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October 19, 2015

Via Hand Delivery

Martin P. Honigberg, Chairman
New Hampshire Site Evaluation Committee
21 South Fruit Street
Concord, NH 03301

Re: New Hampshire Site Evaluation Committee - Docket No. 2015-06
Joint Application of Northern Pass Transmission LLC ("NPT") and Public Service Company of New Hampshire d/b/a Eversource Energy ("Eversource") for a Certificate of Site and Facility for the Construction of a New 1,090 MW Electric Transmission Line

Dear Chairman Honigberg:

Enclosed for filing with the New Hampshire Site Evaluation Committee ("Committee") in the above-captioned matter, please find a complete, original Joint Application of Northern Pass Transmission LLC ("NPT") and Public Service Company of New Hampshire d/b/a Eversource Energy ("Eversource") for a Certificate of Site and Facility for the construction and operation of a proposed electric transmission line with a 1,090 MW transfer rating, extending approximately 192 miles from the Canadian border in Pittsburg, New Hampshire to a substation located in Deerfield, New Hampshire. The line is comprised of a 158.3 mile, +/- 320 kV direct current (DC) segment and a 33.7-mile 345 kV alternating current (AC) segment. Approximately 60.5 miles will be located underground in public roads in three separate segments. We have provided additional Application copies, and delivered them accordingly, consistent with the Committee's October 15, 2015 Order.

In accordance with RSA 162-H:7(V), copies of the Application are being delivered to each host community. In response to our inquiries, numerous host communities expressed their desire to receive the Application in electronic form. If any of these towns or cities later decide they would like all or part of the Application as a hard copy, we will provide it.

To the extent possible, the Project will be constructed in existing transmission rights-of-way ("ROW"). In areas where there is no existing ROW, the Project will be constructed on land owned or leased by Renewable Properties, Inc., an affiliate of NPT. Throughout the route design process, NPT has been committed to working with local communities affected by the Project. In response to public comments regarding potential visual effects, several segments of the Project

have been routed underground. As designed, the Project will not have an unreasonable adverse effect on the natural environment, aesthetics, historic or archaeological sites, air or water quality or on public health and safety. In addition to the Application, the Applicants have provided the original comment cards to the Committee from the public information sessions that were held in the five host counties.

In accordance with RSA 162-H:7, the Application includes pre-filed testimony, exhibits, each agency's completed application forms and other information sufficient to satisfy the application requirements of each State agency having jurisdiction, under New Hampshire or federal law, to regulate the construction or operation of the proposed facility.

The Application contains confidential archaeological information, confidential information on the status, location, and distribution of native plant and animal species and natural communities and confidential and proprietary business information. See Appendices 19-30, parts of Appendices 35 and 36, Appendix 43, pre-filed testimony of Julia Frayer. The Applicants are concurrently submitting an original and 18 copies of a Motion for Protective Order and Confidential Treatment regarding these materials. The archaeological information is only contained in the one hard copy being submitted to the SEC and the hard copy being provided to DHR. We are submitting only a single copy of the natural resource information and the company confidential information – that material is contained in the complete hard copy to the SEC.

In addition, the Application contains four Petitions for Licenses to Cross Public Waters and Lands Owned by the State. We are providing an original, six paper copies and one electronic copy of each petition. Each Petition is addressed to the New Hampshire Public Utilities Commission ("NHPUC") and is being submitted in accordance with RSA 371:17 for a license to construct and maintain the new electric transmission line and associated facilities, as well as the new, relocated PSNH facilities, above and across State waters and State lands. The Applicants respectfully request that the SEC provide the originals, six paper copies, and the electronic copy of each petition to the NHPUC. Also, in accordance with the NHPUC rules, the Applicants have submitted an electronic copy of each petition for the New Hampshire Consumer Advocate.

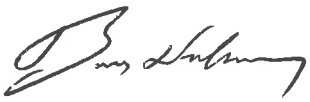
We are also submitting one Petition to Commence Business as a Public Utility on behalf of Northern Pass Transmission LLC in accordance with RSA 374:22. We are providing an original, six paper copies and one electronic copy of this petition. We also request these be provided to the NHPUC. As noted above, the Applicants have submitted an electronic copy of each petition for the New Hampshire Consumer Advocate.

Pursuant to RSA 162-H:8-a, the Applicants have included a check for the application filing fee in the amount of $626,000. This reflects the $50,000 base fee for an electric transmission facility, required under RSA 162-H:8-a(II)(b), and $576,000 for the 192 miles of the electric transmission facility required under RSA 162-H:8-a(II)(b)(1). The Applicants have also included the following checks: $220,750 for the Alteration of Terrain Permit Application;

$1,234,210.55 for the Wetlands Permit Application; and, $4,200 for the NHDOT Railroad Crossing Permit Application.

The Applicants are being jointly represented by McLane Middleton, Professional Association. We are concurrently filing an original and 18 copies of Appearances. If you have any questions or concerns regarding this Application, please do not hesitate to contact me at 603-226-0400, or via email at barry.needleman@mclane.com.

Sincerely,



Barry Needleman

BN:slb

Enclosures

STATE OF NEW HAMPSHIRE

BEFORE THE

SITE EVALUATION COMMITTEE

Docket No. 2015-06

JOINT APPLICATION OF NORTHERN PASS TRANSMISSION LLC AND PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE D/B/A EVERSOURCE ENERGY

FOR A CERTIFICATE OF SITE AND FACILITY TO CONSTRUCT A NEW HIGH VOLTAGE TRANSMISSION LINE AND RELATED FACILITIES IN NEW HAMPSHIRE

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*****All or portions of the bold and italicized appendices are subject to a pending motion for confidential treatment.***

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NORTHERN PASS TRANSMISSION PROJECT

EXECUTIVE SUMMARY

Project Benefits Overview

The Northern Pass Transmission Project ("Northern Pass" or the "Project") as proposed by Northern Pass Transmission LLC ("NPT) will deliver 1,090 MW of clean, renewable electricity to New England and New Hampshire, and create a rare combination of economic, environmental and other benefits. Northern Pass will provide $3.8 billion in economic stimulus in the State, reduce the electricity costs of New Hampshire customers by more than $80 million annually, create more than 2,600 New Hampshire jobs at the peak of construction, generate an estimated $600 million in local, county and State tax revenues over the first 20 years of operation, and provide $200 million in funding for community betterment, economic development, clean energy and tourism. Simultaneously, the Project will reduce regional greenhouse gas emissions by more than 3.3 million tons per year. That reduction will help New Hampshire achieve the goals of the NH Climate Action Plan and the Regional Greenhouse Gas Initiative. These benefits will be accomplished at no cost to New Hampshire customers and with no demand on government services.

This Executive Summary provides an overview of the Project as detailed in the accompanying Application for a Certificate of Site and Facility ("Application") to the New Hampshire Site Evaluation Committee ("SEC"). As demonstrated here, and in the Application, the Project advances New Hampshire's energy objectives, provides significant economic benefits to the State and host communities, and surpasses regulatory siting requirements – all with minimal impacts to scenic and historic resources and to the environment.

The Project

Northern Pass will deliver 1,090 MW[1] of clean, renewable electricity through a transmission line (and related facilities) consisting of a single circuit 320 kV high voltage direct current ("HVDC") transmission line linked to a 345 kV alternating current ("AC") transmission line via an HVDC/AC converter terminal located in Franklin, New Hampshire. The entire line extends approximately 192 miles from the international border between Canada and Pittsburg, New Hampshire to Deerfield, New Hampshire. NPT has partnered with Hydro-Québec ("HQ"),

[1] Since the 1,000 MW Project was announced on August 18, 2015, NPT and HQ have confirmed with the manufacturer that the technology will allow the Project to deliver 1,090 MW.

a well-established producer of clean, renewable power that has been reliably supplying energy to New England since the mid-1980s. Together, NPT and HQ have developed the necessary project elements on each side of the U.S./Canadian border to ensure a viable solution for meeting our energy and environmental needs. Siting for the line supporting the Canadian portion is currently underway.

The Applicants

The Project proponents are NPT[2], a New Hampshire company, and Public Service Company of New Hampshire d/b/a Eversource Energy ("PSNH"), (the "Applicants"). The Applicants are wholly-owned subsidiaries of Eversource Energy, New England's largest utility system serving more than 3.6 million electric and natural gas customers in Connecticut, Massachusetts and New Hampshire.[3]

The Case for Northern Pass

In 2014, the New England governors acknowledged that the region is facing an imminent energy crisis. More recently, the President and CEO of ISO New England ("ISO-NE") projected potential supply shortages for the region and identified the need for new infrastructure investment.[4] New England electricity prices are among the highest and most volatile in the nation because of seasonal constraints with gas supply and an over-dependence on natural gas generation.[5] To address this problem, all of the New England governors have announced their support for the construction of additional interstate natural gas transmission lines into New England as well as for the increased opportunity for hydroelectric power transmission from Canada.[6]

According to ISO-NE's 2014 *Regional System Plan*, more than 45 percent of the region's electric generating capacity consists of natural gas-fired power plants. As a result, the region relies too heavily on natural gas for power generation. That over-reliance causes severe price

[2] NPT is an indirect subsidiary of Eversource Energy and was formed as a single purpose entity to construct, own and operate the Project in the State of New Hampshire. NPT is a direct subsidiary of Eversource Energy Transmission Ventures, Inc., a direct subsidiary of Eversource Energy created for the purpose of owning transmission related businesses not owned by Eversource's state-regulated energy subsidiaries.
[3] Eversource engages in electric and gas delivery to businesses and residences throughout the northeast, and owns and operates approximately, 4,270 circuit miles and distribution stations and 449,737 distribution transformers.
[4] Gordon van Welie, *State of the Grid: Managing a System in Transition* (January 21, 2015)
[5] FERC, *Winter 2014-15 Energy Market Assessment*, 1, 13 (Oct. 16, 2014), *available at* https://www.ferc.gov/market-oversight/reports-analyses/mkt-views/2014/10-16-14-A-3.pdf.
[6] Allie Morris, *New England energy officials warn of possible power crisis; governors infrastructure initiative could be the solution*, Concord Monitor (July 2, 2014) *available at* http://www.concordmonitor.com/home/12596728-95/new-england-energy-officials-warn-of-possible-power-crisis-governors-infrastructure-initiative-could.

volatility and reliability problems when the gas transmission system cannot keep pace with overall demand, particularly in winter when there is increased need for natural gas for home heating.[7] According to ISO-NE, "there is no longer any uncertainty about the existence of reliability problems as a direct result of gas dependence."[8] Compounding this over-dependence, power plants using other fuels have either retired or are scheduled to retire. Furthermore, New England does not have the infrastructure in place to provide a sufficient supply of natural gas to meet demand. Consequently, New England and New Hampshire will continue to face the risks of fuel supply disruptions and dramatic price volatility. The clearest recent example of how this problem affects consumers and businesses is the 2013-2014 heating season. During that time, customers in New England paid $3 billion more in energy costs than they would have paid if adequate infrastructure had been available to supply natural gas in New England.[9]

Northern Pass will help diversify the region's energy mix and ease the volatility experienced in recent years. The availability of this power will also help offset more expensive energy sources, many of which run on fossil fuels. Northern Pass will lower energy costs for the region as a whole and for New Hampshire in particular. PSNH will enter into a power purchase agreement ("PPA") with HQ for approximately 100 MW of reliable, clean hydroelectric power. The PPA will provide competitive pricing and price stability to help insulate PSNH customers from the volatile power markets.

Public Interest

While the provision of 1,090 MW of clean, competitively priced, renewable hydropower to customers in New Hampshire and the rest of New England is the most direct benefit of the Project, Northern Pass provides other significant public benefits as well. The Project is the enabling element of the Forward New Hampshire Plan ("Forward NH" or "Plan"), an initiative that will provide approximately $3.8 billion in benefits to the State, including more than $80

[7] For example, during the winter of 2014, natural gas-generated energy, which normally costs $30-$40 a megawatt hour, reached prices of $800 a megawatt hour on the spot market. Peter Kelly-Detwiler, *Volatility in Early January Power Markets: The Vexing Polar Vortex*, Forbes (January 16, 2014), *available at* http://www.forbes.com/sites/peterdetwiler/2014/01/16/volatility-in-early-january-power-markets-the-vexing-polar-vortex/.

[8] *Addressing Gas Dependence*, Discussion Draft, at 17 (July 30, 2012), *available at* https://mitei.mit.edu/system/files/20130416-brandien.pdf.

[9] During a forum held at Saint Anselm College, Gordon van Welie, president and CEO of ISO-NE, stated that New England paid $3 billion more than it should have for energy during this period because of a lack of infrastructure. D. Solomon, *No relief from New England energy costs in near future*, The New Hampshire Union Leader (June 30, 2014), *available at* http://www.unionleader.com/apps/pbcs.dll/article?AID=/20140701/NEWS06/140709999/0/ANNOUNCEMENTS

million annually in lower energy costs, a $2.2 billion increase in Gross Domestic Product, the creation of more than 2,600 jobs, an estimated $600 million in tax revenues over the first 20 years of operation, more than 3.3 million tons per year in reduced carbon emissions, a more diversified regional power supply, and enhanced electric system reliability, while moving the State closer to achieving its energy and environmental objectives. The specific benefits of Forward NH include the following:

1. *Design modifications.* Modification of the Project design to include an additional 52 miles of underground construction, for a total of over 60 miles. This additional underground construction avoids or minimizes potential visual impacts to the most sensitive scenic resources in the State, including areas in and around the White Mountain National Forest, Franconia Notch area, the Rocks Estate area, and along the Appalachian Trail. Alternative structure designs have also been incorporated to minimize potential effects along the overhead parts of the Project route.
2. *No Cost to New Hampshire Customers.* All costs of siting and constructing Northern Pass will be paid by the Project, at no cost to New Hampshire customers.
3. *Power Purchase Agreement.* As described above, the PPA will permit the delivery to New Hampshire of approximately 100 MW of firm, on-peak, renewable hydroelectric power together with the potential environmental attributes, and will provide greater price stability at estimated customer cost savings totaling $100 million over 20 years.
4. *Energy Cost Suppression*. Delivery of 1,090 MW of energy will suppress wholesale energy prices leading to estimated annual savings greater than $80 million for New Hampshire businesses and residential customers who are currently subject to some of the highest energy rates in the country.
5. *Forward NH Fund*. Commitment of $200 million to fund important New Hampshire priorities – controlled by an advisory board structure – that will include community betterment, clean energy innovation, economic development and tourism with emphasis on the host communities and the North Country in particular.
6. *Coös Loop Transmission Upgrade*. A transmission upgrade of the Coös Loop, which will relieve existing constraints and unlock up to 100 MW of renewable generation.
7. *New Hampshire First.* A commitment to a "New Hampshire first" approach to hiring construction workers for the Project. This approach will help create more than 2,600

direct and indirect jobs, both union and non-union, during peak construction. This element of the Plan also includes the establishment of an innovative partnership with the International Brotherhood of Electrical Workers ("IBEW") and National Electrical Contractors Association ("NECA") and national contractors to create highly desirable career training and job opportunities for New Hampshire residents.

8. *Natural Resource Preservation and Tourism*. Dedication of approximately 5,000 acres in existing land holdings to natural resource preservation, recreational activities and additional mixed uses that are important to the North Country's future.
9. *North Country Jobs Creation Fund*. Sponsorship of the $7.5 million North Country Jobs Creation Fund, which will be directed by local individuals and dedicated to important economic development and job creation opportunities in the region.
10. *Increased Property Tax Revenue.* Northern Pass will, on average, generate approximately $30 million per year in local, county and State property tax revenues, or $600 million over the first 20 years of operation.
11. *NFWF Partnership*. Establishment of a $3 million partnership with the National Fish and Wildlife Foundation ("NFWF") to pursue environmental conservation and research activities in New Hampshire through collaboration with environmental organizations, government agencies and research universities, including the University of New Hampshire.
12. *Economic Growth*. Create a significant increase in New Hampshire's Gross Domestic Product, estimated to be $2.2 billion over the Project's construction period and in the first 10 years of operation.
13. *Reduced CO_2 Emissions*. Reduction of carbon dioxide emissions in New England by more than 3.3 million tons annually. This reduction will support the goals of the New Hampshire Climate Action Plan, the Regional Greenhouse Gas Initiative ("RGGI") and the New England Governors' Renewable Energy Blueprint.

Project Elements

The HVDC portion of the Project will run 158.3 miles from the international border between Canada and Pittsburg, New Hampshire to Franklin, New Hampshire, where the electricity will be converted to alternating current ("AC") by a HVDC converter terminal. The power will then flow over a 345 kV AC line extending 33.7 miles before interconnecting with

the transmission system at the existing substation at Deerfield, New Hampshire. The Project expects to upgrade the Deerfield substation and the Scobie Pond substation in Londonderry, each of which is owned and operated by PSNH, and will upgrade an anticipated ten structures between those substations.[10]

More than 83% of the proposed route will be along existing transmission corridors or will be buried under public roadways, thus resulting in reduced potential environmental and visual effects. The overhead portion of the HVDC line will be 97.8 miles long, consisting of a 32-mile section, where property rights for a new right-of-way ("ROW") were purchased from willing landowners, and 65.8 miles installed in existing PSNH ROWs. Where necessary, portions of the existing transmission and distribution lines will be relocated to allow room for the HVDC line construction.

The underground portion of the line will be installed in three sections for a total length of 60.5 miles: (1) a 0.7 mile segment in the towns of Pittsburg and Clarksville in the vicinity of the Route 3 bridge crossing of the Connecticut River; (2) a 7.5 mile segment in the towns of Clarksville and Stewartstown; and (3) a 52.3 mile segment starting in the Town of Bethlehem at Route 302, following Routes 302, 18, 116, 112 and 3 and ending at the intersection of the transmission ROW and Route 3 in Bridgewater. At the six locations where the overhead line transitions between the overhead line and cable, a 75' by 130' transition station will be installed.

When the Project is commissioned and ready for commercial operation, ISO-NE will assume operational control pursuant to the terms of a FERC-approved Transmission Operating Agreement between NPT and ISO-NE.

Solicitation and Response to Public Comment

NPT performed extensive outreach along the proposed Project route and throughout New Hampshire to ensure that residents received detailed information about the Project and its benefits, and had an opportunity to share their concerns and receive answers to their questions. As a result of this outreach, substantial elements of the Project were modified. Most notably, NPT now proposes to build nearly one-third of the Project underground, in public highways, in and around the White Mountain National Forest, Franconia Notch area, the Rocks Estate area,

[10] The northern HVDC converter terminal will be constructed by HQ at the Des Cantons substation in the Province of Québec, Canada; it will be connected to an HVDC line that will run southward in Québec for approximately 47 miles, where it will connect to the Northern Pass line at the U.S. and Canadian border in Pittsburg, New Hampshire.

and along the Appalachian Trail. In addition, the Project has substituted additional streamlined monopole structures in place of lattice structures at a variety of locations.

Communication with landowners closest to the proposed route has been and continues to be a top priority. Project outreach specialists communicated with all abutting landowners by mail and invited them to contact the Project team with comments or questions. All landowners were offered one-on-one site visits with Project representatives to gain a better understanding of the Project and the possible effect on their land. Regular Project newsletters were sent to keep landowners and stakeholders up-to-date on the permitting schedule, technical details, opportunities for input, and community outreach efforts. The Northern Pass website also provides a thorough description of the Project including, among other information, town-by-town overviews, route maps, permit applications, and Project news. The "Contact Us" icon on the Project's website allows individuals to reach Project representatives through email or by phone. As of the date of this filing, more than 3,700 inquiries have been addressed.

NPT also hosted or participated in a variety of public meetings and open houses, each of which provided the public with an opportunity to meet Project representatives, ask questions and submit comments. Fifteen open houses were held in 2013 in communities along the proposed route and were well attended. Project staff also attended each of the U.S. Department of Energy's public hearings in 2011 and 2013. Pre-application public information sessions were held in September 2015 in each of the five counties (Coös, Grafton, Belknap, Merrimack and Rockingham) where the Project is proposed to be located. Open houses were held in conjunction with each of these sessions.

NPT has kept municipal officials informed of the latest developments via in-person meetings, phone calls, letters and e-mails. Representatives of the Project have met with elected officials at the State and local levels upon request, and provided regular updates to those officials via in-person visits, letters and e-mail. See Appendix 42. Project representatives have also met with hundreds of community groups and organizations, including Chambers of Commerce, Rotary and Kiwanis Clubs, labor organizations, conservation groups and business groups. Through these presentations and Q&A sessions, NPT sought to keep local groups informed while affording them an opportunity to speak directly with Project representatives.

In sum, NPT has conducted extensive outreach with the public and stakeholders and intends to continue this process throughout the permitting and construction phases of the Project.

Potential Impacts and Proposed Mitigation Measures

NPT has commissioned studies and has been the subject of a number of studies for the purpose of understanding, evaluating and addressing the potential economic, visual, environmental, historic and cultural effects of the Project. These include the following:

Aesthetics. Terrence J. DeWan, an expert in evaluating visual effects, conducted a visual assessment of the Project in each of the host communities along its entire 192 mile route, including 889 square miles, and an additional 26 adjacent towns where the Project might be viewed from scenic resources. Mr. DeWan used widely accepted visual assessment methodologies to analyze both the existing conditions and how changes to the visible landscape might result from the Project.

With input from this expert, NPT has taken significant steps to reduce visual effects by:

- Locating significant portions of the Project underground in public roads
- Co-locating a majority of the Project in existing transmission corridors
- Co-locating new transmission structures in proximity to existing structures to maintain spacing and avoid irregular linear patterns
- Using the same materials as other structures in a corridor to minimize contrasts in color and texture
- Designing transmission structures with relatively narrow profiles
- Replacing existing 115 kV lines with narrower transmission structures
- Maintaining or restoring vegetation of road crossings and river and stream crossings, and planting native tree and shrub species to restore landscapes disturbed by construction, particularly along the underground segments

Based on these modifications to the Project, the visual impact assessment concludes that Northern Pass will not have an unreasonable adverse effect on aesthetics. Although Northern Pass will be visible from some scenic resources, the effects will be minimal. See Appendix 17.

Archeological Resources. Victoria Bunker, Inc., a New Hampshire archeological consulting firm, assessed the potential effect of the Project on archeological resources. The consultant conducted substantial resource identification through Phase I-A (field and document reviews) and Phase I-B (test pit digging) surveys. The U.S. Department of Energy ("DOE") also completed a Phase I-A survey for the Project route.

In addition to the SEC's review, the Project's potential effects will be thoroughly reviewed by DOE and the New Hampshire Division of Historical Resources ("DHR") pursuant to Section 106 of the National Historic Preservation Act. The Section 106 process will provide a framework for additional identification of any effects and determination of appropriate avoidance, minimization or mitigation, most likely through a Programmatic Agreement and cultural resources management plan. Based on the vast amount of archeology survey work that has been done to date, and with the assurance of DOE's and DHR's continuing vigorous oversight, the consultant concluded that the Project will not have an unreasonable adverse effect on archeological resources.

Historic Resources. Cherilyn Widell of Widell Preservation Services, LLC, an historic preservation consulting firm, assessed the Project's potential effect on historic resources. Ms. Widell worked closely with Preservation Company of Kensington, New Hampshire. They mapped and catalogued 1,284 properties within the Project's Area of Potential Effect for the overhead portion of the route. One hundred and ninety-four of those 1,284 properties were then subject to more intense analysis because they met the National Historic Preservation Act age eligibility criterion and are potentially in view of the Project. Of these 194 properties, Ms. Widell concluded the following: (1) 12 properties may experience an indirect adverse visual effect from the Project; (2) the Project will not create an adverse effect in the setting of a National Historic Landmark; and (3) the indirect visual effects on one property that is already listed on the National Register of Historic Places (the Weeks Estate) will not cause it to be removed from the Register because of a loss of integrity.

Where potential visual effects from the Project impact historic sites, the Project has been designed to substantially avoid and minimize these impacts. Locating a large portion of the line in existing transmission ROWs, and burying another 60 miles of line, are effective ways of reducing or eliminating such impacts. The Project has also changed originally planned structure heights, designs and locations for this purpose.

Based on the historical resources survey results, the Project's avoidance and minimization efforts and the continuing involvement of the DHR, the actual adverse effects from the Project will be minimal. To address any such effects, NPT will undertake all mitigation measures as required by the SEC and DOE (in consultation with DHR) in the Section 106 process. See Appendix 18.

Natural Environment. Normandeau Associates, Inc., an environmental consulting firm, conducted an extensive study of environmental resources along the Project route and consulted with state and federal regulatory agencies to ensure the Project avoids and minimizes environmental effects. The Applicants are proposing various best management practices that, when implemented, will achieve this result. Unavoidable impacts will be mitigated in accordance with state and federal regulations and guidance.

Northern Pass addresses a vital State, regional and national air quality policy goal by reducing greenhouse gas emissions in New England by more than 3.3 million tons of CO_2 annually. This goal is accomplished with minimal impact on water quality and the natural environment. The Project has avoided all but a small amount (less than 3 acres) of wetlands and vernal pools by carefully analyzing the resources and designing around them. Any unavoidable impact is more than addressed in the Project's comprehensive mitigation proposal, which provides for an estimated payment of approximately $3 million to New Hampshire Department of Environmental Service's Aquatic Resources Mitigation Fund, and the preservation of some 1,668 acres for wetlands and wildlife mitigation, all in satisfaction of State and federal wetlands permitting requirements. Appendices 31–32.

Northern Pass has been designed to effectively avoid and reduce impacts to wildlife and to plant and aquatic species. Normandeau's studies concluded that aquatic impacts are expected to be minimal. Given the minor nature of expected impacts to cold-water fisheries and essential fish habitat, the commitment to best management practices, and the absence of in-channel work associated with the Project, the Project will not have a significant effect on aquatic resources. See Appendix 33.

The Project will also not have significant effects on wildlife or wildlife habitats. In the new ROW, the amount of habitat being converted from forest to shrub cover is small, given the amount of forest that is available in the surrounding landscapes. The wildlife species observed or likely to occur in this Project area are adapted to conditions currently present in the surrounding landscape affected by historic and on-going logging. The impacts associated with construction and operations are expected to have an insignificant effect on the habitat value of this part of the Project area for the wildlife species known or likely to be present. The habitat conversion will create a small benefit for shrub land species.

In the existing ROW, the incremental widening in some locations will convert a minimal amount of forest to shrub habitat, but the effect on either shrub land species using the existing ROW, or forest species using the adjacent habitat will be negligible. Periodic mowing and selective cutting will continue to maintain the ROW as shrub land, maintaining suitable conditions for shrub land species that currently use the ROW. The Project will implement an agency-approved avoidance, minimization and mitigation plan for two previously identified key species – the Karner blue butterfly and the Northern Long-eared Bat. See Appendix 36.

Public Health and Safety

The Project will be constructed and operated in a safe manner and will adhere to all applicable safety and electrical codes, including the National Electric Safety Code and all Eversource transmission line design standards. Before construction, NPT will develop a project safety plan to be followed by all employees and contractors, and will retain qualified project management and staff who are experienced with managing and executing similar projects. During construction, NPT will follow all applicable safety regulations and confirm that each person on-site has adequate training to ensure the Project is constructed safely.

Exponent, Inc., an engineering and consulting firm, assessed extreme low frequency electric and magnetic fields ("EMF") associated with the Project. Exponent modeled the existing and expected EMFs under certain average and peak load conditions. This assessment found levels of EMFs to be well below exposure thresholds developed by the International Commission on Non-Ionizing Radiation Protection and the International Committee for Electromagnetic Safety. Exponent concluded that there will be no unreasonable adverse effects on public health and safety as a result of Project-related EMF. See Appendices 37–38.

Orderly Development of the Region

Northern Pass will not interfere with the orderly development of the region. Any potential effect on land use will be minimal, and the Project will have positive effects on the local economy and jobs.

Land Use. There will be no changes to prevailing land uses after construction of the Project. The Project will have no effect on local land uses along the approximately 100 miles of the route that follow existing transmission corridors. Only 32 miles of the 192-mile transmission line is on new ROW. Twenty-four of those 32 miles are in a working forest, and forest management within this entire area will continue uninterrupted after construction. Also, the

operation of the line will not place any new demands on local or regional services or facilities. By using existing roadways and transmission corridors for more than 83% of the route and locating substantial portions of the Project underground, the Project is consistent with local patterns of development. Siting a new transmission line in already-developed roadway and transmission corridors is a sound planning and environmental principle because it reinforces local patterns of development and minimizes environmental impacts. See Appendix 41.

Property Values. Chalmers & Associates, LLC ("Chalmers"), an expert on property valuation issues, reviewed published research and developed New Hampshire-specific research regarding the effects of high voltage transmission lines on property values and real estate markets. The results of this work are reported in Chalmers' study, titled *High Voltage Transmission Lines and Real Estate Markets in New Hampshire: A Research Report*, June 30, 2015. Drawing on his substantial research and analysis, Dr. Chalmers concludes that there is no basis in the published literature or in the New Hampshire research to expect that the Project would have a discernible effect on property values or marketing times in local or regional real estate markets. See Appendix 46.

Tourism. Mitch Nichols of Nichols Tourism Group, an expert on tourism, assessed the relationship between Northern Pass and the tourism industry in New Hampshire. Noting that transmission lines in general do not, and that Northern Pass will not, affect travel demand, Mr. Nichols concluded that Northern Pass would not have a measurable effect on the New Hampshire tourism industry. See Appendix 45.

Financial, Technical and Managerial Expertise

Eversource Energy and its subsidiaries have extensive experience in planning, designing, constructing and operating electric transmission infrastructure projects. Eversource is the recipient of an Edison Award for outstanding development and construction of four critical projects. Eversource has been working on a significant number of other transmission projects including the Greater Springfield Reliability Project, the Interstate Reliability Project, and the Central Connecticut Reliability Project, which are three of the four major projects that are part of the $1.2 billion New England East-West Solution. Eversource enjoys an investment grade rating with a stable outlook from each of the three major credit rating agencies. As of December 31, 2014, Eversource held transmission assets in excess of $7.6 billion and has plans to invest an additional $3.9 billion in new transmission infrastructure over the next four years.

NPT will recover the costs of constructing the Project from Hydro Renewable Energy Inc. ("HRE"), an indirect, wholly-owned U.S. subsidiary of Hydro-Québec, under a Transmission Service Agreement ("TSA") approved by the Federal Energy Regulatory Commission ("FERC"). The HVDC facilities located on the Canadian side of the border will be owned and operated by Hydro-Québec TransÉnergie, a division of Hydro-Québec. The TSA allocates transmission capacity over the Project to HRE on the U.S. side of the border in exchange for transmission service payments that cover the costs of the investment made by NPT in the Project.

Conclusion

Northern Pass will deliver much needed clean, competitively priced, renewable hydropower to New Hampshire and the New England region at no cost to New Hampshire customers and with minimal impact to the State. At a time when the region is searching for ways to reduce energy costs and develop cleaner sources of electricity, Northern Pass provides a rare opportunity to achieve both goals.

The Project also delivers significant benefits that are unique to New Hampshire. Forward NH provides the State with approximately $3.8 billion in economic stimulus. New Hampshire is already receiving the benefit of $200,000 of the total $7.5 million commitment for the creation of jobs in the North Country and $500,000 of the total $3 million commitment to fund important environmental studies as part of the NFWF initiative. More significant benefits begin during the construction phase with the creation of direct and indirect jobs and a commitment to hire New Hampshire workers and contractors first. Once complete, the Project will substantially increase property tax revenues and provide a new source of energy that will reduce New Hampshire's electricity costs while also providing greater energy price stability throughout New England. Finally, Forward NH includes a $200 million fund that will offer grants to communities, organizations and businesses. These grants are focused on community betterment, clean energy innovation, and economic stimulus.

In a manner that is respectful to the voices of New Hampshire residents, NPT has taken very meaningful steps to reduce the Project's potential impact to the State's natural and cultural resources, all while accomplishing the vital goal of bringing clean, affordable power to the State and region, and offering unique and substantial economic benefits to New Hampshire.

JOINT APPLICATION FOR CERTIFICATE OF SITE AND FACILITY

(a) SIGNATURE OF APPLICANTS

Certification by Executive Officer of Northern Pass Transmission LLC:

In accordance with RSA 162-H:8, I, James A. Muntz, the President of Northern Pass Transmission LLC, do hereby swear and affirm that the information contained in this Application is true and accurate to the best of my knowledge and belief.

I also certify that, as an Applicant to the New Hampshire Site Evaluation Committee, Northern Pass Transmission LLC agrees to provide such information as the Committee shall require to carry out the purposes of RSA 162-H.

NORTHERN PASS TRANSMISSION LLC

By: James A. Muntz

Name: James A. Muntz

Title: President

Date: 10-16-2015

State of Connecticut

County of Hartford

On this 16th day of October, 2015, personally appeared before me the above-named James A. Muntz, President of Northern Pass Transmission LLC and swore and affirmed that the information contained in this Application is true and accurate to the best of his knowledge and belief.

Elizabeth A Maldonado

~~Justice of the Peace/Notary Public~~ Commissioner of the Superior Court

My commission expires on _____

Certification by Executive Officer of Public Service Company of New Hampshire d/b/a Eversource Energy:

In accordance with RSA 162-H:8, I, William J. Quinlan, the President and Chief Operating Officer of Public Service Company of New Hampshire d/b/a Eversource Energy, do hereby swear and affirm that the information contained in this Application is true and accurate to the best of my knowledge and belief.

I also certify that, as an Applicant to the New Hampshire Site Evaluation Committee, Public Service of New Hampshire d/b/a Eversource Energy agrees to provide such information as the Committee shall require to carry out the purposes of RSA 162-H.

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE D/B/A EVERSOURCE ENERGY

By: William J Quinlan

Name: William J. Quinlan

Title: President and Chief Operating Officer

Date: 10/16/15

State of New Hampshire

County of Hillsborough

On this 16 day of October, 2015, personally appeared before me the above-named William J. Quinlan, President and Chief Operating Officer of Public Service Company of New Hampshire d/b/a Eversource Energy, and swore and affirmed that the information contained in this Application is true and accurate to the best of his knowledge and belief.

Judy Smith

~~Justice of the Peace~~/Notary Public

My commission expires on 02/28/2017

Judy Smith
Notary Public-Connecticut
My Commission Expires
February 28, 2017

(b) APPLICANT INFORMATION

(1) Name of Applicants

Northern Pass Transmission LLC ("NPT")
Public Service Company of New Hampshire d/b/a Eversource Energy ("PSNH")

(2) The Applicants' Mailing Address, Telephone and Fax Numbers, and E-mail address

For NPT:
Jerry Fortier
Project Director
Eversource Energy
780 North Commercial Street
Manchester NH 03101
Phone Number: (860) 728-4639
Fax Number: (603) 634-3619
Email: jerry.fortier@eversource.com

For PSNH:
David L. Plante
Lead Project Manager – Transmission
Public Service Company of New Hampshire d/b/a Eversource Energy
780 North Commercial Street
Manchester NH 03101
Phone Number: (603) 634-3078
Fax Number: (603) 634-2924
Email: david.l.plante@eversource.com

(3) Name and Address of Parent Company

NPT is wholly owned by Eversource Energy Transmission Ventures, Inc., which in turn is a wholly-owned subsidiary of Eversource Energy ("Eversource"), a publicly-held public utility holding company. PSNH is a wholly-owned subsidiary of Eversource.

- Eversource Energy Transmission Ventures, Inc. has a principal place of business at 56 Prospect Street, Hartford, CT 06103.
- Eversource has a principal place of business at 56 Prospect Street, Hartford, CT 06103.

(4) If the Applicant is a Corporation

a. State of Incorporation

NPT is a limited liability company organized under the laws of New Hampshire, effective March 31, 2010.

PSNH is a corporation organized under the laws of New Hampshire, effective August 16, 1926.

b. Principal Place of Business

For both NPT and PSNH:
780 North Commercial Street
Manchester, NH 03101

c. Names and Addresses of Directors, Officers, and Stockholders

NORTHERN PASS TRANSMISSION LLC

SOLE MEMBER

Eversource Energy Transmission Ventures, Inc. (a wholly-owned subsidiary of Eversource Energy)	107 Selden Street, Berlin, CT 06037

MEMBERS COMMITTEE

James J. Judge	800 Boylston Street Boston, MA 02199
Leon J. Olivier	56 Prospect Street Hartford, CT 06103

OFFICERS

Chairman of the Members Committee	Leon J. Olivier	56 Prospect Street Hartford, CT 06103
President	James A. Muntz	56 Prospect Street Hartford, CT 06103
Executive Vice President and Chief Financial Officer	James J. Judge	800 Boylston Street Boston, MA 02199
Senior Vice President and General Counsel	Gregory B. Butler	56 Prospect Street Hartford, CT 06103
Vice President, Controller and Chief Accounting Officer	Jay S. Buth	107 Selden Street Berlin, CT 06037
Vice President and Treasurer	Philip J. Lembo	One NSTAR Way Westwood, MA 02090
Secretary	Richard J. Morrison	800 Boylston Street Boston, MA 02199

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
DBA EVERSOURCE ENERGY

SOLE STOCKHOLDER

Eversource Energy	300 Cadwell Drive Springfield, MA 01104

DIRECTORS

Gregory B. Butler	56 Prospect Street Hartford, CT 06103
James J. Judge	800 Boylston Street Boston, MA 02199
Thomas J. May	800 Boylston Street Boston, MA 02199
Werner J. Schweiger	107 Selden Street Berlin, CT 06037

OFFICERS

Chairman	Thomas J. May	800 Boylston Street, Boston, MA 02199
Chief Executive Officer	Werner J. Schweiger	107 Selden Street Berlin, CT 06037
President and Chief Operating Officer	William J. Quinlan	780 N. Commercial Street Manchester NH 03101
Executive Vice President and Chief Financial Officer	James J. Judge	800 Boylston Street Boston, MA 02199
Senior Vice President and General Counsel	Gregory B. Butler	56 Prospect Street Hartford, CT 06103
Senior Vice President – Transmission	James A. Muntz	56 Prospect Street Hartford, CT 06103
Vice President – Supply Chain, Environmental Affairs and Property Management	Ellen K. Angley	One NSTAR Way Westwood, MA 02090
Vice President, Controller and Chief Accounting Officer	Jay S. Buth	107 Selden Street Berlin, CT 06037
Vice President – Energy Supply	James G. Daly	One NSTAR Way Westwood, MA 02090
Vice President and Treasurer	Philip J. Lembo	One NSTAR Way Westwood, MA 02090
Vice President – Electric Operations	Joseph A. Purington	780 N. Commercial Street Manchester, NH 03101

Vice President – Engineering	Paul E. Ramsey	780 N. Commercial Street Manchester, NH 03101
Vice President – Generation	William H. Smagula	780 N. Commercial Street Manchester, NH 03101
Secretary	Richard J. Morrison	800 Boylston Street Boston, MA 02199
Assistant Secretary	Florence J. Iacono	800 Boylston Street Boston, MA 02199
Principal Engineer	Thelma J. Brown	780 N. Commercial Street Manchester, NH 03101

(5) If the Applicant is an Association

Not Applicable.

(6) Whether Applicant is the Owner or Lessee of the Site or Facility or Has Some Legal or Business Relationship to It

NPT has option agreements for a leasehold interest in three segments of a new right of way ("ROW") totaling approximately 32 miles extending from the Canadian border in Pittsburg, NH to the existing PSNH ROW in Dummer, NH. Uniting these three leased segments are two sections of public highway, totaling approximately eight miles in the towns of Pittsburg, Clarksville, and Stewartstown, where NPT will install underground transmission facilities pursuant to authority provided under RSA 231:160, *et seq.*

NPT has executed an agreement with PSNH to lease approximately 100 miles of existing electric transmission ROW from PSNH pursuant to RSA 374:30 in three segments: Dummer to Bethlehem—approximately 41 miles; Bridgewater to Franklin—approximately 25 miles; and, Franklin to Deerfield—approximately 34 miles. PSNH will submit the lease to the New Hampshire Public Utilities Commission ("NHPUC") for approval pursuant to RSA 374:30.

Northern Pass will be installed under public highways, pursuant to authority provided under RSA 231:160, *et seq*., for a distance of approximately 52 miles beginning in Bethlehem and continuing through Sugar Hill, Franconia, Easton, Woodstock, Thornton, Campton, and Plymouth, and ending in Bridgewater. Northern Pass, as well as relocated PSNH transmission and distribution facilities, will also cross over highways at various locations pursuant to RSA 231:160, *et seq.*

The Project lines will cross over or under public waters and lands owned by the State pursuant to authority provided under RSA 371:17. Crossings of land owned by the state that is

State-owned railroad property will be crossed consistent with the New Hampshire Department of Transportation ("NHDOT") *Utility Accommodation Manual*, Section XX, Railroads, as well.

In addition, the Project lines will cross a privately-owned railroad in Stark pursuant to agreements with the St. Lawrence and Atlantic Railroad. The Project will also cross federal land in Franklin, Hill, and New Hampton pursuant to an easement to be issued by the U.S. Army Corps of Engineers ("USACE") in connection with the review of the Clean Water Act Section 404 Permit application.

NPT will construct six transition stations on land for which it has a lease option in Pittsburg, Clarksville, Stewartstown, Bethlehem, and Bridgewater and will also construct a converter terminal on such land in Franklin, in order to convert high voltage direct current ("HVDC") power to alternating current ("AC") power.

For the entire length of the transmission line, NPT will own all transmission facilities, including, all lines, supporting structures, underground/above ground transition facilities, and the DC/AC converter terminal.

PSNH owns the sites of AC system upgrades required by the Independent System Operator-New England ("ISO-NE"). Upgrades to the lines between the Deerfield substation and the Scobie Pond substation located in Londonderry, as well as at the stations themselves will be required.

(7) Statement of Assets and Liabilities

Statements of assets and liabilities of Eversource and PSNH are attached to the pre-filed testimony of Michael J. Auseré. There is no statement of assets and liabilities available for NPT.

(c) SITE INFORMATION

(1) Location and Site Address of Proposed Facility

Northern Pass is a linear electric transmission line that does not have a physical address for the Project as a whole. The location of the 192-mile transmission line and associated facilities is shown on the Project Maps submitted in response to Site 301.03 (c)(3) and 301.03 (g)(1). See Appendix 1.

The physical address of the Franklin Converter Station is 1079 South Main Street, Franklin, NH; the physical address of the Deerfield Substation is 27 Cate Road, Deerfield, NH; and the physical address of the Scobie Pond Substation is 6 Brewster Road, Londonderry, NH.

(2) Site Acreage Shown on Attached Property Map and Located by Scale on U.S. Geological Survey or GIS Map

Figure 1 immediately following includes a set of eight map sheets, including a Project Overview USGS Map and seven Project Segment Maps. The overhead and underground transmission corridors and transmission lines are not shown to scale because they would be difficult to discern. The Project is located by scale on the Project Maps included in Appendix 1.

Total acreage for the overhead transmission corridor is 2,985.1 acres, comprising 2,520 acres of existing ROW (a portion of which is to be leased from PSNH) and 465.1 acres of new ROW. The total acreage for the underground transmission corridor is 175.9 acres. The overall total corridor acreage is 3,161 acres.

The overhead transmission line and relocations occupy 169.0 acres of new ROW and 574.6 acres of existing ROW. The underground transmission line occupies 68.9 acres. The overall total line acreage is 812.5 acres.

Total property area for the location of the converter terminal is 118.5 acres; the converter terminal occupies 10 acres. Total property area for the locations of the six transition stations is 406.7 acres; the transition stations occupy 11.8 acres. Total property area for the Deerfield and Scobie Pond Substations is 125.8 acres; the upgrades occupy 11.6 acres.

(3) Location of Residences, Industrial Buildings, and Other Structures and Improvements Within or Adjacent to the Site

Appendix 1 includes 365 Project Maps showing the location of residences, industrial buildings as well as other structures and improvements, and the location of the lines, structures,

associated facilities, wetlands, resource areas, water bodies, highway crossings, and on-site access roads.

(4) Identification of Wetlands and Surface Waters of the State Within or Adjacent to the Site

Wetlands and surface waters of the State located within or adjacent to the Project are shown on the Project Maps, Appendix 1, and the Wetland Maps, Appendix 47. The identified wetlands and other surface waters are also documented and described in detail as a part of the *Natural Resource Mitigation Report*, the New Hampshire Department of Environmental Services ("NHDES") Standard Dredge & Fill Permit Application, USACE Section 404 and Section 10 Individual Permit application, the NHDES Alteration of Terrain Permit Application, and the NHDES Section 401 Water Quality Certification Application. The report and permit applications are referenced in Section (d) of this SEC Application and are included as Appendices 32, 2, 3, 6 & 4, respectively. Sections (h), (i), and (j) of the Application also include pertinent information relating to potential natural resource effects and the proposed mitigation plan.

Wetlands and streams were field-delineated and reviewed by a team of New Hampshire certified wetland scientists from Normandeau Associates as a part of the intensive natural resources survey effort conducted in support of the Project. Wetlands were delineated in accordance with the USACE *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (2009)[11] and state guidance documents.

Over 2,000 wetlands, 271 vernal pools, and almost 1,000 streams and rivers were delineated, classified, and assessed during Project fieldwork on the proposed and alternate transmission line routes, facility locations, and off-ROW access roads. Field surveys for these resources followed standardized methods accepted by New Hampshire and federal regulatory agencies. The USACE reviewed selected delineations in the field and accepted them. Most of the wetlands are emergent or shrub dominated, as they are within an existing transmission or road ROW and regularly mowed or selectively cut. Forested wetlands are the most commonly encountered type of wetland in the proposed new ROW.

[11] U.S. Army Corps of Engineers. 2009. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-09-19. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

The Project lines cross several rivers and many perennial, intermittent and ephemeral streams. The location and classification of wetland and surface water resources are shown in the Project Maps, Appendix 1, and described in greater detail in the *Wetlands, Rivers, Streams and Vernal Pools Resource Report and Impact Analysis*, Appendix 31.

Seventy-five named watercourses and numerous smaller unnamed streams and tributaries were also identified within the Project area. The major rivers crossed by the corridor include the Connecticut River, Upper Ammonoosuc River, Israel River, Ammonoosuc River, Gale River, Pemigewasset River, Merrimack River, Suncook River, and Soucook River. See Appendix 1 for the Project Maps, which display the location of rivers and other watercourses within the Project area. Twenty-five linear miles of watercourses and/or watercourse banks were field-delineated during the natural resources survey, with the majority of the features being small intermittent and ephemeral drainages, many of which are associated with wetlands.

Permit applications for work in the 250-ft protected shoreland of the 21 waterbodies in the Project area that are regulated under the NH Shoreland Water Quality Protection Act (SWQPA, RSA 483-B) and its regulations (Env-Wq 1400) are being submitted with this application in the NHDES Shoreland Permit Applications. See Appendix 5.

(5) Identification of Natural and Other Resources at or Within or Adjacent to the Site

Natural and other resources at or within or adjacent to the site are shown on the Project Maps. See Appendix 1.

The Project area includes a diverse cross-section of New Hampshire's working and natural landscapes. Approximately 83% of the route is located along public roadways or an existing transmission line corridor. Adjacent areas include a mixture of moderate and light residential development, light commercial and industrial development, and agricultural areas, as well as cleared and regenerating shrub and forested-lands that have been recently or historically logged. Most of the Project is located in rural areas, although some locations are more developed. In addition to the sixty miles of the route which will be constructed underground, the proposed Project lines cross several State and local roads, as well as Interstate 93.

The Project is located primarily within private lands. The Project lines also cross several public and private conservation properties along existing ROW areas, including but not limited to, the White Mountain National Forest ("WMNF"); the Appalachian National Scenic Trail ("Appalachian Trail" or "AT"); the Nash Stream, Percy, Cape Horn and William H. Thomas

State Forests; the Rocks Estate; Bear Brook State Park; the Pondicherry Unit of the Silvio O. Conte National Fish and Wildlife Refuge; and some smaller holdings such as town, family, and memorial forests and easements. See Appendix 1 for the Project Maps, which display the location of public and private conservation properties along the Project ROW.

Plants and Vegetation

In order to document the natural resources, community types, and land uses, various studies were performed by Normandeau Associates. A detailed natural community and rare, threatened, and endangered species survey was conducted within the proposed Project area. This survey was designed with input from state and federal resource agencies to thoroughly catalogue any protected resources. See *Vegetation and Ecological Communities Report,* Appendix 34 and *Rare, Threatened and Endangered Plants and Exemplary Natural Communities Report*, Appendix 35. Wildlife habitat surveys were also conducted in order to describe and access areas that may be suitable Deer Wintering Areas, vernal pool habitats, songbird and migratory bird habitats, and habitats for other terrestrial mammals and riparian species. These surveys are addressed in detail in Section (i) and in Appendix 36 *Wildlife Report and Impact Assessment.*

The Project lines traverse seven ecoregion subsections between the US border with Canada and the Scobie Pond substation in Londonderry. These subsections are described in Appendix 34. Spruce-fir and northern hardwood forests dominate in the White Mountains and northward; mixes of hardwoods, hemlock, and white pine dominate in central areas; and pitch pine and oaks appear in forests in the southern section where they are locally abundant on the extensive sand plains of the Merrimack River valley. The vast majority of vegetation in the Project area consists of native species (in the forested portion of the ROW) or non-invasive, non-native species (such as common pasture grasses) in the existing ROW that is maintained by mowing. Invasive species are generally present at low frequencies, near roads in developed areas and agricultural fields. Much of the northern section of the Project has been intensively logged, although it does include some areas of intact forest that have not been disturbed in recent decades.

Rare plant survey methods were developed through consultation with the US Fish and Wildlife Service ("USFWS"), US Forest Service ("USFS"), and NH Natural Heritage Bureau ("NHNHB"). Surveys were then conducted by qualified botanists for target species and NHNHB reporting protocols were followed when rare plants were encountered. Appendix 35.

To protect these sensitive resources, the boundaries of rare plant populations and communities were surveyed but not shown on Project Maps that are publicly available. The rare plant locations and potential Project-related impacts were provided to the relevant regulatory agencies and discussed in detail prior to the filing of this Application. This consultation process and the agency recommendations are documented in the *Regulatory Agency Consultation Summary Table*, Appendix 48. Seven state-listed threatened or endangered species, eight state-watch species, four state indeterminate species, and one potential state exemplary natural community were observed within the Project area. No federally-listed threatened or endangered plant species were observed. Most of the documented rare plant species within the existing transmission ROW are dependent upon open (non-forested) conditions, which are partially or entirely maintained by mowing, disturbance associated with recreational activities, or both. The results of these surveys are described in Section (i) of this application and Appendix 35.

Wildlife and Wildlife Habitat

Wildlife habitat and rare species surveys were conducted in the Project area following protocols developed through consultation with state and federal biologists, as detailed in Appendix 36. As requested by NH Fish and Game Department ("NHFG"), USFWS, and USFS, the Project screened for the presence of all state-listed wildlife species, federally-listed wildlife species, WMNF Forest Service Sensitive Species, and three high-value habitat types. These surveys included desktop studies and direct surveys, snow tracking surveys, aerial raptor nest surveys, and targeted and general habitat evaluation. The Project area was found to include habitats or potential habitats for 25 state or federally listed threatened, endangered, or special concern insects, amphibians, reptiles, birds and mammals. In addition, several locations with Deer Wintering Areas, Moose Concentration Areas, bear-scarred beech stands, and other important wildlife habitats were documented. All of these resources were considered during Project design, and to the extent practicable, impacts were avoided and minimized. Impacts to wildlife habitats are addressed in the Project mitigation plan. See *Natural Resource Mitigation Plan*, Appendix 32.

Aquatic resources

Aquatic resources within the streams and rivers of the Project area, including rare freshwater fish and mussels, cold water fish habitat, and Essential Fish Habitat ("EFH"), were also evaluated. Details of the aquatic survey work plans developed through consultations with

state and federal regulatory agencies, as well as the survey results, are included in the *Fisheries and Aquatic Invertebrates Resource Report and Impact Analysis*, Appendix 33. All of the streams north of the confluence of the Merrimack and Pemigewasset Rivers, and some of the streams south of that point are considered cold water streams capable of supporting brook trout and other important cold/cool water species. The Project area contains 163 perennial rivers and streams more than 1-foot wide (this is less than one per mile). The Stream Segment Temperature Model ("SSTEMP") was used to evaluate the potential thermal impact of tree canopy clearing on all of these streams.

The Connecticut, Androscoggin, Merrimack, and Lamprey Rivers, including their tributaries, have also been designated as EFH for Atlantic Salmon eggs, larvae, juveniles, adults, and spawning adults, although in the Project area, only the Lamprey River is currently accessible to salmon. Because the existing and proposed ROW crosses the main channels and tributaries of the Merrimack, Connecticut and Lamprey Rivers, and tributaries of the Androscoggin Rivers, the potential effects of construction activities were evaluated for these rivers.

Surveys were conducted for the state and federal endangered, threatened and special concern mussels. A desktop review identified six streams for field survey and mussel surveys were conducted by an experienced, agency-approved aquatic biologist by viewtube, snorkel or SCUBA gear, depending on water depth. Only the Eastern elliptio, one of the most common and abundant freshwater mussel species in New England, was found in the Project area during the surveys and described in Appendix 33.

Historical Sites

The known archeological resources and sensitivity areas along the Northern Pass route have been identified in numerous Phase I-A and I-B archeological surveys conducted both by (1) the U.S. Department of Energy ("DOE") in its work on the Draft Environmental Impact Statement ("DEIS") and under Section 106 of the National Historic Preservation Act, and (2) NPT's archeological consultants. Above ground historic resources have been surveyed by the DOE, and separately for NPT by its historical resources consultants. These resources are described and discussed in Section (i)(2) of this application and Appendices 19 to 30.

(6) Information Related to Whether the Proposed Site and Facility Will Unduly Interfere with the Orderly Development of the Region Having Given Due Consideration to the Views of Municipal and Regional Planning Commissions and Municipal Governing Boards

Northern Pass will not interfere with the orderly development of the region. The Project will provide substantial, wide-ranging economic benefits to New Hampshire citizens and businesses and will further the goals of state and regional environmental policies by increasing the supply of low carbon Canadian hydropower. The Project will also diversify the regional power supply, enhance reliability and provide other system electrical benefits.

As required, Section (j) of this Application addresses the potential effects of the Project on local land use, local economy, and local employment. Potential impact on land use is assessed in the Normandeau Associates report titled *Review of Land Use and Local, Regional and State Planning*, Appendix 41. That report and the associated testimony of Robert Varney concludes that the Project will not change prevailing land uses along the corridor. The prevailing land uses along the corridor include forest, agriculture, residential, commercial, industrial, transportation, utilities, conservation, recreation, historic, and natural resources. The existing electric utility corridor in these areas has been a part of the fabric of local development. There will be no changes to the continuation of these uses resulting from the Project. Approximately 83 percent of the Project is located in existing electric transmission line and transportation corridors. Siting a new transmission line in already developed corridors is a sound planning and environmental principle because it reinforces local patterns of development and minimizes environmental impacts. As the SEC has found in prior decisions, utilizing pre-existing corridors is consistent with the orderly development of the region because it maintains current development patterns and minimizes impacts to local land use. See *Decision* in *Portland Natural Gas Transmission System Maritimes & Northeast Pipeline Company*, Docket No. 96-01 and Docket No. 96-03, Decision (July 16, 1997), and *Findings of the Bulk Power Facility Site Evaluation Committee, Application of New England Hydro - Transmission Electric Company,* Inc., Docket No. DSF 85-155 (Sept. 16, 1986).

Approximately eight miles of the Project in Pittsburg, Clarksville and Stewartstown and 52 miles from Bethlehem to Bridgewater will be placed underground. There will be no change to the existing land uses along those underground segments.

In addition, the approximately 32 miles of new ROW between Pittsburg and Dummer will have limited impact on land use. Twenty-four miles of this northernmost segment of overhead line will be located on property that is primarily forested, and managed for uses such as timber harvesting, recreation and other energy facilities. This segment is actively managed by Wagner Forest Management for timber harvesting, and the Granite Reliable Wind Project, an SEC-certificated, operating wind farm, is also located in this area. These uses will continue uninterrupted after construction.

By using existing ROW and transportation corridors, and locating portions of the Project underground, the Project will not disrupt adjacent land uses and is fully consistent with local and regional patterns of development.

Mr. Varney also reviewed whether the Project is consistent with local, regional and statewide long-range plans. See Appendix 41. Mr. Varney examined local land uses in each community along the Project route; conducted a review of local, regional, state and federal long-range planning documents; considered comments received through NPT's public open houses; discussed the Project with local and regional planners; and reviewed the DEIS and comments received during the DOE scoping process, the DEIS comment period, and the Applicants' pre-application Public Information Sessions. Based on his extensive review, Mr. Varney concludes that the Project will not interfere with the implementation of local, regional and state-wide plans.

NPT commissioned several assessments of the potential economic impact of the Project on the region and the State. Julia Frayer of London Economics, Inc. prepared a comprehensive assessment of the local economic impact. That assessment concludes that the construction and operation of the Project will produce a variety of economic and environmental benefits to New Hampshire and the New England region. Five categories of benefits are discussed in her report, *Cost-Benefit and Local Economic Impact Analysis of the Proposed Northern Pass Transmission Project*, and include: (i) wholesale electricity market benefits, (ii) retail electricity cost savings, (iii) local economic benefits, (iv) production cost savings, and (v) emissions reductions. See Appendix 43. In addition, as detailed in the report of Dr. Lisa Shapiro, *Northern Pass Transmission Project - Estimated New Hampshire Property Tax Payments Report*, the Project will increase revenue generated from state, county and local property taxes in New Hampshire. See Appendix 44.

The impact of Northern Pass on property values is summarized in a report prepared by Dr. James A. Chalmers, *High Voltage Transmission Lines and New Hampshire Real Estate Markets: A Research Report,* Appendix 46. Dr. Chalmers assessed the state of knowledge concerning the effect of high voltage transmission lines ("HVTL") on property values and supplemented existing research on that issue with three New Hampshire specific research initiatives, applying the findings summarized in his report. Dr. Chalmers' conclusions are consistent with those in the professional literature, namely, that there is no evidence that HVTL result in consistent measurable effects on property values, and where there are effects, they are minimal and decrease rapidly with distance.

The relationship between tourism and the Project is assessed in *Northern Pass Transmission and New Hampshire's Tourism Industry* as prepared by Mitch Nichols of Nichols Tourism Group. See Appendix 45. This report concludes that HVTL in general do not, and that the Project specifically will not, impact travel demand, and that Northern Pass will not have a measurable impact on New Hampshire's tourism industry.

Based on all of the foregoing, and in consideration of the information provided in Sections (j)(1) through (j)(3), the Project will not unduly interfere with the orderly development of the region.

(d) OTHER REQUIRED APPLICATIONS AND PERMITS

(1) Identification of All Other Federal and State Government Agencies Having Jurisdiction, Under State or Federal Law, to Regulate any Aspect of the Construction or Operation of the Proposed Facility

RSA 162-H:7, IV provides that "[e]ach application shall contain sufficient information to satisfy the application requirements of each state agency having jurisdiction, under state or federal law, to regulate any aspect of the construction or operation of the proposed facility, and shall include each agency's completed application forms." The statute thus requires an applicant to satisfy the application requirements of the "state agencies having permitting or other regulatory authority." *Id.* The Applicants acknowledge that under Site 301.03(d) the SEC may require the filing of additional information relative to other agencies and other aspects of regulation and regulatory compliance under its rulemaking authority. However, as discussed below, the Applicants submit that the statute limits the agencies that may make agency-specific completeness determinations to those state agencies that make final decisions.

Pursuant to the statute, each state agency having permitting or other such regulatory authority must determine if an application contains "sufficient information for its purposes" to make a final decision. *Id.* Accordingly, the Applicants believe that only those state agencies that make a final decision by issuing a permit, order or decision within the time limits established in RSA 162-H:7, IV-c, may participate in making a completeness determination under the statute. Those state agencies include NHDES, NHPUC, and NHDOT.

An agency's purpose under the statute must be read in the context of its other requirements under the statute, namely, those that require an agency having permitting or other regulatory authority to report its progress to the SEC within 150 days and to make a final decision within 240 days. RSA 162-H:7, VI-b and VI-c. This position is consistent with the fundamental goal of resolving all issues in an integrated fashion, as set forth in RSA 162-H:1. Moreover, the statute recognizes that agencies having permitting or other such regulatory authority over a project comprise only those agencies that may dictate terms and conditions in a permit or decision, or deny a necessary approval altogether. RSA 162-H:16, I.

Recent amendments to RSA Ch. 162-H, specifically, the addition of RSA 162-H:7-a, which recognizes the two basic ways in which state agencies may participate in SEC proceedings, i.e., as an agency that makes a final decision, or as an agency that takes a position on how the SEC should make a particular finding supports this conclusion.

a. Federal Agencies

- United States Department of Energy ("DOE") (authority over U.S.A.-Canada border crossing and environmental impact of the Project);
- US Army Corps of Engineers ("USACE") (Clean Water Act, 33 U.S.C. § 1344 *et. seq.*, relative to wetland protection as addressed through the New Hampshire Programmatic General Permit);
- US Environmental Protection Agency ("USEPA") (Clean Water Act, 33 U.S.C. § 1251 *et. seq.*, relative to the National Pollutant Discharge Elimination System ("NPDES") Construction General Permit);
- United States Forest Service ("USFS") (authority over federally owned and managed land crossings);
- United States National Park Service (authority over Appalachian Trail crossing as delegated to the United States Forest Service);
- Federal Aviation Administration ("FAA") (14 C.F.R. § 77.9 relative to the preservation of navigable airspace, an air obstruction determination under FAA Regulation Part 77.9(b) is required);[12] and
- US Fish and Wildlife Service ("USFWS") (Endangered Species Act (ESA) of 1973, 16 U.S.C. § 1531, *et. seq.*, relative to protection of federally-listed threatened and endangered species as addressed under the New Hampshire Programmatic General Permit).

b. State Agencies

1. *State Agencies That Make An Agency Completeness Determination*

- NH Department of Environmental Services ("NHDES"), Water Division, Wetlands Bureau (RSA Ch. 482-A, relative to dredge and fill in wetlands as addressed under the NHDES Wetlands Permit Application);
- NHDES, Water Division, Alteration of Terrain ("AoT") Bureau (RSA 485-A:17, relative to surface water runoff from land disturbance as addressed under the NHDES Alteration of Terrain Permit Application);

[12] The Applicants will submit FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the FAA at least 45 days before commencing construction.

- NHDES, Water Division, Watershed Management Bureau (Clean Water Act, 33 U.S.C. § 1341 *et. seq*., related to state certification that the Project will meet state water quality standards);
- NHDES, Water Division, Shoreland Program (RSA Ch. 483-B, the Shoreland Water Quality Protection Act, establishes standards for development adjacent to the state's public water bodies as addressed under the NHDES Shoreland Permit Application);
- NH Department of Transportation ("NHDOT") (RSA Ch. 236, 231 and 265 relative to regulation of the highway system, requires permits for utility crossings and use of NHDOT ROWs); and
- NH Public Utilities Commission ("NHPUC") (jurisdiction relative to crossings of public waters and lands under RSA 371:17 as addressed under the four NHPUC License Applications, and a Petition to Commence Business as a Public Utility under RSA 374:22).

2. *Other State Agencies*

- NH Division of Historical Resources ("NHDHR") (National Historic Preservation Act, 16 U.S.C. § 470 and RSA Ch. 227-C regarding cultural resource protection);
- NH Natural Heritage Bureau ("NHNHB") (authority under RSA Ch. 217-A, the NH Native Plant Protection Act, to review impacts to state-listed rare, threatened, and endangered plant species as addressed under the NHDES Wetlands Permit Application);
- NH Fish & Game Department ("NHFG") (authority under RSA Ch. 212-A, the NH Endangered Species Conservation Act, to review impacts to state-listed rare, threatened, and endangered wildlife species as addressed under the NHDES Wetlands Permit Application); and
- NH Department of Safety, Division of Fire Safety, State Fire Marshal (RSA Ch. 21- P:12 relative to the responsibilities of the State Fire Marshal, ensuring compliance with the NH State Fire Code and the NH State Building Code through the review of plans prior to construction). See Appendix 50.

(2) Documentation that Demonstrates Compliance with the Application Requirements of Such Agencies

Documentation demonstrating compliance with the application requirements of the State and federal regulatory agencies listed in (d)(1) above has been included within the agency application

forms and supporting documentation contained in the Appendices listed in the following Section (d)(3).

Applications for certain construction related approvals from state and federal agencies will be filed by NPT or its contractors after: (1) the SEC site certificate and other approvals listed above are issued; (2) equipment is ordered; and (3) field work is ready to begin. These may include, if necessary:

- NHDOT Special Permit to move a load in excess of legal limit;
- NHDOT Driveway / Curb Certification;
- New Hampshire Department of Resource and Economic Development ("NHDRED") Notice of Intent to Cut;
- USEPA NPDES Construction General Permit;
- FAA Form 7460-1, Notice of Proposed Construction or Alteration;
- Blasting Permits;
- NHDES Groundwater Discharge Permit; and
- NHDES approval of laydown areas, storage areas, wire pulling sites, temporary access roads, and permanent access roads.

(3) A Copy of the Completed Application Form for each Such Agency

A copy of the relevant permit application forms have been included in this application and appended as follows:

Appendix 2:	NHDES Wetlands Permit Application
Appendix 3:	USACE Section 404 Clean Water Act and Section 10 Rivers and Harbor Act Application
Appendix 4:	NHDES Section 401 Water Quality Certification Application
Appendix 5:	NHDES Shoreland Permit Applications
Appendix 6:	NHDES Alteration of Terrain Permit Application
Appendix 7:	DOE Presidential Permit Application
Appendix 8:	USFS Special Use Permit
Appendix 9:	NHDOT Petition for Aerial Road Crossings
Appendix 11-15:	NHPUC Petitions[13]

[13] NPT will file a petition to commence business and petitions to cross public waters and lands owned by the State. PSNH will file petitions to cross public waters and lands owned by the State.

(4) Identification of Any Requests for Waivers from the Information Requirements of any State Agency or Department Whether Represented on the Committee or Not

The Applicant has requested waivers of the following agency rules as provided in the Table below:

Table 1

Agency:	Rule:	Which Seeks Information About:
NHDES Wetlands	Env-Wt 501.02(a)(3); 505.01(i)	Attach legible and labeled color photographs clearly depicting the jurisdictional areas to be impacted, the resource outside of impact area, and any shoreline structures and culvert inlet/outlets
NHDES Alteration of Terrain	Env-Wq 1503.08; 1503.11	One copy of plans as specified in Env-Wq 1503.11, as applicable for the proposed project, printed on white paper that is 34 to 36 inches wide by 22 to 24 inches high. The waiver request is in reference to the transmission line plans, which will be printed at 11 by 17 inch instead of required dimensions.
NHDES Alteration of Terrain	Env-Wq 1504.09(b)(2)(c)	For all other areas that contribute runoff to the project site, soil types shall be identified in accordance with: 1. The NRCS county-wide web soil survey as found at http://websoilsurvey.nrcs.usda.gov; or 2. SSSNNE Special Publication No. 3, Site-Specific Soil Mapping Standards for New Hampshire and Vermont, December 2006. This waiver request is in reference to the transmission line portions of the Project only).

(e) ENERGY FACILITY INFORMATION

Not Applicable.

(f) ELECTRIC GENERATING UNIT INFORMATION

Not Applicable

(g) TRANSMISSION LINE INFORMATION

(1) Location Shown on U.S. Geological Survey Map

The location of the Project is shown on US Geological Survey maps which are provided in Appendix 2 NHDES Wetland Permit Application Appendix A USGS Topographic Maps.

(2) Corridor Width For:

a. New route

The width of the new ROW located in Coös County in the towns of Pittsburg, Clarksville, Stewartstown, Dixville, Millsfield and Dummer will be 120 feet.

b. Widening along existing route

Table 2 presents a breakout of ROW widening along the existing ROW.

Table 2

County	Town	Approximate Location	Approximate Distance (feet)	Expansion (feet)
Merrimack	Pembroke	Proposed Structure 3132-178 to 3132-195	8,014	45
Rockingham	Deerfield	Cate Road, east and parallel with existing ROW	343	85
	Deerfield	From previous segment toward Deerfield Substation, southeast, not parallel with existing ROW	342	Varies from 285 to 515
Coös	Whitefield	Proposed Structure DC-609 to DC-611 triangular area parallel to southerly edge of the existing ROW	328	124

(3) Length of Line

The total length of new transmission line, including overhead transmission line and underground cable, is 192 miles.

(4) Distance Along New Route

The length of new overhead transmission line along a new route is approximately 32.0 miles. The length of new underground cable along a new route is approximately 60.5 miles.

(5) Distance Along Existing Route

The length of new overhead transmission line along the existing route is approximately 99.5 miles. No underground cable is being installed along the existing route.

(6) Voltage (Design Rating)

NPT proposes to construct a single circuit ±320 kV HVDC transmission line from the Canadian border in Pittsburg, New Hampshire to a new converter terminal in Franklin, New Hampshire where the direct current ("DC") will be converted to alternating current ("AC"). From Franklin, a new 345 kV transmission line will connect with the existing substation in Deerfield, New Hampshire.

(7) Any Associated New Generating Unit or Units

There are no associated generating units.

(8) Type of Construction

The new HVDC line will be constructed utilizing a combination of overhead and underground construction techniques. The new 345 kV AC line and 115 kV line configurations will be constructed utilizing conventional overhead transmission line construction techniques. The Project also includes a new converter terminal, construction of six new HVDC OH/UG Transition Stations and modifications to two existing substations and transmission lines.

For the portion of the Project running from the international border to Franklin, New Hampshire, NPT proposes to construct a single circuit ±320 kV HVDC transmission line. The line will be above ground, except for two underground cable segments in the northern sections totaling approximately 8.2 miles of the Project and a 52.3 mile underground segment in the central portion of the Project. The total length of the HVDC portion of the Project is approximately 158.3 miles. For the AC portion of the Project, Northern Pass proposes to construct a single circuit 345 kV AC overhead transmission line between a new converter terminal in Franklin to an existing substation in Deerfield. The length of the AC portion of the Project is approximately 33.7 miles. The Project will include six HVDC Overhead to Underground Transition Stations located in Pittsburg, Clarksville (2), Stewartstown, Bethlehem

and Bridgewater. There are also modifications to the Deerfield and Scobie Pond Substations and two transmission lines between the stations.

Overhead Transmission Line Construction

The overhead transmission lines will be constructed in a progression of activities typically proceeding as follows:

- Development of a compliance plan
- Establishment of marshaling yard and laydown area locations;
- Removal of ROW vegetation and mowing in advance of construction;
- Installation of soil erosion and sedimentation controls;
- Construction of access improvements, as needed
- Construction of work pads and pulling sites;
- Removal and disposal of existing transmission line components;
- Installation of foundations and structures;
- Installation of conductor and shield wire; and
- Restoration of the ROW.

Development of a Compliance Plan

The compliance plan will be prepared by the contractors and reviewed by the Project Management Team ("PMT") and will describe the work plan, erosion control measures, will identify the sensitive resources and mitigation measures required and will determine the measures contractors will use to ensure compliance with the Certificate.

Establishment of Laydown Area Locations

Project laydown yards generally consist of existing open areas approximately five to fifty acres in size, which are located off the ROW along the length of the Project. These yards will be utilized for material and equipment storage, work force parking and field offices. The Applicants will require that the contractors establish these laydown yards in previously disturbed areas selected, in part, because they will have little to no environmental or community impacts. Laydown yards will typically: be located away from residential areas; be of sufficient size to accommodate necessary vehicles and equipment; have a means to restrict access; not require tree clearing or extensive grading; not require any disturbance to wetlands or waterbodies; and be located on land under control of the Applicants or their contractors, by lease agreement or otherwise. Sites typically chosen include parking lots, gravel pits and industrial sites.

The initial laydown yards have been identified and are depicted on the Wetland Maps at Appendix 47. Additional laydown areas may be identified, as necessary, during the course of construction. As part of this Application, and to the extent any other environmental approvals are necessary in connection with the identification of additional laydown areas, the Applicants request that the SEC delegate authority to NHDES to issue such approvals.

Removal of Vegetation and Mowing in Advance of Construction

The ROWs will be cleared of trees and brush to provide the necessary access for construction equipment and a safe work area for crews. Clearing the ROWs provides for an environment that safely and reliably supports the construction and ongoing operation of the transmission lines. No herbicides will be used for clearing during construction. During the tree clearing operations the preliminary erosion control measures will be installed on an as needed basis. As the tree clearing operation progresses along the ROW, the transmission line construction process will begin and follow the tree clearing operations.

Where the Project will be constructed in the area of new ROW, construction will commence with clearing of all tall-growing woody species within the 120 foot width of the ROW. The remainder of the overhead transmission line route is located in existing transmission line corridors and will require mowing of access roads, selective clearing and side trimming to accommodate the additional transmission line.

Generally, trees will be cut close to the ground, leaving the stumps and roots in place to minimize ground disturbance. Stumps will only be removed where required to facilitate structure installations, access, or a safe working environment.

Small trees and shrubs within the ROW will be mowed, as necessary, with the intent of preserving roots and low-growing vegetation to the extent practical. Where the ROW crosses streams and brooks, low-growing vegetation along the stream bank will be selectively cut to preserve a riparian buffer that will minimize the disturbance of stream bank soils and reduce the potential for erosion and sedimentation. In addition, the Applicants will preserve low-growing vegetation in accordance with regulatory guidance or permit conditions, as necessary, to protect rare, threatened, and endangered ("RTE") species or habitats. This Project will span more than one growing season; therefore, additional mowing of access roads and work pads may be required as vegetation re-generates in these locations.

Tree removal equipment will utilize existing access roads which may be improved as necessary to facilitate a safe and productive working environment while minimizing overall disturbance. The boundaries of wetlands will be clearly marked prior to equipment mobilization to prevent unauthorized vehicular encroachment into wetland areas. Forestry equipment will be operated from upland areas. Trees within wetland areas that are inaccessible by equipment staged in upland areas will be removed manually.

Installation of Soil Erosion and Sedimentation Controls

As discussed above, a compliance plan will be prepared by the contractor and reviewed by the PMT to describe the work plan, erosion control measures and identify the sensitive resources and mitigation measures required. Pre-construction walkovers will be performed by members of the PMT and the contractor in preparation for the Project.

Full erosion control measures will then be installed in a linear progression along the Project ROW in order to prepare the work areas ahead of construction and this process will be completed along the ROW until each section of the Project is complete and these measures will then be maintained until disturbed areas have been restored and stabilized. At that point a similar progression will occur to remove the erosion control measures and restore the ROW to meet the requirements.

Construction of Access Improvements

Construction vehicles must be able to access the location of each structure that will support the transmission lines. Therefore, access to the construction sites will be achieved by utilizing existing roads, developing new roads or by using timber mats. Timber mats may be used in or around wetlands to protect these environmentally sensitive areas. Silt fencing and/or other environmental controls will also be used to stabilize the soil and protect wetlands during construction. At the request of property owners, gates may be installed across new access roads where they intersect town or state roads to help deter unauthorized access to the ROW or where access roads cross agricultural land containing livestock. Access road improvements average two to three days on each property.

Construction of Work Pads and Pulling Sites

At each transmission line structure site along the ROW, a work area, called a “crane pad”, is required to stage structure components for final on-site assembly and to provide a safe, level work base for the construction equipment used to erect the structure. The size and

configuration of a crane pad at a particular structure location would vary based on site-specific conditions; however, a typical pad averages about 120 feet by 100 feet. The exact locations and configurations of crane pads will be determined during final Project design based on site-specific conditions (e.g., to avoid or minimize work in wetlands or other environmentally- or culturally-sensitive areas). However, at each structure site, the crane pad will generally be situated within the structure location envelope identified on the Project Maps.

A typical (upland) installation of a crane pad involves several steps, beginning with the removal of vegetation, if necessary. The crane pad site then will be graded to create a level work area and, if necessary, the upper three to six inches of topsoil (which is typically unsuitable to support the necessary construction activities) will be removed and temporarily stockpiled within the ROW. A filter fabric layer then will be installed over the excavated area and a rock base allowing for drainage, then would be layered on top of the filter fabric. Additional layers of rock with dirt/rock fines are typically placed over this rock base. Finally, a roller is used to flatten and compact the pad. Crane pads often can be modified and contoured to the surrounding area to minimize impacts. In areas where crane pads must unavoidably be located in wetlands, layers of removable timber mats are typically used to construct the pads. Alternatively, a large rock base layer may be used to allow water to flow underneath the pad with smaller rock, layered on top of larger rock, followed by the final layer of gravel intermixed with soil.

The wire-stringing operation requires a work pad approximately 100 feet by 200 feet, which is used for staging material and the puller and tensioner equipment, at each end of the section that is being strung. These pulling sites will be set up at various intervals along the ROW and are placed just before the stringing activity takes place. The Applicants request that the SEC delegate authority to NHDES to review and approve, as necessary, the location of wire pulling sites.

Upon completion of construction, the crane pads and wire pulling sites, rock base and fabric materials, and timber mats (where used for crane support in wetlands) will be removed. The topsoil layer will be re-spread over the crane pad site and the area will be returned to pre-construction grade, to the extent practical and consistent with Eversource's ROW maintenance program.

Installation of Foundations and Structures

There are three separate foundation types planned for new transmission structures: drilled shaft (utilized for lattice tower structures and steel monopole and H-frame structures), grillage (utilized for lattice tower structures) and direct embedded structures (utilized for steel monopole and H-frame structures). The installation of drilled shaft foundations begins by mobilizing the drill equipment and setting up over the foundation locations. The foundation drilling process involves drilling holes that vary in diameter and depth dependent on the design, structure type and results of the geotechnical report and presence of rock. Once drilling is complete, a steel rebar cage and anchor bolt assembly is placed in each hole and concrete is poured to construct a foundation for the new steel structure or lattice tower. Concrete trucks are used to deliver the concrete mix for the foundations. Drilling operations typically occur for two to five days at each structure location.

The installation of grillage foundations is accomplished by the use of conventional construction equipment, such as an excavator. The excavation is typically an area between six feet and fifteen feet squared and up to fifteen feet deep. The steel grillage foundation along with stub angles are placed in the hole and then backfilled with either select backfill material or concrete. Installation of grillage foundations will typically occur for two to three days at each structure location.

Direct embedded foundations are installed by excavating a hole to the required depth using excavator or drill equipment to dig the hole. The structure is placed in the hole and then filled with a suitable backfill material. In locations where rock is encountered, the foundation hole is excavated to the rock depth and the contractor will use other approved methods to remove the rock including ripping, hoe ramming, or blasting, to achieve the required depth.

During construction of the Project, it is likely that occasional shallow-to-bedrock soil depths and subsurface boulders will be encountered. Blasting may be required in order to place transmission line support structures. For transmission line construction, blasting activity will be limited to the small volume of material needed to be removed to fit and plumb the pole structures. Only small charges are required for the installation of transmission structures. The blasting plan will reflect this limited use of charges. See also Section (i)(6).

For work locations adjacent to or crossing gas pipelines, the PMT will coordinate with the utility owner. Such coordination may include communicating with the utility, locating the

pipeline, excavating near pipelines, and constructing access roads to cross the underground pipeline. In addition, to eliminate the risk of damaging the pipeline, the construction contractor will be required to determine the location of the pipeline before installing structure foundations near the pipeline. The contractor will use vacuum trucks and hand tools to safely remove backfill material above the pipe and to confirm the location of the pipeline. This will ensure that there will be no damage or disturbance to the pipeline.

Prior to any construction activity in the proximity of a pipeline, the contractor will be required to provide for approval by the PMT, a work plan and drawings that accurately locate and describe the construction activities and that include the following:

- Excavator set up in relation to the pipeline
- Any benching needed for leveling the excavator or drill equipment
- Excavation location including depth and length
- Sloping or shoring
- Ingress and egress locations
- Clearance requirements
- Pipe location
- Spoil pile location

Once the foundations have been installed, transmission structure installation will begin. The Project will use lattice towers and steel pole structures. Steel pole structures will primarily be single pole structures (i.e., monopoles) and also include some H-frame and three-pole angle and dead-end structures. See Appendix 1 for structure diagrams. Steel structures will be delivered in sections, with the number of sections being is dependent on the overall height of the structure. The bottom section of the steel pole is either installed on a drilled shaft foundation or directly embedded in the earth. Steel structures will be either bolted flange connections or slip fit connections. On slip fit structures the sections will be installed by using a crane to lift the sections and place them on the previous steel pole section. The sections will be joined together by jacking the sections until the overlap between the sections is within the manufacturer's specifications. The pole sections will be bolted to the previous steel pole section.

Lattice tower structures will be delivered to the ROW in bundles of angle iron. The structures will be constructed in place by crews bolting together, or lacing, the towers on site.

Installation of Conductor and Shield Wire

With the new structures in place, wire ("conductor"), shield wire and fiber optic ground wire ("OPGW") will be installed by utilizing stringing blocks (pulleys), pulling ropes, pullers and tensioners. Once the stringing blocks are in place, the pulling ropes, or lead lines, are typically installed via helicopter and the pulling ropes are then attached to stringing equipment (pullers and tensioners) to pull the conductor, shield wire and OPGW through the stringing blocks. The conductor is then sagged to the specified tension and clipped into place.

During the stringing operation, temporary guard structures or boom trucks will be placed at road and highway crossings and at crossings of existing utility lines. These guard structures will be used to ensure public safety and uninterrupted operation of other utility equipment by keeping the conductor off the traveled way and away from other utility conductors at these crossing locations. Shield wires and OPGW will be installed on top of the structure in a similar manner.

ROW Restoration

Temporary work areas (including ditches, roads, walls, and fences) and pre-construction drainage patterns will generally be restored to their pre-existing condition. Restoration efforts, including removal of construction debris, minor grading, and stabilization of disturbed soil, will be completed following the construction operations. All disturbed areas around structures and other graded locations will be seeded with an appropriate seed mixture and/or mulched to stabilize the soils in accordance with applicable regulations. Regulated environmental resource areas that are temporarily disturbed by construction will be restored in accordance with applicable permit conditions to pre-existing conditions under the supervision of Project environmental monitors. Temporary sediment control devices will be removed following the stabilization of disturbed areas.

Removal / Relocation of Existing Lines

Other lower voltage transmission and distribution lines are located in ROW that the Project will traverse. See Nathan Scott and Derrick Bradstreet pre-filed testimony for the location of these lines. During construction, the removal of existing lines will be carefully coordinated with the installation of new lines to allow workers to safely perform construction while customers continue to receive electrical power with no loss of service.

Where relocations are required, new poles and wires will be first installed in an alternate section of the ROW. Once complete, the existing line will be de-energized so that power can be

transferred to the newly built line. The de-energized lines will then be removed so that the Project construction can continue.

Existing structures that require removal will be de-energized and the overhead wires removed. If concrete foundations are encountered, they will be removed below grade and the area will be filled with appropriate soils. All of the demolition debris such as wood poles, steel structures, insulators, conductor and concrete will be taken off-site to an approved waste management facility for recycling or disposal.

Construction of the Transition Stations

At each end of the underground segments, an OH/UG Transitions Station will be installed to allow for the transition of the overhead conductor to the underground location. The transition station will resemble a small switching station an area approximately 75 feet by 130 feet, and will be enclosed by a perimeter security fence. The equipment at each station will include a line terminal structure, surge arresters, instrument transformers; disconnect switches, cable terminators, communications equipment, and a small control building.

The work at each OH/UG Transition Station will begin with survey, staking and protection of any sensitive areas. Access to the work site will then be established and the required safety measures will be implemented prior to construction. The work site will then be cleared of any trees, shrubs and debris (if needed) and the temporary environmental erosion controls will be installed. Environmental control measures will be monitored throughout the process until the site is restored and stabilized. The work site will be grubbed, stripped and graded to the designed elevations, and then the disturbed areas will be restored. Next steps will include excavating and installing foundations, drainage systems, perimeter security fence, ground grid and underground conduits within the station footprint. Station materials, structures and equipment will begin delivery to the site for installation. The structures and equipment will be installed on the foundations, control building erected and control cable and conductors installed and terminated. When construction is complete, final restoration of any disturbed areas outside of the developed footprint will be completed and environmental controls will be removed, though some controls remain until the area is completely stabilized.

Underground Construction

The underground transmission line will be constructed in a progression of activities typically proceeding as follows:

- Site preparation, similar to overhead construction, including surveying, removal of vegetation in the ROW, installation of soil erosion and sedimentation controls, construction of access roads
- Trench Excavation and Conduit Installation
- Cable splicing

Site Preparation and Development of a Traffic Control Plan

Similar to overhead transmission construction, the HVDC Underground Transmission line construction will generally progress in a linear manner. Installing an underground transmission line is comparable to that of installing a water or sewer main. It is expected that work at multiple sites will occur simultaneously in order to meet the Project milestones for energization. Work will begin by first performing survey, staking and protection of any sensitive areas, and contacting Dig Safe for demarcation of existing utilities. The installation of the underground transmission line will follow the existing highway alignment to the extent possible and will include sections that are either under the roadway, in the roadway shoulder or in undeveloped areas. Where the installation is in the highway ROW, it will be conducted in a manner that protects the public. A traffic control plan will be implemented utilizing traffic control devices as necessary to ensure the safety and expeditious movement of the traveling public. The plan will conform to the NHDOT's *Construction Sign Standards*, the State of New Hampshire *Flagger Handbook*, and standards set forth in the Federal Highway Administration ("FHWA") *Manual on Uniform Traffic Control Devices* ("MUTCD"), which is a required condition of the NHDOT's excavation permit. Where the installation is in a paved road, the pavement will be saw cut on both sides of the trench to limit damage to the road. In undeveloped locations, temporary roads will be constructed for safe, efficient and environmentally compliant access to the work.

Trench Excavation and Conduit Installation

The Project involves longitudinal installation of conduit and cable in approximately 60 miles of public highways as well as the installation of cable splice pits (described below). Typical techniques used for the underground construction are open trenching and direct bury duct banks with concrete caps, both described below. In some locations the use of a 'Jack & Bore' or Horizontal Direction Drilling ("HDD") is required.

A trench will be excavated to the design depth, which generally has a minimum cover along and/or across the highway ROW of 30 inches except where crossing ditches where 48 inches is required. When the trench is deeper than 48 inches, the sidewalls will be shored for support in order to allow safe worker access. If an underground utility line crossing is performed within an existing highway, it will be installed by jacking or boring or by other trenchless technology methods. Minimum cover of trenchless installations will be five feet on secondary roads and ten feet under primary and freeway roadways. For the longitudinal installation, typically up to 750 feet of trench excavation will be open at a time to allow for efficient construction installation methods. Stormwater and groundwater issues will be managed in compliance with state and federal law and all permit conditions. Conduits will be installed into spacers to maintain their position in the trench and will be either backfilled with a suitable granular material or a high slump concrete, and then capped with a layer of concrete for protection against accidental dig-ups. Any temporary shoring will be removed as the trench is backfilled. After backfill, public roads will be restored as required and undeveloped areas will be restored.

If the need arises to conduct blasting during installation of utility facilities all laws, ordinances and regulations, including the NHDOT *Standard Specifications for Road and Bridge Construction*, will be followed in the use, handling, loading, transporting and storage of explosives and blasting agents. See also Section (i)(6).

Jack & Bore and micro-tunneling can be used for short distances when crossing under a railroad or highway, particularly when depths exceed 20 feet. For this application, a reinforced jacking pit will be constructed to the depth of the proposed bore and similarly a reinforced receiving pit will be constructed at the termination point of the pipe. A concrete reaction wall will be poured inside the jacking pit opposite the exit point of the bore. In Jack & Bore the pipe is pushed along its path, and spoils will be removed from the inside of the pipe by auger or by hand. Hydraulic equipment is used to push the pipe string and will be set up in the jacking pit. Alignment of the pipe will be monitored, and adjustments made as required until the pipe reaches the termination point in the receiving pit. Micro-tunneling is very similar to Jack & Bore, except a remote controlled boring machine goes along the bore path, first excavating ahead of the pipes which are jacked in behind it as the spoils are removed.

HDD will be used for long distance trenchless crossings. Typical applications are large stream or water body crossings such as the first underground segment in the vicinity of the Route 3 bridge-crossing of the Connecticut River in Pittsburg and Clarksville. Prior to installation, the process for HDD construction begins with establishing an electronic positioning sensor system. The crews will set up drill equipment including a drill rig, mud mixer/reclaimer, pumps, miscellaneous support equipment, loaders, boom trucks and control booth. A pilot hole will be drilled using a 'steerable' drill bit or mud motor with electronic position sensing equipment attached to a string of steel pipe sections. The pilot hole will be drilled along the pre-determined bore path to the exit point. During the pilot hole drilling the bore will be kept full of bentonite water slurry to provide lubrication and cooling for the drill bit, to help support the hole and to carry cuttings back to the entry hole to be cleaned and reused. The mud motor will be removed when it reaches the exit pit, and replaced with a reamer bit used to enlarge the hole as the drill rig pulls the string back. During the pull back, additional pipe is attached to the reamer from the exit pit so that there will always be a string of pipe in the bore. After the reamer is pulled back, a series of larger and larger reamers are pulled through the bore until the size is adequate for pullback of the 'casing pipe or conduit'. The casing pull back should be completed without stopping, to prevent friction buildup due to collapsed soil, so the entire length of casing is fused together into one long section before the pull back. Once the casing is in place, additional conduits may be attached or it may be terminated in a splice pit near the entry and exit pit.

Trenches terminate either at splice pits or an underground to overhead transition structure. The conduit systems will be 'proofed' or tested by pulling a specified dimensional mandrel through the duct from splice location to splice location. After installation and testing of the duct bank, pits and transition structure system, the conductors will be pulled to the splice locations. Conductors will be spliced in the pits, or terminated at a transition structure. When an underground section is complete there will be a series of electrical tests performed on the cable before it is energized.

Cable Splicing

Cable splice pits are installed along the underground cable route at intervals corresponding to the greatest length of cable that can be transported on a reel and as determined by the engineer. This distance will vary depending upon the terrain, and the diameter and unit weight of the cable however, approximate distances of 1,500 to 2,500 feet between locations is

typical. The pits (which are typically precast concrete and are typically 30 by 10 by 6 feet in dimension) provide a protected location for making cable splices, and facilitate replacement cable installation when necessary. The cable will be installed in the conduit between the pits using puller/tensioner equipment. A cable reel trailer with a braking system or tensioner will be stationed at one end of the pull and a cable puller will be stationed at the other end. The puller will utilize a wire rope attached to the end of the conductor to pull the conductor through the duct system. Prior to pulling the cable, a jacket integrity test is performed on the cable while it is on the reel and a second jacket test is performed after the pull is completed. A pull for one reel of conductor typically takes one to two hours depending upon the setup time.

The cable splicing is performed inside a portable enclosure placed on top of the splice pit. The enclosure provides for temperature, humidity and dust control to ensure optimal conditions for cable splicing. The cables to be spliced are brought in at each end of the enclosure and the cable ends are then prepared by exposing the conductors. The conductors are then joined by either welding or using a mechanical connection and then a pre-molded splice body is placed over the conductor joint to complete the splice.

This process is repeated for the second cable. Both splices are then placed in cradle supports on the pit floor. The splice pit is then filled with sand to secure in place the cables and splices. The precast concrete lid is then placed on top to seal the splice pit and the excavation filled back to finish grade.

Construction of the Converter Terminal and Existing Substation Modifications

The conversion from HVDC to AC will occur at the converter terminal located in Franklin, New Hampshire. The converter terminal includes buildings with conversion equipment and controls, and an open-air substation with filter banks and other equipment similar to a conventional substation.

The construction activities for the converter terminal and existing substations modifications are generally the same. It is expected that work at multiple sites will occur simultaneously in order to meet the Project milestones for energization. In some cases, existing infrastructure or existing lines may need to be re-located prior to the construction of the station. The relocations will be planned and included as part of the constructions sequencing activities. The existing substations modifications will include connecting the new 345 kV AC line from the converter terminal to an existing terminal in the Deerfield Substation. In order to establish the

new line position for the 345 kV line from the converter terminal, it will be necessary to relocate an existing 345 kV line connection in the substation. That relocation will also require the addition of terminal structures, 345 kV switches, breakers, bus work, instrument transformers and associated protection and control devices inside the existing Deerfield Substation. In addition, the 345 kV AC line from Buxton, Maine to Londonderry, New Hampshire which presently goes by the Deerfield Substation will be split into two segments and terminated at Deerfield Substation. Terminating this line at Deerfield will require the construction of an additional 345 kV bay position, which will be done within the existing substation yard. At the Scobie Pond 345 kV Substation, in Londonderry, New Hampshire, 345 kV capacitor banks will be installed in an area adjacent to the existing substation yard.

The work at each station site will begin with the survey, staking and protection of any sensitive areas. Access to the work site will then be established and the required safety measures will be implemented before construction. The work site will then be cleared of any trees, shrubs and debris (if needed) and the temporary environmental erosion controls will be installed. Environmental control measures will be monitored throughout the process until the site is restored and stabilized. The work site will be grubbed, stripped and graded to the designed elevations; the disturbed areas outside of the footprint of the site stations will be restored. Blasting that is required for the construction of station sites will be achieved through blast detonation in delayed series that will result in no greater impact or vibration than those charges required for setting transmission line structures.

Next steps will include excavating and installing foundations, drainage systems, perimeter fence ground grid and underground conduits within the station footprint. Station materials, structures and equipment will begin delivery to the site for installation. The steel structures and equipment will be installed on the foundations, buildings will be erected, control cables and conductors will be installed and terminated. When construction is complete, final restoration of any disturbed areas will be performed. Environmental controls will be removed, though some may remain until the area is completely stabilized.

Following installation, and prior to energization, an extensive electrical testing process will begin in order to confirm that each piece of equipment and each circuit is installed and operating in accordance with the specifications. Energization is a sequential process that energizes the equipment and facilities in a logical order to coordinate with the equipment and

system requirements to meet the Project milestones. Transmission line outages will be necessary and will require coordination with ISO-NE. The Project team will implement an outage and schedule process to confirm that all new or modified transmission and station facilities are sequenced into service in accordance with ISO-NE Operational procedures with no interruption of service to the distribution customers.

Construction of the ISO-NE Required AC Transmission Network Upgrades

Minor upgrades associated with the existing AC transmission facilities will be required, consisting of an estimated 10 structures upgrades to maintain ground clearances for the 345 kV AC transmission line from Deerfield Substation to Scobie Pond Substation in Londonderry. This work will progress in a linear sequence and will be performed in accordance with the compliance plan. Erosion control measures will be installed early in the construction process and maintained until disturbed areas have been restored. Prior to the commencement of work on a particular work area, the contractor, along with an Owner's Engineer construction field superintendent and environmental inspector, will conduct a preconstruction walk down to discuss the compliance work plan and identify areas to avoid or watch carefully during construction. Access roads will be constructed, typically utilizing existing roads, developing new roads or by placing timber mats. Next, the crews will begin framing, removing existing structures and erecting and setting the replacement structures. The erection crews will likely utilize temporary crane pads which are approximately 5,000 to 10,000 square feet as staging structure components for final on-site assembly and to provide a safe, level work base for the construction equipment used to erect transmission structures. After construction activities are completed, disturbed areas outside of the developed footprint will be restored.

Testing and Commissioning

Following the installation and prior to energization, an extensive electrical testing process begins to confirm that each piece of equipment and all protection and control systems are installed and operating in accordance with Project specifications. Energization is a sequential process that energizes the equipment and facilities in a logical order and coordinates with the system and equipment requirements. Transmission line or equipment outages will be necessary and will require coordination with local control centers and ISO-NE. No interruption to distribution customers is anticipated.

(9) Construction Schedule, Including Start Date and Scheduled Completion Date

Scheduled construction will begin after all the necessary state and federal approvals and permits have been acquired. The current forecasted start of construction is in early 2017 with an expected completion date in mid-2019.

Table 3 provides an approximate overview of the proposed schedule:

Table 3

Activity	**Scheduled Start / Finish Date**
Submit SEC Applications & Corps Permit	4th Quarter 2015
SEC Approval & Corps Permit Complete*	4th Quarter 2016
Relocation of Existing Utility Infrastructure	1st Quarter 2017 / 1st Quarter 2018
Transmission Line Construction	2nd Quarter 2017 / 4th Quarter 2018
Deerfield / Scobie Pond Substation Upgrades	2nd Quarter 2017 / 4th Quarter 2018
Franklin Converter Station	1st Quarter 2017 / 2nd Quarter 2019
Transmission Underground Civil installation	2nd Quarter 2017 / 3rd Quarter 2018
Transmission Underground Cable installation	2nd Quarter 2017 / 3rd Quarter 2018
Energize Northern Pass Transmission Line	1st Quarter 2019 / 2nd Quarter 2019

* - Approval dates based on statutory timeframes.

The construction schedule and sequence plan has been developed by establishing key milestones and in-service dates with consideration being given to restrictions that may be encountered including, but not limited to: time of year restrictions for environmental, transmission system requirements and municipal/abutter requests, long lead material procurements, anticipated winter weather conditions and other permit/approval requirements.

The construction sequence plan has been developed using the summary schedule to form the basis of the construction services and material supply for the substation and transmission line. A construction planning team will be involved in the further refinement of construction sequencing including final commissioning of the modified stations and transmission line. This

team will include members of the PMT, representatives from Eversource system planning, system operations and engineering, outage coordinators and the management and construction teams of the contractor(s).

Construction phasing will be carefully planned and executed. The timing and coordination of construction activities will be developed to minimize the number and duration of outages, maintain efficiencies in the construction process, maintain a safe work environment for personnel and contractors, and comply with environmental regulatory requirements.

(10) Impact on System Stability and Reliability

NPT must receive approval from ISO-NE pursuant to Section I.3.9 of the ISO-NE Tariff in order to interconnect the Project to the electric grid. Therefore, ISO-NE must determine that the Project will have no significant adverse effect on the reliability or operating characteristics of transmission facilities in the region or on the system of an entity participating in the regional energy market. See pre-filed testimony of Bradley P. Bentley.

In October 2013, NPT submitted Proposed Plan Applications to ISO-NE for a 1,200 MW project under the ISO-NE's prior rules. ISO-NE issued a letter approving that proposal on January 9, 2014, subject to certain requirements. See Appendix 40. Subsequently, NPT asked ISO-NE to study a proposal for a technology change that would reduce the Project capacity from 1,200 MW to 1,090 MW. NPT submitted an interconnection request for an elective transmission upgrade early in 2015, which initiated another ISO-NE study and approval process. See Appendix 40. NPT expects to submit Proposed Plan Applications for ISO-NE approval by the end of 2015.

As part of the review of an application for a Certificate of Site and Facility, RSA 162-H:16, V previously required NHPUC to find that a proposed bulk power facility would not adversely affect system stability and reliability. That provision was repealed in 2009, effectively recognizing the changes in the electric industry since 1991, when RSA 162-H:16, V was adopted, and the role is now filled by ISO-NE as the FERC-approved regional system operator. However, the SEC's rules, adopted in 2008, continue to require applicants for generation and transmission facilities to include information on the impact of a proposed project on system stability and reliability. In recent cases, this Committee has not made a specific finding with respect to system stability and reliability but rather, has adopted the practice of conditioning the Certificate on continuing to cooperate with ISO-NE to obtain the approvals necessary for

interconnection. See e.g., Laidlaw, SEC Docket 2009-02, and Groton, SEC Docket 2010-01. This approach recognizes the practical reality that ISO-NE has supplanted the field of inquiry and that no project may be interconnected to the electric grid in New England until the ISO-NE has determined that it will have no significant adverse effect on system stability and reliability.

(h) ADDITIONAL INFORMATION

(1) A Description in Detail of the Type and Size of Each Major Part of the Proposed Facility

Northern Pass is a 192-mile, high-voltage electric transmission line, with associated facilities, proposed to carry 1,090 MW of renewable hydroelectric power from Canada into New Hampshire, where it will enter the New England electric grid. The Project includes approximately 158.3 miles of HVDC line and 33.7 miles of AC line. Three segments of the HVDC line, totaling 60.5 miles, will be underground.

The Project consists of the following:

+/- 320 kV DC Transmission Line

The HVDC overhead conductor will employ a two-conductor bundle for the positive and negative energized poles with the bundle consisting of "All-Aluminum Alloy Concentric-Lay-Stranded" ("AAAC") conductors. Each conductor has a designation of 2,932.9 kcmil AAAC and has an outside diameter of 1.975 inches and a rated breaking strength of 83,500 pounds. The proposed design would limit the tension in the conductor to 20,000 pounds under the National Electric Safety Code ("NESC") heavy district loading case. For the underground sections of the DC line, separate cables are required for the positive and negative poles. These underground cables will have an overall diameter of approximately 4.5 inches. The conductor inside of the cable will be copper and have a diameter of approximately 2.25 inches. Insulating material that is a cross-linked polyethylene ("XLPE") type makes up the majority of the cable between the copper conductor and the outside sheath.

345 kV AC Transmission Line

The AC conductor will be "Aluminum-Conductor Steel-Reinforced" ("ACSR") with a 1,590 kcmil "Lapwing" designation. The conductor has an outside diameter of 1.504 inches and a rated breaking strength of 42,200 pounds. The proposed design would limit the tension in the

conductor to 11,400 pounds under the NESC heavy district loading case. The 345 kV AC line will use a two-conductor bundle for each energized phase.

Transition Stations

A transition station, resembling a small switching station, must be installed at each of the six points where the line transitions between an overhead and an underground (or an underground and an overhead) configuration. Transition stations will be approximately 75 feet by 130 feet in size and enclosed by a fence. Equipment at each transition station will include a line terminal structure, surge arresters, disconnect switches, cable terminators, communications equipment, and a small control building.

Converter Terminal

The conversion from HVDC to AC will occur at an HVDC converter terminal in the City of Franklin, on approximately 10 acres of a 118-acre former campground site. The converter terminal will be designed for a continuous HVDC to AC transfer rating of 1,090 MW using Voltage Source Converter ("VSC") DC converter technology. The VSC includes a HVDC area where the line enters the terminal. Equipment in this area includes disconnect switches, circuit breakers, capacitors, reactors and instrument transformers. The conversion from HVDC to AC takes place in a valve hall, which is a building approximately 250 feet by 250 feet. The main electrical component that transforms the energy from HVDC to AC are the insulated gate bi-polar transistors ("IGBT"). The IGBTs are electronic devices that essentially build an AC voltage from the HVDC voltage. HVDC reactors are also located in the valve hall. A control room and office space will be located adjacent to the valve hall. The AC portion of the converter terminal includes the converter transformers, reactors, filters, capacitors, instrument transformers, disconnect switches, and circuit breakers.

AC System Upgrades

The ISO-NE I.3.9 studies determined that the two 345 kV lines between Deerfield and Scobie Pond will need to be thermally uprated, which involves replacement of 10 structures to allow higher power flows. Upgrades to the Deerfield and Scobie Pond Substations are described below.

Deerfield Substation

The Project's interconnection to the New England electrical system will be at the existing Deerfield Substation, where the 345 kV AC line from the HVDC converter terminal will connect

to an existing terminal. In order to establish the new line position, an existing 345 kV line connection will be relocated and will require the addition of terminal structures, 345 kV switches, breakers, bus work, instrument transformers, and associated protection and control devices inside the existing Deerfield Substation.

A 345 kV AC line from the Town of Buxton, Maine to the Town of Londonderry, New Hampshire, the 391 line, presently goes by the Deerfield Substation with no electrical connection. The 391 line will be terminated at the Deerfield Substation, splitting it into two segments: Buxton to Deerfield and Deerfield to Londonderry. Terminating this line will require the construction of an additional 345 kV bay position at the Deerfield Substation, which will be done within the existing substation yard.

Also at the Deerfield Substation, in order to provide system voltage support during abnormal events, it will be necessary to construct both a Static VAR Compensator (SVC) and 345 kV capacitor banks, which will be done in an area adjacent to the existing substation yard. Equipment additions will include breakers, SVC and transformer, capacitor banks, switches & bus, instrument transformers and arresters.

Scobie Pond Substation

To provide voltage support for the Project, a 345 kV capacitor bank will be constructed at the Scobie Pond Substation in an area adjacent to the existing substation yard and 345 kV breakers will be installed in the existing substation bus.

Structures

NPT proposes to use primarily lattice steel structures, with some tubular steel monopole structures that are required by physical design limitations or proposed to reduce or eliminate potential visual impacts. The lattice configuration will have an approximate base dimension of 30 feet by 30 feet and taper to a six foot by five foot column half way up the structure, anchored to four concrete foundations at the corners of the base approximately three to five feet in diameter. Monopole configurations will be approximately five to ten feet in diameter at the base, tapering to approximately one to two feet in diameter at the top, anchored to concrete foundations approximately seven to twelve feet in diameter.

The structure heights proposed for the HVDC portion of the Project range from 60 feet (five structures) to 135 feet (one structure). Of the 858 structures required for the HVDC portion of the Project, 356 are proposed at heights between 80 feet and 85 feet, with the largest numbers

of structures proposed to be 80 feet (169 structures) and 85 feet (187 structures). There are 340 structures in the 345 kV AC portion of the Project and much greater variability in height because of space restrictions in the existing corridor. The AC structures range in height from 48 feet to 160 feet, with 286 of the structures ranging from 70 feet to 130 feet. The largest number of 345 kV structures will be 80 or 130 feet tall (each with 36 structures).

The majority of structures will be spaced approximately 600 to 650 feet apart with maximum spacing of approximately 1,000 feet. For HVDC clearances, the horizontal distance between each energized conductor and the support structure will be 12 to 17 feet. Minimum clearance to ground from the conductors will be 30 feet. For the 345 kV AC circuit, the horizontal distance between an energized phase and the support structure will be 13 to 15 feet. Minimum clearance to ground from the conductors will be 29 feet. Both HVDC and AC line clearances meet or exceed code standards.

PSNH Line Relocations

Along certain sections of the existing ROW, existing PSNH 115 kV transmission lines and 34.5 kV distribution lines will be relocated to make room for the Northern Pass transmission line, and to reduce tree clearing and structure heights where practicable. For the HVDC portion of the line, NPT will relocate approximately 51 miles of existing 115 kV lines and 12 miles of 34.5 kV lines. For the 345 kV AC portion of the line, NPT will relocate approximately 16 miles of existing 115 kV lines and five miles of 34.5 kV lines.

(2) Preferred Location/Choice

Site 301.03 (h)(2) requires that an applicant identify its preferred location and other options for the site of each major part of the proposed facility. More specifically, RSA 162-H:7, V (b) (supp. 2014), requires that an applicant identify both its "preferred choice and other alternatives it considers available for the site and configuration of each major part of the proposed facility and the reasons for the applicant's preferred choice."

NPT proposes to construct an approximately 192-mile transmission line in New Hampshire, comprising a 158.3 mile HVDC segment and a 33.7 mile AC segment, with associated facilities. As required by statute, NPT's preferred choice for the site and configuration of the major parts of the Project is identified in Section (h)(1) and displayed on the route maps in Section (c)(2) and Appendix 1.

NPT's site selection process and the reasons for the preferred choice are set forth in detail in the pre-filed testimony of James A. Muntz and Derrick Bradstreet. As noted in their pre-filed testimony, NPT's preferred choice includes extensive underground installation in public highways in and around the WMNF, Franconia Notch area, the Rocks Estate area, and the Appalachian Trail. Although no longer its preferred choice, NPT considers the route that was identified in its 2013 amended application to the DOE to be available. NPT recognizes that in theory, there may be a number of permutations to its proposed route that would employ other public highways over various distances as discussed in the DEIS, but it does not consider them feasible or available. Further, NPT agrees with the DOE conclusion in the DEIS where DOE identified 16 alternatives that it concluded did not warrant detailed analysis, generally because they were not feasible from a physical or an engineering perspective, or because they did not meet the purpose and need at issue. A summary of the evolution of the preferred choice and the reasons for it follows.

The original effort to develop a route for the Project began in 2009 with the establishment of a Project area that would locate a transmission line crossing the border between Québec and New Hampshire and connecting into the AC system grid at a location that allowed for the delivery of 1,200 MW. Power flow and environmental routing analyses were used to establish the proposed site of the HVDC converter terminal in Franklin and the AC terminal location at the existing Deerfield Substation. Additional information was incorporated into maps of the Project area so that the locations of known constraints, such as conservation areas and wetlands, could be identified and taken into consideration in order to avoid or minimize impacts to population centers and natural resources.

After the route was first proposed in October 2010, NPT undertook a partial rerouting effort, focusing on the portion of the Project where there is no existing transmission ROW, in order to address concerns identified by the public, especially concerning visibility. An extensive property acquisition effort was undertaken at that time to negotiate mutually acceptable arrangements with willing landowners. Because NPT does not have eminent domain rights the only option was to locate the Project in existing utility ROW or on land where NPT could acquire property from willing landowners.

As a consequence, in July 2013, a revised route was proposed in the amended application to the DOE. This revised route was located slightly further east than the original route, traversed

a far less populated area of northern New Hampshire, took advantage of natural topography and forested buffers, and included the two underground segments described above in the towns of Pittsburg, Clarksville, and Stewartstown.

The current route proposed to the SEC reflects further public comment and the DOE's DEIS issued July 21, 2015, and now includes a third underground segment, 52.3 miles in length, along public highways from Bethlehem to Bridgewater. The decision to place the HVDC line underground for this distance necessitated a change in technology from mass impregnated cable to XLPE cable, which results in a lower design capacity of 1,090 MW.

The preferred choice, as it has evolved, is the product of years of planning, surveying, studying, designing, and working with various stakeholders. Many route alternatives were considered and NPT modified the Project along the way to meet specific concerns expressed by citizens in New Hampshire.

The National Environmental Policy Act ("NEPA") process requires consideration of reasonable alternatives to a Proposed Action. DOE identified 24 potential alternatives, including the Proposed Action and No Action. Some of the 24 alternatives represented partial variations on either the Proposed Action or another alternative, including a number of possible underground routes, either for the full length of the transmission line or for some segment. Based on the analysis undertaken in the preparation of the DEIS, DOE concluded that there were six alternatives (including certain variations to those) that warranted detailed analysis. DOE further concluded that 16 alternatives did not warrant detailed analysis. Accordingly, the DEIS included detailed analysis of the six alternatives, including the Proposed Action and No Action and further explained the reasons why DOE concluded the other alternatives were not reasonable and therefore not analyzed in detail.

The preferred route incorporates various principles and reflects multiple goals, beginning with a top-down approach of using power flow and environmental analyses to identify a general pathway from the northern terminus of the HVDC line at Hydro-Québec's Des Canton substation across the New Hampshire border to interconnect with the New England electric grid. As noted above, those analyses resulted in a crossing of the U.S. and Canada border at Pittsburg, the location of a converter terminal in Franklin, and interconnection to the New England electric grid in Deerfield.

The preferred route also uses a bottom-up approach that accommodates sometimes competing objectives. Specific segments of the preferred route were selected in order to: (1) make the best use of existing overhead transmission corridors and to remain consistent with existing land uses and to minimize new impacts; (2) construct new overhead corridor, where existing ROW is unavailable, by acquiring property from willing sellers; (3) install underground cable along public highways in areas where property could not be acquired from willing sellers; (4) install underground cable in order to avoid potential impacts to the White Mountain National Forest, the Franconia Notch area, the Rocks Estate area and along the Appalachian Trail; (5) construct transition stations on property acquired from willing sellers at locations that are technically feasible; and (6) recognize constraints on the highways that could accommodate undergrounding.

(3) A Description in Detail of the Impact of Each Major Part of the Proposed Facility on the Environment for Each Site Proposed

Extensive surveys of natural resources potentially affected by any component of the Project were conducted by an experienced team of consultants at Normandeau Associates, Inc. in consultation with the regulatory authorities. The studies conducted to identify resources, assess impacts and avoid and minimize potential negative impacts are described in detail in Sections (h)(4) and (i)(1-5). The results of these studies were incorporated into the siting and design of the Project, resulting in a final design that avoids and minimizes environmental impacts to the extent practicable, while still achieving the goals of the Project.

All parts of the Project, including the transmission structures and underground cable, temporary access roads, work pads, and the nine development sites (converter terminal, substation expansion and transition stations) were located to avoid and minimize impacts to wetlands, streams, vernal pools, and the protected shoreland around public waters, designated rivers, and 4th order and larger streams. Unavoidable impacts to these resources were quantified and described in the NHDES Standard Dredge and Fill Permit Application, the NHDES Shoreland Applications, and the USACE Section 404/10 Permit Application found in Appendices 2, 5 & 3, respectively, and in the *Wetlands, Rivers, Streams and Vernal Pools Resource Report and Impact Analysis*, Appendix 31. These impacts are mostly temporary in nature, and restoration will occur in these areas. The unavoidable permanent resource impacts, along with secondary impacts, are addressed in the Project's natural resource mitigation

proposal, as described in Section (i) below and in the *Natural Resource Mitigation Plan*, Appendix 32. This plan was developed in consultation with local, state and federal agencies to compensate for the unavoidable impacts associated with the Project.

Adherence to the measures necessary for the protection of surface and groundwater quality is demonstrated in the applications for the NHDES Alteration of Terrain Permit and NHDES 401 Water Quality Certification Application, in Appendices 6 and 4, respectively. These applications detail the stormwater management plans, erosion and sedimentation controls, and Best Management Practices ("BMP") incorporated into the design and construction plans for Northern Pass. Implementation of these measures during construction will protect the quality and quantity of groundwater and surface water.

The potential effects of the Project on rare, threatened and endangered plants and wildlife ("RTE"), Exemplary Natural Communities, and Forest Service Sensitive Species were studied in accordance with work plans developed through consultations with state and federal resource agencies. Surveys for rare plants, snakes, freshwater mussels, fish, and selected birds were conducted, as well as bat acoustic surveys, winter tracking, wildlife habitat assessments, and stream temperature modeling. Northern Pass has committed to numerous schedule restrictions, impact-reducing construction measures, and other agency recommendations for protecting sensitive species. Details regarding the assessment of these resources are included in the *Rare, Threatened and Endangered Plants and Exemplary Natural Communities Report*, Appendix 35, the *Wildlife Report and Impact* Assessment, Appendix 36, and the *Fisheries and Aquatic Invertebrates Resource Report and Impact Analysis*, Appendix 33. Permanent alterations of wildlife habitat and listed plant species are addressed in the *Natural Resource Mitigation Plan*, Appendix 32.

(4) A Description in Detail of the Applicants' Proposals for Studying and Solving Environmental Problems

The Applicants have engaged in extensive studies to identify and assess potential environmental impacts that may occur as a result of the proposed Project. Work plans describing methods of studying natural resource issues and incorporating agency guidelines and standards were developed through consultation with state and federal agencies during field investigations. Information collected from the implementation of these work plans was used during Project

design to assess, avoid and minimize impacts. The studies are described in greater detail in Section 301.03(i) and in the technical reports attached to this application.

Wetlands, vernal pools, and streams were delineated and surveyed following state and federal guidelines, and physical and biological characteristics were recorded to evaluate their functions, and values. See Appendix 31. Surveys for threatened and endangered birds, snakes, and turtles were conducted, as well as winter tracking studies for Canada lynx and American Marten. Surveys for Karner blue butterfly eggs were conducted on wild lupine plants in the Concord Pine Barrens. Habitat studies for eastern small-footed bats, special concern birds, and other wildlife were also conducted, including Deer Wintering Area and Moose Concentration Area surveys, surveys for bear-scarred beech trees and raptor nest surveys. See Section (i)(5) and Appendix 36. Studies were also conducted to assess potential project effects on cold water fisheries, rare freshwater mussels, and EFH. See Section (i)(5) and Appendix 33. During Project design, the Northern Long-eared Bat was placed on the federal list of threatened species due to the devastating effect of white-nose syndrome. Acoustical surveys were conducted to identify potential locations of these bats so that Project activities can be scheduled to avoid injuring bats roosting in Project area trees during the summer breeding season. See Section (i)(5) and Appendix 36.

The results of these studies have been used to design the Project so as to avoid and minimize impacts wherever possible. The design team collaborated with scientists from Normandeau Associates during transmission structure siting and modified the structure layout, which was initially based on maximum spacing and avoidance of transportation and river corridors, to avoid as many wetlands, vernal pools, small streams, and rare, threatened, and endangered (RTE) plants as practicable. The siting of transition stations underwent a similar review. During an iterative plan set review process, Normandeau scientists made many recommendations for modifying the location or layout of proposed structures, access paths and work pads that were in or near sensitive natural resources.

Plans were refined again after “constructability walkdowns” by a transmission construction manager and wetland/wildlife scientist so as to avoid additional direct wetland impacts. The Project’s decision to place approximately 60 miles of the Project underground almost entirely in the already disturbed parts of public roads also resulted in a reduction in certain natural resource impacts. The overhead structure configurations were also altered to

reduce the necessary ROW width for achieving safety clearances, reducing approximately 116 acres of forest clearing.

Many self-imposed seasonal restrictions and survey requirements have been developed by the Project to minimize impacts to wildlife at critical life stages. Examples include seasonal tree-cutting restrictions wherever acoustic surveys identify possible Northern Long-eared Bats, avoiding work near Deer Wintering Areas during periods of exceptionally deep or crusty snow, and searching black racer and turtle nesting habitat just prior to construction to avoid accidental crushing by equipment.

A description of the design modifications made to avoid and minimize impacts is included in Appendix 32. These modifications, in concert with the scheduling commitments, BMPs for construction and ROW maintenance, an Erosion Protection and Sedimentation Control Plan, a Surface Water Pollution Prevention Plan, compliance with Avian Protection Plan guidelines established by the Avian Powerline Interaction Committee ("APLIC"), and a Project specific Construction Management Plan (which captures all of these protective measures in one place for the contractors) will help avoid and minimize impacts to wetlands and other natural resources. Eversource has a strong track record in managing the construction of its transmission lines to ensure that contractors comply with these requirements.

The permanent wetlands impacts from the Project total 2.53 acres. Compensation for the remaining permanent natural resource impacts are addressed in the Project's mitigation proposal See Appendix 32. These unavoidable impacts have been quantified and evaluated in accordance with state and federal guidance to develop the compensatory mitigation package. The proposed mitigation package components that the Project is pursuing and that have been reviewed by regulatory agencies and are described in greater detail in Section (i). They include:

- The preservation of 1,668 acres of undeveloped land in northern New Hampshire that will protect high value wetlands and the adjacent upland buffers, and habitats for marten, lynx, forest-nesting birds, Northern Long-eared Bats, Moose Concentration Areas, Deer Wintering Areas, and other forest habitats in perpetuity;
- Protection of land within and near the Concord Pine Barrens with potential value for the threatened and endangered lepidoptera of the pine barrens, including Karner blue butterfly, pine pinion moth, Persius dusky wing skipper, and frosted elfin and also potential habitat for the state-threatened wild lupine;

- An anticipated contribution to the Aquatic Resource Mitigation ("ARM") fund of approximately $3 Million that will support State-selected wetland mitigation projects in the watersheds associated with the Project in other towns in the Project area;
- Compliance with appropriate mitigation requirements as may be required by the National Historic Preservation Act during the completion of the Section 106 process.

In addition to the avoidance, minimization and mitigation of environmental impacts associated with siting, constructing and operating the Project, the Project provides substantial environmental benefits to the State and region by:

- Displacing fossil fuel generation, thus assisting in meeting State and regional air quality goals, particularly by reducing regional carbon dioxide emissions by over 3.3 million tons a year (equivalent to the annual emissions of nearly 690,000 cars).
- Complementing the development and operation of local renewable energy sources, such as wind and solar.
- Providing fuel diversity benefits that ISO New England has determined to be essential to energy security at this time, and thus helping to address an increasing dependence on natural gas.
- Reducing conventional air pollutants substantially by a projected annual average over the first 11 years of operation of 537 to 624 short tons for Nitrous Oxide (NOx) and 261 to 460 short tons for Sulfur Dioxide (SO_2).
- Contributing $3 million to the National Fish and Wildlife Federation, which will be available for New Hampshire projects including the Early Successional Forest Initiative, Northeast Rivers Initiative (Eastern Brook Trout), and Trust for Public Land's White Mountain Initiative.

(5) A Description in Detail of the Applicants' Financial, Technical, and Managerial Capability to Construct and Operate the Proposed Facility

Financial Capability

NPT is a single purpose limited liability company that is a wholly-owned subsidiary of Eversource Energy Transmission Ventures, Inc. (EETV), which in turn is a wholly-owned subsidiary of Eversource, a public utility holding company, formerly known as Northeast Utilities. NPT will be the developer and owner of the Project. Currently, the Project is estimated to cost $1.6 billion and to date over $90.5 million has been expended on permitting and design.

Eversource Energy

Eversource is rated by the three major credit rating agencies. Eversource's corporate credit ratings and outlooks are as follows: Standard and Poor's (S&P) rates Eversource as A stable; Moody's rates Eversource as Baa1 stable; and Fitch rates Eversource as BBB+ stable. Eversource anticipates internally generating the cash and issuing debt to fund NPT's capital requirements. As a result of Eversource's strong credit ratings, it has ready access to capital markets. Eversource has issued $925 million in long-term debt in the first nine months of 2015, and issued $725 million in long-term debt in 2014.

Eversource has had an annual construction program well in excess of the annual cash requirements of Northern Pass. The table below demonstrates that annually Eversource generates adequate cash flow internally to meet its equity investment obligations in Northern Pass. The table also demonstrates that annually Eversource has issued a combination of short and long term debt well in excess of NPT's new debt requirements.

(Thousands of Dollars)	2014	2013	2012
Investments in Property, Plant and Equipment	$1,603,744	$1,456,787	$1,472,272
Net Cash Flows Provided by Operating Activities	1,635,473	1,663,539	1,161,229
Issuance of Long-Term Debt	725,000	1,680,000	850,000
Increase/(Decrease) in Short-Term Debt	285,075	(397,000)	825,000
Net Increase in Debt	1,010,075	1,283,000	1,675,000

Source: Eversource 2014 Form 10K, Consolidated Statement of Cash Flows, page 67

Northern Pass Transmission

The Transmission Service Agreement ("TSA") signed by Hydro Renewable Energy Inc., a wholly-owned subsidiary of Hydro-Québec, and approved by FERC provides for a formula rate cost recovery. The formula rate plan is a cost tracker that will allow NPT's revenue to track its cost of service. NPT's capital structure under the TSA will provide for strong cash flow credit metrics, which will allow the company to achieve its investment grade credit rating target. This capital structure and the FERC-authorized return on equity will provide NPT an

operating margin to withstand the business risk of unforeseen events.

Hydro-Québec

The financial strength of the Project is based as well on the credit worthiness of NPT's counter-party, Hydro-Québec, which is Canada's largest electric utility. Hydro-Québec's current ratings are: S&P—A+; Moody's—Aa2; and, Fitch—AA-. Hydro-Québec is Canada's largest electric utility and is one of the largest power generators and transmission companies in North America. Hydro-Québec is a crown corporation incorporated under the Hydro-Québec Act and is owned by the province of Québec. Hydro-Québec has been selling power to the New England energy market for the past several decades. Hydro-Québec operates in a resilient economy with adequate cash and investment balances, and exceptional access to capital.

Construction

During construction, Eversource will periodically make equity capital contributions to NPT, which is obligated under the TSA to use commercially reasonable efforts to maintain a capital structure of 50% equity and 50% debt. NPT is currently borrowing via intercompany loans from Eversource. It may continue to borrow from Eversource during the construction period or it may replace some or all of the intercompany loans with a third-party loan.

Operation

Once the Project commences operations, NPT will begin receiving revenue from Hydro Renewable Energy Inc. under the TSA. NPT will use a formula rate to calculate Hydro Renewable Energy Inc.'s payment obligations for transmission service over the line. The TSA has a forward-looking formula rate that calculates costs on a prospective basis and then trues up such projected costs to actual costs in order to permit NPT to recover its annual revenue requirements. The formula rate recovers a return on investment plus associated income taxes, depreciation expense, operation and maintenance expenses, administrative and general expenses, municipal tax expense, and other expenses associated with the Northern Pass line. The revenues paid by Hydro Renewable Energy, Inc. are guaranteed under the TSA by Hydro-Québec.

Insurance

NPT and its construction contractors will carry adequate insurance to provide coverage against liability or damage resulting from the construction or operation of the Project. The types of insurance and coverage levels will be comparable to other projects of similar size and character that are currently operated by Eversource affiliates.

Technical and Managerial Capability

Eversource operates New England's largest utility system serving more than 3.6 million electric and natural gas customers across Connecticut, Massachusetts, and New Hampshire. Eversource owns and operates approximately 4,270 circuit miles of transmission lines, 72,000 pole miles of distribution lines, 578 transmission and distribution stations, and 450,000 distribution transformers. PSNH and its predecessor companies have owned, operated and maintained transmission facilities in New Hampshire for over one hundred years. See pre-filed testimony of Mike Auseré for a map of the service territory of Eversource and its subsidiary companies.

Eversource Energy and its subsidiaries have extensive experience in planning, designing, constructing and operating electric transmission infrastructure projects. Eversource is the recipient of an Edison Award for outstanding development and construction of four critical projects. Eversource has been working on a significant number of other transmission projects including the Greater Springfield Reliability Project, the Interstate Reliability Project, and the Central Connecticut Reliability Project, which are three of the four major projects that are part of the $1.2 billion New England East-West Solution. As of December 31, 2014, Eversource held transmission assets in excess of $7.6 billion and has plans to invest an additional $3.9 billion in new transmission infrastructure over the next four years.

Consequently, Eversource has the resources to use in-house and contract labor as needed for the installation, operation, maintenance, repair, and removal of the Project. See pre-filed testimony of James A. Muntz, Jerry Fortier, Derrick Bradstreet, Samuel Johnson, John Kayser, Nathan Scott, and Lynn Farrington for a further discussion of the Applicants' technical and managerial capability to construct and operate the Project.

Decommissioning

RSA 162-H: 7, V (g) requires that each application for a certificate describe in reasonable detail the elements of and financial assurances for a facility decommissioning plan. NPT and Hydro Renewable Energy Inc. executed a TSA on October 4, 2010, which, among other things, addresses decommissioning. FERC approved the TSA on February 11, 2011. See Docket No. ER11-2377-000, *Northern Pass Transmission, LLC, Order* Accepting Transmission Service Agreement, 134 FERC 61,095.

Section 9.3 of the TSA as amended, which is attached as Appendix 16, sets forth the

elements of the Northern Pass decommissioning plan. Essentially, the plan provides that NPT will collect, through a FERC-approved rate, a monthly payment from Hydro Renewable Energy Inc. over the last five years of the 40-year term of the TSA, termed the Decommissioning Payment Period, designed to cover the costs of decommissioning, which is defined as "the work required to (a) retire the Northern Pass Transmission Line and dismantle the materials, equipment and structures comprising the Northern Pass Transmission Line and (b) restore and rehabilitate any land affected by the construction or dismantlement of the Northern Pass Transmission Line, in each case, as required by Applicable Law."

Six months before the five-year Decommissioning Payment Period commences, NPT must provide a plan to the management committee to be established by the Parties, including an estimate of decommissioning costs and a description of the scope and frequency of progress reports for monitoring decommissioning.

As part of its TSA filing, NPT asked FERC, as an accounting and regulatory matter, for authority to establish a regulatory asset to record the expenses related to an asset retirement obligation associated with the decommissioning of the NPT transmission line. FERC granted NPT such authority, which assures that the decommissioning expenses will be properly accounted for and eligible for recovery through FERC rates.

(6) Statement of Assets and Liabilities of the Applicants

Statements of assets and liabilities of Eversource and PSNH are attached to the pre-filed testimony of Michael J. Auseré. There is no statement of assets and liabilities available for NPT.

(7) Documentation that Written Notification of the Proposed Project, Including Appropriate Copies of the Application, Has Been Given to the Governing Body of Each Community in Which the Facility is Proposed to be Located

NPT will provide the governing body of each municipality or unincorporated place where the Project is proposed to be located (as listed below) with a copy of this Application concurrent with the filing with the SEC, and will provide documentation of delivery. Appendix 51 is reserved for this purpose.

Pittsburg, Board of Selectmen

Clarksville, Board of Selectmen

Stewartstown, Board of Selectmen

Dixville, Coös County Commissioners

Millsfield, Coös County Commissioners

Dummer, Board of Selectmen

Stark, Board of Selectmen

Northumberland, Board of Selectmen

Lancaster, Board of Selectmen

Whitefield, Board of Selectmen

Dalton, Board of Selectmen

Bethlehem, Board of Selectmen

Sugar Hill, Board of Selectmen

Franconia, Board of Selectmen

Easton, Board of Selectmen

Woodstock, Board of Selectmen

Thornton, Board of Selectmen

Campton, Board of Selectmen

Plymouth, Board of Selectmen

Ashland, Board of Selectmen

Bridgewater, Board of Selectmen

New Hampton, Board of Selectmen

Bristol, Board of Selectmen

Hill, Board of Selectmen

Franklin, City Council

Northfield, Board of Selectmen

Canterbury, Board of Selectmen

Concord, City Council

Pembroke, Board of Selectmen

Allenstown, Board of Selectmen

Deerfield, Board of Selectmen

Chester, Board of Selectmen

Raymond, Board of Selectmen

Londonderry, Town Council

(i) EFFECTS OF THE FACILITY

(1) Aesthetics

The Applicants had a visual assessment prepared to analyze the effect of the Project on aesthetics along the entire 192-mile route from the Canadian border to Deerfield, New Hampshire. See *Visual Impact Assessment*, Appendix 17. The Project will be built mostly within existing electric transmission line ROW along with three segments, totaling approximately 60.5 miles, being located underground in public roads. Both existing conditions and the changes to the visible landscape that may result from completion of the Project were thoroughly researched and evaluated in accordance with widely accepted visual assessment methodologies. This extensive work forms the basis for the conclusion that the Project as proposed will not have an unreasonable adverse effect on aesthetics.

The development of the visual assessment began with a careful description of existing conditions within the study area—generally a six (6) mile wide corridor, three (3) miles on either side of the Project and extending to five miles on either side in some locations. Where the line is located underground within existing road ROW, the study area extended out one quarter mile on either side of the route. The description includes the natural and built landscape of the study area as well as the visible features of the proposed Project.

For purposes of the visual assessment, the entire study area was divided from north to south into six (6) subareas. This allowed for an assessment in each of the host communities combined with a regional perspective recognizing the fact that municipal boundaries alone would artificially segment the analysis. The study area encompasses 889 square miles and includes municipalities from Pittsburg to Deerfield in New Hampshire. An analysis of the existing conditions was conducted in each subarea within the towns and cities through which the Project passes and in adjacent towns where views of the Project may occur from recognized scenic resources. Except for subarea three, which is the underground section in or around the WMNF, the Franconia Notch Area, the Rocks Estate area, and along the Appalachian trail, the topography and natural landscape within three miles of the proposed route is characterized by rolling low hills or mountains, water bodies, fields and forests. The topography, landscape and development patterns are different, of course, in the WMNF, which contains some of the highest mountains and most significant panoramic views in the State.

Development patterns in the north are more rural, with agriculture and forestry the more prevalent economic activities. Population centers are mostly concentrated in small towns and villages, which are connected by a network of State and local roads, small and large rivers, and the interstate highway system. Residential development, commercial areas, and some industrial sites are located throughout the study area. The density of all these activities and the corresponding built environment increases steadily and significantly as one travels from north to south along the route.

Based on designations in State, national, regional, and local publications, approximately 525 scenic resources were identified and ranked throughout the study area. Broadly speaking, "scenic resources" are publicly accessible places with some scenic value and are classified based upon the significance attributed to them in their respective public designation documents. In accordance with typical visual assessment methodologies, greater significance was accorded to those resources of likely interest to larger segments of the public.

In the study area, the visual assessment identifies state and federal Scenic Byways (e.g., Connecticut River National Scenic Byway, Moose Path Scenic Byway), State Parks (e.g., Coleman, Dixville Notch, Weeks, Forest Lake, Bear Brook, and Pawtuckaway State Parks), State and town forests (e.g., Sugar Hill State Forest, Nash Stream Forest), wildlife management areas (e.g., Pondicherry National Wildlife Refuge, Hoit Road Marsh WMA), lakes and ponds (e.g., Big Dummer Pond, Forest Lake, Webster Lake, Little Diamond Pond), rivers and streams (e.g., Androscoggin, Pemigewasset, Ammonusooc), historic inns and resorts (The Balsams Resort, Mountain View Grand Hotel), and conservation lands (e.g., The Rocks Estate).

Following this identification, the visual assessment undertook a series of screening evaluations for the purpose of narrowing the number of sites that needed a more complete analysis. First, a viewshed analysis, based on geographic information system computer modeling, determined whether the Project's transmission structures might be visible from identified scenic resources.

Second, additional screening techniques were employed to assess possible visibility, including a 3-D computer analysis with photographic overlays, preliminary visual simulations, and cross-sections. Approximately 525 scenic resources were identified in the study area, but the number of resources with a potential view of the Project was reduced to approximately 200 sites as a result of the screening process.

The next step in the screening process was to evaluate both the cultural value as well as the visual quality of the scenic resources. The cultural value of each resource is based on its designation by a public agency, its inclusion in planning documents or other similar sources of information. Visual quality of the resource is based on an evaluation of its landform, vegetation, water bodies, color, views, distinctiveness, and human development. These criteria are then combined to arrive at a determination of scenic significance. Only resources with at least a medium cultural value are evaluated for scenic quality while resources with combined values of at least low-medium move to the next step in analysis. This step resulted in a reduction of the number of sites under review to 70.

A visual impact analysis ("VIA") was performed on each of the 70 remaining scenic resources. The VIA combines visual effect and viewer effect, each rated low, medium or high. The potential visual effect of the Project on each scenic resource is assessed by evaluating the landscape compatibility, scale contrast and spatial dominance of the Project features with the landscape associated with that resource. Landscape compatibility considers possible contrasts in color, form, line, and texture. Scale contrast evaluates the relative size of the Project elements in relation to the resource. Spatial dominance evaluates the position of Project elements and their degree of visibility relative to the surrounding landscape.

Visual simulations from key observation points are created to help evaluate potential visual effects. These simulations merge precise computer-generated representations of the Project features with high-quality digital photographs of the existing landscape to produce an accurate image of how the Project will appear to the ordinary human eye in both a panoramic and normal view from the scenic resource. Viewer effect involves an assessment of viewer expectation including the extent, nature, duration of the public use of the resource and the effect of the Project on the public's continued use and enjoyment of the resource. The overall visual impact rating combines the ratings (low, medium, high) for both visual effect and viewer effect. A detailed analysis is provided for all 70 resources across all of the subareas.

The visual assessment also accounts for the fact that many measures have been incorporated into the planning and design of the Project in order to avoid, minimize or mitigate visual effects. Some of those measures include:

(1) Locating portions of the Project underground, such as in and around the WMNF, the Franconia Notch Area, the Rocks Estate area, and along the Appalachian Trail;

(2) Using existing road rights-of-way for most underground sections to minimize new transmission corridors;

(3) Co-locating a majority of the transmission line in existing transmission corridors;

(4) Locating new transmission structures in proximity to existing structures to maintain spacing and avoid irregular linear patterns;

(5) Using the same materials for the Project line and the upgraded 115 kV line to minimize contrasts in color and texture and to maintain visual continuity in the corridor;

(6) Designing transmission structures with a relatively narrow profile to minimize clearing;

(7) Replacing existing 115 kV lines with narrower transmission structures to accommodate the new transmission line;

(8) Adjusting the alignment of the underground transmission corridor;

(9) Maintaining or restoring vegetation of road crossings and river and stream crossings; and

(10) Planting native tree and shrub species to restore landscape disturbed by construction, particularly along the underground segments.

In some cases, such as where the transmission lines are placed underground, these measures completely avoid visual effects on scenic resources. In other cases, such as the reduction of structure heights or the design of structures with narrow profiles, these measures minimize or mitigate visual effects. Taken as a whole, these measures dramatically reduce the Project's aesthetic effect across a wide range of locations in the 192-mile route.

Ultimately, the comprehensive analysis contained in the visual assessment establishes a sound platform for drawing conclusions about the visual effects of the proposed Project. This extensive analysis leads to the conclusion that the Project will not have an unreasonable adverse effect on aesthetics.

(2) Historic Sites

The area of potential effect ("APE") for both archeological "below ground", and above ground, architectural resources[14] has been extensively surveyed and assessed. See Appendices 19-30. A Phase I-A archaeological survey has been completed for the entire proposed route, and the next level of archaeological survey work along much of the route has also been done. These are the Phase I-B surveys, involving extensive shovel test pitting to locate the presence of archeological resources in those areas identified in the Phase I-A survey as being sensitive The Project has also done a complete identification and assessment of potentially affected historic properties within the APE and, in some cases, beyond that area.

In addition, separate but related work has been undertaken by a contractor working on behalf of DOE in the environmental impact statement process and under Section 106 of the National Historic Preservation Act. The contractor also completed a Phase I-A archeological survey of almost the entire route as well as the forms utilized by the NHDHR in the initial analysis of historic resources—the Project Area Forms ("PAF").

In light of this extensive body of data and based on their background and experience, the Northern Pass historical and archeological resources experts have concluded that the Project will not have an unreasonable adverse effect on historic sites.

Section 106 of the National Historic Preservation Act and RSA 162-H

RSA 162-H:16 requires the SEC to determine whether there are unreasonable adverse effects to "historic sites." Site 301.03(i)(2) further requires that an applicant provide information on the facility's effects on historic sites and mitigation plans.

Any project requiring a federal permit, including almost every project involved in an SEC proceeding, also triggers the Section 106 review process under the National Historic Preservation Act. That extensive process is overseen by the lead federal agency involved in the federal permitting issues, often the USACE due to wetlands permitting considerations. The Section 106 process requires that properties eligible for listing on the National Register of Historic Places ("National Register") be identified and that the potential effects of the Project be assessed. The process concludes with a final determination by the lead federal agency of whether there are any unavoidable adverse effects and, if so, what mitigation measures will be required.

[14] SEC applicants address archeological (below-ground) resources separately from the analysis of architectural (above-ground) resources. By custom and past practice, the SEC refers to the above ground sites as "historic resources" or historic properties," and the below-ground resources as "archeological resources."

This effort is undertaken by the lead federal agency in consultation with NHDHR, whose director serves as the State Historic Preservation Officer ("SHPO") for purposes of Section 106. In practice, NHDHR takes a lead role in the review of the identification of resources potentially eligible for listing on the National Register and in considering a project's potential effects on those resources. Final authority under Section 106 rests with the lead federal agency. Also, at the federal level the Advisory Committee on Historic Properties has an important role in implementing the requirements of Section 106, especially when there are differences of view between and among different federal agencies and between the lead federal agency and the SHPO.

DOE is the lead federal permitting agency for the Project. In New Hampshire, this Section 106 consultation process begins with an applicant or agency submitting a Request for Project Review Form.[15] NHDHR then reviews reports that identify archeological and historic resources and then assesses effects and considers possible mitigation measures. The final determination on cultural resources is then made by the lead federal agency under Section 106. The time frame for federal review under Section 106 is not controlled by RSA 162-H, and has usually extended beyond state and federal permit decision deadlines. As acknowledged again by the SEC in its *Groton Wind* decision, the Section 106 and NHDHR process is iterative and continues past SEC deadlines. The *Groton Wind* decision also provides a succinct summary of the differences between the § 106 process and the RSA 162-H -- "The § 106 process is designed to preserve the historic resources, while RSA 162-H:16, IV(c) requires the Subcommittee to ensure that the Project will not have unreasonable adverse effect (sic) on historic resources. See 16 U.S.C. § 470, *et. seq*.; RSA 162-H:16, IV(c)." *Order and Certificate of Site and Facility with Conditions*, May 6, 2011, at 56.

Given the iterative nature of the review of historic sites and the extended timeframe for such review to occur, the SEC has adopted the standard practice of conditioning approval on required further consultation with NHDHR, completion of any incomplete analysis and reports,

[15] See *Application of Laidlaw Berlin Biomass, LLC*, SEC 2009-02, Order Accepting Application for Certificate of Site and Facility and Designating a Subcommittee Pursuant to RSA 162-H:6-a , (January 26, 2010). In that decision the SEC Chair indicated that by filing the Request for Project Review ("RPR") form "[t]he Applicant has, therefore, necessarily provided sufficient information to initiate the DHR application process. Neither RSA 162-H: 6-a nor 162-H: 7, IV, require the Applicant to complete the entire review process with a state agency prior to the filing of an Application with the Committee."

and immediate reporting of new findings. See *Groton Wind* at 56-7 (citing the SEC's ability to delegate to an SEC member agency the authority to specify methods, etc. RSA 162-H:4, III-a.)

It is expected that the Section 106 process will result in the federal agencies consulting with NHDHR and NPT (and other consulting parties) to develop a Programmatic Agreement ("PA"). As part of the PA, NPT will commit to develop, with appropriate agency review and comment, a cultural resources management plan ("CRMP"). The CRMP will establish the procedures to further identify the boundaries of the potentially eligible sites for areas within the APE and will describe the measures that will be taken to further avoid, minimize and mitigate potential adverse effects to archeological and historical resources.

Archeological Resources

NPT completed a Phase I-A archeological review for the entire route. This review identified any known archeological resources and provided an initial broad identification of any likely archeological resources within the overall Project area, which is the APE, as determined by DOE. The Project has also reviewed reports and accompanying appendices prepared by the consultant performing work on behalf of DOE (SEARCH) on its Phase I-A archeological study. While there is substantial overlap between the sites/areas that were identified in these separate Phase I-A reports, there are also identified areas that did not match. The sites/areas identified by the DOE that did not coincide with the Project's sites/areas will be addressed in future Phase I-B survey work.

NPT has also undertaken Phase I-B surveys in order to provide confirmation of archeological site presence or absence within areas exhibiting archeological resource sensitivity. These surveys provided additional data on subsurface conditions and artifact occurrence at sites that were visually defined during Phase I-A (for example, cellar hole sites).

The Phase I-A and Phase I-B survey work follows the phases of archeological survey per the NHDHR *Standards and Guidelines,* and pursuant to specific methods approved by NHDHR. The Project has completed the following Phase I-A and I-B survey reports:

- *Results of Phase I-A Archeological Survey -- Existing ROW Corridor and Franklin Converter Terminal (2013)* (Approved by DHR 6-13-13) (Appendix 19);

- *Results of Pha*se *I-A Archeological Survey -- Proposed Northern Route; Northumberland, Stark, Dummer, Millsfield, Dixville, Stewartstown, Clarksville*

and Pittsburg, Coös County, NH (*2013*) (Approved by DHR 12-3-13) (Appendix 20);

- *Results of Phase I-A Archeological Survey -- AC System Transmission Line Upgrades (PSNH 373 Line); Deerfield, Candia, Raymond, Chester, Auburn, Derry and Londonderry, NH* (*2014*) (Approved by DHR 6-5-14) (Appendix 21);

- *Results of Phase I-A and Phase I-B Archeological Survey -- Proposed Expansion of Deerfield Substation Proposed Expansion of Scobie Pond Substation And AC System Transmission Line Upgrades (PSNH 373 Line); Deerfield, Candia, Raymond, Chester, Auburn, Derry and Londonderry, NH (2014)* (Appendix 22);

- *Results of Phase I-A Archeological Survey -- Northern Underground Route; Stewartstown and Clarksville, Coös County, NH* (*2015*) (Appendix 23);

- *Results of Phase I-A and Phase I-B Archeological Survey Transition Stations and Connecting Routes; Stewartstown, Clarksville and Pittsburg, NH (2015)* (Appendix 24);

- *Results of Phase I-A Archeological Survey Off Right-of-Way Access Roads; Clarksville, Dixville, Dixs Grant, Dummer, Errol, Franklin, Millsfield, New Hampton, Stark, Stewartstown, Pittsburg and Wentworth's Location, NH (2015)* (Appendix 25);

- *Results of Phase I-A Archeological Survey -- Underground Route; US Route 3 - Bridgewater, Plymouth, Campton, Thornton, and Woodstock NH Route 112 - Woodstock and Easton, NH Route 116 - Easton and Franconia, NH Route 18 - Franconia, Sugar Hill and Bethlehem, and US Route 302 - Bethlehem, NH (2015)* (Appendix 26);

- *Results of Phase I-A and Phase I-B Archeological Survey Bridgewater and Bethlehem Transition Stations (2015)* (Appendix 27);

- *Results of Phase I-A Archeological Survey Off Right-of-Way Lay Down Areas Millsfield and Clarksville, NH (2015)* (Appendix 28);

- *Results of Phase I-B Archeological Survey Existing ROW Corridor; Deerfield, Allenstown, Pembroke, Concord and Canterbury, NH (2014)* (Approved by DHR 7-8-14) (Appendix 29); and

- *Results of Phase I-B Archeological Survey -- Northern Route; Stark, Millsfield, Dixville, Stewartstown and Pittsburg, NH (2015)* (Appendix 30).

Additional Phase I-A (if and as needed) and Phase I-B survey work will be completed as part of the Section 106 process.

The Project has taken and will continue to take meaningful measures to avoid and minimize potential adverse effects to these sites. The Project's archeologists shared the results of the Phase I-A and Phase I-B surveys with the design engineers, and consulted with them on specific areas of potential effect. The design engineers then reviewed and revised the design of the transmission line to avoid or reduce impact to archeological resources, and the Project's decision to place an additional 52 miles of the route underground in the already disturbed part of public roads substantially reduces potential adverse effects. Other measures will also be implemented, such as buffering of cemeteries or graveyards to accommodate the potential for unmarked graves or funerary goods that may occur beyond fence lines. During construction, where appropriate, there will be on-site technical oversight by one or more cultural resources monitors. A series of best management practices for protection of resources will be followed and may include training of construction personnel, use of barrier fencing, protective fill, or other protective measures. Information about the location of known archeological resources will be kept confidential. Construction drawings will, however, be marked so that construction crews will avoid and minimize impacts to archeological resources.

NPT will also follow an "unanticipated finds" policy to address resources discovered during construction in areas where previous study failed to identify archeological deposits. Generally, this is accomplished through such efforts as monitoring, recovery or documentation. Mitigation measures may range from "data recovery" to "preservation in place." According to the NH DHR *Standards and Guidelines*, Phase III Data Recovery is "a full-scale investigation of the portion of the site affected by the project." As such, this effort entails a series of steps including development of a research design, collection of detailed information on past environmental conditions and context, completion of research, field investigations and analysis of features, strata, and artifacts pertinent to research questions, and reporting on results and findings.

All mitigation measures will be developed in coordination with DOE and NHDHR. As mentioned above, the Project expects that a PA and a CRMP will be developed that will set forth the measures that must be undertaken for mitigation of any adverse effects.

Historical Resources

Both NPT and SEARCH have done extensive surveys to identify properties in the APE that are potentially eligible for listing on the National Register. The Northern Pass survey was a

collaborative effort by the Preservation Company, a New Hampshire-based firm specializing in historic properties assessment, and Cherilyn Widell of Widell Preservation Services LLC with offices in Chesterton, Maryland. Ms. Widell has substantial experience assessing historic properties including service as the SHPO for the State of California. The results of this survey are set forth in the report titled *Northern Pass Transmission Project -- Assessment of Historic Properties, October 2015,* Appendix 18, and in Ms. Widell's pre-filed testimony.

In addition, SEARCH reviewed historical resources for the Environment Impact Statement and for purposes of complying with Section 106 of the National Historic Preservation Act, has prepared PAFs for most of the route. These PAFs were submitted to NHDHR on April 30, 2015 and followed the usual NHDHR prescribed approach to initiate review in the Section 106 consultation process.

The study conducted by NPT is intended to complement, not substitute for, the identification and effects analysis of historic resources being conducted by NHDHR under DOE's ultimate authority. Nevertheless, the identification and evaluation methodology used by NPT is fully consistent with 36 C.F.R. § 800.4 (identification of historic properties), 36 C.F.R. § 60.4 (criteria for evaluation), and National Park Service publications and directives related to the identification of properties eligible for the National Register of Historic Places, such as *How to Apply the National Register Criteria for Evaluation (updated 1997),* the *Secretary of the Interior's Standards for the Identification and Evaluation of Historic Properties* (1983) and *Guidelines for Evaluating and Documenting Rural Historic Landscapes* (Updated 1999). Thus, the Northern Pass assessment will also help inform the remaining work to be completed under Section 106.

The assessment identified 1,284 possible historic properties with a construction date from before 1965[16] within the APE for the Project and did an initial evaluation of each one to decide which ones merited further assessment on their historic nature and potential effects of the Project. From this list of properties that might be in view of the Project, 194 were selected for further analysis based on viewshed mapping and field survey; historic resource assessment forms were completed for each of these historic resources and are included in the report titled *Northern Pass Transmission Project -- Assessment of Historic Properties, October 2015,* Appendix 18.

[16] Resources dating from 1966 to 1968 were mapped and included in the database but received no further analysis because they were less than fifty years old and did not meet the National Register age-eligibility criterion.

Applying the criteria for determining visual effects and further analyzing potential effects by using 3-D modeling and photo overlays, the consultants determined that 12 of the historic properties identified and analyzed might be adversely affected by the Project. And, even for these 12 properties, the effects have been minimized to the extent practicable.

NPT made many changes to the Project design to avoid and minimize potential visual effects, including placing the line underground and in existing transmission corridors. This is an effective way of either avoiding impact altogether or minimizing effects on historic resources. Additionally, in the specific locations where the Project could have or does have a potential for adverse effect, the Project has changed originally planned structure heights, designs and locations to avoid or minimize effects on historic resources. A table summarizing those design changes is included in the *Historic Resources Assessment Report* at Figure 2, Appendix 18.

(3) Air Quality

The Project will provide the capacity to deliver 1,090 MW of clean, renewable, hydroelectric power to the State and the region, which will contribute significantly to improved air quality. Specifically, the Project will help meet air quality goals in New Hampshire and the region by reducing regional carbon dioxide emissions by over 3.3 million tons per year—equivalent to the annual emissions of approximately 690,000 vehicles.

Construction of the Project will result in minor, short-term localized effects on air quality, primarily from fugitive dust (resulting from ground disturbance at work sites and vehicular movements on access roads along the ROWs) and from vehicular emissions associated with operating construction equipment. No long-term adverse effects on air quality will result from the operation of the proposed transmission lines. To minimize short-term adverse effects to air quality during construction, environmental monitors will review ongoing activities, verifying and documenting that appropriate preventative and proactive BMPs are being used and maintained. These practices may include mulching/covering stock piles and installing wind breaks to reduce the potential for the generation of wind-eroded particulates, using water trucks to suppress construction-related (fugitive) dust when necessary, and installing crushed stone aprons at all access road entrances to public roadways to minimize tracking of soil onto public thoroughfares. In addition, vehicular emissions will be limited by requiring contractors to properly maintain construction equipment and vehicles.

Once constructed, the Project will be a source of clean and renewable energy, will not produce air emissions in New Hampshire and will not have an adverse effect, let alone an unreasonable adverse effect, on air quality. Ultimately, the Project will provide significant air quality benefits to the State and the New England region.

(4) Water Quality

Based on all of the information contained in the pre-filed testimony, the Application, and the accompanying reports, the Project will not have an unreasonable adverse effect on water quality.

Surface Water Quality

Surface water quality and the designated uses associated with waters located within or near the Project site will not be adversely impacted by the Project during the construction or operational phases. The Project is designed to meet the standards set forth in the rules pertinent to the following applications: NHDES Alteration of Terrain Permit Application ("AoT") Appendix 6, NHDES Section 401 Water Quality Certification Application, Appendix 4, NHDES Wetlands Permit Application, Appendix 2, NHDES Shoreland Water Quality Protection Act Permit Application, Appendix 5, and USACE Section 404 Clean Water Act Permit, Appendix 3. As part of the AoT Application, stormwater control measures and infrastructure associated with the nine development sites have been designed according to the New Hampshire Stormwater Manual so that treated discharges avoid adverse impacts on designated uses or surface water quality. Pollutant loading analyses have been completed for these sites and support the conclusion that there will be no adverse effects on surface water quality. The New Hampshire Watershed Report Cards for the Assessment Unit IDs ("AUIDs")[17] associated with the nine site developments related to the Project are included in the Section 401 Water Quality Certification.

The Project has been designed to be protective of water quality. NPT has studied the potential effects of the Project on water quality throughout the planning, routing and engineering phases of the Project. As described below, measures will be followed to address the potential for increased sediment erosion and movement during the construction phases and changes in stormwater runoff once the Project is complete. All construction contractors associated with the Project will be trained on and required to adhere to all applicable BMPs, state and federal rules

[17] A description of Watershed Report Cards is located at:
http://des.nh.gov/organization/divisions/water/wmb/swqa/report_cards.htm

and permit requirements and approved procedures, protocols and permit conditions that are protective of water quality. Herbicides or chemical treatments will not be used before or during construction of the Project. Future vegetation management controls will be similar to those used by PSNH in the ROW. These management measures currently consist primarily of periodic mowing, trimming and cutting of vegetation, by hand or mechanical means, to maintain clearance distances and to address safety considerations. Herbicides may be used in rare circumstances; for example, where they have been requested for invasive species eradication or control by NHDES or a municipality.

With respect to planning for and managing stormwater to protect sensitive wetlands, watercourses, waterbodies and habitats during site preparation and construction activities, the Project's contractors will follow the BMPs detailed in the three-volume *NH Stormwater Manual* (NHDES, 2008) and will adhere to specific permit conditions contained in the Certificate of Site and Facility when issued by the SEC, including conditions recommended by other state agencies. All work performed by NPT's contractors will follow the NHDES *Best Management Practices Manual for Utility Maintenance in and Adjacent to Wetlands and Waterbodies in New Hampshire* published by NHDRED. For items not addressed in the foregoing manuals, a supplemental Project-specific BMP manual will be created based on specific permit conditions. Additionally, in locations where blasting may be required, these activities will be governed by a plan to be developed by the blasting contractor in accordance with the BMPs presented in NHDES' *Rock Blasting and Water Quality Measures that can be Taken to Protect Water Quality*. Land clearing (forestry) contractors will comply with NHDRED *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire.* Environmental monitors will review ongoing activities throughout the construction phases of the Project and will inspect the condition and effectiveness of the erosion control measures. Inspection and maintenance logs will be maintained to provide feedback to the construction contractors and the Project as appropriate.

The Project will also meet the requirements of the Construction General Permit ("CGP") through the USEPA National Pollution Discharge and Elimination System ("NPDES") Phase II program. A significant component of the CGP involves development and implementation of a

Stormwater Pollution Prevention Plan ("SWPPP")[18] to govern site-specific construction activities and guide the required management of stormwater pollutants and sediments using BMPs prior to and during construction and after construction is complete until stabilization is achieved. As part of the environmental monitoring procedure described above, the monitors will work with the Project's contractors to ensure compliance with the CGP and SWPPP and thereby protect water quality throughout the duration of constructing the Project.

Wetlands, Vernal Pools and Shoreland

Applications for state and federal wetland permits have also been submitted for Project activities in wetlands, rivers, streams, and vernal pools under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act as administered by USACE, and in accordance with RSA 482-A and Env-Wt 100, et seq. These applications satisfy the stringent requirements of those permitting programs to avoid, minimize and mitigate wetland impacts. Many individual and multi-agency pre-application meetings and telephone conferences were held to discuss the Project and the application requirements. These meetings included staff and managers from the USACE, USEPA, NHDES Wetlands Bureau, NHDES AoT Program, and NHDES Shoreland Program. Additional meetings and conversations were held with federal and state technical staff at various times during project design. See Appendix 48 for a list of consultations with regulatory agencies.

Permit applications for work in the 250-ft protected shoreland of the 20 waterbodies in the Project area that are regulated under the SWQPA (RSA 483-B) and its regulations (Env-Wq 1400) have also been submitted. The activities that require shoreland permits include earthwork, tree clearing, and increases in impermeable surfaces within the various shoreland zones regulated by NHDES, unless these activities are already covered in the NHDES Wetland application. Most of the Project is located in existing ROW, where the earthwork, footprint of the proposed structures, and necessary clearing within protected shoreland is fairly limited and unavoidable.

The siting and design of all Project features included efforts to avoid and minimize impacts to wetlands and other natural and cultural resources. Due to these efforts there will only be 2.53 acres of permanent impact along this 192-mile transmission corridor. There will also be temporary impacts of approximately 140 acres resulting from either temporary fill or excavation

[18] The draft SWPPP is appended to NHDES Alteration of Terrain Application. The final SWPPP will be submitted with the NPDES Construction General Permit to USEPA at the time of construction.

in resource areas. The vast majority (99%) of unavoidable wetland, stream and vernal pool impacts associated with Northern Pass will be temporary or secondary impacts, generally resulting from indirect impacts due to ancillary activities, such as tree clearing, which may alter some wetland functions.

Temporary impacts to wetlands associated with construction of the Project include activities such as placing timber mats on wetlands and across streams for construction access roads, temporary timber mat crane pads, and trenching through jurisdictional streams and wetlands for underground installation. Access roads involve a 16 foot-wide travel surface to accommodate vehicles and equipment needed to pour concrete foundations and erect steel structures. Crane pads or work pads will be established at each new or relocated structure location to provide level ground for safety and stability of equipment.

A number of efforts have been undertaken to avoid direct impacts to resource areas, such as trenchless technology in specific locations. Work during frozen conditions will also help to minimize disturbances to wetlands and streams. Where winter construction is not possible, access through wetlands and streams will include utilizing swamp mats or other approved BMPs. Access roads across wetlands and streams will be temporary and designed to minimize impacts and surface water disturbance. Temporarily impacted wetland resources will be restored following a project-specific restoration plan that makes use of native and naturalized seed mixes, and, in selected locations, plantings or other special treatments. See *Natural Resource Mitigation Plan,* Appendix 32.

The small, dispersed permanent impacts are associated with transmission structure foundations for new and relocated structures, caissons, and guy wires, and the construction of transition stations and substation expansions. Structure selection was based on several considerations, including ROW width, resource impacts, structure height/visibility concerns, and construction issues. There are two facilities with large footprints that necessitate correspondingly larger impacts to local wetlands than are proposed in other areas of the project. These include Transition Station 1 (1.06 acres of wetland impacts), Transition Station 5 (0.37 acres of wetland impacts), and the Deerfield substation expansion (0.68 acres of impact). The locations of these facilities were dictated by the transmission design and constructability issues, while minimizing impacts to natural resources to the extent practicable.

It was not possible to avoid all wetland impacts due to the limits of structure spacing and the location of other built and natural landscape features that must be considered (roads, driveways, existing transmission and distribution lines, rivers, cliffs, ravines, etc.). The resulting unavoidable permanent wetland impacts of 2.53 acres resulting from structure foundations, transition stations, and substation expansion are small, and are spread out in small quantities over the 192-mile project. These scattered transmission structure footprints will have minimal effects on the functions and values of wetlands along the corridor.

Based on pre-application meetings with federal regulatory agencies, secondary impacts to wetlands, streams and vernal pools will include the conversion of forested wetlands to scrub-shrub or emergent wetlands through tree clearing, impacts to deep organic soils and clearing of upland forest within 100 feet of perennial streams, 50 feet of intermittent streams, and 25 feet of ephemeral streams, and within the 100 foot "envelope" associated with high quality vernal pools. Forested wetlands within the ROW that are cleared may experience a shift in the dominant vegetation assemblage. This could result in a change in hydrology associated with decreased evapotranspiration depending upon the extent of clearing and orientation of the impacted ROW. However, any such areas will likely remain wetland systems and maintain a hydrological and biological connection to adjacent portions of the same wetland systems not impacted by the project. The overall impact on the functions and values associated with a cleared wetland and adjacent portions of the undisturbed wetland system will be minimal.

Temporarily impacted areas will be restored, and BMPs will be employed during construction. Although unavoidable direct impacts to wetlands are small, any such impacts, as well as secondary wetland impacts and impacts to wildlife resources, will be more than adequately addressed by a compensatory mitigation package that proposes 1,668 acres of land preservation, an ARM fund payment of approximately $3 million, and funding of other natural resource programs and projects in New Hampshire. See Appendix 32.

(5) Natural Environment

Based on all of the information contained in the pre-filed testimony, the Application, and the accompanying reports, the Project will not have an unreasonable adverse effect on the natural environment.

Fisheries and Aquatic Resources

Normandeau Associates studied the potential impacts to state or federally listed fish and aquatic invertebrates, cold water fisheries, and EFH, as reported in its *Fisheries and Aquatic Invertebrates Resource Report and Impact Analysis*, Appendix 33. Three fish species are listed by New Hampshire as being endangered or threatened, including the state endangered and federally threatened shortnose sturgeon, state endangered American brook lamprey, and the state threatened bridle shiner, but there are no known occurrences of these species in the Project area.

The only federally- or state-listed fish or aquatic invertebrates likely to be in the Project area are freshwater mussels. No listed mussels were observed and only one mussel species was found during the 2013 Normandeau survey. This mussel, the eastern elliptio (Elliptio complanata), is an extremely common species found in a variety of habitats, and is considered one of the most abundant freshwater mussel species in New England. Therefore, impacts to rare freshwater mussels are very unlikely.

Aquatic impacts are expected to be virtually non-existent. Only one un-named stream in northern New Hampshire has the potential to exceed a maximum July stream temperature capable of causing brook trout to avoid the portion of the stream in the newly cleared ROW for short periods of time.

Significant Wildlife Species and Significant Wildlife Habitat Resources

Normandeau Associates also evaluated the potential impacts to wildlife resources from the Project, and recommended impact avoidance, minimization and mitigation measures. The resources considered were based on state and federal agency requests, and included specific habitats and species present or likely to use the Project area, in addition to an analysis of the general wildlife habitat and species likely to be present. Between January, 2011 and August, 2015 Normandeau designed and conducted a variety of desktop and field studies to evaluate the wildlife and habitat resources in the Project area. The results of this study are set forth in Normandeau's report *Wildlife Report and Impact Assessment*, Appendix 36.

The Project area passes through a variety of habitat types and will therefore potentially affect a number of different wildlife species. Normandeau Associates identified and evaluated significant wildlife species, including species listed as threatened or endangered at the federal and/or state level, those that are candidates for such listing, and those that are identified as "special concern" species by NHF&G. Habitats associated with other species were also

evaluated at the request of resource agencies, for example Forest Service Sensitive Species ("FSS") associated with the WMNF. The habitat used by wildlife for critical life cycle functions were evaluated as significant habitat resources species, and these include several specific habitats that were of concern to NHFG. Currently, there are no federally designated critical wildlife habitats in New Hampshire.

Based on the studies conducted by NPT and the information presented in the *Wildlife Report and Impact Assessment*, the Project will not have a significant impact on wildlife and their habitats. From the known biology of the species present in and around the Project area, impacts resulting from the Project will be minor. Additionally, as described above, the Project has integrated natural resource issues into planning and design, placing just over 60 miles of the Project underground, thereby minimizing the impacts of the Project.

The primary impact to all reptiles, including the listed species, occurring as a result of the Project is disturbance during initial construction and during maintenance when the Project is in operation. Because the existing ROW has the potential to provide important habitat (basking, denning, nesting) for most reptiles, including the listed species mentioned above, the Project's impact will be mitigated by implementing BMPs and construction timing restrictions during construction and subsequent maintenance activities specifically to minimize disturbance and subsequent impacts to these species. Habitat conversion from forest to grassy or shrubby vegetation will provide benefit to reptiles by increasing the amount of ground receiving direct sunshine.

For most avian species the primary impact that is likely to occur as a result of the Project is disturbance during construction, and conversion of habitat where forest clearing is required. Clearing forest and creating open or shrubby habitats will result in a minor loss of habitat for forest-nesting species, but compared to the total amount of forest habitat that will remain available in the surrounding landscape, this impact is not significant. Clearing forest and creating open or shrubby habitats will benefit shrub-nesting species.

The Concord Pine Barrens is the only location in the Project area that provides suitable habitat for listed insect species, including the Karner blue butterfly, a federally listed species. To address potential impacts, a species protection plan designed to benefit the Karner blue butterfly (and that will also benefit the other three special status insect species) will be implemented. An egg survey for the Karner blue butterfly was conducted in July of 2015 to provide a basis for

estimating impacts to this species from the construction. This approach was approved by the USFWS and NHF&G. All maintenance activities in this part of the ROW will be designed to maximize the benefit to these species. Habitat restoration will be implemented through re-vegetation to rapidly recreate suitable habitat when construction is complete. Off-site habitat protection, restoration and/or creation will also be used to provide a net benefit to these species. For the Karner blue butterfly, the Project will implement an agency approved avoidance, minimization and mitigation plan.

Conversion of forest habitat will have some effect on forest mammals, as will disturbance during construction. However, given the abundance of forest around the Project area and the high mobility of marten, lynx and bats, these impacts will be minimal.

Impacts to wildlife and all other all natural resources were avoided and minimized in all phases of the project, including: transmission line route selection; siting and configuration of structure foundations; siting of the converter terminal, substation expansions, and transition stations; selection of access road locations (both on and off the ROW); selection of construction BMPs; and scheduling of work, especially vegetation clearing. The decision to place a substantial portion of the Project underground in roadways, primarily to reduce visual impacts, also resulted in a reduction in habitat impacts. The Project has developed self-imposed seasonal restrictions and survey requirements to minimize impacts to wildlife at critical life stages. See Appendix 32.

Rare Plants, Rare Natural Communities, and Exemplary Natural Communities

Normandeau Associates conducted a comprehensive study of rare plants, rare natural communities, and exemplary natural communities, as reported in its *Rare, Threatened and Endangered Plants and Exemplary Natural Communities Report* (Appendix 35). The study did not identify any federally listed threatened or endangered plant species within the Project area based on desktop and field inventory efforts. However, seven state-listed threatened or endangered species, eight state-watch species, four state indeterminate species, and one potential state exemplary natural community were observed within the proposed Project area. However, no state threatened or endangered plant species will be impacted in the northern segment, and none of the RTE plant species occurring in the northern segment is regionally rare. Permanently impacted areas within the existing ROW due to proposed structures occupy a very small area within the ROW. As a result, any loss of habitat to the impacted state endangered and threatened

species will be minor. The proposed underground route between Bethlehem and Bridgewater will avoid impacts to two exemplary natural community systems, one population of a state endangered plant species, two populations of a state watch plant species, and one population of a state indeterminate plant species.

To the extent practicable, the location of structure foundations was shifted to avoid or minimize impacts, and temporary access roads were re-routed if practicable. Further, the Project has committed to impact minimization measures in consultation with the NHNHB.

(6) Public Health and Safety

(A) Electric And Magnetic Fields ("EMF")

Exponent, Inc. was retained to model electric and magnetic field levels associated with the Project, and to undertake an assessment of the most current scientific literature on health research regarding exposure to these fields. Based on this assessment, Exponent concluded that the Project will not have an unreasonable adverse effect on public health and safety as a result of electric and magnetic fields. Exponent's summary of the scientific research further supports the conclusion of scientific and public health agencies that there are no established effects of EMF on public health and safety at the levels associated with the Project. Exponent's conclusion is fully consistent with the DOE's conclusions from the July 21, 2015 DEIS that electric and magnetic fields

> "generated by underground portions of the Project would be below accepted limits. Overhead portions of the line, including HVDC and HVAC portions, would generate EMFs which would have no impact outside of the transmission route, and minimal impacts within the transmission route. There is no authoritative evidence that exposure to EMFs could increase or create a public health risk."
> DEIS, Summary, Section S.9.4, pages S-22 to S-23.

Background

Electric and magnetic fields are produced by natural and man-made sources. Wherever electric current is flowing, there is both an electric field and a magnetic field present. Northern Pass will be a source of these fields for both the DC and AC portions of the Project.

DC and AC electricity are fundamentally different in nature. DC electricity flows consistently in one direction while AC electricity alternates back and forth 60 times per second. As a result, the electric and magnetic fields from these lines have different characteristics. Fields from DC lines are known as static fields (0 Hertz) whereas those from AC lines are known as EMFs, with frequencies centered on 60 Hertz. The standard unit for measuring the strength of an

electric field is volts per meter (V/m). The unit of magnetic field strength is measured in milligauss (mG).

Static (DC) electric fields exist naturally due to charge in the air and clouds overhead, ranging from a few hundred V/m to several thousand V/m or occasionally even tens of thousands of V/m with approaching storm clouds; the static cling between your body and clothes can range up to half a million V/m. The earth has a natural static magnetic field that varies from approximately 200 mG at the equator to over 700 mG at the north and south poles; the intensity of the static magnetic field in New Hampshire is about 530 mG. Much higher static magnetic fields in the tens of thousands to hundreds of thousands of mG are present from common items such as magnets. Higher static magnetic fields, in the 15,000,000 mG range are produced by magnetic resonance imaging machines.

Typical sources of EMFs include power lines, building wiring, home and office appliances, tools, and electric currents flowing on water pipes. The importance of these sources to overall exposure varies considerably. For example, if a residence is very close to a power line, that source could be the dominant, but not necessarily the only, source of magnetic fields in the home because EMF levels decrease rapidly with distance from a transmission or distribution line.

Guidelines

There are no federal standards in the United States or Canada for 60-Hertz EMF or static field exposures, and there are no guidelines for EMF and static field levels from transmission lines in New Hampshire. Criteria to assess potential effects of the Project's static fields and EMF on health and the environment were identified from guidelines and standards published by national and international agencies. Reviews conducted by, among others, include the U.S. Food and Drug Administration ("FDA"), the World Health Organization ("WHO"), the International Committee on Non-Ionizing Radiation Protection ("ICNIRP"), the National Radiation Protection Board of Great Britain ("NRPB"), and the International Committee on Electromagnetic Safety ("ICES") indicate that exposure to EMFs and static fields associated with the proposed Project would not have an unreasonable adverse effect on public health and safety.

Northern Pass DC Transmission Line

None of the health and scientific agencies that have researched DC transmission lines like Northern Pass have concluded that exposures at levels, similar to the Project's would have an

adverse effect on human health or the environment. The ICNIRP limit on exposure of the general public to static magnetic fields is 4,000,000 mG (ICNIRP, 2009), which is thousands of times greater than the Earth's magnetic field and the static magnetic field from the Project's DC line. No scientific or health agency has recommended limits on static electric fields and there is no scientific basis to project adverse effects from the low static magnetic fields associated with the DC portion of the Project.

With respect to both the electric and magnetic fields for the DC segments of the Project, Northern Pass is well below any of the established guidelines that are discussed above. The DC electric field is highest under the conductors of the line and decreases with distance. At the edge of the ROW for portions of the route with overhead DC conductors, the calculated level of the static electric field is 8.8 kV/m or less. The calculated maximum static electric field on the ROW in fair weather is approximately 15 kV/m, but will increase to approximately 23 kV/m during foul weather. The DC magnetic field diminishes with distance from the transmission line conductors and varies with the amount of current on the line. At the edge of the DC overhead line ROW, the field level is 79 mG or less when the Project is operating at its full-rated load. The maximum calculated static magnetic field from the DC portion of the Project on the ROW is calculated to be 355 mG for the overhead portion of the route, and 526 mG for the underground portion of the route at full rated loading.

Northern Pass AC Transmission Line

There are guidelines developed by two internationally recognized bodies, the ICNIRP and ICES, a committee of the Institute of Electrical and Electronics Engineers ("IEEE"), which are designed to protect the public from the effects of electric and magnetic fields that occur at high exposure levels. The most recent exposure limits were set by ICNIRP in 2010. The field exposures corresponding to the ICNIRP guideline limits are 9,146 mG for the magnetic field and 26.8 kV/m for the electric fields, which are significantly greater than the fields calculated for the Project.

None of these agencies conclude that the overall evidence suggests the existence of any adverse long-term health effects from exposure to EMF below scientifically-established guidelines. Since the 1970s, a number of scientific studies have examined potential long term effects of EMFs, and expert panels on behalf of scientific, health, and government agencies have evaluated the available scientific literature on potential EMF effects. These agencies include the

US National Institute on Environmental Health in 1998, the IARC in 2002, the NRPB in 2004, the WHO in 2007, ICNIRP in 2010, and the Scientific Committee on Emerging and Newly Identified Health Risks ("SCENIHR") in 2015. Furthermore, there are currently no known biophysical mechanisms that could explain an effect of long-term exposure on cancer or other disease. With respect to the overall evidence on potential long-term effects, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields.

With respect to both the electric and magnetic fields for the Project, Northern Pass is well below any of the established guidelines that are discussed above. The AC electric field for the Project is highest under the conductors of the line and decreases with distance. At the edge of the ROW the electric field is calculated to be 2.7 kV/m or less. The maximum level in the ROW is 5.2 kV/m. The AC magnetic fields decrease with distance from the transmission line conductors and vary with the amount of current they carry. At the edge of the ROW, the AC magnetic field level will vary between 0.1 mG and 92 mG, except for an approximately 2000-foot segment where the field on one side of the ROW is calculated to be 127 mG when operating at full-rating. The maximum level on the ROW is 366 mG.

(B) Sound

Background

To accurately assess acoustic impact, baseline sound surveys were conducted to document the time-varying characteristics of ambient environmental sounds in the Project area. Sound monitoring programs relied on unattended continuous measurements (3 to 7 day periods) and attended intermittent measurements (15 to 20 minute intervals). The measurements were taken during a cold weather season with leaves off the trees, and a warm weather season with foliage and insect sounds present. See *Northern Pass Project Sound Reports 1 through 5*, Appendix 39.

Baseline sound surveys were conducted for the stationary facilities and the Project route. Reviews of the existing land use in the vicinity of the Franklin converter terminal, Deerfield substation, and Scobie Pond substation were conducted to identify the closest and most representative receptor locations. Seventeen measurement locations were selected for assessing ambient sound levels along the route in order to provide a representative sample of the various acoustic environments.

The sound levels calculated for the Project are consistent with the State of New Hampshire Site Evaluation Committee's (SEC) finding in the *Antrim Wind Energy, LLC* case, SEC Docket No. 2012-01, (April 25, 2013) where the SEC relied upon the 2009 WHO Guidelines. The SEC determined that the proposed wind facility would not have an unreasonable adverse effect on public health and safety insofar as sound levels generated by the facility at the outside facades of residences, during daytime, did not exceed 45 dBA or 5 dBA above ambient, whichever is greater, and, at nighttime, did not exceed 40 dBA or 5 dBA above ambient, whichever is greater.

Stationary Facilities

Surveys quantified the lowest background sound levels typically occurring in the vicinity of the Project. In most environments, background sound levels reach a minimum during the late night or early morning hours when local traffic is negligible. The "nominally lowest" background sound levels measured during the summer and winter surveys are as follows:

Franklin Converter Terminal:	Winter – 21 dBA; Summer – 27 dBA
Deerfield Substation:	Winter – 24 dBA; Summer – 27 dBA
Scobie Pond Substation:	Winter – 30 dBA; Summer – 34 dBA (North Monitor) Winter – 31dBA; Summer – 36 dBA (South Monitor)

The potential impact of facility sounds has been assessed based on incremental increases above the "nominally lowest" background sound level measured in the baseline sound surveys, which is a very conservative estimate of typically lowest background sound levels that occur in the area. The following impact classification was used to rate impacts above the "nominally lowest" background level.

Up to 5 dBA	–	*little or no impact*
5 to 10 dBA	–	*minimal impact*
Greater than 10 dBA	–	*significant impact*

In order to obtain a rating of "minimal impact" or less, the following acoustic design goals have been defined for Project related equipment at each facility when measured at the boundaries of the receptor property.

Franklin Converter Terminal:	Maximum continuous level of 30 dBA .
Deerfield Substation:	Maximum continuous level of 29 dBA
Scobie Pond substation:	Maximum continuous level of 35 dBA.

These acoustic design goals will be incorporated into contracts for the respective facilities. At the conclusion of construction, the contractor will demonstrate compliance with the acoustic specifications through field measurements

Transmission Lines

A small electrical discharge, referred to as corona, occurs when the voltage on a conductor creates an electric field surface gradient sufficient to cause a local breakdown of the air (ionizing the air) adjacent to the conductor. Power lines are designed so that the conductor surface does not normally produce corona, but precipitation, or debris, such as insects, may produce corona under certain conditions. The discharge, which is accompanied by a small snapping sound, is most pronounced directly underneath the line conductors, and decreases with distance from the transmission line.

Sources of audible noise are all around us, including, wind movement, distant traffic noise, and the activities of insects, birds, and other animals. Specific identifiable noises such as birdcalls, neighborhood activity, and traffic can produce audible noise levels of 50 to 60 dBA or greater. The sound level of typical human speech is approximately 60 dBA. Background level can vary widely depending on location and land use. Typical background levels of noise in rural and urban environments can range from 35 to 60 dBA. Specific background sound levels measured along the Project route varied from 18 dBA to 45 dBA.

The type of audible noise produced by corona is the same, but behaves differently depending on whether a line is DC or AC. The audible noise level from an AC line increases in foul weather while the audible noise from a DC line decreases in foul weather. The calculated A-weighted audible noise level at the edge of the ROW along the DC line route is 27 dBA or less in fair-weather conditions and 28 dba or less in foul weather. The calculated A-weighted audible noise level at the edge of the ROW along the AC line route is 18 dBA or less in fair-weather conditions and 43 dba or less in foul weather. The maximum foul weather sound level experienced along the Project route, 43 dBA is within the range of existing background noise levels measured along the line route. Levels above 40 dBA only occur for a few line segments on the southern AC-only portion of the Project and only during foul weather when background noise will likely increase due to the weather. For additional information, see *Electrical Environment of the Proposed Northern Pass Transmission Project: DC Electric Field, DC*

Magnetic Field, Air Ion Density Common, AC Electric Field, AC Magnetic Field, Audible Noise, and Radio Noise, Appendix 38.

Construction Noise

For the most part, construction activities will only take place during daytime hours. The construction schedule will include many overlapping phases occurring throughout the proposed transmission line.

Due to the temporary nature of most construction components of the Project, construction noise is not expected to result in an unreasonable impact at sensitive receptors. The following noise abatement measures will apply throughout the Project:

- The construction equipment manufacturers' stock sound muffling devices will be used, and will be kept in good repair throughout the construction process.
- The majority of the potentially noisy construction work will be performed during daytime hours.
- The Project will maintain communication with the communities during the construction process in order to inform of potential impact during construction, and to respond to community concerns.

(C) Aviation Safety

NPT has been working with the Federal Aviation Administration ("FAA") for Project design purposes since 2010. The Project submitted information in 2011 to the FAA to verify that the Project's calculated height limitations were correct. Discussions with the FAA validated the understanding of the limitations in the area of the Concord Airport. Structure designs in certain areas of the Project were modified to avoid being considered a hazard for currently approved flight patterns. Obstruction evaluations are only valid for 18 months after receipt from the FAA and can be renewed only once for a second 18-month extension. The Project plans to submit the final design documentation in mid-2016.

Helicopters are used by construction contractors and electric utility operations and maintenance personnel as an essential tool in the construction of transmission lines, particularly in remote or inaccessible areas. Helicopters will also be used for wire stringing operations,

bringing workers, materials and equipment to the worksite, and for inspecting existing or newly constructed transmission lines. It is not unusual for three or more helicopters to be working on the Project simultaneously during peak construction periods. The tasks generally performed include, pulling in lead line for wire stringing, placing workers on pole tops for wire clipping and re-numbering, long-lining, stringing blocks to and from the poles, inspecting new or de-energized lines prior to energizing them, and flying in and setting pre-assembled structures.

Because helicopter work involves mostly low flight paths, often in common and intersecting ROWs, flights must be monitored and controlled to keep the work as safe as possible. All proposed helicopter flight schedules are sent daily to a central contact in the utility's control center and distributed to a predetermined flight contact group consisting of all individuals involved in planning and executing helicopter flights to identify and resolve any flight conflicts. An aircraft description, pilot identification and phone numbers, and radio frequencies monitored are provided daily. All pilots are required to call the control center before liftoff and upon landing. When flights are complete and clear of the ROW, the control center will log them out.

(D) Crossing Local Highways

NPT seeks permission to install the Project, including conduit, cable, wires, poles, structures and devices across, over, under and along certain locally-maintained highways, including 71 aerial crossings and four underground roadway installation sections. The underground sections are identified by town and roadway. The SEC has exclusive authority to grant permission to an energy facility to utilize locally-maintained highways. In *Public Service Company of New Hampshire v. Town of Hampton*, 120 N.H. 68 (Jan. 31, 1980), the Court pointed out that the "declared purposed of RSA ch. 162-F [forerunner to RSA ch. 162-H] is to provide a resolution, in an 'integrated fashion,' of all issues involving the routing of transmission lines." The Court found that the Town of Hampton could not regulate transmission lines associated with the Seabrook Nuclear Station, noting that the SEC protects the public health and safety of towns with respect to transmission lines covered by the siting statute. NPT has filed a request with the NHDOT to cross state-maintained highways and has included that request with the Application as required by RSA 162-H:7 and Site 301.03 (d). See Appendix 9.

RSA 162-H:16, IV provides that the SEC must find, among other things, that issuance of a certificate of site and facility will not have an unreasonable adverse effect on public health and

safety. Utilities of all varieties, including power lines, have long been recognized as appropriate users of public highways, so long as the facilities do not conflict with the general public's superior use. E.g., *McCaffrey v. Concord Electric Co.*, 80 N.H. 45, 46-47 (1921). In *King v. Town of Lyme*, 126 N.H. 279, 284 (1985), the Court affirmed that a utility's use of a highway easement is appropriate since New Hampshire has never considered highway purposes to be limited to the transportation of movable vehicles, persons or property.

The authority to erect electric transmission lines and underground cables in state and local highways is codified at RSA 231:160. The standard for locating poles, lines, and underground cables is set forth at RSA 231:168, which states that the lines "will not interfere with the safe, free and convenient use for public travel of the highway." To further that process, the NHDOT has adopted certain standards, which are set forth in its *Utility Accommodation Manual* ("UAM"), dated February 24, 2010. This filing constitutes notice of these proposed crossings, associated pole placements and locations in accordance with the procedures set forth in the UAM Appendix G-3.1-2.

The New Hampshire Supreme Court has made it clear that the authority to license placement of power lines, poles and underground conduit within highways is regulatory in character and must be exercised in a non-exclusionary and reasonable manner. In *Rye v. Public Service Company of New Hampshire*, 130 N.H. 365 (1988), the Court found that a crossing application may be denied only for a public safety-based reason.

NPT seeks approval from the SEC to install its Project within, along, over, under and across locally-maintained highways. This request mirrors the approach followed, and the standards applied, in the request made to NHDOT for state-maintained highways. With respect to the underground highway installation sections in the towns of Clarksville and Stewartstown, NPT proposes that the SEC apply the NHDOT *Standard Specifications for Road and Bridge Construction* and the provisions, instructions, and regulations set forth in the NHDOT's standard Excavation Permit. Furthermore, NPT proposes that the SEC condition approval of a certificate, to the extent necessary, on compliance with such standards. Accordingly, Project plans for aerial crossings and underground sections within highways are provided at the 30% design level, which is the commonly accepted level of detail for initial permit applications and consistent with NHDOT practice. See Appendix 9 and 10.

As the design and permitting process proceeds, further refinements and more information will be incorporated before final approval. In addition, appropriate traffic management and control plans, as well as temporary access requests will be developed for the Project as more field detail and construction means and methods become available during the approval process.

As explained in Mr. Bradstreet and Mr. Kayser's testimony and exhibits, NPT's Project will not unreasonably interfere with the safe, free, and convenient use for public travel of locally-maintained highways, and it will not have an unreasonable adverse effect on public health and safety.

(E) Blasting

During construction of the Project, it is likely that occasional shallow-to-bedrock soil depths and subsurface boulders will be encountered. Blasting may be required to place transmission line support structures, install transmission lines underground, or for substation construction. No adverse effects from blasting activity upon either sensitive natural resources of adjacent property owner are anticipated due to the small charges required for this activity. A Project-specific blasting specification will be included in the requirements for contractors.

All laws, ordinances and regulations, including the NHDOT *Standard Specifications for Road and Bridge Construction*, will be followed in the use, handling, loading, transportation, and storage of explosives and blasting agents. Based on the foregoing, coupled with the pre-filed testimony of John Kayser, there will be no unreasonable adverse effects on public health and safety.

(j) ORDERLY DEVELOPMENT

(1) Estimate of Impacts on Local Land Use

Local land uses along the Project corridor include forestry, agriculture, residential, commercial/industrial, transportation, recreation, conservation, historical, and natural features such as rivers, wetlands, and wildlife habitat. As set forth in the report prepared by Robert W. Varney titled *Review of Land Use and Local, Regional and State Planning*, Appendix 41, these uses will be able to continue largely uninterrupted during the operation and maintenance of the Project.

Over 83% of the 192-mile Project follows already developed transmission and roadway corridors. In many cases the existing ROW pre-dates adjacent and nearby land uses. The use of

pre-existing corridors helps to maintain existing land use patterns for most of the route and minimize impacts to existing land use as well as the environment.

The existing ROW traverses or is bordered by agricultural lands, forests, commercial areas, residential neighborhoods, recreational areas, areas of scenic and historic significance, and a wide variety of wildlife habitat. By following the existing corridor, the Project will maintain existing land use patterns along the existing ROW. The transmission upgrade work at and between the Deerfield and Scobie Pond Substations will have no effect on land use.

The approximately 32 miles of new ROW between Pittsburg and Dummer traverses sparsely populated land, which is primarily forested and managed for timber, recreational and other energy facility uses. These uses will continue uninterrupted after construction. In addition, approximately eight miles will be placed underground, further avoiding potential impacts.

Anticipated temporary construction impacts include construction and traffic-related noise, traffic diversion, site work, clearing of vegetation, use of lay down areas for equipment, installation of erosion control, dust control, excavation, use of heavy equipment, temporary wetland crossings, and other associated construction activities. These activities will comply with BMPs as well as with state and federal permit requirements. The long-term operation of the facility will not interfere with existing or future local land use patterns.

(2) Estimate of Impacts on Local Economy

Economic Benefits

Infrastructure projects such as Northern Pass provide economic benefits in both the construction and operating phases. During construction, the local economy benefits from increased employment (such as construction jobs and the employment generated from the regional supply chain effects of various other goods and services being supplied to the construction Project) and induced effects (for example, the local spending of construction workers at restaurants, hotels, and for other services). State economic activity during construction, as measured by Gross Domestic Product ("GDP") in New Hampshire, will expand by over $210 million per year on average at the peak of construction. For New England, GDP will expand by approximately $490 million. See Appendix 43.

During operation, primarily as a result of reduced costs of electricity, households will be able to save more or spend their higher disposable income on other goods or services, thereby stimulating the economy. Similarly, firms that benefit from lower costs of electricity will be able

to expand production, further benefiting the local economy. Moreover, NPT will pay property taxes that may be used by state and local governments to increase government spending on programs that benefits the economy. NPT would also need to hire local labor for operations and maintenance ("O&M") of the infrastructure and is projected to spend $3.5 million annually on O&M. In addition, NPT will spend $10 million annually on funding initiatives under the Forward New Hampshire Plan ("Forward NH Plan") through 2039. In total, New Hampshire and New England region GDP will increase by over $160 million and $1.1 billion respectively during the forecast timeframe from 2019-2029.

NPT expects that the Project will be constructed starting in 2017 and concluding in 2019. NPT's expenditures in the State will create new jobs and increased economic activity in New Hampshire and across the region. Including labor and materials, total spending to construct the Project is estimated to be approximately $1.1 billion, of which over $610 million will be spent on labor, including environmental experts, lawyers, and other experts, as well as construction workers, engineers, and personnel for site preparation. Spending on materials is projected to be more than $500 million, of which nearly 27% would be spent in New Hampshire. Total labor and materials spending from 2015 to 2019 in New Hampshire is projected to be over $400 million.

Once commercial operations begin, NPT is expected to reduce the wholesale market price of electricity (energy and capacity) in the ISO-NE markets, which will ultimately benefit retail electricity consumers. The reduction in wholesale electricity costs in the region is estimated to average between $851 million and $866 million per year for the forecast timeframe, 2019-2029, and New Hampshire will average more than $80 million in reduced wholesale electricity costs during that period. Operation of the Project would lead to reduction in the retail costs of electricity across New England by approximately $575 million a year, and approximately $80 million in New Hampshire.

As a result, residential customers would be able to spend the money they save from lower retail costs of electricity on other goods and services and therefore lead to an expansion of economic activity. Commercial and industrial customers, especially those that rely heavily on electricity use, may also experience a positive income effect as a result of reduced costs of electricity, which are generally treated as a variable cost in business. Assuming the same production level in the short term, decreases in electricity costs will increase profitability. In the

medium term, businesses facing decreasing electricity costs may choose to increase production, and that may mean expansion of their capital, which then induces demand in other industries. For example, increased production will indirectly create opportunities for additional employment as production expansions typically require additional labor. Businesses will also require incremental inputs to their production process which will, therefore, indirectly increase demand in other industries. There will also be a substitution effect, where possible technically and economically sensible electricity use will displace other fuel use in the economy. In the long run, businesses that have production cost savings from lower electricity costs may choose to expand their capacity through capital expenditures, which in turn will also increase production levels and create additional employment opportunities, and result in tertiary economic impacts.

Local economic benefits during the operating phase decline over time as retail electricity cost savings diminish. It is important to note, however, that wholesale electricity market benefits (and therefore retail electricity cost savings) are likely to continue for a few years after 2029 and therefore local economic benefits will also continue. At the same time, there will be annual O&M spending over the life of the Project. Consequently, local economic benefits to New Hampshire will continue for the longer term.

Taxes

NPT will pay property taxes to thirty-one (31) communities and half of the counties in New Hampshire. Based on the current, proposed route, it will pass through municipalities from Pittsburg in the north to Deerfield at the southerly end. It will also provide revenue to the five (5) counties from Coös to Rockingham and thus the NPT property tax payments will also indirectly benefit all of the communities within each county. NPT will also pay property taxes to the State for the utility education tax. The money received from this tax will be redistributed to communities throughout New Hampshire through the school aid formulas.

New tax revenue for the first full year of operation is estimated using the estimated total Project costs allocated town-by-town, and a range for the projected future tax rates. Increased tax revenue from NPT can be used to increase spending, or to lower other tax payers' costs, or a mix of both. The estimated NPT investments would range from approximately $528 million in Grafton County, $511 million in Merrimack County, $335 million in Coös County, $122 million in Rockingham County, and $28 million in Belknap County, for a total of approximately $1.5 billion in new taxable utility property (excluding costs of 115 kV upgrades and relocations).

NPT will pay an estimated $35 to $40 million in new New Hampshire property taxes in the first full year of operation. The overall estimates can be broken down into the following categories:

- Approximately $21 million to $26 million in municipal and local education property taxes;
- Approximately $4 million in county taxes; and
- Approximately $10 million in state utility education property taxes redistributed to local communities for education.

NPT's new taxable investment is estimated to be in the aggregate approximately 11 percent of the total local taxable base across the 31 host communities in the first full year of operation. The median share is estimated to be 12.3 percent and the average is approximately 18 percent.

Five counties are impacted by the Project. NPT's taxable investment is estimated to be nearly 10 percent share of the total local taxable base in Coös County, 3.7 percent in Grafton, 3.1 percent in Merrimack, 0.3 percent in Belknap and in Rockingham in the first full year of operation.

NPT will pay an estimated new $10 million in utility state education property taxes in the first full year of operation, which is an estimated 15 to 25 percent increase in that revenue source.

Actual NPT property tax payments depend on a number of factors. These factors can be organized into two groups. The first set of factors depends upon the actual Project costs and allocation of costs across communities, and its taxable value over time. The second set of factors depends on the community, the level of government expenditures, other sources of revenue, and the taxable base.

Over the life of the Project, once operational, if the net book value of Northern Pass approximates the fair market value for tax purposes then the taxable value will slowly decline over the life of the Project. NPT tax payments and the local tax relief it will provide could be the largest in the early years and gradually decline over the life of the Project. Actual NPT tax payments will depend on the change in Project property value, all property value, and government spending over time. Total new property taxes paid to New Hampshire communities

over the 20 years period are estimated to be an annual average of $28 million to $34 million, and a 20-year total of an estimated $564 million to $692 million.

Property Values

Dr. James Chalmers assessed the state of knowledge with respect to the effects of high voltage transmission lines ("HVTL") on property values and supplemented the existing research with New Hampshire specific research initiatives and summarized his findings in a report titled *High Voltage Transmission Lines and New Hampshire Real Estate Markets: A Research Report, June 30, 2015* (the "Research Report"), Appendix 46. Dr. Chalmers then applied the findings of the Research Report to the Project in his pre-filed testimony.

The Research Report contains a summary of the published, professional literature and the results of three, New Hampshire specific research initiatives namely, Case Studies, Subdivision Studies and Market Activity research. The Case Studies analyze 58 individual sales of residential properties crossed by, or bordered by, a HVTL. The Subdivision Studies examine the timing and pricing of lot sales in 13 subdivisions where certain lots are crossed or bordered by a HVTL. The Market Activity Research compares sale price to list price ratios and days on market for residential sales in different locations relative to a HVTL corridor.

The published literature is extensive and compares the sales of properties potentially affected by a HVTL to the sale of properties unaffected by such lines. These studies were carried out using different methods (statistical studies, subdivision studies, case studies). The literature can be summarized as follows:

- For residential properties about half of the studies find some measure of a negative impact on the value of the property resulting from proximity to HVTL whereas half find none. Where effects are found, they were usually in the range of a 1-6% reduction in value and any effect is reduced rapidly as distance from the lines increases. Effects seldom extend beyond 200 - 300 feet from the HVTL. Once proximity has been accounted for, visibility generally has no additional, independent effect on market value according to the statistical studies. Likewise, encumbrances frequently have no effect on market value but there is an effect it is small relative to the size of the encumbrance.
- HVTL generally have no effect on the value of commercial/industrial properties unless development of the site is constrained in a way that reduces the income producing potential of the property such as by reducing the size of the improvements that can be built on the site.
- The market value of vacant land is generally not affected by HVTL although there may some impact on value if the development of the land is constrained by

the ROW, or if the HVTL are the principal differentiating feature of otherwise very similar parcels.

The results in the published literature are sufficiently consistent across geographic areas and development patterns that there is no reason to expect a different result in New Hampshire. The three research initiatives described above were undertaken to test that conclusion.

Case Studies

The Case Studies represent a broad spectrum of properties crossed by, or adjacent to, a HVTL in New Hampshire including variations in property location, size and value and in the way in which the property is physically affected by the HVTL. While the results of any single Case Study are necessarily anecdotal, useful generalizations can be drawn when considering the results from the 58 Case Studies. These include the following: sale price effects are infrequent-demonstrated in 10 cases out of 58 or 17%. Despite significant encumbrances of many properties crossed by a HVTL ROW, highly visible structures and, in some cases, extreme proximity to the ROW, the effects on sale prices appear to be small and the effect is reduced substantially with distance from the line. Only one of the 10 cases concerned a property located more than 100 feet from the edge of the ROW. In those instances in which an effect on sale price was noted, the properties were not only close to the ROW, but were forced to be close to the ROW because the developable portion of the lot was constrained by the location of the ROW on the property.

Subdivision Studies

Lot sales were studied at 13 subdivisions where some lots were crossed or bordered by a HVTL ROW and others were not. The response of the market to the two categories of lots was analyzed both in terms of sale price and marketing time. Investigation of the lot sale history indicates a general absence of impact on marketability associated with lots encumbered by or abutting a HVTL ROW. Eight of the 13 subdivisions studied showed no differential sale price or marketing time effect associated with the HVTL. In those cases where there were price effects, the lots were heavily encumbered and frequently the area in which improvements could be sited on the lot was constrained.

Market Activity Research

Data were initially collected for all sales occurring in towns for which some portion of the town fell within one mile of a HVTL. The sales were categorized by distance into three

groups, encumbered or abutting, 1 foot to 500 feet, and 500 feet to one mile. Multiple Listing Service data on sale price to list price ratios and days on market were then analyzed to see if there was market resistance to the properties in locations closest to the HVTL. The analysis indicated no systematic market disadvantage of the encumbered or proximate properties relative to the more distant group with respect to sale price or time on the market.

In sum, the findings of the three New Hampshire specific research initiatives are consistent with the conclusions of the professional literature, namely that there is no evidence that HVTL result in systematic or widespread effects on real estate markets. The research and the studies also establish that where market effects occur, proximity combined with clear visibility of the HVTL, are the critical variables. Because Northern Pass will be located in an existing ROW, the proximity of existing homes relative to the ROW will not change. Moreover, the impact of proximity on value is increased by constraints the ROW places on the siting of the improvements on the property. Yet any such constraints on property located near the ROW will be unaffected by NPT's use of existing ROWs. Chalmers therefore concludes that the Project will not have a discernible effect on property values or marketing times in local or regional real estate markets.

Tourism

The analysis of the relationship between tourism and the Project is contained in a report titled *Northern Pass Transmission and New Hampshire's Tourism Industry*, prepared by Mitch Nichols of Nichols Tourism Group. See Appendix 45. That report concludes that transmission lines in general, and the Project in particular, will not impact travel demand or have a measurable effect on New Hampshire's tourism industry.

Mr. Nichols conclusions are based on the absence of any research studies supporting a claim that transmission lines negatively affect the tourism industry, on his 20 year experience of assisting tourist destinations across the country, and his evaluation of the potential impact on tourism from two unrelated large transmission line projects in New Hampshire and Maine. The report concludes that tourists visit New Hampshire because of the diversity of visitor experiences provided by the State as well as its ease of access and its general affordability and that the presence of transmission lines does not impact their decision-making.

(3) Estimate of Impacts on Local Employment

At the peak of construction, NPT is projected to directly employ over 2,000 persons and to create over 2,600 jobs. During operations, NPT will create an average of more than 1,100

jobs per year in New Hampshire. See pre-filed testimony of Julia Frayer. NPT expects that construction will take approximately 30 months, starting in 2017 and concluding in 2019. Between 2015 and 2019, NPT is expected to spend more than $130 million for the purchase of services and materials in New Hampshire, which will stimulate the local economy, expand state GDP, and create additional jobs.

A crucial component of the expected employment benefits is the creation of indirect and induced jobs. Indirect jobs arise as a result of the need to satisfy demand for the goods and services required by the Project's direct suppliers. By contrast, induced jobs are created by increased spending by workers hired to construct Northern Pass. As a result, on average more than 1,300 full-time, part-time, and seasonal jobs (direct, indirect and induced) will be created in New Hampshire per year during the construction period. In New Hampshire, 17% of these indirect jobs are expected to be created in the professional, technical services sector, 24% in the administrative services sector, 10% in the agricultural and forestry sector, and another 6% in the food services and wholesale trade sectors. A similar distribution applies to New England as a whole.

During commercial operation, there will be a significant increase in the number of jobs in the service sectors, such as retail trade, health care and social assistance, professional, scientific and technical services, and accommodation and food services. During the operating phase, it is estimated that New Hampshire will see an increase of more than 130 indirect jobs created per year and more than 1,000 induced jobs created per year. NPT creates jobs indirectly through its O&M spending, which feeds into other intermediary industries. As a result, O&M spending on the Project creates indirect jobs in professional technical and scientific services, as well as administrative jobs, food service jobs, financial jobs and many others.

(k) PUBLIC INTEREST

The SEC must find that an "energy facility" will serve the public interest in order to grant a certificate of site and facility. Northern Pass serves the public interest by providing low carbon, competitively priced power from Hydro-Québec to customers in New Hampshire. As a result, Northern Pass will lower energy costs, increase GDP, create jobs, increase the tax base, reduce emissions, diversify regional power supply, enhance electric system reliability, and advance state and regional energy and environmental policies.

Through the Forward New Hampshire Plan, NPT will also commit $200 million for community betterment, tourism, clean energy innovation, and economic development; sponsor a $7.5 million North Country Job Creation Fund; reserve 5,000 acres for natural resource preservation, recreational activities, and additional mixed uses important to the North Country's future; upgrade the Coös Transmission Loop; and partner with the National Fish and Wildlife Foundation to restore and sustain healthy forests and rivers in New Hampshire. In addition, through a 20-year power purchase agreement between PSNH and Hydro-Québec, PSNH customers will receive $100 million in additional cost savings. In total, NPT will provide over $3.8 billion in benefits to New Hampshire in coming years without any monetary contribution from New Hampshire residential and business customers.[19]

Provides Economic Benefits

Electricity Prices

The Northern Pass power supply will exert a downward pressure on wholesale power market prices in New England and ultimately reduce the market price of capacity and energy. As a consequence, the combined wholesale energy and capacity market savings are estimated to be approximately $80 million to $100 million on average per year for all wholesale load in New England. New Hampshire's share of these direct wholesale electricity market benefits will be $8.2 million to $10.2 million on average per year.

These wholesale market costs savings will ultimately benefit retail customers through lower electricity rates driven by lower prices in standard offer procurements and lower costs to competitive retail suppliers. As a consequence, New England retail consumers are projected to enjoy over $575 million per annum of retail electricity cost savings for the first 11 years of commercial operation due to the Project's impact on the wholesale energy and capacity markets. New Hampshire retail consumers will benefit from approximately $80 million per annum in retail electricity cost savings, approximately half of which will accrue to residential customers, based on the current composition of retail load in New Hampshire. See Appendix 43.

Gross Domestic Product

The economic benefits created during the construction phase are the result of Northern Pass spending in New Hampshire and other New England states. Including labor and materials,

[19] For additional information regarding the benefits associated with the Project, see the pre-filed testimony of William J. Quinlan, Julia Frayer, Lisa Shapiro, and Bradley P. Bentley.

NPT anticipates spending approximately $1.1 billion to develop and construct the transmission facilities, during the period from 2015 through 2019. Of this amount, approximately $615 million will be spent on labor in New Hampshire and New England, which is the largest driver of GDP growth.

During the commercial operations phase, as a result of reduced retail costs of electricity, households will be able to save more or spend their higher disposable income on other goods or services, stimulating the economy. Similarly, firms that benefit from lower costs of electricity will be able to expand production, further benefiting the local economy. NPT will pay property taxes which may be used by the State and by local governments to increase government spending on programs that benefits the economy. NPT will also need to hire more local labor for O&M of the infrastructure.

NPT is expected to spend over $130 million between 2015 and 2019 for the purchase of services and materials. At the peak of construction, over 2,600 jobs will be created in New Hampshire (this number includes direct, indirect, and induced jobs). As a consequence, Northern Pass will increase New Hampshire GDP by over $210 million at the peak of construction.

During the commercial operations phase (2019-2029), NPT will create, on average, over 1,100 new jobs per year in New Hampshire. These local economic impacts are primarily being driven by the retail electricity savings, however, NPT is also providing additional support to New Hampshire with over $13.5 million of direct spending (including approximately $10 million per year of economic development funding initiatives for the first 20 years). In addition to the increased employment, Northern Pass will generate new economic activity for New Hampshire averaging over $160 million annually for the forecast timeframe.

Jobs

During and after the construction phase of the Project, NPT is committed to increasing employment in New Hampshire. During the construction phase of the Project, which is expected to begin in 2017, the NPT is estimated to hire more than 580 employees (direct jobs) in New Hampshire on average per year to construct the Project. This will create over 1,350 total jobs (direct, indirect, and induced) per year in New Hampshire. During the commercial operations phase, New Hampshire will see over 1,100 total new jobs per year on average. See Appendix 43.

As part of the Forward New Hampshire Plan, NPT will commit to a "New Hampshire First" approach to Project construction that will provide direct jobs to New Hampshire citizens. This commitment to New Hampshire citizens will also include the establishment of an innovative training program that will create highly desirable career opportunities for New Hampshire residents.

Taxes

The Project will provide increased tax base to the 31 communities hosting the line. If mill rates remain unchanged after the Project enters into service, NPT estimates that the expanded tax base would add between $35 million to $40 million in new tax revenues in that first year of operation in the form of local, county and State education taxes. These funds will provide much needed support for local government, infrastructure, and public schools. Over the first 20 years of the Project's life, the total added tax revenues to State and local governments is estimated at between $564 million and $692 million.

Advances State and Regional Policies to Lower Emissions

The objectives of the Project are consistent with, and will help to satisfy many of the environmental requirements and explicit goals of important State and regional policies. Most notably, the Project helps implement the New Hampshire Climate Action Plan, which encourages the construction of HVTL to import clean, hydroelectric power from Canada in order to increase the use of non-greenhouse gas emitting sources of power in New Hampshire. The importation of clean, renewable hydropower also advances New Hampshire's effort to meet new, more stringent Regional Greenhouse Gas Initiative ("RGGI") goals. In addition to RGGI goals, the EPA announced the Clean Power Plan ("CPP") on August 3, 2015 which will establish interim and final CO_2 emission performance rates for fossil fuel-fired electric generating units.

To the extent that hydroelectric power purchased from Québec displaces gas and other fossil-fired generation in New England, the Project will lead to a reduction in greenhouse-gas emissions related to locally-sourced fossil generation. At the conservative 83% load factor, the energy flowing through the Project will result in over 3.3 million tons of avoided CO_2 emissions per year in New England which is the equivalent of removing approximately 690,000 passenger cars from the road. EPA has projected that the social cost of carbon could be as high as $65/ton by 2020. Therefore, based on 2007 dollar values, the Project will create over $200 million per year of incremental social benefits from CO_2 reductions in New England. The Project is also

expected to reduce regional nitrous oxide (NO_x) emissions by approximately 537 to 624 tons per year and to reduce regional sulfur dioxide (SO_2) emissions by approximately 261 to 460 tons per year.

Diversifies Energy Supply

New Hampshire and New England rely on the same regional electric power grid and wholesale energy market for the delivery of power. Although New Hampshire represents only 9 percent of the total electric demand in New England, it is a fully integrated part of the grid and market and, therefore, directly affected by events and market dynamics that impact the region. In 2014, the New England governors acknowledged that the region is facing an imminent energy crisis. More recently, the President and CEO of ISO-NE also projected potential supply shortages for the region and discussed the necessity of new infrastructure investment.[20] New England electricity prices are among the highest in the nation because of inadequate diversity of energy supplies.[21] To address these problems, all of the New England governors announced their support for the construction of additional electric transmission lines into New England for hydroelectric power transmission from Canada.

According to ISO-NE's *Regional System Plan* 2014, more than 45% of the region's electric generating capacity consists of natural gas-fired power plants. New England and New Hampshire have therefore become over-dependent on natural gas for power generation. At the same time, power plants using other fuels have either shut down or are scheduled to shut down, a trend that promises to exacerbate this overdependence on natural gas. That overdependence on a single fuel causes severe price volatility and reliability problems when the gas transmission system cannot keep up with overall demand, a circumstance that is particularly prevalent in winter during times of high demand for home heating.[22] According to ISO-NE, "there is no longer any uncertainty about the existence of reliability problems as a direct result of gas

[20] Gordon van Welie, *State of the Grid: Managing a System in Transition* (January 21, 2015)

[21] FERC, *Winter 2014-15 Energy Market Assessment*, 1, 13 (Oct. 16, 2014), *available at* https://www.ferc.gov/market-oversight/reports-analyses/mkt-views/2014/10-16-14-A-3.pdf.

[22] For example, during the winter of 2014, natural gas-generated energy, which normally costs $30-$40 a megawatt hour, reached prices of $800 a megawatt hour on the spot market. Peter Kelly-Detwiler, *Volatility in Early January Power Markets: The Vexing Polar Vortex*, Forbes (January 16, 2014), *available at* http://www.forbes.com/sites/peterdetwiler/2014/01/16/volatility-in-early-january-power-markets-the-vexing-polar-vortex/.

dependence."[23] New England does not have the infrastructure in place to provide a sufficient supply of natural gas to meet demand. Consequently, New England and inevitably New Hampshire will continue to face the risks of fuel supply disruptions and dramatic price volatility. The clearest recent example of how this affects people and businesses is the 2013-2014 heating season when New England paid more than twice as much for energy than it would have if it had prices and supply consistent with the rest of the East Coast.[24]

Enhances Electric System Reliability

According to FERC, the Project will allow more energy to be delivered during peak hours when marginal generation costs and market-clearing prices are highest. This will benefit the public interest by relieving grid congestion and moderating price volatility. In addition, according to FERC, the Project "does not limit competition; in fact, [FERC has found] that it does the opposite and increases competition by offering New England customers an additional supply resource."[25]

The Project provides important system benefits. First, the HVDC portion of the Project will provide power system support. Second, it may be able to limit the effects of a cascading blackout and provide emergency support after outages. Third, it has the capability of helping New England meet its reserve requirements. Fourth, this new regional interconnection is highly dispatchable and will allow for use by others when Hydro-Quebéc has not scheduled power deliveries. Finally, hydropower diversifies New England's generation supply.

The AC system upgrades will help maintain system voltages and reactive reserve, and improve power transfer capabilities and deliverability in New Hampshire as described below. First, transmission system operators must deal with changes in load and generation on a minute-by-minute basis and be prepared to respond to disturbances on the system. In addition, operators must be able to schedule maintenance outages without significant risk to reliability. These expected regional network upgrades will allow the system operators to be more responsive and

[23] *Addressing Gas Dependence*, Discussion Draft, at 17 (July 30, 2012), *available at* https://mitei.mit.edu/system/files/20130416-brandien.pdf.

[24] During a forum held at Saint Anselm College, Gordon van Welie, president and CEO of ISO-NE, stated that New England paid $3 billion more than it should have for energy during this period because of a lack of infrastructure. D. Solomon, *No relief from New England energy costs in near future*, The New Hampshire Union Leader (June 30, 2014), *available at* http://www.unionleader.com/apps/pbcs.dll/article?AID=/20140701/NEWS06/140709999/0/ANNOUNCEMENTS

[25] *Northeast Utils. Serv. Co. & NSTAR Elec. Co.*, 129 FERC ¶ 61, 279 at 22 (2009).

flexible in responding to power system needs. This is because the upgrades are designed to address stressed conditions, which occur infrequently during the year. At other times, the system operators will be able to support the power system with the additional infrastructure. Second, in addition to providing increases in power carrying capability, new transmission infrastructure provides resiliency benefits. When new transmission reactive devices, such as those NPT expects to construct, are added to the system, the devices help support the power system in emergency conditions, especially during storm events. Essentially, a power system that has multiple paths to connect various areas of the system is more reliable. Third, the location of the converter terminal in Franklin facilitates the potential use and incorporation of the 345 kV AC transmission facilities of Northern Pass into a PSNH reliability project should ISO-NE determine that those facilities, along with other system improvements, could address a reliability need at some point in the future.

(l) PRE-FILED TESTIMONY SUPPORTING THE APPLICATION

The following is a list of the individual witnesses and their general subject matter:

1. James A. Muntz: The Applicants' preferred route and the route selection process, federal permitting process, Tri-State Clean Energy RFP, technical and managerial capabilities
2. William J. Quinlan: Project overview and New Hampshire Benefits
3. Michael J. Auseré: Financial capabilities of the Applicants
4. Jerry Fortier: Technical and managerial capabilities of the Applicants
5. Samuel Johnson: Project outreach and land rights associated with the Project
6. Derrick Bradstreet: Technical and managerial capabilities (overhead design) of the Applicants
7. Nathan Scott: Technical and managerial capabilities (underground design) of the Applicants
8. John Kayser: Technical and managerial capabilities (construction) of the Applicants
9. Lynn Farrington: Technical and managerial capabilities (traffic) of the Applicants
10. Terrence DeWan & Jessica Kimball: The Project's visual impacts (i.e. aesthetics)
11. Victoria Bunker: Archeological resources
12. Cherilyn E. Widell: Above-ground historic resources
13. Robert W. Varney: Air quality
14. Jacob Tinus: Water quality
15. Lee Carbonneau: Natural Environment and wetlands
16. Sarah Barnum: Wildlife
17. Dennis Magee: Rare, threatened, and endangered plants
18. William Bailey: Public health and safety (EMF)
19. Gary Johnson: Sound
20. Douglas H. Bell: Sound
21. Robert W. Varney: Orderly regional development and local land use
22. Julia Frayer: Benefits to local economy and local employment
23. Lisa Shapiro: Local property tax revenues
24. James A. Chalmers: Local property values

25. Mitch Nichols: Tourism
26. Bradley Bentley: Benefits to system stability and reliability

(m) COPY OF TRANSCRIPT FROM PUBLIC INFORMATION SESSION HELD 30 DAY PRIOR TO THE FILING OF THE APPLICATION

A copy of the transcript from the public information sessions is included in Volume III of the Application for the following five public information sessions: Merrimack County, September 2, 2015, in Concord; Rockingham County, September 3, 2015, in Deerfield; Grafton County, September 8, 2015, in Lincoln; Coös County, September 9, 2015, in Whitefiled; and Belknap County, September 10, 2015, in Laconia.