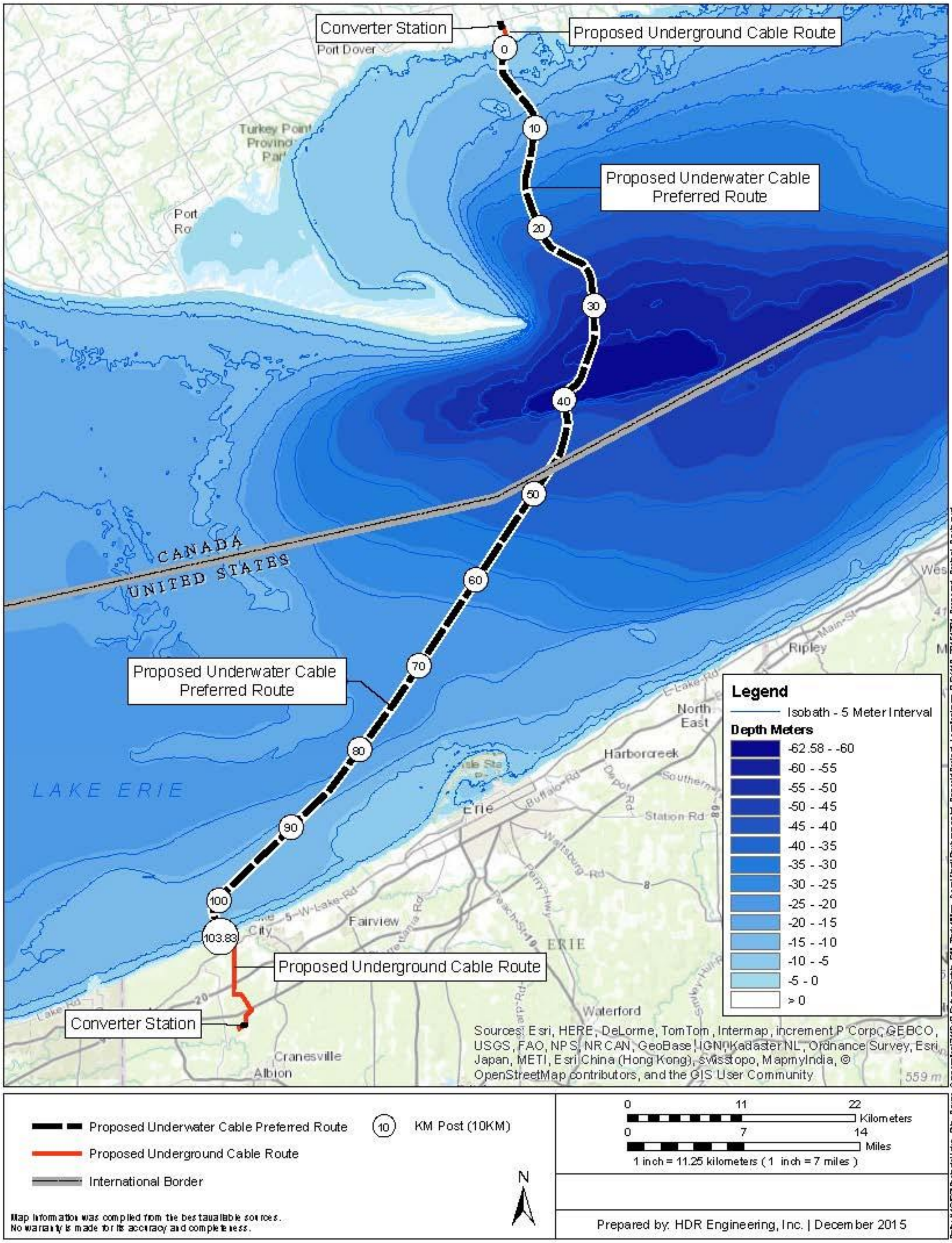
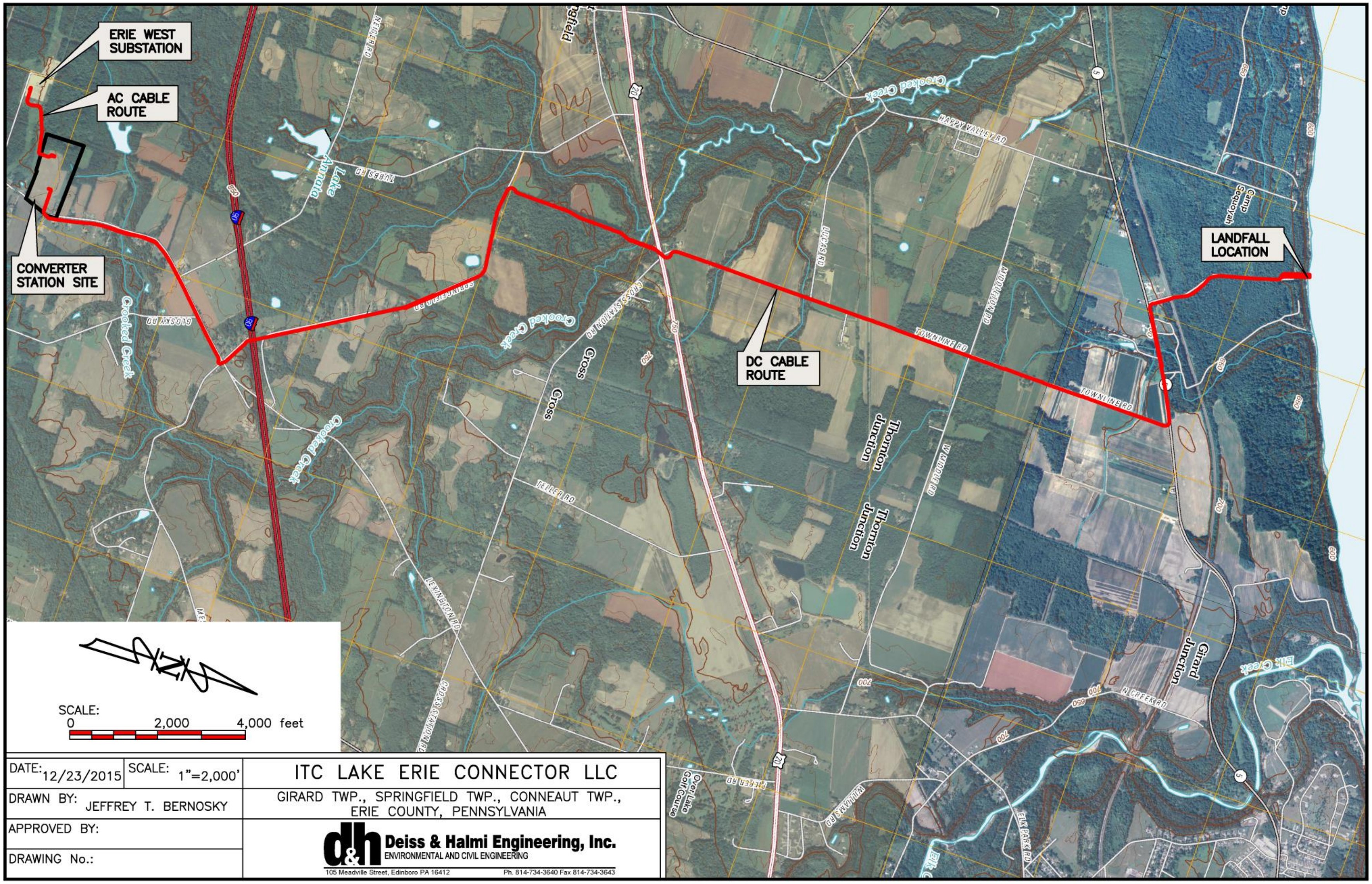
SECTION I: LOCATION MAPS

- Project Location Map
- Underground Segment Route Map

Project Location Map



Underground Segment Route Map



SECTION J: PROJECT DESCRIPTION AND NARRATIVE

1.0 OVERVIEW

ITC Lake Erie Connector LLC (the Applicant) is proposing to construct and operate the Lake Erie Connector Project (Lake Erie Connector or the Project), an approximately 72.4 mile (116.5 km) 1,000 megawatt (MW) +/-320 kilovolt (kV) high-voltage direct current (HVDC) bi-directional electric transmission interconnection to transfer electricity between Canada and the United States (U.S.). For purposes of permits being issued in the U.S., the Project consists of an approximately 42.5-mile (68.4 km) HVDC transmission line that would be buried in the lakebed bottom of Lake Erie from the U.S.-Canada border and be installed underground in Pennsylvania to a new converter station, called the Erie Converter Station, as well as approximately 2,082 ft (635 m) of underground 345 kV alternating current (AC) cable between the Erie Converter Station and the nearby existing Penelec Erie West Substation. The converter station will include equipment to change the AC of the existing aboveground transmission network to the direct current (DC) transmitted by the proposed Project, and vice versa. HVDC technology is used for the Project because it has many advantages over AC technology for long distance power transmission. These advantages include the ability to control power flow and lower transmission losses.

The Applicant is submitting this application for

1. a Rivers & Harbors Act §10 and Clean Water Act §404 permit for proposed work in and under the bed of Lake Erie;
2. a Clean Water Act §404 permit for stream crossings and wetland encroachments related to the Erie Converter Station site and underground portion of the Project;
3. a Pennsylvania Water Obstruction and Encroachment Permit for both the in-lake/underwater work and stream crossings and wetland encroachments associated with the Erie Converter Station and underground portion of the Project;
4. a §401 Water Quality Certification from the PADEP covering the activities that would be permitted under the USACE River and Harbors Act and §404 permits; and
5. a submerged lands license agreement from the PADEP for the submerged lands of the Commonwealth in the bed of Lake Erie that would be permanently occupied by the Project.

1.1 Project Purpose

The purpose of the Project is to develop a controllable HVDC submarine and underground bi-directional merchant transmission facility that will interconnect the Independent Electricity System Operator (IESO) market in Ontario to the PJM market in the U.S. to facilitate the transfer of electricity, improve availability, and diversify electric energy supply portfolios for both markets.

1.2 Project Need

The Project provides a new pathway for power transfers between the IESO and PJM grids. The Project will enhance power system reliability while providing improved access to markets and could be utilized to support energy and environmental policy goals. In addition, the Project will provide substantial public benefits of the types referenced in 25 Pa.Code §105.16 (see Section S). This includes enabling the development of energy resources by providing the ability to tap into clean energy generation in Canada to help support electric demand in Pennsylvania and more broadly in PJM makeup capacity lost as a result of coal and other fossil fuel plant retirements in the U.S., the creation or preservation of employment during construction and operation of the Project, provision of public utility services by improving the availability of the electric grid (PJM and IESO) and provision of economic benefits in Pennsylvania including tax revenues over the course of the Project's lifetime and the creation of construction and operations jobs.

1.2.1 Power System Benefits

By increasing transfer capability between Ontario and PJM and establishing a direct controlled intertie between the IESO and PJM wholesale electricity markets, the Project will augment power system availability in the Eastern Interconnection. The Project will provide a source of energy supply during all hours of operation. This new access to energy supply sources could help system operators at PJM and IESO avoid emergency control actions (e.g., voltage adjustments, shedding load) that would otherwise be needed to maintain the stability of their respective power systems when the systems are stressed and/or under very tight supply.

HVDC transmission with voltage source converter (VSC) technology to be used in the Project allows for immediate and automatic control of voltage through reactive power adjustment at the point of interconnection. Reactive power is critical to the reliable operation of power systems. From an operational perspective, having adequate reactive capability in appropriate locations on the grid is essential to mitigating potential for voltage concerns, including voltage collapse that can lead to a regional or system-wide blackout.

HVDC transmission lines also can help to maintain the scheduled flow of energy independent of conditions on the connecting power systems. There are times during a system disturbance when the continued flow of energy may be essential to maintain stability, and the Project will provide this capability. By facilitating the exchange of energy between the power systems, the Project will provide operational and planning flexibility.

1.2.2 Market Efficiency Benefits

The wholesale electricity markets in Ontario and PJM operate to facilitate competitive wholesale power markets by providing clear price signals regarding the relative value of energy.

Because no direct connection between Ontario and PJM presently exists, transacting between these two electricity markets has been inefficient. Exporting energy from Ontario to PJM requires energy to either travel around the east side of Lake Erie through New York (through the New York Independent System Operator (NYISO) wholesale electricity market) into PJM or around the west side of the lake through the Midwest U.S. (through the MISO wholesale electricity market) into PJM. Either of these routes can result in power system congestion, as well as additional costs associated with transacting through these other markets before accessing PJM. Similar challenges are associated with transmitting energy from PJM to Ontario. The integration of the Project into the IESO and PJM wholesale electricity markets will improve market efficiency by enabling direct energy transactions.

1.2.3 Environmental Benefits

The Project may assist with meeting Renewable Portfolio Standards (RPS) in PJM states. PJM has recently estimated that PJM states would need approximately 22,000 MW of wind generation and 7,000 MW of solar generation to meet existing RPS needs by 2020, which is around three times as high as the current levels of renewable generation in PJM.[1] As a result, considering Ontario's generation supply mix, the Project provides the potential for exports of energy, capacity, and/or Renewable Energy Credits (RECs) that could be used to meet applicable RPS in PJM states.

Moreover, the Environmental Protection Agency's proposed Clean Power Plan (CPP) will require reductions in carbon emissions from existing fossil fuel generation, beginning in 2022. The CPP was adopted by EPA as final rulemaking in October 2015. Under the CPP, States are required to develop and submit implementation plans for achieving carbon emission reductions from the power generation sector. Under those implementation plans, retirements of fossil fuel generation (particularly coal-fired generation) are likely.[2] The Project could make an important contribution to replacing that generation[3].

2.0 PROJECT DESCRIPTION

This section provides a description of the facilities associated with the Project and the proposed construction or installation techniques. The Project has three distinct components: the converter stations, the underground cable systems, and the underwater cable systems, each of which is described below.

2.1 General Project Description

For purposes of permits being issued in the U.S., the Project consists of an approximately 42.5-mile, 1,000-MW, +/-320-kV, HVDC, bi-directional electric transmission interconnection to transfer electricity from the U.S.-Canada border, as well as approximately 2,082 ft of underground, 345 kV, AC cable between the proposed Erie Converter Station and the nearby existing Penelec Erie West Substation (Figure 2.1-1).

An HVDC electric power transmission system uses direct current (DC) for the bulk transmission of electrical power, in contrast with more common alternating current (AC) systems. For underwater cable projects, either high voltage AC (HVAC) or high voltage DC (HVDC) transmission is possible, each with its advantages and disadvantages, which are heavily dependent on the route length, voltage, and transmission capacity. The main advantage of HVDC transmission over HVAC is the ability to control power flow and lower transmission line

[1] See *Introduction to the PJM Renewable Integration Study* (March 2014) at https://www.pjm.com/committees-and-groups/subcommittees/irs/pris.aspx

[2] *See* the March 2, 2015 "PJM Economic Analysis of the USEPA Clean Power Plan" for a discussion of capacity at risk of retirement.

[3] Additional pending regulatory proposals, if adopted, would cause retirement of significant coal fired generation in Pennsylvania and other parts of PJM much sooner than the CPP. EPA's December 3, 2015 proposed amendment to the Cross-States Air Pollution Rule (CSAPR) proposes major reductions in the NOx allowances for emissions during the summer ozone season starting in 2017. The EPA proposal would impose a 74% reduction for Pennsylvania NOx emissions, which would result in a significant curtailment of coal plant generation, particularly during summer peak electric demand periods.

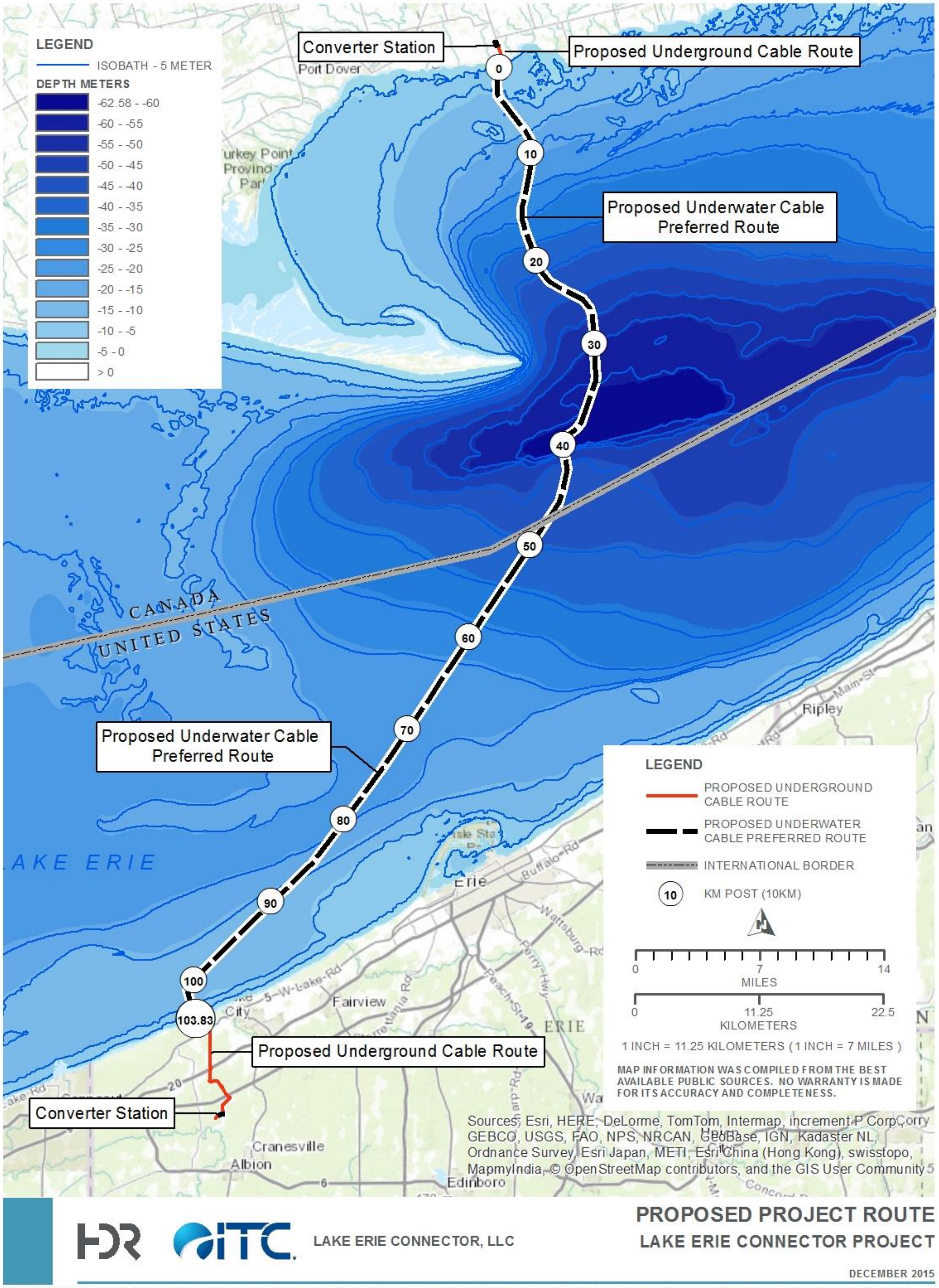
losses. In addition, an HVAC cable system needs three cables to convey the electricity (not counting a separate communications line to facilitate control), whereas an HVDC cable system only needs two electric transmission cables. When connecting two different electrical systems, HVDC is typically selected as it is asynchronous and can adapt to almost any rated voltage and frequency.

In the U.S., the Project would consist of one 1,000-MW HVDC transmission line and an HVDC converter station with ancillary aboveground facilities. In Canada, the Lake Erie Connector facilities include another HVDC converter station (the Haldimand Converter Station), which would be located near a Point of Interconnection (POI) at the existing Nanticoke TS switchyard in Haldimand County near the Hamlet of Nanticoke, Ontario. The Haldimand Converter Station lies within part of the Ontario Independent Electricity System Operator (IESO) grid and would convert 500-kV AC power to +/- 320-kV DC power or vice-versa. The Haldimand Converter Station would connect to the IESO grid at a POI 0.8 mi. (1.3 km) away, at the existing Nanticoke TS switchyard in the Hamlet of Nanticoke.

The HVDC transmission line consists of two transmission cables, one positively charged and the other negatively charged, along with a fiber optic cable for communications between the converter stations. In the U.S., the transmission line elements of the Project consist of:

- HVDC underwater (from the U.S./Canada border to landfall in Erie County) - 35.4 mi (57.0 km);
- HVDC underground (from landfall to the Erie Converter Station) - 7.1 mi (11.4 km); and
- HVAC underground (from Erie Converter Station to Erie West Substation) - 2,082 ft (635 m).

Figure 2.1-1 Proposed project route.



The cables would make landfall in Springfield Township in Erie County, Pennsylvania, and in the landward segment would be installed primarily along existing roadways to a new HVDC converter station (Erie Converter Station) to be constructed in Conneaut Township in Erie County, Pennsylvania. The Erie Converter Station would convert +/- 320-kV DC power to 345 kV AC power or vice-versa and connect to a nearby POI at the existing Penelec Erie West Substation that is part of the PJM grid. The 345 kV AC underground cables between the Erie Converter Station and the nearby Erie West Substation would be approximately 2,082 ft (635 m) in length.

The U.S. portion of the Project, including the Erie Converter Station facility, underground cable system, and underwater cable system are further described in the following sections, along with general information about installation methods for each component of the U.S. portion of the Project.

2.2 Erie Converter Station Description

2.2.1 General Facility Location and Description, Erie Converter Station

The proposed Erie Converter Station site location and layout is shown in Figure 2.2-1. The selected location and layout of the Erie Converter Station is intended to be close to the existing Penelec Erie West Substation, avoid wetland effects, and minimize other environmental and community effects.

An area of approximately six acres (2.4 hectares) is required for the Erie Converter Station with its surrounding equipment and access ways. In addition to the permanent area occupied by the Erie Converter Station facilities, additional area will be occupied by related construction period and post-construction stormwater management facilities. Additional area will be temporarily disturbed during construction for material laydown and staging and to support construction efforts. The total disturbed area associated with the Erie Converter Station site is approximately 21.4 acres (8.7 hectares). The Erie Converter Station would have a main building, which would house HVDC converter modules; a service building to contain the control and protection equipment, cooling equipment, and auxiliary distribution panels; and a storage building. The HVDC converter modules will convert the AC power to DC power using Voltage Source Converter (VSC) technology which utilizes Insulated Gate Bipolar Transistors (IGBTs). The main building (converter hall) would be approximately 370 ft by 110 ft (110 m by 35 m) with a building footprint of 1 acre (0.4 hectares) and a height of approximately 60 ft (18 m) (Figure 2.2-2). The indoor design of the HVDC converter modules would reduce audible sound and protect the equipment from exposure. The primary equipment installed outside of the buildings is anticipated to include circuit breakers, disconnects, surge arrestors, transformers, cooling equipment, and metering units. The facility will also have an emergency generator. Security fencing will prevent unauthorized access and provide for public safety.

A driveway will provide access to the site from nearby roadways. The driveway would be approximately 20 ft (6.1 m) wide, with an approximate maximum 3-ft (0.9 m) wide shoulder. Culverts will be installed to maintain appropriate conveyance of stormwater flows without adverse impact to upstream or downstream properties.

The Erie Converter Station will interconnect with the existing electrical power systems at the nearby existing Penelec Erie West Substation POI (Figure 2.2-3) through underground AC cables (discussed further in Section 2.3).

Figure 2.2-1 Preliminary Erie Converter Station site location and layout

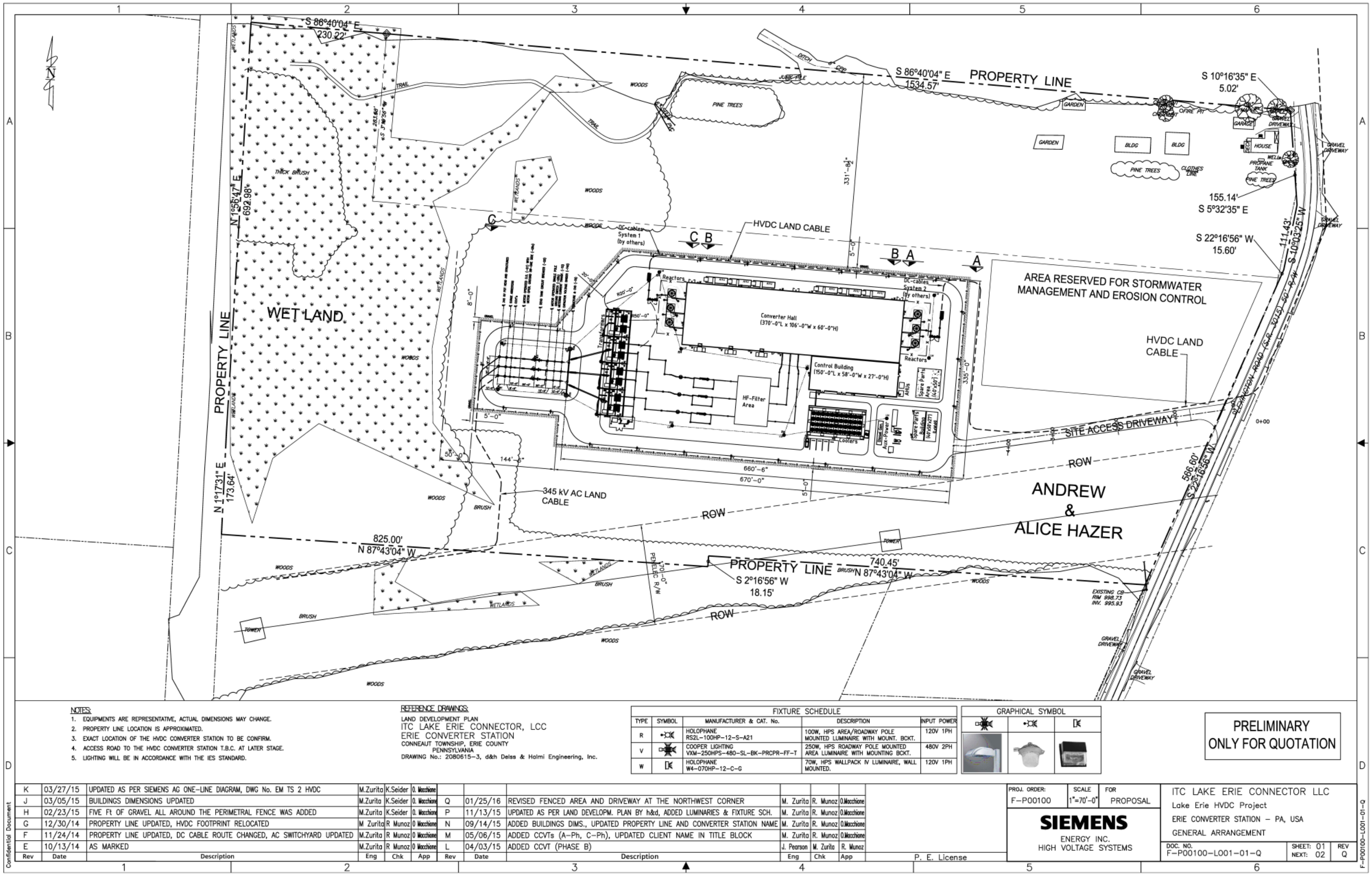
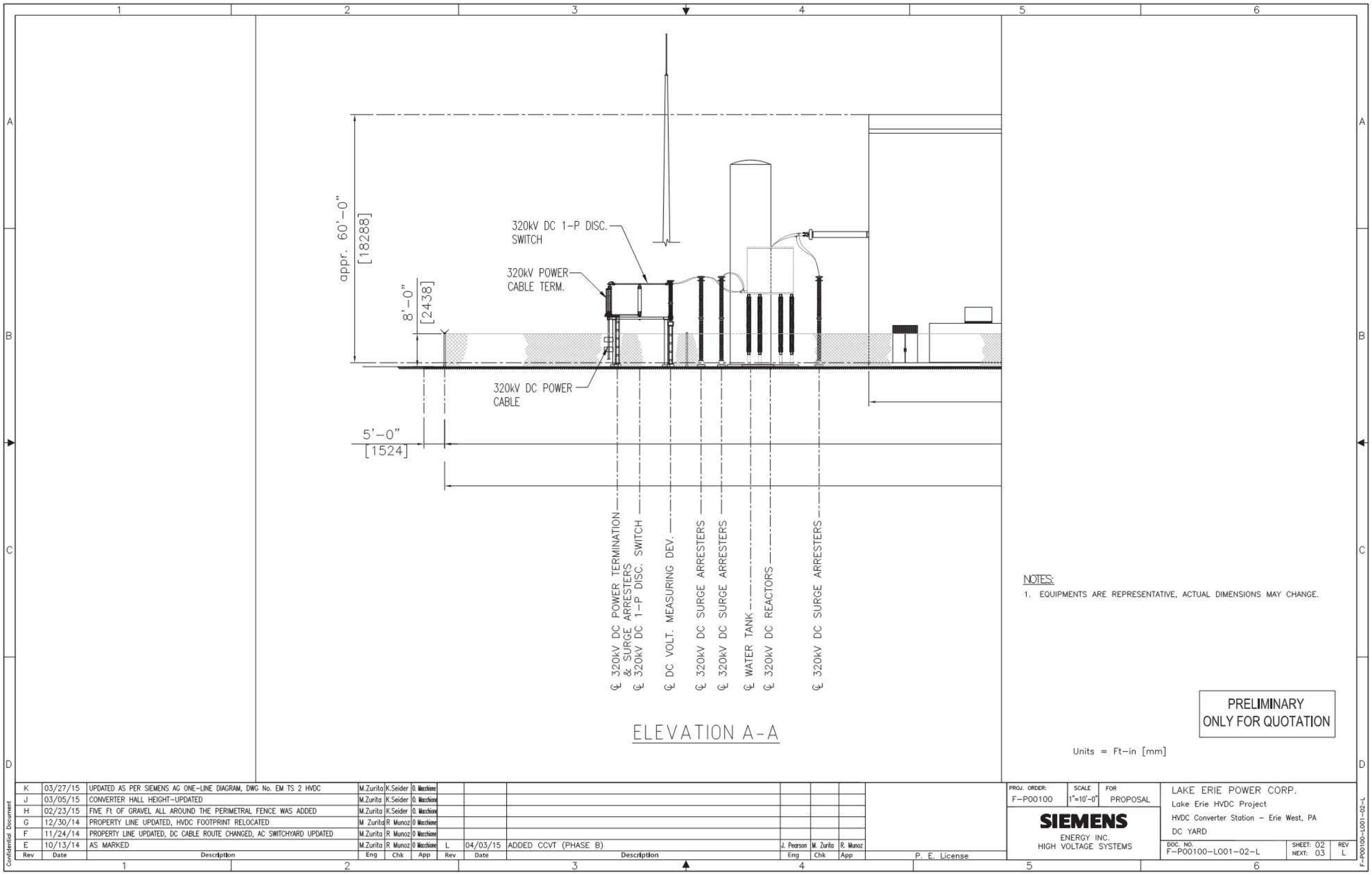
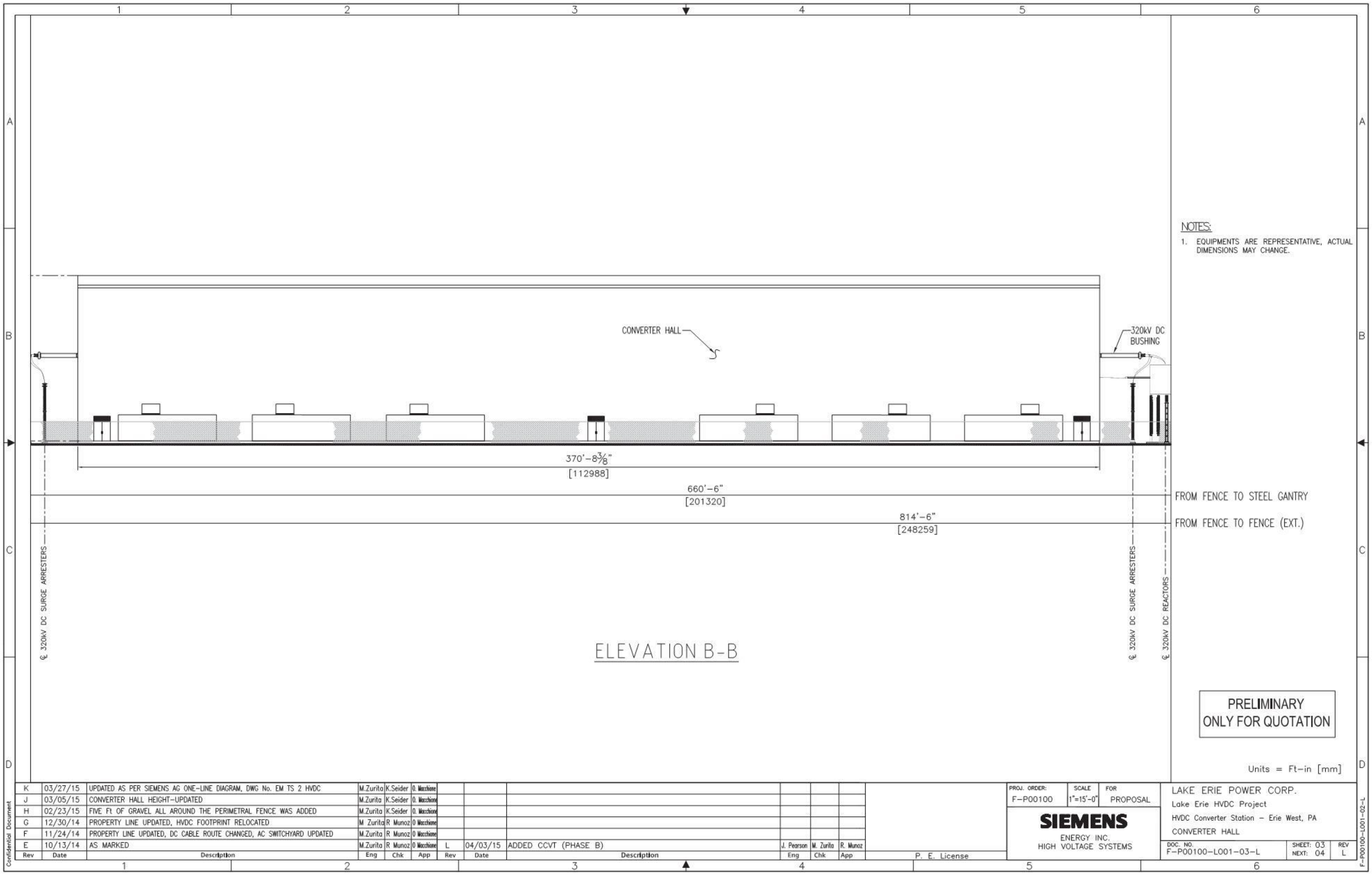


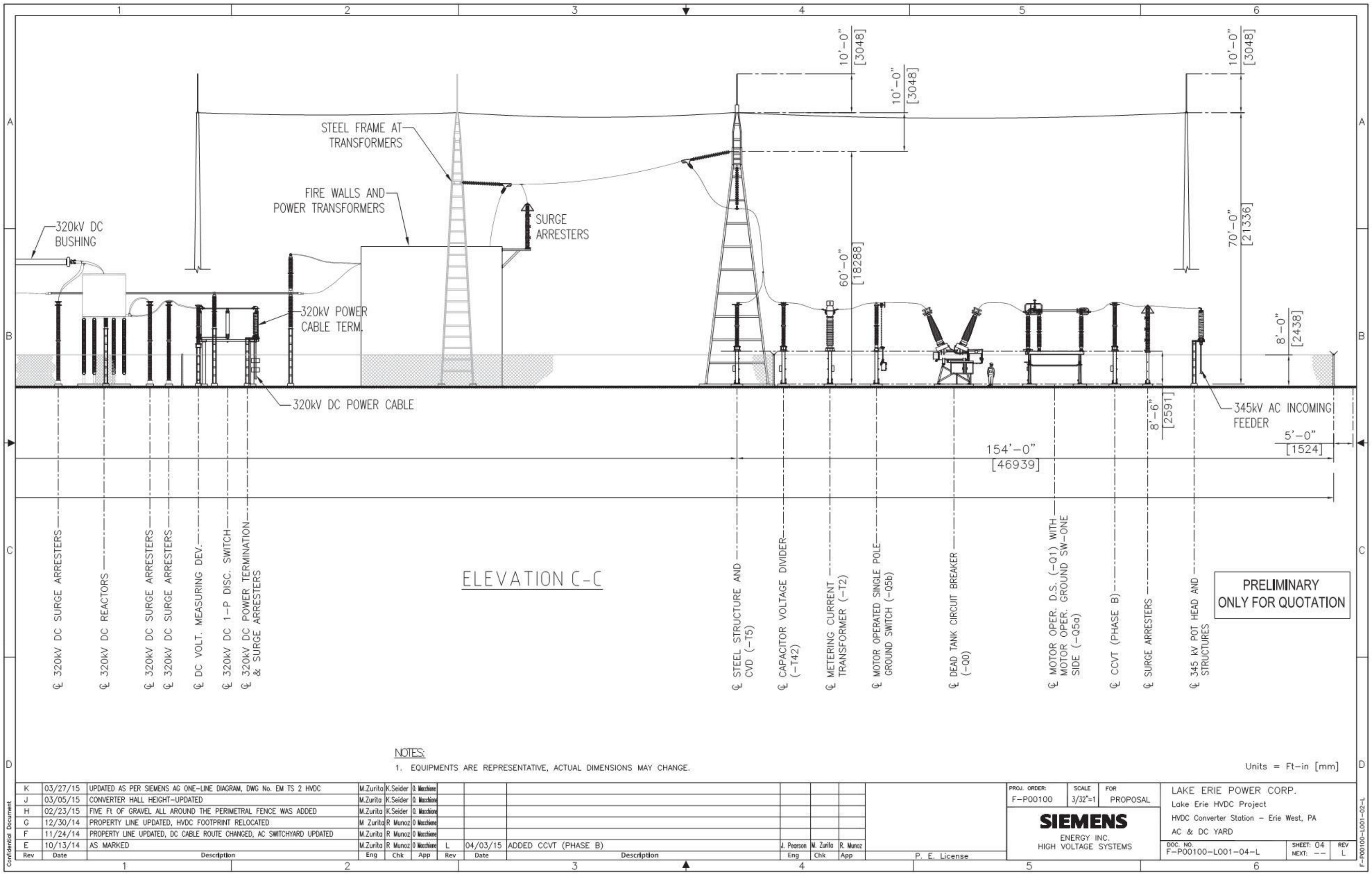
Figure 2.2-2 Converter site representative figure (SHEET 1 of 3).



(SHEET 2 OF 3)


NOTES:
1. EQUIPMENTS ARE REPRESENTATIVE, ACTUAL DIMENSIONS MAY CHANGE.
CONVERTER HALL
320kV DC BUSHING
370'-8⅜"
[112988]
660'-6"
[201320]
FROM FENCE TO STEEL GANTRY
814'-6"
[248259]
FROM FENCE TO FENCE (EXT.)
℄ 320kV DC SURGE ARRESTERS
℄ 320kV DC SURGE ARRESTERS
℄ 320kV DC REACTORS
ELEVATION B-B
PRELIMINARY ONLY FOR QUOTATION
Units = Ft-in [mm]
K 03/27/15 UPDATED AS PER SIEMENS AG ONE-LINE DIAGRAM, DWG No. EM TS 2 HVDC M.Zurita K.Seider O. Macchione
J 03/05/15 CONVERTER HALL HEIGHT-UPDATED M.Zurita K.Seider O. Macchione
H 02/23/15 FIVE Ft OF GRAVEL ALL AROUND THE PERIMETRAL FENCE WAS ADDED M.Zurita K.Seider O. Macchione
G 12/30/14 PROPERTY LINE UPDATED, HVDC FOOTPRINT RELOCATED M Zurita R Munoz O Macchione
F 11/24/14 PROPERTY LINE UPDATED, DC CABLE ROUTE CHANGED, AC SWITCHYARD UPDATED M.Zurita R Munoz O Macchione
E 10/13/14 AS MARKED M.Zurita R Munoz O Macchione
L 04/03/15 ADDED CCVT (PHASE B) J. Pearson M. Zurita R. Munoz
Rev Date Description Eng Chk App
Confidential Document
P. E. License
PROJ. ORDER: F-P00100
SCALE 1"=15'-0"
FOR PROPOSAL
SIEMENS
ENERGY INC.
HIGH VOLTAGE SYSTEMS
LAKE ERIE POWER CORP.
Lake Erie HVDC Project
HVDC Converter Station – Erie West, PA
CONVERTER HALL
DOC. NO. F-P00100-L001-03-L
SHEET: 03 NEXT: 04
REV L
F-P00100-L001-02-L

(SHEET 3 OF 3)


STEEL FRAME AT TRANSFORMERS
FIRE WALLS AND POWER TRANSFORMERS
SURGE ARRESTERS
320kV DC BUSHING
320kV POWER CABLE TERM.
320kV DC POWER CABLE
345kV AC INCOMING FEEDER
10'-0" [3048]
60'-0" [18288]
70'-0" [21336]
8'-0" [2438]
8'-6" [2591]
5'-0" [1524]
154'-0" [46939]
ELEVATION C-C
℄ 320kV DC SURGE ARRESTERS
℄ 320kV DC REACTORS
℄ 320kV DC SURGE ARRESTERS
℄ 320kV DC SURGE ARRESTERS
℄ DC VOLT. MEASURING DEV.
℄ 320kV DC 1-P DISC. SWITCH
℄ 320kV DC POWER TERMINATION & SURGE ARRESTERS
℄ STEEL STRUCTURE AND CVD (-T5)
℄ CAPACITOR VOLTAGE DIVIDER (-T42)
℄ METERING CURRENT TRANSFORMER (-T2)
℄ MOTOR OPERATED SINGLE POLE GROUND SWITCH (-Q5b)
℄ DEAD TANK CIRCUIT BREAKER (-Q0)
℄ MOTOR OPER. D.S. (-Q1) WITH MOTOR OPER. GROUND SW-ONE SIDE (-Q5a)
℄ CCVT (PHASE B)
℄ SURGE ARRESTERS
℄ 345 kV POT HEAD AND STRUCTURES
PRELIMINARY ONLY FOR QUOTATION
NOTES:
1. EQUIPMENTS ARE REPRESENTATIVE, ACTUAL DIMENSIONS MAY CHANGE.
Units = Ft-in [mm]
K 03/27/15 UPDATED AS PER SIEMENS AG ONE-LINE DIAGRAM, DWG No. EM TS 2 HVDC
J 03/05/15 CONVERTER HALL HEIGHT-UPDATED
H 02/23/15 FIVE Ft OF GRAVEL ALL AROUND THE PERIMETRAL FENCE WAS ADDED
G 12/30/14 PROPERTY LINE UPDATED, HVDC FOOTPRINT RELOCATED
F 11/24/14 PROPERTY LINE UPDATED, DC CABLE ROUTE CHANGED, AC SWITCHYARD UPDATED
E 10/13/14 AS MARKED
L 04/03/15 ADDED CCVT (PHASE B)
Rev Date Description Eng Chk App
P. E. License
PROJ. ORDER: F-P00100
SCALE 3/32"=1
FOR PROPOSAL
SIEMENS
ENERGY INC.
HIGH VOLTAGE SYSTEMS
LAKE ERIE POWER CORP.
Lake Erie HVDC Project
HVDC Converter Station - Erie West, PA
AC & DC YARD
DOC. NO. F-P00100-L001-04-L
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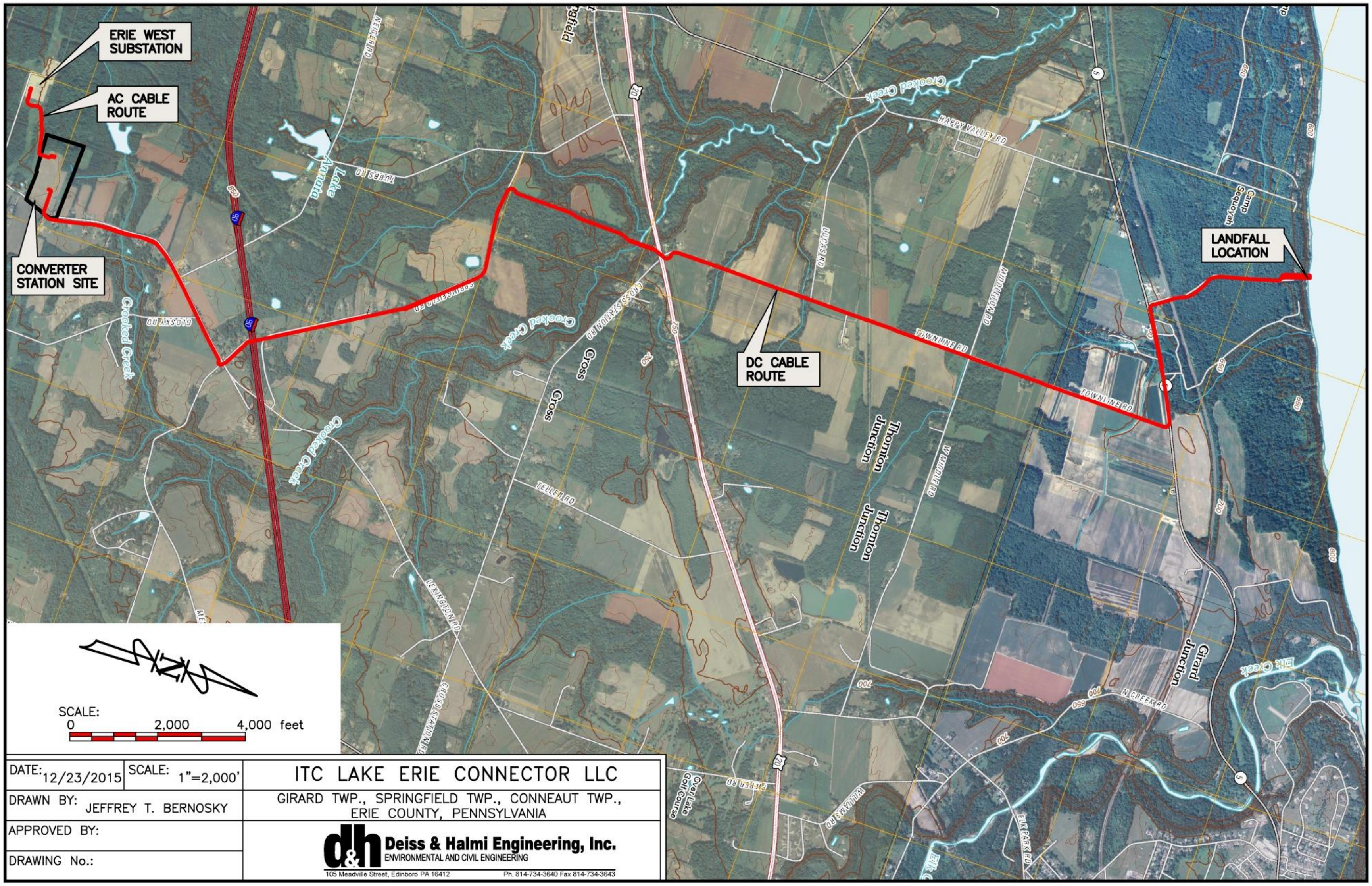
REV L
Confidential Document

Figure 2.2-3 Underground Project routing.



2.2.2 Construction Methods, Erie Converter Station

This section describes site preparation and general construction methods for the Erie Converter Station.

Erosion and sedimentation control measures will be installed and construction-phase stormwater management best practices will be implemented in accordance with erosion and sedimentation control plans and a National Pollutant Discharge Elimination System (NPDES) stormwater permit approved by the Erie County Conservation District and the Pennsylvania Department of Environmental Protection (PADEP), and grubbing and clearing of wooded construction areas will commence. The Erie Converter Station site will be prepared for staging and laydown activities early in the construction process. Two access roadways will be completed to facilitate equipment deliveries, construction worker movement and parking areas.

When site preparation is complete, the foundations and building construction will commence. Site fencing will be installed to limit access to only construction personnel. The Erie Converter Station will contain buildings, structures, and electrical equipment to be installed on concrete slabs or a gravel base. Construction will include 12 to 18 months of site work and equipment installation, followed by 4 to 6 months of testing and commissioning work inside the Erie Converter Station buildings.

The AC interconnections with the existing Penelec Erie West Substation will be completed prior to commissioning and testing of the Erie Converter Station.

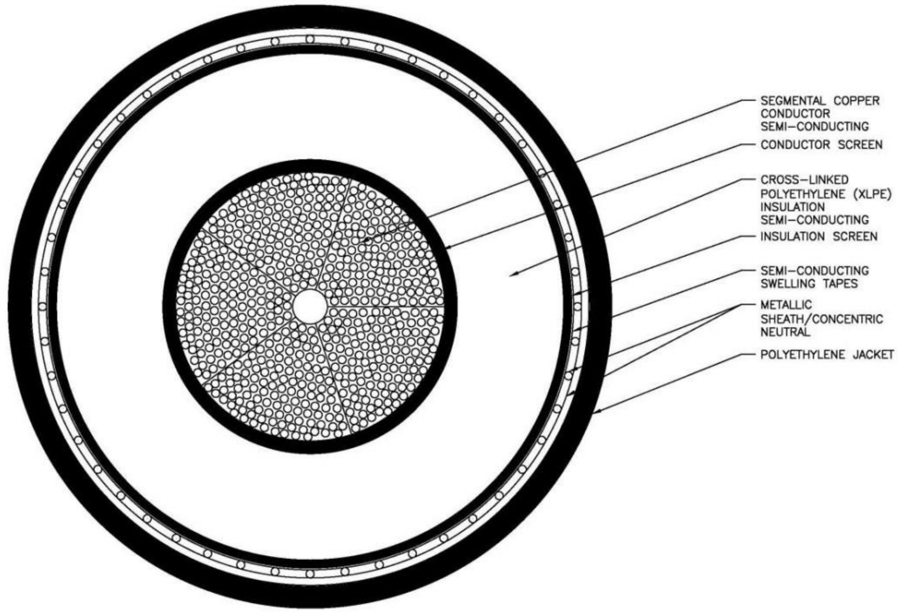
2.3 Underground Cable Description

2.3.1 General Facility Location and Description, Underground Cable

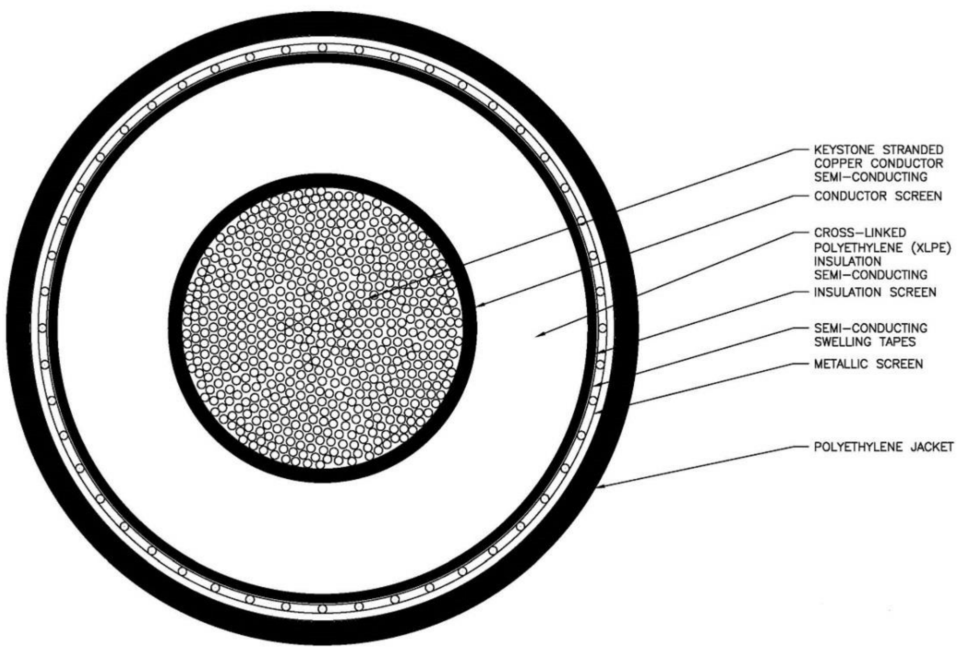
The underground cable section (Underground Segment) involves that portion of the HVDC line that is not buried in the lakebed of Lake Erie, as well as the underground AC cables that will connect the Erie Convertor Station to the existing Penelec Erie West Substation. The underground HVDC transmission line will consist of two high-voltage cables, along with a fiber optic communications cable, all of which will be underground. The underground cable route will extend approximately 7.1 miles (11.4 km) from the proposed Erie Converter Station site in Erie County to the Lake Erie landfall, which is located on a private property west of Erie Bluffs State Park. The Applicant 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 ROWs in order to minimize environmental disturbance. Plans of the proposed underground segment are included in Section H.

The underground HVDC transmission cables will be constructed with a central copper conductor insulated with extruded solid dielectric polymer rated at +/- 320-kV HVDC. The diameter of each underground HVDC transmission cable is approximately 5 inches (130 mm) and weighs approximately 22 pounds per foot (lb/ft) (33.4 kilograms/meter [kg/m]) (see Figure 2.3-1).

Figure 2.3-1 Typical AC (top) and HVDC (bottom) transmission cable cross sections.



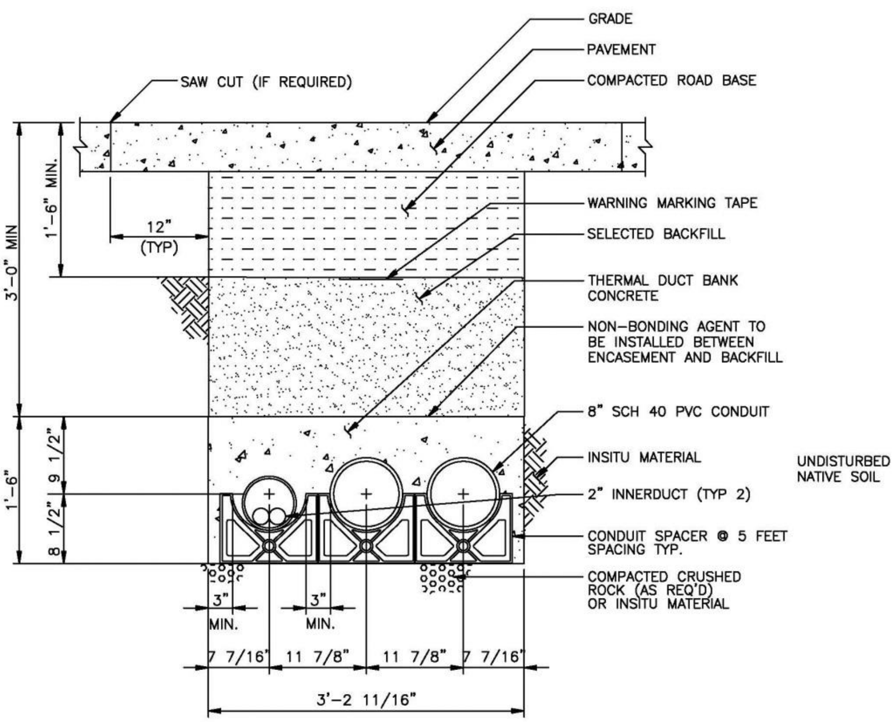
DETAIL A
345KV WEST ERIE INTERCONNECTION
SCALE: NTS



DETAIL D
± 320KV DC 2500 SQ MM LAND CABLE
SCALE: NTS

For the underground portions of the HVDC transmission line route, the two cables within the transmission system would typically be installed along with a fiber optic cable in a concrete-encased PVC conduit duct bank with a minimum 3 ft (0.9 m) 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 ft to 2 ft (0.3 m to 0.6 m) above the cables in the trench. The top 1 ft to 2 ft (0.3 m to 0.6 m) of the trench will be backfilled to match the surrounding area. A representative cross-section of a typical duct bank is provided in Figure 2.3-2.

Figure 2.3-2 Typical duct bank cross section.



Note: Figure is representative.

Where the duct bank cannot be installed by trenching, such as significant water crossings, railroad crossings, and certain highway crossings, the transmission line conduits will be installed by horizontal directional drill (HDD) or cased auger boring (Jack & Bore).

The majority of the underground HVDC transmission system in the U.S. will be installed within existing roadway ROWs. Limited portions of the cable will be located on private property. The cables would be installed outside the improved roadway surface, or under the pavement where necessary or appropriate. The Applicant will coordinate the exact locations of the cables with Pennsylvania Department of Transportation (PennDOT) and the townships. Construction activities, including traffic management and paving restoration, will be coordinated with the PennDOT, the respective townships, and adjacent property owners, as appropriate, to minimize traffic disruption during installation. Construction activity will generally be conducted during daytime hours, unless night construction is requested by state or local officials to avoid significant impacts to traffic or equipment deliveries or unless required by a particular construction technique. The Applicant will coordinate surface restoration procedures with PennDOT, the appropriate townships, and (as applicable) the owners of private lands on which the underground transmission line is located.

The interconnection to the existing PJM grid will be by a 345 kV, AC, underground transmission line connecting the Erie Convertor Station to the existing Penelec Erie West Substation. The AC cables would measure approximately 2,082 ft (635 m) in length. This line would consist of six 345 kV AC cables with solid dielectric polymer insulation. The cables would be placed underground at an approximate depth of 3 ft to 6 ft (1 m to 2 m).

2.3.2 Construction Methods, Underground Cable

All construction activities will be conducted in accordance with an Erosion and Sedimentation Control Plan (E&SCP) and Post Construction Stormwater Management Plan (PCSM Plan) for the Erie Converter Station, and an E&SCP and a Site Restoration Plan for the underground segment cable route, all approved by the Erie County Conservation District, under delegation from PADEP. The E&SCP and PCSM Plan are required by the both the Conneaut Township Stormwater Management Ordinance and the PADEP 25 Pa. Code Chapter 102 regulations, and will be implemented under the requirements of an National Pollution Discharge Elimination System Permit for Stormwater Discharge Associated with Construction Activities (NPDES Permit). Proposed construction methods, erosion and sedimentation control plans, and wetland and stream crossing methods are summarized in the following sections.

2.3.2.1 Construction Access and Temporary Workspace

The temporary construction work areas for cable installation would be primarily in roadway ROWs. A typical temporary construction area in the roadway ROW would be approximately 15 ft to 38 ft (4.6 m to 12 m) wide. Transportation of construction equipment and materials over weight-posted roads will 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 will be stored in temporary upland workspaces away from the wetland area. Prior to construction, erosion and sedimentation control best management practices (BMPs) will be implemented along wetland boundaries in these areas to prevent the movement of sediment from work areas and stockpile areas along the roadway.

It is anticipated that most of the work along roadways will be performed with one lane of the road closed over a work area length of a few hundred feet. The work area location will move as various sections are completed. There may be more than one work area if simultaneous crews are to be used. Traffic control will be provided in accordance with PennDOT standards.

In some instances it may be necessary to close the work area road to through traffic. Such closures would be undertaken in coordination with and the approval of the respective township (and PennDOT if applicable). Although through traffic will be limited in such cases, the contractor will be required to provide access to private driveways at all times.

Temporary laydown areas will be required during installation. These areas will be utilized for the storage of equipment and materials. No grading or subsurface impacts are expected in these areas, though aggregate or crushed rock would be added. Six laydown areas have been identified (Table 2.3-1) and are shown in Section I of the JPA. The temporary laydown areas will be restored to existing conditions upon completion of the Project.

Table 2.3-1 Laydown areas for the Project.

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

2.3.2.2 Cable Installation

Typical excavation equipment will be used to dig the trench (e.g., excavators, backhoes, loaders). A concrete-encased PVC duct bank will be installed in the trench and the cable will pulled into the duct bank. Due to weight restrictions for over-road hauling of cable reels, the underground cable will be delivered and installed in lengths of not greater than 2,500 ft (762 m). Cables will be spliced together in pre-cast concrete splice vaults, which will be installed and backfilled in advance of jointing operations to reduce the duration of open excavations. These vaults will be approximately 9 ft (2.7 m) wide by 30 ft (9.1 m) long by 9 ft (2.7 m) deep and installed with a minimum of 1.5 ft (0.5 m) of cover. Splicing vaults typically include permanent access by a pair of 3-ft (0.9 m) manhole access risers. Vaults will be designed for full road traffic loadings.

Approximately 20 splice vaults would be required on the U.S. side. The duct bank is constructed first by excavating a trench, installing conduit on spacers, and encasing the conduit with thermally acceptable concrete or similar material. The trench will be backfilled and restored. After the full duct bank segment (vault to vault) is complete, the cable will be pulled into the duct bank and spliced to the next cable segment. The standard construction sequence is summarized 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 cable into duct bank segment.
- Splice cable to adjacent cable segments.
- Restore construction area to original conditions and install above- or at-grade markers indicating the location of underground HVDC transmission cables.

Construction of the underground cables, both HVDC and AC, would take approximately 6 months.

2.3.2.3 Wetland and Stream Crossing Methods

General procedures in locations to protect wetland and stream resources during construction will include:

- Complying with permit conditions received from the U.S. Army Corps of Engineers (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, in order 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 is practicable.
- No assembly area, temporary equipment, or materials storage areas will be allowed within 50 ft (15 m) of the top of bank of a stream or edge of a wetland, except for materials and equipment associated with an excavation that will be within 50 ft of the stream or wetland. A sediment barrier will be located between the material and the stream or wetland.
- No vehicle repair or vehicle fueling will occur within 100 ft (30 m) of a stream or wetland area.

The Applicant will follow applicable soil erosion control and dewatering requirements as detailed in an erosion and sedimentation control plan and NPDES stormwater permit, which will include the following typical methods. Water removed from excavated trenches will be discharged to an upland vegetated area off the roadway through a “pumped water filter bag” surrounded by a compost filter sock ring that will overflow into existing roadway ditches or upland area. There will be no direct discharges to wetlands or water bodies. Appropriate spill prevention and containment measures for hydraulic fluids or fuels will be applied during construction. Construction crews will have spill response absorbent pads and spill response procedures in construction vehicles. A Preparedness Prevention Contingency Plan will be developed for materials handling and implemented during construction.

Except where expressly prescribed by permit, spoil from trench excavation will be stockpiled a minimum of 50 ft (15 m) from wetland edges or streams (except for materials and equipment associated with an excavation that will be within 50 ft of the stream or wetland), and spoil piles will be protected by appropriate erosion and sedimentation control BMPs where the potential exists for sediment transport to wetlands or streams. Disturbed upland areas will be re-graded to pre-existing contours and re-seeded with an upland conservation seed or appropriate mix to reduce erosion and sedimentation potential.

2.3.2.4 Jack & Bore Construction Method

Trenchless construction methods will be used at the Erie landfall location where the transmission line transitions from the underwater to underground segments and may be utilized 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 Project: Jack & Bore and HDD methods. The equipment used and the type of operation would vary depending on the length and depth of the installation.

Jack & Bore (open-face, cased auger borings) will typically be used for crossings less than 300 ft (91 m) with uniform, cohesive soils. An elevated water table can 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.

Jack & Bore installations begin by excavating a launching and receiving pit on either side of an obstacle. The launching pit is typically 10 ft to 15 ft (3 m to 4.5 m) wide and 30 ft to 40 ft (9 m to 12 m) long. The receiving pit is typically about 10 ft wide by 10 ft 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.

Depending on installation conditions, the steel casing will 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 are 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.

2.3.2.5 Horizontal Directional Drilling Construction Method

HDD is used for installing conduit ducts for cable or wire line products, as well as for installing pipelines. The technology avoids excavating a trench and is commonly used for a variety of situations, including crossing lakes, wetlands, rivers, and roads and railways. HDD will be used for longer crossings where open trenching is less appropriate, with the largest, most complex HDD operation occurring at the transition points between land and Lake Erie. HDD will allow for the avoidance or minimization of disturbance to the Lake Erie shoreline and near-shore areas. HDD is accomplished by using a guided drill rig to open a pilot bore, then multiple reaming passes of the pilot bore to open the hole to the diameter required to install the pipe bundle into the borehole, typically 50 percent larger than the pipe bundle. Drilling fluid will primarily consist of a combination of water and bentonite clay (a naturally occurring nontoxic mineral). In some instances, additives to improve viscosity, improve hole 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 will be used. All potential additives will be identified in the drilling plan submitted to and approved by the applicable environmental agencies.

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

The equipment used in an HDD operation includes an HDD drilling rig system, a drilling fluid collection and recirculation system, and associated support equipment. 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 (36-cm) to 18-inch (46-cm) pipe would be installed in each borehole as a casing pipe. Smaller, 10-inch (25-cm) to 12-inch (30-cm) pipe would be used for HDD installations on land, which have smaller-diameter cables. A minimum spacing of approximately 33 ft (10 m) between the shoreline borehole paths and 15 ft (4.6 m) between land borehole paths would be required to minimize interference.

The shoreline HDD operation will occur in a temporarily cleared work area of approximately 100 ft by 150 ft (23 m by 46 m) for large HDD operations; the work area for small HDD operations will be about 15 ft wide by 50 ft long (4.5 m by 15 m) such that it can be done alongside a roadway. Setup for the HDD boring in most cases will be located a minimum of 50 ft (15 m) from stream and wetland areas. Boring equipment setups will not be staged in wetlands. Generally, small (6 ft [1.8 m] x 6 ft [1.8 m] x 4 ft [1.2 m]) 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.

To address the potential risk in HDD activities of an inadvertent return (i.e., the unexpected leakage of drilling fluids [consisting largely of bentonite clay] through unidentified weaknesses in the soil), the HDD contractor for each installation will provide and implement a Drilling Fluid Management Plan. The Drilling Fluid Management Plan will identify the fluid handling, recovery, recycling, and disposal procedures and equipment. The HDD contractor will also implement the Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan (Attachment 1 of the JPA); 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 will be held with the authorizing agencies to review these plans.

Drilling fluid solids (bentonite clay) and cuttings will be contained and settled in tanks or sediment traps and subsequently disposed of at an approved offsite facility. Water used in the drilling fluid will be recovered and reused after filtering out cuttings, and then disposed at an approved facility. Excavated soils will be temporarily stored onsite during construction and will be used to restore the site to its previous grade once the drilling process has been completed, or transported for disposal/reuse at an approved location. The disturbed areas will be restored to their original grade and seeded with an appropriate seed mix for natural revegetation.

2.4 Underwater Cable Description

2.4.1 General Facility Location and Description, Underwater Cable

The underwater cable route (referred to as Lake Segment or Underwater Segment) for the +/-320-kV HVDC transmission line would extend approximately 35.4 mi (57.0 km) within Lake Erie from the U.S./Canada border to the proposed landfall location in Erie County (see Figure 2.1-1). A 500-m (1,640-ft) route corridor was initially identified for the underwater HVDC cable route (250 m on either side of the centerline shown on Figure 2.1-1). The cable alignment has been refined to approximately a 100-m (328-ft) width in the route corridor as a result of the additional in-water surveys that occurred during 2015. The HVDC transmission cables would transition from the landfall location into Lake Erie via borings through bedrock installed by HDD methods. Three short trenches will be excavated in the bedrock (primarily shale) from the exit of each of the three HDD bores at approximately kilometer post (KP) 103.4. The three trenches will merge into one trench, which will continue through the bedrock to the softer lakebed material where the sediment overlay is deep enough that burial by jet plow or water jetting can be utilized (approximately KP 102). The underwater transmission cables are generally sited to maximize the system's operational reliability while minimizing the costs and potential environmental impacts caused during construction, operation, and maintenance.

The underwater HVDC transmission cables will be solid dielectric extruded insulated HVDC cables (Figure 2.3-1), which will be deployed with a fiber optic cable. An extruded lead moisture barrier with a polyethylene jacket will be used to protect the insulation system. To protect the cable and provide additional strength during installation, an armoring system consisting of one layer of galvanized wires with bedding layers will be installed over the polyethylene jacket. Each cable will be approximately 6 in (15.2 cm) in diameter and weigh approximately 41.9 lb/ft (62.4 kg/m). The two underwater HVDC transmission cables and the fiber optic cable will be bundled together during installation to minimize disturbance and external electrical and magnetic fields.

The cables will be buried in the lakebed to protect the cables from damage due to shipping traffic, fishing activity, and ice scour. Typical burial depths in areas where the cable will be installed by jet plow or water jetting range from 3 ft to 10 ft (1 m to 3 m). In the approximately 0.9-mi (1,500-m) long area where the cables will be installed in trenches within bedrock from the end of the HDD borings to the softer lake bed sediments, the typical burial depths will be approximately 6 ft (1.8 m). No existing utility crossings have been identified for the proposed transmission cable route in the U.S.

2.4.2 Construction Methods, Underwater Cable

Marine route surveys have been completed and installation engineering is being performed to evaluate the route position in order to avoid shipwrecks, existing pipelines or other utilities to the extent possible, and to refine construction methods. The general sequence for installing the underwater HVDC transmission cables will be as follows:

- Install HDD conduit;
- Perform pre-lay grapnel run; and
- Install cable in lakebed (in trenches within bedrock and via jetplow or water jetting methods in softer sediments).

2.4.2.1 Install HDD Conduit

The shoreline crossings at Lake Erie will also be completed by three separate HDD bores, one bore for each HVDC cable and one bore for the fiber optic cable. It is currently estimated that the HDD will exit the lake in Pennsylvania approximately 2,000 ft (600 meters) from shore, at a water depth of approximately 18 ft (5.4 meters)(while HDD bores can be drilled further than this, there are limitations to how far an underwater cable can be pulled through an HDD bore). It is expected that the distance between bores at the exit will be approximately 33 ft (10 m).

The rocky and steep nature of the bluffs will require an HDD operation with special attention to preventing fluid releases into the nearshore area. Prior to drilling operations, three offshore sump pits will be excavated (in rock) where each HDD bore will exit (one bore for each HVDC cable and one bore for the fiber optic cable). Each pit will be approximately 20 x 10 x 7 ft (6.1 x 3.1 x 2.1 meters) and is designed such that it could contain approximately 10,000 gallons of bentonite if there was an unexpected discharge. Any bentonite that is discharged will be contained at the bottom of the sump (bentonite clay has a specific gravity greater than water). Divers/video cameras will monitor the sump, and should bentonite be discharged, divers will employ a submersible pump to recover the bentonite slurry into tanks that are located on the support barge. The use of this system minimizes the amount of disposal required and minimizes potential impacts to water quality from the release of bentonite. The drilling mud will then be returned to shore (in the tanks) for upland disposal.

While the borehole is being completed, the conduit pipe is assembled on land and floated out onto the lake and pulled into the borehole from the water to the land side terminus of the HDD bore. The method used for this installation will depend on topography and geotechnical investigation. If the soils are too hard for forward reaming tools, a method that allows access from both sides may be required.

As mentioned in Section 2.3.2.5, to address the potential risk in HDD activities of an inadvertent return (i.e., the unexpected leakage of drilling fluids [consisting largely of bentonite clay] through unidentified weaknesses in the soil), an Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan will be implemented at each location where HDD work is performed. This plan describes how to monitor for, identify, contain, and remediate releases of drilling fluid. Among other elements, the monitoring program will consist of visual observations in the surface water at the targeted drill exit point and monitoring of the drilling fluid volume and pressure within the borehole. Visual observations of drilling fluid on the surface or in nearby water, or excessive loss of volume or pressure in the borehole, would trigger response actions by the HDD operator, including halting drilling activities and initiating recovery of released bentonite clay.

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

2.4.2.2 Perform 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 will penetrate the lake bottom to a depth of about 3.3 ft (1 m), depending on sediment type. If an obstacle were encountered, the barge would stop and send a diver to the bottom before the obstacle would be brought to the surface for disposal. Debris recovered and brought to the surface would be disposed of at an upland facility. If an object is too large, or not movable, the location would be recorded and the route adjusted to avoid the obstacle during the cable installation. It is expected that such route adjustments would be accommodated within the 100-m corridor described in this JPA application.

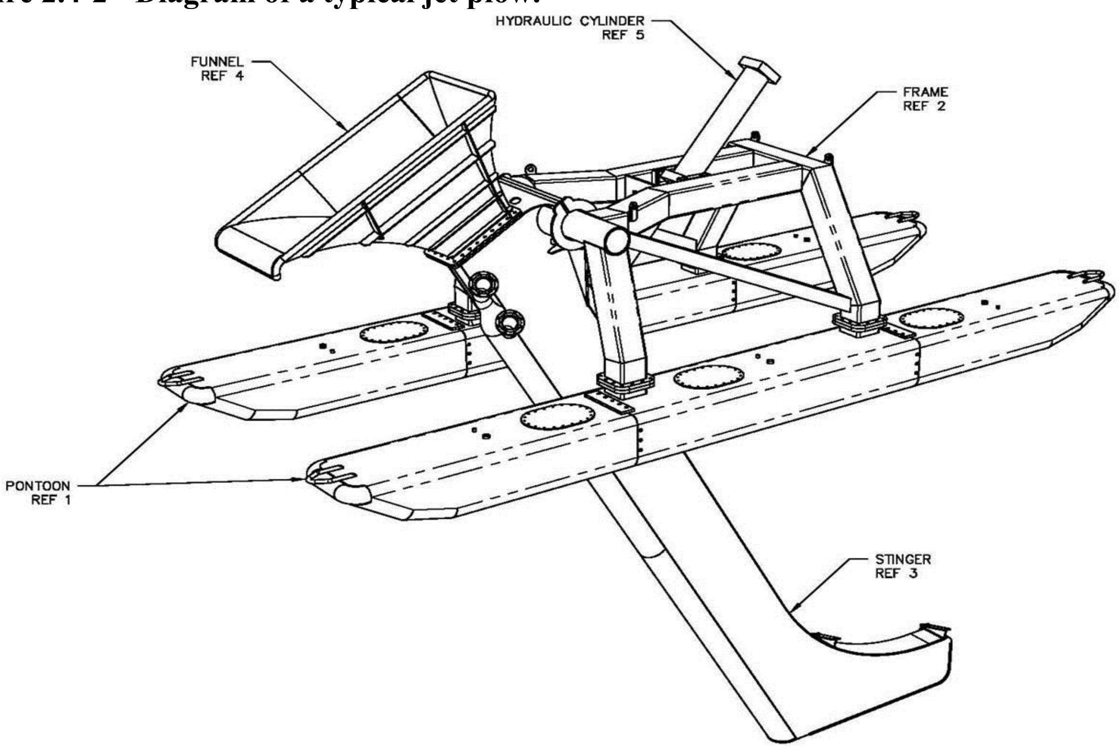
2.4.2.3 Install Cable

At the Erie landfall, bedrock is either exposed or very close to the surface for a substantial distance out to deeper water (about 1.3 miles). In this nearshore area, a trench will be excavated in the bedrock (primarily shale) from the exit of the HDD bore at approximately kilometer post (KP) 103.4 to the softer lakebed material where the sediment overlay is deep enough that jet plow burial can be utilized (approximately KP 102). A trench would be excavated in the bedrock approximately 6 ft (1.8 m) below the natural top of the bedrock; and, the width would be about 4 ft (1.2 m). Any sediment overburden above the bedrock trench would first be excavated and sidecast. A barge-mounted drill will then drill 4-inch stemmed charge blast holes to a depth of 4 ft below planned excavation grade. The holes will be packed with low-level Hydromite emulsion explosive and detonated. The blasted rock will be removed by a barge-mounted excavator and side cast. The trench in the bedrock will be bedded and backfilled with a sand, gravel, or rock (originating from an on-land source). Drilled and excavated material will be side cast on the lake bottom.

Beyond the nearer shore areas underlain by shallow bedrock, cable installation will 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 (see Figures 2.4-1 and 2.4-2). 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.

Figure 2.4-1 Photograph of a typical jet plow.

Figure 2.4-2 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. However, the jet-plow is supported on the lake bed by pontoons or skids and pulled along the sediment surface. The very soft sediment in the deeper areas of Lake Erie (approximately between KP 15-55[4]) 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 lake bed 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.

No utility, pipeline, or other submerged infrastructure crossings have been identified along the U.S. portion of the Project's proposed underwater cable corridor.

Cable laying is a continuous procedure. The majority of material required for the cable installation will be transported and stored on the installation vessel; although, it cannot carry enough cable to complete the entire route. A cable transport barge will, therefore, be used to carry the remaining cable. In the unlikely event the cable installation must be abandoned due to extreme weather conditions, the cable will either be surface laid along the route, or in extreme cases, the cable cut. Following return of appropriate weather conditions, the cable will then be retrieved, spliced as necessary, and the installation process will continue.

The cable installation in the U.S. 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 cable installation would occur, including jet plowing or water jetting in soft sediments. These activities are expected to occur between May and November each year. Jet plowing will proceed at about 0.9 – 1.2 miles per day (1.5 – 2.0 km/day).

2.5 Permanent Land Right-of-Way Requirements

On-land ROW requirements for the Project include a permanently maintained vegetative easement clear of trees, up to 25 ft on either side of the cable, to keep the duct bank free of tree root systems that could dry out the soil, leading to higher soil thermal resistivity, thus reducing cable performance. Depending on soil conditions, some areas may require a narrower (i.e., less than 50-ft wide) permanent vegetation management area.

2.6 Submerged Lands License Requirements for Occupation of Submerged Lands of the Commonwealth

Lake Erie is a navigable lake, and the bed of Lake Erie is owned by the Commonwealth of Pennsylvania, and is considered "submerged lands of the Commonwealth." Section 15 of the Pennsylvania Dam Safety and Encroachments Act, 32 P.S.§693.15 authorizes PaDEP, with the approval of the Governor, to grant an easement, right-of-way, license or lease to occupy submerged lands of the Commonwealth in any navigable lake for any water obstruction or encroachment which is constructed for the purposes of, among other items "providing … energy

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

production", "providing a public utility service by a government agency or subdivision or public utility or electric cooperative", or "other activities which require access to water." 35 P.S. §693.15(b)(4), (5),and (6). The total area of land which any such project authorized by PaDEP may occupy, may not exceed 25 acres. (If a project exceeds 25 acres of submerged lands occupation, separate legislative authorization is required.)

The Project qualifies for receipt of an easement, right-of-way or license to occupy submerged lands of the Commonwealth under the provisions of 32 P.S. §693.15(b):

- The Project provides for energy transmission, facilitating the exchange of electric energy between the IESO grid in Canada and the PJM grid in the United States, and therefore qualifies under 32 P.S. §693.15(b)(4).
- The Project qualifies as a "public utility service" as defined in Section 3 of the Dam Safety and Encroachments Act, by rendering services for electricity transmission. 35 P.S. §680.3. The Project ultimately will be a "public utility" as defined in 25 Pa. Code §105.1 and the Federal Power Act. Section 105.1 of the Pennsylvania regulations define a "public utility" as a "corporation having the power and privileges of corporations not possessed by individuals or partnerships which entity renders a public utility service." In relevant part, the Federal Power Act defines a "public utility" as "any person who owns or operates facilities subject to the jurisdiction of [FERC]."[5] FERC's jurisdiction extends "to the transmission of electric energy in interstate commerce" (i.e., all "interstate transmissions" of electricity) and "the sale of electric energy at wholesale in interstate commerce."[6] Because the Project will involve transmission of electricity to the PJM grid, it is subject to FERC's jurisdiction.[7] As determined in *Multitrade Limited Partnership*.[8] an entity become a "public utility" upon the earlier of the following triggering events: (1) commencement of transmission of electric energy in interstate commerce (i.e., at the time a project is energized); (2) commencement of sales for resale of electric energy in interstate commerce; or (3) FERC's acceptance of a voluntarily filed rate schedule, even though the relevant facilities have not yet been energized and service has not yet been provided.[9] In this case, upon commencement of operation and/or FERC's acceptance of

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[5] 16 U.S.C. § 824(e).

[6] *Id*. § 824(b)(1).

[7] *See* 2013 Memo at 2; *Champlain Hudson Power Express, Inc.*, 132 FERC ¶ 61,006, 2010 WL 2636410, at *9 (July 1, 2010) (with respect to similar project from Canada to New York under Lake Champlain, concluding "that the ownership and operation of the transmission facility, as well as wholesale sales made over the facility in interstate commerce, will be jurisdictional").

[8] *See Multitrade Limited Partnership*, 63 FERC ¶ 61,252, 1993 WL 183138, at *2 (June 1, 1993).

[9] *Babcock & Brown Holdings, Inc.*, 121 FERC ¶ 61,304, 2007 WL 4556772 (Dec. 28, 2007) (recognizing that a holding company's subsidiary which was responsible for constructing a transmission line, but did not yet begin operation, was a "public utility" under the FPA because FERC accepted the subsidiary's filing of an operating memorandum pursuant to section 205 setting forth cost-based rate principles and obligations associated with the development, financing, and operation of the line); *see also* FERC, Final Policy Statement, *Allocation of Capacity on New Merchant Transmission Projects and New Cost-Based,*

ITC LEC's rate schedule filing, the Project will qualify as a "public utility." Thus, the Project qualifies under 32 P.S. §693.15(b)(5).

- Finally, the Project requires access to water in order to complete the connection between Ontario, Canada and the PJM grid in the United States, which are separated by Lake Erie, and therefore also qualifies under 32 P.S. §693.15(b)(6).

The area of submerged lands of the Commonwealth that will be "occupied" by Project facilities is less than 25 acres. The elements of the Project that occupy submerged lands of the Commonwealth consist of the following:

- Three conduits will be installed via HDD from the shore of Lake Erie to approximately 2,000 ft from shore. Each conduit will be approximately [2] ft in diameter and will exit into the HDD boring transition pits. Thus, the area occupied by the three conduits would be 3 x 2 ft x 2,000 ft = 12,000 sq. ft. (0.27 acres).
- As explained in Section 2.4.2, the HDD borings will exit into three transition pits (each approximately 20 ft long x 10 ft wide x 7 ft deep). From the HDD boring exit bits, there will be three trenches through bedrock, each approximately 10 ft wide, to the point where the three cables will combine into one installation. The transition pits and bedrock trenches will be bedded and backfilled with sand, gravel, or rock (originating from an on-land source. The total area occupied by the pits and transition bedrock trenches would be 3 x 250 ft x 10 ft = 7,500 sq. ft. (0.17 acres).
- From the junction point of the three cables, the cables will be laid together in a trench through the bedrock to the point where sediments are sufficient to allow installation via jet plow or water jet. The trench in the bedrock will be bedded and backfilled with sand, gravel, or rock (originating from an on-land source). The bedrock trench is anticipated to be approximately 4,921 ft long and 4 ft wide. The total area occupied by the bedrock trench would be 4,921 ft x 4 ft = 19,684 sq ft (0.45 acres).
- In the deeper portion of the lake bed, where the cables are installed via jet plow or water jet, the only area of submerged lands occupied will be the width of the combined cable bundle (except for joints, which are described below), which will be less than [2] ft in width. The route distance from the bedrock trench exit to the U.S./Canada border is approximately 180,863 ft. The calculated area occupied by the cable installed in sediment is 180,863 ft x 2 ft = 361,726 sq. ft. (8.3 acres).
- There will be up to 2 joints within the deeper water areas where the cables are spliced. The area occupied by joints involve a total of 400 ft x 10 ft, or 4,000 sq ft. (0.09 acres)

Thus, the total area occupied by the Project is calculated to be [9.2] acres.

Participant-Funded Transmission Projects Priority Rights to New Participant-Funded Transmission, 142 FERC ¶ 61,038, 2013 WL 240927, at *8 (Jan. 17, 2013) ("We reaffirm here that all merchant transmission developers and nonincumbent cost-based, participant-funded transmission projects become public utilities at the time their projects are energized (and, depending on the circumstances, may become public utilities even earlier)).

2.7 Waterbodies Identification and Wetland Delineation

Waterbody identification and wetland delineations were conducted in accordance with the *Corps of Engineers Wetlands* Delineation Manual (Environmental Laboratories 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North Central, Version 2.0 (United States Army Corps of Engineers 2012a). The surveys occurred from August 4, 2014 through August 8, 2014, November 5 and 6, 2014, December 22, 2014, April 15 and 16, 2015, and December 16 and 22, 2015. All project components and an appropriate buffer were surveyed. Details of the delineation techniques and results can be found in the attached Stream Identification and Wetland Delineation Report (Attachment 2 to this application package).

Canadian Seabed Research (CSR) conducted surveys along the Project route in Lake Erie in 2014 and 2015 to evaluate surficial geology, sediment type and thickness, bedrock outcrop locations, depth to bedrock, water depths, ice scour, shipwreck locations, known shallow gas regions, known infrastructure, and thermal resistivity (Appendix K to the Environmental Assessment, Attachment 3 to this application package). CSR has compiled this information in order to develop and identify route variances as well as other potential restraints to construction.

2.8 Proposed Project Disturbance Areas

This is a summary of disturbance area effects to streams and wetlands. More detailed information regarding the affected resources is discussed in the EA in Attachment 3.

Wetland and waterbody impacts are proposed in order to construct the Project. The wetland and waterbody impacts are detailed in Table 2.8-1 and Table 2.8-2, respectively. A summary of impacts is provided below. The impact locations are depicted on the map set Figure 2: Resource Map in Section I as well as the Erosion and Sedimentation Control Plan, and Project Plan and Profile drawings located in Section H.

Table 2.8-1 Total Proposed Wetland Impacts Associated with the Project*

Wetland Type	Temporary Impacts (acres)	Permanent Impact (acres)
Palustrine Emergent	0.80	0.02
Palustrine Scrub Shrub	0	0
Palustrine Forested	0	0.99
Total Impacts	0.80	1.01

* 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..

Table 2.8-2 Total Proposed Waterbody Impacts Associated with the Project*

Stream Type	Temporary Impacts (crossing width - linear ft)	Temporary Impacts (crossing width - square ft)	Permanent Impacts (linear ft)	Permanent Impacts (square ft)
Ephemeral	321	161	0	0
Intermittent	43	129	19	25
Perennial	1,239	7,185	98	131
Total Impacts	1,604	7,475	117	155

* Based on guidance provided by PADEP, the impacts to regulated waterbodies listed in this table include the area of HDD crossings underneath waterbodies. However, such HDD crossings involve no disturbance of the waterbody; and the functions and values of the waterbodies crossed under by HDD method are not affected..

2.8.1 Avoidance and Minimization of Impacts to Waterbodies and Wetlands

Through the siting, planning, design, and implementation measures for this Project, a number of steps have been taken to avoid or minimize potential impacts to aquatic habitat and environmental resources, including the following:

- By burying the proposed cable within both the lake segment and the underground segment of the project corridor, encroachment in wetlands and waterways is generally a temporary disturbance only. Meanwhile, the above-ground electric Erie Converter Station has been sited to avoid impacts to existing wetlands and streams within the watershed.
- Intensive studies for both the underground and lake segments have been conducted to identify and characterize environmental resources encountered in the project vicinity and are discussed in the Environmental Assessment provided as Attachment 3;
- Multiple route options were investigated with a goal of siting the underground segment in previously disturbed corridors and with minimal impact on existing natural resources and current or zoned land uses. The Project lake segment was also sited to avoid sensitive aquatic habitat and historic resources. A comprehensive alternatives analysis is provided as Section 3 of the EA (Attachment 3);
- Specific wetland and stream crossing locations and construction methods have been chosen to minimize or avoid impacts to waterways and wetlands, including use of a horizontal directional drill (HDD) construction method to bore underneath and avoid impacts to sensitive resource areas;
- Site specific erosion and sedimentation control measures and best management practices (BMPs) have been proposed that minimize adverse effects on unavoidable resource areas, as identified in the Erosion and Sedimentation Control Plan (Section M);
- The applicant has actively engaged government agencies throughout the project siting and permitting process and also held local information sessions to seek and incorporate local opinion during the siting process.

As described in the Alternatives Analysis, Section 3 of the Environmental Assessment (Attachment 3), the potential waterbody and wetland impacts were evaluated for a number of route options. The proposed underground route segment is the route option with the lowest acreage of impacts to waterbodies and wetlands, and is primarily located adjacent to pre-existing disturbed areas. None of the wetlands identified within the proposed project impact zone are classified as exceptional value wetlands, as defined by 25 Pa. Code § 105.17. The Project route does cross a high quality watershed. Consequently, the Applicant proposes to bore below selected streams and wetlands with a HDD construction method to avoid potential impacts. The specific locations where such methods will be used are described in Tables 1 and 2 (attached to this Section J).

In-stream work will be conducted according to the state construction timing window restrictions for crossing of Lake Erie tributaries (no in-stream work from September 1 through December 1). There are no other applicable state construction timing limitations for stream crossings for this Project. Although construction will involve some short-term activities within 100-year floodplains, construction workspaces will be restored to their pre-construction contours, resulting in no long-term impacts on floodplains. To protect the integrity of the HVDC cable during flood events, the Project facilities will be designed, constructed, tested, operated, and maintained to conform to applicable federal, state, and local requirements.

Where temporary impacts on surface waterbodies cannot be avoided during construction activities, the Project's construction corridor will be limited to no more than 50 ft in width. Crossing techniques include use of HDD, jack and bore and open cut methods, depending on the logistics and resource sensitivity of each waterbody or wetland crossing, as detailed in Tables 1 and 2 (attached to this Section J).

To minimize temporary impacts associated with installation of the Project facilities, the waterbody construction procedures, erosion control measures, and post-construction restoration activities identified in the Erosion and Sedimentation Control Plan (E&SCP - see Section M), will be implemented.

The layout of the Erie Converter Station has been designed to avoid impacts to the wetland area west of the site. A post-construction stormwater management plan has been developed for the Erie Converter Station and is included in Section O.

HDD crossings of sensitive features include five stream crossings and six wetland crossings along the underground portion of the cable route. All five HDD stream crossings are located within a special protection, high quality watershed. The HDD crossing method will avoid and minimize impacts to associated streams and wetland, including Crooked Creek and its associated wetlands as well as the lake to shoreline transition zone. The HDD crossing technique is detailed in the narrative and will be employed to traverse the shoreline bluff zone underground, thus preventing shoreline erosion and maintaining the current structural integrity of the bluffs, including their use as potential bank swallow habitat.

The Applicant is taking a number of steps to minimize potential sediment disturbance and related effects of sedimentation associated with Project construction activities in Lake Erie. These measures include the following:

- Use of jet plowing for deployment of the cable in soft sediment;

- Use of a dynamically positioned vessel to install the cables;
- Implementing measures to minimize sedimentation during blasting associated with bedrock trenching;
- Use of HDD in the nearshore area and the transition to land-based installation;
- Other protective measures.

In areas of soft sediment, which extend along a majority of the route (from the U.S./Canada border in the middle of the lake to the area nearshore where the lake bed becomes bedrock), installation of the transmission cables will be conducted by the use of a jet plow. The benefits of jet plowing which help to minimize water quality impacts include:

- No pre-trench or separate excavation is required;
- Simultaneously trenches and buries the cable;
- Water pressure and volume can be controlled and adjusted; and
- Adjustable plow speed.

Use of a dynamically positioned vessel for cable deployment allows maintaining the cable deployment vessel's position with the use of thrusters instead of anchors. This reduces the amount of anchoring required for cable installation, thereby minimizing lake bed disturbance. It also allows for more efficient, quicker installation than if an anchored vessel were used[10].

In Lake Erie, limited blasting is required to bury the cable within an approximately one-mile segment of the lake bed. The amount of explosives and blasting technique required for bedrock trenching will be limited to the extent possible to avoid noise and vibration impacts on fish. Some displacement of fishes from the active construction footprint of the Project will occur, but will be limited in spatial extent at any given time.

The use of HDD construction methods would avoid disturbance of the near shore area where spawning, feeding, and rearing is most common among a variety of species.

The Applicant and its contractors will develop and implement the following plans to minimize and mitigate in-lake sedimentation during cable installation:

- Blasting Plan (Attachment 4);
- Inadvertent Fluid Release Prevention, Monitoring, and Contingency Plan (Attachment 1);
- Drilling Fluid Management Plan; and
- Preparedness Prevention Contingency (PPC) Plan.

The evaluation presented herein demonstrates conclusively that the proposed Project complies with the 404(b)(1) Guidelines, and that the Project's purpose and need cannot be fulfilled

[10] Anchors may be used during jointing and landing operations.

without resulting in impacts to waters of the U.S.. The Applicant is committed to implementing measures to effectively minimize the unavoidable impacts of the proposed Project. The Project would meet all state and federal standards with respect to water quality and endangered species and would not cause significant degradation to waters of the U.S.

2.9 Project Schedule

Project construction is anticipated to begin start, at the earliest, in the later part of 2017, after receipt of all required construction permits, and will take approximately 2.5 years to complete, with an anticipated in-service date in the fourth quarter 2019. The project schedule may be adjusted due to market conditions as a result of the competitive solicitation process for capacity on the line, and/or the timing of the formal engineering design process, and/or the permitting process.

2.10 Public Involvement

Public outreach efforts undertaken by the Applicant have included local presentations with the affected townships and Erie County Executive regarding the Project objectives and elements, a public launch/media event, and a public open house held on March 12, 2015. Notice of the open house was mailed to 120 residents located within 1,000 ft of the proposed transmission line right-of-way as well as to local government officials. The open house was held at Girard High School in Girard Township, PA, where the Applicant described the proposed Project and various technical experts answered questions. A description of the regulatory requirements associated with the project development and related opportunities for future public input were also provided. The Applicant also provided updated information on the Project and the associated development schedule and answered questions from the public during the regularly scheduled meeting of the Girard Township Supervisors on May 12, 2015.

In addition, the Applicant has created a publicly available ITC Lake Erie Connector website (http://www.itclakeerieconnector.com) that includes baseline information on the proposed Project, links to media articles, frequently asked questions and upcoming Project events. The website also allows the public to submit questions about the Project and register for e-mailed updates, including announcements of future public meetings or how to access Project permit applications. The website summarizes public outreach activities already undertaken and those planned for the future.

The Applicant has also maintained an ongoing dialogue regarding the Project with affected landowners. It has already made a number of refinements to the Project in response to landowner concerns.

2.11 Alternatives and Other Analyses

Section S of this application (together with the Environmental Assessment contained in Attachment 3) provides an analysis of alternatives. Section S also provides an analysis under 25 Pa. Code §105.16 comparing project benefits vs. impacts and a discussion of compliance with the federal §404(b)(1) guidelines.

TABLES

Table 1 Proposed Wetlands Impacts for the Project

Wetland ID Name[1]	Dominant NWI Classification[2]	Associated Streams	Impact Type (Wetland Conversion, Cable Crossing, Work Space, Access Road)	Proposed Crossing Method	Impact Latitude[3]	Impact Longitude[3]	Temporary Impact[4]		Permanent Impact[5]	
							Acres	Square feet	Acres	Square feet
WPA-KAS-001	Palustrine Forested Wetland (PFO)	SPA-KAS-001 [Unnamed Tributary (UNT)] to Lake Erie; Turkey Creek - Frontal Lake Erie Watershed (HUC #0401201010702)	Limit of Distrubance (LOD) Conversion PFO to Palustrine Emergent Wetland (PEM)	Tree clearing and timber mats	42.005728	-80.398252	0.0	0.0	0.07	3,228
WPA-KAS-002	PFO	SPA-KAS-001 (UNT) to Lake Erie; Turkey Creek - Frontal Lake Erie Watershed (HUC #0401201010702)	LOD Conversion PFO to PEM	Tree clearing and timber mats	42.006636	-80.399172	0.0	0.0	0.5	22,525
WPA-KAS-002	PFO	SPA-KAS-001 (UNT) to Lake Erie; Turkey Creek - Frontal Lake Erie Watershed (HUC #0401201010702)	Construction Laydown Area	Tree clearing and timber mats	42.006636	-80.399172	0.2	7,379	0.0	0.0
WPA-KAS-002	PEM	SPA-KAS-001 (UNT) to Lake Erie; Turkey Creek - Frontal Lake Erie Watershed (HUC #0401201010702)	LOD	Timber Mats	42.006696	-80.399325	0.01	261	0.0	0.0
WPA-KAS-004	PFO	SPA-KAS-001 (UNT) to Lake Erie; Turkey Creek - Frontal Lake Erie Watershed (HUC #0401201010702)	LOD Conversion PFO to PEM	Tree clearing and timber mats	41.996059	-80.387947	0.0	0.0	0.4	17,167
WPA-KAS-012[6]	PFO	(UNT) to Crooked Creek; Crooked Creek Watershed (HUC #041201010701)	N/A	Horizontal Directional Drill (HDD)	N/A	N/A	0.0	0.0	0.0 0.00[7]	0.0 100[7]
WPA-KAS-018	PEM	N/A	AC Cable LOD	Timber Mats	41.935161	-80.381237	0.3	12,676	0.0 0.01[7]	0.0 359[7]
WPA-KAS-028[6]	PEM	SPA-KAS-016 Crooked Creek; Crooked Creek Watershed (HUC #41201010701)	N/A	HDD	N/A	N/A	0.0	0.0	0.0	0.0
WPA-KAS-028[6]	PFO	SPA-KAS-016 Crooked Creek; Crooked Creek Watershed (HUC #41201010701)	N/A	HDD	N/A	N/A	0.0	0.0	0.0	0.0
WPA-KAS-029[6]	PEM	SPA-KAS-017 (UNT) to Crooked Creek; Crooked Creek Watershed (HUC #41201010701)	N/A	HDD	N/A	N/A	0.0	0.0	0.0	0.0
WPA-KAS-029[6]	PSS	SPA-KAS-017 (UNT) to Crooked Creek; Crooked Creek Watershed (HUC #41201010701)	N/A	HDD	N/A	N/A	0.0	0.0	0.0	0.0
WPA-KAS-030[6]	PEM	(UNT) to Crooked Creek; Crooked Creek Watershed (HUC #041201010701)	N/A	Jack & Bore	N/A	N/A	0.0	0.0	0.0 0.00[7]	0.0 13[7]
WPA-KAS-034	PEM	(UNT) to Crooked Creek; Crooked Creek Watershed (HUC #041201010701)	LOD	Timber Mats	41.978317	-80.388102	0.0	39	0.0	0.0

Wetland ID Name[1]	Dominant NWI Classification[2]	Associated Streams	Impact Type (Wetland Conversion, Cable Crossing, Work Space, Access Road)	Proposed Crossing Method	Impact Latitude[3]	Impact Longitude[3]	Temporary Impact[4]		Permanent Impact[5]	
							Acres	Square feet	Acres	Square feet
WPA-KAS-035	PEM	SPA-KAS-021 (UNT) to Crooked Creek; Crooked Creek Watershed (HUC #041201010701)	LOD	Timber Mats	41.983634	-80.38801	0.01	505	0.0	0.0
WPA-KAS-036	PFO	N/A	LOD	Tree clearing and timber mats	41.964316	-80.388180	0.0	0.0	0.0	26
WPA-KAS-040	PEM	N/A	AC Cable LOD	Timber Mats	41.935548	-80.379430	0.2	9,043	0.0 0.01[7]	0.0 239[7]
WPA-KAS-041	PEM	N/A	AC Cable LOD	Timber Mats	41.934862	-80.382212	0.1	5,375	0.0 0.00[7]	0.0 140[7]
WPA-KAS-042	PFO	N/A	AC Cable LOD Conversion PFO to PEM	Timber Mats	41.935569	-80.381462	0.0	0.0	0.01	436
						Total:	**0.81**	**35,279**	**0.99** **0.02**[7]	**43,380** **851**[7]

Notes:
1. Unique HDR wetland identifier.
2. Jurisdictional classification must be confirmed by USACE. Classification based on field observations and current guidance documents.
3. Latitude and Longitude are calculated at the point where the feature is impacted by LOD.
4. Temporary impacts calculated in accordance with the PASPGP-4 Cumulative Impacts Screening Form.
5. Permanent impacts are associated with wetland type conversion.
6. Wetland will be crossed by the proposed cable or is located within the cable route corridor. HDD construction method under USACE regulation will avoid all impacts to the wetland.
7. 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.

Table 2 Proposed Waterbody Impacts for the Project

								Temporary Impacts				Permanent Impacts[9]					Temp. Floodway Impacts[7,9]	
										Dimension (feet)				Dimension (feet)				
Stream ID[1]	Waterbody & Watershed Name	Stream Type	Impact Latitude[2]	Impact Longitude[2]	Impact Type (Access Road, Work Space, Centerline, Laydown Yard, Limit of Disturbance)	Proposed Crossing Method	USACE Regulated Linear Feet of Impact[3]	Area (acres)[4]	Square Feet[4]	DEP Regulated Linear Feet Cable Crossing[5]	Bank to Bank Crossing Measurement[6]	Area (acres)[4]	Square Feet[4]	Bank to Bank Crossing Measurement[6]		Cable Diameter (ft)	Area (acres)	Square Feet
SPA-KAS-001	UNT (Unnamed Tributary) to Lake Erie; Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	42.009562	-80.401573	LOD	Open trench	925.9	0.126	5,503.6	925.9	23.7	0.00	31.5	23.7	x	1.33	1.70	73,921
SPA-KAS-002	UNT to Lake Erie; Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	42.005671	-80.393451	LOD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	42.0	5.1	0.00	6.8	5.1	x	1.33	0.02	745
SPA-KAS-004	UNT to Lake Erie; Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	42.006038	-80.387737	LOD	Open trench	50.5	0.01	252.3	50.5	5.1	0.00	6.8	5.1	x	1.33	0.31	1,3621
SPA-KAS-005	UNT to Lake Erie; Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	41.998203	-80.387853	LOD	Open trench	50.6	0.01	506.2	50.6	10.0	0.00	13.3	10.0	x	1.33	0.13	5,567
SPA-KAS-006	UNT to Lake Erie; Turkey Creek-Frontal Lake Erie; 041201010702	Perennial	41.996563	-80.387889	LOD	Open trench	51.4	0.01	257.0	51.4	5.2	0.00	6.9	5.2	x	1.33	0.12	5,397
SPA-KAS-016	Crooked Creek Crossing #1; Crooked Creek; 041201010701	Perennial	41.942158	-80.374690	HDD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	52.1	8.0	0.00	10.7	8.0	x	1.33	0.02	975
SPA-KAS-016	Crooked Creek Crossing #2; Crooked Creek; 041201010701	Perennial	41.973008	-80.387497	HDD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	72.0	30.0	0.00	39.9	30.0	x	1.33	0.49	2,1340
SPA-KAS-017[8]	UNT to Crooked Creek; Crooked Creek; 0412010110701	Intermit.	41.944013	-80.374683	HDD LOD; Temporary Floodway Only	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	N/A (HDD)	1.0						0.05	2,296

Stream ID[1]	Waterbody & Watershed Name	Stream Type	Impact Latitude[2]	Impact Longitude[2]	Impact Type (Access Road, Work Space, Centerline, Laydown Yard, Limit of Disturbance)	Proposed Crossing Method	USACE Regulated Linear Feet of Impact[3]	Temporary Impacts: Area (acres)[4]	Temporary Impacts: Square Feet[4]	Temporary Impacts: Dimension (feet): DEP Regulated Linear Feet Cable Crossing[5]	Temporary Impacts: Dimension (feet): Bank to Bank Crossing Measurement[6]	Permanent Impacts[9]: Area (acres)[4]	Permanent Impacts[9]: Square Feet[4]	Permanent Impacts[9]: Dimension (feet): Bank to Bank Crossing Measurement[6]	Permanent Impacts[9]: Dimension (feet): Cable Diameter (ft)	Temp. Floodway Impacts[7,9]: Area (acres)	Temp. Floodway Impacts[7,9]: Square Feet
SPA-KAS-018	UNT to Crooked Creek; Crooked Creek; 041201010701	Intermit	41.957183	-80.373815	LOD	Open trench	43.3	0.00	129.4	43.3	3.3	0.00	4.4	3.3	1.33	0.09	3,842
SPA-KAS-020	UNT to Crooked Creek; Crooked Creek; 041201010701	Perennial	41.978391	-80.388200	LOD	Open trench	60.0	0.00	180.0	60.00	3.7	0.00	4.9	3.7	1.33	0.00	70
SPA-KAS-021	UNT to Crooked Creek; Crooked Creek; 041201010701	Perennial	41.983679	-80.388112	LOD	Open trench	50.6	0.00	177.1	50.60	3.5	0.00	4.7	3.5	1.33	0.12	5,279
SPA-KAS-025	UNT to Crooked Creek; #1 Crooked Creek; 041201010701	Intermit	41.966468	-80.388533	HDD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	163.6[10]	6.9	0.00	9.2	6.9	1.33	0.26[10]	11,160[10]
SPA-KAS-025	UNT to Crooked Creek; #2 Crooked Creek; 041201010701	Intermit	41.966468	-80.388533	HDD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	- -[10]	4.9	0.00	6.5	4.9	1.33	- -[10]	- -[10]
SPA-KAS-025	UNT to Crooked Creek; #3 Crooked Creek; 041201010701	Intermit	41.966468	-80.388533	HDD	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	- -[10]	3.3	0.00	4.4	3.3	1.33	- -[10]	- -[10]
SPA-KAS-026	UNT to Crooked Creek; Crooked Creek; 041201010701	Perennial	41.963659	-80.380342	LOD	Open trench	50.2	0.01	200.1	50.20	4.0	0.00	5.3	4.0	1.33	0.12	5,223
SPA-KAS-027[8]	UNT to Crooked Creek; Crooked Creek; 041201010701	Perennial			HDD LOD; Temporary Floodway Only	HDD	N/A (HDD)	N/A (HDD)	N/A (HDD)	N/A (HDD)	2.0					0.01	436

Stream ID[1]	Waterbody & Watershed Name	Stream Type	Impact Latitude[2]	Impact Longitude[2]	Impact Type (Access Road, Work Space, Centerline, Laydown Yard, Limit of Disturbance)	Proposed Crossing Method	USACE Regulated Linear Feet of Impact[3]	Temporary Impacts				Permanent Impacts[9]				Temp. Floodway Impacts[7,9]	
										Dimension (feet)				Dimension (feet)			
								Area (acres)[4]	Square Feet[4]	DEP Regulated Linear Feet Cable Crossing[5]	Bank to Bank Crossing Measurement[6]	Area (acres)[4]	Square Feet[4]	Bank to Bank Crossing Measurement[6]	Cable Diameter (ft)	Area (acres)	Square Feet
SPA-KAS-030[8]	UNT to Crooked Creek; Crooked Creek; 041201010701	Ephemeral	41.974081	-80.387427	Jack and Bore LOD; Temporary Floodway Only	Jack and Bore	N/A	N/A	N/A	N/A	2.0					0.04	1,673
SPA-KAS-031	UNT to Crooked Creek; Crooked Creek; 041201010701	Ephemeral	41.965216	-80.389108	Construction Laydown Area LOD	Matting	N/A	0.00	160.6	321.0	0.5					0.81	35,449
PPA-KAS-002	UNT Pond	Pond	41.941263	-80.374416	LOD		N/A	0.00	108.4	N/A	N/A					N/A	N/A
Project Impact Total						**Project Totals[3,5]**	**1,603.6**	**0.17**	**7,475.4**	**1,933.3**		**Project Totals[9]**	**155.16**	**116.7**		**4.29**	**186,993**
						Perennial	**1,239.30**	**0.17**	**7,185.4**	**1,405.4**		**Perennial[9]**	**130.61**	**98.2**		3.04	132,574
						Intermit.	**43.3**	**0.0**	**129.4**	**207.0**		**Intermittent[9]**	**24.55**	**18.5**		0.40	17,298
						Ephemeral	**321.0**	**0.0**	**160.0**	**321.0**		**Ephemeral[9]**	**0.0**	**0.0**		0.85	37,122

Notes:
1. Unique HDR Identifier
2. Latitude and Longitude are calculated at the point where the pipeline crosses the feature.
3. Linear feet of impact as requested by the USACE. Excludes impacts associated with HDD bores.
4. Area and square foot calculation are based on GIS calculations and reflect the stream dimensions and variations collected during field surveys.
5. Linear feet of impact as requested by the PADEP. Includes impacts associated with HDD bores.
6. Bank to bank crossing measurement is a GIS performed calculation based on the GIS data collected during field surveys.
7. Floodway impacts as requested by the DEP Impacts Associated with the Project Work Site Form.
8. Waterbody will not be crossed by the cable, but LOD projection indicated floodway impacts.
9. Based on guidance provided by PADEP, the impacts to waterbodies listed in this table include the area of HDD crossings underneath the waterbodies and associated floodways. However, such HDD crossings involve no disturbance of the waterbodies or associated floodways.
10. Meander stream that is crossed by the cable route centerline three (3) times in a short segment of the proposed route. Impact calculations associated with HDD crossing of this stream are combined and presented as one.

Table 3: Adjoining Landowner List

Tax Parcel ID	Owner Line 1	Address Line 1	Address Line 2	City	State	Zip+4
Properties on which facilities will be constructed						
04005009000400	SITHE PENNSYLVANIA HOLDINGS LL	C/O RELIANT ENERGY MID ATLANTIC POWER HOLDINGS LLC	ATTN PROPERTY TAX DEPT POB 1410	HOUSTON	TX	77251-1410
04005010000300	LAVERY TERRY A	8680 LEXINGTON RD		GIRARD	PA	16417-8904
04005010000400	HAZER ANDREW JR UX ALICE	409 VESTA DR		DAUPHIN	PA	17018-9613
04005010000600	GLOSKEY RICHARD UX MARY M	8251 GLOSKEY RD		GIRARD	PA	16417-7005
04005010001100	MATERIAL RECOVERY GROUP ERIE	PO BOX 1102		CHARDON	OH	44024-5102
24008064000500	FAIRVIEW EVERGREEN NURSERIES	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
24008066000100	PULINE PATRICIA K	3717 MCKEE RD		ERIE	PA	16506-1925
24020066000800	STEWART WILLIAM S	11416 SPRINGFIELD RD		GIRARD	PA	16417-7232
24020068000600	CARR, BRADLEY T.	11057 SPRINGFIELD RD		GIRARD	PA	16417-7223
24020068000800	CARR , BRADLEY T.	11057 SPRINGFIELD RD		GIRARD	PA	16417-7223
24021076000100	SEDLER TRUST	8009 LEXINGTON RD		GIRARD	PA	16417-9102
39005000000000	CONRAIL	PO BOX 8499		PHILADELPHIA	PA	19101-8499
39005003000600	BECK CAROLYN M ET EDWARD L ET EMILY M ET MARTIN J	7621 WELCANA DR		FAIRVIEW	PA	16415-1025
39005004000700	BECK CAROLYN M ET EDWARD L ET EMILY M ET MARTIN J	7621 WELCANA DR		FAIRVIEW	PA	16415-1025
39005006000501	FAIRVIEW EVERGREEN NURSERIES INC	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-1171
39040014000100	NEWMAN THOMAS S UX DIANE M	11641 MAIN ST		GIRARD	PA	16417-9003
Properties adjacent to those properties on which facilities will be constructed						
04005000000000	BESSEMER & LAKE ERIE RAILROAD	C/O CN TREASURY & TAXATION	PO BOX 8100 DOWNTOWN STATION			00000-0000
04005009000300	HAZER ANDREW JR UX ALICE	409 VESTA DR		DAUPHIN	PA	17018-9613
04005009000301	PENNSYLVANIA ELECTRIC CO	ATTN: PENELEC TAX DEPARTMENT	800 CABIN HILL DR	GREENSBURG	PA	15601-1650
04005010000200	WHEELER VICTOR JOHN UX SANDRA	8650 LEXINGTON RD		GIRARD	PA	16417-8904
04005010000500	FISH RODNEY A UX TRUDY A	8760 LEXINGTON RD		GIRARD	PA	16417-8906
04005010000700	TAYLOR TONY G	8780 LEXINGTON RD		GIRARD	PA	16417-8906
04005010000701	PENNSYLVANIA ELECTRIC CO	ATTN: PENELEC TAX DEPARTMENT	800 CABIN HILL DR	GREENSBURG	PA	15601-1650
24008064000402	LAKESHORE COMMUNITY SERVICE	1352 W 26TH ST		ERIE	PA	16508-1402
24008064000600	MARINO JOSEPH P UX KALEEN H	4561 TOWNLINE RD		GIRARD	PA	16417-9116
24008066000101	MCDONALD BETTY	C/O BETTY WOODS	11431 CROSS STATION RD	GIRARD	PA	16417-9153
24008066000103	CROSS STATION MOBILE HOME COMMUNITY	935 LINDEN AVE		ERIE	PA	16505-3424

Tax Parcel ID	Owner Line 1	Address Line 1	Address Line 2	City	State	Zip+4
24008066000300	PENNA ELECTRIC CO	ATTN: TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020066000801	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
24020066000802	PENNA ELECTRIC CO	ATTN TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020066000804	AGNELLO MICHAEL UX DENISE	11466 SPRINGFIELD RD		GIRARD	PA	16417-7232
24020066000805	RENNER ALBERT W UX SHIRLEY E	11448 SPRINGFIELD RD		GIRARD	PA	16417-7232
24020066000806	DOMBROWSKI DAVID W UX SUSAN M	8331 BARKER RD		GIRARD	PA	16417-8706
24020066000807	STEWART WILLIAM S	11416 SPRINGFIELD RD		GIRARD	PA	16417-7232
24021076000200	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
24021076000801	GLOSKEY RICHARD UX MARY MARGARET	8521 GLOSKEY RD		GIRARD	PA	16417-7011
24021076000900	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
39004003000412	GAINES KENNETH L UX APRIL BALDWIN	3254 E STANCLIFF RD		MC KEAN	PA	16426-2116
39004003000500	SNYDER DIANE L ET AMANDA L	12000 W LAKE RD		EAST SPRINGFIELD	PA	16411-9102
39005003000700	COMMONWEALTH OF PENNSYLVANIA DEPT OF CONSERVATION & NATURAL RESOURCES	BUREAU OF FACILITY DESIGN & CONSTRUCTION	LAND RECORDS SECTION PO BOX 8451	HARRISBURG	PA	17105-8451
39005004000600	BUIE FAMILY LIVING TRUST AGREEMENT THOMAS P BUIE TRUSTEE	812 LAKE JOSEPHINE DR		SEBRING	FL	33872-0000
39005004000800	COMMONWEALTH OF PENNSYLVANIA DEPT OF CONSERVATION & NATURAL RESOURCES	BUREAU OF FACILITY DESIGN & CONSTRUCTION	LAND RECORDS SECTION PO BOX 8451	HARRISBURG	PA	17105-8451
39005006000400	TRAVIS RICHARD L UX SHIRLEY T	949 CANNON CIR		WEBSTER	NY	14580-8924
39005006000500	MARINO JOSEPH P UX KALEN H	4561 TOWNLINE RD		GIRARD	PA	16417-9116
39005006000600	TRAUT JAMES E	468 THORNYCROFT AVE		PITTSBURGH	PA	15228-2455
39020059000502	WHITE SUSAN BOOZER	7755 ROUTE 215		GIRARD	PA	16417-9020
39020059000503	CORNELIUS GEORGE W UX MARJORIE S ET STEVEN G	5447 WASHINGTON AVE		ERIE	PA	16509-2817
39020059000600	CORNELIUS EDWIN J	7855 ROUTE 215		GIRARD	PA	16417-9035
39040014000200	GARONE ANTHONY	1508 CENTER ST		SEWICKLEY	PA	15143-2040
39040014000300	GARONE ANTHONY	1508 CENTER ST		SEWICKLEY	PA	15143-2040
Properties adjacent to public road right-of-ways where facilities are constructed (not including properties already listed above)						
04005010000100	HAZER ALICE J	409 VESTA DR		DAUPHIN	PA	17018-9613
04005011000100	LAVERY TERRY E UX NANCY D	8615 LEXINGTON RD		GIRARD	PA	16417-8905
04005011000101	HALL DARREN M UX CHRISTINE M	926 MAPLE LN		MEADVILLE	PA	16335-1141
04005011000102	LAVERY DOUGLAS E UX MARY ANN	8651 LEXINGTON RD		GIRARD	PA	16417-8905
04005011000107	LAVERY DAVID C UX PATRICIA G	8675 LEXINGTON RD		GIRARD	PA	16417-8905
04005011000108	LAVERY DAVID C UX PATRICIA G	8675 LEXINGTON RD		GIRARD	PA	16417-8905
04005011000300	HAZER ANDREW JR UX ALICE	409 VESTA DR		DAUPHIN	PA	17018-9613
24007000000200	CONRAIL	C/O PROPERTY TAX DEPT	PO BOX 8499	PHILADELPHIA	PA	19101-8499

Tax Parcel ID	Owner Line 1	Address Line 1	Address Line 2	City	State	Zip+4
24007023000600	MARINO JOSEPH P UX KALEEN H	4561 TOWNLINE RD		GIRARD	PA	16417-9116
24007023000601	MARINO DAVID N UX KATRINA H	2101 TOWNLINE RD		LAKE CITY	PA	16423-1616
24007024000100	KMECIK DANIEL R	11613 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9215
24008064000100	KMECIK DANIEL R	11613 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9215
24008064000700	FAIRVIEW EVERGREEN NURSERIES	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
24008065100100	PETERS RAYMOND UX DONNA	4970 TOWNLINE RD		GIRARD	PA	16417-9117
24008065100200	SABOL DONALD E UX SHIRLEY L	4892 TOWNLINE RD		GIRARD	PA	16417-9117
24019080000600	COLE BRADLEY	10990 SPRINGFIELD RD		GIRARD	PA	16417-9101
24020066000700	SISSON RENTALS III LLC	7301 ROUTE 215		GIRARD	PA	16417-9029
24020066000701	PENNA ELECTRIC CO	ATTN TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020067001601	NETH ROBERT C UX DEBORAH L	11084 SPRINGFIELD RD		GIRARD	PA	16417-7224
24020067001700	STEMPLE BRIAN L ET WUNZ MARLENE C	11088 SPRINGFIELD RD		GIRARD	PA	16417-7224
24020067001800	MUMFORD RICHARD C UX JOYCE A REVOCABLE LIVING TRUST	11110 SPRINGFIELD RD		GIRARD	PA	16417-7226
24020067001801	MUMFORD RICHARD UX JOYCE	11110 SPRINGFIELD RD		GIRARD	PA	16417-7226
24020067001900	KLEMM JACK E III UX STEPHANIE A	11160 SPRINGFIELD RD		GIRARD	PA	16417-7226
24020067002000	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
24020067002100	SISSON FARM LLC	7301 ROUTE 215		GIRARD	PA	16417-9029
24020067002400	MATERIAL RECOVERY GROUP ERIE	PO BOX 1102		CHARDON	OH	44024-5102
24020068000100	BARTOSEK VINCENT J UX PATRICIA C	11261 SPRINGFIELD RD		GIRARD	PA	16417-7227
24020068000200	THOMPSON MEGAN E	11241 SPRINGFIELD RD		GIRARD	PA	16417-7227
24020068000300	HAYES DOROTHY E VIR RICHARD D	66 FRANKLIN ST		ALBION	PA	16401-1133
24020068000400	TAYLOR GERALDINE F	11165 SPRINGFIELD RD		GIRARD	PA	16417-7225
24020068000401	WOOD JAMES C UX SHELLY R	11131 SPRINGFIELD RD		GIRARD	PA	16417-7225
24020068000402	JORDANO JAMES V	11185 SPRINGFIELD RD		GIRARD	PA	16417-7225
24020068000500	DOMBROWSKI GENE C UX ELAINE E	11105 SPRINGFIELD RD		GIRARD	PA	16417-7225
24020068001200	MATERIAL RECOVERY GROUP ERIE	PO BOX 1102		CHARDON	OH	44024-5102
24020069000100	COONFER JEFFREY W UX MELINDA S	11477 SPRINGFIELD RD		GIRARD	PA	16417-7231
24020069000200	GRESH LINDA M	11373 SPRINGFIELD RD		GIRARD	PA	16417-7229
24020069000201	PENNA ELECTRIC CO	ATTN: TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020069000202	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
24020069000300	PENNA ELECTRIC CO	ATTN: TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020069000303	PENNA ELECTRIC CO	ATTN: TAX DEPARTMENT	800 CABIN HILL DRIVE	GREENSBURG	PA	15601-1650
24020078000100	MCDONALD PERCY K UX NORMA JEAN	11006 SPRINGFIELD RD		GIRARD	PA	16417-9124
24020078000101	MCDONALD JOHN C UX GAIL LYNN	11065 SPRINGFIELD RD		GIRARD	PA	16417-7223
24021074000100	GRESH JOHN R	10413 MESSINGER RD		GIRARD	PA	16417-9210
24021074000200	HAZER GEO AND HAZER ANDREW	409 VESTA DR		DAUPHIN	PA	17018-9613

Tax Parcel ID	Owner Line 1	Address Line 1	Address Line 2	City	State	Zip+4
24021075000100	EDWARDS JANICE	8210 GLOSKEY RD		GIRARD	PA	16417-7006
24021075000101	MCQUEENEY RANDALL UX SUSAN J	8353 LEXINGTON RD		GIRARD	PA	16417-9129
24021075000300	LAVERY TERRY E UX NANCY D	8615 LEXINGTON RD		GIRARD	PA	16417-8905
24021075000301	BROWN DEAN UX DEBRA	8541 LEXINGTON RD		GIRARD	PA	16417-9120
24021075000302	PLATZ RONALD E UX SANDRA R	8574 LEXINGTON RD		GIRARD	PA	16417-9120
24021075000303	KELLER GERALD F UX LEE ANN	8519 LEXINGTON RD		GIRARD	PA	16417-9120
24021075000400	SHELDON ROBERT R UX IONA M	8471 LEXINGTON RD		GIRARD	PA	16417-9105
24021075000401	SHELDON JOHN R UX CHERIE R	8395 LEXINGTON RD		GIRARD	PA	16417-9129
24021075000402	SHELDON RAYMOND R UX ELAINE R	8421 LEXINGTON RD		GIRARD	PA	16417-9105
24021075000500	MIHALAK MICHELLE S	8377 LEXINGTON ST		GIRARD	PA	16417-9129
24021077000200	MCDONALD JOHN C UX GAIL LYNN	11065 SPRINGFIELD DR		GIRARD	PA	16417-7223
24021077000300	KEITH RONALD W UX DOROTHY J	11047 SPRINGFIELD RD		GIRARD	PA	16417-9124
24021077000400	MCPEAK KENNETH L UX JOYCE A	11033 SPRINGFIELD RD		GIRARD	PA	16417-9124
24021077000500	KOWALSKI BONNIE J	8100 LEXINGTON RD		GIRARD	PA	16417-9125
24021077000600	SCHNEIDER EDWARD J UX MARY L	8118 LEXINGTON ROAD		GIRARD	PA	16417-9125
24021077000700	SHERMAN LONNIE H & BARBARA REVOCABLE LIVING TRUST	8130 LEXINGTON RD		GIRARD	PA	16417-9125
24021077000800	SCHRUM TIMOTHY E UX CAROL R	8150 LEXINGTON RD		GIRARD	PA	16417-9125
24021077000900	GRESH MICHAEL S	8280 LEXINGTON RD		GIRARD	PA	16417-9128
24021077000902	GRESH MICHAEL	8280 LEXINGTON RD		GIRARD	PA	16417-9128
39005004000900	COMMONWEALTH OF PENNSYLVANIA DEPT OF CONSERVATION & NATURAL RESOURCES	BUREAU OF FACILITY DESIGN & CONSTRUCTION	LAND RECORDS SECTION PO BOX 8451	HARRISBURG	PA	17105-8451
39005005000100	FAIRVIEW EVERGREEN NURSERIES INC	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
39005006000200	KMECIK DANIEL R UX BRENDA M	11613 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9215
39005006000301	RENSEL MICHAEL J ET PHILLIPS PENNY SUE	11799 W LAKE RD		EAST SPRINGFIELD	PA	16411-9781
39005006000302	BOYCE BRUCE E ET BREESE PRISCILLA A	6590 MEADVILLE RD		GIRARD	PA	16417-7302
39005006000401	TRAVIS RICHARD L UX SHIRLEY T	949 CANNON CIR		WEBSTER	NY	14580-8924
39005006000700	MARINO JOSEPH P UX KALEEN H	4561 TOWNLINE RD		GIRARD	PA	16417-9116
39005006000800	CURTIS WILLIAM M	PO BOX 107		EAST SPRINGFIELD	PA	16411-0107
39005006000808	WEAVER DONALD A II	11772 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9218
39005006000809	QUINN JOSEPH P UX DENISE A	11524 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9214
39006007000200	KMECIK DANIEL R	11613 MIDDLE RD		EAST SPRINGFIELD	PA	16411-9215
39006007000300	FAIRVIEW EVERGREEN NURSERIES INC	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805

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39006008000200	FAIRVIEW EVERGREEN NURSERIE	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
39006009000200	FAIRVIEW EVERGREEN NURSERIES INC	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
39031007000100	FAIRVIEW EVERGREEN NURSERIES	7463 W RIDGE RD	PO BOX E	FAIRVIEW	PA	16415-0805
39039007000300	SABOL DONALD E UX SHIRLEY L	4892 TOWNLINE RD		GIRARD	PA	16417-9117
39051015000100	LUCCHINI ALLAN C ET CHARLES D	118 LEMOYNE AVE		WASHINGTON	PA	15301-3636