Lake Encroachment Permit Application Narrative

NEW ENGLAND CLEAN POWER LINK

Lake Bomoseen, Castleton, Vermont

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Table of Contents

1.0 Introduction and Regulatory Background 1

2.0 NECPL Project Overview and Route Development 2

3.0 Lake Bomoseen Encroachment Project Description (Line 4) 4

- 3.1 Encroachment Location 4
- 3.2 Proposed Terrestrial Cable Specifications 4
- 3.3 Installation Methods and Equipment 5
- 3.4 Operational Description 6

4.0 Purpose of the Project (Line 5) 7

5.0 Public Benefits of the Project (Line 6) 8

- 5.1 Environmental Benefits 9
- 5.2 Electric Benefits 10
- 5.3 Infrastructure Benefits 10
- 5.4 Economic Benefits 10

6.0 Planned Work Schedule (Line 7) 11

7.0 Abutting Landowners (Line 9) 11

8.0 Project Cost and Application Fee (Line #10) 12

9.0 Public Trust Determination 12

- 9.1 Part 1: Extent of Encroachment 12
  - 9.1.1 Construction Considerations and Precautions 13
  - 9.1.2 Operational Phase 14
- 9.2 Public Trust Determination Part 2: Effect of Statutory Criteria 14
  - 9.2.1 Water Quality 14
  - 9.2.2 Aquatic and Shoreline Vegetation and Biota 14
  - 9.2.3 Navigation 14
  - 9.2.4 Other Recreation and Public Uses 15
  - 9.2.5 Consistency with Natural Surroundings 15
  - 9.2.6 Consistency with Applicable Municipal Shoreland Zoning Ordinances 15
  - 9.2.7 Consistency with Applicable State Plans 16
- 9.3 Public Trust Determination Part 3: Potential Cumulative Effect of the Encroachment 16

10.0 Conclusions 17

References 19

Appendices – See Attached Appendix Document Tracking Table

1.0 Introduction and Regulatory Background

On behalf of Champlain VT, LLC d/b/a TDI New England ("TDI-NE"), VHB has prepared this Lake Encroachment Permit Application for the portion of the proposed the New England Clean Power Link Project ("NECPL" or "Project"), that would be installed beneath the southern end of Lake Bomoseen ("Lake") in Castleton, Vermont via Horizontal Directional Drill ("HDD") methodology. The HDD would be staged within the US Route 4 Right of Way ("ROW"). The Project Overview Map, Overland Segment Map, and Lake Bomoseen Plans and Profile are provided in Appendix 1.

According to Vermont Statutes Annotated ("V.S.A.") Title 29, Chapter 11 Management of Lakes and Ponds §402(3), the alteration of the lands underlying any waters, or the placement of a cable or similar structure beyond the shoreline is considered to be an encroachment, and is prohibited without obtaining a Lake Encroachment Permit. In addition, a shoreline is further delineated as the mean water level of a lake. Water levels for Lake Bomoseen are maintained by a dam and regulated in accordance with 10 V.S.A. §905(2), which defines the jurisdictional surface level as "at gage zero (0) plus or minus three (3) inches, with the desired level on the plus side in the summer." The dam is owned by the Vermont Department of Environmental Conservation ("VT DEC") but is operated by the Town of Castleton. This application has been prepared to demonstrate how the proposed Lake installation will meet the applicable permitting criteria. The following documents, in addition to the Statutes, have been referenced in preparation of the application materials:

- VT DEC *Interim Procedures for the Issuance or Denial of Encroachment Permits*, dated October 6, 1989 ("Interim Procedures").
- VT DEC *Explanation of Public Trust Review of Encroachment Permit Applications*, undated, accessed on VT DEC WWMD web site January 2015 ("Explanation").
- VT DEC *Instruction Sheet – Application for Permit Management of Lakes and Ponds,* undated, accessed on VT DEC WWMD web site January 2015.

The completed VT DEC Lake Encroachment Permit Application Form is enclosed, and this report serves to provide supplemental information beyond that provided on the Application Form. Sections 2.0 through 8.0 of this report provide information directly requested by the form (Lines 4 through 10). Section 9.0 of this report describes how the LEP application meets the Public Trust Doctrine and can therefore be permitted. Conclusions are presented as Section 10.0. Additional supporting materials, such as maps, plans, and technical reports, are provided in the Appendices, as referenced by the Attached Document Tracking Table.

The Applicant submitted a Petition for a Certificate of Public Good ("CPG") and prefiled testimony ("PFT") and exhibits to the Vermont Public Service Board ("VT PSB") on December 8, 2014. The majority of this report, as well as application and supporting materials, are a compilation of text and supporting documents from relevant PFT and exhibits. Additional Project information and details can be found in materials associated with that preceding. References are provided at the end of the report.

2.0 NECPL Project Overview and Route Development

The NECPL HVDC electric transmission line will provide electricity generated by renewable energy sources in Canada to the New England electric grid. The line will run from the Canadian border at Alburgh, Vermont to Ludlow, Vermont along aquatic and underground routes. The nominal operating voltage of the line will be approximately 300 to 320 kV, and the system will be capable of delivering 1,000 megawatts ("MW") of electricity.

The proposed aquatic portion of the transmission line, approximately 97 miles in length, will be buried to a target depth of 3 to 4 feet in the bed of Lake Champlain except at water depths of greater than 150 feet where the cables will be placed on the bottom and self-burial of the cables in sediment will occur. In areas where there are obstacles to burial (e.g. existing infrastructure, bedrock), protective coverings will be installed except in deeper waters of the Lake (greater than 150 feet deep). The Lake Champlain portion of the Project is being submitted for VT DEC review in a separate Lake Encroachment Application.

The overland portion of the transmission line, approximately 57 miles in length, will be buried approximately four feet underground within existing public (state and town) ROWs or on land owned by TDI-NE.[1] The cables will be installed within a railroad ROW for approximately 3.5 miles in the town of Shrewsbury and Wallingford. In Castleton, the transmission line will be installed beneath the southern end of Lake Bomoseen via HDD methodology, with HDD staging located on both sides of the Lake within the ROW of US Route 4.

In Ludlow, the HVDC line will terminate at a converter station that will convert the electrical power from direct current ("DC") to alternating current ("AC"). An underground AC transmission line will then run

[1] The only potential areas where underground burial will not occur is at two stream/river crossings in Ludlow where the cables may be placed in conduit and attached to a bridge or culvert headwall.

to the existing 345 kV Coolidge Substation in Cavendish, Vermont located approximately 0.6 miles to the south that is owned and operated by the Vermont Electric Power Company ("VELCO").

TDI-NE conducted feasibility studies resulting in the selection of the point of interconnection and the proposed transmission line route in Vermont. The studies found that of the substations considered, only the VELCO Coolidge Substation has the infrastructure necessary to reliably interconnect the NECPL without significant upgrades to the New England Independent System Operator ("ISO-NE") transmission system. After determining that the NECPL could reliably interconnect to the Coolidge Substation, TDI-NE evaluated a number of alternative routes from the Canadian border to the substation. Based on TDI's experience with a similar project (the Champlain Hudson Power Express), TDI-NE focused on alternatives that utilized Lake Champlain as the primary route, utilized buried HVDC technologies, and utilized public ROWs. Installing cables in the Lake is less costly, less disruptive to communities and less impactful when using environmentally-sensitive lake installation measures. TDI-NE also evaluated several above-ground and underground routes that did not utilize Lake Champlain as part of its alternatives analysis for its Section 404 application to the U.S. Army Corps of Engineers ("USACE"). The non-lake or overhead alternatives were deemed impracticable due to cost, logistics, and/or technological constraints.

Once an approximate route using the Lake and public ROWs was developed, TDI-NE evaluated numerous route segments. TDI-NE developers and engineers evaluated numerous entry/exit points along Lake Champlain and road, railroad and utility ROW corridors from Lake Champlain to Ludlow. Meetings were held with the owners of these corridors to evaluate the feasibility of installing an HVDC cable. Once a preliminary route was selected by TDI-NE, it was previewed with state and federal regulators per their request and then through many meetings with town representatives and abutters along the route. Through feedback received at these meetings, several adjustments to the original route were made in Alburgh, Benson, Shrewsbury, Wallingford and Ludlow. The final proposed Alburgh to Benson Lake Route was selected based on criteria described in the Section 248 proceeding and in the Lake Champlain Lake Encroachment Permit Application. The proposed Benson to Ludlow Overland Route was selected based on the following criteria:

- Avoid Green Mountain National Forest lands
- Find a route over the Green Mountains that was as flat as possible
- Stay on existing public rights of way to avoid the use of private property and the attendant potential impacts
- Find the most direct route possible

The following Sections follow the format of the Lake Encroachment Permit Application form, and the Line numbers provided correspond to the line numbers on that form.

3.0 Lake Bomoseen Encroachment Project Description (Line 4)

3.1 Encroachment Location

As depicted in the Project Plans and profiles provided in Appendix 1, the transmission line is proposed to cross the southern end of Lake Bomoseen, just north of the US Route 4 bridge in Castleton. The Lake is approximately 260 feet wide in this area. The eastern edge of the HDD launch area would be situated approximately 180 feet from the western shore of the Lake between the Project's mile post ("MP") 112.6 and MP 112.7. The entire HDD bore hole will be approximately 2,300 feet in length, with the HDD exit area being located over 1,600 feet to the east of Lake Bomoseen's eastern shore, at MP 113.1.

3.2 Proposed Terrestrial Cable Specifications

The underground transmission cables will have a diameter of approximately 4.6 inches, and each cable will weigh approximately 20.2 pounds per foot. The outer sheathing insulation of the underground transmission cables will be composed of an ultraviolet-stabilized, extruded polyethylene layer.

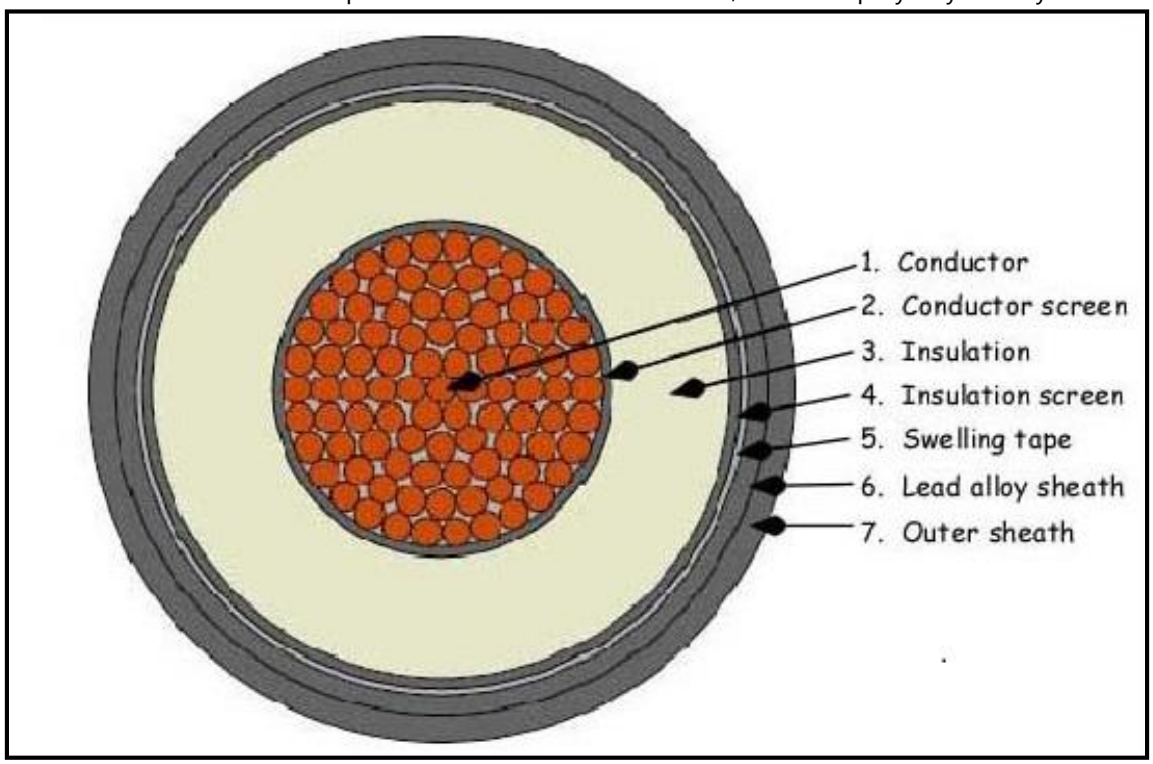

Figure 1: Example Terrestrial HVDC Transmission Cable Cross-Section

3.3 Installation Methods and Equipment

Horizontal Directional Drill

The transmission line will cross Lake Bomoseen using HDD, a trenchless construction technique, to avoid impacts to the Lake shoreline and nearshore habitat. HDD is a method of installing underground utilities in a shallow arc along a prescribed path by using a surface-launched drilling rig.

The main equipment used for HDD include:

1. a directional drill rig sized for the Project;
2. drill rods linked together to form a drill string for advancing the drill bit and for pulling back reamers and products, i.e., high density polyethylene pipe (HDPE) conduit;
3. a transmitter/receiver or wire line for tracking and recording the location of the drill and product;
4. a tank for mixing and holding drilling fluid; and,
5. a pump for circulating the drilling fluid and various pumping and centrifugal pumps/cyclones to recycle the drilling fluid and remove cuttings.

An HDD includes a launch site where the rig is set up and positioned to drill a pilot bore along a planned path to an exit pit where first a reamer (to open the bore to the required dimensions) and then the HDPE conduit are attached and pulled back through the hole. The rig is secured and positioned at a distance behind the entry point to allow the drill to enter the ground at the planned location at a typical entry angle of 8 to 16 degrees. A pit for capturing drilling fluids (returns) is dug at the point of entry and at the planned exit point in terrestrial HDD's. Accepted industry practices for inadvertent return management and spill prevention and control, is discussed in Section 9.1.

The drilling fluid is an absorbent clay composed of aluminum phyllosilicate which facilitates the HDD function by suspension of drill cuttings allowing removal, reducing friction forces, and stabilizing the bore hole. The drill string, composed of a series of drill rods, is advanced using rotational torque and thrust until the drill string has enough downhole stability to allow the operator to change the direction that the string will advance along the drill path. The operator navigates the drill by manipulating the drill string. Drilling fluids, pumped down through the hollow drill rods and holes in the drill bit, keep the system cool, stabilize the hole and extract the returns (cuttings). Material Safety Data Sheets for the drilling mud and anticipated additive are provided Appendix 3.

Once the bore hole reaches the exit area, the reaming and installation of the HDPE conduit phase begins. The hole is reamed in one or more passes to the required diameter. When the bore is large enough to accept the HDPE conduit (approximately 1.5 times the size of the conduit), the HDPE conduit is attached to the drill string with a pulling head and swivel and pulled back to the rig.

Separate drill holes for each cable will be required, and the cables will be installed at a minimum of 20 feet below the Lake bottom. Each cable will be installed within a 10-inch (64-cm) diameter, or larger, HDPE conduit. To maintain appropriate separation between the two cables, approximately 6 feet (1.8 meters) will be maintained between each drill path. After the HDPE conduits are in place, the transmission cables and the fiber optic line, which will be attached to one of the cables, will be pulled through these pipes. The pipes will remain in place to protect the transmission cable.

3.4 Operational Description

With the exception of system monitoring, the NECPL Project will be largely unmanned after commissioning. Controls will be automated, with power delivered as "base load" with remote operations being managed by TDI-NE. ISO-NE will have operational control of the NECPL. Field support of system operations will be provided in consultation with the manufacturer through a contracted specialty transmission services provider.

The Project has an expected life span of at least 40 years. During this period, it is expected that the transmission system will maintain an energy availability factor of 95 percent, meaning that the transmission system will be delivering electricity 95 percent of the time, with the remaining five percent allocated for scheduled and unscheduled maintenance and lower throughput on the cables.

The HVDC transmission cables themselves will be relatively maintenance free, as they will be installed within specified design and field condition parameters. Although no components of the transmission system will require regular replacement, regular inspections, in accordance with the manufacturer's specifications, will be performed during scheduled outages to ensure equipment integrity is maintained.

Transmission Cable Inspection

The overland cable will be inspected approximately every 3 years to ensure that adequate cover exists. In addition, following installation of the transmission cable, annual walk-down inspections will be conducted of the transmission cable ROWs, transitional splice vaults and duct banks to ensure that cables are fully secure and that there is no potential intrusion or activity that could impact cable operation. More specifically, on-the-ground inspectors will survey the terrestrial ROW periodically for:

- Vegetation on the ROW that might be capable of disrupting (i.e., damaging) the cables below;
- Line exposures at areas with steep slopes and stream banks;
- Unauthorized encroachments;
- Vandalism.

While not anticipated, it is possible that over the expected 40-year lifespan of the proposed Project the transmission cables may require repair. The proposed cable installation design and techniques identified by TDI-NE will minimize the potential for mechanical damage to the cable system and ensure

operational safety and reliability of the cables. If a cable is damaged, a protection system in place will detect the fault and the Ludlow and Quebec HVDC Converter Station switching systems will de-energize the transmission system in approximately five milliseconds.

Before operation of the proposed NECPL Project begins, an Emergency Repair and Response Plan ("ERRP") will be prepared to identify procedures and contractors necessary to perform maintenance and emergency repairs. The ERRP will detail the activities, methods, and equipment involved in repair and maintenance work for the transmission system. Although the scope of work for each situation will be adjusted to fit the conditions of the problem, the typical procedures for repair of a failure within the terrestrial portions of the proposed NECPL Project route are described as follows:

Terrestrial Transmission Cable Repair

In the event of transmission cable repair, pre-selected local contractors identified during the development of the ERRP will excavate around the location of the problem and along the transmission cable for the extent of cable to be repaired or replaced. Once the portion of the transmission cable is excavated, specialized OEM personnel will remove the damaged cable and install new cable. Once complete, the transmission cable trench will be backfilled and the work area restored using the same methods as described for the original installation.

End of Cable Life

The Project has an expected useful life of 40 years. TDI-NE will evaluate the continued viability of the NECPL's existing infrastructure prior to the end of its useful life, to determine whether it can continue to operate, and/or whether the NECPL should be upgraded (subject to any necessary VT PSB approvals).

Presuming that the Project will not continue to operate, TDI-NE currently proposes to de-energize the line but leave the cable in place. As necessary, TDI-NE will provide state and local officials with accurate and detailed information on the location of the line. Otherwise, because the underwater/underground line will have no ongoing impacts, decommissioning the line in place will have a much lower impact to the environment, and will be much less disruptive to the public, than mobilizing the equipment and crews necessary to deconstruct and remove it from the lakebed, roads and railroad ROWs.

4.0 Purpose of the Project (Line 5)

As previously discussed, the transmission line route has been carefully considered and the proposed alignment represents the most feasible route. By following US Route 4, the transmission line can be installed on relatively flat, previously disturbed ground and be easily maintained within the ROW. The purpose of installing the cable beneath Lake Bomoseen is to maintain the most direct route possible,

since US Route 4 crosses the southern end of Lake Bomoseen. TDI-NE proposes installation via HDD methodology in order to eliminate direct impacts to the Lake and lakeshore.

The purpose of the overall NECPL Project is to import Canadian renewable power to serve the New England market using buried HVDC lines to deliver safe, reliable renewable power in an environmentally and aesthetically responsible manner. A number of factors over the last few years have led TDI-NE to propose the development of new infrastructure to connect renewable energy sources to the Vermont and New England energy markets, including:

1. ISO-NE identified three core challenges in its 2013 Regional Electricity Outlook:
    - Increasing reliance on natural gas as a fuel source for power plants and the potential for reduced operational performance during stressed system conditions.
    - The large number of aging, economically challenged oil- and coal-fired generators that provide fuel diversity to the resource mix.
    - Greater future needs for flexible supply resources to balance variable, renewable resources that have operating characteristics markedly different from those of traditional generating resources.
2. The announcement on August 28, 2013 that Vermont Yankee would close opened transmission capacity on the Vermont transmission grid.
3. The Governors' regional initiative to expand large hydro imports into New England, May 17th, 2013.

TDI-NE determined that such a project could be logically and efficiently located in Vermont due to its proximity to Canada and the availability of transmission interconnection points.

TDI-NE is in the business of providing independent transmission to serve the North American market. TDI-NE believes that in order for power markets to work efficiently and effectively there must be sufficient transmission to allow the lowest-cost generation to flow to meet the needs of consumers. In today's market, acute transmission bottlenecks are causing prices to rise, hindering renewable generation projects and impeding the efficient operation of AC systems. TDI-NE's business model is centered on the use of buried HVDC lines, which avoids aesthetic concerns and the attendant impacts on communities. It also increases the electric grid's safety and reliability because underground/underwater infrastructure is less susceptible to damage from natural disasters.

5.0 Public Benefits of the Project (Line 6)

The proposed Project will provide numerous environmental and other broader public benefits, the majority of which are outlined below. Since a large portion of the Project will be installed in Lake Champlain, TDI-NE has proposed numerous Lake Champlain-specific benefits. These benefits have been

proposed by TDI-NE as part of its petition for a CPG under 30 VSA § 248, submitted on December 8, 2014, and are described in further detail in the supporting testimony and exhibits in that proceeding. TDI-NE expects that the proposed benefits will be included as conditions in the final CPG for the project, when and if a CPG is issued.

5.1 Environmental Benefits

The Project will result in the following environmental benefits:

1. TDI-NE has committed to contribute $2 million in annual funding for Lake Champlain phosphorous cleanup for 40 years. An additional $1 million will be paid at financial close and $1 million will be paid at the start of operations. The precise mechanism for allocating this funding over the life of the Project will be identified as part of the §248 process.
2. TDI-NE has committed to contribute $1 million in annual funding for Lake Champlain enhancement through a Trust Fund for 40 years. The precise mechanism for allocating this funding over the life of the Project will be identified as part of the §248 process.
3. The Project is expected to reduce CO_2 emissions by up to 3.3 million tons annually within New England. Significant annual CO_2 reductions are anticipated, because the Project is expected to import new low-carbon resources such as hydroelectricity and wind power. These new, clean resources will displace fossil fuel generating resources within New England, which will have the impact of reducing CO_2 emissions throughout the region. In addition, the Project supports the Vermont 2011 Comprehensive Energy Plan which sets a vision to have the State secure 90% of its energy from renewables by 2050. The Vermont Energy Plan specifically supports large-scale hydroelectric generation and renewable resources from out-of-state sources.
4. The Project will provide funding in the amount of $350,000 to the State for use of the FWD Access Area. This funding will enable the design, permitting and construction by FWD of a new double-lane boat ramp at the State-owned Korean War Veterans Access located in Alburgh, VT. A boat ramp in this section of the Lake will help alleviate congestion at other nearby ramps.
5. TDI-NE proposes to complete re-vegetation and stabilization of a severely eroded bank on Lake Champlain on their property in Benson, Vermont.
6. The project proposes to replace and upgrade selected culverts to meet to meet the design requirements of the Vermont Stream Alteration General Permit in Benson that convey perennial streams. These upgrades require temporary private property easements, which TDI-NE is working to secure.
7. As part of construction, the Project is anticipated to enable improvements to existing roadside ditches along Routes 22A and 103. These improvements are expected, because excavation will need to occur within roadside ditches to install the cables and TDI-NE will be obligated by VTrans to restore the ditches.

5.2 Electric Benefits

The NECPL Project will result in the following Electric benefits:

1. TDI-NE has reached an agreement that requires $3.4 million in average annual payments to VELCO for 40 years. These payments will be distributed to Vermont ratepayers by VELCO through reductions in their electric bills. The details of this agreement are contained in exhibit TDI-JMB-7 of the 248 filing.
2. TDI-NE has committed to contribute $1 million in annually to the Vermont Clean Energy Development Fund to support Vermont Renewable Programs for 40 years. These funds are administered and distributed by the VT PSB and Clean Energy Development Board.
3. TDI-NE estimates that the Project will create $294 million in Vermont ratepayer savings for the first ten years due to the decline in retail energy and capacity prices.
4. The HVDC technology proposed has electrical reliability benefits for Vermont. First, this technology has "black start" capability, which could enable the Project to materially contribute to the restoration of electric services within Vermont and the region in the event of a major regional power outage. Second, HVDC technology is more controllable compared to HVAC technology. Third, because of its capacity to inject reactive power into the adjacent AC network, it not only improves the voltage performance response of the transmission network at the point of interconnection, but also to the adjacent AC network.

5.3 Infrastructure Benefits

The NECPL Project will result in the following infrastructure benefits:

1. TDI-NE has proposed $0.5 million in average annual payments to Vermont Agency of Transportation ("VTrans") for the use of their right-of-way for 40 years. These payments would likely be a condition of any VTrans permit.
2. TDI-NE will install a new fiber network for the Project to ensure seamless communications between a Converter Station in Canada and the Converter Station proposed in Ludlow. There is an opportunity for VTrans, Green Mountain Railway, and VELCO to access this fiber network to enhance their own communication systems. These communication systems benefit Vermont through economic efficiencies and enhanced safety.
3. Within Ludlow and Benson there is a potential to replace in-kind deteriorating culverts with new culverts.

5.4 Economic Benefits

The NECPL Project will result in the following economic benefits:

1. Based on input from the Vermont Tax Department, TDI-NE expects to pay an estimated $7.2 million in average annual property tax payments for 40 years. These payments would flow to the municipal budgets of 14 Towns and the State Education Fund.

2. As part of Project operations, TDI-NE estimates it will pay $8.2 million in average annual corporate income taxes to Vermont for 40 years.
3. TDI-NE estimates it will pay $31.4 million in sales tax payments to Vermont during three years of project construction.
4. An economic analysis estimates that the Project will create 140 jobs annually during construction and 22 jobs annually during operation within Vermont. The cumulative value of these jobs is estimated at $158.3 million.
5. These jobs are estimated to spur an additional $3.8 million in VT expenditures annually during construction and operation.
6. Vermont ratepayers are protected financially because the risk associated with the development and construction are solely the Applicants.

6.0 Planned Work Schedule (Line 7)

The permitting phase of the proposed NECPL Project is expected to continue through 2015 into early 2016. Pre-construction activities will commence in 2016 related to the qualification and selection of contractors. Construction-related engineering activities are expected to commence in 2016 and continue through early 2019 with performance testing and commissioning. TDI-NE anticipates that the commercial operation date for the proposed NECPL Project will be April 2019. A schedule of Project permits and milestones is provided in Appendix 1.

TDI-NE anticipates certain seasonal restrictions placed on construction, including:

- Restrictions on working in the VTrans ROW from December 1 to April 15.
- Restrictions on works hours and prohibitions from working on Sundays and State Holidays.
- The hours of construction on land are generally Monday through Friday, 7 AM to 7 PM, and Saturdays from 8 AM to 5 PM for areas near homes. Where TDI-NE is working in close proximity to residences, consideration in planning and executing the construction work will attempt to minimize the overall duration of the impact on the residences, and TDI-NE will provide residents with reasonable advance notice of 24-hour HDD operations.

7.0 Abutting Landowners (Line 9)

A map showing Abutting Parcels and a Table with landowners contact information are provided as Appendix 2. Since the HDD launch areas are within the Route 4 ROW, abutting parcels are considered those which abut both the ROW and the shore of Lake Bomoseen.

8.0 Project Cost and Application Fee (Line 10)

The length of the encroachment beneath Lake Bomoseen is approximately 260 feet, which represents 11 percent of the entire HDD in this area (approximately 2,300 feet in length). Therefore, the estimated cost of the Project's encroachment beneath Lake Bomoseen is calculated to be 11 percent of the entire Lake Bomoseen HDD cost, or $272,729. TDI-NE has enclosed a check for the permit application fee of $3,027, which is one percent of this amount plus $300.

9.0 Public Trust Determination

In addition to the material presented above to complete the VT DEC Lake Encroachment Permit Application Form, the following additional information has been prepared to assist in the consideration of this application. As described by the VT DEC Explanation document, in order to find that an LEP application meets the Public Trust Doctrine and can therefore be permitted, VT DEC must find that the public purpose and benefits outweigh adverse effects on the public good. In making this determination, the VT DEC applies a three part test, as described in the Interim Procedures. Information relevant to each of these parts is presented below.

9.1 Part 1: Extent of Encroachment

Part 1 of the Public Trust Determination assesses the effect of the Encroachment, with consideration of the extent of the encroachment, less intrusive alternatives, measures taken to reduce impacts on the public resources, and the placement of fill beyond the Lake's mean water level that could potentially impact the public use of the state's natural resource. The proposed HDD beneath Lake Bomoseen will avoid all direct physical impacts to the natural resources along the shorelines and the bed of the Lake during construction. This portion of the Project does not include any placement of fill, borrow material, sand, or other materials beyond the mean water level of the Lake. Once constructed, the cables will not be visible, and its presence is therefore consistent with the natural surroundings.

This section demonstrates how the Project and Project components were developed in accordance with these considerations.

9.1.1 Construction Considerations and Precautions

Installation Methodology

TDI-NE plans to implement the use of HDD technology to install the transmission line approximately 20 feet beneath the Lake in order to avoid impacts to shoreline and near shore habitats. The current design of the HDD staging areas is over 180 feet from the western shore and over 1,600 feet from the eastern shore of the Lake. Appropriate EPSC and borehole fluid containment measures would be implemented, as depicted on the Lake Bomoseen Plan and Profile Sheets provided in Appendix 1.

Drilling Mud and Inadvertent Returns

Drilling mud would consist of non-hazardous bentonite slurry (a combination of bentonite clay, water, and drilling additives). Material Safety Data Sheets ("MSDSs") for typical drilling mud additives are provided in Appendix 3. Additional or alternative additives may be determined necessary by the selected contractor, and although TDI-NE anticipates they would likely also be non-toxic, MSDSs would be provided to the VT DEC for review prior to construction. Prior to construction of the NECPL, TDI-NE would complete a geotechnical study of the soil and sediments along the proposed HDD route to determine the appropriate composition and density of the drilling mud to reduce the risk of inadvertent returns. Although considered unlikely, TDI-NE has prepared a Horizontal Directional Drilling Inadvertent Return Contingency Plan for managing inadvertent returns, which would serve as a guide for the selected contractor to develop their own plan that contains similar or more stringent provisions (provided in Appendix 3).

Hazardous Materials

The installation of the terrestrial portion of the transmission line would require the transport, handling, use, and onsite storage of hazardous materials and petroleum products, primarily associated with the operation of the equipment and vehicles. To minimize potential impacts from hazardous materials and wastes, TDI-NE would require all contractors to follow certain TDI-NE-proposed measures, which would include but not be limited to establishing a Spill Prevention, Control, and Countermeasure ("SPCC") Plan or its equivalent to prevent, control, and minimize impacts from a spill of hazardous materials, hazardous wastes, or petroleum products. Potential measures to be included in the Plan include but are not limited to: keeping appropriate spill control equipment such as containment booms, water skimmers, and sorbents on site and ready for use; using secondary containment when practical; and following all appropriate Federal and State of Vermont regulations regarding management of hazardous materials and wastes. TDI-NE's Overall Oil and Hazardous Materials Spill Prevention and Contingency Plan stipulates the minimum requirements and components of a Contingency plan to be developed by the selected Contractor, and is provided in Appendix 3.

9.1.2 Operational Phase

As previously discussed, once constructed, the HVDC transmission cables themselves will be relatively maintenance free, as they will be installed within specified design and field condition parameters. Although no components of the transmission system will require regular replacement, regular inspections, in accordance with the manufacturer's specifications, will be performed during scheduled outages to ensure equipment integrity is maintained, as described in Section 3.4.

9.2 Public Trust Determination Part 2: Effect of Statutory Criteria

Part 2 of the Public Trust Determination examines the effect of the encroachment on statutory criteria including water quality, fish and wildlife habitat, aquatic and shoreline vegetation, navigation, and other recreational and public uses, including fishing and swimming. In addition, the Department will examine the proposed encroachment's consistency with the natural surroundings, any applicable municipal shoreland zoning ordinances, and any applicable state plans.

9.2.1 Water Quality

As the transmission line will be installed completely beneath the shores and Lake bed, no significant or measurable impacts on any narrative of numerical criteria of the VWQS are anticipated for Lake Bomoseen as a result of the construction or operation of the Project.

9.2.2 Aquatic and Shoreline Vegetation and Biota

With the use of HDD, no disturbance whatsoever would occur to shoreline or aquatic vegetation, and therefore no significant or measurable impacts are anticipated as a result of the construction or operation of the project. No significant or measurable impacts on fish and wildlife habitat are anticipated as a result of the construction or operation of the project.

9.2.3 Navigation

The HDD installation beneath the Lake does not involve any interruption of navigation on Lake Bomoseen, as the drills will be staged on land. Once operational, the transmission line will result in deviations from the ambient geomagnetic field. According to modeling completed by Exponent, Inc. (2014), an 18 percent change in the geomagnetic field would be detectable 25 feet away from the circuit centerline in the HDD transition. The transmission line will be installed at least 20 feet beneath the Lake bed, and the navigable depth of the water in this section of the Lake is at least five feet deep. Any potential changes to compass readings due to magnetic fields would occur above and in the vicinity of the buried cables. Impacts to navigation are expected to be minimal, since compass deviations would be minimal and

navigation by compass in this narrow, shallow stretch of Lake Bomoseen is likely not a common practice.

9.2.4 Other Recreation and Public Uses

The HDD staging areas are located on land within the US Route 4 ROW, and construction would not interfere with recreation and/or public use of Lake Bomoseen. Once installed, there would be no significant or measurable impacts on recreation and public uses other than the magnetic field deviation and maintenance activities described above.

9.2.5 Consistency with Natural Surroundings

Once installed, the NECPL will not be visible and its presence is therefore consistent with the natural surroundings.

9.2.6 Consistency with Applicable Municipal Shoreland Zoning Ordinances

TDI-NE held several meetings with towns where the Project Route would be located to obtain their input on the route design and overall Project. The Project team also reviewed Castleton's Town Plan (2010) and Zoning Regulations (2011) to ensure the Project would be consistent with both. Relevant policies ("P#") from the plan and the Project's conformance with these are as follows:

- P27, Community Facilities and Services Goals, Policy 2: "Ensure that the location and capacity of infrastructure is consistent with other planning goals, such as protection of natural resources . . . "

  Project Response: The use of HDD installation methodology protects natural resources by avoiding direct physical impacts to the Lake bed and shoreline.

- P49, Water Quality Threats in Lake Bomoseen: "Development and increasing recreational use are inevitable threats to all of Castleton's lakes and ponds, particularly Lake Bomoseen. There are a number of regulatory methods available to the town in order to help mitigate the impacts of increased usage in and around Castleton's lakes and ponds. The town can ensure that setback requirements for lakeside dwellings are a sufficient distance from the water's edge to allow a greater filtering distance before run-off can enter the lake, establish vegetative buffer strips along the shorelines to help prevent run-off and erosion . . ."

  Project Response: As previously discussed, the HDD launch areas will be set back over 180 feet from the Lake shore, and appropriate EPSC measures will be implemented to prevent runoff and erosion.

- P53, Natural Resources Goals, Policies, and Programs, Water Resources: "Prohibit any development that will degrade water quality in Castleton" through programs such as "enforce all provisions of Castleton's shoreland zoning requirements" and "reduce erosion and siltation of shorelines and stream banks by requiring proper stabilizing measures for new construction under Castleton's site plan review."

  Project Response: As described above, the Project HDD is proposed well beneath the bed of Lake Bomoseen. In addition, the Project is seeking a VT DEC issued Construction Phase Stormwater Discharge Permit, which provides EPSC details for the Project terrestrial route. The Castleton Town Zoning Regulations (2011) do not specify Lake or shoreland ordinances. Furthermore, the Route 4 ROW Project location is not specifically zoned.

In summary, the Project is consistent with applicable Town Plan and municipal shoreland zoning ordinances for the Town of Castleton.

9.2.7 Consistency with Applicable State Plans

Lake Bomoseen is located within the Southern Lake Champlain Basin and more specifically the Poultney Mettowee Basin, which each have Tactical Basin Plans developed by VT DEC. According to the VT DEC Watershed Management Division's website, "Tactical Basin Plans focus on the projects or actions needed to protect or restore specific waters and identify appropriate funding sources to complete the work based on monitoring and assessment data." The plans are developed to meet the goals and objectives of the Vermont Surface Water Management Strategy ("VT SWMS") to protect, maintain, enhance, and restore the biological, chemical, and physical integrity, and public use and enjoyment of Vermont's water resources, and to protect public health and safety. As described herein, the Project's construction approach has been designed to avoid all direct impacts to Lake Bomoseen, and will therefore conform to the goals and objectives of the VT SWMS. Furthermore, as outlined in the Public Benefits Section, the Project will result in a significant amount of funding for Environmental efforts, including Lake Champlain phosphorus cleanup and water quality enhancement projects, which will assist VT DEC in meeting the goals and objectives of the Basin Plans.

9.3 Public Trust Determination Part 3: Potential Cumulative Effect of the Encroachment

Part 3 of the Public Trust Determination determines if the potential cumulative effect of the encroachment, when considered in conjunction with other existing encroachments, is adverse. The construction of the cable has been designed so that the cable will not be visible and will not interfere with public uses of the Lake. Once installed, operation of the transmission line will not result in adverse impact of the statutory criteria. As demonstrated herein, the Project itself meets the criteria of Parts 1

and 2 of the Public Trust Determination, and it is not expect to result in adverse cumulative effects of existing encroachments.

10.0 Conclusions

TDI-NE is seeking a Lake Encroachment Permit for the portion of the NECPL that would be installed via HDD beneath Lake Bomoseen in Castleton, Vermont. The transmission line will consist of two approximately five-inch diameter cables that will be solid state dielectric and thus will contain no fluids or gases. The NECPL will also include a one-inch diameter, separately armored multi-strand fiber optic cable that will facilitate HVDC control.

As presented in this Application Narrative, application of the three part Public Trust Doctrine Procedure demonstrates that the Project conforms to the Public Trust Doctrine, as follows:

Public Trust Doctrine Procedure: Part 1

- The extent of the Project's encroachment is not excessive for its stated purpose. The transmission lines will be installed in a narrow corridor and will not be visible once installed.
- The Project's overall route was designed after a thorough and detailed alternatives analysis, and the proposed route represents the best combination of least overall environment impact and cost-efficiency.
- Construction methodology (HDD) and routing have been designed to eliminate impacts to the Lake.
- The installation of the transmission lines would not create an obstruction to navigation, nor would it result in the elimination of public use of any portion of the Lake.
- The Project will result in numerous Public Benefits:
    - Environmental Benefits, including significant funding contributions to Lake Champlain clean-up funds, greenhouse gas reductions, State public access improvements, bank stabilization, culvert upgrades, and roadside ditch clean-up
    - Electric Benefits, including cost reductions to Vermont ratepayers, significant funding contributions to VT renewable programs, and increased electrical liability as a result of system upgrades
    - Infrastructure Benefits, including lease payments to VTrans, creation of a new fiber optic network, and culvert replacements
    - Economic, including annual property, income, and sales tax payments to the State of Vermont, job creation, and construction expenditures

Public Trust Doctrine Procedure: Part 2

- The Project's construction has been designed to avoid adverse impact to Lake Bomonseen's water quality, fish and wildlife habitat, aquatic and shoreline vegetation, navigation, and other recreational and public uses, including fishing and swimming.

- The Project's encroachment is consistent with the natural surroundings, applicable municipal shoreland zoning ordinances, and applicable state plans.

Public Trust Doctrine Procedure: Part 3

- The Project's encroachment in Lake Bomoseen does not result in an adverse potential cumulative effect when considered in conjunction with other existing encroachments.

As presented herein, the Project will bring numerous significant public benefits to the State of Vermont and the region. TDI-NE petitions that these benefits outweigh any potential impacts to the Lake associated with the Project's construction and/or operation, or to any potential cumulative effects of existing encroachments. The Project conforms to the Public Trust Doctrine, and therefore should be permitted in accordance with VSA Title 29, Chapter 11 Management of Lakes and Ponds §402.

References

This permit application relied on the following Prefiled Testimonies submitted to the State of Vermont Public Service Board on December 8, 2014:

- Prefiled Direct Testimony of Donald Jessome, Eugene Martin & Joshua Bagnato.
- Prefiled Direct Testimony of Dr. William Bailey

Exponent, Inc. Overland Magnetic Field Report for the New England Clean Power Link Project. December 2, 2014.

TDI-NE, New England Clean Power Link Project Horizontal Directional Drill Inadvertent Return Contingency Plan. February 2015.

TDI-NE, New England Clean Power Link Project Overall Oil and Hazardous Materials Spill Prevention and Contingency Plan. February 2015.

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