UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY AND
ENERGY RELIABILITY

NORTHERN PASS TRANSMISSION LLC

DOCKET NO. PP-___

APPLICATION OF
NORTHERN PASS TRANSMISSION LLC
FOR PRESIDENTIAL PERMIT

OCTOBER 14, 2010

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APPLICATION

Pursuant to Executive Order (EO) No. 10485, as amended by EO 12038, and 10 C.F.R. § 205.320 *et seq*., Northern Pass Transmission LLC (Northern Pass or the Applicant) hereby applies to the United States Department of Energy (DOE) for a Presidential Permit authorizing the construction, connection, operation, and maintenance of facilities for the transmission of electric energy at the international border between the United States and Canada. This Application does not seek authority for any export of power from the United States. The information that follows is submitted in support of the Application.

SECTION 1

INFORMATION REGARDING THE APPLICANT

Northern Pass is a special purpose entity created to construct, own, operate and maintain a transmission project (the Project) that will deliver competitively priced, low carbon power[1] that will help satisfy the requirements of the Regional Greenhouse Gas Initiative (RGGI) by reducing greenhouse gas emissions, help achieve the goals of the New Hampshire Climate Action Plan by enabling importation of Canadian hydroelectric power, and help mitigate price volatility in the region's energy market by increasing the region's fuel diversity. It will achieve these goals by capitalizing on Hydro-Québec's excess capacity from hydro-electric generating facilities that already exist or are currently under construction and by enabling the flow of approximately 1,200 MW of power into New Hampshire and the New England region. The Project will be participant-funded by H.Q. Hydro Renewable Energy, Inc., an indirect, wholly-owned U.S. subsidiary of Hydro-Québec, under a Transmission Service Agreement (TSA) that is subject to approval by the Federal Energy Regulatory Commission (FERC). The power that flows as a result of this Project will be competitively priced, and it will not be intermittent in the way that wind and solar power are. The Project will also serve to meet future load growth requirements,

[1] The electricity delivered by H.Q. Hydro Renewable Energy, Inc. over the Project would consist of "system" power comprised of approximately 98% hydroelectric generation, with the balance made up of a combination of other sources of generation.

and it may help avoid or defer the need to construct fossil fuel generation plants that would otherwise be required to produce an equivalent quantity of reliable power.

1.1 Legal Name of the Applicant

The legal name of the Applicant is Northern Pass Transmission LLC. Northern Pass has its principal place of business at Energy Park, 780 North Commercial Street, Manchester, NH 03101.

1.2 Legal Names of All Partners

Northern Pass is jointly owned by NU Transmission Ventures, Inc. (75 % owner), a wholly-owned subsidiary of Northeast Utilities, a publicly held public utility holding company, and NSTAR Transmission Ventures, Inc. (25% owner), a wholly-owned subsidiary of NSTAR, a publicly held public utility holding company. NU Transmission Ventures, Inc. and Northeast Utilities both have their principal place of business at 56 Prospect Street, Hartford, CT 06103. NSTAR Transmission Ventures, Inc. and NSTAR both have their principal place of business at One NSTAR Way, Westwood, MA 02090.

1.3 Communications and Correspondence

All communications and correspondence regarding this Application should be addressed to the following persons:

Anne Bartosewicz
Northeast Utilities
107 Selden Street.
Berlin, CT 06037
860-665-2771
bartoab@nu.com

Mary Anne Sullivan
Hogan Lovells US LLP
555 13th St. NW
Washington, DC 20004
(202) 637-3695
maryanne.sullivan@hoganlovells.com

1.4 Foreign Ownership and Affiliations

Neither Northern Pass, NU Transmission Ventures, Inc., nor NSTAR Transmission Ventures Inc., nor their respective ultimate parent entities, is owned wholly or in part by a foreign government or any instrumentality thereof. Northern Pass will have an undivided ownership of the Project facilities on the U.S. side of the border.

The high voltage direct current (HVDC) facilities located on the Canadian side of the border will be owned and operated by Hydro-Québec TransÉnergie, a division of Hydro-Québec. Additionally, Northern Pass has executed a TSA with H.Q. Hydro Renewable Energy, Inc., an indirect, wholly-owned U.S. subsidiary of Hydro-Québec. Once approved by FERC, the TSA will allocate 1,200 MW of transmission capacity over the Project to H.Q. Hydro Renewable Energy, Inc. on the U.S. side of the border in exchange for transmission service payments that cover the costs of, and investment in, the Project.

1.5 Existing Contracts with Foreign Entities for Purchase, Sale or Delivery of Electric Energy

As noted above, Northern Pass has executed a TSA with H.Q. Hydro Renewable Energy, Inc. Northern Pass has no other direct or indirect contracts for purchase, sale, or delivery of electric energy with any foreign or foreign-owned entities.

1.6 Corporate Authority and Compliance with Laws

Exhibit A is an opinion of counsel stating that the construction, connection, operation, and maintenance of the proposed facility is within the corporate power of the Applicant and that the Applicant has complied with and, if the proposed actions are performed in accordance with this Application, will comply with all pertinent federal and state laws.

SECTION 2

INFORMATION REGARDING THE TRANSMISSION LINES TO BE COVERED BY THE PRESIDENTIAL PERMIT

2.1 Project Overview

Northern Pass proposes to construct an HVDC electric transmission line with a bidirectional 1,200 MW transfer rating running from the international border between New Hampshire and Canada to Franklin, New Hampshire, where it would connect with a 345 kV alternating current (AC) line. The northern HVDC converter terminal will be constructed at the Des Cantons Substation in Québec, Canada, and will be connected to a HVDC line that will run southward in Québec for approximately 45 miles where it will cross the Canada / US border into New Hampshire. The New Hampshire segment of the HVDC line will continue southward for approximately 140 miles to the southern HVDC converter terminal. The southern HVDC converter terminal will be constructed in Franklin, New Hampshire, and will convert the direct current (DC) power to AC power. Northern Pass proposes to construct the 345 kV AC line from the Franklin converter terminal location to the Deerfield Substation in Deerfield, New Hampshire owned by Public Service Company of New Hampshire (PSNH), a wholly-owned subsidiary of Northeast Utilities.

The Project will enable the bidirectional transmission of 1,200 MWs of power between Québec to New England, providing low carbon, competitively priced electricity for consumers in the New England region. Once the Project has completed commissioning and is ready for commercial operation, the Independent System Operator - New England Inc. (ISO-NE) will assume operational control over the Project pursuant to the terms of a FERC-approved Transmission Operating Agreement between Northern Pass and ISO-NE.

In addition to its energy benefits, the Project will bring significant economic and fiscal benefits to New Hampshire during its construction phase, and on-going benefits once the Project is operational. Based on preliminary estimates, hundreds of direct construction jobs in New

Hampshire, as well as professional and technical services jobs, will be supported during the Project's construction phase. Through the multiplier effects from the direct and indirect expenditures, additional economic activity in retail, services, and other sectors is also expected, in total adding tens of millions of dollars to household earnings each year during the construction phase. Once the Project is operational, it will significantly add to the tax base for both the state of New Hampshire and the municipalities in which the facilities will be built.

2.2 Technical Description

2.2.1. Number of Circuits[2]

For the portion of the Project running from the international border to Franklin, New Hampshire, Northern Pass proposes to construct a single circuit ±300 kV HVDC above-ground transmission line that will be mounted on structures ranging from approximately 90 feet to 135 feet tall. The length of the HVDC portion of the Project is approximately 140 miles.

For the AC portion of the Project, Northern Pass proposes to construct a single circuit 345 kV AC above-ground transmission facility running from Franklin to Deerfield, New Hampshire. Planning studies that Northern Pass is conducting for ISO-NE will determine the ultimate configuration of that transmission facility. Northern Pass proposes to construct the 345 kV AC line mounted on structures ranging from approximately 80 feet to135 feet tall. The length of the AC portion of the Project is approximately 40 miles.

Typical existing right-of-way (ROW) widths for the Project vary from approximately 150[3] to 410 feet.

2.2.2. Operating Voltage and Frequency

The nominal operating voltage for the HVDC line will be ±300 kV and will consist of positive energized conductors, negative energized conductors and a dedicated metallic return conductor. The nominal operating voltage for the AC facility will be 345 kV, three-phase at a frequency of 60 Hz.

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[2] In certain areas, existing 34.5 kV and 115 kV structures will need to be rebuilt (within the existing ROW) in order to efficiently utilize existing ROW for the new facilities.
[3] An exception to this 150 foot width exists along a 1/4 mile distance within the White Mountain National Forest where the ROW width is set at 100 feet under an existing Special Use Permit.

2.2.3. Conductors

The choice of the specific conductors that will be utilized for the HVDC line is being evaluated. One alternative being evaluated is an "Aluminum Conductor Steel Reinforced" (ACSR) conductor. It would have a designation of 2156 kcmil ACSR "Bluebird," which has an outside diameter of 1.76 inches. Rated breaking strength of this conductor is 60,300 pounds. The proposed design would limit the tension in this conductor to 16,000 pounds under the National Electric Safety Code (NESC) heavy district loading. For this type of conductor, there would be a three conductor bundle for each energized positive or negative energized conductor and one dedicated metallic return conductor.

Another alternative being evaluated is one that would reduce the number of conductors required in each conductor bundle from three to two. This alternative is an "All-Aluminum Alloy Concentric-Lay-Stranded" (AAAC) conductor. It would have a designation of 2932.9 kcmil AAAC which has an outside diameter of 1.975 inches. Rated breaking strength of this conductor is 83,500 pounds. The proposed design would limit the tension in this conductor to approximately 23,000 pounds under the NESC heavy district loading. For this alternative, there would still be a requirement of one 2932.9 kcmil AAAC conductor for installation as the dedicated metallic return.

The 345 kV AC type of conductor proposed is an ACSR conductor that has the designation of 1590 kcmil ACSR "Lapwing." It has an outside diameter of 1.50 inches. Rated breaking strength of this conductor is 42,200 pounds. The proposed design would limit the tension in this conductor to 11,400 pounds under the NESC heavy district loading. The 345 kV line will use a two-conductor bundle for each energized phase.

Additional conductors for the AC and DC circuits may be evaluated during the design process before the conductor selection is finalized.

2.2.4. Additional Information Regarding Overhead Lines

i. Wind/Ice Loading

Wind and ice loading for the proposed design incorporates three NESC loading cases required for this area of the Unites States. These cases are Rule 250B, Rule 250C and Rule 250D. Rule 250B is the NESC heavy district loading case. It consists of a wind velocity of 40 mph, 0.5 inch of ice and a wire temperature of 0ºF. This is the only loading case that requires an additional NESC constant of 0.3 lb/ft. The constant is applied to every foot of conductor. Rule 250C considers extreme wind. A wind velocity of 100 mph at 60ºF is the weather condition applied during this case. Rule 250D is a loading case that considers wind and ice. It contains a wind velocity of 40 mph, 1 inch of ice and a wire temperature of 15ºF.

In addition to the loading conditions required by the NESC, the proposed design will incorporate an additional combined wind and ice loading case to address icing conditions present in New Hampshire. That case consists of a wind velocity of 40 mph, 1.25 inches of ice and a wire temperature of 15ºF.

ii. Description of Typical Supporting Structure

Northern Pass is evaluating the supporting structure type(s) and configurations shown in Exhibit B for use in the Project. The general structure details provided below are typical of such supporting structures.

Because terrain and existing ROW width along the preferred route varies, two structure types are being considered for the HVDC line: tubular steel (monopole) and steel lattice structures. For both the monopole and lattice structures, a configuration where the energized conductors are oriented horizontally in relation to one another and a configuration where the energized conductors are located vertically in relation to one another will be required. For both the monopole and lattice configuration, the horizontally configured structures would be approximately 90 feet in height, and the vertically configured structures would be approximately

135 feet in height.[4] The monopole configurations would be approximately five to ten feet in diameter at the base, tapering to approximately one to two feet in diameter at the top. These structures would be anchored to a concrete foundation approximately seven to twelve feet in diameter. The lattice configuration will have an approximate base dimension of 30 by 30 feet and taper to a six by five foot column half way up the structure. Lattice structures will be anchored to four concrete foundations at the corners of the base approximately three to five feet in diameter.

The arms of the structures will support an insulator string, the bundled conductors and a dedicated metallic return conductor. Horizontally configured structures will support two overhead static ground wires where the vertically configured structures will support only one. In each case, one of the overhead static ground wires will have a fiber optic core to enable communications and system protection functions between the two converter stations.

For the 345 kV AC portion of this Project, multiple structure configurations will be used to accommodate the variety of existing ROW width and conditions. In ROW areas that can accept a wider horizontal configuration, the 345 kV transmission line will be installed on wood or steel H-frame structures and will be approximately 80 feet in height. These structures will consist of two wood or steel poles with a 26 foot separation. Pole diameters for these structures will be approximately one to three feet. Foundations for these structures will involve direct embedding of a portion of the pole in the ground. The cross-arm of this structure will support all three insulator strings and the energized conductors. In addition, these structures will support two overhead static ground wires. One of the overhead static ground wires will have a fiber optic core for communications and system protection functions between the Franklin converter terminal and Deerfield Substation.

In areas with narrower ROW width (due to constraints that limit ROW expansion), steel monopole structures in delta (two conductors on one side of the monopole and one conductor on the opposite side) and vertical configurations can be used. In addition, some areas may require

[4] Structure heights are typical for a straight, level stretch of land. Actual structure heights will vary, and may be greater in height (e.g., highway crossings), based on topography, span length and the line layout.

double circuit configurations (two circuits installed on a common structure). Structure heights for these configurations range from approximately 110 feet to 130 feet with a base diameter of approximately five to ten feet, tapering to one to two feet at the top. These structures will be anchored to a concrete foundation approximately seven to twelve feet in diameter. The arms of the structures will support an insulator string and the energized conductors. In addition, these structures will support one or two overhead static ground wires depending on the specific structure configuration. One of the overhead static ground wires will have a fiber optic core for communication and system protection functions between the Franklin converter terminal and Deerfield Substation.

iii. Structure Spacing

In areas where the new line will be located in existing ROW, structures will run in parallel to the existing transmission line structures along ROW's that generally range from 150 to 410 feet in width. Some of these existing ROW's may need to be expanded to make room for the new transmission line, and some existing transmission lines may need to be reconfigured to do the same. In areas where the new line will be located on all new ROW, support structures will be placed in ROW that is approximately 150 feet wide. Generally, structures will be spaced approximately 800 feet apart with a maximum spacing of approximately 1,000 feet.

iv. Conductor Spacing

The Project will employ horizontal and vertical spacing between ±300 kV HVDC energized conductors of 26 feet. For 345 kV energized conductors, the horizontal spacing will be 26 feet and the vertical spacing will be 22 feet.

v. Line to Ground and Conductor Side Clearances

For HVDC clearances, the horizontal distance between each energized conductor and the support structure will be approximately 15 feet. Minimum ground clearance for the conductors will be 30 feet. Energized conductors will be attached to the structure using 20 DC type insulator disks per string. This will provide approximately 10 feet of insulation between the energized conductors and the arm of the structure.

For the AC 345 kV circuit, the horizontal distance between an energized phase and the support structure will be approximately 13 to 15 feet. Minimum ground clearance for conductors will be 24 feet. Energized phases will be attached to the structure using 17 insulator disks per string. This will provide approximately eight feet of insulation between energized phases and the arm of the structure.

vi. Underground and Underwater Lines

The Project will not employ underground or underwater lines.

vii HVDC Southern Converter Terminal

The conversion from DC to AC occurs at a converter terminal. The converter terminal will be designed for a continuous DC to AC transfer rating of 1,200 MW and will utilize conventional DC converter technology (current source converter technology). The converter terminal will be configured as a bipole system and include a dedicated metallic return conductor. The HVDC converter terminal will contain the following equipment and facilities:

- Valve Hall – The terminal will include an electrical enclosure for the thyristor (valves) that will also contain control, protection and monitoring equipment.
- Converter Transformers – The terminal will include oil-filled power transformers with a primary voltage of 345 kV. The ratings of the transformer connection to the valve hall will be determined by the HVDC equipment vendor based on the 1,200 MW transfer rating of the station. The transformers will be located outdoors.
- AC Switchyard – The terminal will include a 345 kV switchyard to interconnect the 345 kV line that will extend to Deerfield Substation. The AC switchyard will be air insulated and located outdoors.
- AC Filters – The terminal will include high voltage AC filters consisting of capacitors, reactors and resistors. The AC filters will be designed to prevent the injection of

harmonic currents into the AC transmission system. The AC filters will be air insulated and located outdoors.

- DC Switchyard – The terminal will include a ±300 kV DC switchyard which will be the termination point of the DC line. The DC switchyard will be air insulated and located outdoors.
- DC Filters – The terminal will include DC filters consisting of capacitor, reactors and resistors. The DC filters will be designed to prevent the injection of harmonic currents into the DC transmission system. The DC filters will be air insulated and located outdoors.

2.2.5. AC System Interconnection

The Project's interconnection to the New England electrical system will be at the existing PSNH's Deerfield Substation located in Deerfield, New Hampshire. The 345 kV line from the converter terminal will terminate at a new position on the substation breaker and a half bus. New substation equipment to support the interconnection consists of terminal structures, 345 kV switches, breakers, bus work, instrument transformers and associated protection and control devices. No expansion to the existing substation area is needed to support the new line position.

2.3 General Area Map and Border Area Maps

Exhibit C contains general area maps (north, central, south sections) showing the approximate locations of the Project facilities.

A map that shows the general area where the Project will cross the international border is attached as Exhibit D. A detailed map showing the exact latitude and longitude of the border crossing will be provided as soon as practicable after Northern Pass and Hydro-Québec TransÉnergie each complete consultation processes with interested stakeholders which will provide input for the border crossing decision.

2.4 Bulk Power System Information

2.4.1. Expected Power Transfer Capability

The Project's rated power transfer capability between the Québec and the New England transmission systems is approximately 1,200 MW. Based on available vendor estimates, the Project's short term overload capability is expected to be in the range of 10% to 15%. The actual short term overload capability will be determined in the detailed engineering design phase.

2.4.2. System Power Flow

Northern Pass recognizes that DOE regulations require it to provide system power flow plots for the Applicant's proposed service areas for heavy summer and light spring load periods, with and without the proposed international interconnection, for the year the line is scheduled to be placed in service and for the fifth year thereafter. Northern Pass is currently conducting system studies of the transmission network as administered by ISO-NE. After the completion of these studies, which we expect to occur in early 2011, Northern Pass will promptly provide DOE with the required system power flow plots.

2.4.3. Interference Reduction Data

Electrical interference associated with the HVDC line has been analyzed for the conductor configurations indentified in Section 2.2.3. Radio interference is generated by corona occurring on the conductors. The conductor and DC voltage selected for this line results in a relatively low level of corona, which in turn avoids any unacceptable level of radio interference.

Electrical interference from a HVDC line in terms of television interference is a result of gap type discharges. The design of this HVDC line will use modern hardware, appropriate construction techniques and a line configuration that yields a low level of corona that will minimize the onset of gap discharges which in turn avoids any unacceptable level of television interference.

Interference issues associated with the 345 kV line are being addressed using the Project design standards. Based on that analysis, the conductor size, tension of the line and distance to other lines and to the edge of the ROW will be designed to minimize electrical interference issues.

Electrical interference of the converter terminal is also being addressed using the Project design standards. Equipment spacing and minimum conductor size requirements designed to minimize electrical interference issues have been identified. Additional details regarding the features required to minimize interference effects of the converter station will be developed during the Project's detailed design phase.

2.4.4. Relay Protection

The HVDC converter terminal protective relaying systems will utilize microprocessor based devices that conform to Northeast Utilities, Institute for Electrical and Electronics Engineers, North American Electric Reliability Corporation and Northeast Power Coordinating Council requirements. Specific protection schemes, equipment and functional devices will be determined during the Project's detailed design phase, which is expected to be complete in 2012.

SECTION 3

INFORMATION REGARDING ENVIRONMENTAL IMPACTS

3.1 Introduction

The Project will provide clean, low carbon, competitively priced and reliable hydroelectric power from Québec to consumers in the adjacent State of New Hampshire and the New England region. Much of the transmission facility is proposed to follow existing transmission line ROW’s in order to avoid or minimize environmental impacts. In addition, in the siting of any new ROW’s, structures and facilities, Northern Pass will seek to avoid, minimize, and/or mitigate environmental impacts while still meeting the construction, performance, and reliability needs of the Project.

Northern Pass anticipates that DOE will prepare an Environmental Impact Statement (EIS) to assess the environmental impacts of the Project, in compliance with the National Environmental Policy Act (NEPA) and DOE’s implementing regulations, 10 CFR Part 1021.

Northern Pass further anticipates that the environmental impacts associated with the Project will be reviewed by numerous agencies and the public during preparation of the EIS and during the federal and state permitting processes. Topics likely to be addressed include land use and infrastructure; geology and soils; engineering; hazardous materials; electric and magnetic fields; water resources; wetlands and floodplains; vegetation; wildlife; fish; rare, threatened and endangered species; air quality and climate change; noise; socioeconomics; cultural (archeological, historical, etc.) resources; visual resources; and electric system operation and reliability.

3.2 Assessment of Environmental Impacts

In order to be better prepared for the permitting process and to develop information to support the Project design effort, Northern Pass undertook a preliminary assessment of the potential environmental impacts of the Project, including the impacts on both natural and cultural resources, some of which is reflected in the discussion that follows. Northern Pass anticipates that the information presented here regarding environmental and cultural resource issues will be refined, expanded and updated through DOE's NEPA review and the federal/state permitting process.

The effort to develop a preferred route for the Project began with the establishment of a project area. The boundaries of the project area were established based on the need to (i) locate a transmission line crossing at the border between Québec and New Hampshire, and (ii) connect into the AC system grid at a location that allows for the delivery of 1,200 MW. Power flow studies were used to identify the DC facility end point in Franklin, and the AC terminal location at the existing Deerfield Substation.

After establishing the project area, the next step was to collect data on human and natural resources and to identify possible engineering constraints and obstacles. Project representatives obtained that data by meeting with state and federal natural resource agencies, non-governmental organizations (stakeholder groups), and by examining publicly available information databases. Primary sources of data were color aerial photography, field identification of residences, businesses and public facilities, and geographic information system (GIS) data from various state and local agencies. The GIS data included federal and state lands, conservation easements, historic and archaeological resources, parks, rivers, and other resources. Most of the data were quantified using GIS software; others were calculated by measuring information directly from the aerial photography.

Using GIS software, all of this information was incorporated into maps of the project area so that the locations of known constraints, such as publicly or privately held conservation areas, could be identified and taken into consideration. Once the constraint maps had been developed, the process of identifying potential routes for the HVDC and AC transmission lines began. The objective was to identify routes that began at the border between Canada and New Hampshire, extended to the converter terminal location in Franklin and continued to the Deerfield Substation while avoiding or minimizing impacts to both human and natural resources.

Route segments were then laid out within the project area to create hundreds of potential route variations, avoiding known constraints, to the extent possible, and taking advantage of opportunities to follow existing linear facilities such as transmission line corridors, roads, and railroads where the Project could share existing ROW. The potential routes consisted of individual segments that could be combined to form a continuous path between endpoints. This step included consideration of multiple alternatives through each section of the project area. A first level review of these initial alternatives resulted in the elimination or modification of some alternatives because of either potential impacts to human or natural resources, or engineering difficulties such as steep slopes.

Northern Pass then conducted a second level review in which it quantified the social and environmental resources that would be impacted by the remaining route alternatives. This evaluation of the routes included a systematic comparison of the alternatives based on criteria that represented the potential adverse effects on resources along the route segments based on the types of resources present. The quantitative data were totaled for all of the potential routes. These data were used in evaluating the remaining alternatives, through the application of a mathematical comparison of the routes, to identify the routes with the least overall social and environmental impact.

The segment alternatives were divided into three geographic sections for the analysis:

- The north section, consisted of 46 segments which can be combined into 528 possible routes and are located between the Canadian border and Whitefield Substation, in Whitefield , New Hampshire, utilizing both existing and new ROW;

- The central section, which consisted of six segments and four possible routes and includes both a route that traverses the White Mountain National Forest (WMNF) on existing ROW, and a route that goes around the WMNF on new ROW; and

- The south section, which consisted of 37 segments and 32 possible routes that are located from the Franklin southern terminal location to the existing Deerfield Substation utilizing both existing and new ROW.

Northern Pass then reviewed all of the data obtained from the mathematical comparison (statistical analysis) of the routes. The result was the selection of a preferred route and certain alternative route segments for the proposed transmission facility. Northern Pass believes that, as a general matter, the impacts of the preferred route will have less impact on environmental and other resources than the alternative route segments. The preliminary assessment of environmental impacts that follows is for this preferred route, and Northern Pass describes generally how those impacts would differ if other alternatives were selected.

3.2.1 Wetlands, Floodplains and Water Resources

The minimization of impacts to rivers, streams, lakes, ponds, floodplains and wetlands crossed by the Project was a critical objective in Northern Pass's selection of a preferred route. The Project will cross several large rivers, many ephemeral, intermittent and perennial streams and ponds. New state stream-crossing rules will apply to all streams and rivers that must be crossed by equipment. State law provides special protection to certain water bodies including Public Waters, Designated Rivers, fourth order and larger streams, and streams within the WMNF. All rivers and streams in the WMNF have been designated as "Outstanding Resource Waters" (ORW) by the New Hampshire Department of Environmental Services (NHDES).

Based on National Wetland Inventory (NWI) data, Northern Pass estimates that approximately 5.5 miles of wetlands would be traversed by the Project's preferred route. However, Northern Pass also recognizes that NWI maps may underestimate the quantity of forested wetlands, which are the most common wetland type in New Hampshire. Northern Pass anticipates that a detailed analysis of flood plain and wetland impacts will occur during DOE's NEPA review based on field delineation of wetlands along the preferred route using state and federal protocols and consultation of Federal Emergency Management Agency Flood Insurance Rate Maps.

3.2.2 Critical Wildlife Habitat

Neither the Project's preferred route nor the alternatives would cross land that the United States Fish and Wildlife Service (USFWS) has designated as critical habitat for any endangered species. There currently is no designated critical habitat for any species in the State of New Hampshire.

3.2.3 Threatened or Endangered Wildlife or Plant Life

The USFWS New England Field Office database lists the eastern cougar, Indiana bat, grey wolf, dwarf wedgemussel, and the Karner blue butterfly as federal endangered animal species with ranges that encompass portions of the preferred and/or alternative routes. A portion of the preferred route passes through Coos County where the Canada lynx is potentially present. In addition to these wildlife species, the USFWS also lists the Jesup's milk-vetch and Robbin's cinquefoil as endangered plant species and the small whorled pogonia as a threatened plant species with ranges known to encompass the preferred and/or alternative routes (USFWS, 2009).

In New Hampshire, the Nongame and Endangered Wildlife Program of the Fish and Game Department is the steward for the state's nongame wildlife, that is, species that are not hunted, fished or trapped. The New Hampshire Natural Heritage Bureau (NHB) in the Division of Forests and Lands at the Department of Resources and Economic Development is responsible for identifying, tracking and protecting New Hampshire's rare plants and exemplary natural communities. The NHB maintains a comprehensive data base of threatened and endangered species throughout New Hampshire.

Based on data from the NHB, there are no records of federal threatened or endangered species occurring within 1,000 feet of the preferred and/or alternative routes. The NHB data, however, include records of state listed species occurring within 1,000 feet of the Project's preferred and/or alternative routes. State endangered species are the northern harrier, wild comfrey, and golden fruited sedge at the northern section of the preferred route, and the muskflower in the central portion of the alternative route. State threatened species are the Kalm's lobelia at the northern portion of the preferred route, the peregrine falcon and Pickering's bluejoint (plant) at the central section of the alternative and preferred routes, respectively, and the state northern black racer (snake) in the southern portion of the preferred route, and wild lupine in the southern portion of an alternative route. Additionally, the NHB database includes records that do not identify the species present at the recorded location due to the species' vulnerability to illegal collection. There are five such records within 1,000 feet of the alternative routes and one such record within 1,000 feet of the preferred route.

Northern Pass will coordinate with the USFWS, U.S. Forest Service (USFS), U.S. Environmental Protection Agency, New Hampshire Department of Fish and Game, New Hampshire Department of Resources and Economic Development, NHDES and scientists from research institutions and environmental organizations and others to ensure that potential impacts to threatened and endangered species and habitats have been carefully considered and avoided, minimized or mitigated.

3.2.4 Navigable Waterway Crossing

The Connecticut River is designated a federal navigable river in New Hampshire from the Massachusetts Border, north to Pittsburg. The preferred route would cross the Connecticut River once in the Town of Pittsburg. The Merrimack River is also considered a federal navigable waterway south of Concord to the Massachusetts-New Hampshire state line. The AC line would cross the Merrimack River north of Concord, where it is not designated a navigable waterway.

3.2.5. Indian Land

There is no federally-designated Indian land in the areas along either the preferred route or the alternative routes. Northern Pass will follow the guidance of the New Hampshire Division of Historical Resources (DHR)/State Historic Preservation Office and the USFS regarding cultural resource assessments and consultations with Tribes that may have historical interests' affected by the Project.

3.2.6 Federal Lands

The preferred route crosses two major federal natural resource areas, the WMNF and the Appalachian National Scenic Trail (Appalachian Trail or AT). The preferred route crosses approximately 10 miles of the WMNF, all on an existing transmission line ROW. Northern Pass proposes to construct the new line largely within this existing ROW. A large part of the Appalachian Trail in New Hampshire runs through the WMNF. The preferred route crosses the AT within the WMNF on the existing transmission corridor described above. The policies of both the USFS and the National Park Service (NPS) specify that any new crossings of these lands should be at already disturbed locations, and the preferred route is consistent with both of those policies. One alternative, as described below, would go around the WMNF. It is 13 miles longer than the preferred route, requires acquisition and clearing of a new 53 mile long, 150 foot wide ROW, and would cross the AT at a location that does not currently contain a transmission line crossing, although it is a "disturbed location" in that it would cross the AT at a highway.

Northern Pass intends to engage the USFS, NPS, the Appalachian Trail Conservancy and the Appalachian Mountain Club and other stakeholder groups with regard to the proposed AT crossing, so that their concerns and requirements can be considered early in the Project evaluation and design.

3.3 Historic and Cultural Resources

Based on information obtained from the DHR, ten historic sites have been identified within a half-mile of the Project's preferred route that are listed on the National Register of Historic Places or are eligible for listing. These sites include the Poore Family Homestead District and Keazer-Flanders Farm in Stewartstown, the Johnson Farm in Stratford, the Rocks Estate in Bethlehem, the Campton Town House near Beebe River in the Town of Campton, Hill Center Church in the Town of Hill, the Aiken Family Webster Lake Complex on Webster Lake in the City of Franklin, the Webster Farm Historic District in the City of Franklin, the Stone Arch Culvert in the Town of Canterbury, and the Deerfield Center Historic District in the Town of Deerfield. Northern Pass anticipates that, in cooperation with DOE, it will support further research and field studies for the Project and coordinate with the State Historic Preservation Office during the NEPA and federal and state permitting processes, consistent with Section 106 of the National Historic Preservation Act.

3.4 Right of Way, Operations & Maintenance

To the extent possible, Northern Pass intends to use existing transmission ROW under an arrangement with PSNH. Regardless of the final routing, Northern Pass anticipates the need to acquire some additional ROW. From the international border crossing location to the Lost Nation Substation, located in the Town of Northumberland, New Hampshire, a distance of approximately 45 miles, no transmission ROW exists, and new ROW that will be 150 feet wide must be acquired. The 150-foot width for the new ROW is based on the clearance requirements of the Northern Pass design criteria which, in turn, are derived from, and consistent with, the NESC. From Lost Nation Substation to the HVDC converter terminal in Franklin, the new line will be located within an existing transmission ROW, although in some areas this ROW will have to be expanded. In addition, in some areas, existing AC transmission and distribution lines will have to be relocated or reconfigured within the ROW to make the most efficient use of existing ROW.

The 345 kV AC facility from the converter station in Franklin to the Deerfield substation will use existing ROW where possible. In some areas where the ROW is not wide enough, the ROW area will need to be expanded. In areas where ROW expansion is not possible because of congestion or constraint, new ROW will need to be acquired.

Northern Pass will also acquire temporary easements during the construction process to accommodate construction activities (e.g., access and lay down areas).

Maintenance of the lines will be performed in accordance with Northeast Utilities system maintenance policies and procedures, the elements of which are to:

- Identify industry best practices for a specific preventative maintenance program;

- Assure compliance with regulatory and power coordination authority standards and guidelines;
- Establish maintenance practices that are practical and cost effective;
- Establish maintenance practices that monitor equipment operating conditions and provide trendable data; and
- Provide a written description of the maintenance program.

Specific requirements for high voltage transmission lines include:

- Aerial patrol of lines each year for inspection of structures and conductor;
- Foot patrol of the lines each year to visually inspect the facilities;
- Thermographic inspection of lines two times per year;
- Patrol of lines after every operation (i.e., permanent or temporary line faults) if the specific cause cannot be identified;
- Aerial patrol of lines each year for vegetation management inspection; and
- Three year vegetation trimming cycle.

Maintenance activities in the ROW, depending on the natural features and accessibility of the ROW, can be carried out on foot, or by line truck, track mounted vehicle, ATV or snowmobile. Any of these activities can have an impact on the environment if not performed in a sensitive manner. All vegetation management and line maintenance activities associated with the Project's new lines will be performed in accordance with the New Hampshire Division of Forest and Lands Best Management Practice for Utility Maintenance (Interim, January 2010). That Best Management Practice provides guidance for identifying appropriate means and methods for vegetation management and maintenance in or within the vicinity of jurisdictional wetlands. Northern Pass will provide a field manual summarizing the Best Management Practice to all contractors performing maintenance work in the ROW.

Maintenance associated with the HVDC converter terminal and the Deerfield Substation upgrades will also be performed in accordance with Northeast Utilities system maintenance policies and procedures, the elements of which are to:

- Monitor, test and maintain civil, electrical, protection and communication equipment including visual inspection, sampling, trending, testing, maintenance and time based equipment replacement; and
- Monitor on-line key electrical devices to determine equipment status, load levels, temperature and to identify any abnormal conditions.

SECTION 4

ALTERNATIVES TO THE PROPOSED FACILITY

The selection of a preferred route was the product of a very deliberate process through which Northern Pass carefully evaluated the potential environmental, historical and cultural resource impacts of a wide variety of alternative routes. It is a route that, in the judgment of Northern Pass, would minimize these impacts. The analysis described in Section 3.2 resulted in the identification of multiple alternative segments rather than completely separate routes because the beginning, intermediate and end points of the Project are necessarily fixed by three key factors: the desire to avoid or minimize impacts by using existing electric transmission system ROW to the extent feasible; the configuration and design limits of the existing electric transmission system; and the purpose and need for the Project. Many route segments were eliminated from consideration because of the adverse impacts on environmental, historical or cultural resources or because they are technically infeasible.

Specifically, Northern Pass has evaluated routing alternatives that it is capable of constructing and operating, that avoid and minimize environmental and cultural impacts, that are technically feasible, and that satisfy the underlying purpose and need of the Project of providing the capacity to deliver power from Des Cantons Substation in Quebec to southern New Hampshire. Within those constraints, there are a number of routing alternatives that Northern Pass believes it is capable of implementing, that would meet the Project's objectives, and that could be selected by permitting agencies if, in particular circumstances, the impacts of an alternative are deemed by such agencies to be more acceptable than those along the preferred route.

Therefore, the preferred route represents Northern Pass' best judgment in selecting a route from a wide range of alternatives – all of which are banded both by the practicable limits of what Northern Pass is capable of doing and by the need to satisfy the Project's objectives. The maps attached as Exhibit C show three alternative segments for the north section, two alternative segments for the central section, and two alternative segments for the south section. Generally, the alternatives offer trade-offs between the types of resources affected.

4.1 Alternatives in the North Section

Three alternative segments were identified in the north section. The first alternative is 0.5 miles longer than the preferred route and is located east of the preferred route primarily in the Town of Stratford, New Hampshire. This alternative is approximately 10.2 miles long and deviates to the east around several mountains to limit its visibility from the Connecticut River Scenic Byway. However, this alternative would cross part of the Bunnell Working Forest, a protected conservation area.

The second alternative segment is approximately 8.6 miles long, 1 mile longer than the preferred route, and it would bypass the Cape Horn State Forest to the west and traverse the towns of Northumberland and Lancaster. This alternative traverses fewer wetlands and water bodies, but it does not follow existing ROW and would be more visible from the Connecticut River Scenic Byway. This alternative also traverses the Potter Farm, a privately-owned conservation area.

The third alternative segment is approximately 21.1 miles long, 1.8 miles longer than the preferred route, and it would bypass the community of Whitefield, as well as an historic site and some conservation lands. However, this alternative would require acquisition and development of all new ROW over its entire length. This alternative would also be more visible from, and would cross, the Connecticut River Scenic Byway.

4.2 Alternatives in the Central Section

Two alternative segments were identified in the central section. The first alternative winds around the WMNF and is approximately 53 miles long. It is 13.3 miles longer than the preferred route and requires acquisition and clearing of a new 53 mile long, 150-foot wide ROW. In addition, this alternative would cross the AT at a location that does not currently contain a transmission line crossing. This would be contrary to the NPS's stated policy goal of utilizing a "like" crossing for new transmission facilities.

The second alternative segment leaves the existing ROW just north of Webster Lake and goes around the west side of the lake for 5.3 miles before rejoining the existing ROW south of the Webster Substation. This alternative is .1 mile longer than the preferred route, would locate the line in new ROW, and would be highly visible to the residents around Webster Lake.

4.3 Alternatives in the South Section[5]

Two alternative segments were identified in the south section. The first alternative, which would leave the existing ROW north of Oak Hill Substation, is 8.8 miles long, 0.5 mile shorter than the preferred route, but it requires 5.2 miles more of new ROW than the preferred route. This alternative also has 33 more newly affected residences than the preferred route.

The second alternative segment also leaves the existing ROW north of Oak Hill Substation and runs in an easterly direction until it connects to an existing distribution line corridor. This 28.3-mile alternative is 1.7 miles longer than the preferred route, requires expansion of approximately 9.7 miles of existing distribution ROW and acquisition of 18.6 miles of new ROW, 10.6 miles more new ROW than is required for the preferred route. The alternative also has 37 more newly affected residences than the preferred route.

4.4 No Action Alternative

The no action alternative of not constructing the Project would eliminate the Project's direct impacts to environmental, historical and cultural resources in the area along the preferred route.[6] However, that would be at the expense of losing the Project's capacity for delivering 1,200 MW of clean, low-carbon power and achieving the policy objective of improving fuel diversity. In addition to helping achieve these environmental and energy policy goals, the injection of such

[5] Northern Pass may conclude that one additional segment represents a feasible alternative route. Provided ISO-NE approves the proposed configuration of the 345 kV AC line, and provided that the Federal Aviation Administration authorizes the location of the necessary transmission structures in the vicinity of Concord Municipal Airport, that alternative route would follow existing ROW for approximately 7.7 miles in the City of Concord and the Town of Pembroke, NH. This route is not depicted on Exhibit C.

[6] Note, however, that, if and to the extent impacts in Canada are a factor, the no action alternative would not result in the cancellation, or delay in construction, of any hydroelectric generation facilities in Canada.

reliable, renewable and competitively priced power would help to meet the New England region's future load growth needs, and help mitigate energy market volatility which is often driven by the price of fossil fuel-based sources of power. If the Project were not constructed, the need to reduce greenhouse gas emissions to help meet RGGI requirements would still exist, as would the need to develop sources of cleaner, low carbon, renewable power and the need to reduce our reliance on fossil fuel. To achieve those objectives, other transmission lines that would likely have environmental, historical and cultural resources impacts of the same character and magnitude as those created by the Project would need to be built to deliver that power.

Additionally, without this Project's capacity to bring Hydro-Québec's excess hydro-electricity to the U.S., in order to satisfy future load growth and provide the same level of service from non-intermittent power sources, new power plants would need to be built that would almost certainly have greater impacts on environmental and other resources than the Project will have. In summary, as a practical matter the no action alternative does not really serve to avoid impacts; it will only result in the similar and potentially more significant impacts to environmental, historical and cultural resources. Based on the Project's combination of characteristics and benefits, the no action alternative is a poor option.

SECTION 5

VERIFICATION

Exhibit F contains a verification of the contents of this Application by an officer of Northern Pass having knowledge of the matters set forth herein.

ATTACHED EXHIBITS

Exhibit A	Opinion of Counsel
Exhibit B	Drawing of Typical Structure Configurations
Exhibit C	General Area Map
Exhibit D	Area Map of Border Crossing
Exhibit E	System Power Flow Plots (to be provided later)
Exhibit F	Verification of Application