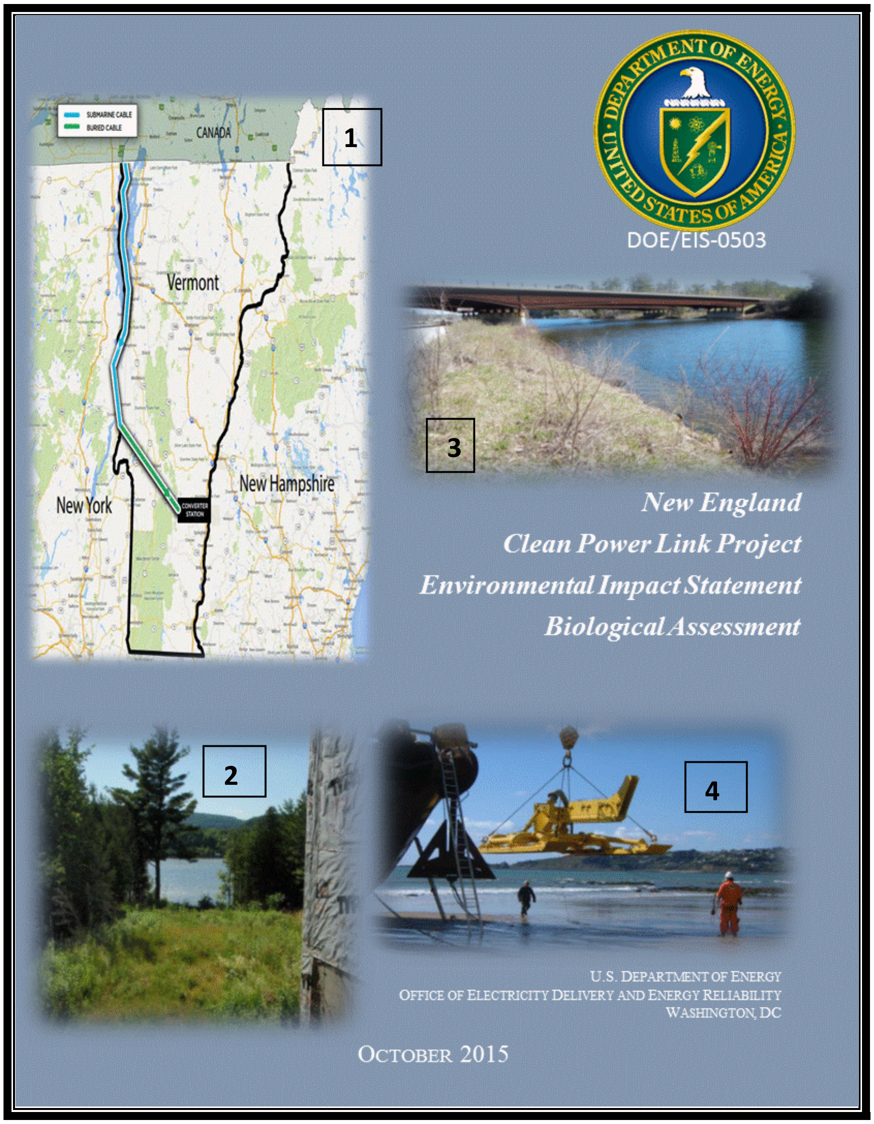
DOE/EIS-0503

New England Clean Power Link Project Environmental Impact Statement Biological Assessment

U.S. DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY
WASHINGTON, DC

OCTOBER 2015



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1. TDI-NE (*http://wamc/files/styles/default/public/201410/new-england-clean-power-link-map-ctsy-tdi-new-england.jpg" alt="">)*
2. NECPL exit from Lake Champlain (Benson, Vermont) courtesy of TDI-NE
3. Lake Bomoseen, Fair Haven, Vermont courtesy of TDI-NE
4. TDI-NE 2014a

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1 INTRODUCTION

The purpose of this Biological Assessment (BA) is to evaluate the potential impacts of the proposed New England Clean Power Link (NECPL) Project on federally listed threatened or endangered species, and to comply with the requirements of the Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1531–1534). The proposed federal action by the U.S. Department of Energy (DOE) is the issuance of a Presidential permit that would authorize Transmission Developers, Inc. - New England (TDI-NE) to construct, operate, and maintain the proposed NECPL Project crossing of the United States/Canada border. The DOE prepared a draft Environmental Impact Statement (EIS) for the proposed NECPL Project (DOE 2015) to comply with the requirements of the National Environmental Policy Act (NEPA)[1] and also prepared this BA as the lead Federal Action Agency for the proposed NECPL Project. The Final EIS contains additional details about the Project and potential effects on the natural and human environment, and is incorporated into this BA by reference. The U.S. Army Corps of Engineers (USACE) is pursuing a federal action related to the implementation of the proposed NECPL Project regarding issuance of a Clean Water Act (CWA) Section 404 permit and a Section 10 of the Rivers and Harbors Act permit for the Project.

TDI-NE proposes to develop the NECPL Project as a merchant transmission facility to connect renewable power from Canada to Northeast power markets. TDI-NE estimates that the total capital cost for the Project would be $1.2 billion and that it would be in-service by 2019 (TDI-NE 2014a, 2014b).

The Project includes construction, operation, and maintenance of an approximately 154-mile long, 1,000 megawatt (MW), high-voltage electric power transmission system originating in the Canadian Province of Quebec and terminating at a proposed high voltage direct current (HVDC) converter station in Ludlow, Vermont. The NECPL transmission system includes the Lake Champlain Segment (aquatic) and the Overland Segment (terrestrial) in the state of Vermont. The underwater portions of the transmission cable would be buried in Lake Champlain, except at depths greater than 150 feet, where the cables would be placed on the lakebed. The terrestrial portions of the transmission cable would be buried underground within existing roadway right-of-ways (ROW) and, to a small extent, railroad ROWs. The HVDC transmission line consists of two cables, one positively charged and the other negatively charged. Two solid, dielectric (no fluids), cross-linked polyethylene (XLPE) cables, each approximately 154-miles long, would have a nominal operating voltage of approximately +/- 300 to 320 kilovolts (kV). The proposed Ludlow HVDC converter station, would convert the electrical power from direct current (DC) to alternating current (AC) and then connect to the existing 345-kV Coolidge Substation in Cavendish, Vermont, which is owned by the the Vermont Electric Power Company (VELCO) (TDI-NE 2014a).

On May 20, 2014, TDI-NE applied to the DOE for a Presidential permit in accordance with Executive Order (EO) 10485, as amended by EO 12038, and the regulations at *10 Code of Federal Regulations* (CFR) 205.320 et seq. (2000), “Application for Presidential Permit Authorizing the Construction, Connection, Operation, and Maintenance of Facilities for Transmission of Electric Energy at International Boundaries.” TDI-NE submitted a minor route revision on October 9, 2014.

1.1 ENDANGERED SPECIES ACT REQUIREMENTS

The ESA establishes procedures for the protection and conservation of threatened and endangered species and the ecosystems upon which they depend. The ESA describes several categories of federal status for plants and animals and their critical habitat, which have been designated by the U.S. Fish and

[1] The draft EIS was noticed by the Environmental Protection Agency on June 10, 2015.

Wildlife Service (FWS) or National Marine Fisheries Service (NMFS). In addition to allowing the listing of species and subspecies, the ESA allows listing of distinct population segments (DPSs) of vertebrate species. An endangered species is defined as any species in danger of extinction throughout all or a large portion of its range. A threatened species is defined as any species likely to become an endangered in the foreseeable future. Critical habitat is defined in the ESA as "a specific geographic area that is essential for the conservation of a threatened or endangered species and that could require special management or protection". Critical habitat can include an area that is not occupied by a species but is needed for the recovery of that species. There are no designated or proposed critical habitat areas in the proposed NECPL Project area, which is described further in ***Section 2***. Because terrestrial and freshwater species are managed by the FWS, federal agencies must consult the FWS, under Section 7(a)(2) of the ESA, on activities that may affect a listed terrestrial or freshwater species**.** These interagency consultations, or Section 7 consultations, are designed to assist federal agencies in fulfilling their duty to ensure federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat.

1.2 CONSULTATION HISTORY

The DOE initiated consultation with the FWS by letter on January 12, 2015. The DOE identified two species, the federally endangered Indiana bat (*Myotis sodalis*) and the threatened northern long-eared bat (NLEB) (*Myotis septentrionalis*), that may occur within the Project area and that may be affected by the proposed Project. By letter dated July 13, 2015, the FWS provided the DOE with specific protection and mitigation measures that could be used for the Indiana bat, NLEB, and species protected under the Migratory Birds Treaty Act and the Bald and Golden Eagle Protection Act.

2 DESCRIPTION OF THE PROPOSED ACTION

The following section summarizes key elements of the proposed NECPL Project, which was drawn from the DOE Final EIS (DOE 2015). This section defines the Project area (including the route segments referred to in the Final EIS and used in this BA) and specific engineering details of the transmission system installation: aquatic DC transmission cables, horizontal directional drill (HDD) methods, terrestrial DC transmission cables, the proposed Ludlow HVDC converter station and the substation interconnection in Coolidge.

2.1 DESCRIPTION OF THE ROUTE SEGMENTS USED IN THE FINAL EIS ANALYSES

The transmission cable route is divided into two segments: Lake Champlain Segment and the Overland Segment. ***Table 1*** summarizes the Project route, including the corridor type and approximate length for each section. ***Appendix C*** of the Final EIS provides the transmission system route maps.

TABLE 1. SUMMARY OF PROJECT ROUTE

Cable Section	Segment	Corridor Type	Approximate Length (miles)
United States/Canada Border to Alburgh, Vermont	Lake Champlain	Terrestrial	0.5
Lake Champlain at Alburgh, Vermont to Benson, Vermont	Lake Champlain	Aquatic	97.6
Benson east (along local roads) to Vermont Route 22A	Overland	Terrestrial	4.3
Vermont Route 22A south to U.S. Route 4 in Fair Haven	Overland	Terrestrial	8.2
U.S. Route 4 east to U.S. Route 7 in Rutland	Overland	Terrestrial	17.4
Route 7 south to Route 103, North Clarendon	Overland	Terrestrial	2.7
Vermont Route 103 south/southeast to Railroad ROW in Shrewsbury	Overland	Terrestrial	3.8
Green Mountain Railroad Corporation Railroad ROW south to Route 103 in Wallingford	Overland	Terrestrial	3.5
Route 103 ROW south/southeast to Route 100 in Ludlow	Overland	Terrestrial	10.6
Route 100 ROW north to Town Roads in Ludlow	Overland	Terrestrial	0.8
Ludlow town roads to proposed HVDC Converter Station	Overland	Terrestrial	4.5
Proposed AC cable alignment from Converter Station in Ludlow to VELCO Coolidge substation in Cavendish, Vermont along town roads	Overland	Terrestrial	0.6

Source: TDI-NE 2014b; updated in TRC 2015

2.2 NECPL PROJECT AREA

The Project area is defined in 50 CFR Part 402.02 as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action”. No aquatic species listed as threatened or endangered according to the ESA are known to occur in the Lake Champlain Segment or Overland Segment (DOE 2015). For this BA the Project area for terrestrial protected and sensitive species along the terrestrial portions of the proposed NECPL Project is 100 feet on either side of the transmission line. There are no federally protected aquatic species within the NECPL Project area.

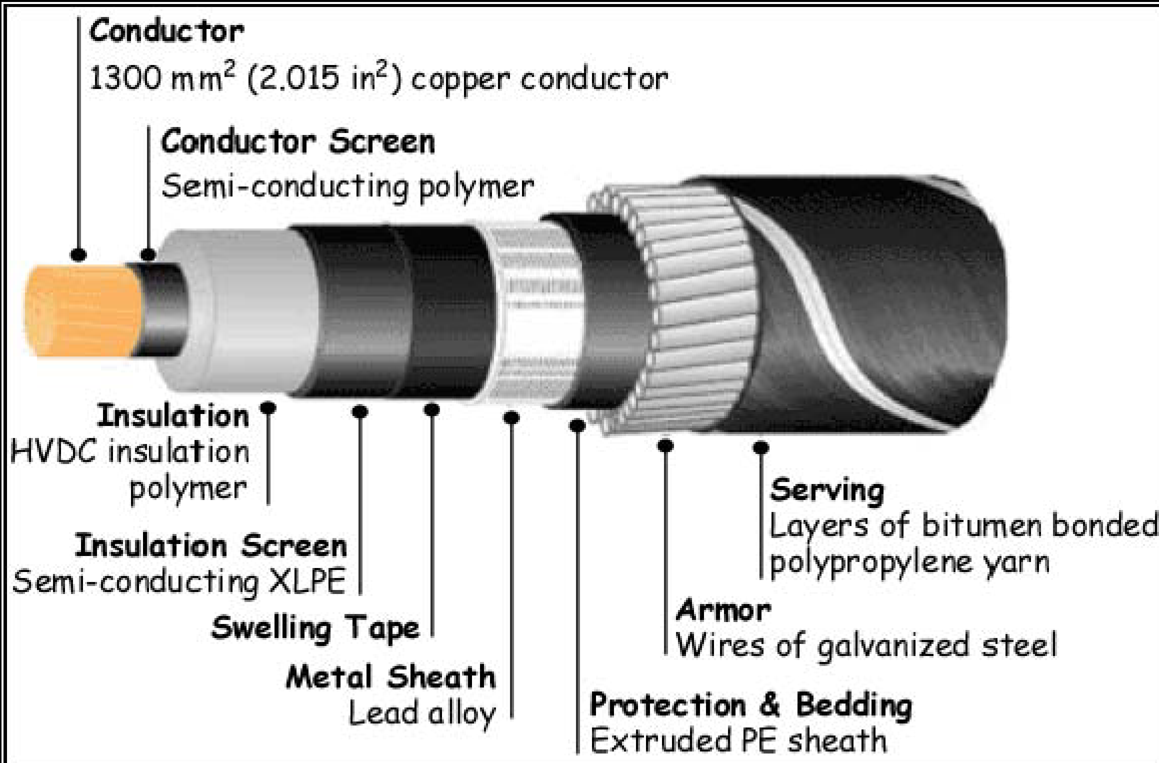
There are two terrestrial species that may occur in the Project area: the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened NLEB (*Myotis septentrionalis*) ***(Section 3.2)***.

2.3 DESCRIPTION OF CONSTRUCTION METHODS

The following sections describe the specific engineering details of the transmission system for the proposed NECPL Project. The following subsections also discuss how TDI-NE proposes to install and operate the transmission line and aboveground facilities of the proposed NECPL Project.

2.3.1 Aquatic Direct Current Transmission Cable

TDI-NE proposes to install transmission XLPE HVDC cables rated at +/- 300 to 320kV (depending upon the manufacturer) in the Lake Champlain Segment. The polyethylene insulation in the XLPE cable eliminates the need for fluid insulation, enables the cable to operate at higher temperatures with lower dielectric losses, improves transmission reliability, and reduces risk of network failure (TDI-NE 2014a) (***Figure 1***).



Source: Cross-Sound Cable Company 2012

FIGURE 1. EXAMPLE AQUATIC HVDC TRANSMISSION CABLE CROSS-SECTION

Underwater cable installation activities would be limited to certain times of the year to avoid life-cycle effects on aquatic species in the Project area. The majority of the transmission cables would be buried beneath the bed of Lake Champlain at depths of 3 to 5 feet to prevent unrelated aquatic operations in the waterways from disturbing the cables. The actual burial depth would depend on factors such as the presence of existing infrastructure, the potential for anchor damage, the identification of archaeological or historic resources, local geological or topographical obstacles, or other environmental concerns. Burial depths would depend on available aquatic construction equipment, soil types and depth to bedrock, existing utilities, and the types of lake activities that occur in an area and their potential threat to cable integrity. In depths greater than 150 feet the cables are proposed to be laid on the bottom of the lake and self-burial is expected to occur unless cable crosses an existing utility or another cable. The actual burial depth would depend on factors such as the presence of existing infrastructure, the potential for anchor damage, the identification of archaeological or historic resources, local geological or topographical obstacles, or other environmental concerns. Burial depths would depend on available aquatic construction equipment, soil types and depth to bedrock, existing utilities, and the types of lake activities that occur in an area and their potential threat to cable integrity. Where the transmission cables would cross an existing utility such as a pipeline or another cable, they would be laid over the existing utility, and articulated concrete mats would be installed over the cable crossing (***Figure 2***). Articulated concrete mats (***Figure 3***) are typically small, pre-formed, concrete blocks that are 9 to 12 inches thick and are interconnected by cables or synthetic ropes in a two-dimensional grid ranging in size from 6 feet by 6 feet to 8 feet by 25 feet.

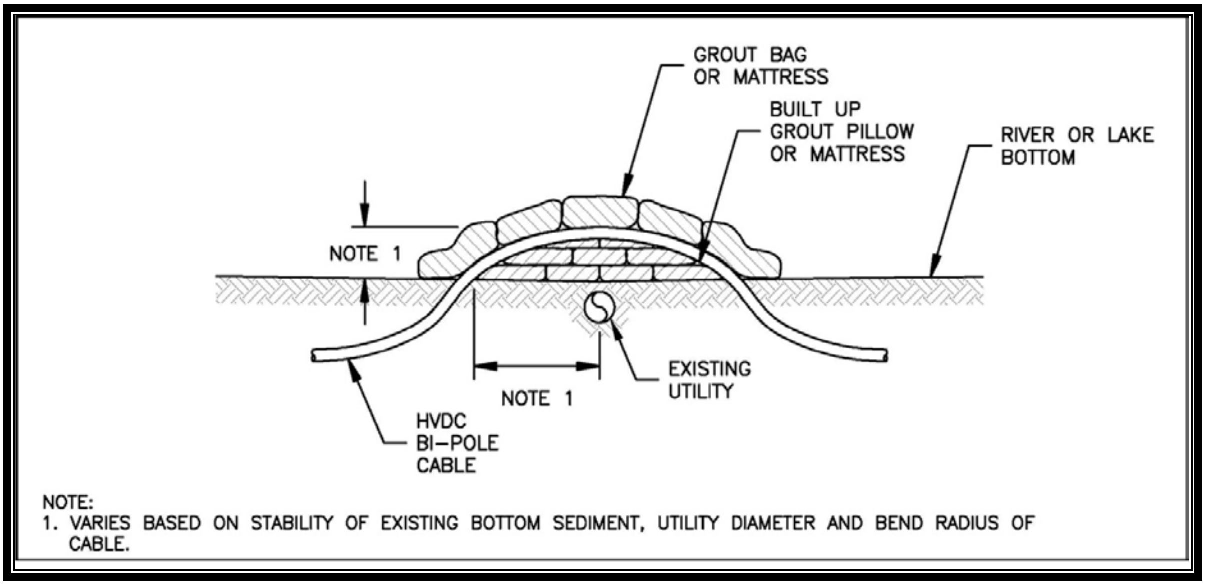


FIGURE 2. REPRESENTATIVE SCHEMATIC OF PROTECTION MEASURES FOR AQUATIC TRANSMISSION CABLES

Source: IMCA 2011

FIGURE 3. TYPICAL ARTICULATED CONCRETE MATS

2.3.2 Horizontal Directional Drilling

TDI-NE would use the HDD method to install the transmission cables in transition areas between aquatic and terrestrial portions of the Project route and install cables under certain roadway or railway crossings in limited situations where trenching is not possible, or under certain environmentally sensitive areas such as lakes and rivers. TDI-NE anticipates that the largest, most complex, HDD operation would occur at the two land-to-water transitions in Alburgh and Benson, Vermont.

At each proposed HDD location, two separate drill holes would be required, one for each of the cables (***Figure 4*** and ***Figure 5***). Each cable would be installed within a 10-inch-diameter, or larger, high-density polyethylene (HDPE), tube-shaped duct, or conduit. A minimum of 6 feet is required between each drill path to maintain appropriate separation between the cables. After the HDPE conduits are in place, the transmission cables are pulled through these pipes, which remain in place to protect the transmission cable.

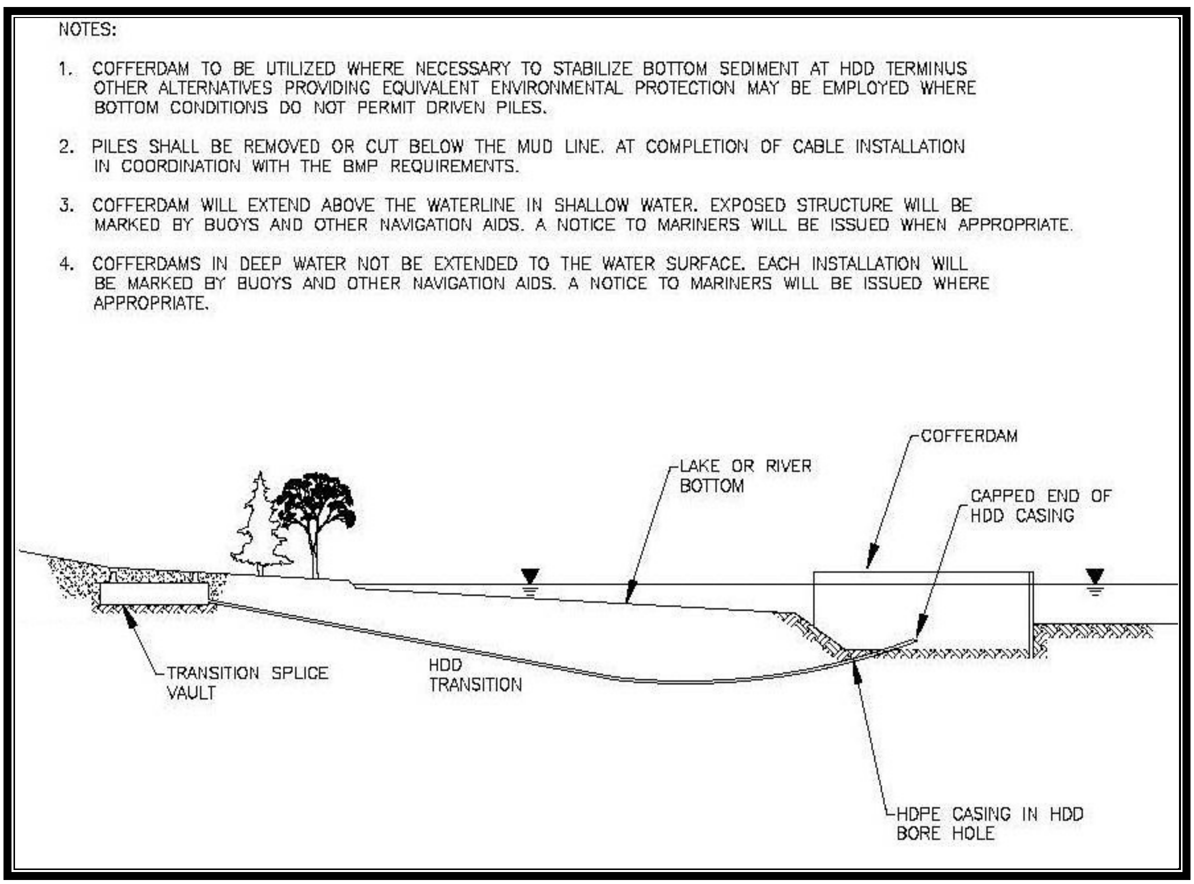
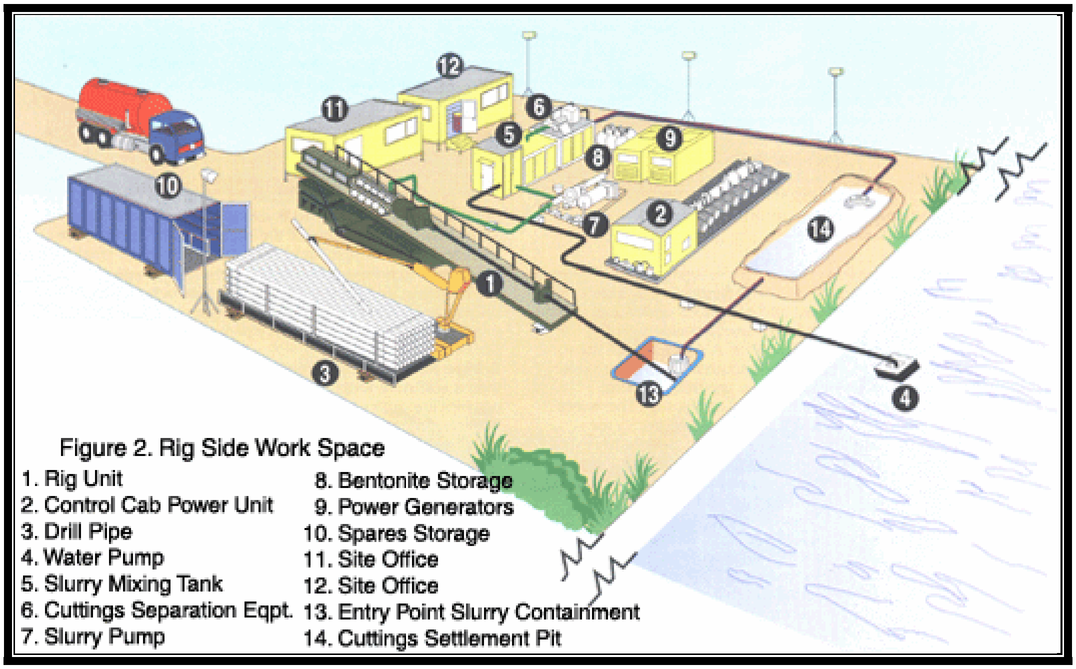


FIGURE 4. EXAMPLE HDD TECHNIQUES



Source: Laney Drilling 2012 as cited in TDI-NE 2014a

FIGURE 5. TYPICAL HDD LANDFALL DRILL RIG OPERATION

For drilling operations extending from land into water, the directional drill would exit the ground in water at a depth sufficient to avoid affecting the littoral zone. To minimize turbidity in Lake Champlain associated with the HDD operation, TDI-NE may use a receiver casing. A large-diameter pipe segment would be pushed into the lake bottom at the planned HDD exit point. The slope of the exit shaft would be set at a grade suitable for the HDD exit slope. The HDD drill head would be steered into the bottom of the receiver casing and would continue up the shaft to the cable-laying barge. The shaft would be left in-place until the bore hole is ready to receive the bore casing or cable. At that time, sediment and turbid water would be pumped out of the shaft into holding tanks on the barge, and the shaft would be removed and treated water released back into the lake.

TDI-NE expects to employ at least three different sized HDD rigs on the Project, requiring staging areas of varying sizes depending on the length of the drill at the particular location, proximity to sensitive areas such as wetlands, access limits, and other constraints.

2.3.3 Terrestrial Direct Current Transmission Cable

The buried transmission line would begin at the United States and Canada border, continue into Alburgh, Vermont (0.5 miles) and then approximately 56 miles from Benson, Vermont to the proposed HVDC converter station in the town of Ludlow, Vermont. The outer sheathing insulation of the underground transmission cables would be composed of an ultraviolet-stabilized, extruded polyethylene layer (***Figure 6***). The underground transmission cables would have an outside diameter of 4.5 inches, and each 1-foot length of cable would weigh approximately 30 pounds.

The two cables within the system typically would be laid side by side approximately 12 to 18 inches apart in a trench approximately 4 to 5 feet deep to provide for at least 3 feet of cover over the cables. After the cables are laid in the open trench, the trenches would be backfilled with low-thermal-resistivity material, such as well-graded sand to fine gravel, stone dust, or crushed stone. Any fill would be disposed of at an approved site. A protective cover of HDPE, concrete, or polymer blocks would be placed directly above the backfill material. A marker tape would then be placed 2 to 3 feet above the cables (***Figure 7***).

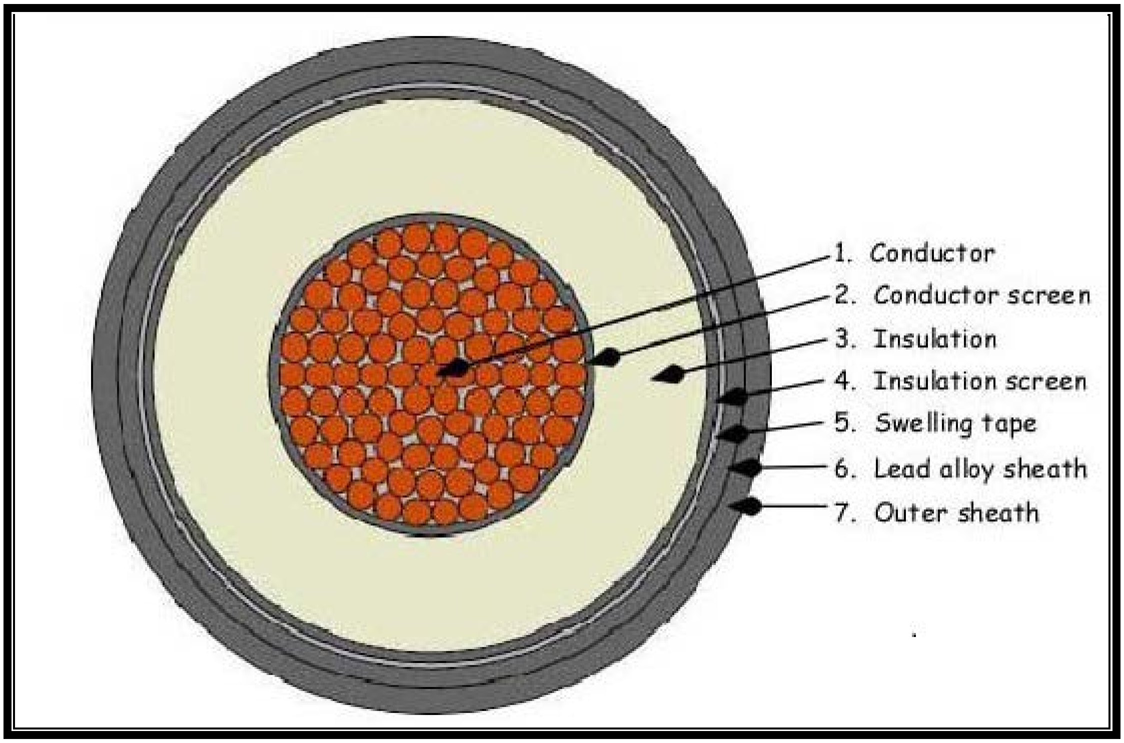


FIGURE 6. EXAMPLE TERRESTRIAL HVDC TRANSMISSION CABLE CROSS-SECTION

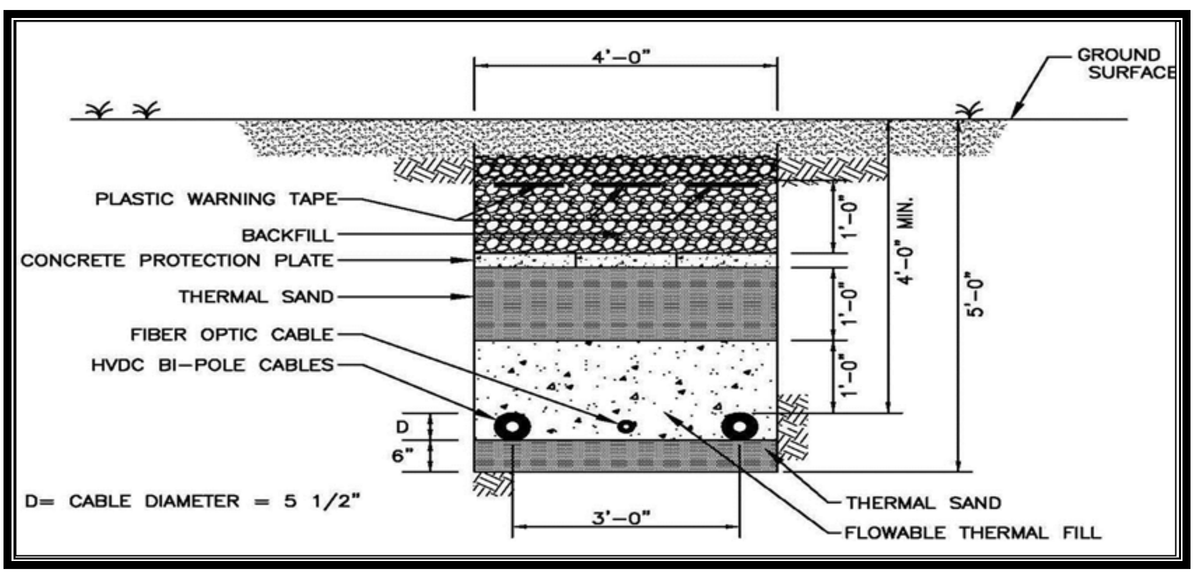


FIGURE 7. CROSS-SECTION OF UNDERGROUND SYSTEM

Installing underground transmission cables along existing ROWs would be completed via trenching techniques along this portion of the route, and HDD installation would be used in certain areas. A typical staging area for construction equipment in a roadway ROW would be approximately 20 to 50 feet wide along one side of the roadway (***Figure 8***).

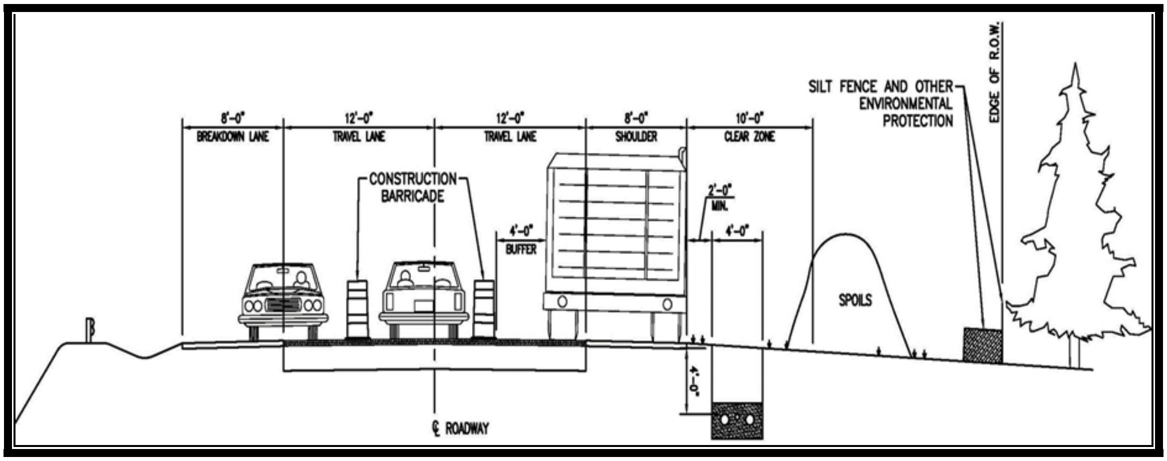


FIGURE 8. A TYPICAL STAGING AREA FOR CONSTRUCTION EQUIPMENT IN A ROADWAY ROW

Trenchless technologies, such as HDD, horizontal boring, or pipe jacking, may be used where the transmission line would cross roadways, railroads, or significant environmental resources. Horizontal boring is similar to HDD but uses an auger-type drill head (i.e., a rotating screw-shaped blade) to remove soil from the borehole. Pipe jacking involves pushing a casing pipe into the soil along the desired alignment and removing the soil from within the casing pipe (DOE 2015).

2.3.4 Ludlow HVDC Converter Station

The HVDC transmission cables would terminate at the proposed Ludlow HVDC converter station in Vermont. The Ludlow HVDC Converter Station would convert the electrical power from DC to AC. An underground HVAC line would run approximately 0.6 miles to connect to the nearby existing Coolidge Substation located in Ludlow and Cavendish, Vermont. The "compact type" HVDC converter station would have a total site footprint (i.e., building and associated areas and equipment) of approximately 4.5 acres, although the cleared area could be approximately 10 acres due to required grading, laydown areas, construction trailers, and setbacks. TDI-NE controls the property for the proposed HVDC converter station which is adjacent to previously disturbed farmland and an overhead transmission line corridor.

The main building would be approximately 165 feet by 325 feet with a height of approximately 52 feet. The HVDC converter station would be designed to blend into the local environment and surroundings. It is anticipated that transformers and a spare parts building would be the major infrastructure installed outside of the building. The HVDC converter station would be powered by electricity taken directly from the proposed NECPL Project. In the unlikely event this is not possible, electric power from a local utility (i.e., VELCO) would be used. A diesel generator may be used as emergency backup to provide black start capability (i.e., the ability to start operating and delivering electric power without assistance from the electric system in the event of an outage) and providing emergency power for the HVDC converter station. The facility would not require onsite personnel during normal operations (DOE 2015).

2.3.5 Coolidge Substation Interconnection

The Ludlow HVDC Converter Station would deliver its energy by underground cable to the existing Coolidge 345-kV substation, which is located on an approximately 6-acre parcel owned by VELCO. The Coolidge Substation is the Project's point of interconnection with the Independent System Operator of New England (ISO-New England) transmission system.

2.4 ADDITIONAL ENGINEERING DETAILS

Electric and Magnetic Fields

Magnetic fields are measured in units of gauss (G) or milligauss (mG). The average magnetic field strength in most homes (away from electrical appliances and wiring) is typically less than 2 mG. Outdoor magnetic fields in publicly accessible places can range from less than a few mG to 300 mG or more, depending on proximity to power lines and the voltage of the power line.

The Overland Segment of the line would be constructed in underground trenches. For very short distances the line would be contained within steel conduits constructed in above ground attachments crossing a bridge or culvert (two configurations, approximately 150 feet), and in an AC duct bank (one configuration, approximately 3,000 feet within public roads) (Exponent 2014).

The change in the ambient geomagnetic field level would be limited largely to the area immediately surrounding the proposed NECPL cables. The calculated DC magnetic field deviations decline rapidly with distance. At 25 feet to either side of the circuit centerline the maximum deviation from the ambient geomagnetic field would be less than 18 percent (the trench HDD configuration). For the remaining trench configurations (25 feet to either side of the cables) the change from ambient conditions would be less than 10 percent. In the duct bank configurations at a distance of 25 feet to either side of the circuit centerline, the maximum deviation from the ambient geomagnetic field would be less than 5 percent. The highest calculated DC magnetic field level anywhere along the Overland Segment of the route (calculated at 3.2 feet, above ground, directly over the proposed NECPL cables) is approximately 1,660 mG, less than 0.04 percent of the general 4,000,000 mG public exposure limit for DC magnetic field levels recommended by the International Commission for Non-ionizing Radiation Protection (ICNIRP) and is below the applicable 10,000 mG medical device standard for exposure to DC magnetic fields. The highest level magnetic field above the AC interconnection is less than 3 percent of the ICNIRP general public exposure limit for 60-Hz AC magnetic fields and below applicable medical device standard for exposure to AC magnetic fields. ***Table 2*** summarizes the magnetic field magnitude as it relates to distance from the centerline (Exponent 2014).

TABLE 2. MAGNETIC FIELD MAGNITUDE DEVIATION (MG) FROM 530.77 MG GEOMAGNETIC FIELD, 1 METER ABOVE GROUND AND FOR OFFSETS FROM CENTERLINE OF BIPOLAR DC CIRCUIT

Cable Placement	Current Direction	Configuration	Distance from circuit centerline							
			-50 feet	-25 feet	-10 feet	Max + deviation	Max - deviation	+10 feet	+25 feet	+50 feet
Trench	Eastward on northern cable	Cables Touching	1.8	6.7	19	19	-82	-1.5	4.1	1.5
		Typical Separation	6.3	23	68	69	-276	1.6	14	5.0
		Maximum Separation	13	47	144	154	-481	21	29	10
		HDD	25	94	311	360	-103	101	61	20
Trench	Eastward on southern cable	Cables Touching	-1.8	-6.7	-18	82	-18	3.3	-4.0	-1.5
		Typical Separation	-6.3	-23	-55	280	-56	18	-14	-5.0
		Maximum Separation	-13	-46	-90	545	-102	57	-26	-10
		HDD	-25	-93	-71	982	-171	190	-49	-20
Duct Bank	Northward on eastern cable	Configuration 1	-7.2	-25	-41	401	-50	-17	-22	-6.8
	Northward on western cable	Configuration 1	7.2	25	69	70	-326	49	23	6.8
Duct Bank	Northward on top cable	Configuration 2	-2.3	-17	-97	126	-124	99	22	3.8
	Northward on bottom cable	Configuration 2	2.4	18	99	140	-110	-96	-21	-3.7

Source: Exponent 2014

2.5 CONSTRUCTION AND SCHEDULE

TDI-NE anticipates that the permitting phase of the proposed NECPL Project would continue through 2015, with major construction commencing in 2017. Installation of the cables is proposed to be completed between 2016 and 2018.

2.5.1 Aquatic Cable

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

- pre-installation clearing
- cable installation
- post-installation survey

To the extent practical, the aquatic transmission cables would be buried in Lake Champlain to a target depth of between 3 and 5 feet, or the maximum reasonably attainable depth. Factors that may influence attainable depth include the lakebed bedrock and substrate. The first step in the installation of the aquatic transmission cables would involve clearing the proposed route of debris (e.g., logs, out-of-service cables) by dragging various types of grapnels (i.e., a long sliding prong, a series of giffords, and a series of rennies) along the route. The specific type of grapnels to be utilized would be determined prior to construction in consultation with the contractor (TRC 2015). The next step would be installing the transmission cables using either a jet plow or a shear plow. The two HVDC underwater cables associated with the Project would be bundled and laid together within the same trench. The cables would be initially placed in a vertical position (one on top of the other) in the trench, although sediment conditions could allow for slumping into a horizontal position (side-by-side) relative to each other (TRC 2015). Cable burial would generally be performed at the same time the cable is laid or at a later date, as deemed appropriate or necessary due to subsurface conditions. The cables would be laid by a specially outfitted lay-barge.

The plowing process would be conducted using either a dynamically positioned cable ship or a positioned cable barge towing a plow device that simultaneously lays and embeds the aquatic transmission cables in a trench. If a barge is used, it would propel itself along the route with its forward winches; other moorings would hold the alignment during the installation. A four-point mooring system would allow a support tug to move the anchors while the installation and burial proceeds. A dynamically positioned cable ship would use thrusters and a propulsion system to tow the plow without the use of anchors.

The skid-mounted plow would be towed by the barge or cable ship because it has no propulsion system. The transmission cables would be deployed from the vessel to a funnel device on the plow. The plow would be lowered to the lakebed, and the plow blade would cut into the lakebed while it is towed along the pre-cleared route for a simultaneous lay-and-bury operation. The plow would then bury both cables in the same trench.

The buried aquatic cable in certain sections, including the southern portion of Lake Champlain, would be installed using water-jetting techniques. The water-jetting process uses jets of pressurized water to fluidize the sediments. The jet plow is fitted with hydraulic pressure nozzles that create a downward and backward flow within the trench, allowing the transmission cable to settle into the trench under its own weight before the sediment settles back into the trench.

A shear plow would be used to install portions of the transmission line route where the sediment stiffness is low and the waterway is narrow, which is expected to be in the southern portion of Lake Champlain. For the shear plowing technique, the plow is tethered to a surface support vessel that tows the plow along the lakebed. The plow creates a trench approximately 2 feet wide and 3 to 5 feet deep where the cables would settle. In limited areas along the aquatic route, the necessary burial depths for the protection of the transmission cables may not be achievable due to geology (e.g., areas of bedrock) or existing submerged infrastructure (e.g., other electric cables, natural gas pipelines). In these instances, the transmission cables would be buried as deep as possible or simply laid on the lake bottom and covered with articulated concrete mats for protection.

Both water jetting and mechanical plowing (i.e., jet plow and shear plow) would displace lakebed sediment within a narrow trench, which would permit the transmission cables to sink under their own weight. The displaced sediment would settle, and the trench would refill naturally following the installation of the transmission cables. The bottom area directly disturbed by water jetting or mechanical plowing varies depending upon sediments and depth of installation but would encompass a range from 12 to 16 feet in width depending on the width of the installation device (DOE 2015).

Given the limitations on barge size and the amount of transmission cable that could be carried on board, TDI-NE estimates that the cable-laying vessel would be able to carry approximately 15 miles of cable. This would result in approximately 8 segments that would require 16 splices for the 2 HVDC cables for the approximately 98-mile-long aquatic portion of the Lake Champlain Segment.

2.5.2 Terrestrial

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

- survey work, initial clearing operations (where necessary), and stormwater and erosion control installation;
- trench excavation;
- cable installation and splicing;
- backfilling; and
- restoration and revegetation.

Most of the supplies and equipment required for installing terrestrial transmission cable within the typical trench would be up to 4 feet wide at the top and approximately 4 to 6 feet deep to allow for proper depth and the 1-foot separation required between the two transmission cables to allow for heat dissipation (DOE 2015).

The underground transmission cables would require several joints; a flat pad would be installed under each joint for splicing activities. The number of joints would be determined either by the maximum length of cable that could be transported or by the maximum length of cable that could be pulled. The jointing would be performed in a jointing pit; typical segment lengths would range from 0.1 to 0.5 mile. The Overland Segment of the transmission line within the road ROWs could require more than 200 splices as part of the installation process. Along the road ROWs in normal terrain, where soil conditions range from organic, loam, sand, gravel, or other unconsolidated material, the trench would be excavated using wheeled or tracked construction vehicles where possible.

Along road ROWs, the transmission cables would generally be installed in the cleared area of the road; where that is not possible due to constraints the cables would be installed under the road or minor clearing would occur. If shallow bedrock is encountered, the rock would be removed by the most suitable technique given the relative hardness, fracture susceptibility, and expected volume of material. TDI-NE's preferred approach is mechanical removal. If that is not possible, then TDI-NE would evaluate alternatives, including a more shallow cable installation with enhanced concrete or steel cover protection, an increase in the amount of cover (if the changed topography is not problematic), or blasting to achieve the standard depth. Blasting, if needed, would be conducted only to the extent necessary to remove rock to allow the cables to be buried

Six construction methods are proposed for installing the transmission line across waterbodies and small streams, although TDI-NE will consider others (DOE 2015):

- **Aerial Crossing**. At aerial crossings, the transmission cable would be suspended above the stream being crossed in two locations where the fascia of an existing bridge or the headwall of an existing culvert provides a suitable face for attachment and the structure owner allows this configuration.
- **At Culvert Crossing**. Where feasible, the Project proposes to complete "At Culvert" crossings by excavating a trench within the roadway or within the embankment adjacent to the roadway and installing the transmission cable a minimum of 5 feet beneath the existing culvert.
- **Over Culvert Crossing**. At over culvert crossings, the proposed cable would be installed in the roadway embankment above an existing culvert.
- **Duct Bank Crossing.** At one location, a duct bank is proposed to be installed beneath the road surface in conjunction with a Vermont Transportation (VTrans) roadway improvement project.
- **HDD.** Using this method, cable conduits would be installed under the streambed, avoiding any disturbance of the streambed, and the cables would then be pulled through the conduits.
- **Open Trench Excavation.** The open cut method of construction involves deploying temporary in-stream flow diversion structures, digging an open trench excavation (OTE) across the stream channel, installing the transmission cable, backfilling with suitable materials, and restoring the stream bank and channel bottom. This category includes dam and pump crossing and open cut.

Ephemeral and intermittent streams that are dry at the time of crossing would be crossed only by the open-cut method with prior approval from state and federal agencies as required by permit conditions.

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

The permanent ROW required for maintenance and operation of the transmission line along the terrestrial portions of the Project route would be approximately 12 feet wide along roadway ROWs. The permanent ROW would provide protection of the transmission cables against third-party damage and facilitate any required maintenance or repair. The transmission cables within the trench generally would be separated by a distance of approximately 1 foot.

Measures to Minimize Environmental Impacts

TDI-NE developed industry-accepted Best Management Practices (BMPs) and other environmental mitigation measures that would be implemented before and after construction and during construction to minimize environmental impacts. Those plans and BMPs are discussed in ***Section 5*** and ***Appendix G*** of the Final NECPL EIS.

Operations and Maintenance

The proposed NECPL Project has an expected life span of 40 years or more. The HVDC and short sections of HVAC transmission cables are designed to be relatively maintenance-free and operate within the specified working conditions. Selected portions or aspects of the transmission system would be inspected to ensure equipment integrity is maintained (TRC 2015).

ROW Maintenance
During Project operation, TDI-NE proposes to clear vegetation on an as-needed basis within the 12-foot wide Project corridor, over the transmission cables. Vegetation management would include mowing, selective cutting to prevent the establishment of large trees (i.e., greater than 20 feet tall) directly over the trenched transmission line, and vegetation clearing on an as-needed basis to conduct repairs.

Decommissioning
Decommissioning of the Project transmission system would consist of de-energizing and abandoning the transmission cables in place. If decommissioning plans change, applicable regulations at the time of decommissioning would be met (DOE 2015).

2.5.3 Staging Areas

Aquatic Transmission Cable Support Facilities
For the aquatic section of the Project, it is anticipated that minimal land-based support would be required. Transport of the aquatic transmission cables would occur via the cable-laying vessel, supported by resupply barges operated from a temporary storage area on land. This land-based support facility is envisioned to be no greater than 200 by 300 feet. The proposed NECPL Project would not require the construction of new facilities at these ports (DOE 2015).

Terrestrial Transmission Cable Support Facilities
For the terrestrial section of the Project, additional nearby temporary aboveground support facilities would be established. Support facilities include contractor yards, storage areas, access roads, and additional workspace. Additional workspace may be required at HDD locations, cable jointing locations, and areas with steep slopes. The support facilities would be sited within the existing road or at appropriate nearby areas that already support such activities (DOE 2015).

2.5.4 Operations and Maintenance

The proposed NECPL Project has an expected life span of at least 40 years or more. During this period, it is expected that the transmission system would have scheduled and unscheduled maintenance.

The HVDC and HVAC transmission cables would be designed to be relatively maintenance-free and operate within the specified working conditions. However, selected portions or aspects of the transmission system would be inspected to ensure equipment integrity is maintained. During normal operations, the Ludlow HVDC Converter Station would require minimal to no on-site personnel. Maintenance activities at the converter station, including inspections and preventative maintenance, would be expected to occur regularly throughout the life of the transmission line (TDI-NE 2014a).

Transmission Cable Inspection
Following transmission cable installation, regular inspections of visible parts of the transmission cables, landfall areas, and nearshore protection elements would be conducted to ensure cable integrity. All of the aquatic transmission cables would be accessible either by divers or remotely operated vehicles (ROVs) and inspections would be performed in accordance with manufacturer's specifications to ensure equipment integrity and protection (e.g., appropriate burial depths, concrete mats, rip-rap) are maintained. The aquatic portion of the transmission system would be surveyed at least once every 5 years, and inspections would focus on verifying the depth of cable burial, condition of infrastructure

protection measures, and identifying areas where protection of the transmission system or the environment could be compromised. The upland cable would be inspected approximately every 3 years to ensure that adequate cover exists.

In addition, spot checks of the transmission cable protection materials would be performed during or after the first year of operation. These spot checks would occur more frequently at locations where strong currents are anticipated or in other areas where abnormalities were identified (e.g., extreme storm conditions or ice crush outages). Following completion of the terrestrial facilities, on-the-ground inspectors would 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;
- permanent storm water features requiring maintenance; and
- vandalism.

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

ROW Maintenance

During operation of the proposed NECPL Project, TDI-NE proposes to clear vegetation on an as-needed basis within the 12-foot wide Project corridor, over transmission cables. Vegetation management would include mowing, selective cutting to prevent the establishment of large trees (i.e., greater than 20 feet tall) directly over the transmission line, and vegetation clearing on an as-needed basis to conduct repairs. Vegetation along the transmission line ROW would primarily be managed by mechanical means including such mechanisms as brush hogging, mowing, or hand cutting. Any vegetation management activities currently conducted by the road operators within the roadway ROWs would continue following the construction and operation of the transmission cable. A vegetation management plan for the operational period of the transmission system would be developed and submitted to resource agencies. The goal of the vegetation management plan would be to establish stable low-growing vegetation with shallow root systems that would not interfere with the cables.

Transmission Cable Repairs

While not anticipated, it is possible that over the expected 40-year lifespan of the proposed NECPL Project, the transmission cables may require repair. The proposed cable installation design and techniques identified by TDI-NE would 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 would detect the fault and the Ludlow HVDC converter station switching system would de-energize the transmission system in approximately 33 milliseconds. A margin of safety and reliability against cable damage by vessels or anchors is provided by direct burial of the aquatic transmission cables to an average depth of at least 3 to 5 feet below the lake-bottom or riverbed. The transmission cables would have protective steel armoring wires to protect against damage. At the landfall locations, the aquatic transmission cables would be encased within an HDPE conduit to provide protection against mechanical damage. The steel-wire armored cables would be hermetically sealed to prevent the ingress of water and contain no circulating fluids or reservoirs.

Underground terrestrial transmission cables would be buried to an approximate depth of 4 to 5 feet below ground surface with a pre-cast concrete cap placed on top of the trench above the cables where they are installed by trenching. At utility and roadway crossings where the cables are installed by HDD, the HVDC transmission cables would be protected by a steel sleeve. The Ludlow HVDC converter station would be designed, manufactured, installed, and tested by a reputable equipment vendor with international HVDC transmission experience. Prior to the operation of the proposed NECPL Project, an Emergency Repair and Response Plan (ERRP) would be prepared to identify procedures and contractors necessary to perform maintenance and emergency repairs. The ERRP would detail the activities, methods, and equipment involved in repair and maintenance work for the transmission system. Although the scope of work for each situation would be adjusted to fit the conditions of the problem, the typical procedure for repair of a failure within the aquatic and terrestrial segments of the proposed NECPL Project route is described as follows:

- *Aquatic Transmission Cable Repair*. In the event of aquatic cable repair, the location of the problem would be identified and crews of qualified repair personnel would be dispatched to the work location. Depending on the location of the problem, varying types of repair equipment would be used to perform the necessary work. As part of the ERRP, appropriate vessels and qualified personnel would be pre-selected to minimize the response time. Once the failure location is identified, a portion of the transmission cable, equal to approximately 2.5 times the water depth, would be excavated in preparation for cable replacement. The damaged portion of the cable would be cut and a new cable section would be spliced in place by specialized jointing personnel. Once complete, the transmission cable would be reburied using an ROV jetting device.
- *Terrestrial Transmission Cable Repair*. In the event of terrestrial transmission cable repair, pre-selected local contractors identified during the development of the ERRP would excavate around the location of the problem and along the transmission cable for the length of the cable to be repaired or replaced. Once the portion of the transmission cable is excavated, specialized jointing personnel would remove the damaged cable and install new cable. Once complete, the transmission cable trench would be backfilled and the work area restored using the same methods as described for the original installation.

2.6 Impact Minimization and Conservation Measures

As part of the application development process, TDI-NE detailed a number of industry-accepted BMPs that would be undertaken to avoid or reduce environmental impacts during construction and operation of the proposed NECPL Project. TDI-NE would develop an environmental management and construction plan which documents environmental and construction management procedures and plans to be implemented during the proposed NECPL Project construction activities and during facility operation. In addition, TDI-NE proposed to employ a number of specific measures to minimize environmental impacts as a part of the permit filings. These impact reduction measures, collectively referred to as BMPs, were proposed by TDI-NE for use during construction and operations to protect environmental, agricultural, cultural, and other potentially sensitive resources along the proposed NECPL Project route. TDI-NE proposed measures were taken into account in the environmental analyses conducted for the Final EIS and this BA. These measures include development of an Overall Oil and Hazardous Materials Spill Prevention and Contingency Plan (SPCP); time of year work restrictions; biological studies; work site restoration; and inspection and reporting. Specific measures that apply to ESA-listed species are presented as follows.

2.6.1 Applicant Proposed Measures and BMPs for Aquatic Species

While specific BMPs are proposed to ensure minimal impacts to aquatic habitats and species, there are no aquatic species listed as federally threatened or endangered in the Lake Champlain Segment or Overland Segment (DOE 2015).

2.6.2 Applicant Proposed Measures and BMPs for Terrestrial Species

Indiana Bat

A 2014 survey (AE 2014) identified 116 potential roost trees for the Indiana bat in the Project area. In order to minimize potential impacts on Indiana bats, TDI-NE would avoid cutting potential roost trees identified during survey work (AE 2014). Should cutting of identified roost trees be required, TDI-NE would conduct a Phase 2 assessment which includes acoustic or visual exit surveys and the identification of potential alternative roosting sites (TRC 2014).

In addition, any potential roost trees that have no bat activity, but where the tree is greater than 16 inches in diameter, may be cut within 10 days of the last emergence survey or during the winter period (October 1 to March 31). No cutting of roost trees containing Indiana bats shall occur unless the wildlife agencies review the exit survey data and determine that the tree could be cut (Memorandum of Agreement [MOA] 2015[2]). TDI-NE, in coordination with the Vermont Agency of Natural Resources, also committed to implement various stipulations to protect the Indiana bat. Those stipulations are included in ***Attachment A*** of this BA.

Northern Long Eared Bat

Northern long-eared bats generally have less specific habitat requirements, but primarily roost in trees greater than 3 inches in diameter; it is assumed that the NLEB may occur throughout the Project area. A 2015 study (Stantec 2015) completed desktop analyses and field reconnaissance surveys to: 1) assess the potential for long-term habitat loss (indirect effects) from the Project on potential summer roosting habitat for the federally (threatened) and state of Vermont-listed (endangered) NLEB; 2) identify those areas associated with the Project where proposed tree clearing may directly affect NLEB and their habitat. None of the proposed areas to be cleared are within 1.5 mile of known NLEB hibernacula, so it is assumed that clearing and construction activities would not have any impacts to winter NLEB habitat, regardless of the season in which the work would occur. Of the 48 acres to be cleared on the remainder of the Overland Segment, 8 acres of clearing areas were identified by Stantec as being unsuitable for NLEB, and therefore, can be cleared during any season (i.e., due to a general lack of suitable roosting habitats and features) (***Attachment B***).

Based on the results of this assessment, TDI-NE has agreed to clear trees from the converter station site during the period between September 1 and April 15 (i.e., the NLEB inactive period in Vermont) to avoid direct impacts to roosting NLEB. For those areas along the Overland Segment which could potentially provide habitat (i.e. approximately 40 acres) TDI-NE could choose from the following options: a) clear trees during the inactive period (September 1 to April 15); or b) conduct summer presence/absence surveys[3] during the active roosting period, prior to clearing, to determine if NLEB are roosting (or potentially roosting) in the trees within or near the proposed clearing areas. If/where these surveys determine that NLEB are not present in the proposed clearing areas, clearing could occur during the summer active period within 10 days of conducting the surveys. If/where these surveys show that NLEB are present in or near the clearing areas, clearing should occur during the non-active season (i.e., the September 1 to April 15 period), or further studies should be conducted to determine presence in the immediate clearing area.

[2] http://www.necplink.com/regulatory-documents.php, accessed September 3, 2015.

[3] Including acoustic presence/absence surveys per the USFWS 2015 Range-wide Indiana Bat Summer Survey Guidelines, Appendix E protocol. Under this protocol, acoustic surveys must be conducted during the "active" period between May 5 and August 15.

3 FEDERALLY LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

3.1 AQUATIC SPECIES

No aquatic species listed as federally threatened or endangered according to the ESA are known to occur in the Lake Champlain Segment or Overland Segment (DOE 2015).

3.2 TERRESTRIAL SPECIES

Under the authority of the ESA, the FWS is responsible for the protection and recovery of endangered and threatened terrestrial species. The terrestrial species that are federally listed, or are proposed for federal listing, that have previously been identified in the proposed NECPL Project area are identified in ***Table 3***. There is no designated or proposed designated critical habitat for any of these species within the proposed NECPL Project area.

TABLE 3. FEDERAL AND STATE PROTECTED TERRESTRIAL WILDLIFE SPECIES THAT MAY OCCUR WITHIN THE LAKE CHAMPLAIN SEGMENT ROI

Common Name	Scientific Name	State Status	Federal Status
Northern long-eared bat	*Myotis septentrionalis*	E	T
Indiana bat	*Myotis sodalist*	E	E
E= Endangered T= Threatened			

3.2.1 Indiana Bat

Status

The Indiana bat was officially listed as an endangered species on March 11, 1967 (*Federal Register* 4001). Critical habitat was designated for the species on September 24, 1976 (*Federal Register* 14914). Thirteen hibernacula, including eleven caves and two mines in six states, were listed as critical habitat; however, there is no designated or proposed designated critical habitat for this species in Vermont (FWS 2009).

Behavior and Life History

The Indiana bat is medium in size and ranges from 1.5 to 2 inches long with a wingspan of 9 to 11 inches. Diet varies by season, but generally the Indiana bats forage between dusk and dawn and feed primarily on flying and aquatic insects. Males and non-reproductive females do not roost in colonies and may stay close to their hibernaculum or migrate to summer habitat. Summer roosts are typically found in large live or dead trees with exfoliating bark (FWS 2007).

Distribution and Habitat

Winter habitat for the bat is restricted to underground hibernacula. The majority of these suitable sites are located in the east-central United States. In general suitable sites for winter hibernation have large volumes and large vertical passages with stable ambient below 50°F with infrequent drops below freezing. In spring, reproductive females migrate and form maternity summer breeding colonies where they bear and raise their young.

Summer habitat occurs in riparian, wetland, and upland forests primarily in trees with loose or exfoliating bark. The loose bark allows the bats to roost between the bark and the bole of the tree. Occasionally cavities or crevices may be used for roosting. A variety of tree species that can be found in the Project area and are used for roosts include, but are not limited to, sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), white ash (*Fraxinus americana*), eastern cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), white oak (*Quercus alba*), slippery elm (*Ulmus rubra*), and American elm (*Ulmus Americana),* and sassafras (*Sassafras albidum*) (FWS 2007).

Threats
The primary threats to Indiana bats in Vermont, at this time, are White-nose Syndrome (WNS), energy development (e.g., wind power), and residential and commercial development that fail to incorporate measures to maintain suitable Indiana bat habitat, and avoid and minimize impacts on maternity colonies and swarming bat populations. During winter, threats may include modifications to caves, mines or surrounding areas which could alter microclimates within the hibernacula. Human disturbance or vandalism during hibernation may result in direct mortality or reduction in fat reserves needed to sustain bats through the winter. During the summer, degradation or loss of forested habitat used as summer roosting sites are threats to the bat (FWS 2007). During migration, wind turbines have been documented to kill Indiana bat, particularly during the fall migration (FWS 2014[4]), which includes late summer.

Occurrence in the NECPL Project Area
In Vermont, the Indiana bat is limited in distribution to areas along the southern Champlain Valley. A survey of roost trees, which occurred in 2014, documented 116 potential roost trees within the Project area. The most common potential roost trees included shagbark hickory and black locust (*Robinia pseudoacacia*) (AE 2014). While likely not common with the Project area, it is possible that the Indiana bat may utilize roost trees and forage within the Project area.

3.2.2 Northern Long-Eared Bat

Status
On October 2, 2013, the FWS announced a proposal to list the NLEB as endangered under the ESA and the initiation of a 12-month finding toward a final status determination. On April 1, 2015, the NLEB was listed as threatened under the ESA, with the listing becoming effective on May 4, 2015. Critical habitat for the NLEB has not been designated at this time (*Federal Register* 17974[5]).

Behavior and Life History
The NLEB is a medium sized bat 3 to 3.7 inches in length with a wingspan of 9 to 10 inches. The bats are generally medium to dark brown with a light brown underside and characteristically long ears. The NLEB breeds in late summer or early fall with birth occurring in the following spring via delayed implantation. Females roost in small colonies, generally 30 to 60 bats, to give birth to pups. Young bats begin flying within 18 to 21 days after birth. The maximum lifespan of the NLEB is estimated at 18.5 years (FWS 2015).

The NLEB bat feeds primarily at dusk within the forested understory and along waterbodies. Preferred prey includes a variety of invertebrates including moths, flies, leafhoppers and beetles. The NLEB

[4] https://www.fws.gov/Midwest/wind/wildlifeimpacts/inbafatalities.html
[5] 80 FR 17974, April 2, 2015. Available at http://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07069.pfd, accessed May 29, 2015.

catches prey in flight through the use of echo location as well as gleaning insects from vegetation (FWS 2015).

Distribution and Habitat
The NLEB is found throughout the central and eastern portion of North America, and ranges from Maine west to Montana and throughout much of Canada.

Winter habitat for the NLEB is primarily caves and cave-like structures. Winter hibernacula preferred by the NLEB have large passages with crevices for roosting with temperatures ranging from 0-48°F and high humidity. Winter hibernation generally occurs from mid-fall until mid-spring each year.

During the summer months, the NLEB roost in colonies or singly within crevices, hollows, or flaking bark of trees (approximately 3 inches in diameter at breast height [dbh]). Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may include some adjacent and interspersed non-forested habitats such as emergent wetlands, watercourses and waterbodies and edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts as well as linear features such as fencerows, riparian forests, other wooded corridors, and open aquatic habitats over which the bats can forage. Wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Summer roosts are generally utilized from mid-May through mid-August. The NLEB maternity habitat is similar to habitat occupied during the summer. Occasionally the NLEB may roost in structures such as sheds or barns (FWS 2014).

Threats
The primary threat to the NLEB is WNS. Symptoms were first observed in Vermont in 2008[6], and since that time the population of NLEBs has declined by 99 percent in the northeast. Although the most significant declines in the population are tied to WNS other threats could further reduce the species ability to persist. These threats include impacts to hibernacula and surrounding habitat, temporary and permanent removal of forested habitat, lethal bat removal from homes or occupied structures. During migration, wind turbines have been documented to kill NLEB, particularly during the fall migration (FWS 2014).

Occurrence in the NECPL Project Area
The NLEB has the potential to occur within the entire Project area. While over-wintering habitat is not known within the Project area, based on habitat preferences it is assumed that the bat may roost, forage, or migrate within the Project area.

4 ENVIRONMENTAL BASELINE CONDITIONS

4.1 AQUATIC ENVIRONMENT

Lake Champlain Segment
Lake Champlain provides diverse habitat for aquatic species. Littoral habitat includes near-shore areas such as outcroppings, grassbeds, and debris that provide refuge and habitat for aquatic species. The littoral zone (less than 50 feet) is typically very productive and provides ideal conditions for a wide variety of species from fish to aquatic macro-invertebrates. Open lake waters represent pelagic habitats, which are typically cooler and less productive than littoral habitat. Demersal habitat includes the bottom waters and benthic habitat along the bed of Lake Champlain. Benthic habitat supports a variety of macroinvertebrates that could serve as prey for demersal fish species.

[6] http://digital.vpr.net/post/bat-die-white-nose-syndrome-shows-decline

Most of the Lake Champlain Segment would be installed within aquatic habitat. Habitats present in the terrestrial portion of the Lake Champlain Segment is limited to forest edge and open lawns associated with residential structures along Bay Road in Alburgh, Vermont. Where natural vegetation occurs, the shoreline of Lake Champlain is characterized by early successional forest and shrub lands. The majority of the habitat within the terrestrial portion of the Lake Champlain Segment in Alburgh is agricultural fields and manicured residential lawns. Forested portions are hardwood-dominated hedge rows or road ROW are immediately adjacent to Bay Road. Common species within forested areas include eastern hemlock (*Tsuga canadensis*), pine (*Pinus spp.*), birch (B*etula spp.*), American beech (*Fagus grandifolia*), maple (*Acer spp.*), and occasional oak (*Quercus spp.*) (TDI-NE 2014a).

4.2 TERRESTRIAL ENVIRONMENT

Overland Segment

A variety of terrestrial habitats and species occur within the Overland Segment which support several species of plants and wildlife. Upland forests within and adjacent to the segment are dominated by Northern Hardwood Forest Formation, Spruce-Fir-Northern Hardwood Forest Formation, and the Oak-Pine-Northern Hardwood Forest Formation as well as several areas within the region of influence (ROI) include anthropogenic habitats resulting from agriculture, roads, transmission lines, and residential development. Dominant northern-hardwood forests within the Overland Segment include sugar maple, American beech, eastern hemlock, red maple, yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and white spruce (*Picea glauca*). Shrub layer vegetation includes black cherry (*Prunus serotina*), hobblebush (*Viburnum alnifolium*), striped maple (*Acer pensylvanicum*), shadbush (*Amelanchier spp.*), and wild raisin (*Viburnum nudum var. cassinoides*). Herbaceous vegetation, which is more common in open canopy forest, is extensive and may include wood fern (*Dryopteris spp*.), Christmas fern (*Polystichum acrostichoides*), shinning clubmoss (*Lycopodium lucidulum*), sarsasparilla (*Alaria nudicaulis*), and common wood sorrel (*Oxalis acetosella*) (DOE 2015).

A large portion of the Overland Segment occurs along maintained road ROWs (Vermont Route 22A, U.S. Route 4, U.S. Route 7, Vermont Route 103, and Vermont Route 100); therefore, most terrestrial habitat areas are maintained and mowed regularly. The segment intersects riparian areas for stream and river crossings, but these are limited (DOE 2015). Approximately 9.3 acres would be cleared for the new converter station in Ludlow. Habitat in this area is similar to the terrestrial habitats and upland forests described above.

In August and September of 2014 a survey for potential summer roosting trees for Indiana bat was completed along 14.25 miles of the proposed Project route. The survey area was determined after consultation with the Vermont Department of Fish and Wildlife (VDFW) and the FWS (AE 2014) The survey resulted in the identification of 116 potential day-roosting trees; the most common roosting trees included shagbark hickories (*Carya ovate*), black locust (*Robinia pseudoacaia*), sugar maple, and red maple (AE 2014). Based on habitat preferences, foraging behavior, and the presence of day-roosting trees, the Indiana bat may occur within the Overland Segment ROI (TRC 2014).

While a specific study was not completed for the NLEB, based on habitat preferences and foraging behavior, the NLEB may occur within the Overland Segment ROI (DOE 2015). A review of available natural resource data and contacts with resource agencies indicates that there are no known NLEB hibernacula or maternity roost sites within the 1-mile project buffer (Stantec 2015). A desktop analysis of the NECPL Project clearing and potential NLEB summer roosting habitat in the Project vicinity found that, based on 2011 land use data, 60 percent of the area in the 1-mile buffer of the Overland Segment contains forested land cover that could potentially provide roosting and maternity tree habitat for NLEB. Of this forested cover, Project construction would clear trees from approximately 48 acres along the length of the proposed transmission cable route. This equates to a loss of less than 0.14 percent of the available habitat. Further, geographic information system (GIS) and aerial photo analyses indicate that the majority of the Project's forest clearing would occur along the edges of large, contiguous forest blocks, and clearing would maintain opportunities and similarly suitable habitats for summer-roosting NLEB within these blocks. The complete report is provided as ***Attachment B*** of this BA.

5 POTENTIAL EFFECTS ON FEDERALLY LISTED SPECIES

Potential impacts on federally listed terrestrial species may occur during the installation and operation of the proposed NECPL Project. There are no federally protected aquatic species identified within the NECPL Project and there is currently no designated or proposed designated critical habitat within the NECPL Project. TDI-NE proposed minimization and avoidance measures to minimize potential adverse impacts on federally listed spices during the construction and operation of the NECPL Project. ***Table 4*** summarizes the impacts on terrestrial protected species.

TABLE 4. SUMMARY OF IMPACTS ON FEDERALLY LISTED SPECIES BY RESOURCE AREA

Resource Area	Description of Impacts
Habitat	In total, approximately 36 acres of existing fringe forest cover could be temporarily disturbed and 11.2 acres would be cleared for the permanent project corridor along the entire NECPL Project route to accommodate proposed construction corridors and any necessary additional workspace. Additionally, approximately 9.3 acres would be cleared for the new converter station in Ludlow. In general, there is limited availability of suitable summer roost trees (i.e., 116 potential trees) within and adjacent to the impact area for Indiana bats.
Disturbance (Noise, Vibrations, and Dust)	Increased noise, vibrations, and dust created by construction equipment within the proposed NECPL Project area could disturb protected species in nearby forests. However, the areas impacted by the proposed Project are primarily railroad and road ROWs subject to disturbances from trains and transportation activities. The wildlife that occurs in the Project area is generally habituated to noise and regular disturbance.
Magnetic Fields and Heat	Protected terrestrial species may detect the magnetic field and heat generated by the transmission line during operations; however, there is no evidence to suggest that the proposed NECPL Project transmission line would result in any effects, or that these effects would be adverse. Buried cables, such as those proposed for the NECPL Project, would have no electric fields at the ground surface and the highest calculated DC magnetic field is approximately 1,660 mG. This level is less than 0.04 percent of the 4,000,000 mG for public exposure. The same is true for AC magnetic fields, which are calculated to be less than 3 percent of the public exposure limit (Exponent 2014). As such, the predicted magnetic field and heat associated with the transmission line would not result in any adverse effects on the health, behavior, or productivity of animals.

5.1 AQUATIC SPECIES

No aquatic species listed as federally threatened or endangered according to the ESA are known to occur in the Lake Champlain Segment or Overland Segment (DOE 2015).

5.2 TERRESTRIAL SPECIES

The following subsection presents a discussion of potential impacts on terrestrial threatened and endangered resources. The section includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project that would both produce impacts and are proposed to minimize potential impacts. Impacts on terrestrial species are summarized in ***Table 5***.

Based on the analysis in this section and the discussion of cumulative effects presented in ***Section 6,*** the DOE has concluded that any effects on the Indiana bat and the NLEB would be insignificant or discountable, and that the proposed NECPL Project may affect, but is not likely to adversely affect either species.

TABLE 5. DETERMINATION OF EFFECT UNDER THE ESA FOR FEDERALLY LISTED TERRESTRIAL SPECIES IN THE PROPOSED NECPL PROJECT AREA

Common Name	Scientific Name	ESA Status	Determination of Effect
Indiana bat	*Myotis sodalis*	Endangered	May affect, but not likely to adversely affect
Northern long-eared bat	*Myotis septentrionalis*	Threatened	May affect, but not likely to adversely affect

5.2.1 Construction Impacts on Indiana Bat and Northern Long-Eared Bat

Suitable roosting and foraging habitats for the Indiana bat and NLEB occur within and adjacent to the proposed NECPL Project area. These habitats could support spring staging and migration, summer roosting, maternity, fall migration, or fall swarming periods of Indiana and NLEB bats within or near the Project area.

Adjacent roost trees may be subject to temporary disturbances as a result of project construction. TDI-NE proposed BMPs, described in ***Section 2.6***, would be implemented to minimize potential impacts. The temporary and variable nature of the construction activities and the behavioral responses by bats to the disturbances would not result in adverse effects for the reasons discussed below. In addition, the Proposed NECPL Project would be primarily along and within existing active railroad and road ROW where the existing noise levels are elevated already, and where tree clearing is greatly minimized.

Potential effects associated with construction could range from disturbance to injury or mortality if bats are roosting in trees during cutting, and habitat loss or decreases in the quality of remaining habitat in the Project area. The timing of tree cutting and identification of roost trees, however, and the fact that forested habitat is not limited in Vermont, minimizes the potential significance of this. In addition, no Priority 1 or 2 hibernacula occur within Vermont (FWS 2007). Similarly the potential for effects associated with construction that may impact the NLEB include noise, dust, injury or mortality. Use of BMPs, including tree cutting windows (no cutting from April 15 to August 31) as well as avoidance of trees larger than 3 inches in diameter or completion of presence / absence studies, are likely to limit potential impacts. Construction is not likely to adversely affect the Indiana or the NLEB.

Disturbance and Displacement

Construction of the proposed NECPL Project may result in short-term disturbances that could impact Indiana and NLEBs in the area. If roosting bats or individuals flying through their home range are disturbed or displaced due to construction activities, then the potential exists for harassment or harm to occur. Large-scale construction projects using heavy machinery and vehicles have a greater potential for generating noise, dust, and vibrations that may result in disturbance. These types of disturbances are variable, transient, and temporary in nature as the construction changes locations and are influenced by environmental conditions at any given time or location.

Based on research included in the original Indiana bat recovery plan (FWS 1999), the Indiana bat may be more adaptable with regard to roosts than previously thought. Studies have shown that Indiana bats know of and utilize a number of roost sites within a maternity colony area. The bats move from one roost to another within a single season based on changes to environmental conditions or when a roost becomes unavailable (FWS 1999). NLEBs generally have less specific habitat requirements, but primarily roost in trees greater than 3 inches in diameter. As a result of construction Indiana bats and NLEBs may change foraging areas and seek foraging habitats that are farther away from the construction area.

Construction Noise

Increased noise created by construction equipment within the proposed NECPL Project area may disturb bats day-roosting in nearby forests during spring, summer, and autumn. This potential disturbance would be short-term and noise would not be generated throughout the entirety of the area, at any one time, during construction. Although noise levels associated with construction would likely continue for more than a single day, the bats roosting within or close to these areas are not expected to shift their focal roosting areas farther away given the current level of disturbance from the active road ROW and railroad ROW being used for the proposed NECPL Project. As such, Indiana bats and NLEBs are not likely to become displaced or abandon roosts as a result of construction noise.

Construction Dust

The creation of airborne dust by construction equipment is likely to occur within the Project area for all work involving earthmoving or large equipment. Dust likely would be created during the spring, summer, and fall when Indiana bats and NLEBs are roosting in adjacent forested habitats and possibly foraging throughout the Project corridor. Any potential effects from dust would be localized within and immediately adjacent to the corridor. However, contractors would implement dust-control strategies (i.e., watering down disturbed soil) during construction activities. Given the amount of available foraging and drinking areas versus the area likely to be impacted by construction dust, and the measures to minimize dust, no impacts on bats are anticipated.

Habitat Loss

Vegetation removal may result in a loss of potential roosting habitat for Indiana and NLEBs. While much of the habitat, particularly in areas near existing railroad and road ROWs, lacks suitable roosting habitat, surveys have identified potential roosting trees and suitable habitat within the proposed NECPL Project. For the current route design, an estimated 36.6 acres would be cleared for the temporary construction areas and 11.2 acres would be cleared for the permanent project corridor. Additionally, approximately 9.3 acres would be cleared for the new converter station in Ludlow. For the temporary cleared areas, TDI-NE would allow these areas to revegetate over time.

Based on survey work completed in 2015 there are 116 identified potential Indiana bat roosting trees within the NECPL Project area. These trees would not be removed without further consultation with the FWS as well as additional survey work. If clearing is to occur from April 15 to August 31, preconstruction surveys would be conducted for Indiana bat and NLEB in accordance with the Indiana bat summer survey guidelines (FWS 2015).

5.2.2 Operations and Maintenance Impacts on Indiana Bat and Northern Long-Eared Bat

Vegetation Control

Most of the vegetation that would be impacted along the Overland Segment of the transmission line ROW consists of previously disturbed herbaceous or shrubby cover within the existing highway ROW and railroad ROW, with the exception of the Ludlow converter station. During operation of the proposed NECPL Project, vegetation management in the transmission line ROW would be restricted to vegetation clearing on an as-needed basis within the 12-foot-wide permanent project corridor (TRC/VHB 2014) and at the converter station site. Clearing would be required to remove woody vegetation as the roots may damage the transmission cable. Mowing or cutting would be completed during the day when Indiana and NLEBs may be roosting in adjacent trees. Potential effects from mowing on bats include noise and dust. Noise created by mowing could affect roosting bats in adjacent forests but, as discussed, several colonies of bats have been found near mowed ROWs of major roads and appear to not be affected by noise created by mowing and traffic. In addition, noise created by mowing would be experienced by roosting or foraging bats for a very short duration as mowers would pass quickly by any area having bats. Dust created by mowing would also be present in areas occupied by Indiana bats for a very short duration.

Magnetic Fields

Magnetic fields diminish quickly with distance, so the effect of the overland cables on the ambient geomagnetic field is largely restricted to a distance of approximately 25 feet on either side and above the line (Exponent 2014). The burial of the transmission line also reduces magnetic field exposure compared to an overhead transmission system. Magnetic field deviations diminish with distance from the proposed NECPL Project cable. The calculated magnetic field deviations within 25 feet from the centerline of the cables for the majority of the Overland Segment are less than 8.9 percent of the ambient geomagnetic field level. For the remaining route, the highest calculated magnetic field deviations within 25 feet from the centerline of the cables are less than 18 percent of the ambient geomagnetic field level (Exponent 2014). Although some species of wildlife can detect electric and magnetic fields, the relatively small changes in magnetic fields associated with operating the proposed Project would not affect the behavior of federally protected species (TDI-NE 2014a). Both the Indiana bat and NLEB would likely be able to detect the magnetic field and heat generated by the proposed transmission line during operations; however, there is no evidence to suggest magnetic fields projected for the proposed NECPL Project would result in any adverse effects to the protected bats. Buried cables, such as those proposed for the NECPL Project, would have no electric fields at the ground surface and the constant magnetic field for much of the Overland Segment would be less than 8.9 percent of ambient levels. In addition, these levels would decrease substantially within 25 feet from the transmission cable centerline. As such, the predicted magnetic field and heat associated with the transmission cable would not result in any adverse effects on the health, behavior, or productivity of animals. Magnetic fields resulting from the operation of the proposed Project would not adversely affect bald eagles (TDI-NE 2014a).

Noise

Noise levels related to operation of the proposed NECPL Project are primarily related to the operation of the HVDC converter station, proposed in Ludlow, Vermont. Operation of this facility was investigated to determine sound pressure changes at three locations as a result of operation of the proposed converter station. Background sound pressure monitoring established existing sound levels at three locations ranged from 23 weighted decibel (dBA) to 33 dBA. Resulting baseline sound levels resulted from car by-pass, airplane overflights, birds, and yard maintenance equipment. Sound propagation modeling was preformed and resulted in an estimate that the proposed converter station would not exceed 35 dBA at night (RSG 2014). While this study focused on noise levels and guidelines set by the World Health Organization (WHO), potential noise levels resulting from the proposed converter station are not dramatically higher than baseline sound pressure levels. Given that sound pressure levels, based on the current design, will not exceed 35 dBA, no impacts on bats are anticipated.

6 CUMULATIVE EFFECTS

Reasonably foreseeable future activities that might occur in the proposed NECPL Project area and an assessment of cumulative effects from such when combined with the proposed NECPL Project are described in ***Chapter 6*** of the NECPL EIS (DOE 2015). State, local, and private activities (i.e., non-federal activities) that are reasonably certain to occur within the Project area are provided in ***Section 6*** of the Final EIS (DOE 2015). The Proposed Action when combined with other reasonably foreseeable actions would not contribute to cumulative adverse effects on ESA-listed species, largely because the conservation measures (e.g., BMPs) proposed as part of the proposed NECPL Project would avoid, minimize, and mitigate any impacts on ESA-listed species resulting from Project construction and operation (see ***Section 2.5***).

7 CONCLUSIONS

7.1 EFFECTS DETERMINATION FOR LISTED SPECIES

Based on the description of the proposed NECPL Project in ***Section 2*** of this BA and further described in the associated NECPL Final EIS (DOE 2015), the status of species and environmental baseline described in ***Sections 3*** and ***4***, and the analysis of potential impacts in ***Section 5***, the DOE concludes the following.

Any effects on the Indiana bat and the NLEB would be insignificant or discountable, and the proposed NECPL Project may affect, but is not likely to adversely affect either species.

As a result of the proposed Project, Indiana bats and NLEB may temporarily change roosting or foraging areas and seek roosts and foraging habitats that are located away from active construction areas. However, there are observations in the literature of Indiana bat tolerance to disturbance and it cannot definitively be established that Indiana bats or the NLEB would shift or abandon their roosts or foraging areas (FWS 1999).

In general, there is limited availability of suitable summer roost trees for Indiana bat within and adjacent to the impact area. The 116 potential roost trees identified during the Indiana bat survey within the construction limits would be avoided during construction activities and associated clearing. Tree removal at the converter station would occur between September 1 and April 15. Tree removal along the Overland Segment would occur either a) between September 1 and April 15; or b) after completing the necessary presence / absence surveys and, as necessary, taking further measures. Avoiding potential maternity or roost trees for Indiana bats and NLEB and other measures identified through ongoing consultation with FWS would avoid or minimize to insignificant levels adverse effects on Indiana bats and NLEB.

7.2 EFFECTS DETERMINATION FOR CRITICAL HABITAT

There is no designated or proposed designated critical habitat for any DPS of Indiana bat or NLEB, in the proposed NECPL Project area. As a consequence, there would be no effect on critical habitat.

8 REFERENCES

Arrowwood Environmental (AE). 2014. Indiana Bat Habitat Assessment Report. October 23, 2014.

Exponent. 2014. Overland Magnetic Field Report for the New England Clean Power Link Project. Bowie, MD. Exponent.

Resource Systems Group (RSG). New England Clean Power Link Project-Noise Impact Assessment for Converter Station. November 2014.

Stantec Consulting Services, Inc. (Stantec). 2015. Northern Long-eared Bat Desktop and Reconnaissance Habitat Assessments. Topsham, ME. September 2015.

Transmission Developers, Inc.-New England (TDI-NE). 2014a. Application of Champlain VT, LLC for a Presidential Permit for the New England Power Link HVDC Transmission Project. May 20, 2014.

Transmission Developers, Inc.-New England (TDI-NE). 2014b. New England Clean Power Link Project. Narrative on Project Description and Purpose. Application to USACE for construction permits pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

TRC Environmental Corporation (TRC). 2014. Survey Results Report: Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Communities. November 2014.

TRC Environmental Corporation (TRC). 2015. New England Clean Power Link Project. USACE Application for a Section 404/10 Permit. April 2015.

TRC Environmental Corporation and Vanasse Hagen Brustlin (TRC/VHB). 2014. Vegetation Management Plan. November 2014.

U.S. Department of Energy (DOE). 2015. Draft Environmental Impact Statement: New England Clean Power Link (NECPL) Project. July 2015.

U.S. Fish and Wildlife Service (FWS). 1999. Indiana Bat (*Mytosis sodalist*) Revised Recovery Plan. Fort Snelling, Minnesota.

U.S. Fish and Wildlife Service (FWS). 2007. Indiana Bat (*Mytosis sodalist*) Draft Recovery Plan: First Revision. Fort Snelling, Minnesota.

U.S. Fish and Wildlife Service (FWS). 2009. Indiana Bat (*Mytosis sodalist*) 5-Year Review: Summary and Evaluation. Bloomington, Indiana.

U.S. Fish and Wildlife Service (FWS). 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. January 6, 2014.

U.S. Fish and Wildlife Service (FWS). 2015. Northern Long-Eared Bat (*Myotis septentrionalis*): Fact Sheet.

9 ACRONYMS

AC	Alternating Current
BA	Biological Assessment
BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Ac
dBA	A-weighted Decibel
dbh	Diameter at Breast Height
DC	Direct Current
DOE	U.S. Department of Energy
DPS	distinct population segments
EIS	Environmental Impact Statement
EO	Executive Order
ERRP	Emergency Repair and Response Plan
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
G	Gauss
GIS	Geographic Information System
HDD	Horizontal Directional Drilling
HDPE	High-density Polyethylene
HVDC	High Voltage Direct Current
ICNRP	International Committee for Non-Ionizing Radiation Protection
ISO-New England	Independent System Operator of New England
kV	Kilovolt
mG	Milligauss
MOA	Memorandum of Agreement
MW	Megawatt
NECPL	New England Clean Power Link
NEPA	National Environmental Policy Act
NLEB	Northern Long-eared bat
NMFS	National Marine Fisheries Service
OTE	Open Trench Excavation
ROI	Region of Influence
ROV	Remotely Operated Vehicle
ROW	Rights of Way
RSG	Resource Systems Group

SPCP	Spill Prevention and Contingency Plan
TDI-NE	Transmission Developers, Inc. - New England
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
VDFW	Vermont Department of Fish and Wildlife
VELCO	Vermont Electric Power Company
VTrans	Vermont Agency of Transportation
WHO	World Health Organization
WNS	White-nose Syndrome
XLPE	Cross-linked Polyethylene

ATTACHMENT A: INDIANA BAT CONDITIONS

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Indiana Bat Conditions from TDI-NE / VT ANR Stipulation
Signed: July 17, 2015

1. TDI-NE shall flag the 116 previously-identified potential Indiana Bat roost trees within the Towns of Benson, West Haven and Fair Haven prior to construction. These flags will indicate that these trees are not to be cut by TDI-NE or its contractors.

2. As part of environmental training during construction orientation, TDI-NE shall advise construction workers of the flag color for the previously identified potential Indiana Bat roosting trees and that such trees may not be cut by TDI-NE or its contractors.

3. If Project changes are proposed that would impact potential Indiana Bat roost trees, then TDINE shall conduct bat exit surveys of the impacted trees prior to construction within 100 feet of such trees, utilizing the following exit survey protocol:

a. The surveys shall be performed during the months of June and July in order to determine the presence of, or likely absence of use by, roosting Indiana bats.

b. For each potential roost tree proposed to be impacted, there shall be five detector nights of acoustic surveys aimed at the tree.

c. A minimum of one acoustic detector shall be placed so that the detection cone covers the bole of the tree from 10 feet high to canopy height. Typically this requires placing the detector 50-60 feet from the base of the tree with the microphone pointed at the proper angle.

d. At least four of the detector nights must consist of temperatures above 50 degrees Fahrenheit, winds less than 9 mph, and no sustained rainfall.

e. Acoustic survey results must be presented upon completion of each tree surveyed to the Vermont Fish and Wildlife Department for consultation prior to cutting any trees. As guidance, any potential roost trees meeting the following conditions for all of the acoustic survey nights will be determined to not have bats present:

i. No bat calls recorded; or

ii. No *Myotis* bat calls recorded during the dusk period (up to 2 hours after sunset) and dawn period (after 2 hours before sunrise).

f. The presence of roosting bats will be presumed for every tree for which *Myotis* bat calls have been recorded during the dusk or dawn periods. In order to overcome this presumption, TDI-NE shall perform emergence surveys consisting of three continuous nights of emergence surveys to establish the absence of roosting bats. The emergence surveys shall be conducted in accordance with the following:

i. The specific methodology for conducting emergence surveys is provided in the US Fish & Wildlife Service ("USFWS") 2015 Range-wide Indiana Bat Summer Survey Guidelines, Appendix E Phase 4 Emergence Surveys – Emergence Surveys for Potential Roost Trees.

ii. The emergence surveys shall be conducted by at least one person, and shall begin at least one-half hour before sunset and not end earlier than one hour after sunset.

iii. Data shall be recorded on the USFWS Bat Emergence Survey Datasheet provided in the Appendix.

g. All survey work and acoustic data analysis shall be conducted by individuals trained in bat monitoring and acoustic identification, who shall be pre-approved by DFW. TDINE shall provide DFW with the identity of the proposed surveyors, and their qualifications, at least thirty days in advance of when approval is sought. Approval of qualified surveyors for which documentation of qualifications has been provided will not be unreasonably withheld.

4. Any potential roost tree for which the surveys indicate no bat use may be removed by TDI-NE at any time of year, provided such tree is less than 16 inches diameter at breast height. For any tree which is greater than 16 inches diameter at breast height and for which surveys indicate no bat use, TDI-NE may cut the tree within 10 days of the last emergence count or acoustic survey night, or during the winter period of October 1 to March 31.

5. No cutting of roost trees containing Indiana Bats shall occur unless DFW reviews the exit survey data and determines that the tree can be cut from October 1 to March 31

ATTACHMENT B: NORTHERN LONG-EARED BAT DESKTOP AND RECONNAISSANCE HABITAT ASSESSMENTS

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Northern Long-eared Bat Desktop and Reconnaissance Habitat Assessments

New England Clean Power Link, Vermont

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September 24, 2015

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1.0 INTRODUCTION

This report details the results of desktop analyses and field reconnaissance surveys completed by Stantec Consulting Services, Inc. (Stantec) for TDI New England (TDI-NE) and TRC Companies, Inc. (TRC). Stantec's work was initiated due to potential tree-clearing associated with the proposed construction by TDI-NE for the New England Clean Power Link (NECPL) transmission project in Vermont. The purpose of Stantec's work was to (1) assess the potential for long-term habitat loss (indirect effects) from the project on potential summer roosting habitat for the federally (threatened) and state of Vermont-listed (endangered) northern long-eared bat (*Myotis septentrionalis*) (NLEB); (2) identify those areas associated with the project where proposed tree clearing may directly affect NLEB and their habitat; and (3) develop a set of strategies and options for avoiding and minimizing direct effects to the species and its habitat in the planning and construction of the project.

1.1 PROJECT DESCRIPTION

TDI-NE is proposing to construct and operate the NECPL, a 1,000 MW High Voltage direct current underwater and underground transmission cable that will bring electricity generated by renewable energy sources in Canada to the New England Electric grid (Figure 1-1, Appendix A). The project will install two approximately 5-inch-diameter cables for an estimated 154 miles, all in Vermont. Approximately 97 miles are proposed to be submerged in Lake Champlain and approximately 57 miles are proposed to be buried underground along existing rights-of-way (ROW). The buried transmission line would begin at the United States and Canada border, continue into Alburgh (0.5 miles) and would enter Lake Champlain and then emerge in the town of Benson, Vermont. The cables will then run underground for approximately 56 miles from Benson to a proposed new converter station in the town of Ludlow, Vermont (Overland Segment). With the exception of the Converter Station and access properties in and out of Lake Champlain, the entire length of Overland Segment portion of the NECPL will be co-located with existing roads and railroads, thereby minimizing the amount of new tree clearing and cleared corridors needed.

TDI-NE would use horizontal directional drilling (HDD) to install the transmission cables in transition areas between aquatic and terrestrial portions of the project route and also to install cables under certain roadway and railway crossings as well as certain environmentally sensitive areas such as lakes and rivers. Along road ROW, the transmission cables would be installed primarily in the existing cleared areas; in some locations where that is not possible due to constraints the cables would be installed under the paved surface of the roads. Otherwise, forested areas exist in certain segments of the ROW, and minor tree clearing would occur to accommodate construction and to a lesser extent operations.

The permanent ROW required for maintenance and operation of the transmission line along the terrestrial portions of the project route would be approximately 12 feet wide along road and railroad ROW. During project operation, TDI-NE proposes to clear vegetation on an as-needed basis within the 12-foot wide project corridor, over the transmission cables to prevent deep rooted trees from impacting the operation of the cables. Long-term vegetation management would include mowing, selective cutting to prevent the establishment of large trees (i.e., greater than 20 feet tall) directly over the trenched transmission line, and vegetation clearing on an as-needed basis to conduct repairs.

An Environmental Impact Statement has been prepared pursuant to the U.S. National Environmental Policy Act (NEPA). Other environmental review requirements are being implemented in coordination with the NEPA process to the extent possible, including threatened and endangered species consultation required under the U.S. Endangered Species Act (ESA). TDI-NE anticipates that the permitting phase of the proposed NECPL project will be completed in 2015 with major construction occurring in 2017 and 2018.

1.2 NLEB REGULATORY BACKGROUND

Due to recent population declines, the NLEB was listed in April 2015 as a threatened species under the federal ESA, with the listing going into effect in May 2015. No Critical Habitat was established when the species was listed. The listing included the establishment of an associated Interim "4(d)" Rule that exempts "take" associated with certain activities expected to have negligible impacts on the species (e.g., removal of bats from dwellings, forest management activities, expansion of existing transportation and utility corridors) provided that certain conservation measures can be met. Although take may be exempted in certain situations, consultation with the U.S. Fish and Wildlife Service (USFWS) is still required for projects with a federal nexus (see below).

Relevant to the NECPL project, the USFWS and the Vermont Agency of Natural Resources (ANR) are concerned with the loss or degradation of summer NLEB habitat. No hibernacula are known to occur in or near the project[1]. Activities such as commercial and residential development, transportation and energy ROW development, surface mining, and wind facility construction permanently remove habitat and indirectly affect the species. Timber harvest and forest management can temporarily remove or degrade summer roosting and foraging habitat. When conducted during the active season when bats are present and not hibernating, these tree-clearing activities can also directly kill or injure bats by cutting down their roost trees when they are present in the tree.

Projects that have a federal nexus (e.g., are initiated by a federal agency or require some type of federal permit) are required under the ESA to undergo a Section 7 consultation to allow the federal and state agencies to review the actions and determine whether the action may affect a listed species or its critical habitat (if critical habitat Is established by USFWS). For this project

[1] Scott Darling, VT ANR, personal communication with Stantec, September 2, 2015. The known hibernacula site closet to the project is approximately 1.5 miles from the proposed route near the southern end in Ludlow. All other known hibernacula sites are at least 6 miles from the project.

the need for a U.S. Department of Energy (DOE) permit has triggered the Section 7 consultation process. The consultation will conclude either informally with written concurrence from the USFWS, or through formal consultation with a biological opinion provided by USFWS to the federal agency (the DOE). Stantec understands that informal consultation has been initiated with the USFWS for this project as it relates to the potential effects to NLEB.

Based on previous correspondences with ANR for similar projects, Stantec understands that ANR may consider using an acreage threshold of forest conversion to determine if there will likely be *long-term* impacts to NLEB. For projects that (1) convert/clear less than 1% of the forested habitat within a 1-mile buffer of the project site (i.e., there is less than a 1% chance of impacting roosting NLEB); and (2) maintain connectivity to relatively large contiguous forest blocks within the buffer, ANR assumes that the long-term habitat needs of the species will be maintained. Stantec and TDI-NE also discussed this approach with the USFWS in an August 14, 2015, meeting, and USFWS advised that this methodology would be helpful in understanding long-term impacts to NLEB. At a meeting attended by USFWS, ANR, TDI-NE, TRC, and Stantec on September 9, 2015, USFWS generally agreed with the 1-mile buffer analysis used by ANR, but also requested a finer scale analysis to address potential indirect impacts (at a landscape level) by looking at percentages of core roosting habitat removed in portions of the NECPL Project as a result of proposed temporary and permanent clearing activities.

In a July 13, 2015, letter from USFWS to the DOE regarding NLEB and other federally listed species associated with NECPL project, the USFWS indicated that, in order to avoid killing or injuring bats during the summer/active season, clearing of trees ≥3" diameter at breast height (dbh) should not occur between April 15 and August 31, Vermont's summer/active period, unless comprehensive presence/absence surveys are performed to allow USFWS to determine the current distribution of the species along the project route. Surveys would need to follow the current Indiana bat summer survey guidelines[2]. The occurrence information would allow the USFWS to assess the project for a "take", as defined in the ESA, which for this project would be the a potential for bats to be killed or injured during the summer active season when trees used for daytime roosting and rearing of pups are cleared.

Assumptions on Potential Clearing Impacts

Summer/Active Period Clearing: Assuming that a portion of the proposed clearing areas contains potential summer roosting habitat for NLEB, it is further assumed that bats could be present and disturbed or killed (i.e., a "taking" under the ESA) if clearing were to occur there during the summer/active season (April 15 through August 31)

Winter/Inactive Period Clearing: It is assumed that clearing during the winter/inactive period would completely avoid potential direct impacts to NLEB because they would be hibernating and would not be present in the project area. Based on USFWS guidance it is expected that NLEB would not be present and roosting from September 1 to April 14. Therefore, any tree

[2] 80 FR 17974, April 2, 2015. Available at http://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07069.pdf.

clearing conducted during that window would present little or no risk of direct injury or death as a result of construction.

Use of the 1-Mile Buffer: It is assumed that using a 1-mile buffer in the analysis of indirect impacts to NLEB roosting habitat generally represents an under-estimation of potential NLEB habitat where larger, adjacent or proximal forested parcels are present. This may also present an overestimation of habitat impacts where roads or other developments are present.

Temporary versus Permanent Clearing Impacts: It is important to distinguish temporary clearing impacts from permanent clearing impacts, with the assumption that temporary clearing areas have the potential to re-establish as roosting habitat over time if left to re-vegetate with tree species.

2.0 METHODS

2.1 DESKTOP ANALYSIS

Based on current agency guidance, Stantec conducted desktop GIS assessments to determine: (1) whether the project area contained any known NLEB hibernacula or roost trees; (2) the approximate percent of proposed clearing within a 1-mile buffer of the overland portions of the NECPL transmission corridor; and (3) the landscape-level habitat effects associated with clearing potential habitat areas that are contiguous and exceed 1-acre in size. Note that for (2) above we used the proposed clearing areas associated with the overland cable corridor only and did not include the clearing areas associated with the proposed converter station, the proposed converter station was included for the landscape level analysis (3).

Presence of Known NLEB Hibernacula and Roost Trees

Stantec conducted a search for information on known NLEB hibernacula, roosting trees, and maternity trees. We searched the available state databases and contacted ANR to determine the locations of known NLEB hibernacula and maternity roosts in the vicinity of the project, and incorporated those data in our GIS analyses.

Project Level Habitat Effects Assessment

Stantec created a buffer offset in GIS that extends 1 mile on either side of the proposed project clearing areas. As there will be no clearing for the 0.5-mile section of the overland route located in Alburgh, this segment of the route was not included in the analysis. The proposed Converter Station was also not included in this initial analysis. We used the proposed clearing area polygons to create the buffer offset and overlaid the buffer limits onto a data layer containing the 2011 National Land Cover Data[3] (NLCD) to calculate the approximate extent of forest cover

[3] NLCD is a satellite-derived land cover classification and mapping database available from the Multi-Resolution Land Characteristics Consortium. http://www.mrlc.gov/nlcd2011.php

types within the buffer. We used the NLCD classifications for softwood, hardwood, mixed-wood, and woody wetlands forests to determine the extent of forest cover within the 1-mile buffer. We also performed a step to capture land cover designations along the project corridor that are not reflected in the NLCD. Utilizing manual remote sensing, we compared the NLCD analysis results with 2011 aerial ortho-photos and made adjustments to the forest cover where appropriate. We then calculated the expected forest clearing area (in acres) using the proposed clearing area polygons and divided that number by the total forest area from the NLCD data to estimate the percent of potential forest conversion from the project, per the threshold methods described above.

Landscape Level Habitat Effects Assessment

For this analysis, TRC identified the project-related clearing polygons that would result in 1 acre or more of contiguous clearing (permanent and temporary) of forest habitat. Stantec chose five of these discrete clearing areas (including the converter station site) and created 1-mile buffers around each them. In choosing the five areas, caution was taken to not include any whose buffers overlapped. Within each of these buffers, Stantec calculated the extent of existing forest and the total proposed forest clearing that would result from the project. The following criteria were used in choosing the five areas:

- Two of the largest (acres) proposed clearing areas,
- One of the proposed clearing areas in a more-developed area (i.e., with proportionately less area of contiguous forest than some of the less developed portions of the project area),
- One of the smallest (acres) proposed clearing areas, and
- The proposed clearing associated with the Converter Station.

2.2 FIELD ASSESSMENT

On August 31, 2015, Stantec biologists conducted a reconnaissance field survey of the Overland Segment of the proposed NECPL transmission line route (except the short section in Alburgh with no clearing) to observe the character of woody vegetation to be cleared and to estimate the potential suitability of that vegetation to support summer roosting and maternity/pup rearing by NLEB. Stantec divided the entire length of the Overland Segment route into sequentially numbered 1-kilometer (km) segments and displayed the segment markers and proposed clearing areas on field maps and a GPS receiver to facilitate the field assessment. Within each 1-km segment requiring forest clearing, the biologists surveyed one to two designated clearing locations to assess the overall characteristics of the vegetation as to its potential for supporting summer roosting use by NLEB.

Based on the current knowledge of the species' preferences, NLEB roosting and maternity habitats typically include trees (both live and dead) with cavities, crevices, and loose peeling bark that provide the bats with shelter and concealment while roosting or pup-rearing. The bats roost singly or in small colonies during the day. Though NLEB have been observed roosting in trees as small as 3 inches dbh, the literature suggests that they typically prefer larger, more mature trees for roosting and maternity use. Roost selection is not limited to a single tree species or group of species within its range but instead appears to include any tree species that form suitable cavities or retain loose/exfoliating bark. NLEB use multiple roosts during the course of the summer, moving between roosts every few days.

Based on generally established habitat use criteria described above for assessing NLEB habitat at the reconnaissance level, Stantec collected the following information at each survey location:

- Km segment #
- Site ID #
- Photo #
- Is forest habitat to be cleared contiguous with adjacent forests – Yes or No
- Forest Stand Type: small group, contiguous forest, hedgerow, single tree
- Forest Community Type: hardwood, softwood, mixed wood, plantation,
- Average Tree dbh: <3", 3"-6", 6"-12", >12"
- Roosting Habitat Features Visually Present: i.e., cavities, crevices, peeling bark, snags, none.
- Dominant Tree Species: List
- Road Type at clearing location: Gravel, 2-lane, 4-lane, divided, etc.
- Comments: Presence of water bodies nearby, solar exposure, existing disturbances noted, etc.

The field assessment results were later reviewed by a Stantec bat biologist to consider the overall suitability of the trees in and adjacent to the proposed clearing areas and their potential to support summer roosting and maternity use by NLEB. This biologist used the most recent, publically available aerial photos to corroborate field results and assess the land cover types and contiguity of the forest habitats in the vicinity of the clearing areas. Clearing areas that did not contain trees that could likely be used for roosting (e.g., due to small trunk size or lack of cavities) or that were not part of a contiguous forest block (e.g., within narrow hedgerows) were listed as "not suitable habitat" and marked as such on the project maps. Areas found to contain trees with appropriate roosting features were listed as "potentially suitable habitat" in the GIS data layer. GIS data were then used to map and quantify (1) areas of potentially suitable NLEB summer roosting habitat to be cleared; and (2) areas to be cleared that would be considered "non-habitat" because they did not meet the criteria for typical suitable roosting habitat.

3.0 RESULTS AND CONCLUSIONS

3.1 DESKTOP ANALYSIS

Known NLEB Hibernacula or Roost Trees

Stantec's review of available natural resource data and contacts to resource agencies indicates that there are no known NLEB hibernacula or maternity roost sites within the 1-mile project buffer. Figure 1-1 (Appendix A) illustrates the locations of known hibernacula as provided to Stantec by ANR.

Project Level Habitat Effects Assessment

The results of Stantec's desktop analysis of the project clearing and potential NLEB summer roosting habitat in the project vicinity are summarized in Table 1. Over 60% of the area in the 1-mile buffer of the Overland Segment currently (as of the 2011 NLCD publication) contains forested land cover that could potentially provide roosting and maternity tree habitat for NLEB. Of this forested cover, project construction would clear trees from approximately 48 acres along the length of the proposed transmission. This equates to a loss of less than 0.14% of the available habitat. Further, GIS and aerial photo analyses indicate that the majority of the project's forest clearing will occur along the edges of large, contiguous forest blocks, and clearing would maintain opportunities and similarly suitable habitats for summer-roosting NLEB within these blocks.

Table 1. Calculations from Stantec's desktop habitat analysis of the project's Overland Segment corridor and 1-mile buffer.

Total Length of Proposed Overland Segment Corridor	56 mi / 90 km
Number of 1-km Segments with Clearing Areas	62
Total Area of 1-Mile Project Buffer	56,108 ac
Total Forested Habitat in 1-Mile Buffer (per NLCD)	33,884 ac
Total Proposed Transmission Clearing (per TRC data)	47.8 ac
Temporary Clearing	36.6 ac
Permanent Clearing	11.2 ac

Percent of Total Forested Habitat to be Cleared (permanent and temporary clearing)
47.8 ac ÷ 33,884 ac = **0.14%**

Percent of Total Forested Habitat to be Cleared (permanent only)
11.2 ac. ÷ 33,884 ac = **0.03%**

Landscape Level Habitat Effects Assessment

The total size of the 12 clearing areas over 1-acre is 28.4 acres, including 13.5 acres of temporary clearing, 5.6 acres of permanent clearing, and 9.3 acres for the Converter Station. The results of the landscape habitat effects analysis for the five chosen clearing areas are presented in Table 2. The clearing areas used for this analysis are shown on Figure 1-2.

Table 2. Results of landscape-level analysis of indirect NLEB habitat effects.

Clearing Area ID Number[1]	Buffer Size (Ac)	Forested Habitat within Buffer (Ac)	Proposed Clearing (Ac)	
			Ac	% of Buffer
1 (Smallest proposed clearing)	2,296.7	1,438.9	1.3	0.09%
2 (Second largest proposed clearing)	2,752.5	1,724.0	1.6	0.10%
3 (Proposed clearing near developed area)	2,578.4	1,556.6	1.5	0.09%
4 (Largest proposed clearing area)	3,291.1	2,550.8	3.5	0.14%
5 (Converter Station)	2,399.3	1,600.1	9.3	0.58%

[1] Refer to Figure 1.2

Conclusion: The total area to be cleared along the highway and railroad ROW is approximately 0.14% of the forested habitat within the 1-mile buffer of the project including both areas that will be temporarily cleared during construction as well as those areas that will remain cleared following construction. When considering areas that will remain cleared along the highway and railroad ROW following construction, only 0.03% of available forested habitat within a 1-mile buffer would be impacted. The project will remove substantially less than 1% of the available roosting habitat potential within the buffer, and large contiguous forest blocks will remain in the project vicinity after clearing. The USFWS has suggested that a low percentage of impact to the overall potential habitat would also be factored into their review of the likely impacts associated with the project's clearing activities. Similar results are evident when comparing the landscape level habitat analysis. Exclusive of the Converter Station, clearing within the other 4 areas is less than or equal to 0.14% of the forested habitat within the 1-mile buffer of each area.

3.2 FIELD ASSESSMENT

Stantec's reconnaissance field assessment (windshield survey) found that approximately 40 acres (84%) of the 47.8 acres of proposed tree clearing areas contain potential NLEB summer roosting habitats (Table 2). Both potential habitats and areas deemed as "non-habitats" are shown on Figures 2-1 through 2-15 in Appendix A. Field data are presented in Appendix B.

Potential habitats were considered suitable primarily because they were found to contain trees over 3" dbh, many with potential roosting features such as cracks, crevices, cavities, and sloughing/exfoliating bark. In addition, these areas of potentially suitable habitat typically were part of, or close to, large, contiguous forest blocks. Stantec believes that the tree clearing areas we considered to be "non-habitats" do not contain suitable NLEB summer roosting habitat because they contain trees that are:

- <3" dbh and made up of small saplings or shrub-sized woody plants;
- within narrow hedge rows adjacent to roads and fields, and typically not considered preferred/selected NLEB roosting habitats because they lack connection or proximity to larger blocks of contiguous forest;
- single trees within open areas, not associated with contiguous forests; or
- of sufficient size (dbh) but contain no roost habitat features such as cracks, crevices, cavities, etc.).

Table 3. Summary of windshield survey results for proposed clearing areas within Overland Segment.

Proposed Clearing[1]	Potential NLEB Habitat	Non-Habitat	Totals
Clearing Area	40.0 ac	7.8 ac	47.8 ac

[1] Does not include clearing at converter station site

4.0 AVOIDANCE AND MINIMIZATION OPTIONS

Based on the results of the desktop and reconnaissance field assessment of the areas requiring tree clearing, Stantec offers the following potential options and adaptive management solutions to avoid and minimize impacts. These options are presented in the form of a decision matrix to help with project planning.

1. None of the proposed areas to be cleared are within 1.5 mile of known NLEB hibernacula, so it is assumed that clearing and construction activities will not have any

impacts to winter/inactive period NLEB habitat, regardless of the season in which the work will occur.

2. Clearing trees from the converter station site during only the period between September 1 and April 15 (i.e., the NLEB inactive period in Vermont) will avoid direct impacts to roosting NLEB because they will not be present;

3. Of the 48 acres to be cleared on the remainder of the Overland Segment, the 8 acres of clearing areas identified by Stantec as being in *non-habitat* (refer to field results of this report) can be cleared during any season because it is unlikely that NLEB will be roosting in these areas during their active season (i.e., due to a general lack of suitable roosting habitats and features);

4. For the remaining 40 acres of potentially suitable habitat to be cleared, the options would be to either:

    a. Clear trees during the inactive period (September 1 to April 15); or

    b. For those areas that cannot be cleared during the September 1 to April 15 period, conduct summer presence/absence surveys[4] during the active roosting period, prior to clearing, to determine if NLEB are roosting (or potentially roosting) in the trees within or near the proposed clearing areas;

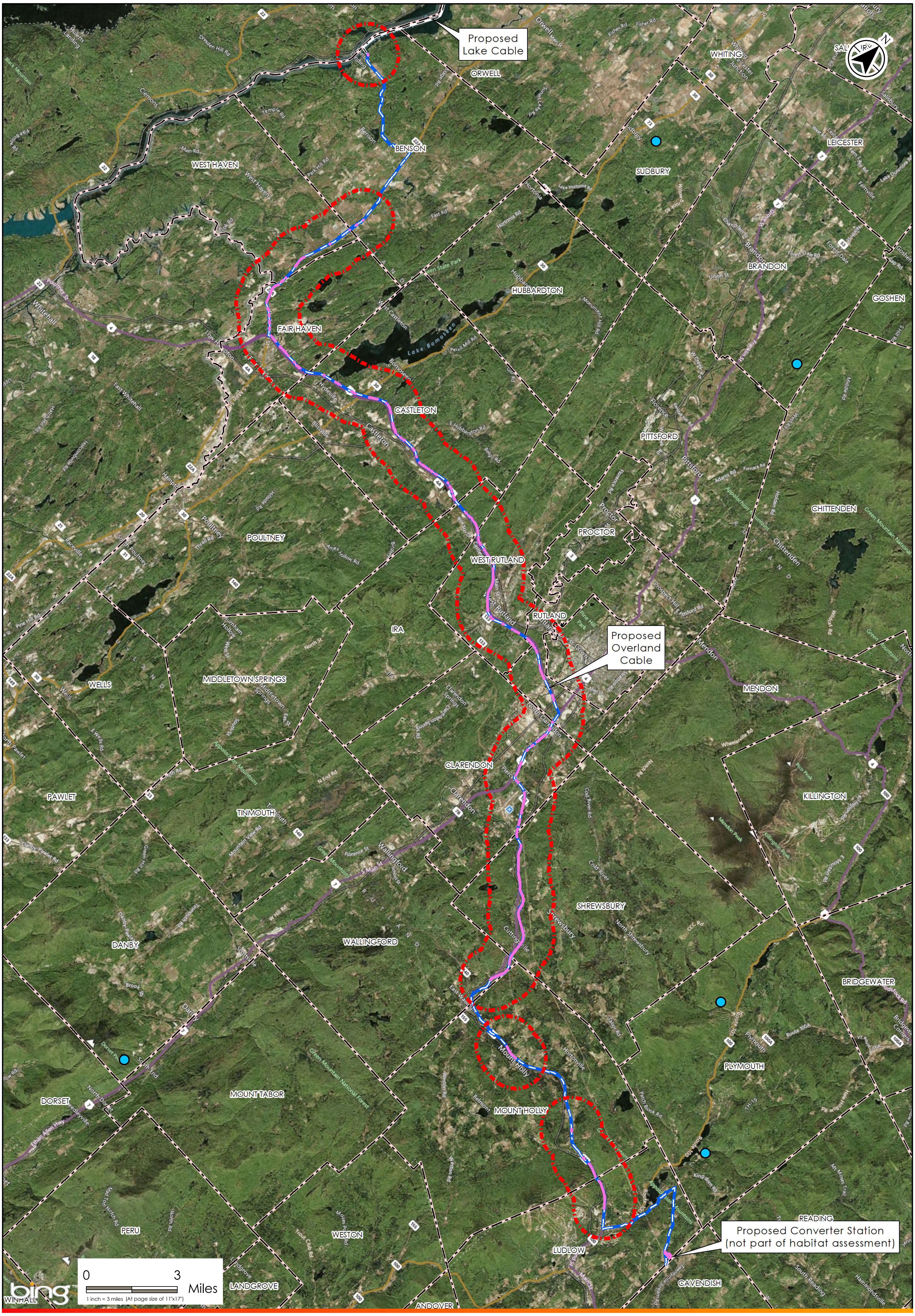
        i. If/where these surveys determine that NLEB are not present in the proposed clearing areas, clearing can occur during the summer active period within 10 days of conducting the surveys;

        ii. If/where these surveys show that NLEB are present in or near the clearing areas, clearing should occur during the inactive season (i.e., the September 1 to April 15 period), or further studies should be conducted to determine presence in the immediate clearing area.

[4] Including acoustic presence/absence surveys per the USFWS 2015 Range-wide Indiana Bat Summer Survey Guidelines, Appendix E protocol. Under this protocol, acoustic surveys must be conducted during the "active" period between May 5 and August 15.

APPENDICES

APPENDIX A FIGURES



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01130_1-1_NLEB_AssessmentProjectArea.mxd

Legend

- Known NLEB Hibernacula (Approx.)
- Proposed Lake Cable
- Proposed Overland Cable
- 1 Mile Project Buffer
- Proposed Clearing
- Town Boundary

Notes:

1. Known Northern Long-eared Bat (NLEB) Hibernacula locations provided by Vermont Agency of Natural Resources (Vermont ANR). Locations are approximate.
2. Base Map: Bing Maps aerial imagery with labels web mapping service, which provides worldwide orthographic aerial and satellite imagery with roads and labels overlaid. Coverage varies by region. (c) 2010 Microsoft Corporation and its data suppliers.

Client/Project

New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

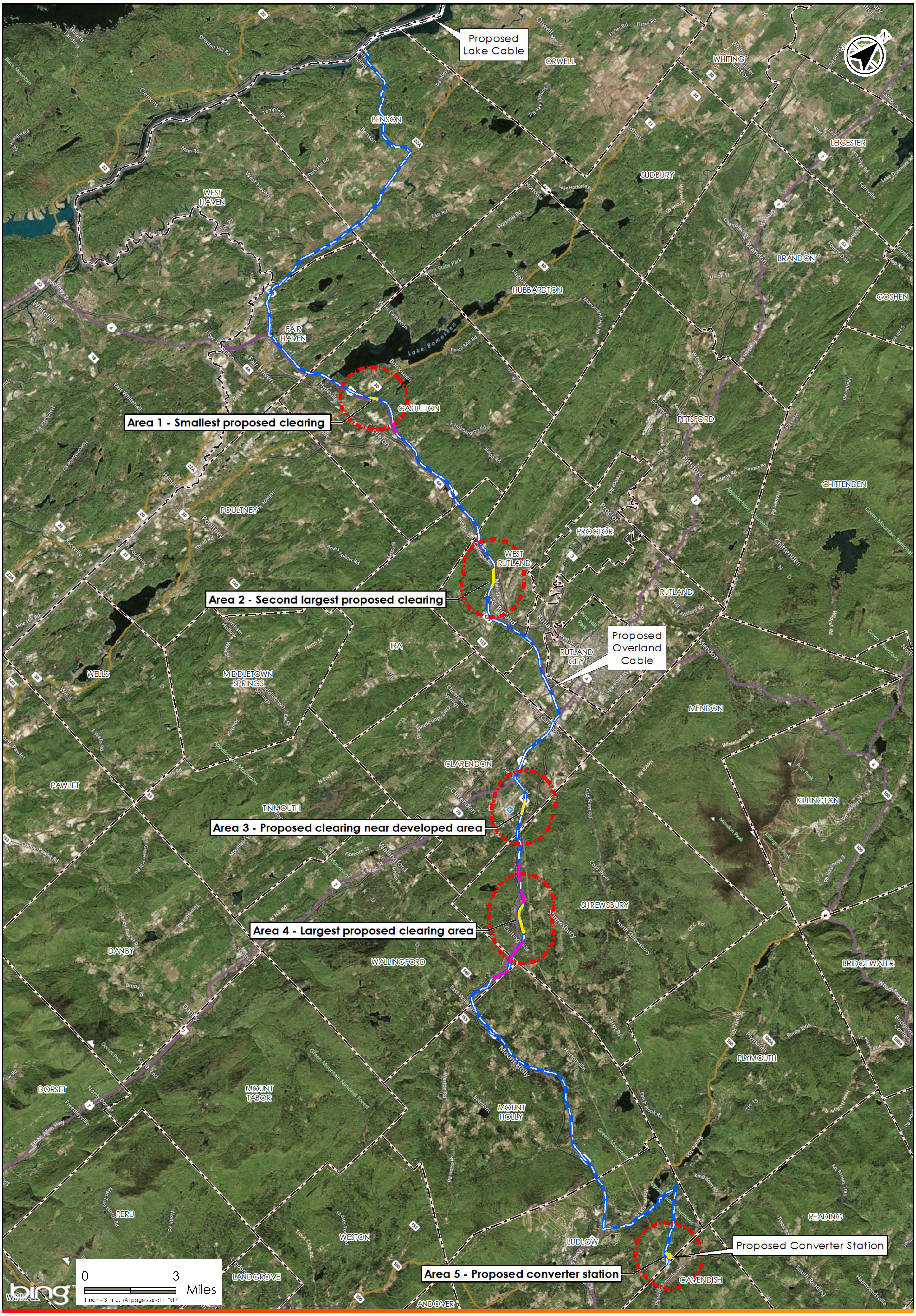
Figure No.

1-1

Title

Northern Long-eared Bat (NLEB) Project Level Assessment

9/22/2015



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01130_1-2_NLEB_LandscapeAssessment.mxd

Legend

- Proposed Lake Cable
- Proposed Overland Cable
- 1 Mile Assessment Area Buffer
- Landscape Level Assessment Area
- Proposed Clearing > 1 Acre
- Town Boundary

Notes:

1. Base Map: Bing Maps aerial imagery with labels web mapping service, which provides worldwide orthographic aerial and satellite imagery with roads and labels overlaid. Coverage varies by region. (c) 2010 Microsoft Corporation and its data suppliers.

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Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

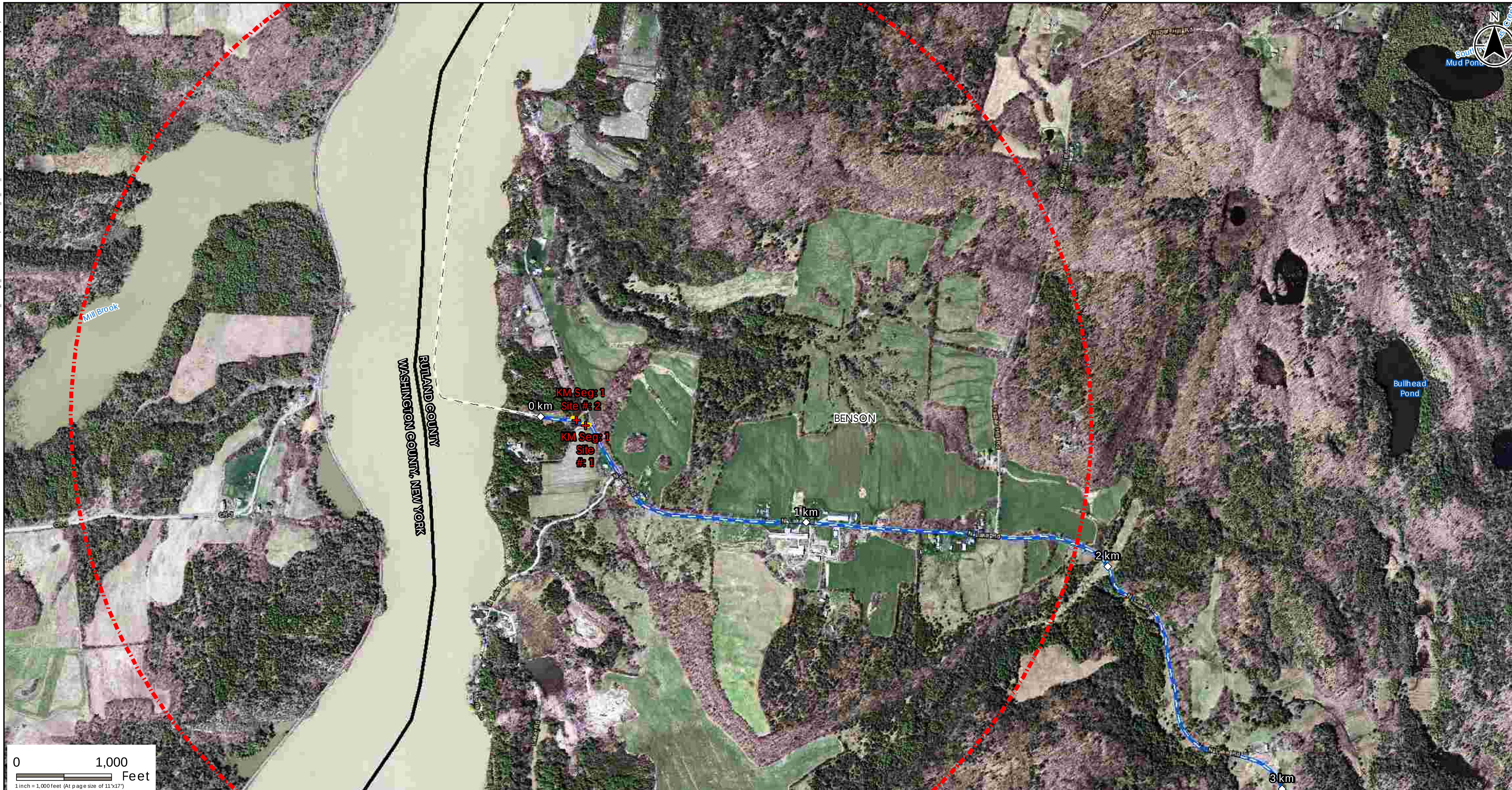
Figure No.

1-2

Title

Northern Long-eared Bat (NLEB) Landscape Level Assessment

9/18/2015



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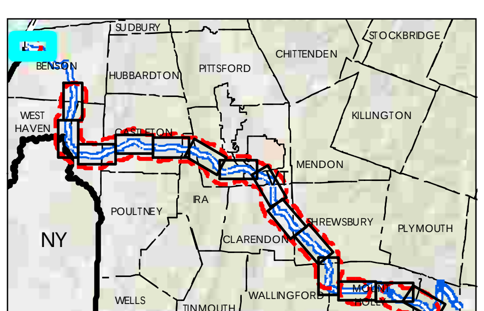
01130_02_NLEB_AssessmentFieldResultsBook.mxd



Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:

1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-1

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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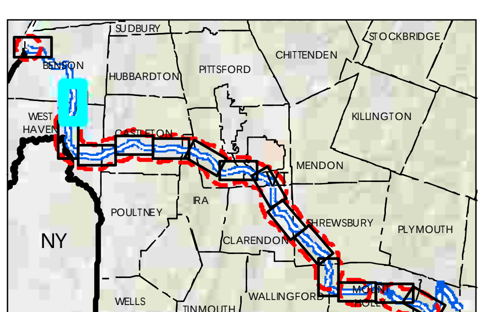


Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

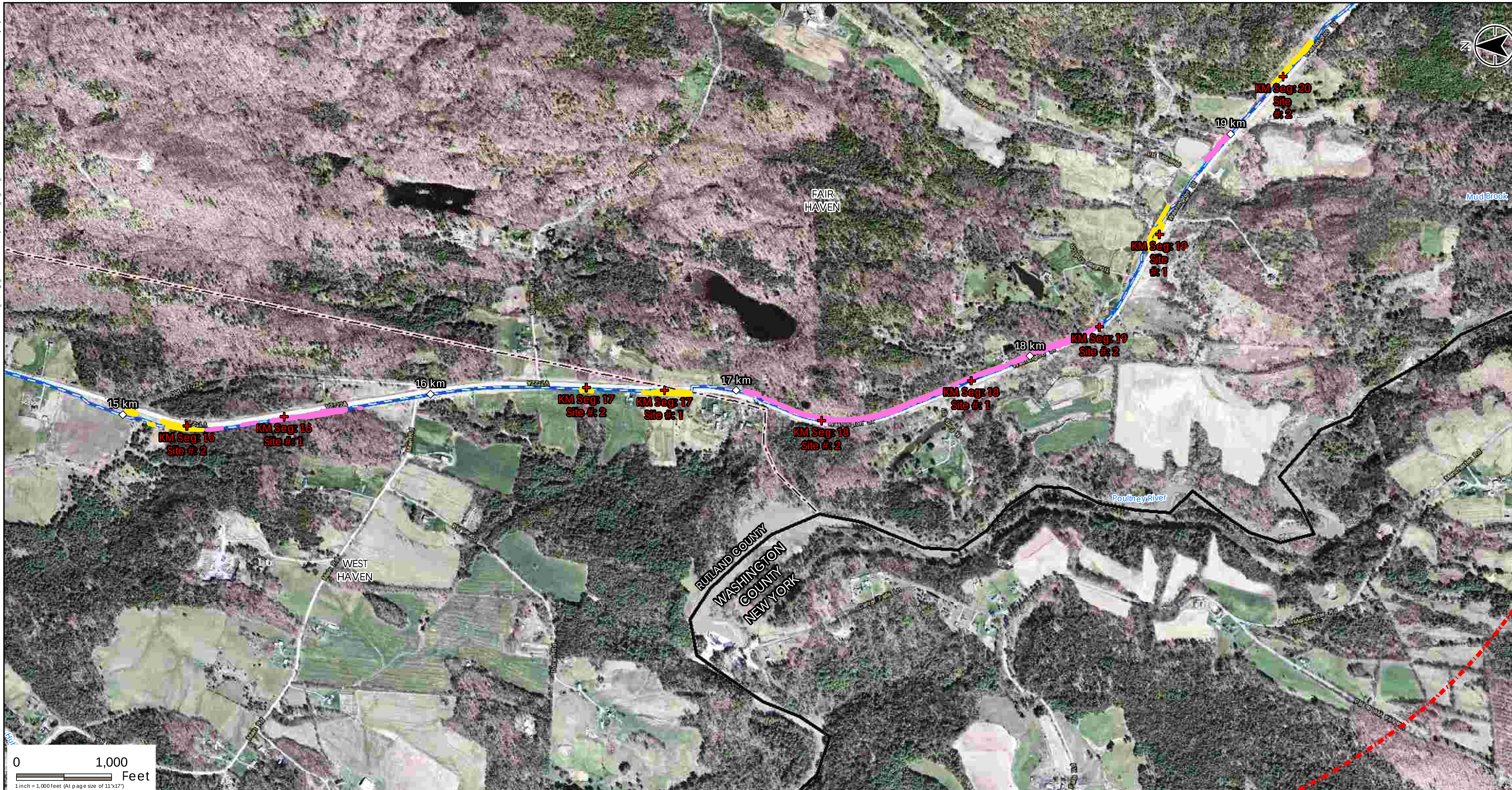
Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-2

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015



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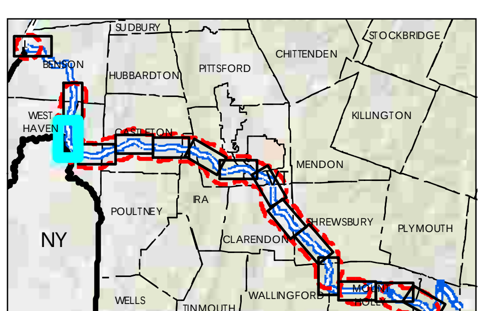

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-3

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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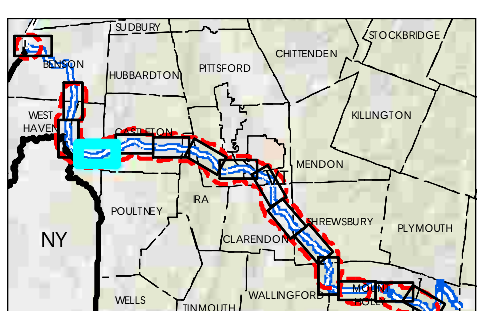

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:

1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-4

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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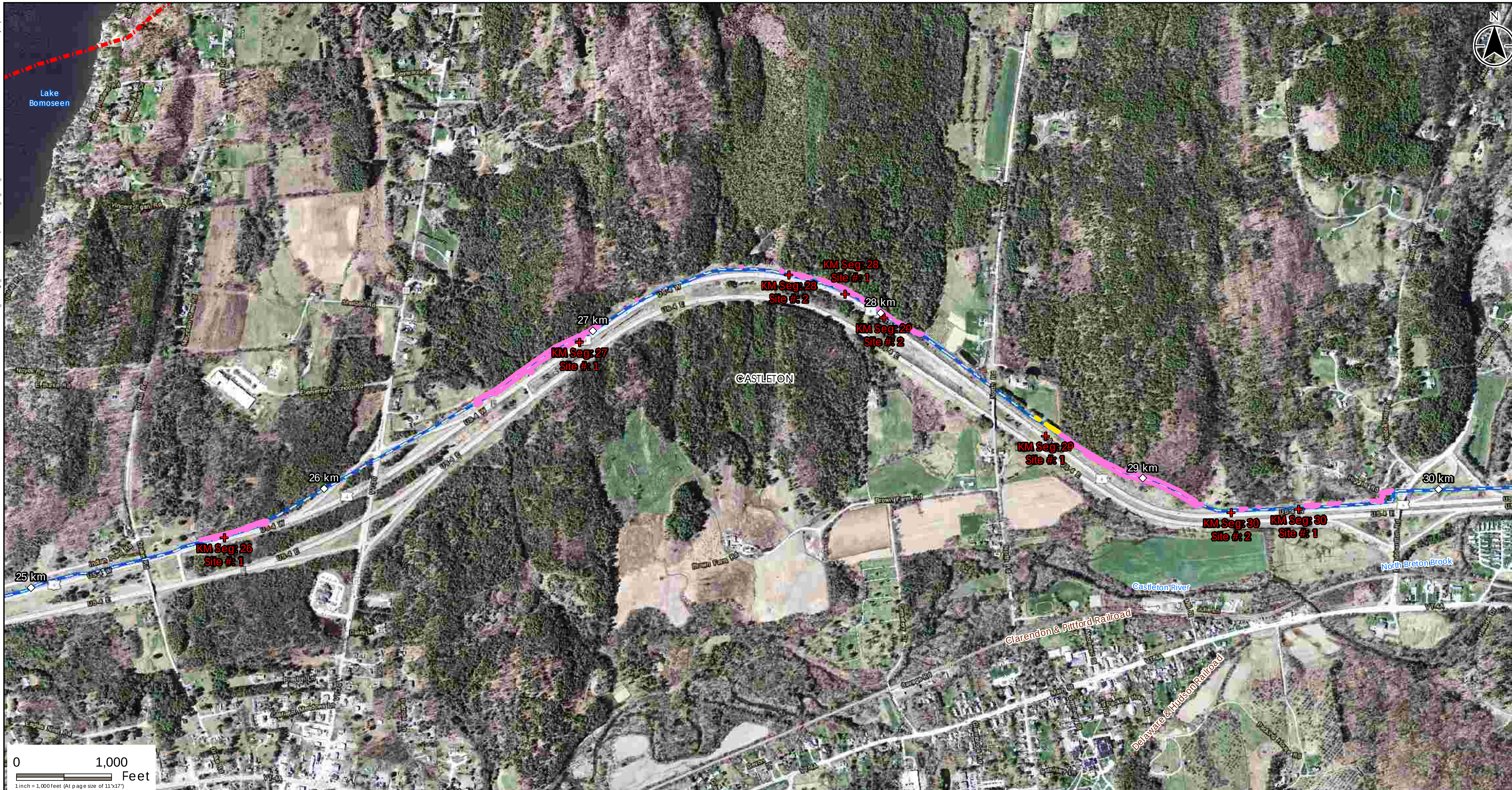

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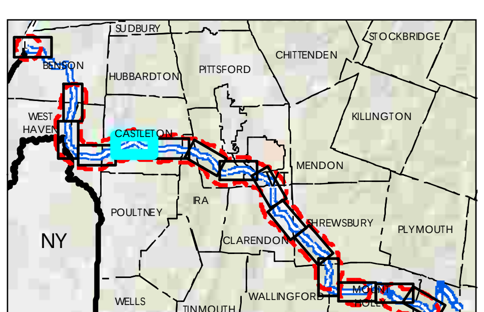

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
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Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-5

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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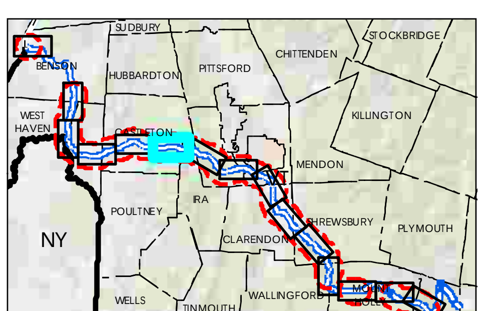

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

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Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-6

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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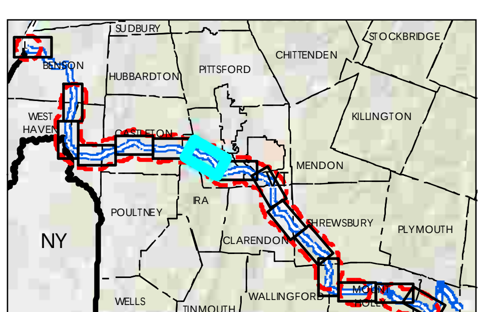

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:

1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-7

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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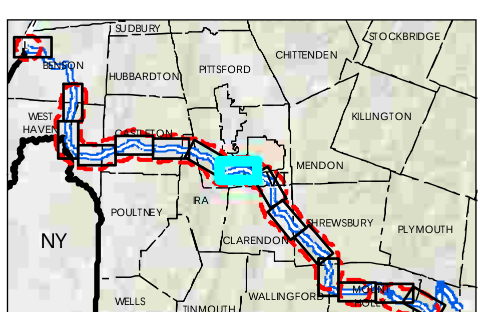

Legend
- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-8

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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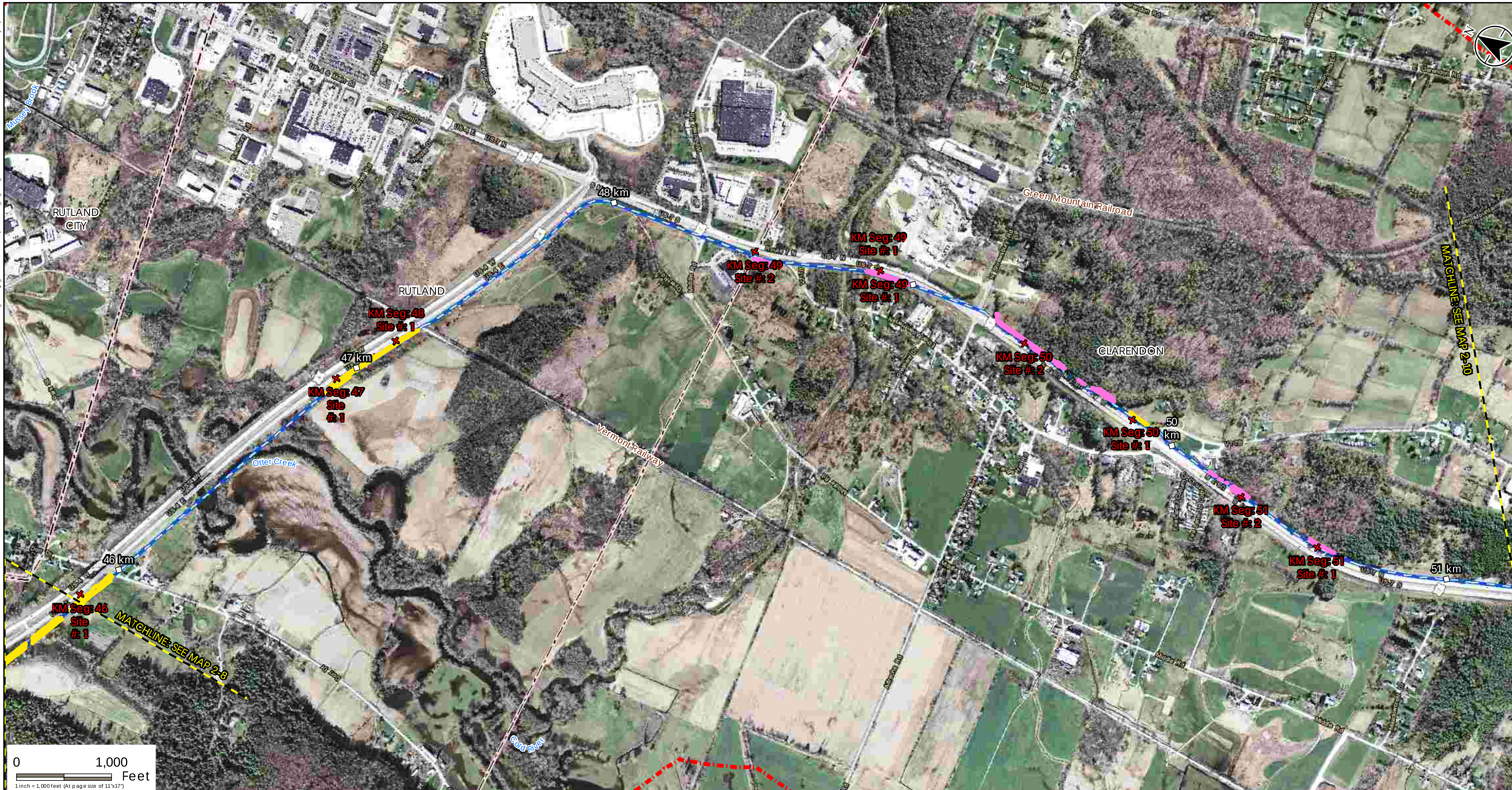

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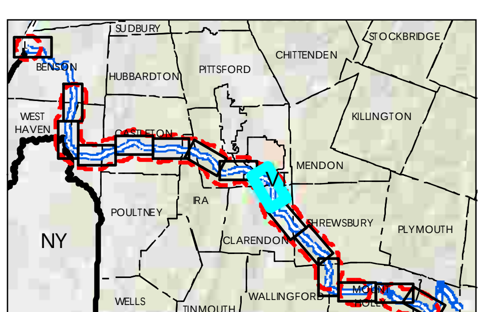

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

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New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-9

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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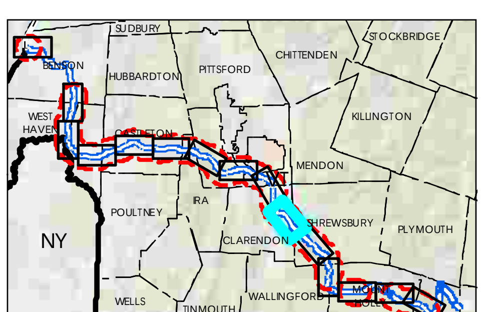

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

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Rutland & Windsor Counties Vermont

Figure No.
2-10

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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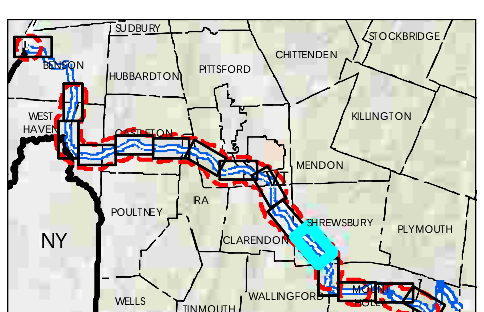

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-11

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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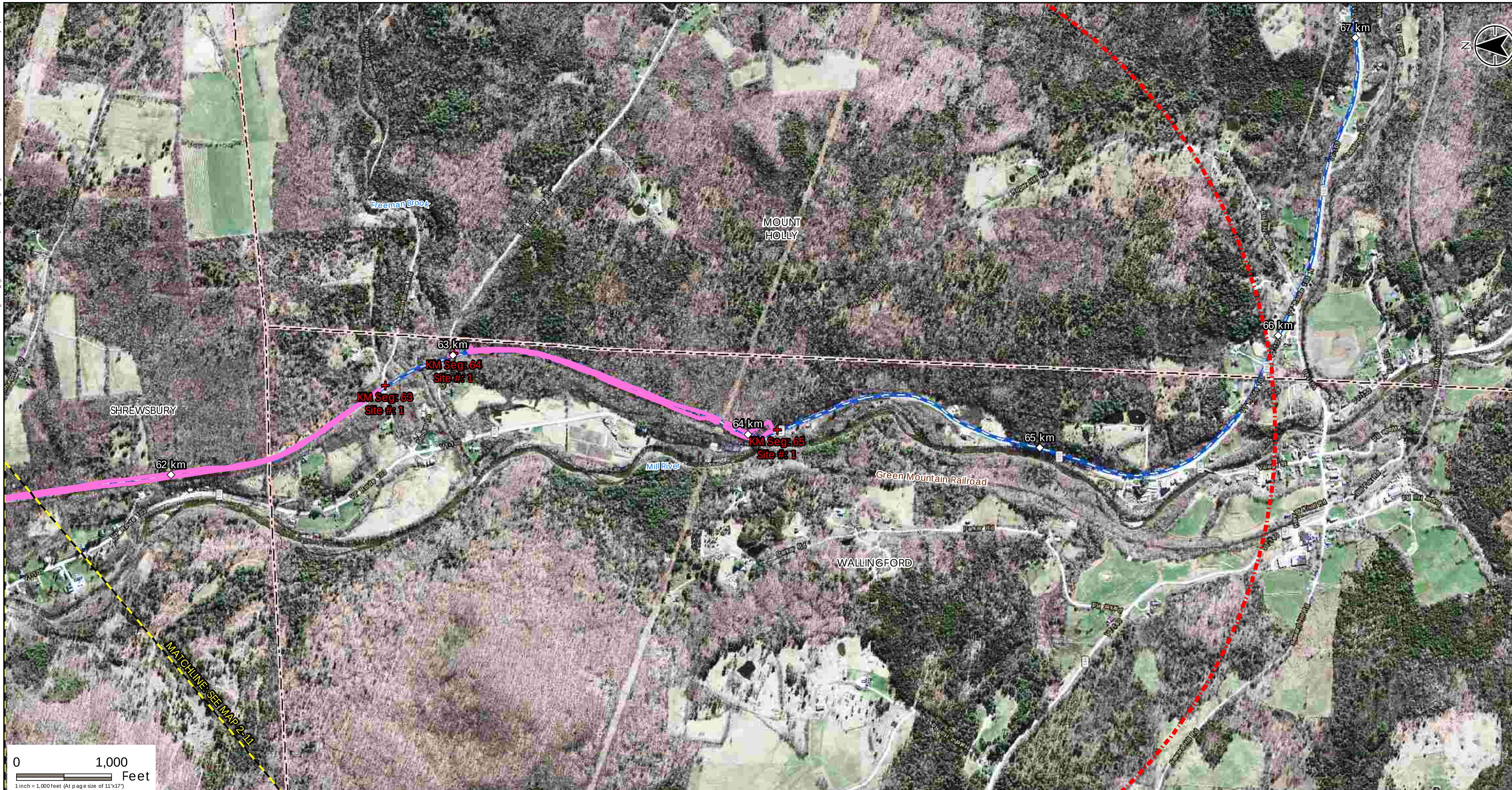

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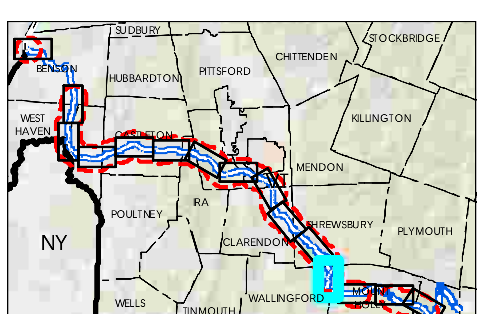

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

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Figure No.
2-12

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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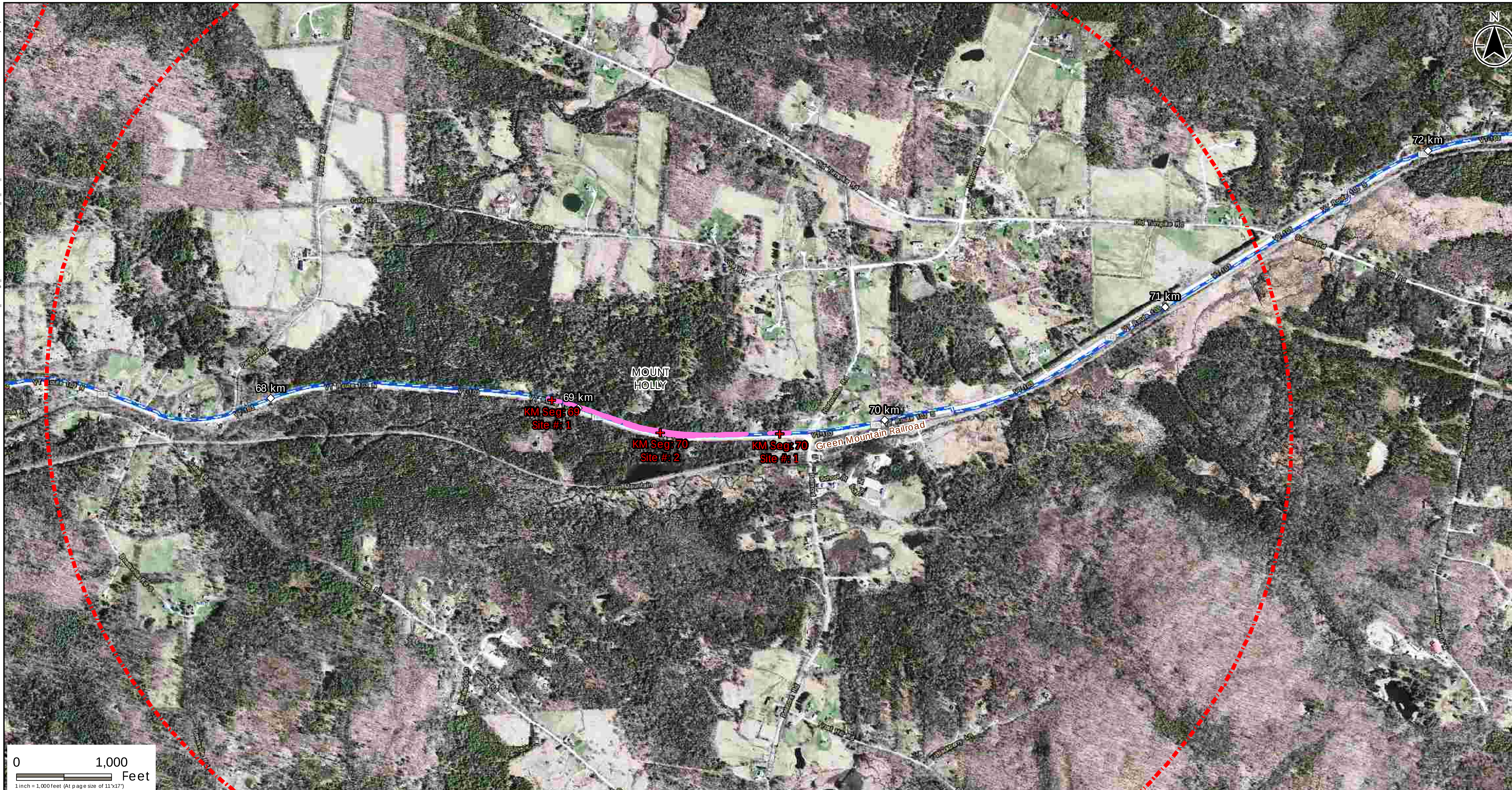

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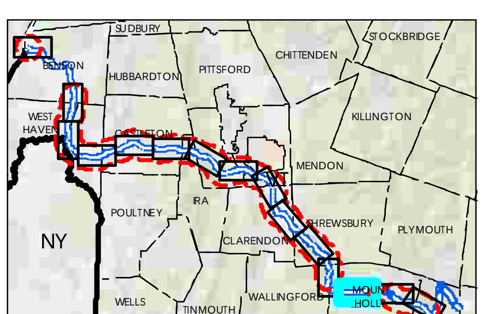

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:

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Rutland & Windsor Counties Vermont

Figure No.
2-13

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

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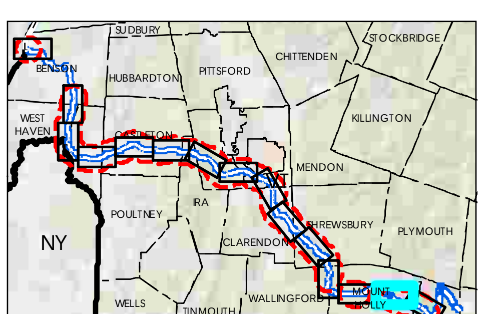

Legend
- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:
1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-14

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

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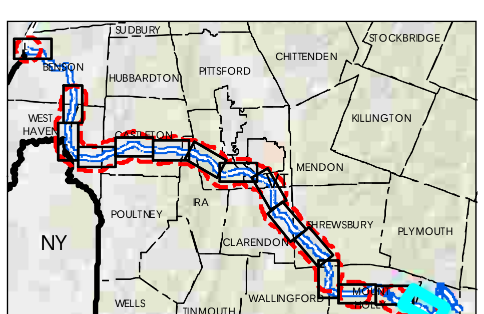

Legend

- KM Segment
- Windshield Habitat Assessment
- Proposed Lake Cable
- Proposed Overland Cable
- Potential NLEB Habitat Clearing
- Non Habitat Clearing
- 1 Mile Project Buffer
- County Boundary
- Town Boundary
- Matchline

Notes:

1. 2011 aerial imagery provided by the Vermont Center for Geographic Information (VCGI).

Client/Project
New England Clean Power Link
Rare Bat Habitat Assessment
Rutland & Windsor Counties Vermont

Figure No.
2-15

Title
Northern Long-eared Bat (NLEB) Assessment Field Results

9/24/2015

APPENDIX B FIELD DATA

APPENDIX B: Results of Windshield Survey for Potential Northern Long-eared Bat Habitat: Field Data - August 31, 2015. NECPL Overland Segment, Vermont.

KM Segment #	Site #	Potential NLEB Roost Habitat?	Photo #	Part of or Near Contiguous Forest?	Habitat Type	Forest Type	Average Tree DBH	Potential Roost Features Present?	Dominant Tree Species[1]	Right-of-Way Description	Comment
1	1	No	1-1	No	Hedgerow	Hardwood	3"-6"	No	Aron melan Swida serr Frax amer	2 lane highway	
1	2	No	1-2	No	Hedgerow	Mixwood	3"-6"	No	Thuj occ Lon mor Frax amer	2 lane dirt road	
12	2	No	12-2	No	Hedgerow	Hardwood	3"-6"	Yes	Car ova	2 lane highway	
12	1	No	12-1	No	Hedgerow	Hardwood	3"-6"	No	Car ova Lon mor Til amer	2 lane highway	
13	1	No	13-1	No	Hedgerow	Hardwood	3"-6"	No	Quer alba Car ova	2 lane highway	
14	1	No	14-1	No	Hedgerow	Hardwood	6"-12"	Yes	Car ova Til amer Rhus typ	2 lane highway	
16	2	No	16-2	Yes	ContiguousForest	Mixwood	3"-6"	No	Pin strob Til amer Rhus typ	2 lane highway	mainly shrubs on eastern edge
16	1	Yes	16-1	Yes	ContiguousForest	Hardwood	>12"	Yes	Car ova Til amer	2 lane highway	large Car ova with exfoliating bark
17	2	No	17-2	No	Hedgerow	Hardwood	3"-6"	No	Car ova Frax amer Rhus typ	2 lane highway	mainly shrubs
17	1	No	17-1	No	Hedgerow	Hardwood	3"-6"	No	Car ova Til amer	2 lane highway	
18	1	Yes	18-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Car ova Frax amer Pin strob	2 lane highway	
18	2	Yes	18-2	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pop trem Ace sac Pin strob	2 lane highway	
19	1	No	19-1	No	SmallGroup	Hardwood	6"-12"	No	Salix baby Pop delt	2 lane highway	
19	2	Yes	19-2	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Car ova Rhus typ	2 lane highway	woodland edge
20	1	No	20-1	No	Hedgerow	Mixwood	6"-12"	No	Pin strob Pop trem	2 lane highway	
20	2	No	20-2	No	Hedgerow	Mixwood	<3"	No	Rhus typ Pin strob	2 lane highway	
21	1	No	21-1	No	SingleTree	Hardwood	6"-12"	No	Frax amer	4 lane divided highway	
21	2	No	21-2	No	SingleTree	Hardwood	6"-12"	No	Frax amer	4 lane divided highway	
22	1	No	22-1	No	Hedgerow	Hardwood	<3"	No	Pin strob Rhus typ Frax amer	4 lane divided highway	shrubby slope
22	2	Yes	22-2	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Pin strob Quer rub Ace rub	4 lane divided highway	
23	1	Yes	23-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob Pop trem Bet pop	4 lane divided highway	
23	2	No	23-2	No	Hedgerow	Mixwood	<3"	No	Pin strob Pop trem Bet pop	4 lane divided highway	sparsely vegetated slope
24	1	No	24-1	Yes	Hedgerow	Hardwood	3"-6"	Yes	Pop trem	4 lane divided highway	
24	2	No	24-2	Yes	SmallGroup	Hardwood	3"-6"	No	Pop trem	4 lane divided highway	sparsely vegetated rock outcrop
25	1	Yes	25-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin strob Pop trem Quer rub	4 lane divided highway	
26	1	Yes	26-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob Ace rub Pru sero	4 lane divided highway	
25	2	Yes	25-2	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob Quer rub Pop trem	4 lane divided highway	
27	1	Yes	27-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pop trem Bet pop Pin strob	4 lane divided highway	
28	1	Yes	28-1	Yes	ContiguousForest	Softwood	6"-12"	Yes	Pin strob Frax amer	4 lane divided highway	
28	2	Yes	28-2	Yes	ContiguousForest	Softwood	6"-12"	Yes	Pin strob Tsu can Quer rub	4 lane divided highway	
29	1	No	29-1	No	Hedgerow	Hardwood	6"-12"	No	Pin strob	4 lane divided highway	
29	2	Yes	29-2	Yes	ContiguousForest	Softwood	6"-12"	Yes	Pin strob Frax amer	4 lane divided highway	
30	1	Yes	30-1	No	SmallGroup	Hardwood	6"-12"	Yes	Pop trem Frax amer	4 lane divided highway	field on western edge
30	2	Yes	30-2	No	ContiguousForest	Hardwood	3"-6"	Yes	Ace rub Frax penn	4 lane divided highway	
31	1	Yes	31-1	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Pop trem Ace rub	4 lane divided highway	woodland edge
31	2	Yes	31-2	Yes	SmallGroup	Mixwood	6"-12"	Yes	Pop trem Pin strob	4 lane divided highway	fields on either side
32	1	Yes	32-1	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Quer rub Til amer Car ova	4 lane divided highway	
32	2	Yes	32-2	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Til amer Car ova Ace rub	4 lane divided highway	
33	1	Yes	33-1	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Tilia amer Frax amer	4 lane divided highway	
33	2	Yes	33-2	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Tilia amer Frax amer Car ova	4 lane divided highway	
34	1	Yes	34-1	Yes	SmallGroup	Hardwood	3"-6"	Yes	Frax penn Ulm amer	4 lane divided highway	
34	2	Yes	34-2	Yes	SmallGroup	Hardwood	3"-6"	Yes	Frax penn Ulm amer	4 lane divided highway	
35	1	No	35-1	Yes	ContiguousForest	Hardwood	<3"	No	Pop trem Bet pop	4 lane divided highway	sparsely vegetated slope
35	2	Yes	35-2	Yes	ContiguousForest	Softwood	6"-12"	Yes	Pin strob	4 lane divided highway	
36	1	Yes	36-1	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Pop trem Bet pop	4 lane divided highway	
36	2	Yes	36-2	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Ulm amer Rhus typ Frax amer	4 lane divided highway	
37	1	Yes	37-1	Yes	Hedgerow	Hardwood	3"-6"	Yes	Frax amer Pop trem Ulm amer	4 lane divided highway	
37	2	Yes	37-2	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Pop trem Bet pop	4 lane divided highway	
38	1	Yes	38-1	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Quer rub Pop trem	4 lane divided highway	

APPENDIX B: Results of Windshield Survey for Potential Northern Long-eared Bat Habitat: Field Data - August 31, 2015. NECPL Overland Segment, Vermont.

KM Segment #	Site #	Potential NLEB Roost Habitat?	Photo #	Part of or Near Contiguous Forest?	Habitat Type	Forest Type	Average Tree DBH	Potential Roost Features Present?	Dominant Tree Species[1]	Right-of-Way Description	Comment
38	2	Yes	38-2	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Frax amer	4 lane divided highway	
39	2	Yes	39-2	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Pop trem	4 lane divided highway	
39	1	No	39-1	No	ContiguousForest	Hardwood	3"-6"	Yes	Pop trem Bet pop	4 lane divided highway	steep rock outcrop
40	2	Yes	40-2	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin strob Ace sac Frax amer	4 lane divided highway	
40	1	Yes	40-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin strob Pop trem Bet pop	4 lane divided highway	
41	1	Yes	41-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob Pop trem Prun virg	4 lane divided highway	only 1 pt taken due to access
42	2	No	42-2	No	Hedgerow	Hardwood	6"-12"	Yes	Sal baby Ace negu	4 lane divided highway	
42	1	No	42-1	No	Hedgerow	Hardwood	6"-12"	Yes	Pop delt Ace neg Til amer	4 lane divided highway	
43	2	No	43-2	Yes	SmallGroup	Hardwood	<3"	No	Pop trem Bet pop	4 lane divided highway	mainly small saplings, 1 large Pop trem
43	1	No	43-1	No	SmallGroup	Mixwood	<3"	No	Pop trem Pin strob Prun virg	4 lane divided highway	mainly small saplings
44	2	Yes	44-2	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Quer rub Pin strob Pop gran	4 lane divided highway	
44	1	Yes	44-1	Yes	ContiguousForest	Hardwood	6"-12"	Yes	Til amer Ulm amer	4 lane divided highway	
45	2	No	45-2	No	SmallGroup	Hardwood	3"-6"	No	Pop trem	4 lane divided highway	
45	1	No	45-1	No	SmallGroup	Hardwood	3"-6"	No	Malus pum	4 lane divided highway	
46	2	No	46-2	Yes	Hedgerow	Mixwood	3"-6"	No	Pop trem Pin strob	4 lane divided highway	mainly saplings
46	1	No	46-1	No	Hedgerow	Hardwood	3"-6"	No	Pop trem	4 lane divided highway	mainly saplings
47	1	No	47-1	No	Hedgerow	Hardwood	3"-6"	No	Pop trem Sal baby	4 lane divided highway	narrow hedge
48	1	No	48-1	No	Hedgerow	Hardwood	3"-6"	No	Pop trem Sal baby	4 lane divided highway	narrow hedge and phrag wetland
49	2	Yes	49-2	No	SmallGroup	Hardwood	3"-6"	Yes	Frax amer Rhus typ Pop trem	4 lane divided highway	
49	1	Yes	49-1	No	SmallGroup	Hardwood	3"-6"	Yes	Ace negund	4 lane divided highway	
50	1	No	50-1	No	Hedgerow	Softwood	6"-12"	Yes	Pin res	4 lane divided highway	
50	2	Yes	50-2	No	ContiguousForest	Mixwood	6"-12"	Yes	Pin res	4 lane divided highway	
51	1	Yes	51-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin stro Pop trem	4 lane divided highway	
51	2	Yes	51-2	Yes	ContiguousForest	Plantation	6"-12"	Yes	Pin res	4 lane divided highway	small portion of Pin res plantation
52	1	Yes	52-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin stro Ace rub	4 lane divided highway	
52	2	Yes	52-2	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pin stro Frax amer	4 lane divided highway	
53	1	No	53-1	Yes	Hedgerow	Hardwood	<3"	No	Pop trem	2 lane highway	
53	2	No	53-2	No	Hedgerow	Softwood	3"-6"	No	Pin res	2 lane highway	
54	1	Yes	54-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob	2 lane highway	
54	2	Yes	54-2	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Ulm amer Ace rub Pin strob	2 lane highway	
55	1	No	55-1	Yes	Other	Mixwood	<3"	No	Pop trem	2 lane highway	phrag wetland
55	2	Yes	55-2	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Pop trem Quer rub	2 lane highway	
56	1	Yes	56-1	Yes	Hedgerow	Hardwood	3"-6"	Yes	Quer rub	2 lane highway	
56	2	Yes	56-2	Yes	Hedgerow	Mixwood	3"-6"	Yes	Pop trem Pin res	2 lane highway	
57	1	No	57-1	Yes	Hedgerow	Hardwood	3"-6"	No	Ace sac Frax amer	2 lane highway	
57	2	Yes	57-2	Yes	ContiguousForest	Softwood	6"-12"	Yes	Pin strob	2 lane highway	
58	1	Yes	58-1	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Pop trem	2 lane highway	
59	1	Yes	59-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Frax penn Ace rub	2 lane highway	1 pt taken due to access - habitat contiguous
59	2	No	59-2	Yes	Hedgerow	Hardwood	3"-6"	Yes	Quer rub	2 lane highway	
58	2	No	58-2	No	Hedgerow	Hardwood	3"-6"	Yes	Frax amer	2 lane highway	
60	1	Yes	60-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Ace sac Frax penn	railroad	1 pt taken due to access - habitat contiguous
61	1	Yes	61-1	Yes	Hedgerow	Hardwood	6"-12"	Yes	Ace sac	railroad	1 pt taken due to access - habitat contiguous
62	1	No	62-1	Yes	Hedgerow	Hardwood	6"-12"	Yes	Frax amer	railroad	1 pt taken due to access - habitat contiguous
63	1	Yes	63-1	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Frax amer	railroad	1 pt taken due to access - habitat contiguous
64	1	Yes	64-1	Yes	ContiguousForest	Hardwood	3"-6"	Yes	Frax amer	railroad	1 pt taken due to access - habitat contiguous
65	1	Yes	65-1	Yes	ContiguousForest	Mixwood	3"-6"	No	Frax penn	2-lane highway	roadside forest
69	1	Yes	69-1	Yes	ContiguousForest	Mixwood	3"-6"	Yes	Ace rub	2-lane highway	roadside forest
70	1	Yes	70-1	Yes	ContiguousForest	Mixwood	6"-12"	Yes	Pin strob	2-lane highway	roadside forest
70	2	Yes	70-2	Yes	ContiguousForest	Softwood	3"-6"	Yes	Pic rub	2-lane highway	roadside forest

APPENDIX B: Results of Windshield Survey for Potential Northern Long-eared Bat Habitat: Field Data - August 31, 2015. NECPL Overland Segment, Vermont.

KM Segment #	Site #	Potential NLEB Roost Habitat?	Photo #	Part of or Near Contiguous Forest?	Habitat Type	Forest Type	Average Tree DBH	Potential Roost Features Present?	Dominant Tree Species[1]	Right-of-Way Description	Comment
76	2	No	76-2	No	Other	Other	<3"	No	Malus pumila	2-lane highway	T-line clearing with Malus shrubs
76	1	No	76-1	No	Hedgerow	Mixwood	3"-6"	Yes	Frax penn	2-lane highway	roadside tree hedge
77	1	Yes	77-1	Yes	SmallGroup	Mixwood	3"-6"	Yes	Car ova Aln inc Pop trem Pic rub	2 lane highway	
78	2	Yes	78-2	Yes	Hedgerow	Hardwood	3"-6"	Yes	Ace sac Pop trem Ulm amer	2 lane highway	
78	1	Yes	78-1	Yes	Hedgerow	Hardwood	6"-12"	Yes	Bet all Ulm amer Frax amer	2 lane highway	
79	2	Yes	79-2	Yes	Hedgerow	Hardwood	6"-12"	Yes	Ulm amer Frax amer Ace sac	2 lane highway	
79	1	No	79-1	Yes	Hedgerow	Mixwood	<3"	No	Sal beb Ace rub	2 lane highway	shrubby
80	2	Yes	80-2	Yes	Hedgerow	Mixwood	3"-6"	Yes	Pop trem Pin strob	2 lane highway	
80	1	Yes	80-1	Yes	Hedgerow	Hardwood	6"-12"	Yes	Car ova Ace sac	2 lane highway	

Key to Tree Species

Aron melan: Aronia melanocarpa - black chokeberry
Ace negund: Acer negundo - box-elder
Ace rub: Acer rubrum - red maple
Ace sac: Acer saccharum - sugar maple
Aln inc: Alnus incana - speckled alder
Bet all: Betula alleghaniensis - yellow birch
Car ova: Carya ovata - shagbark hickory
Frax amer: Fraxinus americana - white ash
Frax penn: Fraxius pennsylvanica - green ash
Lon mor: Lonicera morrowii - Morrow's honeysuckle
Malus pumila - apple
Pic rub: Picea rubra - red spruce
Pin res: Pinus resinosa - red pine
Pin strob: Pinus strubus - white pine
Pop delt: Populus deltoides - cottonwood
Pop gran: Populus grandidentata - big-toothed aspen
Pop trem: Populus tremuloides - trembling aspen
Prun virg: Prunus virginiana - choke cherry
Quer alba: Quercus alba - white oak
Rhus typ: Rhus typhina - staghorn sumac
Sal baby: Salix babylonica - weepiing willow
Sal beb: Salix bebbiana - Bebb's willow
Swida ser: Swida sericea - red-osier dogwood
Thuj occ: Thuja occidentalis - northern white cedar
Til amer; Tilia americana - basswood
Tsu can: Tsuga canadensis - eastern hemlock
Ulm amer: Ulmus americana - American elm

APPENDIX C REPRESENTATIVE PHOTOGRAPHS OF CLEARING AREAS ASSESSED DURING WINDSHIELD SURVEY

*Refer to Figures in Appendix A for kilometer segments and approximate photo locations.

Photo 1. Typical clearing area containing potential NLEB summer roosting habitat. Located along KM # 16 of project's Overland Segment. Stantec, 31 August 2015.

Photo 2. Typical clearing area containing potential NLEB summer roosting habitat. Located along KM # 43 of project's Overland Segment. Stantec, 31 August 2015.

Photo 3. Typical clearing area containing potential NLEB summer roosting habitat. Located along KM # 79 of project's Overland Segment. Stantec, 31 August 2015.

Photo 4. Typical clearing area containing potential NLEB summer roosting habitat. Located along KM # 70 of project's Overland Segment. Stantec, 31 August 2015.

Photo 5. Typical clearing area with no NLEB summer roosting habitat (sapling hedgerow only). Located along KM # 23 of project's Overland Segment. Stantec, 31 August 2015.

Photo 6. Typical clearing area with no NLEB summer roosting habitat (sapling/shrub hedgerow only). Located along KM # 22 of project's Overland Segment. Stantec, 31 August 2015.

Photo 7. Typical clearing area with no NLEB summer roosting habitat (sapling/shrub growth only). Located along KM # 22 of project's Overland Segment. Stantec, 31 August 2015.

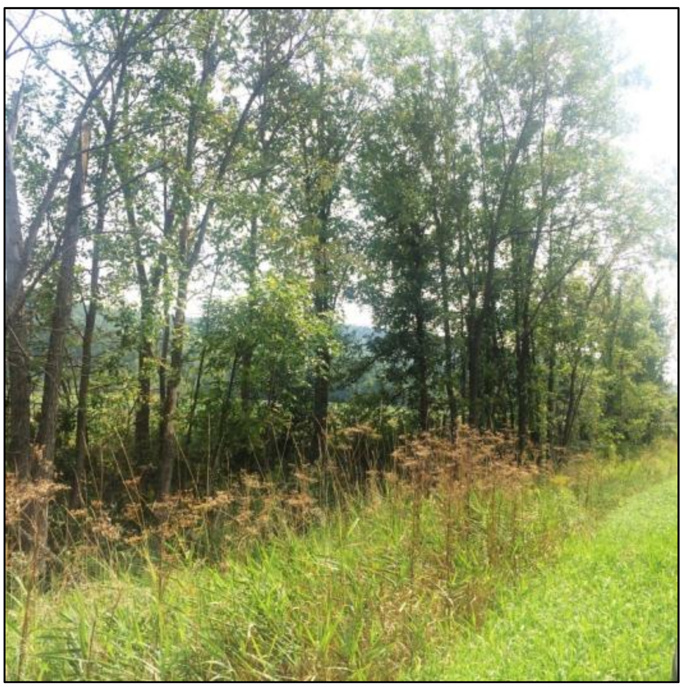

Photo 8. Typical clearing area with no NLEB summer roosting habitat (narrow hedgerow only). Located along KM # 12 of project's Overland Segment. Stantec, 31 August 2015.