cited in HDR 2016). Most of the soil that would be affected is within existing roadway ROW; therefore, the land is disturbed and is not available for agricultural use.

Approximately 21.4 acres of land within the site of the proposed new Erie Converter Station was identified as having prime farmland soil (USDA/NRCS 2013 as cited in HDR 2016).

3.2.9.3 Geology

Devonian shales underlie the unconsolidated deposits that form the ridges along Lake Erie. The Girard Shale found in the region of the Overland Segment is light gray and is generally a poor aquifer (Richards et al. 1987).

3.2.9.4 Soils

Soils along the Overland Segment are dominated by silt loams, sandy loams, and gravelly loams. Slopes are generally shallow. Slopes near Lake Erie are typically 0 to 2 percent, and slopes farther inland are typically up to 8 percent. Steeper slopes (15 to 25 percent) are rare but are found along stream crossings (HDR 2015).

3.2.9.5 Seismicity

The proposed LEC Project route is in an area of mild potential for seismic activity. The Lake Erie basin has a history of relatively weak seismic events.

3.2.10 CULTURAL RESOURCES

The NHPA of 1966 (16 U.S.C. §470 et. seq.) is the federal law that protects cultural resources and requires federal agencies to consider them when planning actions. Cultural resources include archaeological sites, historical structures and objects, and properties of traditional religious and cultural importance to a Native American tribe. Historic properties are cultural resources that are listed on, or eligible for listing on, the NRHP because they are significant and retain integrity (36 CFR §60.4). The NRHP addresses several types of historic properties, including prehistoric and historic archaeological sites, building and structures, districts, and objects.

Section 106 of the NHPA requires federal agencies to consider the potential effects of their proposed actions on historic properties and to develop measures to avoid, minimize, or mitigate those effects by developing an EA. The EA, however, is not intended to substitute for an NHPA Section 106 agreement according to 36 CFR §800.8(c). DOE is coordinating with the PASHPO to determine if a PA would be required for the proposed LEC Project.

3.2.10.1 Area of Potential Effects

Federal regulations define the APE as the geographic areas within which the proposed LEC Project may directly or indirectly alter the character or use of historic properties, if any such properties exist [36 CFR 800.16(d)]. The proposed APE for the Overland Segment will be determined in consultation with PASHPO and tribes. Construction activities (e.g., excavation activities and installation of proposed transmission cables) are expected to occur within the APE. The APE may be further refined through additional engineering.

Work on the Overland Segment would require excavation along approximately 7 miles (HDR 2015). This excavation and other ground-disturbing activities associated with the proposed construction could affect archaeological resources. The proposed LEC Project would require work areas for HDD that would range from approximately 15 feet by 50 feet for small HDD operations (e.g., for borings for shorter distances under smaller streams) to approximately 150 feet by 225 feet for larger HDD operations. Six temporary laydown areas would be required for storing construction equipment and materials (HDR 2015). These work areas, including the 21.4 acre area for the proposed new Erie Converter Station, have the potential to affect above-ground historic properties.

3.2.10.2 Regional Prehistory

Section 3.1.10.2 describes the prehistory of the region.

3.2.10.3 Regional History

Section 3.1.10.3 provides a regional history of the proposed LEC Project area.

3.2.10.4 Archaeological Resources Identified in the Overland Segment

Hartgen (2015) conducted a Phase 1 A Literature Review and Archaeological Sensitivity Assessment. The Phase 1 A included visual inspection of the proposed transmission cable route. In addition, Hartgen (2015) reviewed the Pennsylvania Historical and Museum Commission's (PHMC) Pennsylvania Archaeological Site Survey (PASS) files and Cultural Resources Geographic Information System (CRGIS) database. The Phase 1 A study encompassed an area approximately 1 mile on either side of the centerline of the proposed transmission cable route and the proposed new Erie Converter Station because the APE for the proposed Project had not yet been defined. Hartgen (2015) identified 22 known archaeological sites within 1 mile of the Overland Segment (***Table 3-21***). None of the sites have been determined eligible for listing on the NRHP. In addition, Hartgen (2016) located five archaeological sites during Phase 1B field investigations (***Table 3-22***).

TABLE 3-21: KNOWN ARCHAEOLOGICAL SITES IN THE OVERLAND SEGMENT AREA OF POTENTIAL EFFECT

Site Number	Proximity to Proposed LEC Project	Description
36ER0057	0.5 mile	Village from Transitional/ Woodland yielding Susquehanna broadspear, grit-tempered pottery, stemmed and side-notched points
36ER0106	Adjacent (opposite side of the road)	Debitage
36ER0107	Adjacent (opposite side of the road)	Debitage, chipped stone tools
36ER0108	Adjacent (opposite side of the road)	Debitage, chipped stone tools
36ER0113	0.8 mile	Debitage, chipped and ground stone tools
36ER0114	0.8 mile	Debitage, chipped stone tools
36ER0118	1.0 mile	Cores, flakes, camp with Susquehanna broad point, scrapers, and knives; possibly Early Woodland
36ER0120	0.2 mile	Plano-like, Otter Creek/Big Sandy, and Adena points thought to be Late Paleoindian, Middle Archaic, and Early Woodland; known only from collector interview
36ER0127	0.05 mile	1838 house on a knoll with lithics on ground surface; local tradition has it as an Indian mound
36ER0160	1.0 mile	Woodland, Contact Period, chipped stone tools, trade beads
36ER0161	1.0 mile	Late Archaic and Woodland period, chipped and rough stone tools, pottery
36ER0162	1.0 mile	Multicomponent site on the Elk Creek floodplain; most intensively used in Late Woodland, when it may have been a satellite to a village west of the creek
36ER0218	1.0 mile	No information
36ER0219	0.7 mile	No information
36ER0301	0.1 mile	Village spanning Early Archaic to Late Woodland periods yielding Lecroy or Lake Erie bifurcate, Kirk corner-notched, Lamoka, Levanna, Madison points; because of the coincidence with the Elk Creek Site (36ER162), this may be in error
36ER0313	0.6 mile	Non-diagnostic lithics, sand and rock-tempered pottery; Middle to Late Woodland
36ER0314	0.8 mile	Non-diagnostic lithics, ground stone artifacts
36ER0004	0.9 mile	Earthwork
36ER0089	0.9 mile	No information
36ER0130	0.9 mile	Rock hearths/fire pits with celts and hammerstones.
36ER0302	0.8 mile	Historic scatter with stone debitage, several diagnostic stone tools.
36ER0303	1.0 mile	Late Archaic point with chert debitage and cracked rock

Source: Hartgen 2015

TABLE 3-22: FIELD-IDENTIFIED ARCHAEOLOGICAL RESOURCES IN THE OVERLAND SEGMENT

Field-Identified Archaeological Resource Number	Location	Description
LEC 1	Lake Road (Route 5)	Projectile point, chert flakes
LEC 2	Lake Road (Route 5)	Historic artifacts and building material
LEC 3	Townline Road	Chert flakes, Fire Cracked Rocks (FCR)
LEC 4	Lexington Road	16 historic artifacts
LEC 5	Lexington Road	105 historic artifacts

Source: Hartgen 2016

3.2.10.5 Cultural Resources Identified Above-Ground in the Overland Segment

Hartgen (2015) reviewed information available from the PHMC Bureau for Historic Preservation (BHP) and identified 25 properties inventoried within 1 mile of the Overland Segment and one property listed on the NRHP (***Table 3-23***). The Frederick E. Blair House on West Lake Road was determined eligible for listing on the NHRP; the precise location of the property is unknown and is more than 0.5 mile west of the proposed underground transmission cable route.

TABLE 3-23: INVENTORIED PROPERTIES IN THE OVERLAND SEGMENT AREA OF POTENTIAL EFFECTS

Property Name/Address	Township	State Register/ National Register for Historic Places Status
Dallas Smith House, Middle Road	Springfield	Undetermined
William Cudney House, Route 20	Girard	Undetermined
Circa (ca.) 1855 building, demolished, Nieger Road	Girard	Undetermined
Concrete bridge; ca. 1951, West Ridge Road	Springfield	Not Eligible
Concrete bridge; ca. 1951, West Ridge Road	Girard	Not Eligible
Frederick E. Blair House, West Lake Road	Girard	Eligible
16 properties over 0.9 mile to the west	Springfield	
6 additional properties, inventoried but location unclear	Springfield and Girard	

Source: Hartgen 2015

3.2.11 INFRASTRUCTURE

The Overland Segment of the proposed LEC Project would extend underground (1) by HVDC transmission cable for approximately 7 miles between landfall in Springfield Township and the proposed new Erie Converter Station; and (2) by AC transmission cable for approximately 2,153 feet

from the proposed new Erie Converter Station to the Erie West Substation. The ROI for infrastructure in the Overland Segment includes an area 40 feet on either side of the proposed transmission cable centerline.

The proposed LEC Project has been sited to avoid any known infrastructure unless otherwise stated. Where noted, descriptions are based on responses to Pennsylvania's One Call System, in which owners of underground utilities mark the location of lines in an area slated for excavation (***Figure 3-3***).

3.2.11.1 Electrical Systems

ITC Lake Erie notes the possibility of overhead crossings within the proposed Overland Segment (ITC Lake Erie 2016). One such occurrence specifically mentioned is with First Energy's high voltage transmission cables at approximately Station 208+00. No other crossings of overhead transmission or distribution cables have been identified, although services for individual properties could be affected.

Based on responses to Pennsylvania's One Call System, no substantial underground electrical system infrastructure has been identified in the Overland Segment (***Figure 3-3***).

3.2.11.2 Water Supply Systems

ITC Lake Erie did not consider groundwater sources of public drinking water in its assessment of potential crossings in the Overland Segment, but it did note that no public water supply lines occur along the proposed LEC Project route (ITC Lake Erie 2016, Appendix M). Sixty-seven private wells have been identified along the proposed Project route (***Figure 3-4***).

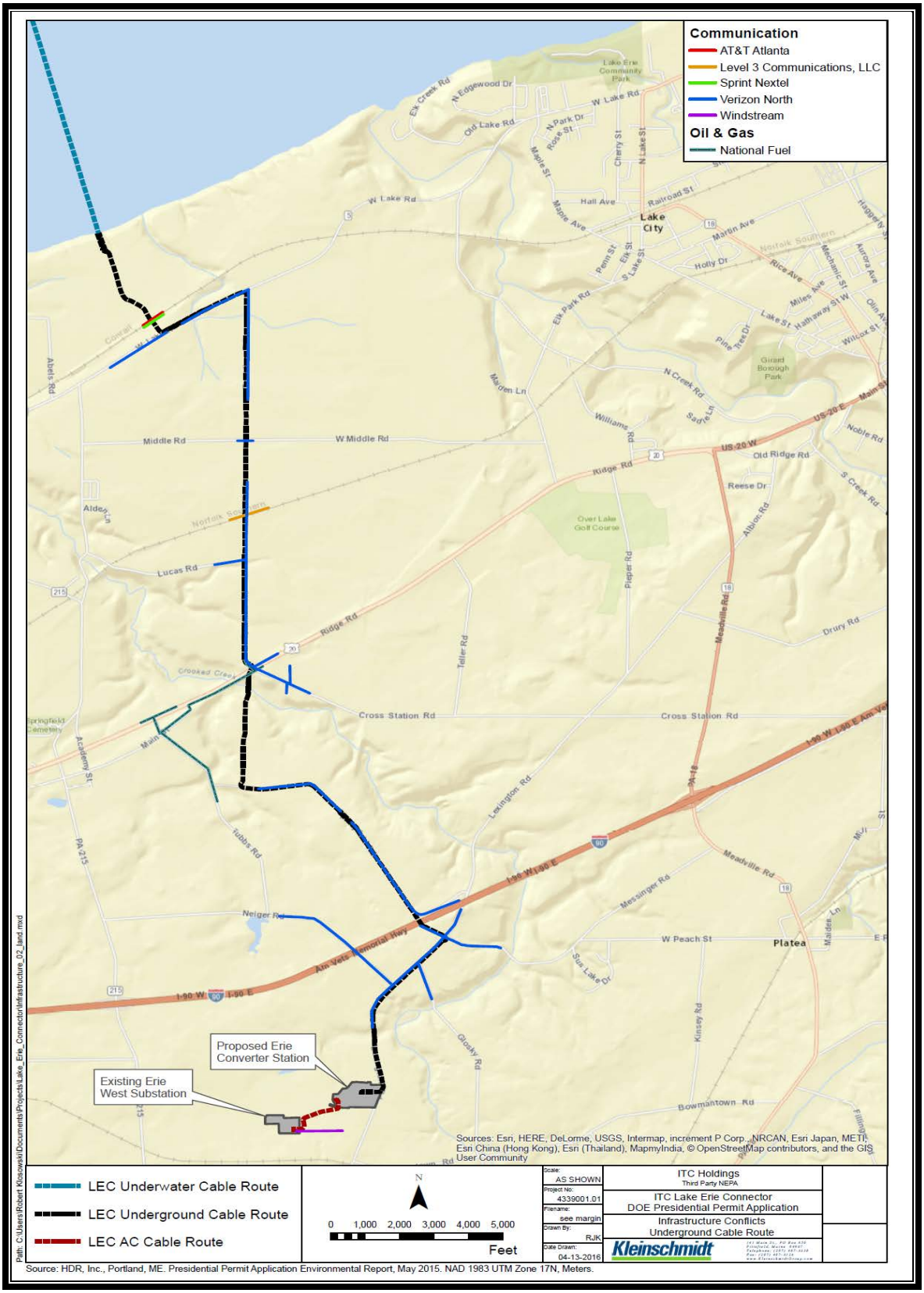


FIGURE 3-3. INFRASTRUCTURE CONFLICTS – UNDERGROUND CABLE ROUTE

Source: ITC 2016, Appendix M

FIGURE 3-4: PRIVATE WELLS – UNDERGROUND CABLE ROUTE

3.2.11.3 Stormwater Management

The Overland Segment is located within the Lake Erie drainage basin (HUC 0412), and the proposed LEC Project route would cross some existing stormwater management infrastructure, including several roadway culverts, swales, and ditches. Most of this infrastructure is located within the roadway ROWs, which are owned and maintained by PennDOT or by the respective township (HDR 2016).

3.2.11.4 Communications

Based on responses to Pennsylvania's One Call System (***Figure 3-3***), underground communications lines within the DC cable portion of the Overland Segment belong to AT&T Atlanta, Level 3 Communications, Sprint Nextel, and Verizon North; another underground communication line belonging to Windstream has been identified within the AC cable portion of the Overland Segment. In addition, overhead communication lines occur adjacent to the roads along the proposed LEC Project route.

3.2.11.5 Natural Gas Supply

Based on responses to Pennsylvania's One Call System (***Figure 3-3)***, an underground natural gas distribution line belonging to National Fuel has been identified in the vicinity of Ridge Road/Route 2, which is within the HVDC cable portion of the Overland Segment.

3.2.11.6 Liquid Fuel Supply

No pipelines or infrastructure for liquid fuel have been identified in the Overland Segment.

3.2.11.7 Sanitary Sewer and Wastewater Treatment

Houses in the vicinity of the proposed LEC Project route have individual septic systems, and there are no municipal sanitary sewer lines or municipal wastewater treatment facilities in the vicinity of the Overland Segment.

3.2.11.8 Solid Waste Management

No landfills are located near the proposed LEC Project, and no waste management sites have been identified within 5 miles of the Overland Segment. The Fairview Site II site for land application of sewage sludge operated by Albion Borough Municipal Authority is located approximately 1 mile from the Overland Segment.

3.2.12 RECREATION

The ROI for recreational resources within the Overland Segment is the area 0.5 mile on either side of the centerline of the proposed transmission cables, including the permanent ROW within which the proposed transmission cable would be operated and maintained and the temporary work areas that may be affected during construction. Several formal recreational areas are within the vicinity of the proposed Overland Segment; however, the ROW does not directly cross through any of those areas. ***Table 3-24*** lists the recreational areas within 5 miles of the proposed landfall of the proposed LEC Project. The landfall is closest to the Erie Bluffs State Park and Pine Lane Campground. Pine Lane Campground is a 24-acre, seasonal campground with 100 sites adjacent to Erie Bluffs State Park. The campground opens on May 6 and closes on October 11, 2016 (Pine Lane Campground 2016).

TABLE 3-24: SHORELINE RECREATION AREAS WITHIN 5 MILES OF THE PROPOSED LEC PROJECT

Recreational Site	Location	Estimated Distance from Proposed LEC Project Landfall
Erie Bluffs State Park	North Springfield	120 feet
Pine Lane Campground	Springfield	0.7 miles
YMCA Camp Fitch on Lake Erie	North Springfield	1.6 miles
Elk Creek Access Area	Lake City	1.8 miles
Uncle John's Elk Creek Campground	Lake City	2.1 miles
Virginia's Beach Lakefront Cottages & Camping	North Springfield	2.1 miles
Lake Erie Community Park	Lake City	2.6 miles
Camp Lambec	West Springfield	2.8 miles
Raccoon Park	East Springfield	4.3 miles
State Game Land Number 314	East Springfield	4.5 miles

Source: HDR 2016

Two state parks along the Lake Erie shoreline, Erie Bluffs State Park and Presque Isle State Park, provide beach access and recreational opportunities. Presque Isle State Park is approximately 12 miles east of the proposed landfall of the proposed LEC Project. Presque Isle State Park is a 3,200-acre, sandy peninsula that arches into Lake Erie and provides many recreational activities, including swimming, picnicking, boating, fishing, hiking, bicycling, and in-line skating. The Tom Ridge Environmental Center in the park provides environmental education and research opportunities (PADCNR 2016a). Erie Bluffs State Park is directly east and adjacent to the proposed landfall of the LEC Project. Erie Bluffs State Park is the newest Pennsylvania State Park and encompasses 587 acres and approximately 1 mile of shoreline with 90-foot bluffs overlooking Lake Erie. The Erie Bluffs State Park attracts approximately 40,000 visitors a year and provides picnicking, environmental education programs, hiking, and hunting opportunities. The park offers more than 500 acres for hunting and trapping deer, turkey, and small game and for training dogs from the day after Labor Day through March 31. The Elk Creek access area offers opportunities for steelhead fishing and a boat launch area for small motorized watercraft, kayaks, and canoes, providing boating access to Lake Erie (PADCNR 2016b).

3.2.13 VISUAL RESOURCES

The ROI for visual resources within the Overland Segment is the area 0.5 mile on either side of the centerline of the proposed transmission cables, including the permanent ROW within which the proposed transmission cable would be operated and maintained, and the temporary work areas that may be affected during construction. Within the Overland Segment, the primary views include Lake Erie to the north and areas of wooded forests, agricultural land, and low-density residential development adjacent to the proposed LEC Project route. A portion of the Overland Segment would be in the vicinity of Route 5, which is part of the Great Lakes Seaway Trail. The Great Lakes Seaway Trail is a 518-mile scenic driving route that follows the shores of Lake Erie, the Niagara River, Lake Ontario, and the St. Lawrence River. The Great Lakes Seaway Trail was one of the first roads in America to be designated as a National Scenic Byway in 1996 and includes historical and cultural heritage sites and scenic views (Great Lakes Seaway Trail 2016). The area surrounding the proposed site of the new Erie Converter Station includes farmlands, wooded areas, and adjacent residential areas. In addition, the

existing Penelec Erie West Substation and associated aboveground transmission cable corridors are located approximately 2,153 feet southwest of the proposed site of the new Erie Converter Station (HDR 2016).

3.2.14 PUBLIC HEALTH AND SAFETY

The ROI for public health and safety includes 40 feet on each side of the proposed transmission cable centerline. This ROI was developed to include public health and construction safety within the construction corridor. Risks for health and safety and associated risk-reduction measures are discussed in the context of the health and safety of contractors and the general public health. This EA also describes the designated ROI that encompasses the area of potential maximum exposure to EMF.

3.2.14.1 Contractor Health and Safety

Section 3.1.14 provides general information on maintaining a safe construction environment. Contractor health and safety concerns for the Overland Segment include risks associated with terrestrial construction activities, heavy equipment installation and transportation, contact with electrical lines, and the potential to sever existing utilities lines. Employers and contractors are responsible for complying with worksite safety regulations.

3.2.14.2 Public Health and Safety

Public health and safety risks associated with the Overland Segment include transportation and traffic hazards due to construction, and the creation of noisy environments during construction. Effects may be minimized by routing the proposed LEC Project through areas that members of the general public use infrequently. Please refer to ***Section 3.1.14*** for more information regarding public health and safety.

3.2.14.3 Electric and Magnetic Fields

Anything that carries an electric current, including electrical transmission lines, produces EMF. ***Section 3.1.14.3*** discusses EMF in detail. The proposed transmission cable would be buried at depths of 3 to 10 feet in the Lake Erie Segment and 3 to 6 feet in the Overland Segment (HDD portions may be buried at greater depths). Due to similar burial depths, the ROI for EMF would not change between the two segments.

3.2.15 NOISE

The ROI for noise for the Overland Segment of the proposed LEC Project includes the area 600 feet on either side of the centerline of the proposed transmission cables. The proposed LEC Project reaches landfall in Springfield Township and moves south through Girard Township, and Conneaut Township. Although Pennsylvania has no statewide noise limit, some municipalities have noise ordinances. In accordance with Springfield Township Zoning Ordinance (§506.7), "Noise which is determined to be objectionable because of volume or frequency shall be muffled or otherwise controlled, except fire sirens and related apparatus used solely for public purposes, which shall be exempt from this requirement. Objectionable noise levels shall be construed as being those in excess of 60 dB at the property line." Conneaut Township has no noise regulations. Girard Township generally prohibits, "Any use of or activity upon property that, by reason of flames, smoke, odors, fumes, noise or dust, unreasonably interferes with the reasonable use, comfort and enjoyment of a neighbor's property or endangers the health or safety of the occupants of a neighboring property or endangers the health and

safety of Township residents and/or the users of Township public streets, property or facilities" (Girard §133-4(F))[14].

The majority of the Overland Segment of the proposed LEC Project lies along road ROW in an area of Erie County that is largely rural residential and agricultural. The existing soundscape for the Overland Segment and the proposed new Erie Converter Station includes natural sources, such as wind, vegetation rustle, and wildlife noises; transportation noise sources from passing trains and automobile noise; and farm-related noise from equipment and animals. Noise associated with the operation of the Penelec Erie West substation, which is approximately 2,153 feet southwest of the proposed new Erie Converter Station site, is part of the existing regional soundscape.

3.2.16 HAZARDOUS MATERIALS AND WASTES

The ROI for hazardous materials and wastes for the proposed LEC Project is the area within the construction corridor, construction staging areas, and the route that construction vehicles would use to access the transmission cable. The ROI encompasses the geographic area that could be affected during construction, operation, and maintenance of the proposed LEC Project.

Hazardous materials are defined under 49 CFR 171.8 and may include liquid fuels, solvents, oils, lubricants, and hydraulic fluids. Hazardous wastes are defined under RCRA, specifically 42 U.S.C. Part 6903, and include spent hazardous materials and byproducts of their use. Special hazards are regulated under 15 U.S.C. Chapter 53 and include asbestos-containing material, PCBs, and lead-based paint (PADEP 2011; DOE 2015b).

The EPA is the primary federal agency responsible for administering and enforcing laws regarding hazardous wastes and materials. However, the EPA may delegate authority to states to administer and enforce these federal programs, so long as the state's program is equivalent to, or as stringent as, the federal program. Pennsylvania's hazardous waste regulations are incorporated into Pennsylvania Code under Title 25. The PADEP is the agency responsible for issuing permits, conducting inspections, signing consent orders, gathering and processing data, implementing corrective actions and other actions necessary to enforce the rules in Pennsylvania Code Title 25 (PADEP 2011).

The Overland Segment ROI encompasses a corridor extending approximately 7 miles from landfall to the proposed new Erie Converter Station and approximately 2,153 feet from the proposed new Erie Converter Station to the Erie West Substation. Proposed transmission cables would be buried underground at a depth of approximately 3 feet to 6 feet below grade for most of this route.

Readily available information indicate no contamination of soil or groundwater in the Overland Segment ROI. No factories, landfills, recycling centers, gasoline stations, automotive repair shops, or other sources of hazardous wastes have been identified in the Overland Segment ROI. The PADEP Bureau of Environmental Cleanup and Brownfield Storage Tank Database shows no storage tanks in the Overland Segment ROI. ITC Lake Erie noted gasoline pumps close to the proposed LEC Project route (HDR 2016); however, whether these pumps are operational or have associated underground storage tanks is unknown. The closest Superfund site to the Overland Segment ROI is the Lord-Shope Landfill, approximately 2 miles from the proposed LEC Project route (HDR 2016).

[14] Township of Girard, PA. Nuisances Code - Any use of or activity upon property that, by reason of flames, smoke, odors, fumes, noise or dust, unreasonably interferes with the reasonable use, comfort and enjoyment of a neighbor's property or endangers the health or safety of the occupants of a neighboring property or endangers the health and safety of Township residents and/or the users of Township public streets, property or facilitieshttp://ecode360.com/8712733 accessed April 2016.

The Overland Segment crosses beneath two railroad lines (HDR 2016). Railroad ROWs have significant potential for environmental contamination. The primary sources of such contamination may include herbicides used to control unwanted vegetation, creosote and arsenic leaching from preserved wood ties, petroleum products dripping from trains, polycyclic aromatic hydrocarbons (PAHs) from the diesel exhaust of locomotives, and metals from industrial waste found in the crushed-stone ballast used on some railroad tracks (DOE 2015b).

3.2.17 AIR QUALITY

The Overland Segment includes the approximately 7 mile proposed transmission cable route from landfall to the proposed new Erie Converter Station plus approximately 2,153 feet to the Erie West Substation. The air quality standards, climate patterns, pollutants, and emission sources in the Overland Segment are the same as those described in ***Section 3.1.17*** for the Lake Erie Segment. The ROI for air quality for the Overland Segment includes Erie County in Pennsylvania.

3.2.18 SOCIOECONOMICS

The ROI for socioeconomics for the Overland Segment is Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships. This ROI includes the communities in which construction would occur and that would be the primary sources of goods, services, and workers for the proposed LEC Project, as well as the primary recipient of economic benefits. The proposed LEC Project would make landfall in Springfield Township, and the Overland Segment would be located primarily along existing roadways through Girard Township to the new Erie Converter Station to be constructed in Conneaut Township.

Section 3.1.18 describes socioeconomic factors, including the population and demographics, employment patterns, and housing services associated with the affected townships, Erie County, the state of Pennsylvania, and the United States to characterize the baseline socioeconomic conditions in the context of regional, state, and federal trends.

3.2.19 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* directs federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environment effects of their actions on minority and low-income populations. Minority populations are those identified in census data as Native American or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; Hispanic; some other race; or two or more races (CEQ 1997). Low-income populations are identified as individuals and families that are living at or below the United States poverty level.

The ROI for environmental justice for the Lake Erie Segment of the proposed LEC Project is Erie County, Pennsylvania, including Springfield, Girard, and Conneaut townships. In order to assess potential minority or low income populations affected within the ROI, demographic data for United States, Pennsylvania, Erie County, and the three census tracts associated with the affected townships were obtained from the U.S. Census Bureau (***Table 3-25***). In 2014, within Erie County and the census tracts, minority populations comprised between 12 and 26 percent of the total population; the largest minority population was identified as black (22 percent in Conneaut Township, census tract 10103), followed by two or more races (1.4 percent in both census tracts 10101 and 10103). No Indian Tribe reservation or land is located within the vicinity of the proposed LEC Project. The 2014 median household income of families in Erie County and the townships within the ROI ranged from $44,702 to

$51,056. Families identified as living below the poverty level ranged from 7.4 percent in Girard Township to 11.1 percent in Springfield Township ***Table 3-25***).

The PADEP established the Office of Environmental Justice to implement the Environmental Justice Public Participation Policy in Pennsylvania (PADEP 2004). An application that potentially effects an environmental justice area is required to adhere to the enhanced public participation provisions stated in the policy. The policy identifies an environmental justice area as an area of concern with a minority population of 30 percent or greater or a population of families living at or below the poverty level of 20 percent or greater, as defined by U.S. Census Bureau data. In addition, the PADEP identifies the area of concern as an area extending one-half mile beyond the boundary of the proposed activity.

TABLE 3-25: RACE, POVERTY AND HOUSEHOLD INCOME DEMOGRAPHICS IN 2014 FOR THE REGION OF INFLUENCE FOR THE LEC PROEJCT

Category	United States	Pennsylvania	Erie County	Springfield Township[1]	Girard Township[2]	Conneaut Township[3]
Total Population	314,107,084	12,758,729	280,132	3,407	5,068	4,348
Race (Percent of Total Population)						
White	73.8%	81.9%	87.9%	97.1%	99.6%	73.8%
Black or African American	12.6%	10.9%	7.1%	0.0%	0.0%	22.2%
American Indian	0.8%	0.2%	0.3%	0.3%	0.0%	0.1%
Asian	5.0%	3.0%	1.4%	0.3%	0.0%	0.0%
Native Hawaiian & Other Pacific Is.	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Some other race	4.7%	2.0%	0.9%	1.0%	0.0%	2.5%
Two or more races	2.9%	2.0%	2.4%	1.4%	0.4%	1.4%
Total Percent Minority Population	26.2%	18.1%	12.1%	2.9%	0.4%	26.2%
Percent of Population Below Poverty						
People Below Poverty	15.6%	13.5%	16.7%	16.6%	9.1%	11.6%
Families below poverty	11.5%	9.3%	11.9%	11.1%	7.4%	7.9%
Household Income						
Per Capita Income	$28,555	$28,912	$24,505	$23,581	$25,602	$13,072
Median Household Income	$53,482	$53,115	$45,703	$44,702	$51,056	$50,714

Source: Headwaters Economics 2016; USCB 2016, data based on 2010-2014 American Community Survey 5-Year Estimates.
[1] Census Tract 42049010101
[2] Census Tract 42049010202
[3] Census Tract 42049010103

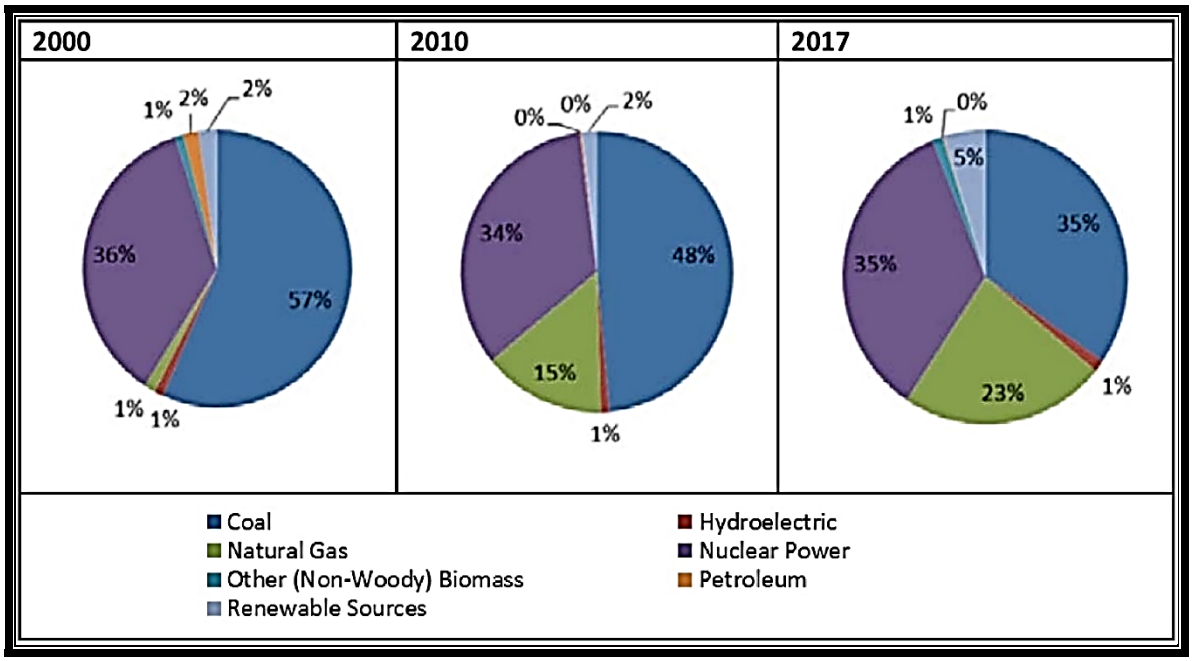
4 ENVIRONMENTAL CONSEQUENCES OF THE NO ACTION ALTERNATIVE

The EA alternatives analysis includes the No Action Alternative, which serves as a baseline against which the potential effects associated with DOE's Proposed Action are evaluated (40 CFR §1502.14(d)). Under the No Action Alternative, DOE would not issue a Presidential permit for the proposed LEC Project to cross the United States border; therefore, no environmental effects associated with the construction and operation of the proposed LEC Project transmission cable, new Erie converter station and interconnection to the existing Erie West Substation would occur on the 18 environmental resource areas (see detailed analyses in ***Section*** 5). Some environmental effects may result from taking no action, as discussed below.

ITC Lake Erie states that the proposed Project would provide a new energy source to Pennsylvania and regional wholesale electricity markets subsequently increasing system reliability and providing operational and planning flexibility (HDR 2015). The proposed LEC Project would interconnect with PJM at the existing Erie West Substation. PJM is the Federal Energy Regulatory Commission approved independent system operator (ISO) and RTO for Pennsylvania. PJM coordinates the movement of wholesale electricity throughout its service region, which includes all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia (PJM 2016[15]).

Pennsylvania's 2014 State Energy Plan (Plan) identifies resources that comprise the region's installed generating capacity and discusses future power planning needs. The Plan identifies that approximately 5,000-MW of coal-fired power plants should have been retired by 2015, or that the plants would be expected to be retired soon thereafter. Between 2010 and 2017, the use of renewable energy sources is projected to increase from 2 percent to 5 percent (***Figure 4-1***). Pennsylvania's Alternative Energy Portfolio Standards require that 18 percent of electricity sold by 2021 must come from approved renewable or alternative sources, including at least 0.5 percent solar photovoltaic power. In 2014, renewable energy accounted for 4 percent of Pennsylvania's net electricity generation.[16] The shift towards renewable energy use is not Pennsylvania-specific and is being seen throughout the PJM service area. Renewable Portfolio Standards (RPS) will significantly increase the need for renewable capacity over the next 5 years. PJM estimates that approximately 22,000-MW of wind generated energy and 7,000-MW of solar generated energy are required to meet existing RPS needs by 2020 (HDR 2015). ITC Lake Erie notes that Ontario has a diverse generation supply mix that could be used to meet RPS needs over the PJM service area (HDR 2015).

[15] http://www.pjm.com/about-pjm.aspx accessed April 11, 2016
[16] http://www.eia.gov/state/?sid=PA



Source: Commonwealth Economics, LLC. as cited in Commonwealth of Pennsylvania State Energy Plan 2014

FIGURE 4-1: PENNSYLVANIA ELECTRICITY GENERATION BY FUEL TYPE

Figure 4-1 provides an overview and future generation estimate of Pennsylvania's electric generation by fuel type. Under the No Action Alternative, it is reasonable to assume that the progression towards renewable energy use depicted in ***Figure 4-1*** would occur. Additionally, it is reasonable to assume that existing generating sources would continue to provide power (either through existing or future development) to meet PJM needs. As noted, ITC Lake Erie states that the LEC Project would provide increased system reliability and operational and planning flexibility. The U.S. Energy Information Administration's (EIA) Annual Energy Outlook 2016 Early Release anticipates that renewable generation will more than double from 2015 to 2040 with implementation of the Clean Power Plan. The DOE agrees that the LEC Project would provide for operational and planning flexibility, as it would provide an avenue for other renewable generation sources. However, DOE has determined that the No Action Alternative is not likely to jeopardize the function of the market. This determination is primarily due to the slow growth in electricity consumption projected through 2040 (EIA 2016).

Under the No Action Alternative, environmental effects related to accommodating current and future electricity demand would continue to occur. Such effects 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 LAKE ERIE CONNECTOR PROJECT

5.1 LAKE ERIE SEGMENT

5.1.1 LAND USE

5.1.1.1 Effects of Construction

The proposed transmission cable would be underwater in the Lake Erie Segment; therefore, most land use plans and policies generally do not apply. Construction of the proposed LEC Project would be compatible with surrounding land uses; therefore, it would be consistent with relevant local plans and policies.

The transportation and recreation sections of this document (***Sections 5.1.2*** and ***5.1.12***) discuss effects on use of Lake Erie for transportation and recreation. Those sections describe potential effects on recreational boat traffic, commercial boat traffic (e.g., ferries), and land uses where the ROI nears the shoreline.

According to HDR (2015), minimal land-based support for the proposed construction would be needed in the Lake Erie Segment; consequently, minimal land use effects are expected. Proposed transmission cables would be transported to the proposed construction area via a cable-laying vessel or supply barge, and other equipment, materials, and supplies would be transported to the work site on barges.

5.1.1.2 Effects of Operations Maintenance, and Emergency Repairs

No effects on land use in the Lake Erie Segment are expected to result from operating, maintaining, or repairing the proposed LEC Project. According to HDR (2015), the proposed Project route in this segment avoids designated anchorage areas.

Intermittent maintenance activities that may occur during the life of the proposed transmission cable (HDR 2015), may minimally and briefly disrupt commercial and recreational use of the lake. Likewise, emergency repairs of the proposed transmission cable may affect recreational and commercial land uses locally, but the effects would be temporary and would occur in the immediate work area.

5.1.2 TRANSPORTATION AND TRAFFIC

5.1.2.1 Effects of Construction

ITC Lake Erie proposes to use a fleet of approximately eight vessels to deploy the proposed transmission cables. Proposed vessels include a cable-laying barge (approximately 290 feet by 90 feet), a transportation barge for the proposed HVDC transmission cables (approximately 250 feet by 72 feet), two support tugs, a crew boat, and a minimum of three small outboard-powered watercraft. The proposed HVDC transmission cable would be manufactured overseas and transported by freighter across the Atlantic Ocean, accessing Lake Ontario via the Saint Lawrence Seaway. The locks of the Welland Canal, which connects Lake Ontario to Lake Erie, limit the size of vessels that are able to pass; therefore, ITC Lake Erie proposes to transfer the transmission cable in segments to smaller barges that are able to pass into Lake Erie (HDR 2016). The transportation of materials through the Welland Canal by barge would result in temporary delays and disruptions to commercial and recreational vessels using the canal.

Approximately 1 to 8 miles of transmission cable could be installed each day in an aquatic environment (DOE 2015b). ITC Lake Erie anticipates that aquatic installation in United States' waters would take approximately 4 to 6 weeks (HDR 2016). The worksite along the Lake Erie Segment would be transient,

would move to where the cable is being installed, and would be closed to other vessels during installation. An exclusion zone of approximately 3,200 feet would be established around cable installation vessels. The aquatic route would pass under several shipping channels, and installation and the presence of construction vessels could temporarily disrupt commercial and recreational navigation in Lake Erie. ITC Lake Erie proposes to develop a Vessel Traffic Management Plan and to coordinate with the USCG to issue a Notice to Mariners prior to the start of construction. Additionally, the contractor would post standard day shapes and lighting in accordance with regulations concerning vessels limited in their ability to maneuver. The closest port to the proposed LEC Project is the Port of Erie, approximately 16 miles east of where the proposed transmission cable would make landfall. Port traffic is unlikely to be affected during construction. Minimal land-based support would be required for aquatic cable installation (DOE 2015b, HDR 2016).

5.1.2.2 Effects of Operations, Maintenance, and Emergency Repairs

Upon completion, the transmission cable route would be marked on navigation charts. The proposed route within the Lake Erie Segment is designed to avoid USCG-designated anchorage areas and port-entry areas. The likelihood of anchor snags to the proposed transmission cable would be insignificant because the transmission cables are proposed to be buried at depths of 3 to 10 feet in the lakebed to minimize the potential for snagging of anchors for recreational vessels or fishing gear. The proposed transmission cable would be armored to prevent damage if an encounter occurs (HDR 2016).

Magnetic fields, such as those produced by electric transmission lines, have the potential to cause compass deflection and affect navigation. Electric and magnetic fields resulting from operating the proposed transmission cables are expected to be negligible for most of the Lake Erie Segment and would not cause compass deflection within Lake Erie shipping channels. Some compass deflection is possible for the HDD portion of the cable (approximately 0.4 mile); however, this section is near the shore of Lake Erie where boaters are unlikely to need a compass to navigate (Intrinsik 2014, Exponent 2015a).

The proposed LEC Project would be designed to require minimal maintenance once installed. If emergency repairs are required, the presence of work barges and other vessels required to complete any emergency repairs may affect commercial and recreational uses of Lake Erie temporarily. Repair time is likely to be less than 30 days, and repair activities would most likely be limited to the immediate vicinity of the repair site (DOE 2015b). An Emergency Repair and Response Plan (ERRP) would identify procedures necessary to perform maintenance and emergency repairs (HDR 2016).

5.1.3 WATER RESOURCES AND QUALITY

5.1.3.1 Effects of Construction

Multiple vessels would be involved in the proposed construction, and a comprehensive Spill Prevention Plan (SPP) would be developed to help to prevent spills during operation on Lake Erie. Most effects on water resources and quality would be limited to the proposed construction and maintenance efforts. The proposed transmission cables would be buried in the lake sediment at depths ranging from 3 feet to 10 feet. The proposed LEC Project location along the eastern basin has the lowest levels of contaminated sediments of the Lake Erie subbasins (***Section 3.1.16***). Towing a grapnel to remove large objects from the lake bottom along the proposed Project route and installing and burying the transmission cable may cause temporary resuspension of sediments, and a potential for local migration of heavy metals within the basin through portions of the water column is possible.

To evaluate the amount of resuspension and potential mixing of sediments and other constituents caused by the jet plow installation method, ITC Lake Erie conducted a modeling study at five representative in-lake sites (three within the United States) using a three-dimensional hydrodynamic and water quality model

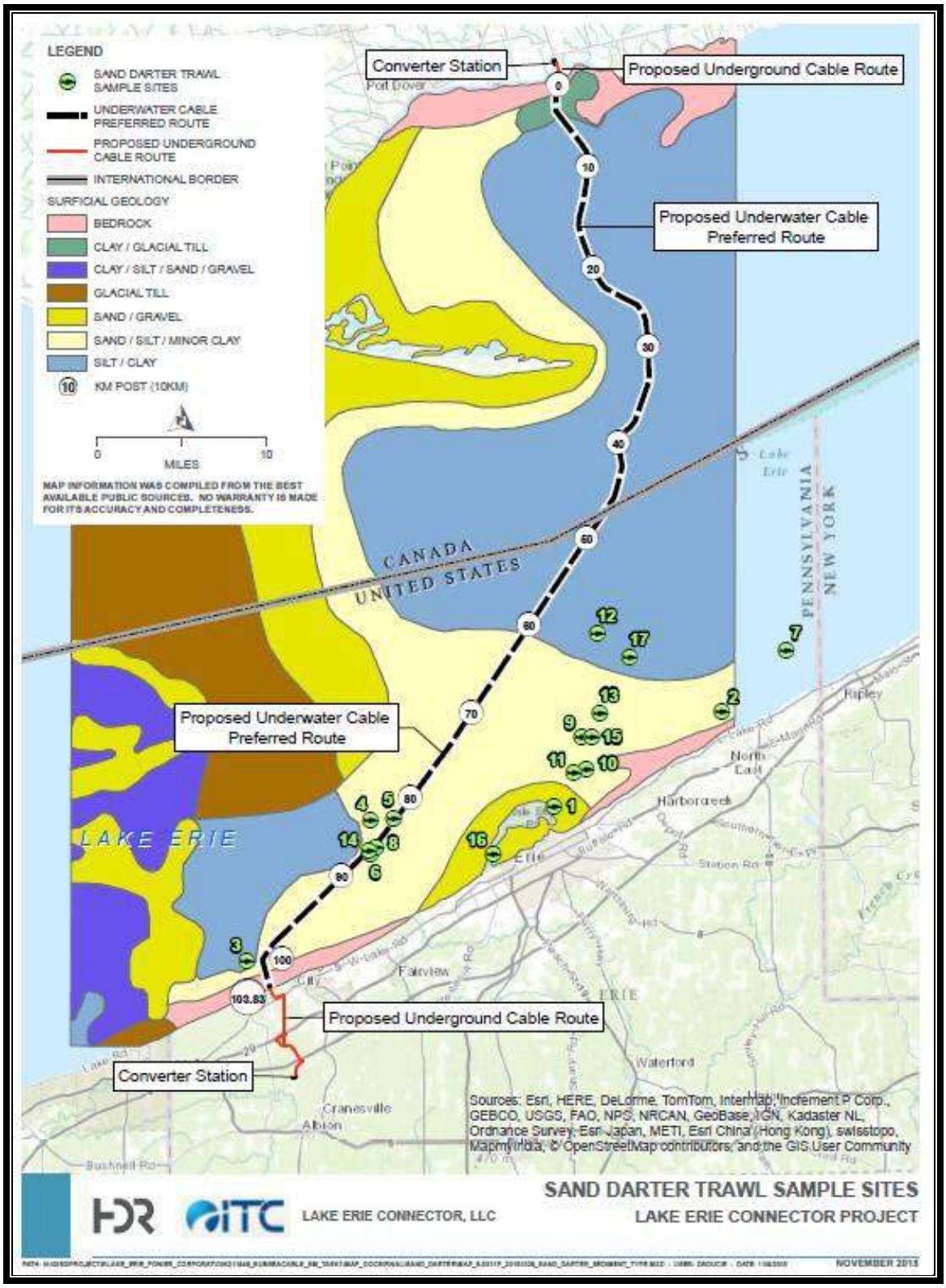
known as MIKE3 Flexible Mesh[17] (FM) (HDR 2015). The objective of the analysis was to display the potential increases in concentrations of total phosphorous (TP), dissolved phosphorous (DP), total suspended solids (TSS), arsenic, cadmium, chromium, copper, lead, nickel, zinc, and mercury. All results from the model were compared to PADEP's short-term and long-term criteria for metals (HDR 2015). Results indicate that the minimal effects on water quality associated with installing the proposed transmission cable in Lake Erie would be local and limited to within four hours following jet plowing. Concentrations of TSS, TP, and DP would increase, reach a temporary peak at the point of installation, and begin decreasing rapidly. Water quality model results at the three in-lake sites in the United States indicate increases in the concentration of TSS of 116, 104, and 208 milligrams per liter (mg/L) above background lake levels at 6 to 10 feet above the bottom at KP 53, 70, and 95, respectively (***Figure 5-1***). Temporary increases in the concentrations of TP and DP after installation are estimated to be less than 0.005 mg/L within 13 to 26 feet of the lake bottom at 328 feet from the installation point. The DP that would be reintroduced during installation represents less than 0.001 percent of all external phosphorous inputs to Lake Erie annually. Model results for increases in the concentrations of dissolved metals are less than the associated method detection limits and much less than short-term and long-term water quality standards (HDR 2015).

Instead of using a jet plow to lay and bury the transmission cable, water jetting may be used to bury installed cable along the United States' portion of the proposed LEC Project route from the Canadian border at KP 47 to KP 55 (***Figure 5-1***), where the sediment is very soft (e.g., fine sediment with high porosity). Water jetting and jet plowing result in similar or the same model outputs for sediment plume and dispersion concentrations (Jiang et al. 2007). Water quality model results show that approximately 30 percent of the volume of the proposed transmission cable trench was assumed to be resuspended into the water column during transmission cable installation regardless of method, based on comparisons with previous studies (HDR 2015).

Blasting is required in some areas, and blasting mats would be installed over the holes to help minimize suspension of blasted material. Blasted bedrock material has a much larger grain size and would settle much quicker than soft sediments. Any mobilization of fine sediments would be limited in duration and would be considerably less than the volumes expected for jet plow installation.

Crossing the Lake Erie shoreline would require boring holes using a HDD before installing the proposed transmission cable. A non-toxic drilling fluid consisting of water and bentonite clay would be used to stabilize the boreholes. Drilling fluid may leak during HDD activities adjacent aquatic to resources, allowing bentonite clay to become suspended in the lake and to disperse in close proximity to the entry and exit points, which may cause temporary, local increases in turbidity (HDR 2016). The HDD contractor would provide a drilling fluid management plan to address procedures and equipment for fluid handling, recovery, recycling, and disposal. Sump pits to control fluid at the exit points of the shore-to-lake transition in Erie, Pennsylvania, would be constructed in the bedrock 2,000 feet from shore, at a water depth of 18 feet. The sump pits would contain sediments suspended during excavation for recovery and disposal at an upland facility. Each pit would have a storage capacity of roughly 10,000 gallons (HDR 2016).

[17] MIKE 3 Flow Model FM is a new modelling system based on a flexible mesh approach. The modelling system has been developed for applications within oceanographic, coastal, and estuarine environments. http://www.donpedro-relicensing.com/Lists/Meetings/Attachments/76/MIKE_FM_HD_3D.pdf.pdf. Accessed April 2016.



Source: HDR 2015

FIGURE 5-1: PROPOSED UNDERWATER AND UNDERGROUND CABLE ROUTE, KM POSTS, SURFICIAL GEOLOGY AND TRAWL SAMPLE SITES FOR EASTERN SAND DARTER

The bentonite would be recovered using an underwater hydraulic pump and would be pumped into tanks on a support barge. The mixture of bentonite and water would be disposed of at an approved facility according to permit requirements. The peak volume of fluid displacement would occur during pipe pull-back; the drilling fluid in the borehole would be displaced as the pipe is pulled into the borehole. The approximate volume of drilling fluid that would be displaced is 51,000 gallons. Most of the displaced drilling fluid would be pushed to the land side of the HDD bore as the pipe is pulled from the lake to land and would be recovered and stored for disposal. Sufficient storage capacity for any displaced volume of fluid would be provided on either side of the borehole (HDR 2016).

Fluid could be released inadvertently if pressure during drilling activities forces the fluid into weak spots in the soils. Fluid seepage would most likely occur near the entry and exit points in areas where the drill head is shallow, but it may occur at other locations along the directional drilling path. If an inadvertent release occurs, the HDD contractor would execute procedures for monitoring, reporting, containing, and cleaning up the release (HDR 2016). In the event of an inadvertent release in water, a dive team would immediately be called on scene to contain the fluid release. Once the fluid is contained, drilling would continue, and remediation would begin. The recovered drilling fluid would be disposed of at an upland facility.

5.1.3.2 Effects of Operations, Maintenance, and Emergency Repairs

Water temperature may increase locally because of the heat generated as electricity moves through the proposed transmission cable. Exponent (2015b) estimated that the temperature at the water and soil interface on the lakebed could increase a maximum of 4.4°F during operations. The area of greatest temperature increase would be approximately 9 inches from the centerline of the proposed transmission cable in the downstream direction of water flow. The physical extent of this temperature increase region is limited; moving only 4 inches from the warmed region, the temperature increase would drop to 0.2°F (Exponent 2015b). No significant effects on water temperature are expected due to the presence and operation of the proposed transmission cable.

In the event of an emergency repair, the effects would be limited to the immediate area of the repair site. During repair activity, the proposed transmission cable would be exposed, spliced with a new section and be reburied. Effects on water quality would only include local increases in turbidity and resuspension of sediments. All effects would be similar or less impactful to those of original installation.

5.1.4 AQUATIC HABITATS AND SPECIES

5.1.4.1 Effects of Construction

In United States waters, the proposed LEC Project would primarily cross silt/clay, sand/silt, and approximately 1.3 miles of bedrock (***Figure 5-1***). The soft sediments are found in the deeper waters of the lake bottom, and the bedrock habitat along the proposed Project route is closer to shore. The first year of installation would include three to four months of HDD and bedrock trenching. The grapnel process to clear objects from the proposed Project route and the transmission cable installation using jet plowing or water jetting (in deeper waters along the lake bottom) would occur during the second year of construction.

The total disturbance area of the trench excavation in United States' waters (both bedrock and sediment) would be approximately 12.5 acres. Water quality modeling efforts for similar projects that have undergone regulatory review and gained regulatory approval have used a jet plow sediment release fraction of between 25 and 30 percent for similar fine-grained sediments similar to those in Lake Erie (Jiang et al. 2007). No fill would be added to the excavated trench because 70 to 75 percent of the existing sediment would return to the trench. A slight depression in the lake bottom would be present over the installed cable temporarily,

but pre-installation conditions are expected to return through natural deposition to the lakebed. The only permanent disturbance of the lakebed would be the presence of the two 6-inch diameter transmission cables and the telecommunications cable.

Fish

Temporary, short-term disturbance of sediments during HDD, the grapnel run, trenching, and low-level blasting is expected to cause an increase in turbidity. Changes in turbidity could affect all life stages of fish. Increased sedimentation could cause pelagic eggs to sink to the bottom, possibly smothering demersal eggs, reducing growth rates, and increasing mortality among larvae. A reduction in oxygen absorption due to gill abrasion could occur in juveniles and adults (Berry et al. 2003). The proposed Project construction may displace the available food sources in the disturbed areas, resulting in a short-term effect on local fisheries. The Pennsylvania shoreline of Lake Erie is dominated by bedrock; therefore, the nearshore construction activities would result in minimal increases in sedimentation.

Regarding an increase in toxins in the water column, as noted in ***Section 5.1.3.1***, the temporary re-introduction of existing sediments to the water column during cable installation do not represent a new pollution source to the Lake. Aquatic life standards address acute and chronic toxicity with acute toxicity resulting from short exposure duration (e.g., 1-hour) and chronic toxicity resulting from a longer exposure (e.g., 4-day) (HDR 2015a). While water quality changes associated with the cable installation would be of short duration at any one location and the associated sediment resuspension would be transient, for purposes of this analysis, the results of the water quality modeling for the proposed cable installation will be compared to both acute standards (1-hour average) and chronic standards (4-day average) for metals."

It is not possible that there would be more toxins in fish; because, no new pollution source would be added to the Lake during the construction process. Fish are generally mobile and could avoid the direct effects of the proposed construction and installation. Most of the fish would be scared away from the area during this construction process due to the noise and the equipment. Because of the short time-frame of resuspension of the toxins in the water, it is unlikely that the toxins would be consumed by any fish and fish are highly mobile and would avoid any construction activities. Another point to emphasize is during the trench excavation, it has been calculated that up to 75 percent of resuspended material would settle back into the trench and would be buried with the transmission cable. Commercially harvested fish in Lake Erie would also be minimally impacted by these activities and there would be no additional toxins consumed by these fish that are harvested for human consumption.

The large, rocky substrate off the shore of Pennsylvania offers spawning and nursery habitat for lake whitefish, rainbow smelt, emerald shiner, spottail shiner, fathead minnow, channel catfish, stonecat, trout-perch, white bass, smallmouth bass, rainbow darter, johnny darter, yellow perch, walleye, and freshwater drum (Goodyear et al. 1982). Lake trout typically spawn in areas of large rocky substrates; however, there has been no evidence of naturally spawning lake trout in the ROI during the last 30 years of restoration efforts (CWTG 2014, NYSDEC 2014). Using HDD in the first 2,000 feet from the United States' shoreline is likely to avoid affecting the nearshore spawning and rearing habitats. Approximately 0.9 mile of bedrock would be bored by HDD. Limited spawning habitat may exist within that area, but fish are likely to avoid the area during the proposed construction and use adjacent habitats for spawning. The small area of disturbance would have little to no population-level effect on the spawning of any fish species. The remaining proposed construction route in the United States occurs over post-glacial sand/silt or rock shoals that lack the aquatic vegetation used by spawning fish (CSR 2015). Proposed construction and installation may have minimal effects on species that spawn in fine or sandy substrates, such as the eastern sand darter. ***Section 5.1.5*** and a biological assessment for the eastern sand darter (HDR 2015; ITC 2016) discuss these effects in greater detail.

Many of fish species in the proposed LEC Project area use nearshore spawning habitats in the spring, so the timing of HDD methods in the nearshore areas would limit direct effects on spawning fish populations. Side-cast rock associated with blasting or excavation may provide increased spawning habitat in the long term.

Jet plowing would cause a local increase in turbidity in Lake Erie's deeper waters (greater than 32.8 feet) where sand, silt, and clay dominate the substrate. Water quality modeling results indicate minimal effects on water quality associated with proposed transmission cable installation; expected effects are limited to temporary increases within four hours following jet plowing or water jetting. Increases in TSS concentration associated with transmission cable installation are expected to be less than 3 mg/L greater than observed background TSS levels at a distance of 328 feet from the point of installation and within 16.4 to 36 vertical feet of the lake bottom (HDR 2015; ITC 2016). Proposed construction effects would be minimal at any one location. The grapnel penetration of the lake bottom to a maximum depth of 3 feet would disturb the underlying sediments temporarily. Some studies have shown that fish may be attracted to an area during dredging and immediately afterward to feed on infaunal organisms stirred up by dredging (Brinkhuis 1980). Bottom feeding fish species (e.g., catfish and sturgeons) would be the primary species enticed to feed in the area during the proposed construction.

The inadvertent release of drilling fluids during the proposed construction also may affect fish communities. The construction of sump pits at the HDD exit points to contain drilling fluids would minimize the potential for released fluids to affect adjacent aquatic resources. Appendix A of Joint Permit Application Volume III (HDR 2015; ITC Lake Erie 2016) presents a detailed Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan for the proposed LEC Project. The Joint Permit Application can be located at http://www.lakeerieconnectorea.com.

Blasting and excavation may cause temporary impulse noise and ground-borne vibration that could affect nearby fish. Effects may include mortality, physical injury, auditory tissue damage, permanent and temporary threshold shifts, behavioral changes, and decreased egg and larvae viability (Hastings and Popper 2005). Blasting would occur in nearshore areas of Springfield Township at Pennsylvania landfall containing exposed or under lakebed surface bedrock. Stemmed charges would be used in the blasting process to minimize aquatic impacts. A stemmed charge would propagate the shock forces into the substrate rather than into the water column in an attempt to increase the efficiency of fracturing the rock while minimizing potential effects on water quality and surrounding aquatic life. The technique of stemming charges (i.e., contained detonation) to be used for the proposed LEC Project results in less pressure on and mortality of surrounding aquatic life than detonation of an explosive charge of the same weight in open water (Nedwell and Thandavamorthy 1992, Hempen et al. 2007). Traxler and colleagues (1992) showed reduced effects of stemmed charge/subterranean explosions versus mid-water explosions, reporting zero mortalities of and observable injuries to largemouth bass, bluegills, and channel catfish kept in cages placed directly above and at distances between 25 and 300 feet from shot holes containing 9.9 and 20 pounds of dynamite.

ITC Lake Erie's evaluation of the effects of blasting on fish is reported in detail in Appendix B of JPA Volume II (HDR 2015; ITC 2016), which includes a review of existing studies and additional research. The proposed blasting method was chosen to minimize potential effects. Most effects associated with noise would be either temporary or intermittent and are expected to affect only a few individuals in Lake Erie. Most fish in the area are expected to move away from sources of noise during the proposed construction. A detailed blasting plan consistent with PADEP and PFBC requirements would be followed and would consider limiting the effects of noise on fish and any other aquatic organisms to the extent possible.

5.1.4.2 Benthic Invertebrates and Aquatic Vegetation

The Lake Erie shoreline in Pennsylvania lacks aquatic vegetation due to frequent, high-energy wave action and the presence of exposed shale bedrock (Rathke 1984, Thoma 1999, Strickland 2010). Exposed shale bedrock prevents the growth of submerged aquatic vegetation (SAV). Rathke (1984) observed no aquatic vegetation at nearshore monitoring sites in surveys conducted during the 1970s. Exposed bedrock in Lake Erie is colonized by filamentous algae of various species including green algae (*cladophora glomerata*), (*ulothrix zonata*), and red algae (*bangia atropurpurea*). Construction activities associated with the proposed LEC Project are not expected to affect any aquatic vegetation. Construction activities may affect the communities of benthos and epifauna by crushing or injuring benthic invertebrates, including mussels in the path of jet plowing and bedrock trenching, or in the footprint of the HDD sump pits. A study regarding a submarine, DC transmission cable in the Baltic Sea determined that benthic macroinvertebrate communities recovered within one year following the initial effect of construction (Andrulewicz et al. 2003 as cited in Exponent 2015a). Post-construction monitoring studies of the 300-kV, HVDC Cross Sound Cable in Long Island Sound reached similar conclusions (S. Wood, personal communication as cited in Exponent 2015a). Sediment disturbed during jet plowing would begin to backfill the trench almost immediately. The depression in the lakebed located immediately over the buried transmission cables is expected to revert to pre-construction conditions within three years (DOE 2014).

Recolonization and the composition of the new epifaunal community depend on the stability of the disturbed areas, the tolerance of benthic organisms to physical changes, and the recruits that are available. The disturbed sediment is expected to settle quickly out of the water column and epifauna from nearby, unaffected areas of Lake Erie are expected to colonize the surrounding areas. Recovery time for benthic communities varies, ranging from several months to several years, depending on the type of community and type of disturbance (DOE 2013).

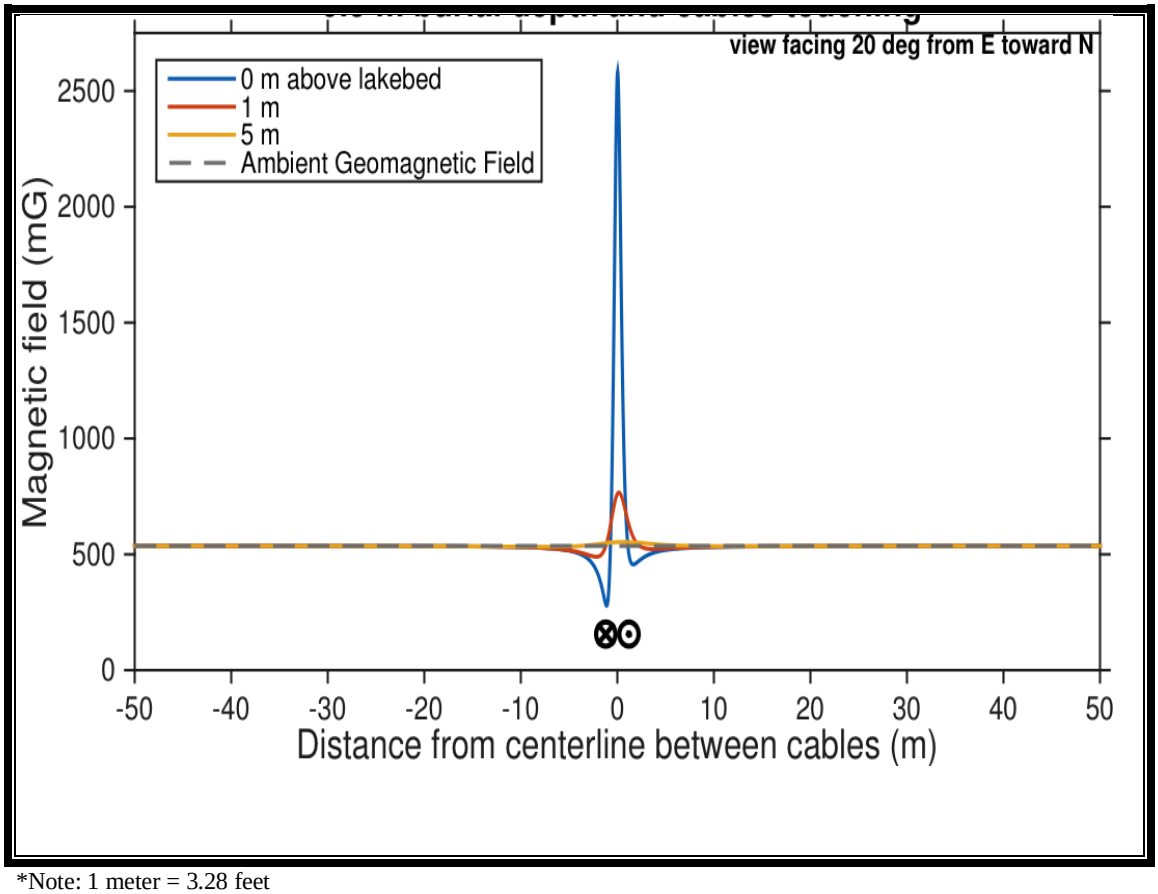
5.1.4.3 Effects of Operations, Maintenance, and Emergency Repairs

The local magnetic fields generated during the operation of the proposed underwater transmission cables could affect aquatic species in the Lake Erie Segment. Although the metallic sheaths that encase the transmission cables would contain the electric field generated by operation of the proposed transmission cables wholly below the sediment surface, movement of electric charges through a static magnetic field induces an EMF that could affect aquatic species in proximity to the transmission cables. Some aquatic species may be sensitive to EMF, and these fields may interfere with the ability to detect prey or navigate during migration.

Electromagnetic fields occur naturally and from anthropogenic sources. Examples of natural sources of EMF include the Earth's magnetic field, currents traveling through the Earth's geomagnetic field, and different processes (biochemical, physiological, and neurological) within organisms. The proposed LEC Project area has a geomagnetic field of approximately 536 mG (Exponent 2015a). High-voltage, direct-current technology produces only static fields. The HVDC cables used in proposed LEC Project would be shielded to eliminate the static electric field, leaving only static magnetic fields to affect surrounding aquatic organisms. ITC Lake Erie modeled the potential effects of magnetic fields produced by the proposed underwater cable system and the potential significance for selected fresh water fish species based upon a review of the relevant literature (Exponent 2015a,). Magnetic field levels would be appreciably different than the Earth's geomagnetic field only in the immediate vicinity of the proposed transmission cable because they diminish very rapidly with distance (Exponent 2015a).

Model results for the magnetic field along portions of the proposed transmission cable route to be jet plowed (i.e., soft sediments) indicate that the peak field deviation (above the ambient geomagnetic field) would be 2,047 mG, and would drop to a value of -18 mG (3.3 percent reduction of the ambient geomagnetic field)

at a distance of approximately 16 feet from the transmission cable, assuming a burial depth of 1.6 feet. At distances greater than 32.8 feet from the proposed transmission cable, the field deviation is less than 5 mG. This estimate is conservative because the transmission cable is expected to be 3 to 10 feet deep for most of the proposed LEC Project route. Assuming a burial depth of 5 feet, the magnetic field level at the lake bottom would be approximately 10 times weaker than what is described for a burial depth of 1.6 feet (Exponent 2015a).

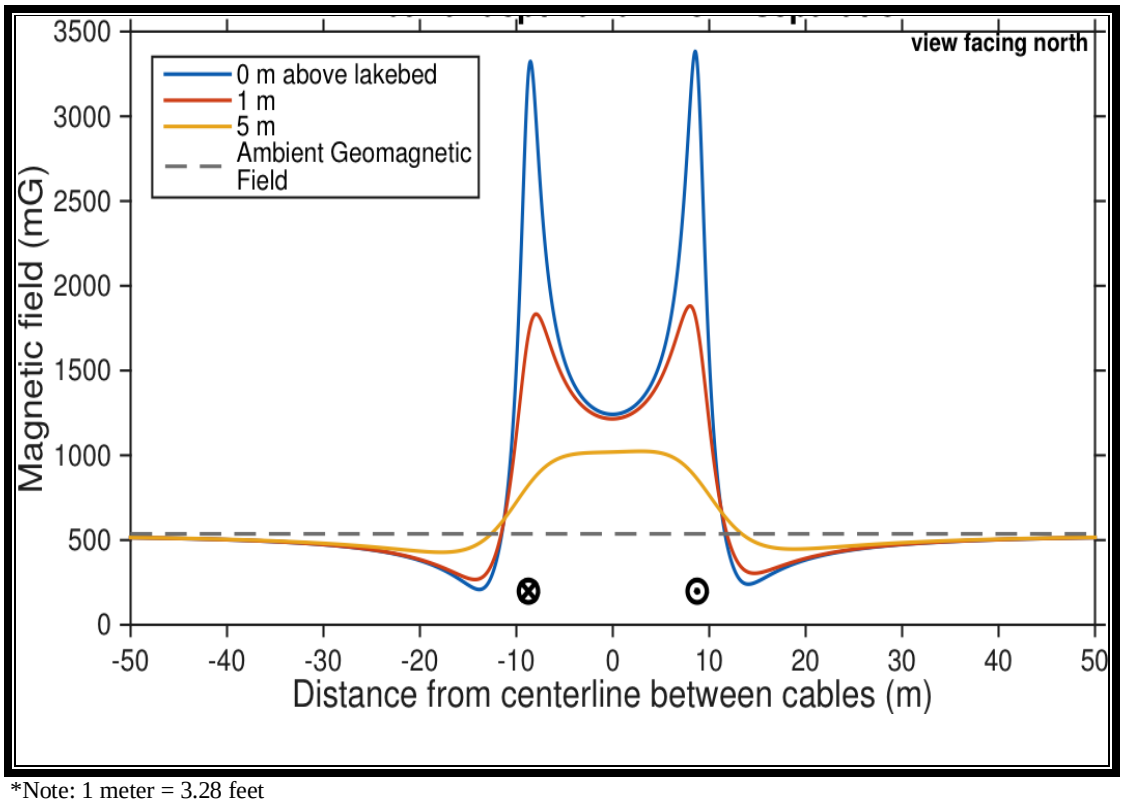


*Note: 1 meter = 3.28 feet

FIGURE 5-2: CALCULATED MAGNETIC FIELD PROFILE FOR CABLES STRAPPED TOGETHER, LAID HORIZONTALLY, ORIENTED AT 20° NORTH OF EAST, AND BURIED AT A DEPTH OF 1.6 FEET

Model results for the HDD portion of the proposed transmission cable (approximately 0.4 mile), assuming a burial depth of 3.28 feet, indicate that the magnetic field deviation (above the ambient geomagnetic field) is 2,846 mG and occurs at the lakebed directly over the transmission line. This field is approximately 5.3 times larger than the geomagnetic field, but it diminishes rapidly with distance. At a distance of 20.5 feet from the proposed transmission cable (49.2 feet from the centerline between the cables), the field deviation drops to -250 mG, representing a decrease in the total magnetic field to a value approximately 50 percent relative to the geomagnetic field. The field deviation decreases further at larger distances, and the overall field becomes nearly indistinguishable from the geomagnetic field at distances greater than 98 feet from the proposed transmission line. The burial depth in the HDD section would vary from approximately 3 feet to 90 feet. For a burial depth of just 3.28 additional feet, the magnetic field level at the lakebed would

decrease by a factor of two; at greater burial depths the magnetic field level would be even weaker, as shown in ***Figure 5-3*** (Exponent 2015a).



*Note: 1 meter = 3.28 feet

FIGURE 5-3: CALCULATED MAGNETIC FIELD PROFILE FOR CABLES ORIENTED NORTH-SOUTH AND BURIED AT A DEPTH OF 3.28 FEET; THE CABLES ARE SEPARATED BY 57.4 FEET

Changes in the ambient geomagnetic field level depend on the immediate area of the proposed transmission cable. The model calculated the strongest magnetic field level at any point along the submarine portion of the transmission cable to be approximately 3,382 mG, which is a deviation of approximately 2,846 mG from ambient (Exponent 2015a). That magnetic field level measured directly over the HDD cables is approximately 0.08 percent of the general public exposure limit recommended by the ICNRP (Exponent 2015a).

5.1.4.4 Fish

Based on modeling results, the proposed LEC Project would not change the ambient static magnetic field in the portion of Lake Erie habitat in close proximity to the submerged transmission cable sufficiently to threaten the health or performance of fish in Lake Erie. The change in magnetic field is not considered to be a physical barrier to migration of fish because they are known to use multiple sensory cues to guide migratory behavior. ITC Lake Erie's model is based on conservative estimations to yield the largest possible estimates of the change in magnetic field. In more typical conditions, potential change to the background magnetic field environment is expected to be less than described (Exponent 2015a).

Increases in temperature at the sediment-water interface associated with operating the proposed transmission cables theoretically could affect demersal species; however, Exponent (2015b) calculated thermal effects on water quality in Lake Erie and found that the anticipated increases in the temperature of the sediment and water column would not significantly affect populations of aquatic species because the increases would fall within the range of natural ambient variability.

5.1.4.5 Benthic Invertebrates and Aquatic Vegetation

No significant effects on shellfish and benthic communities are expected due to the increase in the magnetic field and ambient temperature associated with the operation of the proposed transmission cables.

No effects on aquatic vegetation are anticipated to result from the operation of the proposed transmission cables. Electric and magnetic fields and minimal temperature increases associated with the proposed transmission cable operation would not adversely affect vegetation communities because the area affected is small and is restricted to the immediate vicinity of the cables.

5.1.4.6 Essential Fish Habitat

No Essential Fish Habitat has been designated within the Lake Erie Segment of the proposed LEC Project area.

5.1.5 AQUATIC PROTECTED AND SENSITIVE SPECIES

5.1.5.1 Effects of Construction

Cisco
Excavating the trench in the nearshore bedrock would affect a small area relative to surrounding unaffected habitat for cisco. ITC Lake Erie's proposed in-water construction period of May to November would avoid effects during the peak spawning and hatching season for cisco, which occurs in early spring after ice out; therefore, construction of the proposed LEC Project is not be expected to affect cisco spawning (HDR 2016).

Lake Sturgeon
Lake sturgeon spawn from early April to June along rocky shorelines of lakes over clean gravel shoals, rocky ledges, and around rocky islands (Scott and Crossman 1998; NatureServe 2014; FWS 2015; MDNR 2015). Spawning occurs in water ranging from 1 to 15 feet deep and is temperature dependent (preferred temperature is 53°F to 64°F). Use of HDD avoids effects in shallows water less than 16.4 feet deep where lake sturgeon spawn; therefore, the proposed transmission cable installation would not affect lake sturgeon spawning (HDR 2016). Excavating the trench in the nearshore bedrock would affect a small area relative to surrounding unaffected habitat. Lake sturgeon can be highly mobile and would be able to avoid any direct effects of the proposed construction. Proposed construction activities may cause a temporary, short-term disturbance to the lake bottom and displace the available food source.

Eastern sand darter
As summarized in the applicant-prepared biological assessment (HDR 2015; ITC 2016), the eastern sand darter prefers fine sand sediments in areas of moderate flows. The presence of eastern sand darter in the nearshore environment of the proposed LEC Project route is limited because the substrate is primarily bedrock. Proposed transmission cables would be installed by HDD borings through the bedrock with limited effect on the lakebed, except at the point of transition from the HDD segment to trench installation. Proposed construction activities in the nearshore portion of the Project route would not affect the eastern sand darter.

The PFBC estimated the average density of eastern sand darter in Lake Erie to be 0.43 fish per hectare (100 acres) based on trawl surveys. The area of temporary disturbance of all in-water activities in the Pennsylvania portion of Lake Erie would be approximately 23.0 hectares (56.9 acres). Based on the calculated density of eastern sand darter (without considering spawning season), approximately 10 fish are expected to occur along that portion of the proposed transmission cable route (0.43 fish /hectare x 23.0 hectares). The grapnel run to clear objects from the proposed transmission cable route prior to construction would disturb approximately 20 fish using the aforementioned calculation. According to PFBC, the last time eastern sand darters were caught via trawling near the proposed LEC Project route was in 1999, based on the best available existing data. PFBC trawl data indicate low densities and occasional occurrences of this species. Few individual fish are anticipated to be encountered during jet plowing or the grapnel run in June and July; they are expected to avoid the slow moving proposed construction processes because they are mobile fish and can find suitable habitats in the vicinity to continue spawning, feeding, and normal behavior. The area of permanent disturbance, which consists of the areas excavated for the proposed three HDD sump pits, the transmission cable trench in the bedrock, and associated deposition of side-cast rock would be approximately 2 acres (HDR 2016).

The only potential effect on eastern sand darter would be if the jet plow or grapnel disrupts eastern sand darter eggs. The effect on eastern sand darter eggs is expected to be insignificant given the small width of the area disrupted by the jet plow compared to the available similar habitat in Lake Erie, and the short incubation period (HDR 2016). If the jet plow or the grapnel passes through a spawning site with incubating eggs, the effect would be limited because typical spawning behavior is to lay eggs one at a time over an extended period of time and a large space (Adams and Burr 2004), which suggests that only a small portion of total eggs would be affected.

5.1.5.2 Effects of Operations, Maintenance, and Emergency Repairs

An analysis of the post-construction magnetic-field exposure and available research on the responses of freshwater fish to static magnetic fields (i.e., migratory, behavioral, physiological, and early life-stage) indicate that the proposed LEC Project would not change the ambient magnetic field of Lake Erie habitat in the vicinity of the proposed transmission cable installation sufficiently to threaten the health or performance of cisco, eastern sand darter, or lake sturgeon (Exponent 2015a).

No significant effects on cisco, eastern sand darter, or lake sturgeon are expected due to the small thermal increase in water temperature associated with operating the transmission system in Lake Erie.

5.1.6 TERRESTRIAL HABITATS AND SPECIES

5.1.6.1 Effects of Construction

Construction of the proposed LEC Project may affect terrestrial species that occur in the Lake Erie Segment ROI; however, effects would be minimal because the Lake Erie Segment is entirely aquatic. Potential effects would be limited to species that fly over the ROI (e.g., birds and bats) and waterbirds and semi-aquatic furbearers that use the aquatic habitats of the Lake Erie Segment. The proposed transmission cable would enter and exit the lake via HDD, which would avoid affecting the Lake Erie shoreline and nearshore environments. The HDD exit location from the land into Lake Erie would be via boring through bedrock. No terrestrial habitat or plant species occur within the Lake Erie Segment; therefore, none would be affected by proposed construction activities.

Noise and human activity are expected to increase over baseline levels for only a few hours at any one location during construction. At an expected average installation rate of 0.9 to 1.2 miles a day in soft sediment, noise is expected to increase over baseline noise levels for less than one day at any one location

within the Lake Erie Segment (HDR 2016); therefore, the proposed construction is unlikely to cause birds and bats to permanently avoid forage areas, nests, and roosts adjacent to the Lake Erie Segment, although they may be disturbed and displaced temporarily. Noise may reduce communication ranges or interfere with predator/prey detection temporarily while construction equipment is operating in a particular area; however, it is unlikely to result in significant avoidance of foraging areas, prolonged reduction of communication ranges, or prolonged interference with predator/prey detection during the short time of the proposed construction in a particular area. Semi-aquatic mammals that forage in habitats within the Lake Erie Segment are very mobile species and are likely to exit areas of disturbance during proposed transmission cable installation. Muskrat and mink generally are present only near the shoreline; effects on those semi-aquatic mammals would be limited because most construction would occur either by HDD or jet plowing, limiting interaction with such species. Terrestrial wildlife would not be permanently displaced from the ROI because construction within the Lake Erie Segment would not alter the available habitat for these species. ***Sections 3.1.15*** and ***5.1.15*** discuss the soundscape in the ROI and the potential effects of noise associated with the proposed Project in greater detail.

Potentially affected birds, bats, and semi-aquatic mammals are expected to resume typical activities following construction, and no permanent changes of the habitat in the Lake Erie Segment are expected (HDR 2016). Construction of the proposed LEC Project, therefore, is not likely to adversely affect terrestrial wildlife species.

5.1.6.2 Effects of Operations, Maintenance, and Emergency Repairs

Operation of the proposed transmission system would have no significant effect on terrestrial species in the Lake Erie Segment of the proposed LEC Project.

Maintenance or emergency repairs may require local operation of a vessel. The time required to repair a damaged transmission cable would vary with the nature and extent of damage, location in the Lake, and weather conditions. If the damage occurs when the Lake is frozen, an icebreaker may be necessary to move ice. Noise and activity associated with repair activities may cause birds, bats, and semi-aquatic mammals to avoid forage areas temporarily, but they are expected return to their normal routines following the activity (HDR 2016). ITC Lake Erie would prepare a detailed SPP to ensure hazardous materials associated with repair vessels and activities do not enter the water during emergency repairs (HDR 2016). The anticipated infrequent and temporary activity associated with maintenance and repair of the proposed transmission cable would not adversely affect wildlife species within the Lake Erie Segment.

5.1.7 TERRESTRIAL PROTECTED AND SENSITIVE SPECIES

5.1.7.1 Effects of Construction

Construction of the proposed LEC Project may affect protected and sensitive terrestrial species in the Lake Erie Segment. These effects would be minimal because this portion of the proposed Project is entirely aquatic. No protected or sensitive terrestrial plants occur within the Lake Erie Segment; therefore, there would be no effect on protected terrestrial plants.

The federally protected Indiana bat and northern long-eared bat may occur within or in close proximity to the Lake Erie Segment. Increased noise may temporarily displace any bats present in the area during the proposed construction; however, the duration of increased noise would be brief at any given location (HDR 2016). Bats are expected to return to their habitat when construction ceases; therefore, installing the proposed transmission cable within the Lake Erie Segment is not likely to adversely affect the Indiana bat or northern long-eared bat. In the April 11, 2016, letter, FWS determined that the Project is not likely to affect the Indiana or northern-long-eared bat species.

Bald eagles, bank swallows, and other migratory birds that forage over aquatic habitats within the Lake Erie Segment could be displaced from foraging areas temporarily because of increased noise associated with proposed transmission cable installation and construction vessel traffic (HDR 2016). Construction noise may temporarily cause increased stress, increased travel time to foraging areas from roosts or nest sites, or reduced foraging success. The effects of increased noise are expected to be minimal and temporary, occurring for less than one day at any one location (HDR 2016); therefore, the proposed construction would not adversely affect bald eagles or migratory birds and would result in only temporary disturbance and avoidance of possible habitat for short periods of time (HDR 2016). No permanent changes of habitats in the Lake Erie Segment are proposed; therefore, no long-term effects on bald eagles and migratory birds that use the area are expected. The FWS, in their April 11, 2016 letter, noted that impacts from the proposed LEC Project to bank swallows are low enough that no seasonal restriction on Project activities would be necessary and development of a habitat restoration plan for birds is not warranted based on the following: (1) HDD would be employed to avoid impacts to the bluff, (2) the drill rig would be located approximately 328 feet away from the top of the bluff, and (3) off-shore activities would be approximately 750 feet from the shoreline. The proposed Project is designed so that it would avoid all impacts to the bluff and nesting bank swallows.

5.1.7.2 Effects of Operations, Maintenance, and Emergency Repairs

No protected or sensitive terrestrial plant species occur within the Lake Erie Segment; therefore, operation, maintenance, and emergency repairs of the proposed transmission cable within that Lake Erie Segment would not affect protected plants.

The increased noise associated with emergency repairs may displace federally protected Indiana bats, northern long-eared bats, bank swallows, bald eagles, and migratory birds from foraging over the Lake Erie Segment temporarily, but those effects are expected to be infrequent and of short duration. The likelihood that increased noise would have any negative effect on the protected species is minimal.

5.1.8 TERRESTRIAL WETLANDS

5.1.8.1 Effects of Construction

The Lake Segment ROI is entirely aquatic; no terrestrial wetlands are identified within this segment. The proposed transmission cable would be buried in the lakebed of Lake Erie using HDD, which would avoid affecting shoreline wetlands and nearshore habitat. ***Section 5.1.3*** describes additional measures to protect the shoreline environment during construction.

5.1.8.2 Effects of Operations, Maintenance, and Emergency Repairs

No terrestrial wetlands occur within the Lake Erie Segment; therefore, proposed operations, maintenance, and emergency repairs within the Lake Erie Segment would not affect terrestrial wetlands.

5.1.9 GEOLOGY AND SOILS

5.1.9.1 Effects of Construction

The proposed transmission cable would be buried in sediment for most of the length of the Lake Erie Segment. Before installing cable, ITC Lake Erie would clear obstacles from the lake bottom by running a grapnel along the route. The grapnel would penetrate the lake bottom to a maximum depth of 1 foot and would disturb sediments and have a minor effect on the terrain of the lake bottom. The proposed transmission cable would be installed in the lake bottom using jet plowing and water jetting. Jet plowing

and water jetting would result in temporary disturbance of approximately 12.5 acres within United States' waters. Turbidity could increase significantly in the area immediately surrounding the plowing but would decrease rapidly with distance. Sediments generally would resettle once construction is complete; coarse sediments (i.e., larger grain sizes) would resettle faster than fine sediments. Fine sediments are more susceptible to dispersion prior to resettlement. ITC Lake Erie conducted a modeling study to characterize the dispersion of sediments in the water column during cable installation (HDR 2016). ***Section 5.1.3.1*** of this EA discusses the modeling results in detail. No permanent effects on sediments are expected to result from the proposed LEC Project construction.

A trench would be excavated into bedrock to install the proposed transmission cable in a reach near the lakeshore landfall. The exact length of the reach requiring excavation would be determined following a final geological inspection, but it is likely to be approximately 0.75 miles. Bedrock is either exposed or very close to the surface in this reach. ITC Lake Erie would use blasting methods to excavate a single trench for the proposed transmission cable and backfill the trench with a mixture of sand and gravel from land. The blasted bedrock would be side cast. The proposed LEC Project route was selected to minimize the length of cable within areas of bedrock. Bedrock trenching, including excavating the three HDD sump pits, would disturb an area of approximately 1.9 acres. The topography of this reach would be altered permanently.

The lakebed along the proposed transmission cable route is susceptible to ice scouring from approximately KP 62 to landfall (approximately KP 103.8). ITC Lake Erie would bury the proposed transmission cable deep enough to mitigate the potential effect of ice scouring in the susceptible areas of the proposed Project route.

Neither construction nor operation of the proposed LEC Project would increase the risk of seismic hazards.

5.1.9.2 Effects of Operations, Maintenance, and Emergency Repairs

Neither operation nor inspection of the proposed transmission cable would affect bathymetry or geology within the Lake Erie Segment of the proposed LEC Project.

Emergency repairs could require the proposed transmission cables to be unearthed, which would alter the bottom stratigraphy of Lake Erie similarly to but less extensively than construction. The same approaches used to install the proposed transmission cable initially probably would be used to replace it; therefore, the environmental effects of repairs would be similar to those of the proposed construction. These effects would be negligible because they would occur infrequently, would involve a smaller area, and would be of shorter duration than the effects of initial construction.

Operation of the proposed LEC Project may cause a minor increase the temperature of sediment immediately surrounding the proposed transmission cable.

The proposed transmission cable could be damaged during a seismic event; however, seismic events are rare in the region. The buried cable could shift and deform slightly with ground movements associated with seismic events.

5.1.10 CULTURAL RESOURCES

Two known underwater archaeological sites exist within 1 mile of the Lake Erie Segment (Hartgen 2015). No shipwrecks or other archaeological resources were identified along the proposed Lake Erie segment and all construction activities would be conducted directly on the lakebed route and would avoid the two known underwater archaeological sites. Therefore, construction activities associated with the marine cable route

are not expected to have any effect on historic or archaeological resources. As described in ***Section 3.1.10*** and ***3.2.10***, DOE has initiated consultation with the PASHPO to further define the Project's APE and phased approach to the identifying and evaluating cultural resources.

5.1.10.1 Effects of Construction

Consultation regarding effects on historic properties through the Section 106 process is in progress. ***Appendix F*** provides the letter from the DOE initiating Section 106 consultation with the PASHPO and the PASHPO's May 12, 2016 response (***Appendix F***).

5.1.10.2 Effects of Operations, Maintenance, and Emergency Repairs

The operation and inspection of the Lake Erie Segment would not affect cultural resources within the APE. Any emergency repairs would occur in areas previously disturbed by the proposed Project construction of the transmission cable and, in some cases, in areas purposefully selected to avoid cultural resources; therefore, these activities would have no adverse effects.

5.1.11 INFRASTRUCTURE

The proposed LEC Project would facilitate the transfer of electricity, improve power system availability and reliability, and improve the efficiency of the competitive wholesale power market by connecting the IESO market in Ontario and the PJM market in the United States (HDR 2016).

5.1.11.1 Effects of Construction

Electrical Systems
No substantial electrical system infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on electrical systems are expected to result from construction. Should an electrical system infrastructure be discovered during construction, appropriate BMPs and avoidance/mitigation measures would be developed in consultation with utility providers.

Water Supply Systems
Temporary effects on drinking water intakes associated with suspended sediment entering the intakes are possible during construction, but upon review of HDR (2016) DOE concurs that such effects are unlikely. In areas of soft sediment, the proposed transmission cables would be installed and buried using a jet plow, resulting in only local suspension and transport of sediment (HDR 2016). It should be noted that (1) the sediments disturbed by the proposed transmission cable installation do not represent a new source to Lake Erie, but rather the re-introduction of existing sediment sources into the water column on a short term basis; and (2) the closest water intake (Erie City Water Authority) is more than 4 miles from the proposed LEC Project (HDR 2016).

A water quality model of Lake Erie was developed by HDR Engineering, Inc. (HDR) to assess the potential effects associated with the resuspension of lake sediments during transmission cable installation by calculating increases in concentration at five representative locations for the following parameters: TSS, TP, DP, and dissolved metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury). The model calculated bottom currents in the range of 0.04 – 17.8 centimeters per second for the April – November modeling period, generally in an east-west direction roughly perpendicular to the proposed transmission cable route. The results indicated, and DOE concurs, that water quality effects would be minimal, and that they would be limited to effects occurring locally within a four-hour timeframe, during which the sediments would resettle. Specific conclusions are discussed in detail in ***Section 5.1.3.1***.

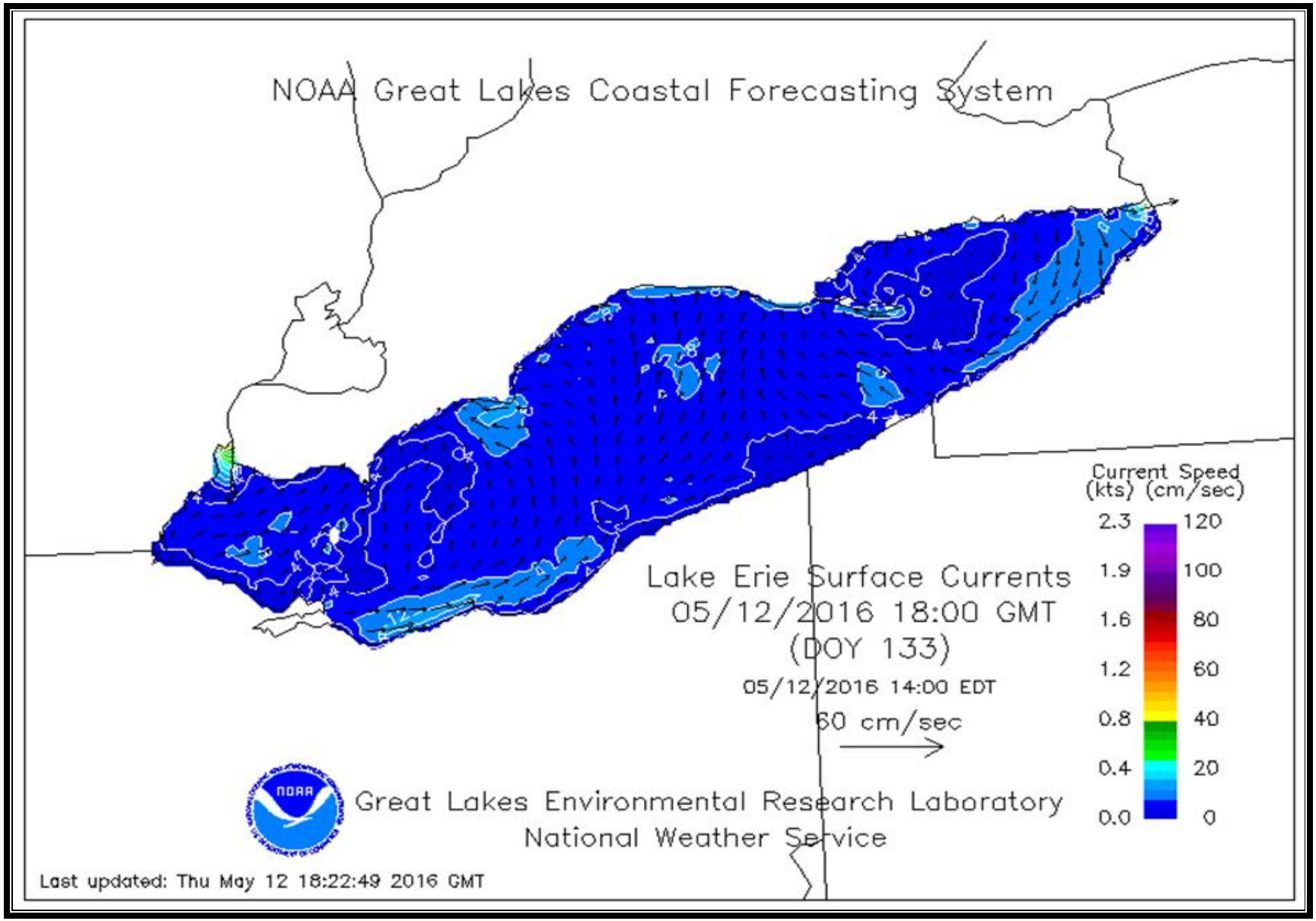


FIGURE 5-4: LAKE ERIE SURFACE CURRENTS

Stormwater Management
No stormwater management infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on stormwater management are expected to result from construction.

Communications
No communications infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on communications are expected to result from construction. If previously unknown communications infrastructure is discovered during construction, appropriate BMPs and avoidance/mitigation measures would be developed in consultation with utility providers.

Natural Gas Supply
No natural gas supply infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on natural gas supply are expected to result from construction. No natural gas production is known to be occurring in the United States' portion of Lake Erie, but if previously unknown natural gas infrastructure is discovered during construction, appropriate BMPs and avoidance/mitigation measures would be developed in consultation with utility providers.

Liquid Fuel Supply
No liquid fuel supply infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on liquid fuel supply are expected to result from construction. If previously unknown liquid fuel supply infrastructure is discovered during construction activities, appropriate BMPs and avoidance/mitigation measures would be developed in consultation with utility providers. Equipment and vessels used to install proposed transmission cable would consume liquid fuel in small quantities. The DOE concurs with HDR (2016) that the amount of fuel consumed during construction is expected to be only a small percentage of the supply in the area.

Sanitary Sewer and Wastewater Treatment
No sanitary sewer or wastewater treatment infrastructure has been identified in the Lake Erie Segment ROI; therefore, no effects on sanitary sewer or wastewater treatment are expected to result from construction. If previously unknown sanitary sewer or wastewater treatment infrastructure is discovered during construction, appropriate BMPs and avoidance/mitigation measures would be developed in consultation with utility providers. The installation of the proposed LEC Project would not require the use of municipal wastewater facilities.

Solid Waste Management
No solid waste management infrastructure has been identified in the Lake Erie Segment ROI. Disposal of material excavated during dredging activities would affect solid waste management in the proposed LEC ROI. HDR (2016) states that prior to drilling operations, three offshore sump pits would be excavated in rock where each HDD bore would exit. Drill cuttings would be contained and settled in tanks or sediment traps and disposed of at an approved facility. Rock excavated from trenching activities in the nearshore bedrock area would be side cast. Upon review of HDR (2016), DOE concluded that any effects of jet plowing and water jetting should be minor because most of the sediment disturbed by these activities would settle back into the trench naturally.

5.1.11.2 Effects of Operations, Maintenance and Emergency Repairs

The proposed underwater transmission cables are expected to be relatively maintenance-free, requiring only periodic inspections.

Electrical Systems
No effects on electrical systems are expected to result from operating, maintaining, or repairing of the proposed transmission cable.

Water Supply Systems
Operation of the transmission cable would not affect water supply systems because the closest water intake (Erie City Water Authority) is more than 4 miles from the landfall (HDR 2016). The DOE concurs with report conclusions that Project operations and periodic surveys and scans associated with underwater inspections would not disturb sediments sufficiently to affect drinking water intakes at this distance.

Stormwater Management
No effects on stormwater management are expected to result from operating, maintaining, or repairing the proposed transmission cable.

Communications
No effects on communications are expected to result from operating, maintaining, or repairing the proposed transmission cable.

Natural Gas Supply
No effects on natural gas supply are expected to result from operating, maintaining, or repairing the proposed transmission cable.

Liquid Fuel Supply
Upon review of HDR (2016), DOE concluded that no effects on liquid fuel supply are expected to result from operating, maintaining, or repairing the proposed transmission cable. Boats and equipment used during inspections and emergency repairs of the proposed transmission system would consume small amounts of liquid fuel; however, the proposed transmission cable would require relatively little maintenance, and although inspections would occur multiple times over its operating life, they would be brief.

Sanitary Sewer and Wastewater Treatment
No effects on sanitary sewer or wastewater treatment are expected to result from operating, maintaining, or repairing the proposed transmission cable.

Solid Waste Management
Upon review of HDR (2016), DOE concluded that no effects on solid waste management are expected to result from operating, maintaining, or repairing the proposed transmission cable. Operating the proposed transmission cable would produce no solid waste; the transmission cable would be relatively maintenance-free. If excavation is required for emergency repairs, soil would be stored temporarily and used to restore locations once repairs are completed.

5.1.12 RECREATION

5.1.12.1 Effects of Construction

Construction would temporarily affect recreation within the proposed transmission cable corridor, including recreational boating, sport fishing, and commercial fishing. During the proposed construction, ITC Lake Erie would establish a 0.5 mile exclusion zone around the cable installation vessel. In addition, ITC Lake Erie proposes to develop a Vessel Traffic Management Plan and to coordinate with the local district of the USCG to issue a Notice to Mariners and to post appropriate navigational aids.

The proposed transmission cable installation would not prohibit any water-based commercial or recreational activities but would displace them temporarily. During construction, the cable-laying work site would be off limits to other vessels, which would be required either to travel around the work site or to use a different area of the lake. Increased vessel activity along the transmission cable route during the proposed underwater transmission cable installation would result in additional traffic on Lake Erie. Given the relatively small footprint and short duration of construction of the proposed LEC Project, effects on recreational uses of Lake Erie are expected to be minor, temporary, and limited to the area immediately surrounding the work.

5.1.12.2 Effects of Operations, Maintenance, and Emergency Repairs

Operation of the transmission cable would not affect recreational use of Lake Erie because the proposed transmission cable would be buried in the lakebed.

Periodic maintenance and emergency repairs may occur intermittently throughout the life of the proposed transmission cable. These activities would be brief and restricted to a discrete area of Lake Erie where the transmission cable repairs and maintenance are required and would have minimal disruptive effects on recreational use of the lake.

5.1.13 VISUAL RESOURCES

5.1.13.1 Effects of Construction

In the Lake Erie Segment, visual effects would be associated with the vessels and equipment necessary for the proposed transmission cable installation. Viewers from shoreline areas or boats on Lake Erie in the vicinity of the construction activities would see the cable-laying barge and support vessels. Commercial and industrial ship and boat traffic is common on Lake Erie; therefore, the presence of construction vessels would be similar to existing views. The proposed LEC Project construction would be temporary and relatively brief in duration, and no permanent visual effects are anticipated because the Project would be buried in Lake Erie.

5.1.13.2 Effects of Operations, Maintenance, and Emergency Repairs

The proposed transmission cables would be buried in the lakebed in the Lake Erie Segment; therefore, operation of the proposed LEC Project would have no permanent visual effects there. If the proposed transmission cable requires maintenance or repair, temporary effects on the Lake Erie viewshed would be similar to those experienced during construction of the proposed LEC Project.

5.1.14 PUBLIC HEALTH AND SAFETY

5.1.14.1 Effects of Construction

Three documents have been developed to assess the effects of the proposed LEC Project on health and safety. ITC Lake Erie analyzed the affected environment and assessed the proposed LEC Project effects in an APEA published in January 2016 (HDR 2016). Two additional documents were developed to address the potential effects of EMF associated with the proposed LEC Project: *Assessment of Lake Erie Connector Project: Static Magnetic Field and Selected Fish Species* (Exponent 2015a), and *Draft Review and Assessment of Electromagnetic Fields and Health for the Lake Erie Connector Project in Nanticoke, Ontario* (Intrinsik 2014). Additionally, assessments of public health and safety performed for a very similar project, the NECPL Project, have been used to evaluate the potential effects of the proposed LEC Project.

5.1.14.2 Effects of Construction

Contractor Health and Safety

Employing the proper safety measures would reduce risks for workers' safety. All contractors working on the proposed LEC Project would be responsible for following federal and state safety regulations, for administering workers compensation programs, and for working in a manner that poses no undue risk to personnel. Contractors would ensure that proper plans and programs are in place for each proposed construction activity, including on-water work associated with laying cable under Lake Erie; this responsibility would include developing Health and Safety Plans (HASPs) and an Emergency Contingency Plan (HDR 2016). The HASPs would include requirements for minimum construction barriers, a list of mandatory PPE, hazard communication information and identification, and other provisions for worker protection as required by federal law. Construction activities on Lake Erie would require a Lake Traffic Management Plan detailing USCG regulations. This plan would meet regulatory permit conditions, including OSHA 29 CFR 1926.106. Installing a transmission cable in the Lake Erie Segment would require specialized marine vessels designed solely for installing transmission cables. Such vessels would be operated by properly trained personnel. A Project-specific blasting plan would be developed to manage potential nearshore blasting activities. Only specially trained personnel would perform blasting (DOE 2015b; HDR 2016).

Public Health and Safety

The risk for public safety during the proposed construction on Lake Erie would be minimal. Risks for public health and safety within the Lake Erie Segment would be associated primarily with navigation and recreation on the lake. Installing and enforcing temporary barriers of approximately 3,200 feet around construction would minimize risks for the public. The public would be notified prior to the commencement of construction.

Electric and Magnetic Field Safety

The proposed transmission cable would not be powered during construction; therefore, it would pose no additional exposure to EMF for contractors or the public beyond baseline levels.

5.1.14.3 Effects of Operation, Maintenance, and Emergency Repairs

Contractor Health and Safety

Normal operations of the proposed transmission cable would require little or no on-water work; therefore, operation of the proposed LEC Project generally would not affect the health and safety of contractors. When on-water work is required, an ERRP would identify procedures necessary to perform maintenance and emergency repairs safely. The ERRP would detail the activities, methods, and equipment involved in repairing and maintaining the transmission system. A SPP also would be developed for the proposed LEC Project. The proposed underwater transmission cable would be inspected periodically by certified divers or by using a remotely operated camera. All operations and maintenance personnel would be responsible for following all guidelines detailed in the ERRP and SPP (HDR 2016).

Public Health and Safety

Operation and maintenance activities associated with the proposed LEC Project would result in little or no effect on public health and safety. The proposed transmission cable would be buried in the lakebed at a depth of 3 to 10 feet, which generally would limit public access to the transmission cable. The proposed transmission cable route would be marked on USCG navigational charts and added to the Pennsylvania Public Utility Commission's One Call database. Maintenance of the proposed transmission cable would be confined to a small area and would be brief, thereby posing minimal risk to public safety.

Electric and Magnetic Fields

Exponent (2015a) and Intrinsik (2014) evaluated the EMF potentially created by the proposed LEC Project. Several measures were proposed to reduce or eliminate EMF risks for humans and aquatic species, including using HVDC technology, shielding transmission cables, and burying transmission cables. HVDC technology produces only static EMF (Intrinsik 2014; HDR 2016) and static EMF induces no electric currents in humans (NIEHS 2002). Shielding of the proposed transmission cables would prevent the flow of electric fields; however, magnetic fields would still be present.

The strength of magnetic fields decreases rapidly with increasing distance from the source (NIEHS 2002). Exponent (2015a) determined that burying the cables in lake sediments at a depth of 1.6 feet results in a field deviation of less than 5 mG at a distance of 33 feet from the proposed transmission cable. The actual field strength is expected to be weaker because the proposed transmission cable would be buried 3 to 10 feet for most of the proposed Project route. Modeling indicates that magnetic fields directly over the proposed transmission cables are likely to be stronger over the HDD portion of the transmission cable (approximately 0.4 mile long). Assuming a burial depth of 3 feet, results indicate that the highest magnetic field level is 3,382 mG at 0 feet (lakebed) over the HDD portion of the submarine cable route. This value is approximately 0.08 percent of the general public exposure limit recommended by the ICNIRP. At a distance of 98 feet from the proposed transmission cable, the total magnetic field would be nearly indistinguishable from the geomagnetic field (Exponent 2015a). The burial depth in the HDD section would vary from approximately 3 to 90 feet. Given the weak magnetic field that the proposed transmission cable is likely to produce and the proposed mitigation (i.e., shielding and burying), exposure to EMF from the ITC LEC Project would have no adverse effect on human health.

5.1.15 NOISE

5.1.15.1 Effects of Construction

The proposed LEC Project would reach landfall in Springfield Township. Pursuant to the Springfield Township Zoning Ordinance (§506.7), "Noise which is determined to be objectionable because of volume or frequency shall be muffled or otherwise controlled, except fire sirens and related apparatus used solely for public purposes, which shall be exempt from this requirement. Objectionable noise levels shall be construed as being those in excess of 60 dB at the property line."

Noise-sensitive receptors for the Lake Erie Segment of the proposed LEC Project may include recreational boaters on Lake Erie, residences, and public-use areas along the shoreline. The landfall of the proposed transmission cable route is within 120 feet of the western boundary of Erie Bluffs State Park. Other shoreline or nearshore noise-sensitive receptors in the general area of the proposed Project (greater than 600 feet from the proposed Project) include Virginia's Beach Lakefront Cottages and Camping, Camp Lambec, Camp Fitch, and Pine Lane Campground (HDR 2016).

The blasting proposed to create a trench in nearshore bedrock could cause intense impulse noise and ground-borne vibration. The proposed blasting would be conducted in a manner that involves the least amount of work, time, and disturbance as compared to rock-drilling, rock-breaking, or rock-hammering. The blasting effort would involve only low-level charges in offshore bedrock areas and would be permitted through the PADEP Ch. 211[18] regulations and conducted in accordance with PADEP and PFBC standards and guidance. Blasting noise and vibration effects on nearshore land uses and structures in the vicinity of the blasting would be managed according to a project-specific blasting plan. The blasting plan would include measures to mitigate the effects of underwater blasting on fish in the general vicinity, such using techniques

[18] http://www.pacode.com/secure/data/025/chapter211/chap211toc.html

that minimize shockwaves, using blasting mats, and using bubble curtains or other measures to clear fish from the immediate blast area.

5.1.15.2 Effect of Operations, Maintenance, and Emergency Repairs

Once the proposed transmission cable is installed and operational, it would be buried in the lakebed of Lake Erie and would have no anticipated long-term effects on noise.

5.1.16 HAZARDOUS MATERIALS AND WASTES

Assessments of hazardous materials and wastes performed for a very similar project, the NECPL Project, (DOE 2015) have been used to aid in the analysis of potential effects of the proposed LEC Project.

5.1.16.1 Effects of Construction

Installation of the proposed aquatic transmission cable has the potential to resuspend contaminants present in the lake sediment. Sediment disturbance would be limited to small work areas during installation of the aquatic transmission cable. ITC Lake Erie conducted a modeling study to characterize the dispersion of sediments in the water column during cable installation. ***Section 5.1.3.1*** of this EA discusses the modeling results in detail.

Construction equipment would require small amounts of liquid fuels, solvents, oils, lubricants, and hydraulic fluids for operation. The HDD contractor would implement an Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan; this plan identifies procedures for monitoring for fluid release, containing a fluid release if it occurs, and cleaning up any fluid losses. Prior to construction, meetings would be held with the authorizing agencies to review these plans. All applicable federal, state, and local laws and regulations would be followed in the use, handling, and disposal of potentially hazardous materials.

5.1.16.2 Effects of Operations, Maintenance, and Emergency Repairs

Proposed LEC Project transmission cables contain no hazardous materials, thereby eliminating any potential for them to contribute to sediment contamination. Moreover, the proposed Project is designed to require little or no maintenance. If emergency repairs should be required, all appropriate spill prevention and containment measures for hydraulic fluids or fuels would be applied for necessary heavy equipment. If any sections of the proposed aquatic transmission cables need to be uncovered for emergency repairs, sediment could be disturbed in the immediate area of the repair. Such disturbances would be temporary, and suspended sediment would resettle in the area from which it originated (DOE 2015b; HDR 2016).

5.1.17 AIR QUALITY

The effects of the proposed LEC Project on local and regional air quality are evaluated based upon the increases or decreases in regulated air pollutant emissions; ambient air quality; and whether a proposed action is located in an attainment, nonattainment, or maintenance area for criteria pollutants. Erie County is in attainment for all criteria pollutants.

5.1.17.1 Effects of Construction

Emissions of air pollutants caused by the installation of the proposed aquatic transmission cables would be primarily from diesel-fueled internal combustion engines, heavy equipment associated with cable laying, transportation barges, tug boats, crew boats, and small outboard-powered crafts (HDR 2016). Emitted

pollutants would include CO, NO_x, SO_2, CO_2, VOCs, and PM. Proposed construction activities would be intermittent and would result in only temporary increases in pollutant concentrations. Emissions associated with the proposed construction are not anticipated to exceed the General Conformity Rule de minimis thresholds established in 40 CFR §93.153(b) for individual pollutants.

Conventional measures would be applied to ensure that ship exhaust complies with regulatory requirements. The release of anthropogenic GHGs and their potential contribution to global warming are inherently cumulative phenomena. The estimated GHG emissions associated with construction of the proposed LEC Project would be small compared to the 244 MMTCO2e of energy-related emissions within the commonwealth of Pennsylvania in 2013 (DOE 2015a), the 5.4 billion tons of CO_2-equivalent emissions in the United States in 2014 (EPA 2016), and the 49 billion tons of CO_2-equivalent anthropogenic GHGs emitted globally in 2010 (IPCC 2014). Any temporary increase in GHG emissions caused by the proposed LEC Project would be associated with construction activities and would be de minimis.

5.1.17.2 Effects of Operations, Maintenance, and Emergency Repairs

The proposed underwater transmission cable system is designed to be maintenance-free; however, regular inspections of the underwater transmission cable route would be performed to ensure proper function and protection of the transmission system. Emergency repairs would be required if the transmission system is damaged. Although repairs could occur multiple times over the operating life of the proposed transmission cables, the activities associated with periodic inspections of the underwater transmission cable route or emergency repairs are anticipated to be brief.

Activities associated with the inspection and potential emergency repairs of the proposed transmission cables in Lake Erie would produce a negligible amount of emissions (HDR 2016). If emergency repair is required for an underwater transmission cable and as part of the ERRP, appropriate vessels and qualified personnel would be used to minimize the duration of the repair. Equipment and vessels similar to those used during construction activities would be used during maintenance and repairs (HDR 2016). Overall, emissions resulting from inspection and emergency repairs of the transmission cables along the Lake Erie Segment of the proposed LEC Project are not expected to cause or contribute to a violation of any federal or state ambient air quality standards, to expose sensitive receptors to increased pollutant concentrations, or to exceed any evaluation criteria established by the SIP.

5.1.18 SOCIOECONOMICS

The following sections summarize potential socioeconomic effects associated with the proposed LEC Project.

5.1.18.1 Employment

ITC Lake Erie estimates that the proposed LEC Project would result in approximately 125 construction jobs during the peak of construction and an additional 185 non-construction, temporary jobs (HDR 2016). During the proposed construction, additional support from the local workforce outside of the 185 non-construction jobs may be required to manage traffic in targeted construction areas, but this employment would be brief.

ITC Lake Erie anticipates that operations and maintenance of the proposed LEC Project would create approximately 10, permanent, full-time jobs, as well as contractual positions for some maintenance services and vegetation management in the ROW for the Overland Segment (HDR 2016); therefore, long-term effects on employment in the region are expected to be minor.

5.1.18.2 Population

ITC Lake Erie expects construction of the proposed LEC Project to take approximately 2.5 years to complete. Given that construction and long-term operations of the proposed Project are likely to require only a small number of workers, most for a relatively short period, even if workers relocate to the region, the proposed Project would have no noticeable effect on the population of Erie County and townships within the ROI.

5.1.18.3 Housing

Given the anticipated number of short-term jobs required to support the proposed construction, short-term accommodations (e.g., hotels, rental units) may be needed for some workers coming from outside the region. The anticipated construction period would be relatively short; therefore, effects of construction of the proposed LEC Project on the local or county housing markets would be minimal.

Long-term effects on the housing would be negligible because of the small number of permanent jobs (10 full-time jobs) anticipated to operate and maintain the proposed LEC Project.

5.1.18.4 Taxes and Revenue

The proposed LEC Project would contribute to a minor increase in local revenues as a result of contributions to expenditures associated with Project construction, such as building materials, wages, and other goods and services, including food and lodging. In addition, the proposed Project would provide contributions to local taxes and revenues associated with property taxes, property easement fees, and real estate purchases and transfers; however, these effects would be minor and brief.

5.1.19 ENVIRONMENTAL JUSTICE

The construction of the proposed LEC Project would be relatively short in duration. The proposed transmission cable would be underwater or underground and primarily within existing roadway segments. The proposed LEC Project and associated construction activities, therefore, would result in no permanent displacement of existing residences or businesses and no significant effects on the population in general, including minority or low-income communities.

None of the census tracts in the identified ROI meet or exceed the PADEP's Environmental Justice Policy threshold of 30 percent minority population or 20 percent of the population living below the poverty level; therefore, no environmental justice populations are located within the proposed LEC Project ROI as defined by the PADEP's Environmental Justice Public Participation Policy. The PADEP Environmental Justice review is also conducted as part of the PADEP review of ITC's Joint Application permit submitted in January 29, 2016.

5.2 OVERLAND SEGMENT

5.2.1 LAND USE

5.2.1.1 Effects of Construction

Construction and operation of the Overland Segment of the proposed LEC Project is anticipated to be consistent with applicable land use plans and policies. According to HDR (2015), the proposed transmission cable would be located mostly within roadway ROWs and, therefore, would be compatible with surrounding land uses. ITC Lake Erie has obtained easements for the proposed transmission cable

route. Construction of the proposed transmission cable would affect land use by restricting future land development in the easements.

Proposed construction may disturb surrounding land uses within roadway ROWs briefly. ITC Lake Erie would build an access roadway for equipment, workers, and parking (HDR 2015). Proposed construction of the overland route would require lane closures, road detours, and the presence of construction work areas and equipment. Staging areas for materials and equipment would affect local land uses temporarily. If these staging areas would be sited within commercial or industrial areas wherever possible, the effects on incompatible land uses would be minimized. These disturbances would continue for the duration of active construction at any given location. According to HDR (2015), ITC Lake Erie would coordinate with PennDOT and local officials to minimize disruption as much as possible.

The effects of construction vehicles on land use in the Overland Segment are expected to be relatively minimal because construction workers would be dispersed throughout the proposed LEC Project area. The number of construction vehicles at any one location would not add noticeably to the number of vehicles typically on any given section of roadway. For further information on effects on transportation, see ***Section 5.1.2***.

Construction of the proposed new Erie Converter Station would affect land uses in the vicinity temporarily. Construction workers and delivery trucks would access the site via local roads, which would cause an increase in traffic in the area (***Section 5.1.2***).

5.2.1.2 Effects of Operations, Maintenance, and Emergency Repairs

Operation, maintenance, and emergency repairs would have little or no effect on land use in the Overland Segment because the proposed transmission cables would be mostly underground within ROWs. HDR (2015) suggest that maintenance activities in these ROWs could include removing trees to protect the proposed terrestrial transmission cables from being disrupted or broken by tree roots, maintaining the functionality of stormwater management features, and replacing system markers as necessary. Since these ROWs are previously disturbed areas, little or no effect is expected. If periodic inspections of the proposed transmission cable ROW would be conducted using passive methods (HDR 2015), DOE concludes that those methods would not affect land uses (e.g., visual observations, instruments). The effects of any emergency repairs would be similar to those described for construction, albeit for a shorter duration and within a smaller footprint.

5.2.2 TRANSPORTATION AND TRAFFIC

5.2.2.1 Effects of Construction

The proposed LEC Project transmission cable within the Overland Segment would be buried primarily within the ROWs of existing roads. Project construction in the Overland Segment is anticipated to take approximately 6 months and to affect traffic on roads along the proposed Project route, on roads used for the transportation of construction vehicles and equipment, and on private roads and driveways used by adjacent property owners. ITC Lake Erie proposes to perform most of the work along roadways with one lane of the road closed for the length of the work area (a few hundred feet) (ITC Lake Erie 2015; HDR 2016). Effects from the proposed construction would be temporary and transitory, lasting only about 3 to 7 days at any one location and moving as installation progresses along the proposed route. ITC Lake Erie notes that more than one work area may be open at a time if simultaneous crews are used. Construction is anticipated to occur during daytime hours, unless otherwise requested. Any necessary road closures would be coordinated with the respective township or PennDOT. Access to private driveways would be maintained at all times.

Temporary construction areas within the roadway ROWs would be approximately 15 to 38 feet wide for trenching (HDR 2016). Jack and bore and HDD methods may be used where necessary. Jack and bore typically would be used for crossings less than 300 feet wide. Jack and bore launching pits are generally 10 to 15 feet wide and 30 to 40 feet long. Receiving pits are generally 10 feet wide by 10 feet long. Work areas for HDD would range from approximately 15 feet by 50 feet for small HDD operations (e.g., for borings for shorter distances under smaller streams) to approximately 150 feet by 225 feet for larger HDD operations. Six temporary laydown areas would be required for storing construction equipment and materials. Construction within wooded areas would require local clearing (HDR 2016).

The proposed route would cross under two railroad ROWs. Effects on railroad crossings would be minimized by using jack and bore methods. Coordination with CSX and Norfolk-Southern railroads during construction would assist in avoiding or minimizing conflict with railroad operations (HDR 2016; DOE 2015b).

Proposed construction activities, the delivery of construction equipment and materials, paving restoration, and the exact locations of transmission cables would be coordinated with PennDOT, the respective townships, and law enforcement, as appropriate. ITC Lake Erie proposes to coordinate with adjacent private landowners, where appropriate. Effects on road crossings would be minimized by using jack and bore methods. ITC Lake Erie proposes to use traffic details, construction signs and barriers, notifications to the local community in advance of road closures, and detours to minimize traffic disturbances during construction. The proposed transmission cable ROW would be maintained clear of large vegetation; however, clearing would be minimized by using existing cleared ROWs for most of the proposed LEC Project route. All temporary laydown areas would be restored to existing conditions upon the completion of construction (HDR 2016).

5.2.2.2 Effect of Operations, Maintenance, and Emergency Repairs

Operation of the proposed LEC Project, including operation of the proposed new Erie Converter Station, would not affect transportation and traffic because the proposed Project would be designed to require little to no maintenance. Maintenance activities at the proposed new Erie Converter Station generally would be confined to the station site. Most of the Overland Segment of the proposed Project would be installed within the ROWs for existing roads. Vegetation along the ROW would be managed as necessary and in accordance with an approved Post-Construction Stormwater Management Plan (HDR 2016).

Emergency repairs would affect traffic and transportation similarly to the initial construction; however, activity associated with emergency repairs is likely to be brief and less extensive than initial construction. An ERRP would identify procedures necessary to perform maintenance and emergency repairs.

5.2.3 WATER RESOURCES AND QUALITY

5.2.3.1 Effects of Construction

Surface Water and Water Quality

Most of the Overland Segment of the proposed route for the transmission cable follows existing roadway ROW to minimize effects on surface water. The ground would be disturbed during installation due to clearing, trenching, and HDD or jack and bore activities. These activities may result in erosion that could affect water quality of nearby surface waters. Approximately 12.4 acres of forested area would be cleared during proposed construction activities. Trenching would occur for approximately 2,500 feet along the proposed transmission cable route. To minimize erosion, spoil would be stockpiled at least 50 feet from the edges of wetlands and streams to the extent logistically possible, and approved BMPs for controlling

erosion and sediment would be implemented. Immediately following the proposed cable installation, the trench would be backfilled and the affected area would be restored within a few days.

Jack and bore or HDD techniques would be used for longer crossings where open trenching is not appropriate. Drilling fluid may leak inadvertently during HDD in areas of weakness or fissuring in the soil and may be suspended or dispersed in the surrounding land and water. The HDD contractor would implement an Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan (HDR 2016). The plan describes ways to identify, contain, and remediate releases of drilling fluid. Sump pits would be built at the entry and exit points to minimize effects on water quality and contain drilling fluid.

The proposed LEC Project would require an individual permit for stormwater discharges associated with construction activities under the National Pollutant Discharge Elimination System (NPDES) because of the potential to disturb more than 1 acre of soil within a high quality watershed (HDR 2016). Erosion and increased sedimentation in stormwater runoff are possible in active construction areas but would be managed in place with BMPs as described in an Erosion and Sediment Control Plan. The plan would follow PADEP's *Erosion and Sediment Pollution Control Program Manual* (PADEP 2012), which specifies BMPs for reducing erosion and controlling sediment, and would be approved by PADEP. Best practices for controlling erosion and sediment and managing stormwater would be implemented to minimize effects on water quality as proposed by ITC Lake Erie. More stringent criteria would be used to design the BMPs in watersheds that require special protection watersheds (i.e., high quality [HQ] and exceptional value [EV]), and non-discharge alternatives would be used wherever possible. Antidegredation Best Available Combination of Technologies (ABACT) BMPs would be used during a 2-year, 24-hour storm when avoiding an increase in the rate or volume of runoff from disturbed areas to a special protected watershed is impossible; BMPs with moderate sediment removal efficiencies (e.g., barrier/riser sediment traps) are ABACT for HQ watersheds, and BMPs with high sediment removal efficiencies (e.g., compost filter sock) are ABACT for HQ and EV watersheds. The proposed LEC Project has been designed and would be implemented to meet the ABACT requirements.

The proposed new Erie Converter Station and the transmission cable would be installed in accordance with an approved Erosion and Sediment Control Plan and the stormwater management plan. On-site BMPs would be used before, during, and after activities that disturb soil. The BMPs specified in the proposed Erosion and Sediment Control Plan for the new Erie Converter Station include (ITC 2016):

- installing a rock construction entrance with wash rack to prevent soil loss from traffic leaving the site;
- placing a compost filter sock downgradient of disturbed areas to prevent the transportation of sediment off site, and removing sediment from the filter sock when accumulations reach one half the height of the sock;
- constructing channels to divert runoff from upgradient areas around the construction site;
- constructing a channel to convey runoff from the construction site to the proposed sediment basin and converting the channel to a vegetated swale as a post-construction BMP for stormwater management;
- constructing a sediment basin to collect and treat runoff water from disturbed areas and to discharge it on site;
- installing mulch blankets on a permanent slopes of 3H:1V[19] and steeper to control erosion;
- and installing riprap aprons at all storm drain outfalls (except where a level spreader is used).

Permanent vegetation would be installed to stabilize all areas of exposed earth that are not otherwise covered with gravel (i.e., pavement, buildings). Permanent stabilization would include grading, placing

[19] H – horizontal direction; V is the vertical direction

topsoil, seeding, and mulching. If weather conditions are favorable, permanent seeding would take place within 7 days of final grading. Otherwise, temporary seeding and mulching would be implemented until conditions become favorable for the establishment of permanent vegetative cover. Temporary seeding and mulching would be applied to exposed areas where earthwork is delayed for a period of 4 or more days. Temporary vegetative stabilization would be maintained until earthmoving recommences, or until the temporary vegetative stabilization is replaced by permanent vegetative stabilization (HDR 2016).

Weighted sediment filter tubes are tube-shaped devices filled with non-biodegradable filter materials for longevity and reuse. These sediment filter tubes may be placed in areas of concentrated flow in lieu of rock filters if installed according to manufacturer's recommendations and the details shown on drawings in the Erosion and Sediment Control Plan (HDR 2016). Once an area tributary has been stabilized, an undamaged tube may be removed and used at another location. Where the total length is greater than the length of individual tubes, multiple tubes would be installed with minimum overlap of 12 inches (or as specified by manufacturer) (HDR 2016).

5.2.3.2 Floodplains

Floodplains exist at stream crossings within the proposed LEC Project area. Clearing, trenching, and HDD would disturb approximately 4.3 acres of floodplain area temporarily during proposed transmission cable installation. Erosion and sedimentation controls would be implemented during proposed construction, and disturbed areas would be restored to pre-existing grading to minimize effects on floodplains.

No permanent above-ground alterations or new impervious surfaces that would affect infiltration, flood storage or flooding hazards are proposed. The proposed transmission cable would be buried, and construction of the proposed LEC Project would have no permanent effects on the FEMA-mapped floodplains or the PADEP regulated floodways.

5.2.3.3 Groundwater

Proposed construction activities are not likely to adversely affect aquifers because most earthwork construction activities would occur within 6 feet of the surface. Where aquifers are shallow enough to be affected by construction activities, ITC Lake Erie proposes construction techniques as described in ***Section 5.2.11.1*** to mitigate the risks to nearby groundwater supplies that use the aquifers. The bentonite clay used during the HDD process is a naturally occurring mineral that is nontoxic and denser than water. If any of the drilling fluid is spilled during HDD activity, the bentonite clay particles would be trapped by the soil via absorption and would aggregate within soil pore spaces (HDR 2016). An Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan would be implemented to identify, contain, and remediate releases of any drilling fluid, if necessary (HDR 2016). The volume and pressure of drilling fluid within the borehole would be monitored, and surface water at the targeted drill exit points would be observed visually. If any excessive loss of volume or pressure in the borehole is observed, or any drilling fluid is observed on surface waters, drilling operations would be halted, and cleanup would be initiated immediately. No significant effects on groundwater are anticipated during HDD operations.

5.2.3.4 Effects of Operations, Maintenance, and Emergency Repairs

No adverse effects on water resources are expected during operation or maintenance of the proposed transmission cables because there would be no change in water quality, water availability, or elevation in floodplains. Ground disturbances related to uncovering and repairing damaged cables could affect water quality temporarily because of the potential for erosion and sedimentation to nearby surface waters. Disturbances would occur if a segment of the proposed transmission cable that crosses beneath a stream is

damaged and requires repairs. The effects would be similar to those described for installation, but the duration would be shorter, and the area of disturbance would be smaller.

5.2.4 AQUATIC HABITATS AND SPECIES

5.2.4.1 Effects of Construction

The proposed Project route for the Overland Segment would cross multiple waterbodies. These crossings are depicted in the Alignment Maps (Section H, ITC Lake Erie 2016). The techniques proposed for crossing waterbodies include HDD, jack and bore, and open trenching. ***Table 5-1*** quantifies the effects of the proposed LEC Project on waterbodies in the Overland Segment due to construction activities. The calculation of permanent effects includes areas where the proposed transmission cable would be installed beneath waterbodies by HDD. This calculation is provided as requested by PADEP; however, the functions and values of the waterbodies above the HDD borings would not be adversely affected, and the ground adjacent to or within the waterbodies would not be disturbed. The Dam Safety and Encroachments Act and Chapter 105 rules require permits for placement of structures in, along, or across any body of water. The statute and §105.18a do not specify that a project that goes under a waterbody must be described as having permanent effects on that waterbody. ***Table 5-1*** is a detailed summary of each crossing.

The open trenching method would result in temporary soil compaction, erosion, loss of vegetation, and loss of the physical structure of the ecological community. Open trenching may affect fish and other aquatic organisms in the small streams; however, the effects would be temporary, and the influence on the overall habitat would be small. Best management practices would be used to maintain stream flows and limit increases in turbidity. Open trenching may impede fish migrating upstream to spawn, but the method would be used only to cross very small streams that migratory fish are not likely to use. Trenching operations may affect slow-moving mussels and invertebrates, but the effect would be negligible due to the limited number of open-trench stream crossings. Jack and bore and HDD methods avoid affecting streams and do not alter stream flows, water quality, or aquatic habitats or organisms. The noise associated with construction may cause fish to move away from the area temporarily.

TABLE 5-1: PROPOSED EFFECTS ON WATERBODIES IN THE OVERLAND SEGMENT OF THE LEC PROJECT*

	Temporary Effects		Permanent Effects	
Stream Type	**Crossing Width (linear feet)**	**Crossing Area (square feet)**	**Linear feet**	**Square feet**
Ephemeral	321	161	0	0
Intermittent	43	129	19	49
Perennial	1,239	7,077	98	287
Total Effects	1,603	7,367	117	336

*The calculation of permanent effects includes areas where proposed transmission cable would be installed beneath waterbodies using HDD. This calculation is provided as requested by PADEP; however, the functions and values of the waterbodies above the HDD borings would not be affected adversely, and the ground adjacent to or within the waterbodies would not be disturbed.

TABLE 5-2: POTENTIAL WATERBODY EFFECTS ASSOCIATED WITH THE PROPOSED LEC PROJECT

Unique Field Identifer[1]	Waterbody	Crossing and Proposed Method	Proposed Effects*	Anticipated Effects on FEMA-mapped Floodplain or PADEP-Regulated Floodways**
SPA-KAS-001	UNT to Lake Erie	Yes, Open cut, flume, or dam and pump	925.9	1.70
SPA-KAS-002	UNT to Lake Erie	Yes, HDD	42.0[3]	0.02
SPA-KAS-004[2]	UNT to Lake Erie	Yes, Open cut[2]	50.5	0.31
SPA-KAS-005[2]	UNT to Lake Erie	Yes, Open cut[2]	50.6	0.13
SPA-KAS-006[2]	UNT to Lake Erie	Yes, Open cut[2]	51.4	0.12
SPA-KAS-016	Crooked Creek Crossing #1	Yes, HDD	52.1[3]	0.02
SPA-KAS-016	Crooked Creek Crossing #2	Yes, HDD	72.0[3]	0.49
SPA-KAS-017	UNT to Crooked Creek	Yes, HDD	0.0	0.05[4]
SPA-KAS-018[2]	UNT to Crooked Creek	Yes, Open cut[2]	43.3	0.09
SPA-KAS-020[2]	UNT to Crooked Creek	Yes, Open cut[2]	60.0	0.00
SPA-KAS-021[2]	UNT to Crooked Creek	Yes, Open cut[2]	50.6	0.12
SPA-KAS-025[2]	UNT to Crooked Creek #1	Yes, HDD	163.6[5]	0.26[5]
SPA-KAS-025[2]	UNT to Crooked Creek #2	Yes, HDD	--[5]	--[5]
SPA-KAS-025[2]	UNT to Crooked Creek #3	Yes, HDD	--[5]	--[5]
SPA-KAS-026[2]	UNT to Crooked Creek	Yes, Open cut[2]	50.2	0.12
SPA-KAS-027	UNT to Crooked Creek	Yes, HDD	0.00	0.01[4]
SPA-KAS-030	UNT to Crooked Creek	Yes, Jack and bore	0.00	0.04
SPA-KAS-031	UNT to Crooked Creek	No	0.00	0.81
PPA-KAS-002	-	No	0	0

Source: HDR 2016

* Measured in linear feet

** Measured in acres; includes combined temporary and permanent impact acreage

Notes: UNT = unnamed tributary

1. Unique identifier assigned to feature during field surveys and correlates with mapping nomenclature.
2. Streams would be crossed by placing duct bank beneath the culvert crossing of the stream. If the culvert is in poor condition, the culvert would be replaced and the stream would be diverted via flume, pump around, or cofferdam. Total linear feet of impacts and estimated floodway impacts for all three crossings of SPA-KAS-025 are included for crossing #1.
3. Based on guidance provided by PADEP, the impacts to regulated wetlands listed in this table include the area of HDD crossings underneath the wetlands. However, such HDD crossings involve no disturbance of the wetlands; and the functions and values of the wetlands crossed under by HDD method are not affected.
4. Waterbody would not be crossed by the transmission cable, but floodway impacts were indicated.
5. Meander stream that is crossed by the proposed transmission cable route centerline three (3) times in a short segment of the proposed route. Impact calculations are combined and presented as one.

5.2.4.2 Effects of Operations, Maintenance, and Emergency Repairs

No significant effects on aquatic habitat and species are expected to result from maintenance activities. Should emergency repairs be required, the effects would be similar to those during initial construction, but of shorter duration and over a smaller area. Related measures to control erosion associated with ground disturbance are described previously in Water Resources and Quality Sections.

5.2.5 AQUATIC PROTECTED AND SENSITIVE SPECIES

Lake sturgeon inhabits lakes and larger rivers and cisco is a pelagic species; therefore, neither species is expected to occur in the streams crossed by the Overland Segment of the proposed LEC Project. Eastern sand darters are expected to avoid stream crossings during the proposed construction. Use of BMPs to avoid siltation or inadvertent returns from HDD operations would help minimize these effects.

5.2.6 TERRESTRIAL HABITATS AND SPECIES

5.2.6.1 Effects of Construction

Construction activities in the Overland Segment of the proposed LEC Project ROI would result in temporary and permanent removal of vegetation, trampling of vegetation by heavy construction equipment, root damage associated with excavation, soil compaction, and generation of dust (HDR 2016). Throughout most of the Overland Segment the proposed transmission cable would be installed and constructed within or adjacent to existing roadways where most vegetation has been disturbed previously. Tree clearing would be minimal within disturbed roadway ROWs and agricultural areas. The proposed LEC Project would be installed immediately outside of ROWs in certain areas to avoid existing infrastructure (e.g., bridges and culverts) and sensitive natural resources (e.g., wetlands or waterways), or to account for the limitations of the cable installation, such as turning radius (HDR 2016). The proposed route would leave existing ROWs briefly at seven places along the route (HDR 2016). Two areas where the proposed route may deviate from existing ROWs are on private property adjacent to driveways. Trees and shrubs within these areas would be cleared so that root systems do not remove excessive moisture from the soil and prevent the cables from functioning properly; consequently, these areas would be permanently converted to herbaceous vegetation. Construction of the proposed LEC Project would result in a 50-foot-wide permanent vegetation management area (i.e., 25 feet on either side of the cable) required for proper function of the transmission cable (HDR 2016). Therefore, 12.4 acres of forested area would be cleared along the Overland Segment, including at the proposed new Erie Converter Station site, along the proposed transmission cable route, and within construction laydown areas. The clearing associated with the construction laydown areas (2.6 acres) would be allowed to return to pre-construction conditions; therefore, permanent clearing associated with the proposed LEC Project construction would be 9.86 acres (HDR 2016).

No significant fragmentation of wildlife habitat is anticipated because the permanent ROW is relatively narrow and is collocated, for the most part, with pre-existing roads and other previously disturbed areas (HDR 2016). The ROW for the Overland Segment is proposed to be permanently maintained as herbaceous vegetation, except where it is located under roads or in shoulder areas (HDR 2016). Although vegetation removal and the reduction or alteration of some wildlife habitat could displace species of birds, mammals, reptiles, and amphibians, most of the proposed alignment is currently maintained regularly (excluding the 12.4 acres of forested areas that would be cleared) and vegetation removal would not be contiguous, but rather occur in small parcels; therefore, the effect of the additional clearing and vegetation maintenance would be minimal (HDR 2016). Birds, reptiles, amphibians, and mammals using the portion of the proposed route that is already disturbed would be

displaced temporarily during construction. Although tree clearing may displace species, there could be a positive impact from different niche species using the cleared sections in all growth successions.

Soil compaction, resulting from foot traffic or heavy equipment typically decreases the rate of water infiltration into the soils resulting in changes in the soil moisture regime and potential changes in soil structural characteristics that may affect vegetation structure and growth. Soil compaction resulting from the proposed Project construction would only occur within the construction corridor. In addition, construction equipment and foot traffic have the potential to spread invasive plant species by disturbing the ground and introducing invasive seed stock carried on the boots, clothing, or equipment of construction workers. ITC Lake Erie would develop and implement measures to reduce the probability of transporting invasive species. Clearing vegetation to prepare for the proposed construction may result in erosion. ITC Lake Erie would implement an Erosion and Sedimentation Control Plan approved by the Erie County Conservation District and a Stormwater Management Plan to reduce the potential effects related to soil compaction, erosion and deposition of sediments. The PADCNR provided the ITC Lake Erie with PNDI clearance, most recently on March 23, 2016. The PNDI clearance letter included recommendations to prevent the spread of invasive species. These recommendations are as follows:

- the area of disturbance should be minimized to the fullest extent that would allow for construction (thus helping to lessen the area of soil and vegetation disturbance associated with this proposed Project);
- if possible, clean all construction equipment and vehicles thoroughly (especially the undercarriage and wheels) before they are brought on site. This process would remove invasive plant seeds from the equipment and undercarriages of the vehicles that may have been picked up at other sites; and
- avoid using seed mixes that include invasive plant species (e.g. crown vetch) to revegetate the area. Attempt to use weed-free straw or hay mixes when possible.

ITC Lake Erie would implement all of the above recommendations during construction of the proposed LEC Project. The DOE concurs that details of the recommendations would be provided to the contractor, as reflected in the Applicant's Erosion and Sedimentation Control Plans (HDR 2016).

Increased noise during the proposed construction may affect species in the Overland Segment (discussed in more detail in ***Sections 3.2.15*** and ***5.2.15***). Terrestrial wildlife species' response to noise depends on the type of noise (i.e., continuous or intermittent), prior exposure to noise, proximity to the source, stage in the breeding cycle, activity (e.g., foraging), age, and gender (HDR 2016). Terrestrial species that could be affected include birds that use grasslands and edges, forest birds, reptiles, amphibians, and mammals. Noise associated with construction of the proposed LEC Project could result in reduced communication ranges, interference with predator/prey detection, habitat avoidance, behavioral changes, disorientation, or hearing loss (HDR 2016). These effects are expected to be temporary and to persist only during proposed construction in any given area. Proposed construction activities within the Overland Segment are close to roads and railroad ROWs (HDR 2016); therefore, wildlife in the vicinity of construction areas would be accustomed to frequent disturbances associated with roadway and rail traffic (HDR 2016). Prior exposure is the most important factor determining the response of wildlife to noise because wildlife may become accustomed to ambient noise. The rate of habituation to short-term construction noise is not known, but most proposed construction activities would occur where the level of ambient noise is already high (e.g., along road ROWs). ***Sections 3.2.15*** and ***5.2.15*** provide additional information about the soundscape and effects of construction noise in the Overland Segment.

Static magnetic fields from the proposed HVDC transmission cables have a very small potential to affect terrestrial species in the Overland Segment (HDR 2016). However, the proposed HVDC

transmission cables would be shielded and buried underground, which would decrease the effect of EMF on terrestrial wildlife. ***Sections 5.1.14*** and ***5.2.14*** provide more information about sources and effects of EMF in the Overland Segment.

5.2.6.2 Effects of Operations, Maintenance, and Emergency Repairs

Soil temperature above the transmission cables is anticipated to increase due to operation of the proposed HVDC transmission cables; however, the heat would dissipate quickly with increasing distance from the proposed transmission cable, particularly if the soil is appropriately moist (HDR 2016). Large-rooted plants would be removed to avoid interference with the buried transmission cable. Heavy equipment used for maintenance or emergency repairs may crush ground vegetation, damage roots, and compact the soil. Any emergency repairs would occur within the same ROW used for construction (HDR 2016). Vegetation disturbance resulting from emergency repairs of the proposed HVDC transmission cable would be isolated to the repair site, and appropriate vegetation would be restored upon completion to support return to pre-existing conditions.

Periodic clearing of vegetation and mowing in the ROW may displace wildlife, and any heavy equipment required for clearing vegetation or other maintenance could kill slow-moving species (e.g. turtles) (HDR 2016). Nevertheless, displacement of birds, mammals, reptiles, and amphibians during operations, maintenance, and emergency repairs would be minimal because most of the alignment is maintained regularly (HDR 2016). Any displacement of wildlife during maintenance and repairs would be temporary. Although these activities would occur repeatedly over the life of the proposed LEC Project, they would be periodic and infrequent.

Noise associated with maintenance and emergency repairs of the proposed transmission cable may affect wildlife temporarily as described in ***Section 5.2.6.1***. Similar to construction, maintenance and emergency repairs would occur close to roadway and railroad ROWs (HDR 2016). Although noise associated with maintenance and emergency repairs may disturb wildlife, these activities would be infrequent and brief; therefore, wildlife in the vicinity would not be affected significantly or permanently.

5.2.7 TERRESTRIAL PROTECTED AND SENSITIVE SPECIES

5.2.7.1 Effects of Construction

Some permanent loss of plants is anticipated due to proposed construction, as described in ***Section 5.2.6.1***. Proposed construction may affect protected and sensitive wildlife species known to occur in the Overland Segment of the proposed LEC Project area (i.e., the Indiana bat, northern long-eared bat, bald eagle, bank swallow, and migratory birds). This section describes methods proposed to protect state-listed plants and federally protected species of wildlife that may occur within the Overland Segment.

5.2.7.1.1 State Listed or Protected Species

Protected Plant Species

Section 5.2.6.1 describes the general effects of the proposed construction on vegetation within the Overland Segment. At the request of PADCNR, ITC Lake Erie engaged ES&I to conduct a survey in May and July of 2015 to identify any known or anticipated state-listed plants that might occur in the proposed LEC Project area; no state-listed species were found during the survey (HDR 2016). In a letter dated March 23, 2016, PADCNR stated its determination that the proposed LEC Project is not

likely to affect state-listed plants and that no further coordination with PADCNR is needed for the Project (***Appendix E***).

5.2.7.1.2 Federally Listed or Protected Species

Indiana Bat and Northern Long-eared Bat

According to the PGC (2013),[20] no hibernacula or summer live-captures of Indiana bats or northern long-eared bats have been recorded in Erie County. Much of the proposed LEC Project area and adjoining areas consist of disturbed open lands and secondary forest that lack suitable habitat for bat roosts (HDR 2016). Although some forested or open woodland habitats occur adjacent to the proposed Project route of the proposed transmission cable, vegetation clearing would be conducted primarily within roadway ROWs, except for 12.4 acres of forest clearing where the proposed route deviates from established ROWs (HDR 2016). Vegetation removal in those areas could result in the potential loss of a few large trees that could be suitable summer roosting and feeding habitat for the Indiana bat. Northern long-eared bats may alter current flight paths between roosting and foraging habitat in response to any loss of forest, which could increase their overall flights, or they could fly over the construction corridor and continue to use previous foraging areas (HDR 2016). Clearing of other vegetation for proposed Project construction would occur primarily within roadway ROWs. Potential effects of mowing include temporary increase in noise and creation of dust. Several colonies of bats found near mowed ROWs of major roads appear to be unaffected by noise created by mowing and traffic (FWS 2008). Roosting or foraging bats would be exposed to noise and dust created by mowing only briefly because mowers would pass by any given area quickly (HDR 2016).

To avoid killing or injuring listed bats, the FWS requested ITC Lake Erie to restrict tree cutting to November 16 through March 31. ITC LEC agreed to the seasonal restriction; therefore, in a letter dated April 6, 2015, the FWS stated its determination that, assuming implementation of the seasonal restriction on tree cutting, the proposed LEC Project is not likely to adversely affect the Indiana bat or the northern long-eared bat (HDR 2016). The seasonal restriction on clearing trees would also help avoid affecting other species that hibernate or migrate out of the proposed Project area during wintertime. The FWS reiterated this in their April 11, 2016 letter, noting that the proposed Project is not likely to adversely affect Indiana bat. Additionally, the FWS noted that because the proposed Project is not located within 0.25 mile of a known northern long-eared bat hibernaculum or within 150 feet from a known, occupied maternity roost tree, any incidental take that might result from tree removal is not prohibited and no further consultation regarding northern long-eared bat is necessary.

Construction noise could affect the behavior of bats foraging or roosting in the area adjacent to the Overland Segment; however, Indiana bats and northern long-eared bats using the area currently occur in proximity to active road corridors and most likely are already habituated to fluctuating noise levels (HDR 2016).

Migratory Birds

The effects of construction noise (e.g., trenching, machinery, vehicles) on migratory birds are expected to be minimal (DOE 2013). Birds within the proposed Overland Segment would move into similar adjacent habitats during a typical construction period in any given location and are likely to return to the area after the proposed construction is completed. Effects may include temporary abandonment of eggs or young in nests built in habitats immediately adjacent to the proposed construction activities.

Proposed vegetation clearing is unlikely to displace an entire breeding population because most vegetation clearing would occur within previously disturbed or fringe habitat (HDR 2016). Trees

[20] http://www.portal.state.pa.us/portal/server.pt?open=514&objID=622722&mode=2>. Accessed February 26, 2016.

would be cleared only between November 16 and March 31 to avoid affecting protected bats. This clearing window would also minimize effects on birds because nests present in trees to be cleared would be from the previous season, and birds would adjust during the following breeding season (HDR 2016). Proposed clearing of any other vegetation during the breeding and nesting season (generally the spring and summer) could affect migratory birds and their nests along the proposed route; however, most of the affected vegetation would be in fringe habitat near roads that is subject to frequent noise and emissions (HDR 2016); therefore, any birds using those areas are likely to be habituated to noise. No significant habitat fragmentation is expected because proposed construction would occur primarily within or adjacent to existing, previously disturbed ROWs. ITC Lake Erie proposed measures to reduce effects on migratory birds, including avoiding sensitive habitats. The 12.4 acres of proposed forest clearing would result in only minor forest fragmentation (HDR 2016).

Bank Swallow

The bank swallow inhabits the bluffs of Lake Erie (ITC Lake Erie 2016), and nesting habitat has the potential to occur at the transition from the Lake Erie Segment to the Overland Segment in Springfield Township. The proposed insertion point for HDD installation of cable is approximately 560 feet south of the bluff; from there, the proposed transmission cable would go downward and under the nearshore bedrock of Lake Erie (ITC Lake Erie 2016). ITC Lake Erie's proposed use of HDD, work space location, and design satisfies the FWS' requirements to avoid affecting the bluffs and nesting bank swallows (ITC Lake Erie 2016). The FWS is satisfied that the anticipated effects of the proposed LEC Project are insufficient to warrant the development of a habitat restoration plan for birds (***Appendix E***). The proposed LEC Project would adhere to the conditions of the MBTA and is not expected to cause any significant harm to the bank swallow or other migratory bird species (ITC Lake Erie 2016).

Bald Eagle

In a letter dated April 11, 2016, the FWS stated that it is not aware of any bald eagle nest within approximately 2,000 feet of the proposed Project (***Appendix E***). ITC Lake Erie would follow all National Bald Eagle Management Guidelines for avoiding disturbance of eagles at foraging areas and communal roost sites.

Proposed construction noise could affect eagles roosting in adjacent trees or foraging in the area. In addition, noise created by mowing, trenching, and machinery could be experienced by roosting, nesting, or foraging eagles. This could result in abandonment of eggs or young in nests built in habitats immediately adjacent to the construction activities (HDR 2016); however, such impacts should not jeopardize the survival of the bald eagle.

5.2.7.2 Effects of Operations, Maintenance, and Emergency Repairs

5.2.7.2.1 Protected Plant Species

Electromagnetic effects produced by the buried proposed transmission cable are not anticipated to affect vegetation within the Overland Segment significantly. ***Sections 5.1.14*** and ***5.2.14*** provide more information about sources and effects of EMF in the Overland Segment.

Vegetation clearing, heavy equipment use, and vehicle or foot traffic associated with maintenance or emergency repairs could crush, kill, or damage state-listed plant species that occur in the Overland Segment. The approved Post-Construction Stormwater Management Plan describes methods for managing vegetation in the proposed transmission cable ROW.

5.2.7.2.2 Federally Listed or Protected Species

Indiana Bat and Northern Long-eared Bat
Both the Indiana bat and the northern long-eared bat are likely to detect the magnetic field and heat generated by the proposed transmission cable during operations; however, no adverse effects on the health, behavior, or productivity of these bats is expected because of the mobility of the species, and because the ROI of the EMF and heat associated with the proposed transmission cable are expected to be small (DOE 2013). ***Sections 5.1.14*** and ***5.2.14*** provide more information about sources and effects of EMF in the Overland Segment.

The effects of maintenance and emergency repairs of the proposed transmission cable on Indiana bats and northern long-eared bats in the Overland Segment would be similar to those of construction but would be less extensive and of shorter duration (HDR 2016).

Migratory Birds
Vegetation maintenance within the proposed transmission cable ROW, and vehicle and foot traffic and the occasional use of heavy equipment associated with emergency repairs could disturb migratory birds (DOE 2013) and result in habitat loss. Vegetation maintenance or emergency repairs in the Overland Segment that occur during breeding and nesting season (generally the spring and summer) could disturb migratory birds and their nests (HDR 2016). Vehicle and foot traffic associated with maintenance and emergency repair activities may displace migratory birds temporarily. Implementation of proposed avoidance and minimization measures, which include avoiding sensitive habitats, would reduce the potential for adverse effects (HDR 2016).

Bank Swallow
Effects on the bank swallow could include noise disturbance of individuals flying near or over the proposed Project area (HDR 2016). Effects of maintenance and emergency repairs, however, would be insignificant due to the short duration of the activities.

Bald Eagle
Emergency repairs, if necessary, are expected to have no significant effect on bald eagles. Effects would be similar to those during construction but would be less extensive and of shorter duration (HDR 2016).

Buried cables, such as those proposed for the LEC Project, would have no electric fields at the ground surface. Research indicates that some species of animals, including birds, are able to detect magnetic fields at levels that might be associated with proposed transmission cables such as those associated with the proposed LEC Project; however, detection does not imply that the fields could result in adverse impacts on the species' ability to forage, reproduce, and survive (DOE 2013).

5.2.8 TERRESTRIAL WETLANDS

5.2.8.1 Effects of Construction

Development of railroads, roads, and agricultural use have affected wetland resources within the Overland Segment of the proposed LEC Project via direct disturbance and modification (e.g. altered hydrology). Temporary and permanent effects on wetlands are expected during proposed construction activities. ***Table 5-3*** is a summary of temporary and permanent effects by wetland type. ITC Lake Erie's proposed Project is designed to avoid and minimize effects on wetland resources to the greatest possible extent. The calculation of permanent effects on PEM wetlands includes areas where proposed transmission cable would be installed beneath wetlands by HDD. This calculation is provided as

requested by PADEP; however, the functions and values of the wetlands above the HDD borings would not be adversely affected. The Dam Safety and Encroachments Act and Chapter 105 rules require permits for placement of structures in, along, or across any wetland. The act and Chapter §105.18a do not specify that a project that goes under a waterbody must be described as having permanent effects on that wetland. ITC Lake Erie's proposed LEC Project include concepts for mitigating unavoidable effects on wetland resources.

TABLE 5-3: SUMMARY OF EFFECTS OF THE PROPOSED ITC LEC PROJECT ON TERRESTRIAL WETLANDS IN THE OVERLAND SEGMENT

National Wetland Inventory Type	Temporary Effects of Construction (acres)	Permanent*Effects of Construction (acres)
Palustrine Emergent Wetlands	0.42	0.07
Palustrine Scrub Shrub Wetlands	0.0	0.0
Palustrine Forested Wetlands	0.0	1.09
Total Impacts	**0.42**	**1.16**

Source: HDR 2016

* The calculation of permanent effects on PEM wetland includes areas where the proposed transmission cable would be installed beneath wetlands by HDD. This calculation is provided as requested by PADEP; however, the functions and values of the wetlands above the HDD borings would not be affected adversely.

Soils and vegetation in affected wetlands would be disturbed temporarily to accommodate the proposed construction by vegetation clearing, trenching, and HDD or jack and bore activities. Disturbance would include preparation of construction laydown areas, temporary placement of timber mats at crossings of wetlands and streams, and vehicle and equipment access. ***Table 5-4*** provides details about individual proposed wetland crossings including associated streams and FWS classification.

The construction sequence within wetlands along the proposed route typically would begin with clearing vegetation within the construction corridor. Wetland topsoil would be segregated and stockpiled separately for post-construction replacement in wetland areas to preserve seed stock for wetland restoration. Timber mat placement and movement of vehicles and equipment may result in erosion that could affect water quality of nearby wetlands. Except in locations specified in the permit, trench spoils would be stockpiled a minimum of 50 feet from the edge of wetlands or streams and protected by erosion and sediment pollution control measures. Immediately following the proposed cable installation, the trench would be backfilled, and restoration would be completed within a few days. Uplands that may be disturbed would be graded to pre-construction contours and seeded with a conservation mix to minimize erosion.

Section 5.2.9.1 discusses inadvertent leaking of HDD drilling fluid. The HDD contractor would implement an Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan (HDR 2016) that prescribes ways of containing drilling fluid and remediating spills. Some wetlands lie within HQ/EV watersheds. As such, the NPDES permit is likely to require stringent BMPs for controlling erosion and sediment in accordance with ABACT (***Section 5.2.6.1***).

The proposed location of the new Lake Erie Converter Station was selected and planned (layout and limits of disturbance) to minimize effects on the adjacent forested and emergent wetlands to the south and west. Similarly, all but one of the proposed construction laydown areas were located to avoid wetland resources completely.

Construction of the proposed Overland Segment would result in 0.42 acre of temporary effects on emergent wetlands and 1.16 acres of permanent effects. The permanent component comprises 0.07 acre of HDD installation and 0.99 acre of PFO wetland that would be permanently converted to PEM or PSS wetlands after the proposed construction. The proposed transmission cable would be installed beneath five wetlands totaling 0.07 acre using HDD (HDR 2016). This construction technique avoids disturbing soil and vegetation, but PADEP considers HDD to be a permanent effect on wetlands. Where encroachments cannot be avoided, HDD or other methods are proposed to limit temporary effects, and disturbed areas would be restored according to a mitigation plan approved by PADEP and USACE (HDR 2016).

ITC Lake Erie included a conceptual mitigation plan to compensate for unavoidable permanent effects on wetland resources as part of the PADEP/USACE Joint Permit Application. The proposed plan includes 2.13 acres of PFO wetland creation, 2.27 acres of PFO wetland restoration, 0.69 acre of PEM wetland enhancement, 0.23 acre of upland forest buffer preservation, and 0.02 acre stormwater treatment area establishment within the same watershed as the proposed LEC Project. The proposed 5.34 acre wetland mitigation site would be preserved in perpetuity with a conservation easement or restrictive covenant (HDR 2016).

TABLE 5-4: DETAILS ABOUT AFFECTED WETLANDS WITHIN THE OVERLAND SEGMENT OF THE PROPOSED LEC PROJECT

Unique Identifier	Dominant FWS Classification[1]	Associated Stream	High Quality Watersheds	Proposed to be Crossed by the Project and Impact Type	Delineated Acres	Proposed Impact Acreage*
WPA-KAS-001	PFO	Abutting SPA-KAS-001 (UNT to Lake Erie)	No	Yes, Tree Clearing	0.32	0.07
WPA-KAS-002	PFO, PEM	Adjacent to SPA-KAS-001 (UNT to Lake Erie)	No	Yes, Tree Clearing	PEM: 0.34 PFO: 3.92	PEM: 0.01 PFO: 0.7
WPA-KAS-004	PFO	Adjacent to SPA-KAS-006 (UNT to Lake Erie)	No	Yes, Tree Clearing	3.91	0.4
WPA-KAS-012	PFO	Abutting Unidentified Stream (UNT to Crooked Creek)	Yes	Yes[2]	1.64	0.0 0.01[3]
WPA-KAS-018	PEM	Abutting UNT to Crooked Creek	Yes	Yes	0.66	0.12
WPA-KAS-023	PFO	Abutting WPA-KAS-023 PSS	Yes	Yes, Trenching and Tree Clearing	0.05	0.05
WPA-KAS-028	PEM, PSS, PFO	Abutting SPA-KAS-016 (Crooked Creek)	Yes	Yes[2]	PEM: 0.27 PSS: 0.17 PFO: 0.27	PEM: 0.0 PSS: 0.0 PFO: 0.0
WPA-KAS-029	PEM, PSS	Abutting SPA-KAS-017 (UNT to Crooked Creek)	Yes	Yes[2]	PEM: 0.11 PSS: 0.03	PEM: 0.0 PSS: 0.0
WPA-KAS-030	PEM	Isolated	Yes	Yes[2]	0.03	0.3
WPA-KAS-034	PEM	Abutting SPA-KAS-020 (UJNT to Crooked Creek)	Yes	Yes	0.02	0.0
WPA-KAS-035	PEM	Abutting SPA-KAS-021 (UNT to Crooked Creek)	Yes	Yes, Trenching	0.13	0.01
WPA-KAS-036	PFO	Abutting SPA-KAS-026 (UNT to Crooked Creek)	Yes	Yes	0.32	0.0
WPA-KAS-040	PEM	Abutting SPA-KAS-019 (Crooked Creek)	Yes	Yes	0.54	0.3
WPA-KAS-041	PEM	N/A	Yes	Yes	0.55	0.8
WPA-KAS-042	PFO	N/A	Yes	Yes	0.59	0.06

Source: HDR 2016
*Includes combined temporary and permanent impact acreage

1. Palustrine Emergent Wetlands (PEM), Palustrine Scrub-shrub (PSS), Woody Wetland Forests (PFO), Unnamed Tributary (UNT).
2. Wetland would be crossed by the proposed transmission cable or is located within the cable route corridor. The HDD construction method under USACE regulation would avoid all effects on the wetland.

5.2.8.2 Effects of Operations, Maintenance, and Emergency Repairs

Long-term maintenance of the proposed transmission cable would require affected wetland areas to remain unforested. Temporary effects may occur in conjunction with vegetation maintenance or emergency repairs, but the extent of these effects would be limited, and the affected area would be restored.

Trenching or excavation may be required to repair damaged transmission cables. These activities would occur only if needed and would require applicable federal, state, and local permits. Any effects of these emergency activities would be similar to those of initial construction but would be less extensive and of shorter duration. In areas where the proposed transmission cable is collocated with roads, the municipality's regular vegetation maintenance programs would protect the transmission cable. Most of the wetlands located within the regularly maintained corridor would be restored to the same value and quality as pre-construction conditions.

5.2.9 GEOLOGY AND SOILS

5.2.9.1 Effects of Construction

Establishment of work areas, installation of the transmission cable, and construction of the proposed new Erie Converter Station would disturb approximately 82 acres of land. Installation of the proposed transmission cable in the Overland Segment would require trenching that would temporarily alter surface grading. Following installation, the trench would be regraded to match the original topography; therefore, no permanent effects on topography are anticipated. Laydown areas used during the proposed construction would be overlaid with coarse gravel, and no permanent effects on topography are anticipated in laydown areas.

No blasting or excavation of rock is proposed in the Overland Segment; therefore, the proposed LEC Project would not affect geology within that area.

Installation of the proposed transmission cable would temporarily disturb soils. Most construction would occur in existing ROWs, except at seven locations where the proposed transmission cable route would briefly leave the road ROW. The areas outside of the roadway ROW are on private property and are mostly adjacent to existing driveways. These areas were disturbed and compacted previously when the road was constructed; therefore, installing the proposed transmission cable would not permanently affect these soils. Two segments of the proposed Project route would be installed in wooded areas: from the Lake Erie landfall to the CSX Railroad crossing, and from Ridge Road to Springfield Road. Construction of the proposed LEC Project in these wooded areas would require clearing.

The effect of the proposed transmission cable installation on soils depends on the installation method. The primary method of installation in the Overland Segment is trenching. Trenching requires removing soil and, sometimes, vegetation. Soil would be stockpiled during installation and backfilled following installation. Trenches typically would be backfilled with the same material that was excavated, but material with low thermal resistivity (e.g., well-graded sand, stone dust, fluidized thermal backfill) may be used in selected areas where soils are compacted or subject to drying out. Any excess excavated soil would be transported for disposal or reuse at an approved location. Disturbed areas would be regraded to their original grade and seeded with annual rye-grass where appropriate. Activities related to trenching may increase the potential for erosion and sedimentation, and the weight of construction vehicles may compact soils adjacent to the trench, which could decrease soil permeability (HDR 2016). ITC Lake Erie would implement BMPs consistent with state regulations and an approved Erosion and

Sedimentation Control Plan and would comply with the requirements of an NPDES permit for stormwater associated with proposed construction activities to minimize the potential for erosion and sedimentation associated with construction of the proposed LEC Project.

Jack and bore technology or HDD would be used in areas such as roadway crossings, wetland and stream crossings, and at the transition between land and Lake Erie. Seven HDD and six jack and bore crossings are proposed (HDR 2016). These methods would minimize erosion and sedimentation. Effects would be related to the use of HDD drilling fluid, which is a solution of water and bentonite clay, and disposal of drill cuttings. Drilling fluid released inadvertently during HDD operations could be absorbed into fractures in the rock and could reach the surface. Contractors responsible for drilling would provide a Drilling Fluid Management Plan that would identify procedures and equipment for fluid handling, recovery, recycling, and disposal. The plan also would identify procedures for monitoring for fluid release, containing a fluid release if it occurs, and cleaning up any fluid losses. An inadvertent release or return of water from drilling at the water-to-land transition areas could increase sedimentation or turbidity in the adjacent water. All construction activities would follow BMPs consistent with state regulations, an approved erosion and sedimentation control plan, and an NPDES permit for stormwater associated with construction activities.

Approximately 570 cubic yards of material would be removed from drill cuttings (HDR 2016). This material would be hauled to an approved upland disposal site. Following drilling and installation of the proposed transmission cable, the holes would be filled, and the surface would be graded. Any equipment and fencing used during the proposed installation would be removed. All proposed construction activities would follow BMPs consistent with state regulations, an approved Erosion and Sedimentation Control Plan, and an NPDES permit for stormwater associated with proposed construction activities.

The proposed new Erie Converter Station would permanently alter approximately 6 acres including equipment and access and would temporarily affect an additional 15.4 acres during the proposed construction for material laydown and staging. Proposed construction activities would involve some vegetation removal, and soils would be compacted under the weight of construction vehicles and equipment. The presence of the proposed new Erie Converter Station and soil compaction would increase the area of impervious surface at the site. All proposed construction activities would follow BMPs consistent with state regulations, an approved Erosion and Sedimentation Control Plan, and an NPDES permit for stormwater associated with construction activities (ITC Lake Erie 2016 prepared by Deiss & Halmi 2016).

Although the U.S. Department of Agriculture/Natural Resources Conservation Service (USDA/NRCS) mapping shows that the land to be temporarily disturbed by the proposed transmission cable installation is considered prime farmland, much of this area has been disturbed previously or is in an ROW, is not available for agriculture, and is not considered prime farmland according to the Farmland Protection Policy Act (FPPA). Some areas where the proposed LEC Project route deviates from the roadway ROW could cross areas used for agriculture, but the proposed transmission cable corridor would be installed only on the edge of such land (HDR 2016). Installation of the proposed transmission cable, therefore, would not affect prime farmland. All land to be disturbed as part of the construction of the proposed new Erie Converter Station is designated as prime farmland. No suitable alternative locations are available, and the effects on farmland are unavoidable because the proposed new Erie Converter Station must be constructed near the existing Erie West Substation.

Neither construction nor operation of the proposed LEC Project would increase the risk of seismic hazards.

*5.2.9.2 E*ffects of Operations, Maintenance, and Emergency Repairs

Operation of the proposed LEC Project would not affect physiography and topography. Emergency repairs of the transmission cable may involve removing and reinstalling a portion of the transmission cable. Temporary effects on topography would be similar to those during construction but less extensive and would persist for a shorter duration. Operation and maintenance of the proposed LEC Project would not affect prime farmland because most land in the transmission cable ROW is not currently used for agriculture.

Operation of the proposed LEC Project would involve routine mowing and removal of vegetation within the ROW. Vegetation along the ROW would be maintained to prevent the establishment of trees and their associated deep root systems close to the proposed transmission cable.

Emergency repairs of the proposed transmission cable may result in effects that are similar to the effects of construction activities but are less extensive and of shorter duration. These periodic actions may result in short-term soil erosion and sedimentation.

The proposed transmission cable could be damaged during a seismic event; however, seismic events are rare in the region. The buried proposed transmission cable could shift and deform slightly with ground movements associated with seismic events. The proposed new Erie Converter Station would be built to conform to seismic hazard standards appropriate for the area.

5.2.10 CULTURAL RESOURCES

The USACE has a responsibility to comply with the National Historic Preservation Act (per 36 CFR 800) under the USACE's historic properties review procedure for USACE permits. The USACE defines the Permit Area as the area comprising the waters of the Unite States that would be directly affected by the proposed undertaking and uplands directly affected as a result of authorizing the work or structures. Three tests must all be satisfied for an activity undertaken outside the waters of the United States to be included within the "permit area". The USACE Permit Area may differ from the DOE's and PASHPO's APE defined in 36 CFR 800.

Hartgen (2016) conducted a Phase 1B investigation of approximately 1,568 shovel tests in the proposed LEC Project area (including the underground segment, laydown areas, new converter station site, and potential wetland mitigation area). The Phase 1B investigation identified five archaeological sites (one pre-contact and historic site, two pre-contact sites, and two historic sites) (Hartgen 2016). By letter dated March 18, 2016, the PASHPO noted that three of the sites should be avoided. ITC Lake Erie will modify the proposed LEC Project to avoid those three sites. The PASHPO recommended that one of the sites should either be avoided or a Phase II level evaluation should be conducted to determine if avoidance is necessary. ITC Lake Erie is undertaking the necessary further evaluation of that site. The PASHPO provided that neither avoidance nor further evaluation is required for the remaining identified site (***Appendix F***).

Ground-disturbing activities would disrupt the context of artifacts in archaeological sites in the APE. For archaeological sites that are eligible for listing on the NRHP, this could constitute an adverse effect according 36 CFR 800.5(a)(1). Consultation regarding potential effects on historic properties through the NHPA Section 106 process is in progress with the PASHPO (***Appendix F***).

By letter dated May 12, 2016, the PASHPO agreed with DOE recommended phased approach to the identification and evaluation of historic resources. Additional consultation is occurring between the DOE and PASHPO.

5.2.10.1 Effects of Construction

The proposed transmission cable would be buried underground and would avoid any standing structures; consequently, the adverse effects of construction along the linear portions of the proposed LEC Project would be limited to exposure to temporary noise, dust, and vibrations and short-term visual effects associated with the proximity of construction activities and equipment. These effects would not require mitigation.

The proposed Project includes five work parcels. Laydown/staging areas were selected at properties controlled by ITC Lake Erie. Hartgen (2015) evaluated these properties for archaeological sensitivity as part of the Phase 1A study. Any additional laydown or staging areas along the proposed Project route would be identified prior to construction and ITC Lake Erie would conduct all appropriate studies in accordance PASHPO stipulations.

5.2.10.2 Effects of Operations, Maintenance, and Emergency Repairs

The operation and inspection of the proposed transmission cable in the Overland Segment would take place in an area that has already been disturbed and would not adversely affect terrestrial archaeological sites within the APE. The Overland Segment encompasses the proposed underground transmission cable; therefore, operations would not likely to adversely affect historic architectural properties within the APE; however, effects on cultural resources have not been determined. The construction, operation, and maintenance of the proposed new Erie Converter Station would have no visual effects on historic architectural properties.

Vegetation maintenance activities and emergency repairs, if necessary, would occur in areas previously disturbed by construction of the transmission cable and, in some cases, in areas selected purposefully to avoid cultural resources; therefore, such activities are not expected to affect cultural resources.

5.2.11 INFRASTRUCTURE

The proposed LEC Project would facilitate the transfer of electricity, improve power system availability/reliability, and improve the efficiency of the competitive wholesale power market by connecting the IESO market in Ontario and the PJM market in the United States (HDR 2016).

5.2.11.1 Effects of Construction

Electrical Systems

Section 3.2.11.1 indicates one instance in which the proposed LEC Project would intersect with an overhead transmission line, as well as the possibility of crossing service lines for individual properties. According to HDR (2016), ITC Lake Erie would consult with owners and operators of electrical lines that may be crossed by the proposed LEC Project or within the construction corridor before beginning installation to develop protection measures for limiting potential interruptions of services. Any underground crossings would be assessed to determine the best way to avoid a conflict, and appropriate standard precautions would be taken when using equipment in the vicinity of overhead crossings. No planned system outages are anticipated.

Water Supply Systems

A limited number of private wells may be at low to moderate risk for temporary turbidity during the proposed construction, or for interruption of flow to the well due to trenching. Moody and Associates conducted a study in which 67 private wells were identified along the proposed LEC Project route, and assessments of water quality, water quantity, and risk were completed for 21 of these wells. Moody

and Associates also evaluated local conditions (e.g., permeability, gradient, groundwater elevation) and borehole logs provided by ITC Lake Erie (***Figure 3-4***). Nine of the 21 wells were judged to be at moderate risk of being affected, and the remaining 12 were judged to be at low risk. As a result of this study a number of proposed construction techniques were recommended in order to avoid, reduce, or mitigate risks to wells adjacent to the proposed LEC Project route (ITC Lake Erie 2016, Appendix M):

- Channels oriented perpendicular to the direction of the trench should be incorporated into the trench bottom along sections of concern.
- The channels should be at least 1 foot wide, at least 1 foot deeper than the prevailing depth of the trench, and no more than 10 feet apart along the length of the sections of concern.
- The channels should be backfilled with a permeable material that would permit groundwater flow beneath the proposed transmission cable.
- Dewatering activities should be kept at the minimum level necessary to facilitate construction activities in order to avoid altering the preexisting groundwater flow gradient, which could result in reduced yield in adjacent wells.

Stormwater Management

Stormwater management infrastructure would be affected where the Overland Segment crosses existing stormwater inlets or pipes, primarily along roadway ROW. To the extent possible, stormwater infrastructure would be avoided by minor route alterations, or by crossing underneath stormwater pipes or culverts, or by use of HDD. Features that cannot be avoided would be restored to their previous conditions after the proposed transmission cable is installed (HDR 2016).

ITC Lake Erie developed a Post-Construction Stormwater Management Plan for the proposed site of the new Erie Converter Station, as required by Conneaut Township's Stormwater Management Ordinance (SWMO) and Stormwater NPDES Permit requirements (25 PA Code Chapter 102). Stormwater BMPs would be implemented as necessary to meet the requirements for volume control, water quality, and peak rate specified in the SWMO and state code.

Communications

Section 3.2.11.4 indicates several underground communication line crossings associated with the DC transmission cable portion of the Overland Segment, and another associated with the AC transmission cable portion. According to HDR (2016), ITC Lake Erie would consult with the owners and operators of communication lines crossed by the proposed LEC Project or within the construction corridor before beginning the installation to develop BMPs for avoiding effects and limiting the potential for interruption of services.

Where the Overland Segment crosses under overhead communication lines, construction equipment would be managed to avoid disturbing these lines or interrupting service (HDR 2016).

Natural Gas Supply

Section 3.2.11.5 indicates an underground natural gas line crossing associated with the proposed DC cable portion of the Overland Segment. According to HDR (2016), ITC Lake Erie would consult with the owners and operators of natural gas lines crossed by the proposed LEC Project or within the construction corridor before beginning the installation to develop BMPs to avoid effects and limit the potential for interruption of services.

Liquid Fuel Supply

Upon review of HDR (2016), it is concluded that no effects on liquid fuel supply are expected to result from construction of the proposed LEC Project. If previously unknown liquid fuel supply infrastructure is discovered during construction, appropriate BMPs and avoidance/mitigation measures would be

developed in consultation with utility providers. Equipment and vehicles used to install the proposed Project components would consume liquid fuel in small quantities, but the amount of fuel consumed during construction is expected to be only a small percentage of the supply in the area.

Sanitary Sewer and Wastewater Treatment
Houses in the vicinity of the proposed LEC Project route have individual on-site septic systems and most of the proposed Project route is along roadway ROWs; therefore, DOE concurs with HDR (2016) that construction would not affect these systems.

Solid Waste Management
Installing the proposed transmission cables and the proposed new Erie Converter Station would generate solid waste, such as excavated soil, brush, tree limbs, logs, slash, and stumps. According to HDR (2016), brush and tree limbs would be chipped and spread in approved locations or hauled off-site for disposal. Timber would be removed as appropriate and then salvaged or disposed of at approved locations. Slash and stump waste would be chipped and hauled to a landfill or other approved off-site locations after obtaining all necessary approvals. Stumps could be buried on private easements with the landowner's agreement and monitored after construction.

Excavated soils would be stockpiled adjacent to the worksite temporarily or transported off-site if on-site storage is not possible. Contaminated excavated soils would be disposed of at an approved landfill facility. Excavated soils and used drilling fluid must be disposed of in an approved landfill facility thus reducing local landfill capacity (HDR 2016).

5.2.11.2 Effects of Operations, Maintenance and Emergency Repairs

The proposed underground transmission cables are expected to require only limited maintenance once installed and would be inspected regularly.

Electrical Systems
No effects on electrical systems are expected to result from operating, maintaining, or repairing the proposed LEC Project.

Water Supply Systems
No effects on water supply systems are expected to result from operating, maintaining, or repairing the proposed LEC Project.

Stormwater Management
Operation and regular maintenance of the proposed buried transmission cables would not affect stormwater management features within the Overland Segment. According to HDR (2016), emergency repairs would be designed to avoid stormwater infrastructure where possible, and stormwater infrastructure that cannot be avoided would be replaced, relocated, or restored to previous conditions upon completion of repairs.

Communications
The proposed LEC Project would use HVDC technology and transmission cable designed to eliminate EMFs that could affect communications equipment along the Overland Segment. According to HDR (2016), the proposed new Erie Converter Station would be designed to meet the requirements of local radio, television, and telephone EMF limits; therefore, DOE concurs with report conclusions that operation and maintenance of the proposed LEC Project would not affect communications systems.

Natural Gas Supply
No effects on natural gas supply infrastructure are expected to result from operating, maintaining, or repairing the proposed LEC Project; furthermore, no equipment used to maintain the proposed Project would consume natural gas.

Liquid Fuel Supply
Upon review of HDR (2016), DOE concluded that no effects on liquid fuel supply are expected to result from operating, maintaining, or repairing the proposed LEC Project. Vehicles and equipment used to service and maintain the proposed LEC Project would consume small amounts of liquid fuel. The proposed LEC Project would require relatively little maintenance, and although inspections would occur multiple times over its operating life, they would be brief.

Sanitary Sewer and Wastewater Treatment
No effects on sanitary sewer or wastewater treatment are expected to result from operating, maintaining, or repairing the proposed LEC Project. The proposed new Erie Converter Station would be manned and would include a potable water well and an on-site septic leach field (HDR 2016).

Solid Waste Management
Upon review of HDR (2016), it is concluded that operation, maintenance, and repairs are anticipated to produce very small amounts of solid waste over the life of the proposed LEC Project. The amounts are not expected to affect solid waste management infrastructure in the proposed LEC Project area.

5.2.12 RECREATION

5.2.12.1 Effects of Construction

In the Overland Segment, the proposed transmission cable would be buried primarily within existing roadway ROWs, except in two locations: from the Lake Erie landfall to West Lake Road (Route 5), and from Ridge Road to Springfield Road. The proposed transmission cable would reach landfall at the shoreline adjacent to Erie Bluffs State Park (approximately 120 feet west of the park boundary); however, the proposed transmission cable route would not traverse any existing recreational areas; therefore, construction would have no direct, land-disturbing effects on recreation. Recreationists may see the construction and hear the noise associated with construction, but these effects would be temporary and short-lived. ***Section 5.1.15.1*** discusses the potential effects of noise during the proposed construction in the Overland Segment in greater detail.

During the proposed transmission cable installation, construction vehicle traffic would increase along the route. Construction of the proposed transmission cable on the roadways in the ROI may result in short-term disturbances for visitors trying to reach recreational areas within the ROI during construction. Proposed construction activities could cause temporary delays due to lane closures, road detours, and the presence of work areas and equipment. These disturbances would be limited to the area of active construction and would be brief (i.e., less than a week in each area and less than 6 months throughout the Overland Segment).

5.2.12.2 Effects of Operations, Maintenance, and Emergency Repairs

Operation of the proposed transmission cable would not affect use of recreational facilities in the Overland Segment because the transmission cable would be buried underground in roadway ROW.

Maintenance (e.g., periodic inspections) and emergency repairs may occur intermittently throughout the life of the proposed transmission cable. Any potential effects on recreation would be similar to

those during initial installation but would be temporary and limited to the immediate area of the maintenance or repair.

5.2.13 VISUAL RESOURCES

5.2.13.1 Effects of Construction

The proposed LEC Project would reach landfall at the shoreline of Lake Erie near Erie Bluffs State Park. Most of the Overland Segment of the proposed LEC Project would be installed within roadway ROW; however, two portions of the route would be within wooded areas: (1) approximately 3,953 feet between the Lake Erie landfall and West Lake Road/Route 5, and (2) approximately 3,885 feet between Ridge Road/Route 20 and Springfield Road (HDR 2016). Proposed construction within the wooded areas would require clearing vegetation. In addition, the proposed transmission cable route would leave the adjacent roadway ROW in a few areas to avoid existing infrastructure (i.e., bridges, culverts) and sensitive natural resources (i.e., wetlands, waterways), or to account for the limitations of the transmission cable installation, such as turning radius. A portion of the proposed transmission cable route (approximately 2,800 feet) would be buried in the ROW along West Lake Road (Route 5).

The presence of construction equipment and activities and construction laydown areas within the Overland Segment of the proposed LEC Project would affect the viewshed temporarily during construction. Clearing within wooded areas along the proposed route required to facilitate construction would result in temporary visual effects. Following installation of the proposed transmission cable, the affected areas would be allowed to revegetate, except for the area within the permanent transmission cable ROW (up to 50 feet), which would be kept free of vegetation with large root systems.

The proposed new Erie Converter Station would encompass an area of approximately 6 acres, including the surrounding equipment and access ways. The driveway providing access to the station from the existing roadway would be approximately 20 feet wide, with a maximum 3-foot shoulder. In addition to the area to be permanently occupied by the proposed new Erie Converter Station, laydown areas would be required during construction, and stormwater management facilities would be required after construction. The total disturbed area associated with the proposed new Erie Converter Station site would be approximately 21.4 acres. Construction activities and laydown areas would result in visual effects on the surrounding area; however, these effects would be limited to the area immediately surrounding the construction and would be short-lived.

5.2.13.2 Effects of Operations, Maintenance, and Emergency Repairs

The proposed new Erie Converter Station would add a substantial, permanent aboveground feature to the viewshed within the Overland Segment. The main building (converter hall) would be approximately 370 feet by 110 feet with a footprint of 1 acre and a height of approximately 60 feet. The equipment outside of the building would include circuit breakers, disconnects, surge arrestors, transformers, cooling equipment, and metering units. Security fencing would surround the proposed new Erie Converter Station to prevent unauthorized access and to provide public safety. ITC Lake Erie proposes to plant a vegetative buffer of trees along the east side of the proposed new Erie Converter Station and along the roadway next to the station.

ITC Lake Erie provided a visual simulation of the proposed new Erie Converter Station from the adjacent roadway location, including both the existing view before construction (***Figure 5-5***), and the site after construction of the new Erie Converter Station and installation of the vegetative buffer (***Figure 5-6)***. The new Erie Converter Station is bound to the west and south by wooded areas, which would help to minimize its visual effects from those directions. The presence of the proposed new Erie

Converter Station would affect views from homes along the north and east of the proposed site, and along the roadway adjacent to the site. The vegetative buffer would minimize these effects. Additional mitigation of visual effects could include use of non-reflective paints and materials and subdued paint colors to limit the contrast and associated visibility of the station.

Visual effects of long-term operations and maintenance would be associated with vehicular traffic to the proposed new Erie Converter Station and associated maintenance and repairs. The visual effects of maintenance and repairs would be short-lived, minor, and limited to the immediately surrounding area.

Source: HDR 2016

FIGURE 5-5: EXISTING CONDITIONS VIEW OF THE LOCATION OF THE PROPOSED NEW ERIE CONVERTER STATION SITE

Source: HDR 2016

FIGURE 5-6: SITE AFTER CONSTRUCTION OF THE NEW ERIE CONVERTER STATION AND INSTALLATION OF THE VEGETATIVE BUFFER

5.2.14 PUBLIC HEALTH AND SAFETY

5.2.14.1 Effects of Construction

Three documents have been developed to assess health and safety for the proposed LEC Project. ITC Lake Erie analyzed the affected environment and assessed Project effects in an APEA published in January 2016 (HDR 2016). Two additional documents were developed to address the potential effects of EMFs: *Assessment of Lake Erie Connector Project: Static Magnetic Field and Selected Fish Species* (Exponent 2015a), and *Draft Review and Assessment of Electromagnetic Fields and Health for the Lake Erie Connector Project in Nanticoke, Ontario* (Intrinsik 2014). Additionally, assessments of public health and safety performed for a very similar project, the NECPL Project (DOE 2015), have been used to evaluate the potential effects of the proposed LEC Project.

5.2.14.2 Effects of Construction

Contractor Health and Safety

Employing the proper safety measures would reduce risks for workers' safety. As discussed in ***Section 5.1.14***, all contractors working on the proposed LEC Project would be responsible for following federal and state safety regulations, administering workers compensation programs, following HASPs, and working in a manner that poses no undue risk to personnel.

Public Health and Safety
The risk for public safety during proposed construction activities within the Overland Segment would be minimal. Most of this segment of the proposed transmission cable would be buried within roadway ROWs. The public would be notified prior to construction (HDR 2016).

Electric and Magnetic Fields
The proposed transmission cable would not be powered during construction; therefore, it would pose no additional exposure to EMF for contractors or the public beyond baseline levels.

5.2.14.3 Effects of Operation, Maintenance, and Emergency Repairs

Contractor Health and Safety
Normal operating conditions would pose little or no safety risk for contractors. The ERRP developed for the proposed LEC Project would identify procedures necessary to perform maintenance and emergency repairs safely. Following the procedures specified in the ERRP and SPP would enable contractors to avoid or minimize risks.

Public Health and Safety
Operation of the proposed LEC Project would pose very little risk for public health and safety because the proposed transmission cable would be buried underground. The proposed transmission cable route would be added to the Pennsylvania's Public Utility Commission One Call database to reduce the potential for accidental contact with buried cables. Transmission cable protection equipment would be designed to shut down operation immediately to protect life and equipment if the proposed transmission cable is damaged by external activities. Public access to the proposed new Erie Converter Station would be restricted by installing secure perimeter fencing (HDR 2016).

Electric and Magnetic Fields
Potential risks associated with EMF produced by the proposed LEC Project would be minimized by burying transmission cables; consequently, no adverse effects on human health resulting from exposure to EMF are anticipated. Please see ***Section 5.1.14*** for additional discussion.

5.2.15 NOISE

5.2.15.1 Effects of Construction

Installing underground transmission cables along the proposed LEC Project route would require clearing vegetation, removing topsoil and storing it, excavating trenches, delivering transmission cable to the installation site, drilling (via HDD or jack and bore), splicing transmission cable, backfilling, and restoring the grade and vegetation. All of these activities are unnatural sources of noise. Pennsylvania has no statewide noise limit. Girard Township and Springfield Township have enacted municipal noise standards as described in ***Section 3.2.15***; Conneaut Township has not.

Noise-sensitive receptors associated with the Overland Segment may include recreational boaters on Lake Erie and people within residences and public-use areas along the shoreline of Lake Erie. The proposed landfall location for the proposed Project is within 120 feet of the western boundary of Erie Bluffs State Park. Other shoreline or near-shore noise-sensitive receptors in the general vicinity of the proposed Project (greater than 600 feet from the proposed Project) include Virginia's Beach Lakefront Cottages and Camping, Camp Lambec, Camp Fitch, and Pine Lane Campground.

Sources of noise within the Overland Segment include wind, vegetation rustle, wildlife noises, and transportation noise, especially the periodic sound of passing trains and traffic on Interstate 90 and other

local routes. No schools, libraries, or hospitals have been identified within 600 feet of the proposed transmission cable centerline of this segment. Construction activities associated with the Overland Segment of the proposed LEC Project could cause an increase in sound that is greater than ambient noise levels, but only for short durations. Noise from proposed construction activities would include equipment that is typically found at large-scale construction sites. Graders, loaders, trucks, pavers, and work activities and processes emit a variety of sounds (HDR 2016). ***Table 5-5*** is a list of construction equipment that is likely to be used for the proposed LEC Project and associated noise levels at a distance of 50 feet from their operating locations (FHA 2006 as cited in ITC 2016).

TABLE 5-5: NOISE LEVELS OF TYPICAL CONSTRUCTION EQUIPMENT

Equipment Description	Device	Acoustical Usage Factor (%)	Spec. 721.560 L_{max} @ 50 feet (dBA, slow)	Actual Measured L_{max} @ 50 feet (dBA, slow) (Samples Averaged)	Number of Actual Data Samples (Count)
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Boring Jack Power Unit	No	50	80	83	1
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS Signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	N/A	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydraulic Jack	No	25	80	82	6
Jackhammer	Yes	20	85	89	133
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarifier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1

Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Roller	No	20	85	80	16
Vacuum Excavator (Vac-Truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19

Source: FHA 2006

Installation of the proposed transmission cable at the transition from water to land and at infrastructure crossings would require using HDD (or jack and bore at some road crossings) to minimize disturbance of the nearshore area; HDD operations and equipment include the drilling rig, air compressor, electrical generator, backhoe, crane, and a mud-makeup/recovery system. All of these pieces of equipment require an engine, and the engines would be equipped with appropriate mufflers as required according to the provisions of the Springfield Township noise ordinance.

Drilling operations would last approximately three months, and the associated noise would be slightly louder than typical construction levels (DOE 2007). The HDD operations associated with terrestrial sites would have slightly lower noise levels than the water-to-land HDD operations because the equipment is smaller and it would be operated for shorter durations. The HDD drilling equipment would produce noise levels between 75 and 105 dBA at the source, and levels would dissipate with distance and competing ambient noise (CSR 2014, 2015). ITC Lake Erie would develop a construction plan to minimize noise during the evening and nighttime hours and to restrict proposed construction activities to daytime hours. Residential areas near the proposed LEC Project would be notified in advance regarding commencement of construction activities, and ITC Lake Erie would respond to any complaints concerning noise to determine if site-specific measures need to be employed to reduce objectionable noise.

Proposed construction activities would take place at night only if requested by state or local officials to avoid interfering with traffic or equipment deliveries, or unless required by a particular construction technique. ITC Lake Erie would coordinate surface restoration procedures with PennDOT, the appropriate townships, and the owners of private lands where the proposed underground transmission cable is located. Noise would increase temporarily in proximity to the construction activity (3 to 4 days at any one transmission cable installation location; 1 week for a vault location). Within 50 feet of proposed construction activities, noise levels would range from approximately 70 to 90 dBA. DOE agrees the noise levels taken by HGC Engineering as cited in HDR 2016. Noise in this range could interfere with sleep or speech in areas near the construction site, but the sound would dissipate rapidly over relatively short distances. ITC Lake Erie would consider noise reduction measures such as installing sound muffling devices on equipment and using sound buffers in areas of continuous operation if landowners in the area complain.

Proposed construction of the new Erie Converter Station would involve 12 to 18 months of site work and equipment installation, followed by four to six months of testing and commissioning work inside the station. The Erie West Converter Station in Conneaut Township would house the indoor converter modules that are designed to reduce audible sound associated with station operation. Equipment installed outside of the new converter station would include circuit breakers, disconnects, surge arrestors, transformers, cooling equipment, metering units, and an emergency generator.

5.2.15.2 Effects of Operations, Maintenance, and Emergency Repairs

ITC Lake Erie commissioned HGC Engineering (HGC Engineering as cited in HDR 2016) to measure ambient noise levels in the vicinity of the proposed Erie West Converter Station and to prepare a predictive model to estimate the potential sound propagation from the station to potential receptors in the area. According to the model, the level of noise likely to be produced by equipment at the new Erie Converter Station during normal operations would not adversely affect sensitive receptors close to the facility. There are few receptors of concern in the surrounding area. Agricultural fields surround the areas to the north and south of the proposed Project location of the new Erie Converter Station, and the area to the west is forested. The Erie West Substation is located southwest of the new Erie Converter Station.

Table 5-6 shows two residential structures southwest of the proposed new Erie Converter Station and the sound contours for the area around the proposed converter station. Residence R1 is approximately 380 feet southeast of the planned converter station. Residence R2 is approximately 560 feet northeast of building. ITC Lake Erie has the option to acquire residence R2, such that it would not be an actual receptor once the new Erie Converter Station is constructed. For purposes of sound-level modeling and assessment, sound levels broadcasting to R1 and R2 were considered to provide a conservative "worst case" assessment of potential effects (HGC Engineering as cited in HDR 2016).

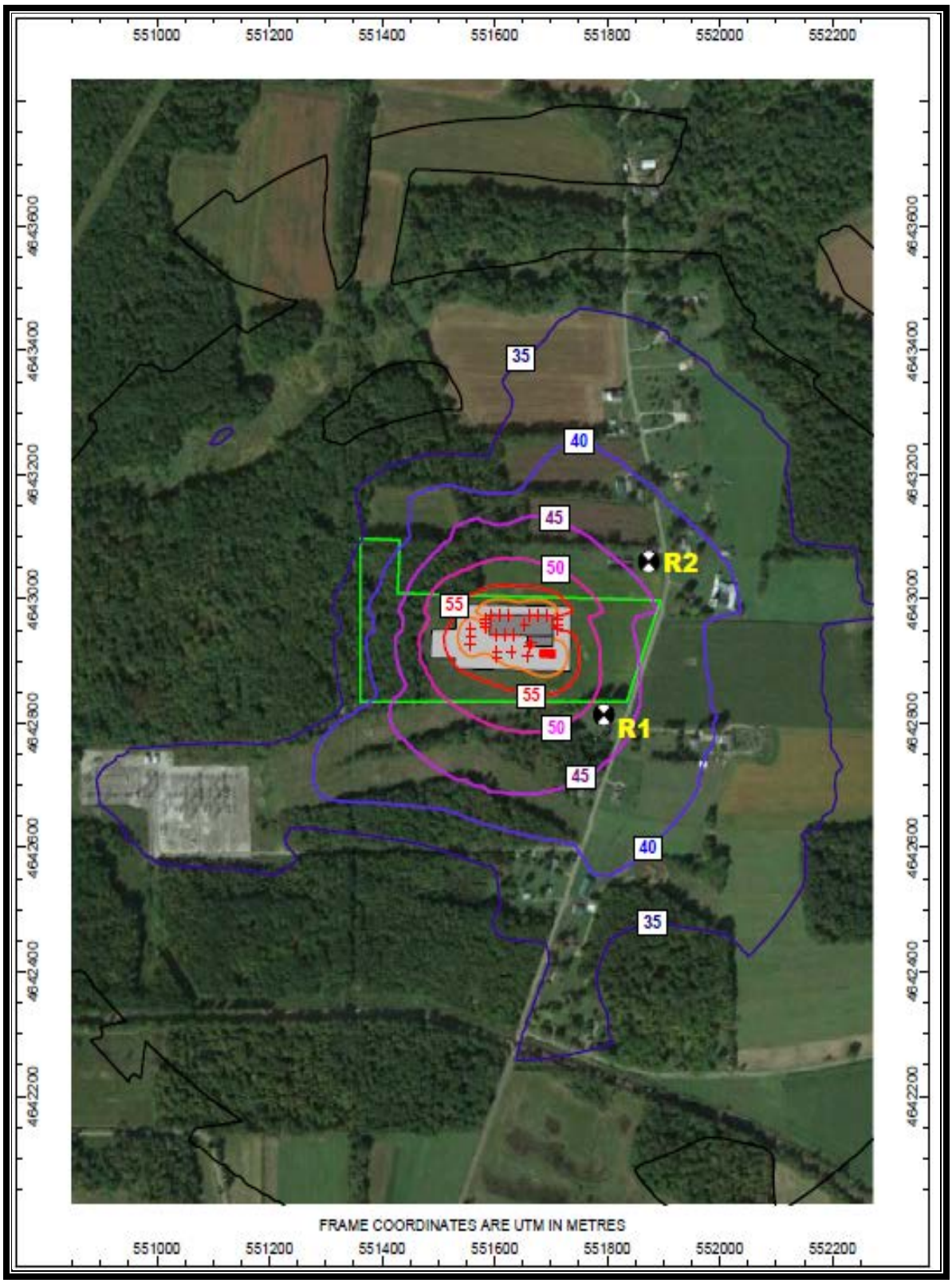
The most significant sound sources at the new Erie Converter Station during normal operation are associated with the cooling fan system (HGC Engineering as cited in HDR 2016). The cooling fan system would consist of 11 banks of 9 coolers each, and the maximum number of banks operating would be 10. The maximum sound level generated by these banks would be 100 dBA at the source. The model assumes all sound sources taken together and maximum fan system operation without using the emergency generator. The modeling results indicate the predicted worst case sound levels at the nearest residences R1 and R2, as shown in ***Table 5-6.***

TABLE 5-6: NOISE MODEL RESULTS FOR RESIDENCES NEAR THE PROPOSED NEW ERIE CONVERTER STATION

Location	Model Assumptions	Predicted Sound Levels (dBA)
R1	All sound sources except emergency generator; max fan system operations	48
R1	With emergency generator	55
R2	All source sources except emergency generator; max fan system operations	44
R2	With emergency generator	44

No noise level limits apply to the proposed location of the new Erie Converter Station. A level of 45 dBA is typical of a small town residence, and 35 dBA is the sound level of a soft whisper heard at 6 feet (***Figure 5-7***). The DOE reviewed the HGC data presented in HDR 2016 and agrees with the description of effects. Measurements of existing ambient noise in the area taken by HGC showed a minimum 1-hour equivalent sound levels less than 50 dBA during daytime hours and less than 40 dBA during nighttime hours. Since there are no zoning or other noise restrictions in Conneaut Township or at the

state level, the operational noise associated with the new Erie Converter Station would comply with current local and state regulations. Effects of noise generated during operations, routine inspection, maintenance, and possible emergency repairs along the proposed transmission cable are expected; however, the increase in sound levels resulting from routine inspection and maintenance activities would be short-term in duration.



Source: HDR 2016

FIGURE 5-7: PREDICTED SOUND LEVELS (DBA) WITHOUT EMERGENCY GENERATOR

5.2.16 HAZARDOUS MATERIALS AND WASTES

5.2.16.1 Effects of Construction

Installation of the proposed terrestrial transmission cable would involve HDD boring at some locations. This method of installation involves drilling fluid in a closed-loop system. Fluid volumes and pressures would be monitored to ensure that no drilling fluid is released. The Overland Segment avoids areas of known contamination. If contaminated material is discovered during trenching and excavation to install the proposed transmission cable, ITC Lake Erie would notify the appropriate local, state, and federal agencies and take the appropriate measures. Uncontaminated soils generated during trenching and excavating would be reused on site or hauled off site to be used as fill material. If contaminated material is identified, it would be disposed of properly according to applicable regulations (HDR 2016).

Construction equipment would require small amounts of liquid fuels, solvents, oils, lubricants, and hydraulic fluids for operation. These materials would be stored and handled following a Preparedness, Prevention, and Contingency (PPC) Plan for storing, using or transporting hazardous materials. The PPC Plan would be prepared in accordance with PADEP's *Guidelines for the Development and Implementation of Environmental Emergency Response Plans*. Spill response procedures and clean-up equipment would be available to construction crews. The HDD contractor would implement an Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan; this plan identifies procedures for monitoring for fluid release, containing a fluid release if it occurs, and cleaning up any fluid losses. Prior to construction, meetings would be held with the authorizing agencies to review these plans (HDR 2016).

5.2.16.2 Effects of Operations, Maintenance, and Emergency Repairs

The transmission cables proposed to be used for the Overland Segment contain no hazardous fluids, eliminating the potential for the cables to contribute to soil or groundwater contamination. Furthermore, the proposed terrestrial transmission cables are designed to be maintenance-free and to require infrequent inspections; therefore, any hazardous materials and wastes associated with maintenance, inspection, and emergency repairs would likely be insignificant. Maintenance equipment would require small amounts of liquid fuels, solvents, oils, lubricants, and hydraulic fluids for operation. As proposed by ITC Lake Erie (HDR 2016), these materials would be stored and handled following a PPC Plan for storing, using, or transporting hazardous materials.

The proposed new Erie Converter Station has the potential to generate small amounts of oil, wastewater, or other hazardous wastes during operation. Oils or hazardous waste would be managed and disposed of according to applicable regulations. Non-hazardous wastewater generated at the proposed new Erie Converter Station would be disposed of at an on-site leach field installed during construction of the proposed LEC Project (HDR 2016).

5.2.17 AIR QUALITY

5.2.17.1 Effects of Construction

Emissions of air pollutants and GHGs associated with installation of the proposed transmission cable in the Overland Segment would result primarily from construction equipment using diesel-fueled internal combustion engines, such as backhoes and trenching equipment (HDR 2016). Emitted

pollutants would include CO, NO_x, SO_2, CO_2, VOCs, and PM. Fugitive dust[21] emissions may also occur during construction on unpaved shoulders and land next to roads, site clearing, earth removal and filling, and HDD.

The concentration of fugitive dust generated from construction activities depends on the amount of small particle silt and the soil moisture content. In general, coarser soil with a higher moisture content would emit less dust into the air when disturbed. Soil within the Overland Segment ranges from fine organic loam and sand to coarser gravel or other unconsolidated material and ranges from poorly to excessively drained (HDR 2016). Depending upon the season, northwest Pennsylvania could experience heavy precipitation which could result in soil with a high moisture content. In accordance with 25 Pa. Code §123.1, fugitive dust along the proposed construction corridor would be controlled using at least the following measures: applying water or other solutions on dirt roads, material stockpiles, and other surfaces that may give rise to airborne dusts; and removing earth or other material promptly from paved streets onto which it has been transported by trucking or earth moving equipment, erosion, or other means (HDR 2016).

All emissions associated with the proposed construction would be temporary and spread over the construction period. The air emissions resulting from construction of the Overland Segment of the proposed LEC Project are not expected to cause or contribute to a violation of any federal or state ambient air quality standard, to expose sensitive receptors to increased pollutant concentrations, or to increase the frequency or severity of a violation of any ambient air quality standard.

5.2.17.2 Effects of Operations, Maintenance, and Emergency Repairs

A diesel-fueled emergency generator would be installed at the proposed new Erie Converter Station. Emissions from the generator would only occur during periodic testing or temporary emergency conditions; thus, any emissions would be brief and localized. The emergency generator would require an operating permit (General Plan Approval/General Operating Permit GP 9 for Diesel or No. 2 Fuel-fired Internal Combustions Engines) (HDR 2016). The permit specifies standards for sulfur oxides, NO_x, VOC, CO, and PM emissions; reporting and testing requirements; and best available technology requirements for emission control devices (PA Bulletin 2016).

The proposed transmission cable for the LEC Project is designed to be maintenance-free. Post-construction activities within the Overland Segment would consist primarily of transmission cable inspections and emergency repairs. Such activities would be brief. All inspections would be performed in accordance with the manufacturer's specifications to maintain equipment integrity. Should emergency repairs be required, equipment similar to that used during construction activities would be used.

Inspection and potential emergency repairs of the transmission cables in the Overland Segment would produce a negligible amount of emissions that would have no significant effects on regional air quality due to the intermittent, brief, small-scale nature of those activities in any given location. The operation of the proposed LEC Project is not expected to cause or contribute to a violation of any federal or state ambient air quality standard.

[21] Particulate matter or dust that is released into the air from disturbance of granular material (soil) by mechanical equipment or vehicles.

5.2.18 SOCIOECONOMICS

Given the short duration of the proposed construction and the primarily temporary workforce associated with the Project, the proposed LEC Project would result in no noticeable changes in employment, population, housing, or taxes and revenue within the ROI. The minimal expected effects of the proposed Project are discussed in detail ***Section 5.1.18***.

5.2.19 ENVIRONMENTAL JUSTICE

The construction of the proposed LEC Project would be relatively short in duration, and the proposed transmission cable would be underwater or underground primarily within existing roadway segments. The proposed LEC Project and associated construction activities, therefore, would result in no permanent displacement of existing residences or businesses and no significant effects on the population in general, including minority or low-income communities.

None of the census tracts in the identified ROI meet or exceed the PADEP's Environmental Justice Policy threshold of 30 percent minority population or 20 percent of the population living below the poverty level; therefore, no environmental justice populations are located within the proposed LEC Project ROI as defined by the PADEP's Environmental Justice Public Participation Policy. The PADEP Environmental Justice review would also be conducted as part of the PADEP review of ITC's Joint Application permit submitted on January 29, 2016.

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6 CUMULATIVE AND OTHER IMPACTS

6.1 CUMULATIVE IMPACTS ANALYSIS

Cumulative impacts are defined in 40 CFR §1508.7 and are described as 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The potential for cumulative impacts depends on both spatial and temporal factors within the environment, which can vary between resource areas. This EA considers cumulative impacts by first identifying other actions (past, present, and foreseeable future), and then by analyzing those actions in concert with the proposed action. Actions identified during the public review period, which have not already been analyzed herein, will be addressed in the final EA.

6.1.1 OTHER ACTIONS CONSIDERED FOR POTENTIAL CUMULATIVE IMPACTS

Both spatial and temporal factors within the environment affect the potential for cumulative impacts. Spatial boundaries for cumulative impacts include the areas in which the proposed LEC Project has direct and indirect impacts on the various resources. These boundaries can vary between resource areas and correspond to the resource area ROIs described in ***Section 3***. Temporal boundaries include the proposed Project construction period through the beginning of operations (i.e., 2017 through fourth quarter of 2019).

6.1.1.1 Past Actions

Past actions are those actions that occurred within the geographic ROI of cumulative impacts and that shaped the current environmental conditions of the proposed Project area. For example, this includes existing utility ROW maintenance within the Overland Segment. For the purposes of this EA, actions that occurred in the past and their impacts are now part of the existing environment, and are included in the affected environment described in ***Section 3***.

6.1.1.2 Present and Reasonably Foreseeable Future Identified Actions in the Lake Erie Segment

No present or reasonably foreseeable future projects have been identified within the spatial and geographic boundaries of the Lake Erie Segment. The Lake Erie Development Corporation proposes to develop an 18-MW wind demonstration project known as "Icebreaker" in Lake Erie near Cleveland, Ohio. Fabrication, construction and installation is scheduled for 2017, with project commissioning scheduled for 2018. The proposed Icebreaker site is not within the Lake Erie Segment ROI and is approximately 70 miles away from the proposed LEC Project route (LEEDCo 2016).

6.1.1.3 Present and Reasonably Foreseeable Future Identified Actions in the Overland Segment

Pennsylvania DOT's Twelve Year Transportation Program is an initiative designed to address transportation improvements spanning three 4-year periods, beginning in 2015. Several roads and bridges within, or in the direct vicinity of, the Overland Segment ROI have been scheduled for improvement during the proposed Project construction period. Interstate 90, before Neiger Road to past Exit 9 before Cross Station Road in Girard Township and the Borough of Platea, is scheduled for reconstruction beginning in April of 2020. The State Route 20 Bridge over the Bessemer and Lake Erie Railroad in Girard Township is scheduled for rehabilitation; however, this bridge rehabilitation is scheduled for May 2021 and would likely occur outside of the LEC Project construction window

(PennDOT 2016b). Cumulative impacts of road and bridge construction projects occurring within the same time and place as the proposed LEC Project could include increased but local and temporary disturbances of traffic patterns and intensified but local and temporary increases in truck traffic. These effects should not overlap in time because the proposed LEC Project should be complete in the fourth quarter of 2019.

6.1.1.4 Present and Reasonably Foreseeable Future Energy Projects

Existing and proposed energy projects within the same county as the proposed LEC Project are within the cumulative impacts ROI because those projects have the greatest potential for cumulative impacts. Projects outside of Erie County would have much less potential for cumulative environmental impacts and are not analyzed in this EA. Pennsylvania's 2014 Energy Plan provides an overview of Pennsylvania's energy policy and infrastructure. It outlines a plan to build and promote Pennsylvania's energy portfolio and support and create employment in the energy sector. Pennsylvania has a significant energy portfolio, with the Commonwealth having the 4th largest energy production in the nation. Pennsylvania relies heavily on electric generation and is the largest electricity exporter in the United States. Coal and petroleum meet most of Pennsylvania's energy consumption needs, comprising approximately 30 percent each of the Commonwealth's energy consumption. Natural gas comprises approximately 20 percent of Pennsylvania's energy consumption and is anticipated to increase in the future. Nuclear power is approximately 18 percent of energy consumption and renewables comprise the remaining approximately 3 percent. The use of renewables is anticipated to increase to 5 percent by 2017. From 2014 through 2015, it was expected that coal and gas-fired power plant retirements accounted for approximately 7,000-MW of lost capacity. Nine new gas-fired power plants, totaling 7,219-MW in capacity, are proposed in Pennsylvania; however none are located in Erie County (Commonwealth of Pennsylvania 2014). The Icebreaker wind power project, discussed in ***Section 6.1.1.2***, would serve as a future regional power source that would likely deliver power to the existing utility grid in the Cleveland metropolitan area.

6.1.2 CUMULATIVE IMPACTS

The following sections describe cumulative impacts to resource areas from the proposed LEC Project and other present or reasonably foreseeable actions. No cumulative effects are anticipated for Land Use, Hazardous Materials and Wastes, Socioeconomics or Environmental Justice.

6.1.2.1 Transportation and Traffic

Cumulative impacts of road and bridge construction projects discussed in ***Section 6.1.1.3*** occurring within the same time and place as the proposed LEC Project could result in increased but local and temporary disturbances of traffic patterns and intensified but local and temporary increases in truck traffic. These effects are unlikely, however, due to the proposed LEC Project construction schedule and in-service date by fourth quarter 2019.

6.1.2.2 Water Resources and Quality

Construction of the proposed LEC Project, combined with shipping, recreation and commercial fishing activities in Lake Erie, may have the potential to contribute to cumulative impacts to water resources and quality. Cumulative impacts may include disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants into the water column, and increasing the potential for spills. Sediment concentrations from the combined activities would drop rapidly with distance from the disturbances and begin to diminish immediately after the proposed LEC Project activities end. Spill prevention plans would be in place to decrease the likelihood of contaminates being released into Lake

Erie. Once the proposed LEC Project construction is complete, cumulative impacts to water resources and quality would be expected to cease.

6.1.2.3 Aquatic Habitats and Species

Cumulative impacts to water quality from the construction of the proposed LEC Project, combined with shipping, recreation and commercial fishing activities in Lake Erie, may have the potential to affect benthic communities and fish. Potential effects include disturbing aquatic substrates, temporarily increasing turbidity, resuspending contaminants that are present into the water column, and increasing the potential for spills. Once the proposed LEC Project construction is complete, cumulative impacts to aquatic habitats and species would be expected to cease.

6.1.2.4 Aquatic Protected and Sensitive Species

No federally listed endangered, threatened, or candidate aquatic species have been identified in proximity to the proposed LEC Project route; therefore, no cumulative impacts on aquatic protected and sensitive species would occur.

6.1.2.5 Terrestrial Habitats and Species

The proposed LEC Project effects on wetland and forested habitat, combined with other unidentified development activities in Erie County, could result in minor temporary and permanent cumulative affects to terrestrial habitats and species. Forested areas along the LEC Project route have the potential to provide habitat for avian and bat species, while wetland communities have the potential to meet the specific habitat needs of a number of plant and animal species. The proposed LEC Project would result in 0.8 acres of temporary wetland impacts and 1.0 acre of permanent wetland impacts. Additionally, the proposed Project would result in the permanent conversion of forested habitat between the Lake Erie shoreline and Route 5, as well as, between Route 20 and Springfield Road. The new Erie Converter Station would be located approximately 1,500 feet from the existing Erie West Substation, which would add to the cumulative impacts to terrestrial habitat in the vicinity of the two stations. Applicant proposed wetland mitigation and the implementation of BMP's would reduce cumulative terrestrial habitat and species impacts.

6.1.2.6 Terrestrial Protected and Sensitive Species

Proposed construction may affect protected and sensitive wildlife species known to occur in the Lake Erie and Overland segments of the proposed LEC Project area (i.e., the Indiana bat, northern long-eared bat, bald eagle, bank swallow, and migratory birds). ITC Lake Erie proposes to restrict tree cutting to November 16 through March 31. The proposed LEC Project is not likely to adversely affect the Indiana bat or the northern long-eared bat (HDR 2016). The seasonal restriction on clearing trees would also help avoid affecting other species that hibernate or migrate out of the proposed Project area during wintertime.

Construction noise from the proposed LEC Project combined with other construction could affect the behavior of bats foraging or roosting in the area adjacent to the Overland Segment; however, Indiana bats and northern long-eared bats using the area currently occur in proximity to active road corridors and most likely are already habituated to fluctuating noise levels. Migratory birds are also familiar with boat traffic and vessel horns, as well as human interaction and are not likely to be adversely affected by the temporary construction noise.

6.1.2.7 Geology and Soils

Impacts on sediments in the Lake Erie Segment would be expected from the proposed transmission cable installation activities. Other activities (*i.e.* commercial shipping, recreation, and fishing) and projects that are close in both time and proximity that would disturb sediments would be expected to have incremental, additive impacts greater than just the LEC Project. Sediment concentrations from the combined activities would fall rapidly with distance from the disturbances and diminish after activities have ceased.

Establishing work areas, installing the transmission cable, and constructing the proposed new Erie Converter Station would temporarily disturb an estimated 82 acres of land. The majority of this disturbance would occur within existing, previously disturbed ROWs. New areas adjacent to ROWs where sediments would be disturbed may permanently compact these soils and reduce vegetative cover. The proposed Project would not result in any new impervious surfaces, except within the new Erie Converter Station development footprint. Additionally, 6 acres of prime farmland are proposed to be permanently disturbed for construction of the proposed new Erie Converter Station. Regional development and roadway construction projects located within the spatial and temporal ROI have the potential to cumulatively affect geology and soils. ITC Lake Erie's proposed use of construction related BMPs and long-term stormwater management measures would minimize the potential for cumulative effects.

6.1.2.8 Cultural Resources

No specific cumulative effects have been identified; however, consultation with the PASHPO is ongoing to determine direct, indirect, and cumulative effects on cultural resources.

6.1.2.9 Infrastructure

The analyses in ***Sections 5.1.11*** and ***5.2.11*** identify negligible impacts on existing infrastructure. ITC Lake Erie has developed specific design and construction measures to further reduce impacts. The construction and operation of the proposed Project would not require any new regional infrastructure or modifications to existing regional infrastructure. To date, no projects have been identified that would result in cumulative impacts on existing infrastructure.

6.1.2.10 Recreation

The proposed LEC Project may temporarily affect boaters and water recreation during installation, maintenance and emergency repairs through the presence of construction/maintenance vessels and limited closures around construction/maintenance sites. Although no other water-based construction activities have been identified in the ROI, multiple aquatic construction activities have the potential to cumulatively increase vessel activity and closures in the immediate vicinities of the proposed construction activities. The closures would be temporary and watercraft would be able to maneuver around closed areas.

The proposed LEC Project Overland Segment construction, coupled with potential road improvements identified in ***Section 6.1.1.3***, could result in temporary road closures for recreational users (i.e. cyclists). Potential effects would be localized and for the duration of the construction activity.

6.1.2.11 Visual Resources

The new Erie Converter Station is proposed to be located approximately 2,153 feet from the existing Penelec Erie West Substation and would cumulatively affect the visual landscape of the area. The new Erie Converter Station is bound to the west and south by wooded areas, which would help to minimize its visual effects from those viewsheds. The presence of the proposed new Erie Converter Station would affect views from homes along the north and east of the proposed site, and along the roadway adjacent to the site. A proposed vegetative buffer would minimize these effects. Additional mitigation of visual effects could include use of non-reflective paints and materials and subdued paint colors to limit the contrast and associated visibility of the station.

6.1.2.12 Public Health and Safety

The proposed new Erie Converter Station would be located approximately 2,153 feet from the existing Penelec Erie West Substation. The proposed AC line connecting the new Erie Converter Station to the existing Erie West Substation would be a new and additional source of magnetic fields at that site. Magnetic fields are shown to become negligible with increasing distance from the source, especially when buried. However, no cumulative impacts to public health and safety are anticipated as the public would be generally excluded from the new converter station site.

6.1.2.13 Air Quality

Emissions from the proposed 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 specific impacts (if any) of climate change that may be produced near the proposed LEC Project or elsewhere. Additionally, the proposed LEC Project would alleviate the need to operate older, more emissive power plants, resulting in long-term, beneficial cumulative impacts on air quality.

6.1.2.14 Noise

Construction of the proposed LEC Project could have temporary cumulative impacts on the noise environment when combined with road improvement activities discussed in ***Section 6.1.1.3***. These impacts would be temporary and would last for the duration of the proposed construction activities. Noise produced by the operation of the proposed new Erie Converter Station would be cumulatively added to noise produced by the existing Erie West Substation. Predictive modeling discussed in ***Section 5.2.15.2*** indicates that the level of noise likely to be produced by equipment at the new Erie Converter Station during normal operations would not adversely affect sensitive receptors close to the facility.

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7 LIST OF PREPARERS

U.S. Department of Energy	
Name	**Organization**
Brian Mills	DOE Office of Electricity Delivery and Energy Reliability, Washington, DC
Lynn Alexander	DOE Office of Electricity Delivery and Energy Reliability, Washington, DC
Cooperating Agencies	
Michael Fodse	U.S. Army Corps of Engineers, Pittsburgh District

EA Preparation Team

Name	Education/Experience	Responsibility
Kelly Schaeffer	**Education:** MS, Recreation and Resource Management, Pennsylvania State University (1991); BS, Recreation Resources Management, University of Maryland (1986) **Experience:** 25 years professional experience	Project Manager
Alison Jakupca	**Education:** B.S. Wildlife, Aquaculture and Fisheries, Clemson University (2004) **Experience:** 12 years professional experience	Deputy Project Manager Traffic and Transportation Public Health and Safety Hazardous Materials and Wastes Web-site Development
Rachel Russo	**Education:** Ph.D. Earth and Environmental Science, University of New Hampshire (2009); M.S. Earth Science, University of New Hampshire (2005); BS Physics, Rensselaer Polytechnic Institute (2001) **Experience:** 6 years professional experience	Air Quality
Alex Malvezzi	**Education:** B.S. Biology, Quinnipiac University (2009); M.Sc. Marine Science, Stony Brook University (2014) **Experience:** 3 years professional experience	Water Resources and Quality Aquatic Habitats and Species Aquatic Protected and Sensitive Species Noise
Kayla Easler	**Education:** B.S. Wildlife Ecology, with a concentration of Wildlife Science and Management, University of Maine (2012) **Experience:** 4 years professional experience	Wildlife Terrestrial Habitats and Species Wildlife Terrestrial Protected and Sensitive Species
Antonio Federici	**Education:** B.S. Natural Resources **Experience:** 19 years professional experience, Professional Wetland Scientist	Botanical Terrestrial Habitats and Species Botanical Terrestrial Protected and Sensitive Species Wetlands
Tracy Maynard	**Education:** B.S. Environmental Science, Marine Science Concentration, University of Connecticut (1999) **Experience:** 16 years professional experience	Technical Reviewer: Water Resources and Quality Aquatic Habitats and Species Aquatic Protected and Sensitive Species
Steve Knapp	**Education:** B.S. Wildlife Ecology **Experience:** 12 years; Professional Wetland Scientist	Technical Reviewer: Wetlands Terrestrial RTE Botanical
Laura Cowan	**Education**: M.S. Earth and Environmental Sciences, Lehigh University (2004), B.S. Science, The Pennsylvania State University (2002) **Experience:** 12 years professional experience	Geology and Soils
Amanda Fleming	**Education**: B.S Auburn University, Environmental Science (2000)	Cultural Resources

	M.S. Troy University, Environmental Analysis and Management (2006) **Experience**: 15 years professional experience	
Robert Klosowski	**Education**: MS, Resource Economics, University of Massachusetts (2000); BS, Electrical Engineering, Virginia Polytechnic Institute (1984) Experience: 18 years professional experience	Infrastructure GIS Support
Karen Klosowski	**Education:** Masters of Urban and Regional Planning, Virginia Polytechnic Institute & State University (1995); Masters of Landscape Architecture, Virginia Polytechnic Institute & State University (1993); B.S. Parks and Recreation, Pennsylvania State University (1985) **Experience:** 22 years professional experience	Recreation Socioeconomics Environmental Justice Visual Resources
Kerry Strout	**Education**: MS Resource Management and Administration, Antioch University New England **Experience**: 10 years professional experience	Administrative Record
Carol DeLisle	**Education:** BA, Biological Science, University of Maryland Baltimore County (1988) **Experience:** 23 years professional experience	Technical Editor
Sue Byrd	**Experience:** 31 years professional experience	Document Compilation Editing Formatting

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9 ACRONYMS AND ABBREVIATIONS

µg/l	Micrograms a Liter
ABACT	Antidegredation Best Available Combination of Technologies
AC	Alternating Current
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
APEA	Applicant-prepared Environmental Assessment
Applicant	ITC Lake Erie Connector, LLC
AQCR	Air Quality Control Region
ASFPM	Association of State Floodplain Managers
BGEPA	Bald and Golden Eagle Protection Act
BHP	Bureau for Historic Preservation
BMP	Best Management Practice
BP	Before Present
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
CH_4	Methane
CHPE	Champlain Hudson Power Express
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPP	Clean Power Plan
CRGIS	Cultural Resources Geographic Information System
CRMP	Coastal Resources Management Program
CSR	Canadian Seabed Research, Ltd.
CSX	CSX Railroad
CWA	Clean Water Act
CWF	Cold Water Fishes
CWTG	Cold Water Task Group
dB	decibel
dBA	A-weighted Decibel
DBH	Diameters to Breast Height
DC	Direct Current
DOE	U.S. Department of Energy
DP	Dissolved Phosphorus
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EO	Executive Order
EPA	U.S. Environmental Protection Agency

ERRP	Emergency Repair and Response Plan
ESA	Endangered Species Act
ES&I	Environmental Solutions & Innovations, Inc.
EV	Environmental Solutions & Innovations, Inc.
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
FWS	U.S. Fish and Wildlife Service
G	Gauss
GHG	Greenhouse Gas
GIS	Geographic Information System
GLWQA	Great Lakes Water Quality Agreement
HAP	Hazardous Air Pollutant
HASP	Health and Safety Plan
HDD	Horizontal Direction Drilling
HDPE	High Density Polyethylene
HDR	HDR Engineering, Inc.
HQ	Headquarters
HQ-CWF	High Quality-Cold Water Fisheries
HVDC	High-Voltage Direct Current
IBA	Important Bird Area
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IESO	Independent Electricity System Operator
IGBT	Insulated Gate Bipolar Transistor
IJC	International Joint Commission
ITC Lake Erie	ITC Lake Erie Connector, LLC
Joint Plan	Joint Strategic Plan for Management of Great Lakes Fisheries
KP	Kilometer Post
kV/m	kilovolts per meter
lb/ft	pounds per foot
L1UBH	Lacustrine, limnetic, unconsolidated bottom, permanently flooded
LEC	Lake Erie Committee
LEDPA	Least Environmentally Damaging Practicable Alternative
LERC	Lake Erie Region Conservancy
LEQ	Equivalent Continuous Noise Level

mg/L	milligrams per liter
MBTA	Migratory Bird Treaty Act
mG	MilliGauss
MGD	Million Gallons per Day
MMTCO2e	Million Metric Tons of Carbon Dioxide Equivalent
MNFI	Michigan Natural Features Inventory
MSDS	Material Safety Data Sheet
MW	Megawatt
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
ng/g	Nanograms per Gram
NAAQS	National Ambient Air Quality Standards
NECPL	New England Clean Power Link
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCC	Northeast Regional Climate Center
NRCS	Natural Resources Conservation Service
NRHP	National Register Historic Places
NYSDEC	New York State Department of Environmental Conservation
NYISO	New York Independent System Operator
O_3	Ground-level Ozone
ODNR	Ohio Department of Natural Resources
OE	DOE Office of Electricity Delivery and Energy Reliability
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
PA	Programmatic Agreement
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PAH	Polycyclic Aromatic Hydrocarbons
PASHPO	Pennsylvania State Historic Preservation Office
PASS	Pennsylvania Archaeological Site Survey
Pb	Lead
PCB	Polychlorinated Biphenyls
PEM	Palustrine Emergent Wetlands
PennDOT	Pennsylvania Department of Transportation
PFBC	Pennsylvania Fish and Boat Commission
PFO	Palustrine Forested Wetland
PGC	Pennsylvania Fish and Boat Commission
PHMC	Pennsylvania Historical and Museum Commission
PJM	PJM Interconnection, LLC

PM	Particulate Matter
PNDI	Pennsylvania Natural Diversity Inventory
PNHP	Pennsylvania Natural Heritage Program
POI	Point of Interconnection
PPC	Preparedness, Prevention and Contingency
PPE	Personal Protective Equipment
PSS	Palustrine Scrub-Shrub
PUB	Palustrine Unconsolidated Bottom
PVC	Polyvinyl Chloride
RACM	Reasonably Available Control Measure
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credits
ROI	Region of Influence
ROW	Right-of-Way
RPS	Renewable Portfolio Standards
RTO	Regional Transmission Operator
SO_2	Sulfur Dioxide
SALDO	Subdivision and Land Development Ordinance
SAV	Submerged Aquatic Vegetation
SCUBA	Self-contained Underwater Breathing Apparatus
SIP	State Implementation Plan
SPP	Spill Prevention Plan
SWMO	Stormwater Management Ordinance
TMDL	Total Maximum Daily Load
TP	Total Phosphorous
TSS	Total Suspended Solids
UNT	Unnamed Tributary
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
VOC	Volatile Organic Compound
VSC	Voltage Source Convertor

10 GLOSSARY

Alternating Current (AC) – Current that varies, or cycles, over time in both magnitude and polarity.

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.

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.

Chert - Stone used in tool making

Cofferdam – A temporary enclosure built within a waterbody that creates a water-free work environment.

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.

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.

Critical Habitat - A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.

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).

Debitage - Material produced during production of stone tools.

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).

Dewater – To remove water.

Dielectric – A nonconductor of direct electric current.

Direct Current (DC) – Current that is steady and does not change sinusoidally (periodically) with time.

Direct Effect - As defined in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.8(a)), direct effects are those "which are caused by the action and occur at the same time and place."

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.

Electric Field - A region around a charged particle or object within which a force would be exerted on other charged particles or objects.

Electric and Magnetic 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.

Element Occurrence (EO) - The Element Occurrence data standard is the product of a collaboration among NatureServe network scientists to improve the consistency and accuracy of EO data throughout the network. It sets out a standardized vocabulary and definitions and establishes guidelines for the collection and management of EO attribute data as well as their spatial representation on maps.

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 Assessment (EA) – 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.

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).

Extremely Low Frequency (**ELF**) **-** Extremely low frequency refers to an electromagnetic field having a frequency much lower than the frequencies of signals typically used in communications. ELFs include alternating current (AC) fields and other electromagnetic, non-ionizing radiation from 1 Hz to 300 Hz

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.

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.

Grapnel - Grappling operations are performed to recover cable or ground-rope from the seabed or to clean up the seabed prior to cable or pipe installations.

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).

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.

Jack and Bore - A trenchless method for installing new cased pipe under existing railways, roadways, and canals without disrupting or inhibiting their use. This method of horizontal auger boring typically involves digging a bore pit to the pre-determined depth, with a tunnel connecting it to a reception pit. Tracks are set in alignment with bore path and the boring machine is set in the pit. The auger is stuffed into the casing and the lead piece is set on the track. The machine turns the cutting head, creating the bore path that the casing is then simultaneously jacked into. The auger carries debris back to the bore pit, where it is removed with a skidsteer and hoisted out of the pit

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.

Lacustrine System - This system includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or dammed river channel; (2) lacking trees, shrubs, persistent emergent, emergent mosses or lichens with greater than 30 percent areal coverage, and (3) total area exceeds 20 acres. Similar wetland and deepwater habitats totaling less than 20 acres are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 6.6 feet at low water. *Definition modified from Cowardin et al 1979.*

Lake Erie Segment - The underwater transmission cable system in the Lake Erie lakebed.

Limnetic - All deepwater habitats within the Lacustrine System. *Definition from Cowardin et al 1979*

Lithic - Relating to stone

Littoral - All wetland habitats in the Lacustrine System. Extends from the shoreward boundary of the system to a depth of 6.6 feet below low water or to the maximum extent of non-persistent emergent, if these grow at depths greater than 6 feet. *Definition modified from Cowardin et al 1979.*

Magnetic Field - The magnetic influence of electric currents and magnetic materials. The magnetic field at any given point is specified by both a direction and a magnitude (or strength); as such it is a vector field.

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.

Overland Segment - The underground transmission cable system between the shoreline and the existing Erie West Substation, including the proposed new Erie Converter Station

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.

Particulate Matter (PM) - An air pollution term for a mixture of solid particles and liquid droplets found in the air. The pollutant comes in a variety of sizes and can be composed of many types of materials and chemicals. Particles that are small enough to be inhaled have the potential to cause health effects.

Perennial (Streams or Creeks) – Those with year-round water flow.

Project Route – The proposed Project route consists of an approximate 72-mile long, high-voltage direct current (HVDC) electric power transmission system that originates in Haldimand County, Ontario, Canada and terminates in Erie County, Pennsylvania, United States. The United States' portion of the proposed LEC Project is approximately 42.8 miles. The LEC Project would cross the United States-Canadian border in Lake Erie as a submerged cable (approximately 35 miles in the Lake Erie lakebed) and would emerge onshore on private property, west of Erie Bluffs State Park. The proposed LEC Project would then run approximately 7 miles underground to a proposed new Erie Converter Station in the Conneaut Township in Erie County, Pennsylvania. Approximately 2,153 feet of 345-kV AC underground transmission cables would run between the new Erie Converter Station and the nearby Penelec Erie West Substation. The proposed LEC Project would terminate at the existing Penelec Erie West Substation and interconnect with the transmission system operated by PJM Interconnection, LLC, (PJM) a Regional Transmission Operator (RTO).

Region of Influence (ROI) – The geographic extent being evaluated for each particular resource area in the Environmental Assessment. 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.

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.

Sedimentation – The deposition or accumulation of sediment.

Seismicity – The frequency or magnitude of earthquake activity in a given area.

Shear Plow – 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 lakebed or riverbed, and the plow blade cuts a trench in the lake or riverbed 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.

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.

Susquehanna Broadspear - Stone projectile points from Native Americans in the northeastern United States

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 (see also **Transmission Line**) – An insulated conductor used for underground or submarine electric transmission applications.

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.

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).

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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11 INDEX

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W

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