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 EVERSOURCC ENERGY FOR A CERTIFICATE OF SITE AND FACILITY

PREFILED DIRECT TESTIMONY OF

MICHAEL BUSCHER, JAMES PALMER AND JEREMY OWENS
ON BEHALF OF
COUNSEL FOR THE PUBLIC

December 30, 2016

Personal Background Michael Buscher

Q. Please state your name, position and business address.

A. My name is Michael Buscher. I am a professional landscape architect and owner of T. J. Boyle Associates, LLC, Landscape Architects and Planning Consultants (T. J. Boyle), 301 College Street, Burlington, Vermont 05401.

Q. Please summarize your education background and work experience.

A. I received my bachelor's degree in Landscape Architecture from the Department of Landscape Architecture at the Pennsylvania State University in 1998, an accredited five-year degree program. After graduating, I worked as a landscape architect in the greater Washington D.C. metropolitan area. In 2001, I moved to Vermont and joined T. J. Boyle. In 2007, I became the owner of the firm. During my time with T. J. Boyle, I have worked on a variety of projects; many projects that I have worked on and/or managed have included visual resource assessments. A copy of my resume is attached as Exhibit CFP-Boyle-1.

Q. Have you testified previously before the New Hampshire Site Evaluation Committee (SEC) or other regulatory bodies?

A. Yes, I testified before the New Hampshire Site Evaluation Committee concerning the Antrim Wind Energy project. Within Vermont, I have testified before local development review boards and planning commissions, Act 250 district environmental commissions, the Environmental Division of Superior Court, as well as the Public Service Board. I have also provided testimony before the New York State Department of Public Service and the Department of Environmental Conservation.

Q. Please identify the people that helped prepare the T.J Boyle Associates Report and describe their experience.

A. James F. Palmer and Jeremy B. Owens contributed to the report prepared by T. J. Boyle. Their experience is described below.

Personal Background James Palmer

Q. Please state your name, position and business address.

A. My name is James F. Palmer. I am a Senior Landscape Architect at T. J. Boyle, 301 College Street, Burlington, Vermont 05301.

Q. Please summarize your education background and work experience.

A. I earned a professionally accredited master's degree in landscape architecture in 1976, and a doctorate in philosophy in 1979 from the University of Massachusetts, in Amherst, Massachusetts. I taught in the Departments of Landscape Architecture and Environmental Studies at SUNY's College of Environmental Science and Forestry in Syracuse, New York from 1980 to 2005. During this time, I also had an active research program investigating landscape perception, and occasionally consulted in visual impact assessment and recreation planning. I founded Scenic Quality Consultants to provide expert witness services in visual impact assessment review in 2008 and also joined T. J. Boyle half-time. I am a licensed landscape architect in the State of Vermont.

My professional experience is somewhat unusual in that I am one of a handful of landscape architects actively engaged in the scientific understanding of visual impacts, community landscape values, and other landscape aesthetics issues. In recognition of my

knowledge and expertise, I was elected a Fellow of the American Society of Landscape Architects in 2003, and to the first class of Fellows of the Council of Educators in Landscape Architecture in 2006. A copy of my resume is attached as Exhibit CFP-Boyle-2.

Q. Have you testified previously before the New Hampshire Site Evaluation Committee (SEC) or other regulatory bodies?

A7 I have not testified before the New Hampshire Site Evaluation Committee. I have testified before the Maine Department of Environmental Protection, the Maine Land Use Regulation Commission, the New York State Public Service Commission, and Vermont Public Service Board.

Personal Background Jeremy Owens

Q. Please state your name, position and business address.

A. My name is Jeremy B. Owens. I am a Vermont licensed landscape architect and project manager at T. J. Boyle, 301 College Street, Burlington, Vermont 05401.

Q. Please summarize your education background and work experience.

A. I received a bachelor's degree in Landscape Architecture from the University of Georgia College of Environment and Design in 2003. I worked at an engineering company in the greater Atlanta metropolitan area for a short time before moving to Vermont in 2004 and joining T. J. Boyle. My resume is attached as Exhibit CFP-Boyle-3.

Q. Have you testified previously before the New Hampshire Site Evaluation Committee (SEC) or other regulatory bodies?

A. I have not testified before the New Hampshire Site Evaluation Committee. In Vermont I have testified before or provided testimony to local development review boards, Act 250 district environmental commissions, the Vermont Environmental Court, and the Public Service Board.

Aesthetics

Q. What is the purpose of your testimony?

A. Our testimony introduces the Report prepared by T. J. Boyle titled, Review of the Northern Pass Transmission Line Visual Impact Assessment, which is provided as Exhibit CFP-Boyle-4. Our testimony also provides an overview of the technical review of the Northern Pass Transmission Line Visual Impact Assessment which was prepared by Terrence J. DeWan & Associates ("Dewan & Associates") (NPT VIA), and the results of various independent analyses that we conducted to address the requirements of the SEC Rules.

Q. Please summarize T. J. Boyle's review of the Project.

A. T. J. Boyle's review of the Project focuses on two main topics. First, we reviewed the NPT VIA. Our review of the NPT VIA includes a technical review of the methodologies used to assess visual impacts and whether the NPT VIA satisfies SEC requirements as outlined in Site 301.05. Second, our analysis conducts an independent review of the Project in order to provide an opinion as to whether the Project will result in an unreasonable adverse effect on aesthetics pursuant to RSA 162-H:16, IV(c). The independent review consisted of field work, participation in a public outreach process convened by Counsel for the Public, preparation of photo simulations, an independent

identification of potential scenic resources, and an independent evaluation of potential impacts to a limited selection of scenic resources. Our review also relied upon our experience and familiarity with the Project as a result of evaluating potential visual impacts for the U.S. Department of Energy's (DOE) environmental impact assessment.

Q. Please describe T. J. Boyle's work relating to the Project for DOE and identify differences in approach, methodology, and goals.

A. T. J. Boyle was contracted to evaluate the potential visual impacts associated with Northern Pass Transmission, LLC's application to the DOE for a Presidential permit to construct, operate, maintain, and connect an electric transmission line across the United States border with Canada. The level of analysis was at a landscape planning scale, which was more appropriate for the national security concerns associated with the Presidential permit that DOE is considering. For instance, it evaluated seven alternative proposals, and site-level mitigation was not considered. The DOE does not have procedures or guidelines for evaluating visual impacts.

In contrast, Northern Pass Transmission, LLC's application to the SEC is for a Certificate of Site and Facility to construct and operate a proposed electric transmission line. The SEC review is concerned with the aesthetic effects of specific siting and design details, the effective use of measures to avoid, minimize or mitigate adverse effects on aesthetics are central to their consideration. In addition, there are no alternatives to consider, and Site 301.05 provides explicit guidance on how to conduct a VIA.

Q. Did the Applicant's Visual Impact Assessment (NPT VIA) provide the SEC with all the information required under the recently adopted SEC rules concerning effects on aesthetics?

A. No. It is our conclusion from the technical review that the NPT VIA does not provide all the information required by Site 301.05. In particular, we found significant errors in the Applicants' approach to identifying scenic resources, which in itself, renders the NPT VIA unreliable for decision-making. Other deficiencies include failure to consider visibility based on bare ground conditions, unsupported introduction of new evaluation factors, photo simulations that do not meet SEC or professional standards, and undervaluation of the expectation of the typical viewer and the effect of future use and enjoyment as scenic resources. In addition, our independent review of a selection of scenic resources found the visual impacts to be much greater than DeWan & Associates recognized; many were clearly unreasonable. The complete technical review of the NPT VIA is provided in Chapter 3 of our report in Exhibit CFP-Boyle-4.

Q. Could you summarize the findings of your independent review of the NPT VIA, and how these findings effect the SEC's determination of whether the Project has an unreasonable adverse effect on aesthetics?

A. Site 202.19(b) states that "an applicant for a certificate of site and facility shall bear the burden of proving facts sufficient for the committee or subcommittee, as applicable, to make the findings required by RSA 162-H:16." Investigating the potential visual impacts of the Project is a large undertaking, but this is not a reason to lower the expectations for a thorough analysis. There are substantial deficiencies in the NPT VIA, which limits the ability to understand and review the Project's potential visual impacts. This may be

sufficient cause for concluding that the Applicant has not provided sufficient evidence for the Committee to make the findings concerning aesthetics.

The focus of our review was the NPT VIA's responsiveness to the technical requirements described in Site 301.05. Our primary conclusions are summarized in Chapter 3 in the Report and our primary conclusions are summarized below.

1. Inadequate Identification of Scenic Resources

In violation of SEC rules, the NPT VIA limits scenic resources primarily to those designated by an institution or otherwise recognized for their scenic or recreational quality and as a result identifies only 680 scenic resources in the 3,209 square miles within 10 miles of the Project's overhead structures. However, Site 102.45(a) is the only type of scenic resource that requires such "designation." Scenic resources defined by Site 102.45(b, c, e & f) are required only to "possess a scenic quality"—not high scenic quality—and Site 102.45(d) includes all "recreation areas established, protected or maintained in whole or in part with public funds." Using the SEC's more expansive definition, in Chapter 4 and Appendix D we identify over 18,000 potential scenic resources using readily available databases, and identified categories of scenic resources that could be inventoried with additional effort (e.g., historic sites, lands given a public use recreation tax abatement). When there is a full accounting of scenic resources, it becomes clear that they are not a few isolated sites, but constitutes the major portion of New Hampshire's landscape. The failure to properly identify scenic resources in itself, renders the NPT VIA non-reliable.

2. Failed to Consider Visibility Based on Bare Ground Conditions

Site 301.05(b)(1) associates the phrase "would be visible" with a visibility analyses "based on both bare ground conditions using topographic screening only and with consideration of screening by vegetation or other factors" (Emphasis added). Using bare ground visibility for long range planning is recommended by standard VIA handbooks (e.g., USFS 1995, p. 4.5; TLI & IEMA 2013, p. 103). The NPT VIA failed to consider visibility from scenic resources based on bare ground conditions. This and other issues with the visibility analysis are considered in Chapter 3 of our Report. The number of potentially impacted scenic resources significantly increases if the visibility analysis is based on bare ground conditions.

3. Unsupported Introduction of New Evaluation Factors

The NPT VIA uses Scenic Significance to eliminate scenic resources from consideration during the Visual Impact evaluation step contrary to the SEC rules. Scenic Significance is a combined rating of Visual Quality and Cultural Value. Site 301.05(b)(6) clearly states the factors that are to be considered. Many, but not all scenic resources are required to "possess a scenic quality," but there is no suggestion in Site 301.05(b)(6) that the degree of scenic quality should be considered. Once a scenic resource is identified as having visibility of the Project, the potential visual impacts are to be evaluated. Similarly, the SEC rules provide no indication that that Applicants can consider Cultural Value, which is an indicator of the scenic resource's significance, in the VIA evaluation. While Site 301.14(2) directs the Committee to consider significance, the SEC rules do not support

the NPT VIA's approach to use this as a screening mechanism in the VIA. The effect of the decision to add Scenic Significance to the VIA is discussed in Chapter 3.

4. Simulations Do Not Meet SEC Standards

Site 301.05(b)(8) establishes the standards for the photosimulations, several of which the NPT VIA does not meet.

- The original photography normally used the medium rather than the required high resolution camera setting.
- The simulation resolution at 11 of the 28 viewpoints is below SEC and generally accepted professional standards.
- The simulations are distributed as PDFs with JPEG compression that further deteriorates the sharpness and clarity of the proposed facilities, inappropriately reducing their apparent visual presence.
- The procedure used to create the visual simulations does not follow the best professional practice in New England. The use of Google Earth Pro for laying out simulations is a new untested methodology; Google does not document the accuracy of its data and there is wide concern expressed on the internet about its accuracy for professional use. The 3D models of the individual structures are created using trial-and-error and scaled by eye until they "look right" when placed in the simulation. The NPT VIA does not use the standard professional practice of creating a rendered 3D model of the proposed structures located on the terrain that is based on the parameters of the landscape and view.

These and other issues concerning the simulations are discussed in Chapter 3.

5 Undervalue the Expectations of the Typical Viewer and the Effect on Future Use and Enjoyment of the Scenic Resource

The NPT VIA assigns relatively low ratings to "expectations of the typical viewer," and the "effect of future use and enjoyment of the scenic resource," both of which the Applicants are required to consider in their VIA. For instance, the Project's effect on continued use and enjoyment is determined to be low or none for all evaluated scenic resources. However, the NPT VIA cited no evidence to support this assertion.

In contrast, scenery was important to the enjoyment and choice to visit over 90 percent of the scenic resources identified at Counsel for the Public's Community Workshops. Similarly, a 2006 study sponsored by the New Hampshire Lakes Association found that 55 percent of the surveyed lake users thought that if the quality of the natural beauty and scenery would become poorer in the next year, they would change the number of planned visits to the site. These and similar findings are presented in Chapter 4.

Q. Please describe your conclusions as to why the Project will result in an unreasonable adverse effect on aesthetics

A. It is the Committee's responsibility to determine findings of unreasonable adverse effect based on the criteria in Site 301.14. T. J. Boyle has undertaken several independent investigations and analyses in Chapter 4 to provide evidence to the Committee to consider in reaching their findings. Our primary findings are summarized below.

1. Evaluation of Potential Visual Impacts to Scenic Resources

Our independent evaluation of potential visual impacts to scenic resources found that of 41 resources evaluated, the Project would result in adverse visual impacts at all 41 resources, we found those impacts unreasonable at 29 of the 41 locations. We found these impacts unreasonable in the given instances for one or more of the following reasons:

- **Inappropriate Siting of New Transmission Corridor.** The proposed location of a new transmission corridor through highly scenic landscapes in northern New Hampshire will result in unreasonable adverse impacts on aesthetics.

- **Mix of Structure Types.** Several structure types are proposed, including a mix of alternating structure types along the NPT line, as well as for existing transmission lines that need to be rebuilt as part of the Project. The consequential mix of structure configurations, materials, and colors will create discontinuity from views within scenic resources and will result in adverse impacts on aesthetics that are otherwise avoidable.
- **Significant Contrast to Existing Character.** New structure types, and the overall organization of the corridor will result in an overwhelmingly industrial character. The contrast when compared to the existing corridor will result in unreasonable adverse impacts on aesthetics.
- **Height of Proposed Structures.** The height of proposed structures is out of scale in comparison to similar size transmission lines. This is likely a result of attempting to incorporate an additional transmission line within corridors that do not have adequate width. The proposed height of new structures will significantly increase the visibility

and prominence of the Project and will result in unreasonable adverse impacts on aesthetics.

- **Lack of Mitigation.** The Project fails to incorporate reasonably available mitigation that could significantly reduce adverse impacts and will result in unreasonable adverse impacts on aesthetics.

In conclusion, review of potential impacts at this small sample of scenic resources clearly indicates that the Project will result in unreasonable adverse impacts as currently proposed. These findings indicate that if all scenic resources were evaluated in accordance with the SEC's rules, similar findings could be determined along the length of the NPT. Based on this small sample alone, we would recommend that the SEC find that Project will have an unreasonable adverse effect on aesthetics.

2. Avoidance or Minimization through Corridor Configuration

In many places, the existing corridor width is inadequate to appropriately accommodate the Project. As a result, the Applicant has greatly increased structure heights, putting them well above the surrounding landscape elements and creating adverse visual impacts. There are alternatives that should be considered to address this problem.

- **Proper routing of the new corridor**. There is no indication in the NPT VIA that visual effects were taken into consideration when selecting the new corridor alignment. The result is a large number of locations documented in Chapter 4 where the proposed new corridor results in unreasonably adverse visual impacts.
- **Co-location of transmission lines**. In areas where two 115 kV lines exist in the corridor, there may be opportunities to co-locate them on the same structure. This

would lessen the space demands on the corridor and allow the Project structures to be lowered.

- **Acquire a wider corridor**. The height of proposed structures could be reduced if the corridor were widened. The NPT VIA fails to explore this opportunity.
- **Standardize road setbacks for new structures**. There are many locations where proposed structures are in close proximity to roads, sometimes as close as 30 feet. The span between structures is sufficient that a minimum road setback guideline of 200 feet in combination with vegetation planting where appropriate would have significant aesthetic benefits.
- **Undergrounding**. Undergrounding avoids visual impacts, and should be considered for additional areas.

3. Adverse Effects Are Not Effectively Mitigated

Site 301.05(b)(10) requires the VIA to provide a "description of the measures planned to avoid, minimize, or mitigate potential adverse effects of the proposed facility, and of any visible plume that would emanate from the proposed facility, and the alternative measures considered but rejected by the applicant." Visual impacts need not be unreasonable to require measures that avoid, minimize or mitigate them. This necessitates considering details at a site-level that are not generally evaluated in the NPT VIA.

Many of the actions represented in the NPT VIA as visual mitigation are taken for other reasons. The most substantive mitigation proposed is burial and the use of weathered steel monopole structures; there is no discussion of alternative measures considered but

rejected. Examples of measures that could be employed to avoid, minimize and mitigate potential adverse effects are described in Chapter 4 and include:

- **Vegetative mitigation alternatives**. There are numerous locations that warrant an evaluation of whether they would benefit from vegetation planting to mitigate visual impacts. For instance, these include all road and river crossings. DeWan & Associates have experience doing this type of analysis as part of a transmission line VIA and it should have been incorporated into the NPT VIA.
- **Structure material and design alternatives**. There is extensive use of galvanized steel lattice and monopole structures, which can create a significant visual impact in many situations. The use of paint or a product such as Natina Steel should be considered at specific locations, such as those listed in Chapter 4.
- **Harmonizing new structures with existing wooden structures**. In many cases the wooden structures on the existing 115 kV line will remain. Consideration should be given to employing new wooden structures that better harmonize with the existing structures to remain, rather than surrounding them with larger steel monopole or lattices structures that have a more industrial appearance.
- **Unify the form and color of all structures within the corridor**. The existing 115 kV line uses one type of structure for long stretches, creating a unified appearance. The NPT proposed to introduce several new structure types into the corridor and frequently change them after a short distance. Where possible, structures should exhibit a unified form and color for long stretches of the corridor.
- **Use non-reflective materials**. The Applicant has asserted that reflection from conductors and insulators is not very visible, and that it quickly goes away with

weathering. The documentation in Chapter 4 illustrates that this is not the case. Best practice is to use non-reflective conductors and insulators from the outset.

There are many viewpoints where a typical person would find the visual impact of the Project unreasonably adverse. Examples are the large number of road crossings and river crossings where structures are in the immediate foreground, and locations where the Project is located along ridgelines so that the structures are "skylined." Mitigation for these and other unreasonable adverse views are ineffective or not proposed at all. We review a number of alternative mitigation measures that represent best practice measures that are not adequately considered and that review is included in Chapter 4. Failure to adequately consider best practical mitigation measures results in the Project as proposed having an unreasonable adverse impact.

Q. Does this conclude your testimony?

A. Yes.

Exhibits

Exhibit CFP-Boyle-1	Michael Buscher Resume
Exhibit CFP-Boyle-2	James Palmer Resume
Exhibit CFP-Boyle-3	Jeremy Owens Resume
Exhibit CFP-Boyle-4	Review of the Northern Pass Transmission Line Visual Impact Assessment

Michael J. Buscher, ASLA

Principal / Landscape Architect

Education

1992-1998	Bachelor of Landscape Architecture, College of Arts and Architecture, The Pennsylvania State University, State College, Pennsylvania
Spring 1996	Roman Urban Studies, Penn State Department of Landscape Architecture, Rome, Italy

Professional Registration

2011 – Present	Licensed Landscape Architect, Vermont No. 81719

Professional Experience

2007-Present	Principal / Landscape Architect, T. J. Boyle Associates LLC, Burlington, Vermont
2001- 2007	Landscape Architect, T. J. Boyle and Associates, Burlington, Vermont
1998-2001	Landscape Architect, Greenhorne & O'Mara Engineers & Planners, Inc., Germantown, Maryland
Summer 1998	Private Contractor, Centre County Historical Society, State College, Pennsylvania

Related Project Experience

Coolidge Solar I, LLC

Managed the visual analysis for a 20-MW solar electric generation facility in Ludlow, Vermont. When constructed, this project will be approximately four times larger than the next largest solar project in the state of Vermont. The Project anticipates a Certificate of Public Good from the Vermont Public Service Board near the end of 2016.

New England Clean Power Link

Manager for the visual impact assessment portion of a 1,000 megawatt (300 to 320 kV) HVDC transmission line and converter station. The VIA will address aesthetic impact requirements for permitting within the state of Vermont and for the EIS. The NECPL received is certificate from public good from the Vermont Public Service Board in 2016. Construction is anticipated for 2018-2020.

Green Lantern Capital Solar Development

Manager for the visual analysis for the development of over 10-MW or solar electric generation facilities, broken into 500 to 1,000 kW net metered Projects. Many of these projects will be co-owned by the towns in which they are located.

Northern Pass Transmission Environmental Impact Statement

Co-manager for the visual impact assessment portion of the EIS for a 180 mile proposed 300 HVDC transmission line in New Hampshire. T. J. Boyle is a sub-consultant to SE Group to provide EIS services for the U.S. Department of Energy and the White Mountain National Forest.

Technology Drive Solar Project

Managed the visual analysis for a 2.2-MW solar electric generation facility in Brattleboro, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in 2013 and completed construction in 2015.

Whitcomb Solar Project

Managed the visual analysis for a 2.2-MW solar electric generation facility in Essex Junction, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in 2013 and completed construction in 2014.

Claire Solar Project

Managed the visual analysis for a 2.2-MW solar electric generation facility in South Burlington, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in 2013 and completed construction in 2015.

Chester Solar Project

Managed the visual analysis for a 2.2-MW solar electric generation facility in Chester, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in 2013 and is currently under construction.

Environmental Assessment for Wind Resources Offshore Georgia

Provided project management for the visual impact assessment portion of the Draft and Final EA to install meteorological measurement towers and buoys on the outer continental shelf, near Tybee Island, GA. This project will be used to assess the potential for offshore wind development in the area.

Harbor View Solar Project

Evaluated potential visual impacts for a proposed 2.2-MW solar electric generation facility in St. Albans, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in November 2012 and completed construction in 2015.

Visualization Study for Offshore North Carolina

Managed the creation of multiple high quality visualizations including: 234 single-frame photographic simulations, 21 panoramic simulations, 48 animated videos and six simulated movies for potential offshore wind development. The visualizations were used by the **Bureau of Ocean Energy Management** to assess aesthetic impacts and finalize the federal offshore lease program for renewable energy projects on the Outer Continental Shelf.

VELCO: Bennington Substation

Managed the visual analysis of a proposed electrical transmission substation located in Bennington, Vermont including coordination of public outreach efforts and investigation of several alternatives with VELCO to gain support from local officials. The analysis included the preparation of testimony, a report, and exhibits including photo simulations of several different design alternatives. The Project received a Certificate of Public Good from the Vermont Public Service Board in August of 2012 and completed construction in 2014.

Lamoille County Sheriff Public Safety Project

Provided aesthetic assessment services, including review under the Quechee Analysis, for the replacement of an existing wireless communication tower in the town of Hyde Park. Several emergency service communication networks will be collocated on the new tower. The project received its Certification of Public Good in 2011 under Section 248a of the Vermont State Statutes.

VELCO: Ascutney Substation

Managed all aspects for the visual analysis of a proposed electrical substation located in Weathersfield, Vermont. Responsibilities included preparation of testimony and report, and oversight of exhibit preparation including photo simulations, for inclusion with the Section 248 petition to the Vermont Public Service Board. The Project received a Certificate of Public Good in April of 2012 and completed construction in 2013.

"SunGen Sharon I" Solar Farm Project – VT Department of Public Service

Reviewed the applicant's petition for a Certificate of Public Good and performed an evaluation of potential aesthetic impacts on behalf of the Vermont Department of Public Service. Responsibilities included preparation of testimony, an aesthetic analysis report, and exhibits for inclusion with the Section 248 filings to the Vermont Public Service Board. This project received a Certificate of Public Good in 2011 and completed construction in 2012.

VELCO: Jay Substation

Evaluated potential visual impacts that would result from a proposed electrical transmission substation in Jay, Vermont. Responsibilities included preparation of testimony, report, and exhibits for inclusion with the Section 248 petition to the Vermont Public Service Board. This project received a Certificate of Public Good in 2011 and construction was completed in 2012.

Williamstown Solar Farm

Evaluated potential visual impacts for a proposed 2.0-MW solar electric generation facility in Williamstown, Vermont. The Project received a Certificate of Public Good from the Vermont Public Service Board in November 2010 and went on line in December 2012.

FairPoint Communications Wireless Broadband

Provided aesthetic assessment services for the permitting of multiple wireless towers throughout the State of Vermont. An initial three-tower project, including coordination of archaeological and historic resources was approved. Studies for several other sites were completed, but FairPoint discontinued the project.

Vermont Community Wind

Conducted a visual resource study in preparation of filing testimony and exhibits to the Vermont Public Service Board for a proposed 85 MW industrial wind turbine project in Ira, Vermont. Responsibilities included assessment of 60 potential turbine locations, coordination and quality control of GIS data for multiple consultants, coordination on public outreach events and the creation of project visualizations. This project is currently on hold.

Southern Loop Project

Evaluated potential visual impacts as the result of proposed transmission upgrades including the addition of a second 345 kV transmission line within an existing corridor, new and expanded substations and a new 345 kV loop. Responsibilities included preparation of testimony, reports, and exhibits for inclusion with the 248 petition to the Vermont Public Service Board. This project received a Certificate of Public Good in February 2009 and construction was completed in 2011.

East Avenue Loop Project

Managed all aspects of the visual analysis for a proposed 115 kV transmission line upgrade between Williston and Burlington, Vermont, including preparation of a visual analysis report, exhibits, and testimony. This project involved the creation of a highly detailed 3-D model that was presented at several key stakeholder meetings and public open house sessions to help inform the public of the visual characteristics of the proposed upgrades. The Certificate of Public Good for this project was issued in May, 2008. Construction was completed 2009.

Deerfield Wind Project

Co-authored a report, created exhibits, prepared joint pre-filed testimony and testified at a technical hearing before the Vermont Public Service Board to evaluate aesthetic impacts of a seventeen 2.0-MW wind turbine project within the Green Mountain National Forest in southern Vermont. This project has received a Certificate of Public Good and is awaiting construction. Co-authored separate report for the EIS.

Beekmantown Wind Project

Conducted a visual resource assessment for a proposed thirteen-turbine industrial wind farm in Beekmantown, NY. Findings were presented in a Visual Impact Assessment Report, along with maps, photo simulations, sections and other exhibits, and filed as attachment D of the Full Environmental Impact Assessment.

Middlebury Spur Environmental Impact Statement

Prepared a visual assessment for inclusion with an Environment Impact Statement of proposed alternates of a railroad spur and loading facilities in Middlebury, VT. Several photo simulations were prepared in order to evaluate alternate proposals, including at-grade and grade-separated crossings of public roads.

East Haven Windfarm

Completed a report summarizing the visual analysis of a four-turbine industrial wind project in East Haven, Vermont, and provided testimony to the Vermont Public Service Board. This project was denied a Certificate of Public Good due to inadequate avian impact studies.

Independent Wireless One – Pritchard Mt. Telecommunication Facility Expansion

Prepared exhibits, including several photographic simulations, in support of testimony submitted to Act 250 District Commission #4 for approval of substantial changes to a pre-existing telecommunication tower.

Northwest Vermont Reliability Project

Prepared exhibits in support of testimony submitted to the Vermont Public Service Board for approval of electrical transmission line upgrades from West Rutland to South Burlington to ensure the reliability of Vermont's transmission system. Construction of this project was completed in 2009.

Rensselaer Greens

Provided aesthetic assessment in opposition to a 550-MW cogeneration facility and a recycled newsprint facility, and testified before a joint hearing of the New York State DEC and DPS.

Memberships and Affiliations

1998-present	Member, American Society of Landscape Architects
2002-present	Member, Vermont Chapter of the American Society of Landscape Architects
2003-2010	Member, Vermont Landscape Architecture Licensure Committee
2003-2011	Treasurer, Vermont Chapter of the American Society of Landscape Architects
2007-2010	Member, Outdoor Lighting Advisory Board – State of Vermont
2007-present	Member, Vermont Planners Association
2007-present	Member, Vermont Nursery and Landscape Association
2008-present	Affiliate Member, the Vermont Chapter of the American Institute of Architects
2009-present	Member, Vermont Green Building Network
2010-present	Advisory Board Member, Vermont Technical College – Architectural and Building Engineering Technology Department
2010-present	Member, Village Steering Committee, Town of Hinesburg

Awards

- 2013 Vermont Chapter ASLA – Planning Honor Award: Visualization Study for Offshore North Carolina
- 2011 Vermont Chapter ASLA – President's Award
- 2009 VPA Plan of the Year Award: Neshobe Farm Planned Unit Development
- 2009 Vermont Chapter ASLA - Honor Award: Neshobe Farm Planned Unit Development
- 2007 Vermont Public Space Awards - Honorable Mention: Lake & College Project
- Spring 1999, Greenhorne & O'Mara Award of Merit
- Grant recipient, City of Gary, Indiana, for nomination of the Lincoln Street Historic Neighborhood to National Register of Historic Places.
- First place, 1996 ASLA Undergraduate Team Research Award

James F. Palmer, PhD, FASLA

Landscape Architect | Scenic Quality Scientist

Education

1968–72	Bachelor of Arts, University of California, Kresge College, Santa Cruz, California
1972–76	Masters of Landscape Architecture, University of Massachusetts, Amherst, Massachusetts
1976–79	Doctor of Philosophy, University of Massachusetts, Amherst, Massachusetts

Professional Experience

2009-present	Senior Landscape Architect, T.J. Boyle Associates, LLC, Burlington, Vermont.
2008-present	Sole Proprietor / Scenic Quality Consultants, Burlington, Vermont.
1979-2008	Independent consultant
2006-present	Professor Emeritus, Faculties of Landscape Architecture and Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, New York
1980- 2006	Assistant through Full Professor, Faculties of Landscape Architecture and Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, New York.
2011-present	Vermont Licensed Landscape Architect No. 80666

Related Project Experience

Northern Pass Transmission Review.
Project Manager for T.J. Boyle Associates. Northern Pass Transmission applied for permits from the New Hampshire Site Evaluation Committee. TJBA served as the aesthetics experts to the Councilor for the Public. Prepare a detailed review of the visual impact assessment submitted with the application, including an interpretation of the SEC's new Rules. Conducted a public outreach program to identify local scenic resources, prepared independent analyses, reports, and exhibits, presented testimony at technical sessions and hearings. (SEC Docket No. 2015-06).

Number 9 Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 119 turbine 250 MW wind energy project. (DEP Applications L-26502-24-H-N).

Weaver Wind Project
Provided Maine's Department of Environmental Protection expert review concerning the scenic impacts of this 23 turbine 75.9 MW wind energy project. (DEP Application L-26464-24-J-N).

Hancock Wind Project
Provided Maine's Department of Environmental Protection expert review concerning the scenic impacts of this 17 turbine 54 MW wind energy project. (DEP Applications L-25875-24-A-N/ L-25875-TF-B-N).

Berlin Communications Tower
Project Manager for T.J. Boyle Associates. Provided Vermont Department of Public Service expert review and analysis concerning the scenic impacts of this project.

Richmond Communications Tower
Project Manager for T.J. Boyle Associates. Provided Vermont Department of Public Service expert review and analysis concerning the scenic impacts of this project. Testify before the Vermont Public Service Board. (PSB Docket 8162.)

Environmental Assessment for Wind Resources Offshore Georgia

Project Manager for T.J. Boyle. Associates. Conducted a visual impact analysis, prepare a comprehensive report, and summarized it for the EA. Oversaw preparation of highly accurate and realistic visual representation of an off-shore meteorological tower and two buoys from 5 public viewpoints. T.J. Boyle Associates is a subcontract to Avanti Corporation, who is coordinating the EA for the Bureau of Ocean Energy Management.

Bingham Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 62 turbine 191 MW wind energy project.

Northern Pass Transmission Project EIS
Project Manager for T.J. Boyle Associates. Conduct the visual impact assessment and prepare visual impact sections of the Northern Pass Transmission Project EIS. The EIS is triggered because the project passes through the White Mountain National Forest, crosses the Appalachian Trail, and requires a Presidential Permit because it crosses the border with Canada. T.J. Boyle Associates is a subcontractor to SE Group, who is coordinating the EIS for the US Department of Energy.

Hancock Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 18 turbine 54 MW wind energy project. (DEP Applications L-25875-24-A-N/ L-25875-TF-B-N).

Bowers Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 16 turbine 48 MW wind energy project. (DEP Applications L-25800-24-A-N/L-25800-TE-B-N).

Visualization Study for Offshore North Carolina
Managed the creation of multiple high quality visualizations including: 234 single-frame photographic simulations, 21 panoramic simulations, 48 animated videos and six simulated movies for potential offshore wind development. The visualizations will be used by the Bureau of Ocean Energy Management to assess aesthetic impacts and finalize the federal offshore lease program for renewable energy projects on the Outer Continental Shelf.

Oakfield Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 50 turbine 150 MW wind energy project. (DEP Applications L-24572-24-E-A/ L-24572-24-C-N).

Bowers Mountain Wind Project
Provided Maine's Land Use Regulation Commission expert review, analysis, testimony and cross examination concerning the scenic impacts of this 27 turbine 69.1 MW wind energy project (Development Permit DP4889).

Bull Hill Wind Project
Provided Maine's Land Use Regulation Commission expert review, analysis, and testimony concerning the scenic impacts of this 19 turbine 34.2 MW wind energy project (Development Permit DP4886).

Saddleback Ridge Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 12 turbine 33 MW wind energy project. (DEP Applications L-25137-24-A-N/ L-25137-TG-B-N).

Highland Wind Project
Provided Maine's Land Use Regulation Commission expert review, analysis, and testimony concerning the scenic impacts of this 48 turbine 128.6 MW wind energy project (Development Permit DP4862).

Spruce Mountain Wind Project
Provided Maine's Department of Environmental Protection expert review, analysis, and testimony concerning the scenic impacts of this 10 or 11 turbine 18 to 20 MW wind energy project(DEP Application Applications L-24838-24-A-N and

L-24838-2G-B-N)

Evaluation of the Methodologies for Visual Impact Assessments (VIA)
Member of a four-person team evaluating the Federal Highway Administration's VIA procedure, including what VIA procedures are used by state DOTs and how effective those procedures are thought to be. The project is funded by a grant from the National Cooperative Highway Research Program.

Kibby Expansion Wind Project
Provided Maine's Land Use Regulation Commission expert review, analysis, and testimony concerning the scenic impacts of this 15 turbine 45 MW wind energy project (Development Permit DP4860).

Berlin Solar
Evaluated potential aesthetic impacts of Green Mountain Power's proposal to construct a 200kV Solar Power Project in Berlin, Vermont. Responsibilities include conducting fieldwork, local compliance review, aesthetic analysis, authoring the report and preparing testimony for inclusion with the 248a petition to the Vermont Public Service Board.

Derby 46kV Transmission Upgrade
Evaluated potential aesthetic impacts of Vermont Electric Cooperative's 46kV transmission upgrade project between Derby and West Charleston, Vermont. Responsibilities include conducting fieldwork, local compliance review, aesthetic analysis, authoring the report and preparing testimony for inclusion with the 248a petition to the Vermont Public Service Board. Docket Number 7545. The Order to issue the Certificate of Public Good was signed on January 5, 2010.

FairPoint Broadband: Essex-Milton
Evaluated potential aesthetic impacts of three wireless broadband telecommunications towers proposed by FairPoint Communications in the Towns of Essex and Milton, Vermont. Responsibilities include conducting fieldwork, local compliance review, aesthetic analysis, and co-authoring the report for inclusion with the 248a petition to the Vermont Public Service Board. Docket Number 7527. The Order to issue the Certificate of Public Good was signed on December 3, 2009.

New York Regional Interconnect
Provided expert review and testimony to Communities Against Regional Interconnect (CARI). a consortium of communities opposing the New York Regional Interconnect (NYRI). Assessment review and testimony concerned the potential aesthetic impacts from a proposed 200 mile 400 kV high voltage direct current transmission line in New York State (NYS PSC Case 06-T-0650). NYRI has withdrawn their application.

Long Island Offshore Wind Park
Provided expert review to Mangi Environmental Group for the Minerals Management Service in preparation of the DEIS for the Long Island Offshore Wind Park. The proposal was for 40 off shore wind turbines to generate 140 MW of electricity. I successfully advocated that the visual assessment include a public acceptance study. Long Island Power Authority is currently reviewing whether to continue with the project.

Concept Plan for Plum Creek's Lands in the Moosehead Lake Region
Provided Maine's Land Use Regulation Commission expert review, analysis, and testimony concerning the scenic and related recreation impacts of Plum Creek's proposed development concept plan for their lands in the Moosehead Lake region (Zoning Petition ZP 707). The plan affects 400,000 acres and proposes nearly 1,000 residential lots, plus 1,000 units divided between two resorts. Since there was no scenic assessment at the time I was retained, I developed a work plan to characterize the scenic issues, focusing on scenic impacts along the shoreline. Based in part on my review, a new proposal was submitted one year latter. My review in the second phase focused on the scenic impacts of hillside development. In both phases I made significant contribution to scoping and evaluating vegetation clearing demonstrations for their effectiveness in screening proposed development.

Redington Wind Power Project
In 2006 I was retained Maine's Land Use Regulation Commission to provide an expert review, prepared testimony, and testified before the Commission concerning the scenic and related recreation impacts of a 90 MW 30 wind turbine

project on Redington and Black Nubble Mountains in Redington Township (Zoning Petition ZP 702).

Cape Wind Project
In 2003 I was retained by the Alliance to Protect Nantucket Sound to provided an expert review, and prepare commentary concerning the scenic and recreation impacts associated with the construction of Cape Wind, a proposal to locate 130 wind turbines in Nantucket Sound to generate up to 420 MW of electricity. The US Army Corps of Engineers initially oversaw the preparation of the DEIS. The visual impact assessment did not follow the Corps' recommended procedures, and was clearly inadequate. Congress moved permitting authority for off shore alternative energy projects to the Minerals Management Service, Department of the Interior. The permitting process was reinitiated and I reviewed the new DEIS.

Brookhaven Energy 580-megawatt Natural Gas-fired Electric Generating Plant
In 2002 I provided an expert review, prepared testimony, and testified before the New York State Public Service Commission concerning the visual impacts associated with the construction of a 580-megawatt Natural Gas-fired Electric Generating Plant in Brookhaven, New York (Case 00-F-0566). I was under subcontract to Spectra Environmental Group who represented the Town of Brookhaven.

Bangor Hydro-Electric 345 kV Transmission Line
In 2002 International Paper retained me to provide an expert review, prepared testimony, and testified before the Maine Board of Environmental Protection concerning the scenic and recreation impacts associated with constructing an 84-mile 345 kV transmission line from Orrington to Baileyville, Maine (Application # L-17131-29-E-N and L-17131-31-F-N). The line would be primarily located in a new corridor on land owned by International Paper and cross several streams and rivers that were important Atlantic salmon spawning areas. Among other things, I advocated consolidating the transmission line in the existing Stud Mill road service corridor. The permit was denied.

Two years later Bango Hydro-Electric submitted a revised plan based on the consolidated corridor that was approved. I provided minor advice on this second application.

Public Acceptance of the Wind Power Project in Searsburg, Vermont
Between 1996 and 1998 I was retained to evaluate the public's acceptance before and after the construction of the Searsburg Wind Power project. The study evaluated knowledge and opinions concerning electric power generation, but focused on the advantages and disadvantages of wind energy. Visual simulations were incorporated into the questionnaire to evaluate scenic impacts. The survey was sent to a randomly sampled panel of residents in the region near a proposed project.

Public Recreation Use of Two Vermont Hydroelectric Projects
In 1990 and 1991 I was retained by Stetson–Harza, Utica, NY to conduct recreation use studies for the FERC hydropower development license applications at Essex 19 and the Clyde River, both in Vermont. I developed a survey plan for both power companies, prepared the questionnaires, conducted the analysis, and wrote the project reports.

Visioning Workshops for Forestport, Inlet, and Old Forge
Designed and conducted three visioning focusing on special community characteristics and how to preserve them in the face of development pressures. These workshops were sponsored by Central Adirondack Partnership for the 21st Century.

The Northern Frontier Special Resource Study
Managed the Special Resource Study to identify nationally significant historical, cultural, and natural resources associated with the area of New York known as the Northern Frontier during the period between the French and Indian War and the War of 1812. Nearly two hundred resources were identified, described, and mapped. Four alternative strategies to manage these resources were evaluated. The final report was submitted to the US Congress by the National Park Service.

Community Landscape Perceptions: Dennis, Massachusetts
Initially served as a survey consultant for a town study in the mid-1970s to determine the scenic values citizens assigned to different areas of their community landscape. Since then, I have conducted two independent surveys at ten year

intervals that demonstrate the efficacy of scenic assessment methods, and the stability of the findings. These studies have been conducted in cooperation with the town planning department.

Community Needs Survey
Served as the survey consultant to the City of Rome, NY to establish priorities for the Comprehensive Planning Program. Worked with planning staff who conducted interviews of opinion leaders to identify possible community needs for which the City could plan. Prepared a questionnaire and random sample of residents. Conducted the data analysis and prepared project report.

Aesthetic Impacts of Timber Harvesting on Middleground Vistas
Directed this study co-sponsored by the White Mountain National Forest and the North Central Forest Research Experiment Station, U.S. Forest Service. Supervised preparation of realistic color simulation depicting alternative clear cutting intensities, patterns and sizes from tow viewpoints. Field validated simulations. Developed a survey instrument to evaluate visual preferences and knowledge of forest practices. Conducted surveys of regional opinion leaders and random samples of northern New Hampshire residents and northeastern Forest Service employees. Conducted statistical analysis, project reports and peer reviewed articles.

Socio–cultural Assessment of Wetland Values
Co-directed (with R. Smardon) a study of human use and values associated with wetlands for the City of Juneau, Alaska. All new construction had been prohibited under Federal regulation until a wetland management plan was approved. Conducted fieldwork to prepare an experiential, visual classification of wetlands. Conducted interviews with local opinion leaders and conducted two public workshops to identify a range of human use values and issues associated with wetlands. This material was used to develop a questionnaire. Developed a random sample of Juneau residents. Conducted a survey of Juneau residents and workshop attendees. Conducted data analysis, prepared project reports and peer reviewed articles.

Memberships and Affiliations

American Association for the Advancement of Science, American Society of Landscape Architects (Fellow), Council of Educators in Landscape Architecture (Fellow), Environmental Design and Research Association, International Association for Landscape Ecology, Landscape Research Group (UK), Vermont Planners Association

Awards

2008	Honor Award, ASLA Professional Awards Program
2006	President's Award, Council of Educators in Landscape Architecture
2006	Elected Fellow, Council of Educators in Landscape Architecture
2003	Elected Fellow, American Society of Landscape Architects
2002	SUNY Chancellor's Award for Exemplary Contributions to Research
2000	Merit Award, ASLA Professional Awards Program
1999	Certificate of Appreciation, U.S. Department of Agriculture, for contributions to the NED-1 expert system.
1998	Merit Award, ASLA Professional Awards Program
1995	Visiting Fellow, Staring Centrum, Wageningen, The Netherlands.
1993	Outstanding Planning Project for Community Research in Comprehensive Planning American Planning Association, New York Upstate Chapter
1979	First Award, Environmental Design Research Association
1977	Citation, Progressive Architecture Awards Program

Selected Publications

Apostol, Dean, James Palmer, Martin Pasqualetti, Richard Smardon, and Robert Sullivan (Editors.). 2016. ***The Renewable Energy Landscape: Preserving Scenic Values in Our Sustainable Future***. New York: Routledge. 286 p.

Palmer, J.F. 2016. A landscape assessment framework for visual impact assessment in the USA. ***Journal of Digital Landscape Architecture*** 2016-1: 10-17.

Palmer, J.F. 2016. Assigning a fixed height to land cover screen for use in visibility analysis. ***Journal of Digital Landscape Architecture*** 2016-1: 125-132.

Palmer, J.F. 2015. Effect size as a basis for evaluating the acceptability of scenic impacts: Ten wind energy projects from Maine, USA. ***Landscape and Urban Planning*** 140: 56-66.

Churchward, Craig, James F. Palmer, Joan Iverson Nassauer, and Carys Anne Swanwick. 2013. ***Evaluation of Methodologies for Visual Impact Assessments***. Washington, DC: Transportation Research Board. 149 p.

Palmer, J.F. 2008. The perceived scenic effects of clearcutting in the White Mountains of New Hampshire, USA. ***Journal of Environmental Management*** 89(3):167-183.

Palmer, J.F. 2004. Using spatial metrics to predict scenic perception in a changing landscape: Dennis, Massachusetts. ***Landscape and Urban Planning***, 69(2-3):201-218.

Palmer, J.F., (project coordinator), et al. 2002. ***The Northern Frontier Special Resource Study***. Boston, MA: Boston Support Office, National Park Service. 122 p.

Palmer, J.F. and R.E. Hoffman. 2001. Rating reliability and representation validity in scenic landscape assessments. ***Landscape and Urban Planning***, 54(1-4): 149-161.

Palmer, J.F. 2000. Reliability of rating visible landscape qualities. ***Landscape Journal*** 19(1/2):166-178.

Twery, M.J., H.M. Rauscher, D.J. Bennett, S.A. Thomasma, S.L. Stout, J.F. Palmer, R.E. Hoffman, D.S. DeCalestra, E. Gustafson, H. Cleveland, J.M. Grove, D. Nute, G. Kim and R.P. Kollasch. 2000. NED-1: Integrated analysis for forest stewardship decisions. ***Computers and Electronics in Agriculture*** 27(1):167-193.

Palmer, J., and J. Roos-Klein Lankhorst. 1998. Evaluating visible spatial diversity in the landscape. ***Landscape and Urban Planning*** 43(1-3): 65-78.

Palmer, J.F. 1997. Stability of landscape perceptions in the face of landscape change. ***Landscape and Urban Planning*** 37(1/2): 109-113.

Palmer, J.F. 1996. The 1996 status report on computing skills and training in landscape architecture. ***Computing*** 9(2):2-5. [reprinted in Upstate Landscapes 14(1) 7-10, 1997]

Palmer, J.F., S. Shannon, M.A. Harrilchak, P. Gobster, and T. Kokx. 1995. Esthetics of clearcutting alternatives in the White Mountain National Forest. ***Journal of Forestry*** 93(5): 37–42.

Palmer, J.F. 1991. Representing error in GIS modeling. *In* K. Beard & B. Buttenfield (co-leaders) NCGIA Initiative Seven Position Papers: Visualization of the Quality of Spatial Data. Orono, Maine: NCGIA. 6 p.

Palmer, J.F., S. Alonso, K. Dong–hee, J. Gury, Y. Hernandez, R. Ohno, G. Oneto, A. Pogacnik, and R. Smardon. 1990. A multi–national study assessing perceived visual impacts. ***Impact Assessment Bulletin*** 8(4): 31–48.

Palmer, J.F. 1990. Aesthetics and quality of life. Appendix V. In Ecosystems and their Human Values (48th Meeting of the Chief of Engineers' Environmental Advisory Board, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS) pp. V1-V15.

Palmer, J.F. and R.C. Smardon. 1989. Measuring human values associate with wetlands. In L. Kriesberg, T. Northrup and S. Thorson (eds.) ***Intractable Conflicts and Their Transformation***. Syracuse, NY: Syracuse University Press. pp. 156–179.

Smardon, R.C., J.F. Palmer, A. Knopf, K. Grinde, J.E. Henderson and L.D. Peyman–Dove. 1988. ***Visual Resources Assessment Procedure for US Army Corps of Engineers***. Instruction Report EL–88–1. Vicksburg, Mississippi: US Army Engineer Waterways Experiment Station. 71 pp. plus appendices.

Smardon, R.C., J.F. Palmer and J.P. Felleman (eds.). 1986. ***Foundations for Visual Project Analysis***. New York: John Wiley & Sons. 374 pp.

Jeremy B. Owens

Associate Landscape Architect | GIS Specialist

Education

1999-2003 Bachelor of Landscape Architecture, College of Environment and Design, University of Georgia, Athens, Georgia

Professional Registration

2011 – Present Licensed Landscape Architect, Vermont No. 81305

Professional Experience

2004-present Associate Landscape Architect, T. J. Boyle Associates, LLC, Burlington, Vermont

2004 Byers Engineering Company, Atlanta Georgia

Related Project Experience

Charter Hill Solar – Conducted an aesthetic review under Section 248 for a 1 MW solar electric generation facility located in Rutland, VT, including a field analysis, GIS viewshed analysis, landscape plantings and aesthetic report.

Sudbury Ervin GMC Solar – Conducted an aesthetic review under Section 248 for a 500 kW solar electric generation facility located in Sudbury, VT, including a field analysis, GIS viewshed analysis and aesthetic report.

GMP Stafford Hill Solar Farm – Conducted an aesthetic review under Section 248 for a 2.3 MW solar electric generation facility located in Rutland, VT, including a field analysis, GIS viewshed analysis and aesthetic report.

Northern Pass Transmission Project – Environmental Impact Statement – Coordinator for the visualization and GIS viewshed analysis portion of an EIS for a 180-mile HVDC/AC transmission line extending from Canada to Deerfield, New Hampshire, including through the White Mountain National Forest. T. J. Boyle Associates is a sub consultant to SE Group, who is coordinating the EIS for the US Department of Energy. Duties include complex GIS analysis, field visit and data collection, and leading the photographic simulation effort.

Environmental Assessment for Wind Resources Offshore Georgia – Prepared 7 photographic simulations, 9 panoramic photomontages, and 1 night-time photographic animation as part of an Environmental Assessment for the Bureau of Ocean Energy Management. Additional duties included site visits, aesthetic report review, and helping prepare language for the aesthetics portion of the Draft and Final EA.

Clarendon Solar Farm Project – Conducted an aesthetic review under Section 248 for a 2.2 MW solar electric generation facility located in Clarendon, VT, including a field analysis, GIS viewshed analysis and aesthetic report.

GMP Winooski 3307 Relocation – Conducted an aesthetic review under Section 248 for the relocation of a 34.5 kV sub-transmission line in Winooski, VT, including photographic simulations, field analysis and report. Testified at the 248 Technical Hearing regarding aesthetics.

Visualization Study for Offshore North Carolina – Prepared 234 photographic simulations, 21 panoramic photomontages, 48 photographic animations, and 6 video simulations of offshore wind farms for the Bureau of Ocean Energy Management. The project included simulating more than 21,000 different wind turbine types/locations from 18 different viewpoints along North Carolina's Outer Banks.

Williamstown Solar Farm – Conducted field analysis, GPS and photographic data gathering, CAD terrain modeling and photographic simulations of a 2.1MW solar electric generation facility in Williamstown, Vermont.

Vermont National Country Club – Prepared an aesthetic analysis as required under the "Quechee Test", including a report, photographic simulations, viewpoint documentation, and GIS mapping. Testified in Environmental Court about accuracy of simulations and Act 250 Criterion 8.

New York State DOT Visual Impact Statement Short Course – One of four instructors to teach a Visual Impact Statement course to New York State's Department of Transportation's landscape architects. Focused on simulation and visualization technologies, including static simulation creation and review, viewpoint documentation, CAD modeling and image overlay, image sampling and exhibit creation. Additional items were discussed including simulation accuracy/credibility and emerging dynamic simulation technologies such as SketchUp, ArcScene and Google Earth Pro

FairPoint Communications Wireless Broadband – Provided extensive data gathering using GPS, as well as subsequent GIS analysis, mapping, and simulation services for proposed wireless broadband tower locations throughout Vermont.

VELCO - Lamoille County Project – Managed many aspects of this 115 kV transmission line project, including preparation of aesthetic exhibits, simulations, GIS analysis, pre-filed testimony and aesthetic mitigation plans for and during the construction process.

VELCO - Southern Loop Project – Provided exhibits for the Public Service Board, including substation and transmission corridor simulations, GIS mapping, and aesthetic analysis. Prepared a 3D GIS model for visual analysis of the transmission corridor incorporating the transmission line design, surrounding buildings, trees, and other relative planning data.

VELCO East Avenue Loop Project – Prepared a 3D GIS Model for the entire EAL 115 kV transmission line corridor for aesthetic analysis and presentations incorporating the 3D transmission line design, 3Dbuildings, 3D trees, and other relative planning data into a movie derived from ESRI ArcScene. Conducted field visibility tests of the proposed structures using balloons and provided aesthetic analysis support.

Deerfield Wind Project – Gathered field data and prepared various viewshed analysis maps depicting proposed wind turbines and their visibility throughout the surrounding area, as well as various other GIS maps included in the aesthetic report.

Beekmantown Wind Project – Conducted preliminary field visibility tests using balloons, prepared simulations and view shed maps for the 13 wind turbines in the project located in Beekmantown, New York.

Middlebury Spur EIS – Prepared GIS maps and simulations of the various design alternatives as part of the Environment Impact Statement for the VTrans Middlebury Railroad Spur Project in Middlebury, Vermont.

Lathrop Sand and Gravel – Prepared several simulations of a proposed sand and gravel extraction operation in Bristol, Vermont. Simulations included project simulated at 14 years, 15 years, 16 years, and 30 years. Vegetative mitigation was incorporated into the simulations at each stage of the extraction life cycle. Prepared Quechee Analysis and testified in Environmental Court about accuracy of simulations and Act 250 Criterion 8.

Awards

- State of Georgia Hope Scholarship Recipient, 1997-1998, 2000-2002
- Sigma Lambda Alpha Honor Society Member, 2000-2002
- University of Georgia Dean's List, 2000-2002

Review of the
Northern Pass Transmission Line
Visual Impact Assessment

December 29, 2016

Prepared by:

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Appendices

Chapter 1. Introduction

On October 19, 2015, Northern Pass Transmission LLC (NPT) filed an application with the New Hampshire Site Evaluation Committee (SEC) to construct and operate a proposed 1,090 MW electric transmission line, extending approximately 192 miles from the Canadian border in Pittsburg, NH to a substation located in Deerfield, NH. Approximately 60.5 miles will be located underground in public roads in three separate segments. As part of this application, NPT submitted the *Northern Pass Transmission Line Visual Impact Assessment* (NPT VIA), prepared by Terrence J. DeWan & Associates (DeWan & Associates).

Effective December 16, 2015, the Site Evaluation Committee readopted with amendments the *NH Code of Administrative Rules,* Site 100, Site 200, and Site 300. Title XII Chapter 162-H:10, VII provides that "applicants pending on the date rules adopted under this paragraph take effect shall be subject to such rules" and "if the adopted rules require the submission of additional information by an applicant, that the applicant shall be afforded a reasonable opportunity to provide that information while the processing of the application continues." As a result, the applicant submitted additional material on February 26, 2016 to update the NPT VIA in response to the new SEC Rules. In addition, on May 10, 2016, DeWan & Associates submitted corrections for three photosimulations. Then on September 29, 2016, DeWan & Associates resubmitted all photosimulations, with revisions to incorporate correct structure designs for the Project, as submitted to the SEC.

The following review by T. J. Boyle is composed of five chapters. Chapter 2 discusses how the new SEC Rules approach the consideration of aesthetic impacts. Chapter 3 reviews the technical approach and methods used in the NPT VIA and their compatibility with the Rules. Chapter 4 presents the results of T. J. Boyle's independent analysis, which includes: (1) identifying scenic resources; (2) investigating user expectations and the effect on future use and enjoyment; (3) evaluating potential visual impacts to scenic resources; and (4) avoidance, minimization and mitigation alternatives. Chapter 5 presents T. J. Boyle's conclusions.

Chapter 2. Site Evaluation Committee's Rules Relating to Aesthetics

In December 2015, the SEC Rules were substantially revised and expanded with specific requirements and criteria for evaluating aesthetic impacts. While the old Rules lacked guidance on how to conduct a VIA, the new Rules specify a number of components that must be included in the VIA. In addition, the VIA must describe the methods used to fulfill these new requirements.

> (b) The visual impact assessment shall contain the following components: …
>
> (2) A description of how the applicant identified and evaluated the scenic quality of the landscape and potential visual impacts; (Site 301.05(b)(2)).

In addition, it is the applicant's burden to provide all the information necessary for the SEC to make a decision.

> An applicant for a certificate of site and facility shall bear the burden of proving facts sufficient for the committee or subcommittee, as applicable, to make the findings required by RSA 162-H:16 (Site 202.19).

The NPT is one of the first major projects to be reviewed under these new criteria.

2.1 Definitions

The Rules now include among their definitions provisions relating to aesthetics. We have included several of these below in order to highlight critical definitions, or identify portions of definitions in which assumptions have been made and what those assumptions are, or simply to point out critical components within particular definitions.

2.1.1 Area of potential visual impact (Site 102.10) (APVI) is the "area from which a proposed facility would be visible, and would result in potential visual impacts." (Emphasis added). "Would be visible" is undefined as Site 301.05(b)(1) indicates that "would be visible" shall be "based on both bare ground conditions…and with consideration of screening by vegetation or other factors." For this review, our initial identification of visibility for scenic resources is identified by use of the bare earth viewshed.

2.1.2 Historic sites (Site 102.23) means "any building, structure, object, district, area or site that is significant in the history, architecture, archeology or culture of this state, its communities, or the nation." The term includes 'any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior.'"

2.1.3 Key observation point (Site 102.25) (KOP) means "a viewpoint that receives regular public use and from which the proposed facility would be prominently visible." (Emphasis added).

2.1.4 Landscape (Site 102.26) means "the characteristic, visible features of an area including landforms, water forms, vegetation, historic and cultural features and all other objects and aspects of natural and human origin." This definition includes and extends beyond those properties eligible for listing on the National Register of Historic Places.

2.1.5 Photosimulation (Site 102.35) "means computer-enhanced images generated using professionally accepted software that illustrate the visible effects anticipated from a proposed facility." (Emphasis added). Specific criteria for photosimulations are provided in Site 301.05(b)(7 and 8).

2.1.7 Scenic quality (Site 102.44) "means a reasonable person's perception of the intrinsic beauty of landforms, water features, or vegetation in the landscape, as well as any visible human additions or alterations to the landscape." (Emphasis added). For this review, we have interpreted scenic quality to be a reasonable person's aesthetic perception of the natural and cultural landscape features.

2.1.8 Scenic resources (Site 102.45) "means resources to which the public has a legal right of access that are:

(a) Designated pursuant to applicable statutory authority by national, state, or municipal authorities for their scenic quality;

(b) Conservation lands or easement areas that possess a scenic quality;

(c) Lakes, ponds, rivers, parks, scenic drives and rides, and other tourism destinations that possess a scenic quality;

(d) Recreational trails, parks, or areas established, protected or maintained in whole or in part with public funds;

(e) Historic sites that possess a scenic quality; or

(f) Town and village centers that possess a scenic quality." (Emphasis added).

We interpret the phrase "legal right of access" broadly to mean places to which the public has the ability, right, and or permission to enter or use lawfully.

Site 102.45 determines scenic resources by one of three defining features:

- "Designated pursuant to applicable statutory authority by national, state, or municipal authorities for their scenic quality."
- "Possess a scenic quality" for conservation lands or easements, lakes, ponds, rivers, parks scenic drives and rides, and other tourism destinations, historic sites, or town and village centers. There is no indication that the scenic quality must be "high," only that there is a "perception of intrinsic beauty."
- "Established, protected or maintained in whole or in part with public funds" for trails, parks or other recreational areas.

2.1.9 Visibility analysis (Site 102.55) means "a spatial analysis conducted using computer software to determine the potential visibility of a proposed facility." Site 301.05(b)(1) requires that visibility be determined based on both bare ground and screening by vegetation or other factors.

2.1.10 Visual impact assessment (Site 102.56) means "the process for determining the degree of change in scenic quality resulting from construction of a proposed facility."

2.2 VIA Requirements

Site 301.05 describes the specific components that a VIA shall contain in some technical and procedural detail. Site 301.05(a) directs the VIA to assess "the effects of, and plans for avoiding, minimizing, or

mitigating potential adverse effects of, the proposed facility on aesthetics." It is to be conducted "in a manner consistent with generally accepted professional standards by a professional trained or having experience in visual impact assessment procedures." Components to be included in the VIA per the SEC Rules include:

2.2.1 Description of the project (Site 301.05(b)(1)), including a map of "the proposed facility…that would be visible from scenic resources, based on both bare ground conditions…and with consideration of screening by vegetation or other factors."

2.2.2 Description of the methods (Site 301.05(b)(2)) used to "identify and evaluate the scenic quality of the landscape and potential visual impacts."

2.2.3 Description of the surrounding landscape (Site 301.05(b)(3)) "to provide the context for evaluating any visual impacts." By implication, this description must make reference to the characteristics that will be used in the VIA's evaluation, such as the form, line, color, texture, and scale of natural and cultural landscape features.

2.2.4 Computer-based visibility analysis (Site 301.05(b)(3)) "to determine the area of potential visual impact," which is a term defined in Site 102.10. As described in the definitions above, the stated intent is that both a bare ground (i.e., terrain) and a screened viewshed shall be used in this determination. For the NPT Project, Site 301.05(b)(4) requires that the visibility analysis extend for a radius of 2 miles from visible project elements located in urban cluster areas and a radius of 10 miles in rural areas.

2.2.5 Identify scenic resources (Site 301.05(b)(5)) within the APVI and "a description of those scenic resources from which the proposed facility would be visible." Visual impacts are only assessed for scenic resources, which is a term defined in Site 102.45. A prudent analyst would identify visibility from scenic resources using both terrain and screened visibility. While it is not specified, it is reasonable to assume that the "description of those scenic resources" would include data relevant to the criteria listed in Site 301.05(b)(6). T. J. Boyle Associates' initial identification of scenic resources is described in Chapter 5 and they are listed and mapped in Appendix D. Field investigation would then be conducted to verify potential visibility and gather further descriptive information from all identified scenic resources.

2.2.6 Characterize potential visual impacts (Site 301.05(b)(6)) to the "identified scenic resources as high, medium, or low, based on consideration of the following factors." The eight factors or criteria to be considered are described; there is no indication that any of these criteria are to be overlooked, or that additional criteria can be considered, or that any particular criteria are intended to have more or less weight than any other.

a. "The **expectations of the typical viewer**." For this review, we interpret this to mean the expectation of scenic quality in the context of visiting a specific scenic resource to engaging in anticipated activities.

b. "The **effect on future use and enjoyment of the scenic resource**." Neither factors (a) or (b) are areas in which VIA professionals are normally trained and the SEC rules provide no guidance. To obtain this information intercept surveys should be conducted by an applicant.

c. "The **extent of the proposed facility**, including all structures and disturbed areas, visible from the scenic resource." Since the next two factors consider distance and horizontal breadth, "extent" may mean (1) the size of the area with visibility, (2) the number of structures visible, and/or (3) the amount of individual structures that are visible.

d. "The **distance** of the proposed facility from the scenic resource." Distance effects the details of facility elements that can be seen, as well as the apparent visual magnitude of the facility. A structure seen at 100 feet has a different visual impact than when it is seen at one mile.

e. "The **horizontal breadth or visual arc** of the visible elements of the proposed facility." In the immediate foreground, structures may be viewed as individual units, but in the midground and background, several structures in a cleared ROW connected by conductors are perceived as a whole unit. The visible horizontal breadth or arc of the facility is an indicator of its visual presence.

f. "The **scale, elevation, and nature** of the proposed facility **relative to surrounding topography** and existing structures." It is assumed that "elevation" refers to the altitude or placement in the surrounding topography, for instance is it on a ridgeline or in the valley. In order to make this comparison, the VIA must have sufficiently described the scale, elevation and nature of the surrounding landscape context, as required by Site 301.05(b)(3).

g. "The **duration and direction of the typical view** of elements of the proposed facility." Duration and direction serve as indicators of how people experience typical views. However, understanding the effect on experience typically requires additional interpretation beyond a statement of time and direction.

h. "The **presence of intervening topography** between the scenic resource and elements of the proposed facility." "Topography" has conflicting uses in site 301.05. The technical definition of topography is "the arrangement of the natural and artificial physical features of an area."[1] Its use here seems to reference the landscape context between the viewer and the proposed facility—a view over a lake is likely to be more impacted than a view over a parking lot.

2.2.7 Photosimulation viewpoints (Site 301.05(b)(7)) are to be selected "to illustrate the potential change in the landscape that would result from construction of the proposed facility and associated infrastructure." The rule indicates the use of three distinct types of viewpoints:

- **Representative key observation points** are assumed to be KOPs selected for the VIA that represent the range in landscape character and distances to the Project.
- **Other scenic resource for which the potential visual impacts are characterized as "High"**. This would include from scenic resources that do not receive regular public use and therefore could not be considered a KOP.
- **A sample of private property observation points** within the APVI. There are scenic resources that are clearly private property. We assume that the intent is to extend the areas represented by the photosimulation viewpoints to include views from scenic resources where private property in the surrounding landscape is the source of scenic quality.

2.2.8 Photosimulation technical requirements (Site 301.05(b)(8)) are specified in considerable detail:

a. Photographs "shall be taken at **high resolution and contrast**." "**High resolution**" requires at a minimum that the photograph resolution be at least as great as good human vision, which can be 0.5 arc-minutes (Deering 1998; Wikipedia 2016b). Therefore, the horizontal number of pixels for a photograph with a coverage of 40 degrees would be 4,800. In order to capture all the information in this level of detail, the Nyquist–Shannon sampling theorem requires that the digital sample of the view have at least two pixels to represent the desired level of detail (Wikipedia 2016b).

[1] https://en.oxforddictionaries.com/definition/topography

Photographs "shall be taken … using a **full frame digital camera** with a **50 millimeter fixed focal length lens**." The specified lens has a horizontal angle of view of just under 40 degrees; there is no reason to require a FX format digital camera, since a DX format digital camera with a 35mm lens can take equivalent quality photographs under the required conditions.

Photography shall be "**under clear weather conditions** and at a time of day that provides **optimal clarity and contrast**." Clear weather is assumed to mean clear visibility. Optimal clarity and contrast could include overcast or cloudy conditions.

Photography "shall avoid if feasible showing any utility poles, fences, walls, trees, shrubs, foliage, and **other foreground objects and obstructions**."

b. Photosimulations "shall be **printed at high resolution** at 15.3 inches by 10.2 inches." If 4,800 pixels are distributed over 15.3 inches, there are 314 pixels per inch. The Nyquist-Shannon sampling theorem indicates that the printer resolution should be at least 600 dpi.

c. "At least one set of photosimulations shall represent **winter season conditions** without the presence of foliage."

d. **Simulation metadata** must be recorded. In addition to the metadata recorded by the camera for each photograph, GPS location, and weather conditions shall be recorded.

2.2.9 Describe "measures planned to … avoid, minimize, or mitigate potential adverse effects," as well as "alternative measures considered but rejected." It is generally accepted by environmental assessment professionals that the preferred approach to mitigation, in order of preference, are avoid, minimize, and compensate. If compensation must be used, visual compensation should be used to redress visual impacts. The requirement that visual compensation must redress visual impacts was recognized by the SEC (2013b, p. 52-53) in its initial denial of the Antrim Wind project.

2.3 Aesthetics Criteria to be Considered by the Committee

The SEC has the authority to issue a certificate of site and facility "containing such terms and conditions as the committee deems appropriate, that authorizes the applicant to proceed with the proposed site and facility" (RSA 162-H:2, II-2). "In order to issue a certificate, the committee shall find that: … the site and facility will not have an unreasonable adverse effect on aesthetics" (RSA 162-H:16 IV). In conducting its visual assessment Site 202.19 states that the applicant "shall bear the burden of proving facts sufficient for the committee or subcommittee, as applicable, to make the findings required by RSA 162-H:16" (i.e., "The site and facility will not have an unreasonable adverse effect on aesthetics."). It further states that "the party asserting a proposition shall bear the burden of proving the proposition by a preponderance of the evidence."

Site 301.14(a) describes the factors that the Committee shall consider relative to findings of unreasonable adverse effects.

2.3.1 "**Existing character** of the APVI." Existing character must be understood in order to determine whether the proposed facility "fits," and the extent to which it changes the existing character.

2.3.2 "**Significance** of affected scenic resources and their **distance** from the proposed facility." There is no guidance on how to interpret "significance." While some distance criterion may be appropriate, it seems more likely that the real concern is the visual magnitude, or how much of the visual field is occupied by the proposed facility.

2.3.3 "**Extent, nature and duration of public uses** of affected scenic resources." In a general sense, this refers to the number of users at scenic resources, their activities and the length of time they are there. It may also be referring to people's behavior at specific viewpoints—what direction do they typically look, how many are there, for how long, and what is their sensitivity to scenic degradation? In some situations, higher numbers of users may imply greater opportunity for impact, but in other situations low numbers of users may imply greater sensitivity—such as in a wilderness setting.

Chapter 5 contains a section that reviews studies from New England that investigated the role or importance of scenery to various activities.

2.3.4 "**Scope and scale of the change** in the landscape visible from affected scenic resources." Similar to 2.3.1 Existing character, described above, this would seem to be a judgement made in comparison to the existing visual character and how the Project "fits" into the existing landscape.

2.3.5 "**Visual impacts … described in the VIA** submitted by the applicant and other relevant evidence." The Site 301.05(b)(6) criteria are included by reference among those that the Committee shall consider. However, the Committee shall also consider other relevant evidence entered into the record.

2.3.6 Extent the facility would be "**a dominant and prominent feature**" within a natural or cultural landscape of high scenic quality or as viewed from scenic resources of high value or sensitivity." A facility's visual dominance and prominence is based in part on its visual magnitude, but also the contextual "fit" within the existing landscape, the visual relationship to the primary visual landmarks, and users' viewing behavior. The Committee is directed to consider how a facility fits within a landscape of high scenic quality, even though it may not be identified as a scenic resource.

2.3.7 **Effectiveness of mitigation** to "avoid, minimize, or mitigate unreasonable adverse effects on aesthetics, and the extent to which such measures represent **best practical measures**." Site 301.05(b)(10) specifies that the planned and considered-but-rejected mitigation measures must be described in the VIA. The Committee must evaluate the effectiveness of these measures to mitigate unreasonable adverse effects, and whether the proposed mitigation represents all reasonable measures to avoid these adverse effects.

Chapter 3. Technical Review of NPT's VIA Approach and Methods

3.1 Methodology Flow Chart

Site 301.05(b)(2) requires that the VIA include "A description of how the applicant identified and evaluated the scenic quality of the landscape and potential visual impacts." The process used for the NPT VIA is described in detail in the Methodology chapter, and summarized in the Methodology Flow Chart. This chart is included in Figure 1 with annotation text in red identifying the section of the NPT VIA that describes each of the methods used. The chart also includes corrections in red to show that both Cultural Value and Visual Quality must be evaluated before it is possible to determine Scenic Significance (NPT VIA, p. M-10).

Our technical review of the VIA approach and methods will follow this chart. Section 3.2 of this review summarizes how DeWan & Associates identified scenic resources; this information is described in sections 2.1 and 5.1 of the NPT VIA. Section 3.3 of this review summarizes how DeWan & Associates determined possible visibility. The focus is on the viewshed analysis, which is described in section 4.1 of the NPT VIA. DeWan & Associates evaluates scenic resources that have possible visibility for both Cultural Value and Visual Quality, which are reviewed here in sections 3.4 and 3.5, and then combined these to determine the Scenic Significance rating reviewed in section 3.6.

The 3D Model Analysis procedures used in the NPT VIA are reviewed in section 3.7, which discusses visualizations. The NPT VIA identifies 70 KOPs and scenic resources, some of which overlap with each other, for individual Visual Impact Analysis. DeWan & Associates created visualizations for 28 of these KOPs—the selection of these viewpoints is reviewed in section 3.7.1, the photography in section 3.7.2, and the construction of the photosimulations in section 3.7.3. All 70 KOPs, including those without photosimulations, are evaluated in the NPT VIA for their Overall Visual Impacts, which is composed of separate two parts—Visual Effect and Viewer Effect. DeWan & Associates' procedures for determining Visual Effect are reviewed in section 3.8; the components of Viewer Effect are reviewed in sections 3.9 and 3.10. DeWan & Associates' Visual Effect and Viewer Effect results are combined into the Overall Visual Impact Rating, which is reviewed in section 3.11. Section 3.13 reviews the approaches to mitigation identified by the NPT VIA. The final section presents our conclusions from reviewing the NPT VIA.

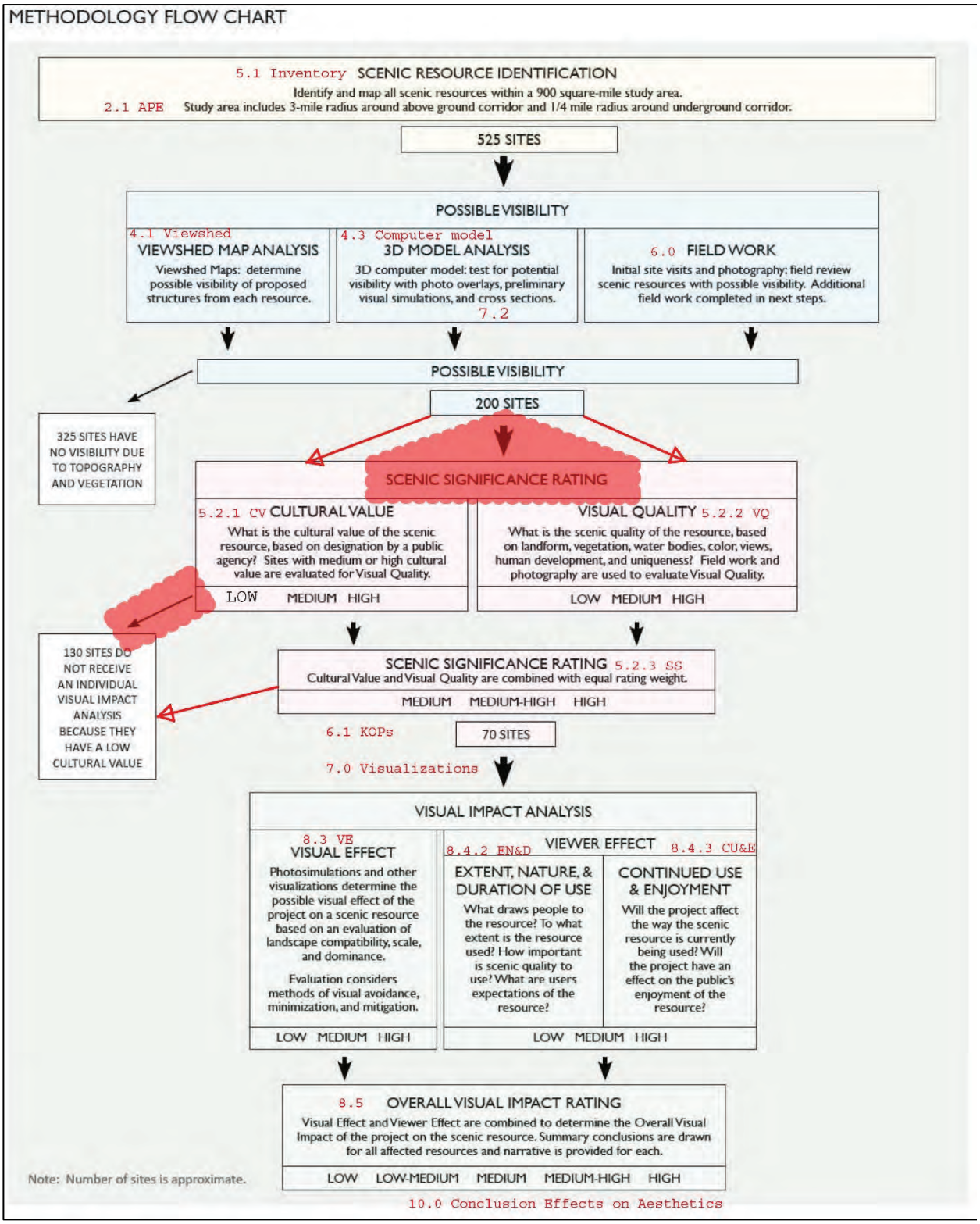


Figure 1. "The Methodology Flow Chart provides a description of the VIA process" prepared by DeWan & Associates (NPT VIA, p. M-2). This figure includes annotations in red added by T. J. Boyle that identify the section of the NPT VIA describing the various steps in the process. Red clouded areas represent corrections in the process flow so they correspond to the description in the text.

3.2 Scenic Resource Identification

The Methodology Flow Chart and SEC Rules restrict the analysis of visual impacts to scenic resources, therefore a thorough identification of scenic resources is the first step to an accurate VIA. The NPT VIA inventoried the following types of scenic resources:

- Publicly accessible places that have been designated or recognized by municipal, regional, state, or national authorities for their scenic or recreation quality and are visited by the general public for the use, observation, enjoyment, and appreciation of their scenic or recreational qualities.
- Conservation lands or easements that have been recognized for their visual quality and are open to the public.
- Tourism destinations (e.g., lakes, ponds, rivers, parks, trails, recreation areas, inns, grand hotels, etc.) that are open to the public.
- Town and village centers with recognized visual quality. (NPT VIA 2015, p. M-8, emphasis added)

The NPT VIA's definition is much more limited than Site 102.45, as described in Chapter 2. In particular, the NPT VIA does not have a clear definition of public access, fails to identify non-designated scenic resources, and requires a high standard of scenic quality. The following discusses these key terms.

Public access. The NPT VIA limits scenic resources to publicly accessible places, but fails to define the term "publicly accessible places." At the September 30, 2016 Aesthetics Technical Session, DeWan & Associates stated that their interpretation of whether the public had a right of access came down to "a gut feeling of whether you were welcome or invited." In contrast, T. J. Boyle interprets the phrase "legal right of access" to mean places to which the public has the ability, right, and or permission to enter or use.

Designation. The NPT VIA limits scenic resources to those that are designated or recognized by an official body for their scenic quality. However, Site 102.45 requires designation for only the first type of scenic resource listed and does not apply a designation requirement for the other five (5) resource categories. As a result, the NPT VIA excludes many areas defined as a scenic resource by Site 102.45.

Possess a scenic quality. The NPT VIA limits consideration of scenic resources to places officially recognized for their higher visual quality. However, Site 102.45 does not require that a resource be recognized for or have high scenic quality, only that it "possess a scenic quality," even if the scenic quality is common or ordinary. In addition, Site 102.45 establishes recreation areas "established, protected or maintained in whole or in part with public funds" as scenic resources regardless of their scenic quality.

3.2.1 Audit of scenic resource identification

The NPT VIA (2015, p. M-2) identified 525 scenic resources within 3 miles of the overhead portion of the Project, and 0.25 miles of the underground portion. In February 2016, DeWan & Associates submitted *Attachment 7: Scenic Resource Identification & Assessment* to the SEC with an additional 97 scenic resources (NPT VIA 2016, Attachment 7, p. 7.2 – 7.3). These data are presented as PDF documents and not all of the various evaluation ratings were reported with each KOP or scenic resource. Therefore, we made an informal data request for a digital database of the identified scenic resources, and DeWan & Associates supplied the Excel database *NPT Scenic Resource Spreadsheet* in September 2016. We calculated the number of scenic resources identified in the NPT VIA and its addendum by counting them as listed in the printed tables for each town; the discovered database is an Excel file and the listed scenic resources are tabulated by town. The results of these counts are shown in Table 1.

Table 1. Number of Scenic Resources Identified by the NPT VIA

Town	NPT VIA (page)	NPT VIA (#)	Addendum 7 (#)	Total	Discovered Database	Notes
Alexandria	4-61	1	4	5	1	
Allenstown	6-9	16	0	16	16	Bear Brook SP + 9 KOPs
Andover	4-65	5	0	5	5	
Ashland	4-11	23	0	23	23	
Belmont	7-3	0	1	1	--	
Benton	--	--	--	--	1	Not in VIA
Berlin	Attach 7-2	0	11	1	0	
Bethlehem	2-59, 3-4	25	3	28	30	6 are listed twice in discovery
Boscawen	5-29	12	0	12	12	
Bow	6-32	2	4	6	2	
Bridgewater	4-7, 3-4	13	0	13	14	2 for Pemmi R
Bristol	4-21	19	0	19	19	
Cambridge	Attach 7-2	0	2	2	0	
Campton	3-4	8	0	8	8	
Candia	7-4	0	2	2	--	
Canterbury	5-9	18	0	18	18	
Carroll	2-75	5	0	5	5	
Chichester	6-33	4	0	4	4	
Clarksville	1-11	19	1	20	19	
Colebrook	1-105	9	3	12	9	
Columbia	Attach 7-2	0	4	4	0	
Concord	5-14	48	5	53	48	
Dalton	2-55	8	0	8	8	
Deerfield	6-21	52	0	52	54	
Dix's Grant	1-106	2	0	2	2	
Dixville	1-45	14	1	15	14	
Dummer	1-69	12	1	13	12	
Dunbarton	7-4	0	2	2	--	
Easton	3-4	8	0	2	7	R Heritage byway not in discovered
Epsom	6-35	5	0	5	5	
Errol	1-109	4	9	13	4	
Franconia	2-79, 3-4	9	0	8	9	underground
Franklin	4-39	26	0	26	26	
Hebron	7-3	0	5	4	--	
Hill	4-35	10	1	11	10	Witte Forest MA not in discovered
Holderness	4-60	4	1	5	8	2 are listed twice, Livermore Falls SF in discovered, but not VIA
Hookset	7-4	0	2	2	--	
Hopkinton	7-3	0	3	3	--	
Jefferson	2-71	16	9	25	16	Inc. Silvio Conte NF&WR + 5

Town	NPT VIA (page)	NPT VIA (#)	Addendum 7 (#)	Total	Discovered Database	Notes
						KOPs; WMNF + 2 KOPs
Lancaster	2-9	36	1	37	36	Inc. Weeks SP + 3 KOPs
Littleton	2-77	12	2	14	12	
Loudon	5-31	5	1	6	5	
Meredith	7-3	0	1	1	--	
Milan	1-113	8	4	12	8	
Millsfield	1-47	10	0	10	10	
New Hampton	4-13	17	0	17	17	
Northfield	5-5	5	1	6	5	
Northumberland	2-7	14	0	14	14	
Northwood	6-37	12	0	12	12	
Nottingham	6-39	10	1	11	10	Pawtuckaway SP + 3 KOPs
Odell	1-110	2	1	3	2	
Pembroke	6-5	11	0	11	11	
Pittsburg	1-7	12	5	17	12	
Pittsfield	7-3	0	1	1	--	
Plymouth	3-4, 4-59	16	0	9	15	Subarea 3 & 4, R Heritage Tr not in discovered
Raymond	7-4	0	2	2	--	
Salisbury	4-67	4	0	4	4	
Sanbornton	4-63	9	0	9	9	
Second College	1-07, 7-4	1	3	4	1	discovered scenic res not in VIA
Stark	1-83	19	0	19	19	
Stewart	7-4	0	1	1	--	
Stewartstown	1-25	22	0	22	22	Inc. Coleman SP + 3 KOPs
Stratford	1-111, 7-4	4	6	10	4	
Sugar Hill	2-78, 3-4	5	0	1	6	2 are listed twice
Thornton	3-4	5	0	5	4	R Heritage Tr not in discovered
Tilton	4-66	1	0	1	1	
Warner	7-4	0	1	1	--	
Wentworths Location	1-108	1	0	1	1	
Whitefield	2-31	18	0	18	18	
Woodstock	3-4	14	0	0	13	Wild Ammonoosuc R not in discovered
Total		**670**	**105**	**732**	**680**	

The NPT VIA lists the scenic resources separately for each town (there is no comprehensive list), so it may be that there are only 525 scenic resources, but because some are listed in more than one town the total

number reaches 670 in the NPT VIA. The Excel database provided in discovery includes the 680 scenic resources. The additional 10 scenic resources may be attributed to duplicate entries. In general, the scenic resources identified in the February 2016 addendum do not appear to be included in the discovered Excel database.

Chapter 4 provides the results of our independent identification of scenic resources that is more firmly grounded in the Site 102.45 definition and determines that there are a great deal more scenic resources that are easily identified, as well as important categories of scenic resources that will require additional investigation.

3.2.2 Source used for identification

DeWan & Associates consulted a great number of sources in order to identify these scenic resources (NPT VIA 2015, Appendix C). Nearly a third of the scenic resources reference local documentation, primarily Municipal Plans (Normandeau Associates 2015). DeWan & Associates referenced the state-wide sources shown in Table 2 in association with 10 or more scenic resources. In general, these sources are lists and not spatial databases compatible with a GIS; the exception is #31—Conservation and Public Lands, which is only associated with 29 scenic resources. Knowing the location of a scenic resource is important to accurately determine if it would have visibility of the Project. It is unclear how many scenic resources DeWan & Associates evaluated as a single point indicating approximate location, rather than a polygon or line that more accurately represents a scenic resource's total area.

Table 2. Most Common Sources Used to Identify Scenic Resources.

ID	Source
14	National Conservation Easement Database (NCED)
30	Official List of Public Waters by NH Department of Environmental Services, 2014
2	NH Fish and Game Department Table of Public-access boating and fishing sites
3	NH Snowmobile Association Map, 2014
8	NH DOT Scenic Byway Map, October 2008.
6	Lands administered by NH Dept. of Resources and Economic Development, and the NH Fish and Game Dept., 2007
1	NH State Park Listing
4	Map of Designated Rivers in the New Hampshire River Protection Program, Department of Environmental Services
5	Delorme Atlas and Gazetteer for New Hampshire, 16th Edition, 2010
7	Society for the Protection of NH Forests – List of Properties, January 2013
31	Conservation/Public Lands. Data available from Earth Systems Research Center, UNH, 2013.

3.2.1 Summary Observations on Scenic Resource Identification

The emphasis of the NPT VIA is on designated resources (i.e., Site 102.45(a)). The NPT VIA does not describe a procedure to identify non-designated scenic resources, as defined by Site 102.45, including:

- Undesignated lakes, ponds, rivers, parks, scenic drives and rides, and especially other tourism destinations that "possess a scenic quality."
- Historic sites which are "significant in the history, architecture, archeology or culture of this state, its communities, or the nation" (Site 102.23 and RSA 227-C:1, VI) that "possess a scenic quality."
- Recreation areas "established, protected or maintained in whole or in part with public funds" (e.g., lands with current use recreation tax adjustment that guarantees 12-month public access).

An independent and more extensive identification of scenic resources is included in Chapter 4.

3.3 Possible Visibility

Site 301.05(b)(4) requires the use of "a computer-based visibility analysis to determine the area of potential visual impact." In rural areas, the visibility analysis shall extend for a radius of 10 miles from the NPT structures; for structures within an urban cluster it shall extend to a 2-mile radius. As noted in Chapter 2 of this report, the SEC rules are ambiguous regarding what parameters a VIA must use for the visibility analysis—however, Site 301.05(b)(1) associates whether the Project "would be visible" from any scenic resource with both bare ground and screened visibility analyses.

3.3.1 Area of Potential Visual Impact (APVI)

The APVI is the "geographic area from which a proposed facility would be visible, and would result in potential visual impacts, subject to the areal limitations specified in Site 301.05(b)(4)"—this is in effect the study area. However, the study area DeWan & Associates used in the NPT VIA to determine whether a scenic resource received an individual assessment was substantially less than 10 miles on either side of the centerline:

> For the above ground portion of the NPT, the study area (also known as the Area of Potential Effect or APE) is defined as a band of land 6 miles in width; 3 miles on either side of the centerline of the existing or proposed transmission corridor. (NPT VIA 2015, p. M-3)

Though the APE extends to 3 miles, the NPT VIA included a screened visibility analysis that extended to 5 miles from the Project centerline. In February 2016 an additional visibility analysis was submitted that purportedly extended coverage to 10 miles (NPT VIA 2016, Attachment 6). A significant error in this analysis is described below, in section 3.3.3. Ten scenic resources 3 to 5 miles from the Project received an abbreviated individual assessment, but scenic resources beyond 5 miles received a general assessment:

> While the SEC rules require an identification and analysis for an area of potential effect of ten miles from the corridor, in reality there are very few instances where the transmission structures and cleared corridor would be able to be detected at distances greater than five miles. Even if observers were able to see the transmission line, it would be perceived as a very small object and would not appear as a dominant or even prominent feature in the overall landscape. (NPT VIA 2016, Attachment 7, p.7-1).

The visual dominance of both the corridor and transmission structures does decrease with distance. It is also true that the APE for transmission project VIAs in New England do not normally extend beyond 3 miles. However, there does not appear to be any systematic investigation to support this practice. Moreover, Site 301.05(b)(4) clearly establishes the appropriate radius for the APVI is 10 miles, which the NPT is not free to ignore.

There are only two observational studies that document the visibility of large transmission line structures. Sullivan, et al. (2014) concluded that casual observers would see 230-kV H-frame towers at 3.5 miles, but that they remain visible up to 5 miles, which he states is a more reasonable distance to set the APVI. Sullivan also observed that the limit of casual visibility for the 500-kV lattice towers in their study was 10 miles, with a reasonable APVI as far as 13 miles. Driscoll, et al. (1976) also documented visibility of transmission lines and arrived at similar results. Both studies support the reasonableness setting the APVI radius to a distance substantially beyond 3 miles. By way of illustration, the existing PSNH 115 kV transmission corridor is clearly visible beginning at 4.5 miles and extending further into the distance, as shown in Figure 2.

Figure 2. The view toward the existing PSNH 115 kV transmission corridor, as seen from the Loon Mountain Summit Observation Tower. The nearest portion of the corridor is greater than 4.5 miles away. (Source: TJBA)

3.3.2 Terrain visibility

A bare ground or 'terrain' visibility analysis was not completed as part of the NPT VIA. However, one was provided in October 2016 in response to Technical Session data request TS 4-4. There is no indication that the terrain visibility was considered in the NPT VIA or subsequent analyses. In the September 30, 2016 Aesthetics Technical Session, Mr. DeWan stated that the terrain viewshed "provides very little useful information," and was therefore not considered in the NPT VIA.

While terrain visibility does generally overstate the existing visibility, it may be a useful indicator of possible visibility if land cover is changed or removed. The US Forest Service *Landscape Aesthetics* handbook states that as a general rule when determining landscape visibility:

> Vegetative screening, being dynamic. is important for short-term, detailed planning. Normally, vegetative screening is inappropriate to consider in long-term, broad-scale planning, such as forest planning. (USFS 1995, p. 4.5)

A 345 kV transmission line is an example of long term planning where one must anticipate changes in landscape over of the Project's lifetime, and best professional practices require consideration of the terrain viewshed is appropriate.

The Landscape Institute and Institute of Environmental Management & Assessment (2013) sponsored *Guidelines for Landscape and Visual Impact Assessment*, which is one of the most widely referenced handbooks on visual assessment worldwide. They also recommend use of terrain visibility, which they call zone of theoretical visibility (ZTV).

> ZTV is now recommended since it makes clear that the area so defined only shows land from which the proposal may theoretically be visible. That is, it treats the world as 'bare earth' and does not take account of potential screening by vegetation or buildings. Desk study, using digital methods, should identify the ZTV for the development proposal and, where appropriate, should be constructed using multiple-point analysis, combing ZTV maps for different parts of the proposal.
>
> In reality many factors other than terrain will influence actual visibility. Other landscape components that may affect visibility, for example buildings, walls, fences, trees, hedgerows, woodland and banks, can in theory be added to digital models that are based on terrain but this is difficult to achieve accurately, especially for a large study area. Their effects are best judged by field surveys that can examine and record their location, size and extent, and their effect in screening visibility at key points. … Site surveys are therefore essential to provide an accurate baseline assessment of visibility. (TLI & IEMA 2013, p. 103)

In summary, terrain visibility is recognized as the appropriate form of analysis for projects that are expected to have a long life-span, such as a transmission line. The analysis is particularly useful as a preliminary guide to inform fieldwork, and for identifying sites that potentially may be impacted. Thus, we do not agree with DeWan's conclusion that terrain visibility provides "very little useful information."

3.3.3 Screened visibility

The visibility analysis reported in the NPT VIA incorporated "screening by vegetation or other factors." DeWan & Associates used elevation data with a 5-meter resolution for both terrain (DTM) and land cover height (DSM) within 1.5 miles of the Project centerline. For the area between 1.5 and 10 miles they used National Elevation Data (NED) with approximately a 10-meter resolution for ground elevation, however land cover height was approximated. DeWan & Associates calculated the average height for each of the NH Land Cover Assessment 2001 (NHLCA) cover types, which has a 30-meter resolution, for the area within 1.5 miles of the Project using the DSM data and then applied these average heights to the land cover types in the area between 1.5 and 10 miles.

Problems with assigned screening heights. There are difficulties with this approach to assigning a screening height to land cover within the area between 1.5 and 10 miles, and it likely overstates the effect of land cover screening. First, although there is often more than one land cover in a 30-meter cell, the cell will be classified as the most common type. For instance, a cell classified as open water may include some of the forest along the shoreline. The DSM provides 36 sampled heights within the NHLCA 30-meter cell, most will be open water, but some of them will be forest trees. Therefore, the average height of open water above the bare ground will be greater than zero. This obvious error was corrected in the NPT VIA visibility analysis (NPT VIA, p. A-3; as explained by Terry DeWan and Jessica Kimball during the November 8, 2016 Aesthetics Technical Session). It was not corrected for other land covers, for instance, row crops are assigned a height of 6 feet—which is sufficient to obstruct an adjacent viewer, even though in late August

when the DSM data were collected the median elevation is 1 foot and over 25 percent of crop land has no height above ground level. At other times of year, the height of crop land is at or near ground level. There are similar problems with all other land covers, with the likely exception for forest types. In an article included in Appendix B, Palmer (2016) considered this problem and recommended that when the data for a land cover type were significantly skewed toward no or very low screening heights, no screening height should be assigned, so as not to over-state the effect of screening. In areas of concern that are further than 1.5 miles from the projects, such as central Concord where a single value fails to reflect the actual opportunity for visibility, the higher quality DTM and DSM data should be acquired to investigate screened visibility or not to assign a screening height at all.

Error in calculating screened visibility. To extend the visibility analysis out to the full 10 miles, DeWan & Associates conducted two separate visibility analyses. The first was for a radius to 5 miles from each structure and was the analysis DeWan & Associates used in the NPT VIA (2015). DeWan & Associates conducted a second visibility analysis for the area between 5 and 10 miles from the NPT centerline and submitted this analysis as part of the February 2016 revisions. The results of both analyses were provided as part of the discovery process. Our inspection of these two visibility maps and parameters used in the viewsheds identified a gap in the analysis—visibility of a structure from a distance of 5 to 10 miles is not determined if the viewer is within 5 miles of the NPT centerline, as illustrated in Figure 3. This is illustrated in Figure 4, which compares the 5 to 10-mile visibility analysis as calculated for the NPT VIA (2016) and DOE (2015) near where the Project corridor turns in Whitefield. It is readily apparent that NPT VIA on the right side does not show visibility within 5 miles of the Project centerline, bur the DOE visibility analysis does.

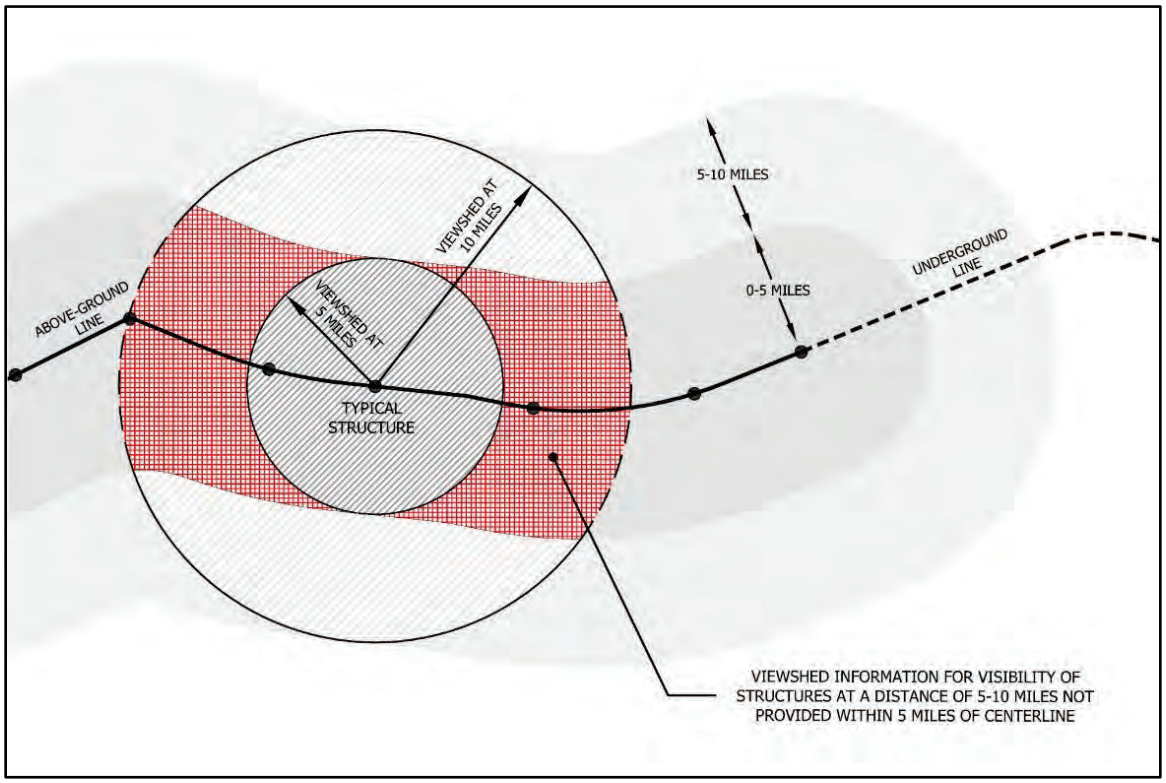


Figure 3. Illustration of how DeWan & Associates calculated visibility for the area 0 to 5 miles and 5 to 10 miles from a structure. The procedure used failed to calculate visibility of a structure between 5 and 10 miles away from an observer standing within 5 miles of the NPT centerline, which corresponds to the dense hatching shown in red.

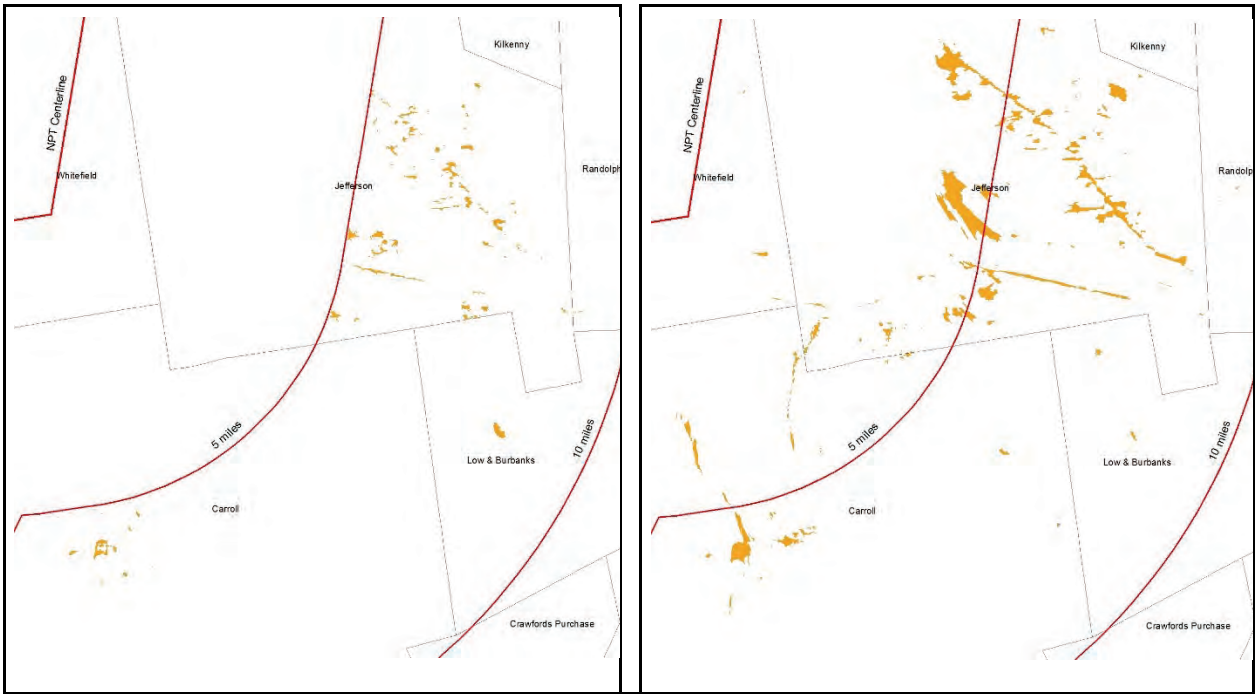


Figure 4. Screened visibility from 5 to 10 miles as calculated for the NPT VIA (2016) on the left and DOE (2015) on the right. The NPT VIA does not show the visibility of structures 5 to 10 miles away when the viewer is within 5 miles of the NPT centerline.

Problem determining scenic resource visibility. Many scenic resources have source data that are only represented as single points, not as areas, so it is difficult to determine whether there will be visibility somewhere on the scenic resource's site. In addition, point data are often approximate locations or "visual centroids" that may or may not be sufficiently accurate for inclusion in a visibility analysis. Recognizing this problem, the NPT VIA determined that "if the viewshed map intersected with a resource or was located within 50 feet of a resource, the resource was classified as having possible visibility" (p. M-7). There is not a recognized standard approach to this problem, but a 50-foot radius around a point is likely to be insufficient to encompass most scenic resource sites, and therefore may not return an accurate representation of visibility. In the Methodology Flow Chart, visibility determines whether a scenic resource is to be evaluated—DeWan & Associates eliminated over half of the identified scenic resources from further consideration because the screened visibility analysis indicates that there is no visibility of the NPT facility. Because of this problem with scenic resources represented as points rather than areas, accurate to use a terrain visibility analysis to determine whether a scenic resource is to be evaluated.

The NPT VIA also explores potential visibility of scenic resources using the ground-level view in Google Earth, as described in section 3.7, and evaluates the visibility between a specific viewpoint and NPT structure using a cross-section. For instance, DeWan & Associates used cross-sections to demonstrate that the NPT will not be visible from Christine Lake, Little Cherry Pond, Catamount Pond, and the beach at the Sahegenet Falls Recreation Areas, even though the visibility analysis indicated potential views of the NPT structures. If the data are accurate, a cross-section can be a useful tool; however, the cross-section only evaluates the line-of-sight between two specified points and these two points may not correspond to the line-of-sight where visibility exists.

3.3.1 Summary Observations on Possible Visibility

The NPT VIA does not consider a bare ground visibility analysis as required by Site 301.05(b)(1). At the September 30, 2016 Aesthetics Technical Session, DeWan & Associates describe a bare ground visibility analysis as "providing very little useful information." It is acknowledged that terrain visibility overstates the visibility under existing conditions, but there are several reasons why it is important. For instance, the US Forest Service (1995, p4.5) recommends that when conducting a visibility analysis "vegetative screening, being dynamic, is important for short-term, detailed planning. Normally, vegetative screening is inappropriate to consider in long-term, broad-scale planning, such as forest planning." Another reason is that many of the scenic resources are entered in the GIS database as a single point representing its general location, not the area's boundaries. While many scenic resources have visibility of the NPT, it is less likely that a randomly selected point on the property will have visibility. While a terrain viewshed may overstate the existing visibility, it is a better filter to identify scenic resources that require field investigation because they have potential visibility of the NPT. By not evaluating whether a scenic resource has potential visibility using a terrain viewshed, any potential future impact on that scenic resource due to changes in land use are not reported to the SEC for consideration.

The screened visibility analysis presents two serious problems. The first is that DeWan & Associates did not determine the visibility of structures 5 to 10 miles away from viewpoints within 5 miles of the NPT. The second problem is that DeWan & Associates' approach to establish the land cover heights used in the screened visibility analysis inappropriately reduces the area and extent of potential visibility. Using an average height ignores the fact that land cover height is highly variable and that the resolution of the land cover data is much coarser than the DSM height data (Palmer 2016). For instance, the average height for row crops is set at 6 feet, even though over half of the land use has a height less than one foot. At the November 8, 2015 Aesthetics Technical Session, DeWan & Associates indicated that they did not question the advisability using average heights to represent the screening effect of all land cover types.

If an accurate DSM is not available, the generally accepted professional standard in Northern New England has been to assign 40 feet to forested areas and not consider screening for other land cover types. This method reduces the chances for false-negative visibility results, and a similar method has been used elsewhere in the NPT VIA. For example, DeWan & Associates uses 42.6-foot ribbons (13 meters) to represent the height of forested areas when creating the photosimulations rather than the average value used in the visibility analysis.

3.4 Cultural Value

The NPT VIA procedure introduces Cultural Value as part of determining Scenic Significance, which creates a hierarchy of scenic resources. The stated goal is:

> The next step in the evaluation process is to determine the significance of each scenic resource that may have a view of the project. Scenic resources within the study area include places of national, state-wide, regional, and local significance. Scenic resources that are visited by large number of people from across the country or the state are generally considered to be of national or state-wide significance. Scenic resources primarily visited by people from the local communities are considered to be of local or regional significance. (NPT VIA, p. M-8)

The NPT VIA does not collect information about visitor numbers, or their place of residence. Instead it asserts that significance is:

> the value that has been placed on a particular resource by a public agency or non-governmental organization, and indicated by formal designation, inclusion in current planning documents, or similar sources of information. …
>
> **High Cultural Value**: Resources of national or state significance that are designated, protected, or noteworthy due to the quality of the surrounding scenery that is intrinsic to their designation. In most cases these are resources that attract large numbers of visitors from across the state and areas outside New Hampshire.
>
> **Medium Cultural Value**: State or national resources that are designated, protected, or primarily noted for values other than scenic, but have a scenic component evident in the designation; or state or national resources noted for visual quality that primarily attract regional or local users.
>
> **Low Cultural Value**: Resources that are designated, protected, or noted primarily for values other than scenic, or scenic areas that primarily attract local users. (NPT VIA, p. M-8)

This approach to determining significance of a scenic resources has been discussed by the SEC, and found wanting. During the afternoon of the first day of deliberation concerning Antrim Wind, Director Simpkins stated that:

> Whether something is more important because it's a State property or federal property versus local property, is I think that's very subjective. … But speaking as a state agency, when we look at something whether to invest money in to, you know, put an easement or conserve it, if someone has already gone through that process and it's already conserved, we don't need to do it (SEC 2013a, p. 56).

While it may be a common expedient in VIAs, it appears that using a hierarchy of designating agency to determine significance is inappropriate in New Hampshire.

3.4.1 Summary Observations on Cultural Value

There is no justification in Site 301.05 for the use of Cultural Value to evaluate scenic resources.

The effect of using Cultural Value as a filter to remove scenic resources with potential visibility of the Project from further analysis is considerable—the Methodology Flow Chart indicates that of 200 sites with potential screened visibility, "130 sites do not receive individual visual impact analysis because they have a low Cultural Value." The data provided through discovery and included in Appendix C identifies additional scenic resources beyond those initially identified in the NPT VIA, but the pattern of exclusion is similar: 680 scenic resources are listed, 282 are identified as having potential visibility, and 170 have a low Cultural Value rating.[1] Of these 170 scenic resources with potential screened visibility and low Cultural Value, DeWan & Associates evaluated the Visual Effect of the NPT for only four.

3.5 Visual Quality

The NPT VIA procedure introduces Visual Quality as part of determining Scenic Significance, which creates a hierarchy of scenic resources. Site 102.44 defines scenic quality as:

[1] This analysis uses the scenic resource assessment data in NPT Scenic Resource Spreadsheet.xlsx provided through informal discovery by DeWan & Associates. Provided in this report as an electronic file in Appendix C.

> a reasonable person's perception of the intrinsic beauty of landforms, water features, or vegetation in the landscape, as well as any visible human additions or alterations to the landscape.

The NPT VIA uses a Visual Quality Evaluation Chart to systematically rate the quality of these landscape elements. It is unclear when or where these ratings were made—in the field or in the office when DeWan & Associates established the Visual Effect ratings. The rating system is similar to that used by the Bureau of Land Management (1986a) with revisions thought to make it more appropriate for New Hampshire landscapes. In particular, the DeWan & Associates' revised form provides for human development having a greater positive or negative effect than BLM permits. DeWan & Associates retained the original BLM numerical ranges for high, medium and low visual quality.

Up to three landscape architects from DeWan & Associates completed the Visual Quality ratings for the 70 scenic resources with individual evaluations in the NPT VIA.[2] The reliability of these ratings is measured with the intraclass correlation coefficient (ICC) (Palmer and Hoffman 2001, see Appendix C), which measures the level of agreement among evaluators. The ICC ranges from 0.0 to 1.0, where ratings above 0.7 are good, and 0.9 would constitute a high professional standard. The form of ICC used here accounts for both the variation within a rater's judgements of all 70 sites and the variation among the three different raters. The ICC for the Total Visual Quality score is 0.879; and the ICC for the various component scores ranges from 0.537 to 0.918.

3.5.1 Summary Observations on Visual Quality

The Scenic Resource Spreadsheet (which includes the assessment of scenic resource from both the NPT VIA and Addendum 6) lists Visual Quality for 115 scenic resources—more than the 70 that were formally rated—from among the 282 identified as having potential visibility. It is unclear how DeWan & Associates evaluated Visual Quality for these additional 45 scenic resources. It is also unclear why DeWan & Associates did not evaluate Visual Quality for the additional 167 scenic resources with potential visibility. However, there appears to be high reliability on the ratings that were completed.

3.6 Scenic Significance

DeWan & Associates determines scenic significance by combining Cultural Value and Visual Quality into five levels: High, Medium-High, Medium, Low-Medium, and Low. The NPT VIA states that "scenic resources that receive at least a 'Medium' Scenic Significance rating are further analyzed to determine the level of visual change/impact the NPT project may have on the resource" (NPT VIA, p. M-10). However, in practice and as stated on the Methodology Flow Chart, DeWan & Associates does not evaluate the Visual Quality of many scenic resources with potential visibility if their Cultural Value is low. If a scenic resource has a high Visual Quality, it would have at least a medium Scenic Significance and therefore Visual Effect should be evaluated. It is necessary to evaluate both Visual Quality and Cultural Value to determine if Scenic Significance is above or below medium.

3.6.1 Summary Observations on Scenic Significance

There is no support in Site 301.05 for using either Cultural Value or Visual Quality to determine whether to evaluate the Visual Effect of the Project on a scenic resource with potential visibility. As a result, DeWan & Associates did not evaluate many scenic resources that they identified. In addition, the NPT VIA fails to

[2] This analysis uses the scenic resource assessment data in NPT RESOURCE EVALUATION CHARTS.xlsx provided through informal discovery by DeWan & Associates. Provided in this report as an electronic file in Appendix C.

follow its own process. DeWan & Associates uses Cultural Value to remove scenic resources from further consideration, without ever evaluating Visual Quality. Because of this, any impact to these resources was not reported to the SEC in the NPT VIA, though it is specifically required in Site 301.05(b)(6).

3.7 Visualizations

Photographic documentation and photosimulations play a central role in the conduct of a VIA. DeWan & Associates' field team may have taken occasional field notes, but the most detailed documentation of the visual condition was through georeferenced photographs. There are literally thousands of photographs at several hundred viewpoints.

The NPT VIA included photosimulations for 28 of the 70 KOP sites that achieved a scenic significance rating of at least medium using their methodology. DeWan & Associates prepared additional simulations as part of the February 2016 addendum. Their typical presentation includes panoramas for the existing and proposed conditions, below each of which is reported information about the photography (date, time, camera model, lens focal length, location, direction of view, distance to visible structures, and number of visible structures) and transmission line (structure types, range of structure height, ROW width). DeWan & Associates also provide a small site map, often a context photo of the viewpoint, and notes describing the viewpoint, and the caveat that the "simulation is based on preliminary design plans." DeWan & Associates provide no information about the panorama's angle of view or projection. In addition, they present a single-frame photograph of the existing condition and a single-frame photosimulation of the proposed condition with a note about the proper viewing distance.

The current best professional practice for creating a visual simulation registers a rendered 3D CAD model of the terrain, contextual elements and proposed project elements to the simulation photograph. This registration is based on metadata for the photograph—specifically the view location, azimuth, eye-level, angle of view and projection—and the 3D model replicates these attributes. The registration is fine-tuned using scaling elements temporarily placed in the 3D model that correspond to known contextual elements in the photograph, such as the location of poles, buildings, and trees. Photo-editing software is used to digitally repaint the image guided by the 3D model and typically using colors and textures obtained from photographs of conditions similar to that being proposed. Vegetation, structures or other landscape elements that will be removed or obscure the Project elements are edited appropriately to represent the proposed landscape condition. Rendering software is used to represent any final structures and apply sun and shadow settings that match the original photograph's time, date and location on the earth. The process entails a combination of the careful application of geometry, but also some artistic principles for a photosimulation to be both accurate and plausible.

The NPT VIA has used a similar process, but employed Google Earth Pro (GE) rather than professionally accepted software as required by Site 102.35 to register a KMZ file of the 3D model of the transmission line to the simulation photograph. The Applicant's 3D model includes an accurate representation of shield wires and conductors, but the actual transmission structures are only schematically represented. When the 3D model and photograph are registered, DeWan & Associates opens them both in Photoshop and then adds a model of each visible transmission structure rendered in SketchUp. The exact process by which this was accomplished is not exactly clear, but based on this review and DeWan & Associates' description of the process at the November 8, 2016 Aesthetics Technical Session, it appears that the size and location of the transmission structure is adjusted visually so it corresponds roughly to the information in the KMZ file. DeWan & Associates then edited the resulting images as mentioned above to remove or mask those portions of the Project that will be screened by terrain, vegetation, or other landscape elements.

The NPT VIA asserts that this approach provides "accurate representations of proposed future conditions" (NPT VIA, p. M-11). However, the developers of Google Earth do not provide sufficient information to evaluate the accuracy and precision of simulations created with this approach, for instance, the precision of the aerial and landform elevation data and the projection being used.

3.7.1 Selection of viewpoints.

The photographic inventory is a major source of information for preparing the VIA, providing the base photography for photosimulations and the context photos that are liberally used throughout the NPT VIA. Visualizations cannot be prepared if the photography does not exist. Therefore, the selection of particular viewpoints has a large influence on the results of the VIA. The NPT VIA states that:

> the evaluation of each scenic resource is based upon an assessment of views from key observation points (KOPs) to determine the visual effect of the project on the resource and the effect that it may have on public use. A KOP is a publicly accessible location in or adjacent to a scenic resource where a) the largest number of transmission structures or the maximum extent of the proposed transmission corridor would potentially be visible, and b) where the greatest amount of public use is expected. (NPT VIA, p. M-10)

This is not in agreement with Site 102.25, which defines a KOP as "a viewpoint that receives regular public use and from which the proposed facility would be prominently visible." In particular, a viewpoint where "the largest number of transmission structures or the maximum extent of the proposed transmission corridor would potentially be visible" is not the same as "from which the proposed facility would be prominently visible," and areas "where the greatest amount of public use is expected" is not the same as "regular public use". DeWan & Associates has defined KOPs in a manner that emphasizes midground views, where the greatest number of visible structures will be visible, and high traffic areas, such as parking lots, over more tranquil areas where people could be expected to contemplate the scenery.

3.7.1.1 Representative KOPs

Site 301.05(b)(7) requires that photosimulations be prepared from "representative key observation points." "Representative" suggests that the selection of a smaller set from the great number of KOPs to simulate requires a conscious process to represent a range of salient characteristics, such as distance from view, type of structures, and landscape character. The NPT VIA does not present a selection process to assure adequate representation of the conditions found over the total length of the Project.

3.7.1.2 Scenic Resources with "High" Visual Impacts

Site 301.05(b)(7) requires that photosimulations be prepared from "other scenic resources for which the potential visual impacts are characterized as "high" pursuant to (6) above." The NPT VIA does not evaluate the potential visual impact for a majority of scenic resources with visibility of the Project, since they are removed from consideration for factors not listed in Site 301.05(b)(6). The NPT VIA cannot fulfill this requirement because it does not conduct the necessary analysis.

3.7.1.3 Lack of Immediate Foreground Viewpoints

A Project structure will be most dominant to a viewer in its immediate vicinity; however, none of the KOPs that DeWan & Associates evaluated represent Project structures in the immediate foreground (0 to 300 feet) (NPT VIA 2016, p. M-4), such as where a road crosses under the conductors. The closest simulation location presented in the NPT VIA is one of the Pemigewasset River crossing in New Hampton, which is approximately 528 feet from the nearest structure (see Figure 5). An example of an immediate foreground viewpoint might be at a road or trail crossing, of which there are more than 120.

Figure 5. The NPT VIA simulation of the Pemigewasset River crossing

The lack of photosimulations with the NPT structures in the immediate foreground is in contrast to how DeWan & Associates (2010) evaluated the visual impacts of the Maine Power Reliability Program (MPRP), where much of the evaluation of aesthetic impacts was conducted in close proximity to proposed structures. In that study:

> The potential impacts on scenic resources and existing public scenic and aesthetic uses were evaluated within the identified project viewshed, which 98 percent of the time is situated within or immediately adjacent to existing transmission line corridor. (DeWan & Associates 2010, p. 6-6)

For the MPRP, DeWan & Associates photographed every affected road crossing and completed a Roadside Visual Buffer Form, which provided:

> …an objective methodology to identify situations where visual buffer treatments were both desirable and achievable at public viewing areas, (primarily road crossings). (DeWan & Associates 2010, Exhibit 6-2, p. 3)

> Over 300 road crossings were evaluated by TJD&A using the criteria in the Roadside Visual Buffer Report… (DeWan & Associates 2010, p. 6-11)

T. J. Boyle has prepared simulations of the NPT project as part of an evaluation of the NPT project for the Department of Energy as part of the VIA portion of an Environmental Impact Statement (DOE DEIS 2015). As part of the DOE DEIS, T. J. Boyle prepared several simulations at road crossings and trails in order to determine the potential scenic impact at those locations as well as to determine the potential effect to viewpoints that are in the immediate foreground of the Project. A comparative example of a T. J. Boyle simulation where a NPT structure is in the immediate foreground is provided in Figure 6.

Figure 6. The DOE DEIS (2015) simulation where the NPT crosses a road in Canterbury, NH.

Figure 4 helps to illustrate how distance from a structure may affect an analysis of Visual Effect when using a simulation. Additionally, Figure 2 illustrates why it is important to include a sampling of simulations of corridor crossings when evaluating Visual Effect on scenic resources as required by Site 301.05(b)(7), which should "illustrate the potential change in the landscape that would result from construction of the proposed facility and associated infrastructure." Additionally, there are more than 120 road crossings and trails that are crossed by the NPT corridor that are considered potential scenic resources as described by Site 102.45. Considering these definitions and requirements of a VIA by the SEC, a sampling of areas that are crossed by the proposed NPT or where NPT structures are in the viewer's immediate foreground must be included in the NPT VIA, particularly at scenic roads and trails, but also at any other scenic resources that may be crossed by the proposed NPT corridor.

Because the NPT VIA does not include such crossings, the KOP viewpoints used and analyzed in the NPT VIA do not adequately represent the range of "viewpoint[s] that receives regular public use and from which the proposed facility would be prominently visible," as defined by Site 102.25 and required in 301.05(b)(7). DeWan & Associates did not prepare simulations representing structures in the immediate foreground, even though such conditions exist from many locations in or along scenic resources that receive regular public use. This practice creates the misleading appearance that Project elements will always be farther away from viewers than may actually be the case.

3.7.1.4 Avoid Foreground Objects and Obstructions

The location of the selected viewpoint can have an effect on the evaluation of Visual Effect on a scenic resource, particularly if impact is evaluated in an office setting after, or in lieu of, visiting the resource and observing the worst case viewpoint. Site 102.25 requires that KOPs be viewpoints "from which the proposed facility would be prominently visible." Site 301.05(6)(c) requires the VIA to consider "the extent of the proposed facility, including all structures and disturbed areas, visible from the scenic resource." Site 301.05(8)(a) requires that photosimulations "shall avoid if feasible … foreground objects and obstructions".

Figures 7 through 10 on the following pages illustrate that DeWan & Associates did not always choose simulations from scenic resources to meet these requirements. As can be seen in these images, modest shifts in a viewpoint location or direction of view can be the difference between seeing a structure and screening it behind vegetation or other obstructions.

3.7.1.5 Photosimulations Must be in the APVI

Site 301.05(b)(8) requires that the photosimulations be "within the area of potential visual impact." However, several simulations are prepared from viewpoints without visibility, which clearly does not meet the standards for simulations or KOPs. These include

- Veterans Memorial Park, Hill (p. 4-37 and 9-159)
- Webster Lake–Lagace Beach, Franklin (p. 4-43 and 9-165)
- Catamount Pond–Bear Brook State Park, Allenstown (p. 6-17 and 9-189).

Figure 7a. The NPT VIA photosimulation from the Deerfield Historic District. From this location the proposed structure at right is heavily screened by intervening vegetation and any Visual Effect may be considered negligible.

Figure 7b. The DOE DEIS photosimulation from the Deerfield Historic District, standing at the Town Hall entrance. The proposed structure is clearly visible behind the church steeple when viewed from the Deerfield Town Hall even during leaf-on conditions.

Figure 8a. The NPT VIA photosimulation from Lagace Beach in Franklin, looking east. From this location the proposed structures are heavily screened by intervening vegetation.

Figure 8b. The DOE DEIS photosimulation from Lagace Beach in Franklin looking north. Though not prominently visible, the tops of three proposed galvanized structures would be visible above the trees just in front of the background mountain at center-right.

Figure 9a. The NPT VIA photosimulation from NH Route 145 in Clarksville, looking northwest. From this location the proposed structures and transition station are screened by intervening vegetation.

Figure 9b. The DOE DEIS photosimulation from NH Route 145 in Clarksville. The proposed galvanized structures and transition station are much closer and clearly visible.

Figure 10a. The NPT VIA photosimulation from Victor Head in Stark, looking south. From this location the proposed structures and transition station are partially screened by intervening vegetation.

Figure 10b. The DOE DEIS photosimulation from Victor Head in Stark, looking south. The proposed structures are clearly visible from an adjacent ledge that offers a better view of the lake and mountains beyond.

Summary Observations. The KOP viewpoints used in the NPT VIA do not appear to adequately represent the range of "viewpoint[s] that receives regular public use and from which the proposed facility would be prominently visible," as required by Site 102.25 and Site 301.05(b)(7). No simulations are prepared representing structures in the immediate foreground, even though such conditions exist from locations in scenic resources that receive regular public use. In the Aesthetics Technical Sessions held on October 6 and November 8, 2016, it was stated by DeWan & Associates that road crossings were not simulated because the structures would be visible for only a couple of seconds, while views in the middleground might be visible for 15 seconds. However, middleground views of structures are generally much less prominent than immediate foreground views, and length of view is not a consideration in the definition of a KOP. While duration of the view is a factor that Site 301.05(b)(6)(g) directs the VIA to consider, one or two seconds in a vehicle is sufficient to register the looming effect of structures in the immediate foreground, and bicycling, running and walking all present longer durations of visibility.

Visibility of the conductors will typically alert a driver approaching the NPT road crossing and it would be a normal impulse for the driver to turn and look at the structures, in particular if the structure is adjacent to the road or is prominently located. Residents living in the vicinity of the road crossings may repeat this pattern several times a day. Regular exposure can begin to negatively affect the sense of place that local residents or tourists may have of that area, and representations of these locations must be included in the VIA.

3.7.2 Photography

The NPT VIA indicates that "two types of photographs were taken during field visits: 1) context photographs, to illustrate site conditions, scenic views, vegetation patterns, structures, etc., and 2) photographs from KOPs to be used in photosimulations" (NPT VIA, p. M-10). Most photographs that DeWan & Associates used for the evaluated simulations were taken with a 24 megapixel Nikon D7100 camera equipped with a GPS unit that records the viewpoint's latitude and longitude as part of the digital photo metadata. DeWan & Associates appears to have used a zoom lens set to the "normal" 35mm focal length (50mm focal length equivalent on a full frame camera) for most of the photographs, with slight variation.

3.7.2.1 Resolution of Original Photography

The resolution of the visual simulations has a significant effect on their interpretation. Site 301.05(b)(8) requires that the "photographs in the simulations shall be taken at high resolution." In this review, we have interpreted that language to mean that the photograph's resolution should be at least as high as human visual acuity, which requires 4,800 horizontal pixels for a 40-degree horizontal angle of view. This is the minimum resolution because a camera sensor is sampling the view and the Nyquist-Shannon theorem implies that the sample must be twice the desired resolution, which would be 9,600 horizontal pixels. The Nikon D7100 camera used by DeWan & Associates for the NPT VIA is capable of taking photographs with 6,000 horizontal pixels, but they did not use that setting for most of their photographs.

Photosimulations were prepared for 28 of the 70 scenic resources evaluated for Visual Quality, Visual Effect, and the Extent, Nature and Duration of Public Use in the NPT VIA (2015). The original photographs used for the photosimulations were provided as part of the "informal" discovery process in September 2016 (DeWan & Associates 2016) provided by the Applicant. The camera, lens photo size, and simulation size for these 30 scenic resources are identified in Table 3. Most of the photographs used a moderate resolution setting of 4,496 horizontal pixels, which does not meet the minimum standard. However, in four cases (see red highlights in the "Photo Size" column in Table 3), the resolution of the base photograph is substantially below the high resolution standard presented in section 2.2.8 above, and well below the maximum resolution of the Nikon D7100 camera.

Table 3. Metadata for Simulation Photography from the NPT VIA

Resource	Town	Camera	Lens	Photo Size (pixels)	Simulation Size (pixels)	NPT VIA (page)
Catamount Hill Summit Trail	Allenstown	Nikon D7100	35mm	6000 x 4000	3801 x 2534	6-10
The Rocks Estate	Bethlehem	Nikon D7100	35mm	4496 x 3000	4496 x 3000	2-62
Slim Baker Area Recreation Area	Bristol	Nikon D7100	35mm	4496 x 3000	4496 x 3000	4-22
Connecticut River Scenic Byway/Moose Path Trail Scenic Byway	Clarksville	Nikon D7100	35mm	4496 x 3000	4496 x 3000	1-14
Turtle Pond	Concord	Nikon D7100	34mm	4496 x 3000	2306 x 1538	5-16
Deerfield Town Hall/Village	Deerfield	Canon Rebel XT	35mm	3456 x 2304	3585 x 2391.	6-26
Big Dummer Pond	Dummer	Nikon D7100	35mm	4496 x 3000	4496 x 3000	1-71
Pontook Reservoir & Androscoggin River	Dummer	Nikon D7100	35mm	2992 x 2000	2992 x 2000	1-76
Franklin Falls Reservoir and Dam	Franklin	Nikon D7100	35mm	4496 x 3000	4496 x 3000	4-46
Daniel Webster Farm	Franklin	Nikon D7100	35mm	4496 x 3000	1449 x 967	4-52
Webster Lake -- Beach	Franklin	Nikon D300	35mm	2144 x 1425	2144 x 1425	4-41
Veteran's Memorial at Hill Pond	Hill	Nikon D7100	35mm	4496 x 3000	4496 x 3000	4-36
Presidential Range Trail Scenic Byway / US Route 2 Overlook	Lancaster	Nikon D7100	35mm	4496 x 3000	4496 x 3000	2-10
Weeks State Park: East Overlook	Lancaster	Nikon D7100	38mm	6000 x 4000	4001 x 2667	2-20
Oakhill Fire Tower	Loudon	Nikon D7100	35mm	4496 x 3000	4496 x 3000	5-32
Milan Hill State Park and Fire Tower	Milan	Nikon D7100	35mm	6000 x 4000	6000 x 4000	1-114
Moose Path Scenic Byway	Millsfield	Nikon D7100	35mm	4496 x 3000	4496 x 3000	1-54
Millsfield Pond	Millsfield	Canon 6D FX	50mm	5472 x 3648	5472 x 3648	1-48
Signal Mountain Fire Tower	Millsfield	Canon 6D FX	50mm	5472 x 3648	4869 x 3246	1-60
Pemigewasset River (NewHampton/Bridgewater crossing)	New Hampton	Nikon D7100	35mm	4496 x 3000	4496 x 3000	4-14
North Mountain Trail - Overlook	Nottingham	Nikon D300	35mm	3216 x 2136	3216 x 2136	6-42
Woodland Heritage Trail	Stark	Nikon	35mm	4496 x	4496 x 3000 (N)	1-84

Scenic Byway (Rt. 110)		D7100		3000	2998 x 2000 (NW)	
Nash Stream Forest / Cohos Trail	Stark	Nikon D7100	35mm	6000 x 4000	3747 x 2491	1-96
Diamond Pond Road / Cohos Trail	Stewartstown	Nikon D7100	34mm	4496 x 3000	4496 x 3000	1-26
Little Diamond Pond	Stewartstown	Nikon D7100	35mm	4496 x 3000	4496 x 3000	1-34
Visitor Center and Recreation Building	Stewartstown	Nikon D7100	35mm	4496 x 3000	4496 x 3000	1-38
Mountain View Grand Resort	Whitefield	Nikon D7100	35mm	6000 x 4000	6000 x 4000	2-34
Burns Pond	Whitefield	Nikon D7100	35mm	4496 x 3000	2791 x 1858	2-42

3.7.2.2 Resolution of the Simulation Image

DeWan & Associates did not use the original photograph files to create the single-frame photosimulations. Instead, they created a panorama manually in Photoshop composed of several photographs, the Project was simulated on the panorama, and a portion of the panorama was clipped in an attempt to create the equivalent of a single-frame simulation. In many cases, the angle of view of this clipped photograph appears to be smaller than the original photographs used to create the panorama. This is illustrated in Figure 11, which shows the original photograph of the entrance to the Coleman State Park and the cropped area used for the photosimulation superimposed on the original. This practice is in direct contradiction to Site 301.05(8)(a) and (b).

The image resolution appears to have been reduced in the process of making several of the panoramic simulations. As a result, when the image used for the photosimulation was clipped from these panoramas, in eight cases the resolution is even less than the resolution of the original photograph (see red highlights in the "Simulation Size" column in Table 3).

Simulations at 12 of the 28 viewpoints are well below the "high" resolution required by Site 301.05(b)(8)(a). The effect of this lower resolution is to understate the clarity of the potential visual impacts.

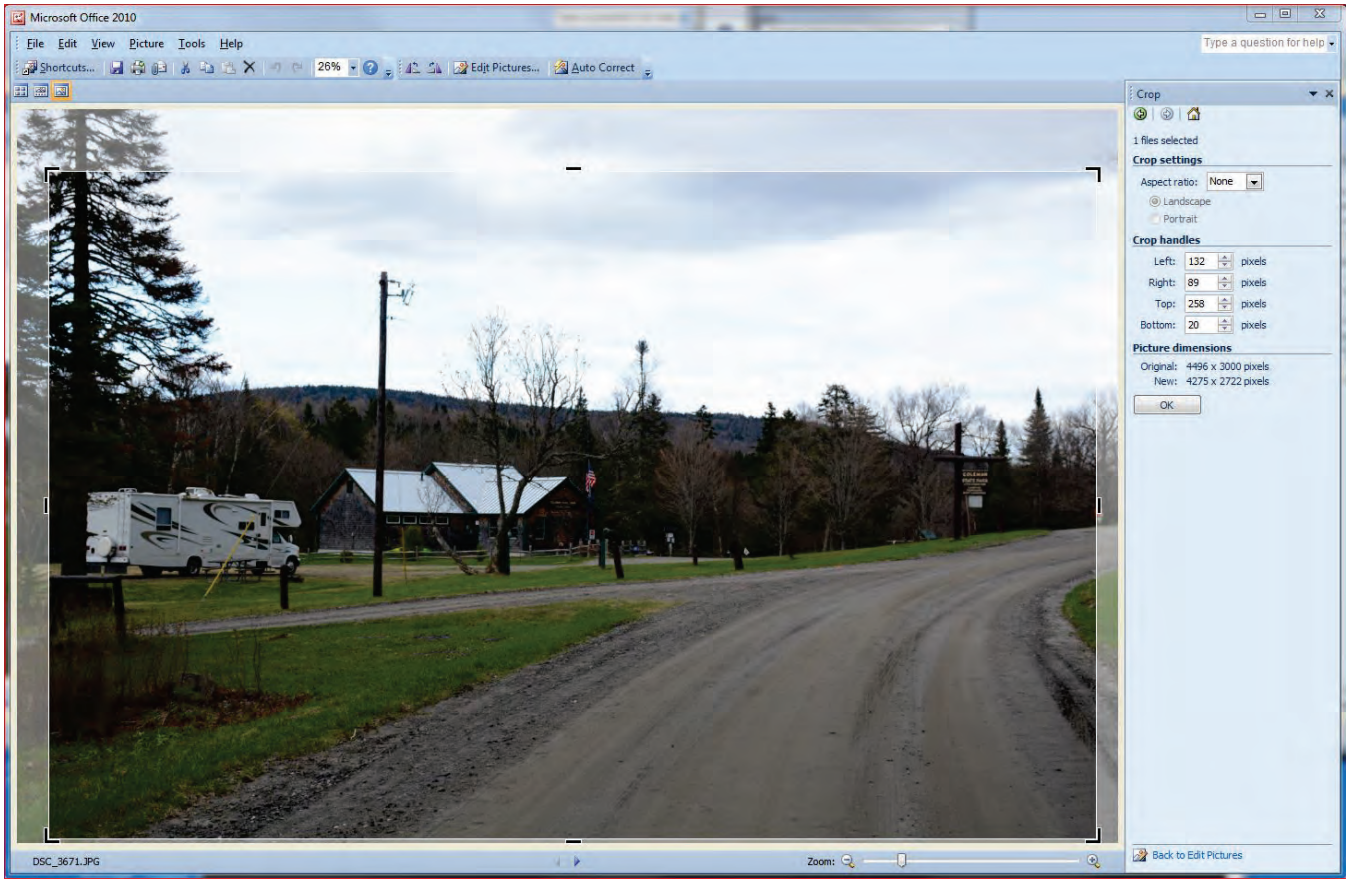


Figure 11. This screen shot shows the original 4,496-by-3,000-pixel photograph of the Coleman State Park entrance and the area cropped for the photosimulation presented in the NPT VIA on page 1-40.

3.7.2.3 Resolution of the Photosimulation PDF Files

The photosimulations are distributed primarily as part of the PDF version of the NPT VIA.[3] There are various ways in which the resolution of images can be inadvertently reduced in the process of making a PDF. Typically, JPEG compression is used on color images; there are several levels of compression and detail is lost in all of them (i.e., they are "lossy" methods of compression). The Applicant's PDF version of the NPT VIA as well as the subsequent revisions provided in September of 2016 are more compressed than the original simulated images, making the Project appear less clear than it will if constructed. The cumulative effect of this degradation in image quality is apparent in Figure 12, which shows the same selected area of The Rocks Estate photosimulation. The example selections are cropped and enlarged for illustrative purposes. All photosimulations provided with the NPT VIA are likely affected by this compression method.

[3] http://www.nhsec.nh.gov/projects/2015-06/2015-06_application.htm

Figure 12. Three cropped selections from the photosimulation at The Rocks Estate. The top simulation is from the NPT VIA (2015), the middle was provided in February 2016, and the bottom is from the data provided in discovery. The resolution of the top two images does not represent the higher quality of the original photograph, as is quite apparent if one focuses on the conductor wires. This practice is misleading and does not comply with Site 301.05(8)(b).

Summary Observations. Overall, the photography used to create the photosimulations evaluated in the NPT VIA does not meet the standard of "high resolution" required by Site 301.05(b)(8)(a), and described in section 2.2.8 above. This is the case, even though the camera equipment that was used is capable of high resolution photography. Similarly, the PDFs used to distribute the photosimulations do not meet the standard of "high resolution" required by Site 301.05(b)(8)(b). The effect of not meeting these requirements is to reduce and blur the apparent visual impact of the Project.

3.7.3 Photosimulation Construction

In order for photosimulations to "illustrate the potential change in the landscape that would result from construction of the proposed facility and associated infrastructure," high accuracy is needed to ensure that each photosimulation plausibly represents the potential change from that particular location, and to instill confidence that the proposed project is being fairly depicted.

3.7.3.1 Registration of NPT 3D Model with the Photography

We have reviewed DeWan & Associates' use of Google Earth Pro as software for 3D modeling and photo registration to determine whether there are significant accuracy issues. The process that DeWan & Associates used is outlined below:

- A 3-D model is created by the project engineers using PLS-CADD transmission design software. This model depicts an accurate representation of conductors and simple stick-figure representations of the transmission structures and 3D insulators. The structures are all to scale and accurately located at a surveyed base elevation. This model is exported as a KMZ file and imported into Google Earth Pro.
- When the NPT KMZ is displayed in Google Earth Pro, there is a good sense of how the project is located in the landscape; what is usually lacking in Google Earth Pro is how the structures may be screened by surrounding trees or other land cover. DeWan & Associates mimics this effect with 42-foot high "ribbons" set on the ground in forested areas, and which are evident in the discovery data provided by NPT. The surrounding forest ribbons are thus very schematic, and do not seem to be based on information that could have been gathered by the DSM information used in the viewshed analysis.
- Google Earth Pro allows for adding a photo as a fixed element in its digital landscape. Digital photographs taken from the field are added to the Google Earth Pro landscape in a location that is very similar to the original location where the photograph was taken. The photograph's transparency is set so that features in Google Earth Pro (i.e., the ridgeline) and the KMZ (i.e., existing poles) can be seen through the photograph. Other photo attributes can be specified, such as eye-level, viewpoint location and orientation, and image tilt, roll and field of view.
- The Google Earth Pro viewpoint and photo are adjusted until the two match each other. This registration process requires both images to share visible location control points, such as existing poles, building corners or landforms. It may be necessary to create KMZ forms to locate and represent these control points in the view. Though not as accurate, identifiable trees, the horizon line, and perhaps a shore line can be created based on aerial photography within Google Earth Pro and used for this registration process. Proper horizontal and vertical registration usually requires at least three good control points within the view.
- Because Google Earth Pro data are generalized with some errors, there will normally be some deviation from an absolute match during the alignment process. For example, Google Earth does not typically show the height of land cover, the photograph and Google Earth Pro have different

> projections, and the resolution of background mountains in Google Earth is very coarse. Once the photograph and Google Earth Pro are registered as best they can be, the Project KMZ is turned on, and the combined overlay image is exported to an external image file to serve as a guide for creating the simulated Project using SketchUp and Photoshop software.

Google's mapping products, including Google Earth, are among the most widely used software available. Google offers these products for free, which has led to a burst of experimentation and innovation. DeWan & Associates' novel use of Google Earth to create photosimulations is just one of many such examples. However, the resolution and accuracy of the data are not intended for scientific or professional applications, such as surveying, modeling wireless communication coverage, or perhaps visual simulations. Google Earth has not made available technical specifications for its product. The Google blogosphere has many questions about accuracy and reliability. For instance, Google Earth Blog writer Timothy Whitehead (2016) replied to a query about accuracy of Google Earth saying that:

> It's complicated. Google Earth uses the World Geodetic System of 1984 (WGS84) datum the same as GPS. The accuracy of altitude data varies considerably by location. The alignment of imagery is also variable often being out of alignment by 30 meters or more. (see Appendix C, Google Earth accuracy.pdf)

While we did not review all of the NPT VIA photosimulations for errors that may arise using the DeWan & Associates process outlined above, we compared several locations to the DOE DEIS photosimulations that T. J. Boyle prepared using more traditional professional software that can utilize more accurate elevation data for registering base photographs, as well as incorporate a more accurate 3D model of the proposed structures. These locations were chosen primarily because both DeWan & Associates and T. J. Boyle prepared simulations using a very similar underlying photograph location. While reviewing these photosimulations, we noticed deviations that possibly arise because of the use of Google Earth Pro to register the NPT facility to the base photography.

3.7.3.2 Determining Whether Structures Are Screened

As stated previously, the NPT VIA photosimulation at Lagace Beach in Franklin is not in the direction of project visibility. However, a photograph looking in the direction of visibility was taken by DeWan & Associates and included in the Lagace Beach KMZ file that was provided during discovery (Figure 13). The NPT VIA explicitly notes that NPT structures would be visible from the beach in three locations (NPT VIA at 4-42, photos 3, 5 and 6). However, the photosimulation only depicts a view in the direction where structures would not be visible, with a view description caption that reads "The proposed structures are behind trees in the foreground and will not be visible from this location" (NPT VIA at 4-43). Without reading the text in the NPT VIA and only viewing the information provided in the photosimulation, one is led to believe that there will be no visibility from Lagace Beach.

Figure 13. An exported image from the Google Earth Pro KMZ file for Lagace Beach provided during discovery, showing that simulating the project from the beach was considered but not carried out.

3.7.3.3 Using Correct Structure Type

Because both the NPT VIA and DOE DEIS include simulations from similar locations at Turtle Pond (aka Turtletown Pond) in Concord, we reviewed this simulation for accuracy. We used a simple comparison overlay to determine that one of the Turtle Pond simulations provided with the NPT VIA shows an incorrect structure. The KMZ 3D model in Google Earth Pro appears to depict a more typical H-frame, which was the structure used in the NPT VIA simulation (Figure 14). However, review of the actual structure that is proposed reveals a 3-pole dead-end configuration (DOE DEIS VIS-12) that has somewhat different visual attributes, including the use of three free-standing tubular poles rather than two poles connected with a cross-bar, as well as additional insulating strings (Figure 15). Whether this mistake was made because the Google Earth KMZ does not include structure information or the structure types were not carefully reviewed is unknown. Nonetheless, the NPT VIA simulation does not accurately depict the proposed project at this location, potentially affecting the assessment of Visual Effect.

Figure 14. Left: A cropped and enlarged image from Google Earth Pro depicting the proposed three-pole structure. The KMZ used in Google Earth Pro does not include obvious information identifying this as a three-pole structure. Right: The photosimulation provided in the NPT VIA. The source for the weathering steel material used in the DeWan & Associates simulation is unknown.

Figure 15. A cropped and enlarged image depicting the proposed three-pole structure behind the existing wooden 115-kV structure and next to the proposed weathering steel 115-kV structure. Variation in time of year, weather and sunlight affect the overall difference in color between this simulation and that shown in Figure 14. An image of Corten steel after 5-years of weathering[4] was used for the weathering steel material.

We also reviewed the NPT VIA photosimulation from the Weeks State Park – East Overlook for accuracy of the structure type. Two types of HVDC structures are proposed in the landscape southeast of Weeks State Park, and because the east overlook is at an elevated location and a simulation to the southeast was prepared in the NPT VIA, both structure types should be visible. Instead of both structure types being visible, the NPT VIA simulated only weathering steel structures (see Figure 16).

[4] Nippon Steel & Sumitomo Metal - https://www.nssmc.com/product/catalog_download/pdf/A006en.pdf

Figure 16. A cropped and enlarged portion of the Weeks State Park – East Overlook facing southeast showing that DeWan & Associates simulated only weathering steel tubular structures. Most of the HVDC structures visible in this simulation should be galvanized steel lattice structures.

The information provided by the NPT to the DOE indicates that these structures should have been simulated as galvanized steel lattice rather than weathering steel monopoles. This error could potentially undermine the assessment of Visual Effect, and in direct contradiction to the explanation of why the overall Visual Effect to Weeks State Park is low in the NPT VIA:

> The use of weathering steel monopole structures will minimize the contrast in color and form and make them relatively inconspicuous to the casual observer. (NPT VIA at 2-21)

3.7.3.4 Proper Structure Location

Similar to Turtle Pond, both of the NPT VIA and DOE DEIS include simulations from similar locations at Little Diamond Pond in Stewartstown. Again, we used a simple comparison overlay to determine that the structures visible on the ridgeline are not properly aligned. The KMZ 3D model in Google Earth Pro clearly depicts the proposed structures across the ridgeline and transitioning in front of the ridgeline where the right of way clearing would be visible (Figure 17). When this image was overlaid on the panorama in both the leaf-on and leaf-off conditions, the alignment from the KMZ file does not match the structures that were placed in the image (Figure 18), and the final simulated conditions do not depict the effects of proposed right-of-way clearing (Figure 19).

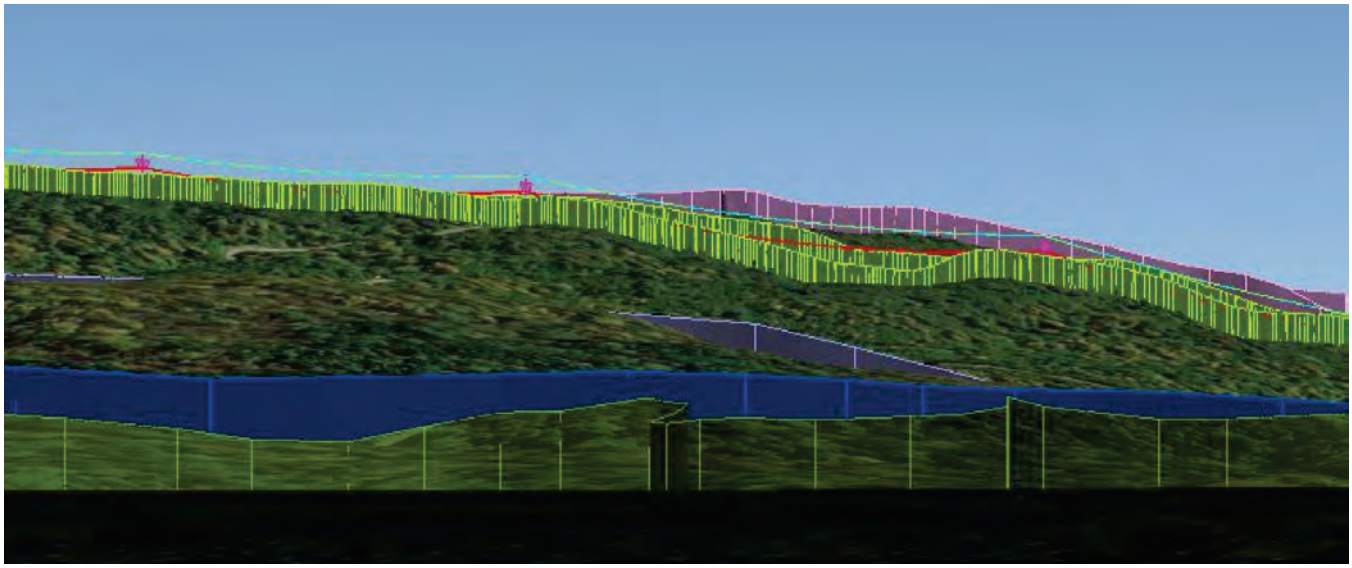


Figure 17. A cropped and enlarged image from the Google Earth Pro KMZ file depicting the proposed structures (dark pink objects) as they ascend the ridgeline as seen from the north side of Little Diamond Pond. The pink ribbon represents the background forest cover at the top of the ridge; the light green ribbons represent the tree line at the edge of clearing on either side of the proposed right-of-way clearing, and the red and cyan lines represent the conductors and shield wires. The ribbons in this model indicate that the structure at far right would be backgrounded by the ridgeline, and that new right-of-way clearing would be visible at center-right under the red conductor line.

Figure 18. A cropped and enlarged image from the Photoshop panorama file used to create the photosimulation depicting the KMZ image overlaid on the panorama image. The structures are not placed to exactly match the heights as indicated by the KMZ image export.

Figure 19. A cropped and enlarged image from the final simulation image. The structures are not depicted as shown in the KMZ image, and the effects of right-of-way clearing visible in the KMZ image are not simulated.

Because the NPT VIA simulation and the DOE DEIS simulation are from nearly identical locations, we created an overlay of the two simulations to compare the accuracy of the DeWan & Associates process (Figure 20). While there is some difference between the base photos, a careful review of the structure locations shows that the NPT VIA structures are spaced farther apart than the DOE DEIS structures, and are not placed at the correct elevation.

Figure 20 A cropped and enlarged image overlay of the NPT VIA and DOE DEIS photosimulations, where the taller structures are from the NPT VIA simulation. The structures in the NPT VIA simulation do not match the spacing of the structures in the DOE DEIS simulation and appear to be spaced much farther apart. Because the photos locations are so close and from a similar perspective, this discrepancy cannot be adequately explained by variation in the underlying photo locations.

A review of the various KMZ files provided in the discovery data reveals that DeWan & Associates created the field of view setting for all of the photo overlays in Google Earth Pro using a horizontal field of view of 35°. It is our understanding that a Nikon D7100 camera and lens set at a 35mm focal length would have a horizontal field of view of 37.26°. This discrepancy would potentially explain why structures are spaced too far apart in the NPT VIA photosimulation from Little Diamond Pond. If so, then the horizontal field of

view settings for all photosimulations provided in the NPT VIA are likely incorrect. It is possible but unlikely that the structure spacing from the DOE DEIS are incorrect since more accurate elevation data such as the DSM were used by T. J. Boyle to align the photo to the existing landform and vegetation. We checked other settings for both of the Little Diamond Pond photosimulations without identifying any issues.

The discrepancy in structure spacing could also arise from the method for creating the panoramas on which the simulation is rendered, as described at the November 8, 2016 Aesthetics Technical Session. The method DeWan & Associates used involved hand-stitching the images rather than using professional panorama software to correct for perspective and differences in the constituent images. Although the effects would likely be minor in this instance, errors in creating the panorama would potentially cause the landform to be incorrect, rather than the KMZ file.

3.7.3.5 Structure Rendering and Orientation

Lastly, we conducted a review of the structure placement within the simulations. As stated in the NPT VIA, "The Google Earth Pro photo overlay and the SketchUp model of each structure are aligned over the existing conditions photograph" (NPT VIA at M-11). This apparently involves creating a structure in SketchUp using the original structure designs prepared by structural engineers, applying materials and colors, rotating the structure to the desired perspective and then exporting an image for overlaying on the simulation. The rendered SketchUp models were not saved and therefore could not be provided as part of discovery. However, their placement is documented in each simulation's Photoshop file.

We randomly reviewed the Route 110 and Big Dummer Pond photosimulations to determine the accuracy of placing individual structures in the photosimulation using the method described above. By turning on the KMZ information in the photosimulation files, it becomes evident that some individual structures have been oriented in a way that reduces the profile of the structure (see Figure 21).

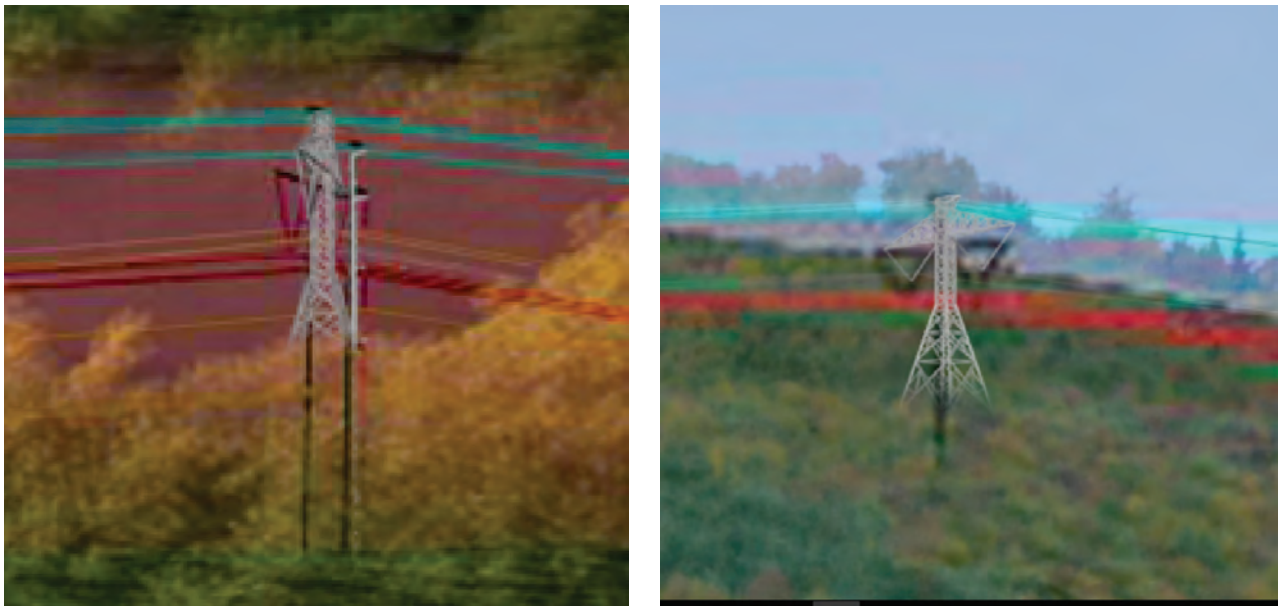


Figure 21. A cropped and enlarged image overlay of the NPT VIA photosimulations at Route 110 in Stark (left) and Big Dummer Pond (right). These structures do not match the orientation of the underlying KMZ file. In both cases, DeWan & Associates oriented the structures in a way that reduces their profile within the simulation, potentially affecting the evaluation of Visual Effect, as well as underrepresenting the aesthetic impacts of the proposed Project.

Additionally, materials for the insulators and shadow settings do not appear to have been correctly depicted. It is our understanding that the insulators would either be dark gray in color or glass. The insulators visible

in the above excerpts are very light gray in color, and may not have had any color applied other than the gray of the galvanized steel. Shadow settings are not clearly detectible at either location, though this could be due to the specific sunlight settings within each view. Without reviewing the SketchUp files used to create the structure images, it is unclear if proper light and shadow settings were used based on the time, day and month that the original photographic image was taken.

3.7.4 Summary Observations on Visualizations

DeWan & Associates did have a process to select "representative" KOPs for simulation. As a result, there are common types of views where the Project would be prominent that are not simulated. The most important of these are where a Project would be in the immediate foreground, such as at a road crossing. The visual impact to some scenic resources and the overall visual impact of the Project is significantly understated by not representing these worst-case views.

DeWan & Associates did not use the original single-frame photographs as the base-photograph for the simulations evaluated as part of the NPT VIA (2015). Instead, these simulations all began as part of a panorama that was manually stitched from several original photographs in Photoshop. At the November 8, 2016 Aesthetics Technical Session, DeWan & Associates were very clear that they assembled the panoramas manually and did not use Photoshop's Photomerge tool, which among other features offers projection options to correct for distortion. The panoramas created by DeWan & Associates are not projected, and their resolution is often lower than the original photographs, which themselves do not always represent "high resolution" photography as required by Site 301.05(b)(8)(a).

The photograph that DeWan & Associates used to represent the existing condition is clipped from the panorama and sometimes covers a smaller area than an original single-frame photograph taken with a "normal" lens. The image maintains the original aspect ratio, however at 11 of the KOP viewpoints the resolution is reduced below 4,496-by-3,000 pixels, sometimes substantially so (e.g., 1,449-by-967 at the Daniel Webster Farm) (see Table 3). The effect of such low resolution is that the photographs do not represent the details that would be clearly apparent to someone onsite. For instance, insulators and lattice structure members are less crisp and the colors muddier than they would appear onsite, or if the simulation used an appropriately high resolution (e.g., see Figure 12).

In many cases, the process of clipping the base-photograph and simulation from the panorama results in a single-frame simulation that no longer represents a photo taken with a "normal" lens, as required by Site 301.05(b)(8)(a). Because the panorama is not projected, and the base-photograph is smaller than the original photography, the field of view cannot be determined. Additionally, the preparation of the final simulation PDF packages was inadequate to represent "high resolution" photography as required.

The process of using trial and error to visually orient a structure in SketchUp until it "looks right" does not meet professional standards, and results in errors in the photosimulations, as described in 3.7.3.5 above. The generally accepted professional standard is to register a photograph to a 3-D model of a project in CAD that includes rendered structures, which provides for more accurate positioning and scaling. Additionally, it is unclear how DeWan & Associates applies sunlight and shadow settings to the structures prior to or after placing them in the Photoshop file. Such files were not provided with the requested data because they were not saved, and the proper settings for light and shading to match the underlying photograph were unable to be confirmed or repeated as part of this analysis.

In the process of conducting our review, we have detected errors in the selection of viewpoints (lack of immediate foreground views), failure to use the most prominent view at a KOP location (see Figures 7 through 8 showing Deerfield Historic District, Lagace Beach, NH Route 145 and Victor Head), low resolution original photographs and simulations (see Table 3), cropping of the simulations (see Figure 9

from Coleman State Park), resolution of the photosimulation PDF files provided with the NPT VIA do not comply with Site 301.05(8)(b) (see Figure 12), depicting a view from a viewpoint that does not have visibility rather than a view that does (Figure 13, Lagace Beach), incorrect structure depiction (e.g., Turtle Pond, Weeks State Park, Little Diamond Pond, and Route 110; see Figures 14 through 20), and errors in structure orientation and structure material representation (e.g., Route 110 and Big Dummer Pond; see Figure 21). These errors involve important elements for simulations of this project. Confidence in the accuracy of photosimulations provided by the applicant is imperative both for the results of the evaluation of Visual Effect as well as for correctly representing the proposed conditions to the SEC and the general public. Regardless of cause, the methods used to create these photosimulations appear to have resulted in a series of errors attributable to both people and software, that undermine the quality and credibility of all of the NPT VIA photosimulations. The effect of low resolution photography and simulations, and PDF compression is particularly misleading, since it represents the Project's appearance as being less clear and with less contrast than required by Site 301.05(b)(8).

3.8 Visual Effect

The core procedure of the visual impact assessment in the NPT VIA, is completion of the Visual Effect Rating Form, (p. M-14). During the November 8 Aesthetics Technical Session, DeWan & Associates indicated that the source of the form was on Foundations for Visual Project Analysis, (Smardon, et al. 1982., p. 219), which is similar to the form used by BLM (1984b) to evaluate visual contrasts. The Form evaluates Landscape Compatibility by rating the color, form, line and texture contrasts between Project's proposed facilities and the existing landscape as seen from the KOP viewpoint. It also evaluates the project's relative size and extent in the context of the surrounding landscape as Scale Contrast. Finally, Spatial Dominance in the Form evaluates the position of the project in the landscape and its visibility; specifically, by considering perceived dominance, distance zone, horizontal field of view, and interference with the existing view. Each of these factors is explained in some detail (p. M-13), and the Form includes a description of each rating level.

The use of this sort of rating system is a well-established professional practice, and it seems to respond to five of the eight factors which the VIA is directed to consider by Site 301.05(b)(6), including:

c. The extent of the proposed facility, including all structures and disturbed areas, visible from the scenic resource;

d. The distance of the proposed facility from the scenic resource;

e. The horizontal breadth or visual arc of the visible elements of the proposed facility;

f. The scale, elevation, and nature of the proposed facility relative to surrounding topography and existing structures;

h. The presence of intervening topography between the scenic resource and elements of the proposed facility;

Up to three landscape architects from DeWan & Associates completed the Visual Effect ratings for 70 KOP/scenic resources evaluated the NPT VIA.[5] The Methodology Flow Chart indicates that the Visual Effect "evaluation considers methods of visual avoidance, minimization, and mitigation." During the

[5] This analysis uses the scenic resource assessment data in NPT RESOURCE EVALUATION CHARTS.xlsx provided through discovery provided by DeWan & Associates. Provided in this report as an electronic file in Appendix C.

September 30, 2016 Aesthetics Technical Session, DeWan indicated that they did not find any places where planting was necessary to avoid unreasonable visual impacts. It is assumed that the Visual Effects ratings are based on the project as represented in the photosimulations, which do not include planting mitigation.

The reliability of these ratings is measured with the intraclass correlation coefficient (ICC) (Palmer and Hoffman 2001). It ranges from 0.0 to 1.0, where ratings above 0.7 are good, and above 0.9 would constitute a high professional standard. The form of the ICC used here accounts for both the variation within an individual rater's judgements and the variation among the three different raters (i.e., ICC (2,3)). Reliability for the Total Visual Effect score is 0.836; and for the various component scores ranges from 0.477 to 0.851.

The relationship between the Visual Effect for a particular KOP and the Visual Effect for the scenic resource it represents is unclear. The NPT VIA evaluates 70 KOPs, though three of these are not KOP viewpoints but large scenic resources that contain two or more KOPs with simulations.

- Bear Brook State Park includes one evaluated KOP with and three without a simulation.
- Coleman State Park includes three evaluated KOPs with simulations.
- Pawtuckaway State Park includes one evaluated KOP with and one without a simulation.

It is unclear how the Visual Effect rating is determined for these and other scenic resources. In the Aesthetics Technical Session on November 8, 2016, DeWan & Associates indicated that there is a Visual Effect at the point of a KOP, but they indicated that "it is necessary to understand what else is happening in the state park," and they "make an evaluation to the resource as a whole." This leads to conclusions in the NPT VIA such as:

> The view of the transmission structures represents a very small percentage of the 98-mile length of the byway. Views of the structures will be seen over approximately 2 miles of the Byway, which is less than 2% of the length of Moose Path Trail.

This thinking is that the "solution for pollution is dilution" which does nothing to correct the unreasonable visual impact at particular viewpoints. This is not the approach required by Site 301.05(b)(10). It is the Applicants' responsibility to describe "measures planned to avoid, minimize, or mitigate potential adverse effects … and the alternative measures considered but rejected." If reasonable and practice steps are not taken to avoid, minimize, or mitigate adverse effects, then the Applicants have not fulfilled their responsibility and the proposal would be unreasonable.

Summary Observations. The Scenic Resource Spreadsheet lists Visual Effect ratings for 70 KOPs that were formally rated from among the 282 scenic resources identified as having potential visibility. The use of Scenic Significance, which is not identified in Site 301.05 as a factor to be considered by the VIA, is the primary reason Visual Effect was not evaluated for the additional 212 scenic resources with potential visibility. In addition, the NPT VIA did not consider any of the numerous locations where structures are fully visible in the immediate foreground, which many would consider the views with the highest visual impact.

3.9 Extent, Nature and Duration

The NPT VIA identifies:

> The second major component in determining overall visual impact is an understanding of the people who use the resource: their expectations in visiting the site, their use patterns, and the effect that the NPT

> project would have on their future use and enjoyment of the scenic resource. (emphasis added) (NPT VIA, p. M-15)

While Site 301.05(b)(6)(a) requires consideration of "the expectations of the typical view," this consideration is briefly mentioned in the NPT VIA (p. M-15), but it does not seem to be part of the actual analysis.

The NPT VIA uses the Extent, Nature and Duration of Public Uses Form to consider this factor as a component in its determination of Viewer Effect (NPT VIA, p. M-15). Extent of Use and Nature of Activity concern how the public uses the area, but the third component in the Form is changed to Duration of View, not Use. Three components are described, each with four possible values that are added together for an overall score between 0 and 9. There is no precedent cited for use of this form; the criteria thresholds do not appear to be grounded in research or previously used methods.

Site 301.14(a)(3) directs the SEC to consider "the extent, nature, and duration of public uses of affected scenic resources" … "in determining whether a proposed energy facility will have an unreasonable adverse effect on aesthetics." However, Site 301.05(b)(6)(g) does concern "the duration and direction of the typical view of elements of the proposed facility."

The NPT VIA clearly states that "this part of the evaluation looks at current use patterns associated with the scenic resources," though at the September 30, 2016 Aesthetic Technical Session, DeWan & Associates indicated very little data was found about any scenic resource users; the question of user data was also raised and similar answers given at the October 6 and November 8, 2016 Aesthetics Technical Session. DeWan & Associates made no attempt to contact the NH Department of Resources and Economic Development's Division of Parks and Recreation, or the Division of Travel and Tourism Development for information. DeWan & Associates also made no attempt to systematically interview users of scenic resources. Other than notes made during a site visit, the only available information comes from the sources identified for each scenic resource, though these are normally database lists or Municipal Plans that do not contain information about users. When questioned on September 30, DeWan & Associates asserted that the Applicant is responsible only for "providing impressions" about the extent, nature and duration of use, and they thought this was sufficient.

The information about public use comes primarily from impressions obtained during the site visit and notes were made from observations such as the wear and tear on facilities, and size of parking lots. Up to three landscape architects from DeWan & Associates completed the Visual Effect ratings, one of whom did not participate in the fieldwork. However, at the November 8, 2016 Aesthetics Technical Session, Mr. DeWan indicated that he made the final determination and the ratings only provided him some guidance.

Summary Observations. In the Form, the rating is for Duration of View, not for Duration of Use. This is not always made clear in the text, and the distinction is meaningful—duration of view means how long a viewer typically is exposed to the view and Site 301.05(b)(6)(g) requires VIAs to consider the duration of such view; duration of use means how long do people stay at the scenic resource and Site 301.14(a)(3) requires the SEC to consider duration of use.

DeWan & Associates based its judgements about the Extent, Nature and Duration of Public Use on very limited information; primarily "impressions" of the scenic resource gained during a brief site visit. There was no attempt to gather information about use at each scenic resource, systematically interview users of specific scenic resources or more generally to interview the public about their use of scenic resources.

3.10 Continued Use and Enjoyment

Site 301.05(b)(6)(b) requires the VIA to consider "the effect on future use and enjoyment of the scenic resource." The NPT VIA states that:

> A rating of high, medium, or low effect on continuous use and enjoyment is based on our experience with energy projects in New England, and the limited research on the effects of certain types of energy facilities and other changes to the visual landscape on the use and enjoyment of scenic resources. (NPT VIA, p. M-15)

There are no citations in the NPT VIA for this "limited research" and none was provided to us in discovery. DeWan & Associates has prepared VIAs for a number of wind energy projects in Maine that involved user intercept surveys. However, the surveys were conducted by a marketing research firm, so clearly DeWan & Associates understand the importance of these data and know how to get them. It is not clear why they did not do so in this case.

The NPT VIA presents no method for evaluating Continued Use and Enjoyment. We assume that they based Continued Use and Enjoyment on "impressions" obtained from the site visit.

Summary Observations. The NPT VIA found only none or low effect on Continued Use and Enjoyment for all scenic resources. The NPT VIA presents no basis for the Continued Use and Enjoyment rating. Chapter 4 includes a review of published research from New England about continued use and enjoyment, and presents the results from analyzing data from two additional studies.

3.11 Overall Visual Impact

DeWan & Associates' Overall Visual Impact Form describes how to combine the ratings for (1) Visual Effect, (2) Extent, Nature & Duration and (3) Continued Use & Enjoyment into five levels: High, Medium-High, Medium, Low-Medium, and Low (NPT VIA, p. M-15).

The NPT VIA does not state the principles or logic used for this three-way combination. The NPT VIA's Methodology Flow Chart suggests that Extent, Nature & Duration and Continued Use & Enjoyment are combined first, and then the result is combined with Visual Effect. However, this does not seem to be the case. Similarly, simply averaging the three ratings does not seem to provide the Overall Visual Impact either. The example in Table 4 shows two sets of ratings used to determine the overall rating. Visual Effect remains high for both, and the ratings for Extent, Nature & Duration and Continued Use & Enjoyment are swapped. If the three factors are equally weighted, the Overall Visual Impact should be the same (i.e., 2.0), and if Viewer Effect is calculated first, and then averaged with Visual Effect, the result should still be the same (i.e., 2.25).

Table 4. Examples from the Overall Visual Impact Rating Form

Visual Effect	Extent, Nature & Duration	Continued Use & Enjoyment	Overall Visual Impact
High (3)	Low (1)	Medium (2)	Medium-High
High (3)	Medium (2)	Low (1)	Medium

Summary Observations. The principle to combine the three factors is unclear and there appear to be Overall Visual Impact Ratings that cannot be explained or reproduced.

3.12 Disposition of Scenic Resources

There are some vagaries in the NPT VIA's record keeping associated with scenic resources and their evaluation. However, through an informal data request the *NPT Scenic Resource Spreadsheet* was provided as the most comprehensive description of how DeWan & Associates evaluated the scenic resources.

The NPT VIA identifies 680 scenic resources, of which 282 are determined to have potential visibility. Of these, the 102 scenic resources identified by the NPT VIA as having a Scenic Significance of medium or higher should receive an individual Visual Impact Assessment that is based on three separate ratings: (1) Visual Effect, (2) Extent, Nature and Duration of Public Use, and (3) Current Use and Enjoyment. All three ratings are necessary to determine the Overall Visual Impact.

In the *NPT Scenic Resource Spreadsheet* there are 102 scenic resources that have a Scenic Significance of medium or higher—therefore all of these scenic resources must evaluated for Visual Effect, Extent, Nature and Duration of Public Use, and Continued Use and Enjoyment. However, 38 scenic resources do not have a Visual Effect rating, 42 do not have an Extent, Nature and Duration of Public Use rating, and 42 do not have a Continued Use and Enjoyment rating. The NPT VIA evaluation process was not completed as specified for a large number of scenic resources.

There is an Overall Visual Impact rating for 69 scenic resources. Of these, Visual Effect is not evaluated for 3 scenic resources, Extent, Nature and Duration of Public Use is not evaluated for 3 scenic resources, and Continued Use and Enjoyment is not evaluated for 8 scenic resources. Overall Visual Impact was determined for a number of scenic resources without completing the NPT VIA evaluation process.

The following summarizes the number of scenic resources that the NPT VIA identified at each step of the Methodology Flow Chart.

Step	Number of Scenic Resources
1. Scenic Resources Identified	680
2. Scenic Resources with Possible Visibility	282
Scenic Resources with Possible Visibility evaluated for:	
3. Cultural Value	282
3. Visual Quality	115
3. Scenic Significance of medium or higher	102
Scenic Resources with Scenic Significance of medium or higher evaluated for:	
4. Visual Effect	64
4. Extent, Nature and Duration of Public Use	60
4. Continued Use and Enjoyment	60
4. All three components of Visual Impact	54
5. Scenic Resources with a determination of Overall Visual Impact Assessment	69

The concern is that many scenic resources that must be evaluated for potential visual impacts are not investigated because of criteria not specified by Site 301.05(b)(6). In addition, the NPT VIA evaluation

process is not being completed for many scenic resources that have a Scenic Significance of medium or higher.

1. **Scenic resource identification**—several types of scenic resources were not investigated or identification was limited in other ways.
2. **Possible visibility**—the required terrain visibility is not considered, and the screened visibility may indicate more screening that actually exists.
3. **Scenic Significance**— Visual Quality is not evaluated for more than half of the scenic resources with potential visibility. Scenic Significance cannot be determined without knowing Visual Quality.
4. **Visual Impact**—three component ratings are needed to determine Visual Impact and they are determined for only half of the scenic resources identified that should be evaluated.
5. **Overall Visual Impact rating** is determined for more scenic resources than have been evaluated for Visual Impact.

3.13 Mitigation

Site 301.05(a) requires that "each application shall include a visual impact assessment of the proposed energy facility, prepared in a manner consistent with generally accepted professional standards…regarding the effects, and plans for avoiding, minimizing, or mitigating potential adverse effects of, the proposed facility on aesthetics." Site 301.05(b)(10) requires the NPT VIA to include "a description of the measures planned to avoid, minimize, or mitigate potential adverse effects of the proposed facility…and the alternative measures considered but rejected by the applicant." In each of these Rule requirements, three categories are presented to address potential adverse effects: avoiding, minimizing, and mitigating. Based on these Rules, T. J. Boyle interprets undergrounding to fit into the first of these categories – avoiding potential adverse effects. In other areas, we interpret the use of alternative structure designs and materials, alternative corridor configurations, and structure placement and spacing as constituting methods of minimizing potential adverse effects. Finally, we see maintaining, restoring and planting new vegetation to screen the proposed facility as mitigating potential adverse effects that could not be avoided or minimized.

These items, as well as alternative measures considered but rejected by the applicant, are required by Site 301.05(b) to be described in the visual impact assessment. The NPT VIA does not describe efforts to reduce potential adverse effects of the Project using the same language provided in the rules. Rather, all efforts to avoid or reduce potential adverse effects are described loosely as "mitigation measures."

> The NPT VIA includes a brief section stating: "Many mitigation measures have been incorporated into the planning and design of the NPT project in order to avoid, minimize, rectify, reduce or eliminate potentially adverse visual impacts" (NPT VIA, p. M-16).

This discrepancy in the definitions used in the SEC Rules and the NPT VIA presents a scenario where the language of the SEC Rules is not adhered to in the NPT VIA. A review of reasonable avoidance, minimization, and mitigating strategies at the NPT VIA proposes as "mitigation measures" is presented below. But the issue is not merely one of semantics; the NPT VIA's approach to describing and recommending any sort of mitigation methods, however defined, is not in accordance with the SEC's requirements nor, apparently, considered to be of great importance. This review is not exhaustive, but rather is a sampling of locations performed for this analysis.

3.13.1 Proposed Avoidance, Minimization and Mitigating Strategies

The NPT VIA's proposed mitigation measures are listed below, and we subsequently review each strategy for efficacy in reducing impacts from the proposed project using examples. Additional mitigation measures are listed at each scenic resource reviewed in the NPT VIA (if applicable), and these descriptions vary somewhat from the ones listed below.

1. Locating portions of the project underground to avoid visual resources such as the White Mountain National Forest.
2. Co-locating the majority of the transmission line in existing transmission corridors to minimize the amount of new corridors that would be required for the NPT project.
3. Locating new transmission structures in proximity to existing structures to maintain the same spacing and avoid irregular linear patterns that can be caused by adjacent conductors being out of synch with each other.
4. Matching materials for relocated 115 kV structures and proposed transmission structures to minimize contrasts in color and texture and contribute to a sense of visual continuity within the corridor.
5. Designing transmission structures with a relatively narrow profile that minimize the amount of clearing required within the existing corridor.
6. Relocating existing transmission and distribution lines within the existing corridors to provide adequate clearance for the proposed NPT structures and minimize the amount of clearing necessary for their installation.
7. Using weathering steel monopole transmission structures in certain locations. This type of structure has a dark brown color that is commonly found in the NH landscape, which minimizes color contrasts. Monopole structures also have a thinner profile and a simpler appearance than lattice structures.
8. Maintaining and/or restoring vegetation at road crossings, subject to underlying landowner permission, to minimize or screen the view down transmission corridors and concentrate viewer attention in the immediate foreground. Vegetation specified in the vicinity of the transmission line must be non-capable, i.e., it cannot be capable of achieving a height tall enough to interfere with the electrical conductors.
9. Maintaining and/or restoring riparian vegetation at river and stream crossings, subject to underlying landowner permission, to minimize boaters' views down transmission corridors and to restore cleared areas with naturalistic landscaping. Riparian vegetation likewise has to be noncapable, i.e., it cannot be capable of achieving a height tall enough to interfere with the electrical conductors.
10. Planting native tree and shrub species to restore landscape disturbed by underground cable installation, subject to underlying landowner permission. Where the landscape adjacent to public roads is disturbed as part of the installation of underground conductors it will be restored with native trees and shrubs, while maintaining a clear path needed for inspection and maintenance.

3.12.1.1 Undergrounding

The NPT Project proposes undergrounding in two short segments in the north, and a longer segment through the White Mountain National Forest. Where it occurs, undergrounding does avoid the need for most above ground facilities and potential adverse effects, but not all of them. There are transition stations between the overhead and underground construction. Transition stations can have a significant visual presence, similar to a substation. In addition, there are splice locations every 1,500 to 2,000 feet that result in larger clearing and excavation, and perhaps a visible above ground or at-grade structure. Additionally, the right-of-way must still be kept clear, which may contrast with the surrounding land cover.

The first area of undergrounding is located in NPT VIA Subarea 1, which includes "a 3,785-foot segment in Pittsburg and Clarksville where it crosses the Connecticut River, and a 7.5 mile segment in Clarksville (1.4 miles) and Stewartstown (6.1 miles). Most of the underground segments will be constructed in municipal and state highway corridors" (NPT VIA p. 1-2). It is our understanding that this underground route was selected in an effort to bypass a so-called "spite line" that had been acquired by opposition groups. For

instance, the Applicant's Response to Municipal Group 2's Data Request states, "in the North Country, the underground route was determined by securing the necessary property rights to construct the Project" (MG2 1-23). NPT has not provided a set of criteria related to scenic resources for determining locations appropriate for undergrounding (e.g., NPT Discovery Response EXP 1-127 in Appendix C). All appearances suggest that undergrounding in Subarea 1 is a strategic business and engineering decision and that it is inaccurate to claim it as purposeful visual mitigation.

The longer area where the project is located underground composes NPT VIA Subarea 3. The preferred route submitted to the US Department of Energy (DOE) in October 2010 used an existing PSNH right of way through the White Mountain National Forest (WMNF) and crossed the Appalachian National Scenic Trail in the high peaks area. Because of its high visual impact to sensitive scenic resources, this original proposal appeared to be inconsistent with the WMNF Forest Plan. After the Draft Environmental Impact Statement was published, NPT revised its application to the DOE to include a 52-mile underground route between Bethlehem and Bridgewater in public road rights-of-way through the WMNF. This is the proposal that was submitted to the SEC in October 2015. This decision to underground the NPT for 52 miles through the WMNF also may be a business decision and "was based on feedback received from key stakeholders" (MG2 1-23), but this feedback is clearly related to the unreasonable effects, including visual, to the WMNF portion of the original proposal:

> The NPT project in Subarea 3 is a 320-kV DC line that will be located underground, entirely within state maintained public roads to avoid impacts to the White Mountain National Forest. (NPT VIA, Subarea 3, p. 3-2)

It should be noted that the overhead portion of the NPT still crosses the White Mountain National Forest in the town of Stark, though this is a less sensitive area.

The NPT VIA identifies 46 scenic resources within ¼ mile of the underground line that will be avoided from the undergrounding between Bethlehem and Bridgewater (NPT VIA at 3-4 and 3-5). Other scenic resources that could be avoided by undergrounding include:

- Route 3 / Connecticut River Scenic Byway
- Connecticut River
- Washburn Family Forest
- Route 145 / Moose Path Scenic Byway
- The Rocks Estate (avoids "direct impacts")
- Presidential Range Trail Scenic Byway / River Heritage Trail Scenic Byway / Baker Pond

The NPT VIA includes no description of whether conducting the NPT VIA influenced the locations chosen for undergrounding, or why undergrounding the line is not planned in other locations where scenic resources would be adversely impacted and would be avoided by undergrounding. NPT has been asked these questions as part of the discovery process, and the responses have been uninformative (e.g., NPT Discovery Response EXP 1-127 in Appendix C). The only substantive document provided is the undergrounding study titled "An Evaluation of All UG Alternatives for the Northern Pass Transmission Project." A review of this document provides no mention of undergrounding the Project for reasons related to proximity to scenic resources.

3.12.1.2 Co-locating in existing corridors

An existing corridor is generally considered a preferred alternative to clearing a new corridor, and can have the effect of minimizing potential aesthetic effects. For instance, the WMNF Forest Plan's Land Use Authorizations (Special Uses) Standard 3 states:

> To reduce the proliferation of separate rights-of-way, new transportation, utility, and communication use proposals shall be accommodated within existing corridors to the maximum extent feasible. Mitigation measures shall be determined by project level planning. (USFS 2005, p. 2.10)

However, the existing corridor must be able to accommodate the new transmission line without significant additional visual impacts to be an effective visual minimization. For instance, Figure 22 shows the PSNH transmission line where it crosses the Cohos Trail in Stark.

Figure 22. The top image is the existing PSNH transmission line corridor as it crosses the Cohos Trail in Stark; the bottom image is NPT's proposal simulated by T. J. Boyle as part of the DOE VIA.

In this scenario, the existing right-of-way contains wooden H-frame structures that are approximately 45 feet high, as well as a buried gas pipeline. The forested edge gives the right-of-way an enclosed feeling; the structures are below the tree canopy and the right-of-way contains only limited metal materials, which is in keeping with the surrounding forested character. The proposal will replace the existing wooden H-frame structures with galvanized steel poles that are approximately 90 feet high, and the new lattice structures are approximately 80 feet high. These new structures are taller than the forest canopy, and substantially taller than the existing structures; they fill the space with a dominant visual presence and have a more industrial character, and because of this the co-location does not minimize impacts.

The portion of the Cohos Trail pictured in Figure 22 was only lightly described in the NPT VIA (see p. 1-97), and no mitigation was proposed for this location. However, "using an existing transmission corridor to minimize the amount of clearing required for the transmission line" was claimed as mitigation in the NPT VIA (see p. 1-85) for the nearby Route 110 Woodland Heritage Scenic Byway, which runs roughly parallel to the corridor in this area. No other efforts were proposed to avoid, minimize or mitigate the potential adverse effects for the Cohos Trail.

Though indirectly described as a mitigation measure through this area, co-location in locations such as the Cohos Trail does not minimize the potential adverse effects of the proposed facility from this scenic resource, or other similar situations. No other methods to reduce potential adverse effects were proposed, and no alternative measures considered but rejected by the Applicant were described. Essentially, no avoidance, minimization or mitigation is planned to reduce impacts to this scenic resource, and no alternative measures have been considered.

Another location where co-location fails to reduce potential adverse effects is shown in the photograph in Figure 23, which was taken where the NPT crosses Nottingham Road in Deerfield. This is a winter scene along a road, looking out over a frozen pond, the foreground vegetation is without leaves and the view has an open feeling. The two closest existing wooden poles are 88 and 79 feet high, the next two structures are a 101-foot wooden H-frame and a 65-foot wooden pole. The existing wooden poles on the right would be replaced with 92-foot galvanized steel poles; the new NPT galvanized steel lattice towers are 130 to 140 feet tall. Three lines makes this a crowded right-of-way, which requires that the lattice towers rise above the existing and replacement poles for design reasons, making them much more visible.

This pond on Nottingham Road was not reviewed in the NPT VIA, though ponds are considered scenic resources that possess a scenic quality as discussed in section 2.1.8 of this report. The pond was also identified as a heron rookery during the Community Outreach further described in Chapter 4. No mitigation was specifically described for this location in the NPT VIA, though co-location with existing 115 kV transmission lines is described in the NPT VIA Conclusion as a measure to "avoid, minimize, or mitigate unreasonable adverse effects on aesthetics," as follows:

> The use of the existing corridor south of Dummer eliminates the need for a new corridor for the majority of the line and avoids the possible visual effects that a new line would have on the surrounding landscape. In locations such as these, co-location of the proposed Project with other existing lines does not minimize impacts. (NPT VIA, p. C-5)

The co-location could thus be considered the Applicant's mitigation measure for this pond in Deerfield. Of note is that Site 301.05 states that the Applicant include "a description of the measures planned to avoid, minimize, or mitigate potential adverse effects of the proposed facility," rather than "*unreasonable* adverse effects" as described in the NPT VIA. Generally, in our experience an existing corridor is a preferred alternative to clearing a new corridor. However, the existing corridor must be able to accommodate the new transmission line without significant additional visual impacts to serve as an effective visual mitigation. Co-

location with the existing 115 kV transmission lines does not minimize the potential adverse effects of the proposed facility through this area, it exacerbates them.

Figure 23. The top image is the existing PSNH transmission line corridor as it crosses Nottingham Road in Deerfield. The bottom image is NPT's proposal simulated by T. J. Boyle.

3.12.1.3 Locating and spacing structures to avoid irregular linear patterns

Spacing the proposed HVDC and existing 115 kV structures such that the proposed conditions avoid an irregular pattern in the landscape is generally a recommended design measure, and can be considered mitigation. A review of examples of how the Applicant applied or attributed spacing as a mitigation (minimizing) measure in the proposed line design reveals situations where a scenic resource could have benefited from this strategy as described, yet it was not successfully employed.

For instance, the crossing of Route 116 in Whitefield illustrated in Figure 24 does not match the existing 115 kV structure spacing, which would be beneficial since these structures are placed away from the road. Instead, only the proposed HVDC and relocated 115 kV structures were spaced in parallel, and a proposed HVDC structure has been located about 38 feet from the roadway and in direct view of a nearby residence and a well-traveled state highway. This location is not regarded as a scenic resource in the NPT VIA, although the road itself qualifies as a scenic resource under the SEC definition in Site 102.45(c). There are other examples where the proposed structures do not match the existing structure spacing at or near scenic resources that could benefit from this mitigation measure, such as the Peaked Hill Road crossing in Bristol (listed as a scenic resource in the NPT VIA, p. 4-21 but otherwise not described, illustrated in Figure 25); the Canterbury Shaker Village Byway at the Hoit Road and Route 132 (Mountain Road) crossings in Concord (described in the NPT VIA, p. 5-11 and illustrated in Figure 26); and Turtle Pond in Concord (described in the NPT VIA, p.5-17 and illustrated in Figure 27).

Figure 24. Aerial view of the Project as it crosses Route 116 in Whitefield. The green line represents the centerline of HVDC structures, red dots represent proposed monopole structures, and the light green dots represent existing 115 kV structures to remain. While the proposed structures maintain a similar spacing rhythm, this does not match the existing line that will remain, and places a 90' HVDC structure within 40' of the roadway.

Figure 25. Aerial view of the proposed project as it crosses Peaked Hill Road in Bristol. The green line represents the centerline of the HVDC structures, red dots represent proposed monopole structures, and the light green dots represent existing 115 kV structures to remain. The HVDC spacing does not match the existing structures.

Figure 26. Aerial view of the proposed project as it crosses Hoit Road and Route 132 (Mountain Road) in Concord. The blue line represents the 345 kV centerline, red dots represent proposed monopole structures, and light green dots represent existing 115 kV structures to remain. The proposed structures do not maintain a similar spacing rhythm, and do not match the existing line that will remain, and a new 90' 345 kV structure is placed within 40' of the roadway. The green shaded area is the Brookwood Open Space, part of the New Hampshire Conservation/Public Lands dataset. Both roads are part of the Canterbury Shaker Village Byway and are heavily traveled by motorists and bicycle riders experiencing their scenic quality.

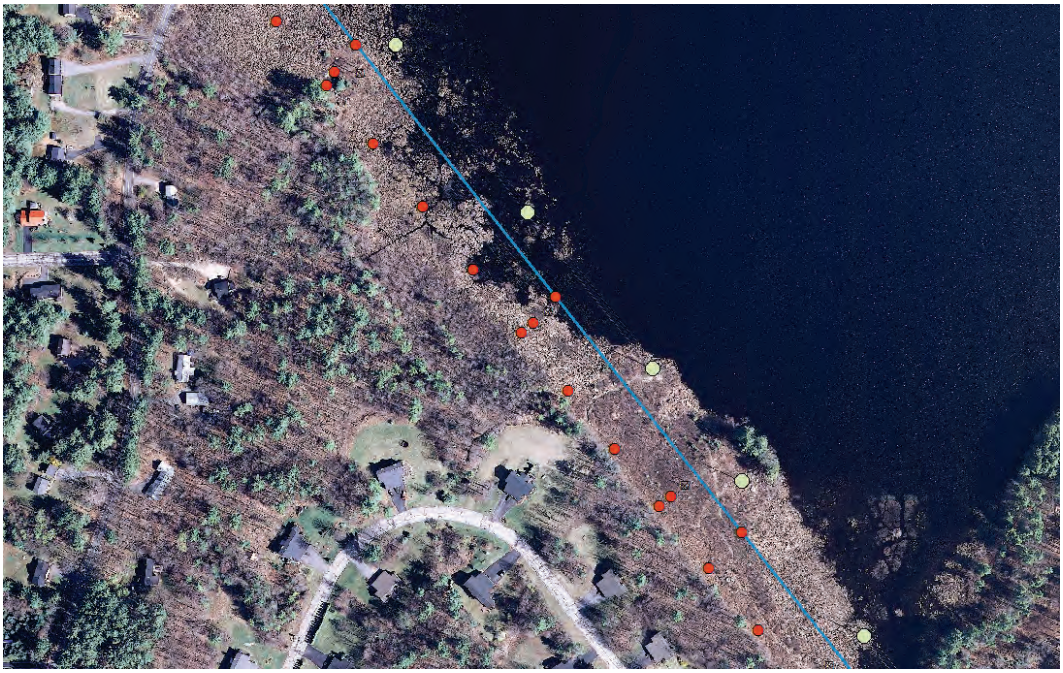


Figure 27. Aerial view of the proposed project as it crosses Turtle Pond. The blue line represents the 345 kV centerline, red dots represent proposed monopole structures, and light green dots represent existing 115 kV structures to remain. The proposed structures do not maintain a similar spacing rhythm, and do not match the existing line that will remain. A review of the simulation in the NPT VIA at 5-19 and 5-21 also does not reveal a consistent spacing of the proposed structures compared with the existing structures.

The Canterbury Shaker Village Byway and Turtle Pond descriptions in the NPT VIA respectively list "Maintaining the same spacing with existing transmission structures" and "Maintaining the similar spacing with existing transmission structures" as a mitigating measure. A review of Figures 26 and 27 clearly show structure spacing that does not match these descriptions.

3.12.1.4 Matching materials for relocated 115 kV and proposed transmission structures

The NPT VIA proposes that where a galvanized lattice HVDC structure is located, any relocated 115 kV monopoles will also be galvanized to "contribute to a sense of visual continuity within the corridor." The NPT VIA proposes a similar strategy where weathering steel HVDC structures are proposed. This proposal would create color similarity between the proposed structures, but these will have very different sizes, forms and textures and dissimilar configurations from each other, and would be very different from the existing wooden structures to remain. For this reason, varying the structure material and matching all proposed structures may not always be considered a minimizing measure. This strategy is seemingly specific to 115 kV transmission structures adjacent to NPT structures, yet the inconsistency of proposed HVDC structures also may heavily detract from the goal of "contributing to a sense of visual continuity."

In particular, our review of the proposed structure types has revealed areas along the proposed corridor where the structures near to a roadway or scenic resource have been proposed as weathering steel or lattice, but structures further away are the opposite structure type, and where present none of the proposed materials match the existing structures. This tendency is illustrated at the Boyce Road crossing in Canterbury (Figure 28), the Route 116 crossing in Bethlehem (Figure 29) and the Rocks Estate in Bethlehem (Figure 30). Other examples include Route 110 in Stark, the two overlooks at Bear Brook State Park (when compared to each other), Cross Country Road in Pembroke, Peaked Hill and Schaeffer Roads in Bristol, Nutting and Jefferson Roads in Whiting, Victor Head and Paris Road in Stark, Route 26 in Millsfield, and Wiswell Road in Clarksville.

Figure 28. A simulation by T. J. Boyle where the proposed NPT crosses Route Boyce Road in Canterbury (simulation included in Appendix F at location CB-1). Three types of transmission structures are visible in this location, including 115 kV weathering steel monopoles, 345 kV weathering steel H-frames, and 115 kV wooden structures using a compact "delta" configuration. An evaluation of this location is discussed in Chapter 4.

Figure 29. Cropped image simulated by T. J. Boyle where the proposed NPT crosses Route 116 in Bethlehem. Three types of transmission structures are visible in this location, including weathering steel monopoles, galvanized lattice structures, and wooden H-frame structures. Not shown is a steel monopole structure at left that would loom above the viewpoint.

Figure 30. Cropped image from the NPT VIA (11-18-2016) simulation where the proposed NPT crosses the landscape visible from the Rocks Estate. Three types of transmission structures are visible in this location, including weathering steel monopoles, galvanized lattice structures, and wooden H-frame structures.

Locations where the existing 115 kV structure will remain will inherently cause differences between structure types in the corridor because the existing structures are wooden with different configurations. This inconsistency in structure types would lead to a mix of patterns throughout the landscape, where the variation in structure form, color and texture contribute to a sense of visual discontinuity within the corridor. This is in direct contradiction to the stated mitigation (or minimization) purpose.

Additionally, there is no supporting evidence in the NPT VIA that maintaining similar structure materials between the proposed HVDC/345 kV structures and relocated 115 kV structures would be a visual benefit versus designing relocated 115 kV structures to match existing 115 kV structures. This is especially important because the proposed materials do not generally exist within the existing corridor, and 115 kV structures that will remain will almost always be wooden structures. To promote a sense of visual continuity within the corridor, the proposed HVDC/345 kV structures should match materials to the extent possible, and the proposed 115 kV structures should match the more compact existing 115 kV wooden structures to the extent possible.

3.12.1.5 Designing transmission structures with a narrow profile to minimize clearing

The Applicant had not fully designed the lattice and monopole HVDC structures in December 2015 when the NPT VIA was submitted to the SEC. The new designs for the horizontal lattice HVDC structures made available in August 2016 were designed with a bulkier cross-arm when compared with the structures originally used for the NPT VIA simulations. The use of V-string configurations will reduce the required clearing widths in new corridors. Compared to the existing structures in the existing corridor, however, the proposed NPT structures do not appear to be "relatively narrow" as they will be substantially taller and have greater visibility, and the relationship of the structure design to minimizing clearing is not established.

A search of the NPT VIA for references to "profile" identifies its use in several places, of which this occurrence on page 1-5 is typical:

> Weathering steel monopole structures – with a slimmer profile and darker color than the typical lattice structures – will be used in certain locations to minimize visual impacts

Rather than clearing, this suggests that the minimizing is achieved by replacing galvanized steel lattice towers with taller weathered steel monopoles which will have a simpler and slimmer appearance, particularly in the foreground but the bulkier cross-arms and the insulator configurations defeat this purpose.

3.12.1.6 Relocating existing structures to minimize vegetative clearing

The Applicant's engineering team often required that existing 115 kV structures be moved in order make space for the NPT structures within the existing right-of-way. Redesigning the relocated 115 kV structures

to a taller and more visible vertical configuration that would fit within the existing right-of-way is the main result of this relocation. For instance, see the existing and proposed conditions where the NPT crosses the Cohos Trail in Figure 22. These actions may have some minimizing effect (i.e., reduced clearing), but also create additional visual impacts (i.e., higher 115 kV structures visible above the tree line), negating any benefits that arise from reducing clearing. This is evident in the impact to Route 110 / Woodland Heritage Scenic Byway in Stark (see NPT VIA, p. 1-89 and the August 2016 photosimulation revision).

3.12.1.7 Using weathering steel monopole structures to minimize color contrasts

The uncritical use of weathering steel monopole transmission towers is an overly simplistic form of mitigation that is not always appropriate. The general approach taken by the US Forest Service is to first identify the most sensitive viewpoints for a particular structure—where a structure is viewed in the foreground, monopoles are preferred, but where it is viewed in the distance, a lattice structure is preferred (see USFS 1995, p. 2.5 and H-37; USFS 1975, p. 29 and 35). In particular, when seen against the sky line, the weathered steel monopoles are bulkier and have a higher contrast than galvanized steel lattice towers (e.g., view across Little Diamond Pond seen in Figure 31).

Figure 31. Cropped area of the T. J. Boyle simulation from Little Diamond Pond where the proposed NPT structures are clearly visible against the skyline. No analysis is presented in the NPT VIA as to whether this is a desirable design versus using lattice structures.

At Little Diamond Pond in Coleman State Park, where the landscape is mostly natural and transmission structures are not currently visible, the NPT was routed adjacent to the State Park property and will be clearly visible from the open water. The proposed minimization is to use weathering steel monopole structures that will emphasize a contrast against the sky, rather than minimize it as presented in the Mitigation description (NPT VIA p. M-16). Given the importance and natural character of this scenic resource and the poor choice of corridor alignment atop the hill and up against the State Park boundary, a more appropriate alternative is to avoid this scenic resource, such as undergrounding the line as it passes next to or around the area around the Coleman State Park. This is discussed further in Chapter 4.

3.12.1.8 Maintaining and/or restoring vegetation at road crossings for screening

The NPT VIA does not provide specific or typical plans to maintain or restore vegetation at any road crossings. Rather, the NPT VIA suggests only general statements of possible locations for planting—EXP 1-134 identifies the 12 locations where "the VIA lists plantings as possible mitigation measures" (Northern Pass Transportation 2016). This mitigation element should also include planting new vegetation, but the Applicant has consistently asserted that mitigation planting is subject to underlying landowner permission. For instance:

> The Applicant has not prepared planting plans for the transition stations as part of the application. Planting plans for the transition stations will be prepared as part of the detail design phase of the project once final approval has been received.

There are no locations where the visual impact from the proposed transition stations was determined to be unreasonable. Plantings and possible other landscape elements, however, will be installed where necessary to screen the transition station from public viewpoints, supplement natural plant succession, or to restore areas disturbed by construction.

Additional native landscaping is not being proposed as screening at all locations where project elements will be visible from public roads for several reasons.

(a) The Applicant does not own the underlying land in the majority of the road crossings.
(b) Installation and continued maintenance of plantings at road crossings would require landowner permission.
(c) In certain areas, plantings may not be compatible with the landowner's objectives for using the land.
(d) In most locations where the transmission line crosses a public road, the view is already open with little or no screening vegetation.

(Responses to Counsel for the Public, EXP 1-133)

Whether the Project's visual impact is determined to be unreasonable is not the qualification for proposing avoidance, minimization or mitigation. Per Site 301.05(a), visual impacts need only be potentially adverse in order to be avoided, minimized or mitigated. The statements above do not change the Applicant's responsibility to mitigate potential adverse impacts to public views from scenic resources, including roadways.

Most public roads that are crossed by the NPT are scenic resources—they are places that "possess a scenic quality" suitable for "scenic drives" (Site 102.45(c)), and driving for pleasure is one of the most common forms of recreation in New Hampshire, making public roads "recreational areas" (Site 102.45(d)). The visual magnitude of structures in the immediate foreground at road crossings is among the most prominent possible views from a scenic resource.

The Applicant has not demonstrated that they have or intend to seek site control or landowner permission to plant, restore or maintain planting that screens public views from scenic resources. The NPT VIA has not demonstrated the way in which impacts would be screened from any scenic resource.

The Mitigation section of the Presidential Range Trail Scenic Byway/River Heritage Trail Scenic Byway/Baker Pond assessment (NPT VIA, p. 2-69) indicates using landscaping as a visual buffer between the roadway and the transition station. The NPT VIA does not, however, include an accompanying landscape maintenance plan, restoration plan, mitigation plan, or visualization of the proposed elements regarding the analysis of visual impact at this location. With a proposed 95-foot tall A-frame transition structure, an approximately 10,400 square foot footprint (NPT VIA, p. 2-68), associated transition station equipment and parking area, and an adjacent 105-foot tall HVDC weathering steel monopole structure proposed at this location, more information should have been included in the NPT VIA to assure that the proposed Project is being correctly represented to the SEC and the public at large, and that the stated mitigation would be effective. Fully describing vegetation planting mitigation and evaluating its effectiveness is especially needed for locations near transition stations and substations, but it is also necessary for other locations where scenic resources will be adversely effected, as required by Site 301.05(b)(10).

3.12.1.9 Maintaining and/or restoring vegetation at river and stream crossings for screening

Similar to section 1.8 above, the NPT VIA does not provide specific or typical plans to maintain or restore vegetation at any river crossings. All rivers are public waters and if they possess a scenic quality they are considered scenic resources (Site 102.45(c)). The visual magnitude of structures seen while recreating on a river can be very significant, for instance see the Pemigewasset River crossing simulation (NPT VIA, p. 4-19). Just as with impacts on other scenic resources, it is the Applicant's responsibility to maintain, restore, and mitigate public exposure to these visual impacts.

3.12.1.10 Planting native tree and shrub species disturbed by underground cable installation

The Applicant has stated that "in general, the current proposed underground alignments are either on one side of the road or the other to minimize the impact to traffic. It is anticipated that construction activities will be limited to the edge of the right-of-way, the shoulder of the road or one travel lane" (Northern Pass Transportation 2016, EXP 1-52). The Applicant has not indicated the need to remove any trees during underground cable installation, and should be required to explain this mitigation measure in more detail.

Additionally, planting vegetation is proposed for disturbed underground portions subject to underlying landowner permission, but paradoxically the same principle has not been proposed for above ground portions of the project, which will have a much greater impact yet carry the same approval restrictions.

3.13.2 Summary Observations on Proposed Avoidance, Minimization and Mitigation

This review of the proposed mitigation finds that the proposed mitigation measures have mixed results and are a limited attempt to mitigate the substantial visual impacts associated with a project of this scale, in particular at road crossings.

Undergrounding. In areas where it is proposed, undergrounding the line would avoid almost all of the adverse visual issues associated with the proposed above-ground portions of the line. Based on the information available in the NPT VIA, the northern undergrounded portions of the line in Pittsburg and Clarksville appear to have been driven by engineering, cost, route restrictions and "feedback" (MG2 1-23) rather than a specific mitigating measure undertaken to reduce potential adverse visual impacts. Including and describing this undergrounding as a mitigation measure "to avoid visual resources" (NPT VIA, p. M-16) is misleading. In this area, undergrounding more appropriately should have been described in the NPT VIA as a circumstance of the proposed Project route selection that incidentally benefits some scenic resources rather than a mitigating measure intended to avoid impacts to scenic resources.

Co-locating in existing corridors. Co-locating the project in the existing corridor has created a significant impact in some places that are counter to the intended purpose. A comparison of the effects of smaller structures in a larger right-of-way is not presented in the NPT VIA. While co-location is generally a desirable circumstance, in some of the settings where the NPT is proposed, the existing corridor cannot adequately accommodate the proposed Project in a way that supports the use of co-location as a minimizing measure. This is especially evident in Figure 23 in Deerfield. Alternative co-location options are discussed further in Chapter 4.

Locating and spacing to avoid irregular linear patterns. A review of the location and spacing of structures to avoid irregular linear patterns by maintaining the same or similar spacing as existing structures reveal situations where this mitigation was not successfully employed. It is inappropriate to include this element as a mitigation measure in the descriptions at specific scenic resources such as the Canterbury Shaker Village Byway and Turtle Pond when it is not successfully employed at those locations.

Matching materials for relocated 115 kV structures and proposed transmission structures. There is no assessment in the NPT VIA of how variation in the proposed structure material and design would be interpreted from specific scenic viewpoints, or as viewers traverse the nearby landscape and observe different types of structures at different locations. Because of the variation of proposed HVDC structure types visible from road crossings or other scenic resources where changes are observable, or in areas where existing wooden 115 kV structures will remain adjacent to the new metal structures, the proposed conditions can contribute to a sense of visual discontinuity within the corridor. In this sense, the proposed mitigation strategy has failed its purpose at these locations. Alternative structure materials are discussed further in Chapter 4.

Designing transmission structures with a relatively narrow profile to minimize clearing. The use of weathered steel monopoles rather than galvanized for NPT structures appears to have little to do with reducing clearing. In some areas, in particular southeast of Concord, additional clearing or new right-of-way

acquisition is minimized instead by significantly increasing the height of the structures, which in turn creates greater visibility and potential visual impact.

Relocating existing structures to minimize vegetative clearing. Redesigning the relocated 115 kV structures to a taller and more visible vertical configuration that would fit within the existing right-of-way is the main result of this relocation. These actions may have some minimizing effect (i.e., reduced clearing), but also create additional visual impacts (i.e., higher 115 kV structures visible above the tree line), negating any benefits that arise from reducing clearing. This is evident in the impact to Route 110 / Woodland Heritage Scenic Byway in Stark (see NPT VIA, p. 1-89 and the August 2016 photosimulation revision), where lower structures would likely be less visible.

Using weathering steel monopole structures to minimize color contrasts. In general, the use of weathering steel monopoles is a better alternative than galvanized steel structures. However, it appears mitigation as presented in the NPT VIA consists mainly of the principle that, when the proposed line creates an adverse condition, then monopoles are an accepted solution. As shown in Figure 31, using monopoles is not always a successful solution, and more aggressive forms of avoidance, minimization or mitigation may be needed. This is further discussed in Chapter 4.

Maintaining and/or restoring vegetation at road crossings for screening. Any analysis of the proposed elements and how visibility can be effectively screened or mitigated from scenic resources should be included with the NPT VIA. The NPT VIA only lightly discusses landscape maintenance, restoration and mitigation. No typical or specific mitigation plans are included with the application and no commitments or assurances are given that landscape mitigation would be needed or installed at any scenic resource. It is unacceptable for a project of this magnitude to eschew landscape maintenance, landscape restoration or landscape mitigation as a reasonable, viable and necessary alternative to simply removing vegetation as needed for construction, clearance requirements and maintenance.

Proposing this Project without an effort to include and describe vegetative mitigation at each of the scenic resources, road crossings, transition stations, and substations would potentially absolve the NPT of any requirement to plant vegetative mitigation if the Project is approved. Reasonable efforts to contact towns and landowners should have been undertaken, and a plan as to how and where negative impacts will be addressed using accepted landscape mitigation techniques should be a requirement for a project of this magnitude. It appears the Applicant has essentially avoided responsibility for making this effort, which would not conform to other recent similarly-sized transmission projects proposed elsewhere in New England. Examples of landscape mitigation proposed for other similar projects are discussed further in Chapter 4.

Maintaining and/or restoring vegetation at river and stream crossings for screening. Similar to road crossings, no specific or typical plans to maintain or restore vegetation at any river crossings are provided. Just as with impacts on other scenic resources, it is the Applicant's responsibility to maintain, restore, and mitigate public exposure to these visual impacts.

Planting native tree and shrub species disturbed by underground cable installation. It is the Applicant's responsibility to explain any potential impacts that would occur in the undergrounded sections, and to explain the method to maintain, restore, and mitigate any damage. It is not clear that claiming this item as "mitigation" goes beyond what NH DOT laws regulating storm water runoff will require, or how it would apply to a known visual impact from the proposed Project. Its inclusion in the list of proposed mitigation measures needs further detailed explanation from the Applicant as to what and where impacts may occur, what type of restoration would be undertaken, and how this applies to the NPT VIA analysis.

Alternative measures considered but rejected by the Applicant. A review of alternative avoidance, minimization, or mitigating measures considered but rejected by the Applicant is not included in the NPT VIA, and therefore the NPT VIA does not meet the requirements set forth in Site 301.05(b)(10).

3.14 Conclusions

Preparing the VIA for the NPT is a substantial undertaking as it must be because of the project size. DeWan & Associates has the experience and qualifications to conduct this work and they have prepared a credible appearing VIA. However, there are aspects of the work that do not meet generally accepted professional standards—responsiveness to the SEC criteria is considered in the next chapter.

3.14.1 Inadequate identification of scenic resources

The NPT VIA (2015) employed a flawed approach to identification of scenic resources. The NPT VIA considers only designated scenic resources, though this is only one type of scenic resource listed in Site 102.45. In particular, DeWan & Associates reviewed municipal plans to identify locally designated scenic resources, though they did not review other local documents, such as conservation or recreation plans. DeWan & Associates made no systematic attempt to search thoroughly for non-designated resources. For instance, NH provides a special property tax assessment for conservation lands (Chapter 79-B) and public recreation access as part of a current use assessment (Chapter 79-A) (see Appendix D, Area of Current Use Appraisal by Town.pdf). It is expected that most of these lands "possess a scenic quality" and are accessible to the public. While the NPT VIA identifies some lakes rivers and scenic drives, the identifications are limited to designated scenic resources—NH is rich in non-designated scenic resources of this type. DeWan & Associates made no attempt to identify tourism destinations, or historic resources eligible for listing on the National Register of Historic Places. For a Project of this magnitude, there are literally tens of thousands of unidentified scenic resources that have not been identified in the NPT VIA.

The VIA is directed by Site 301.05(b)(5) to describe "all those scenic resources from which the proposed facility would be visible." The screened visibility analysis may overstate the extent of screening because it incorrectly applies average land cover heights to account for potential screening. In addition, many scenic resources are only approximately located, and it may not be possible to determine potential visibility of the NPT from them without conducting a thorough field survey. DeWan & Associates did not investigate scenic resources unless they had potential visibility. Using terrain visibility to determine the need for field evaluation is more accurate for scenic resources with imprecise location.

3.14.2 Evaluation is not limited to the Site 301.05 criteria for VIAs

Site 301.05(b)(6) describes factors that a VIA must use to characterize the potential visual impacts. The NPT VIA has incorrectly introduced factors that eliminate legitimate scenic resources from further consideration. In particular, DeWan & Associates use Cultural Value ratings to drop over half of the sites with potential visibility from consideration of potential visual impacts—there is not support for this factor in Site 301.05. Similarly, DeWan & Associates used Visual Quality ratings to eliminate scenic resources from further consideration. While scenic quality is an important characteristic of a scenic resource, there is no support in Site 102.45 or Site 301.05 to place a greater emphasis on different degrees of scenic quality.

Site 301.05(b)(2) requires that the VIA include "a description of how the applicant identified and evaluated the scenic quality of the landscape and potential visual impacts." However, during the October 6, 2016 Aesthetic Technology Session, DeWan & Associates indicated that they did not actually follow the process described in the Methodology Flow Chart and the accompanying text in the NPT VIA Methods chapter.

3.14.3 Simulations fail to meet a professional standard

The photography and simulations are not consistently high resolution, as required by Site 301.05(b)(8)(a). In addition, the photosimulations have several types of errors that could affect an evaluation of Visual Impact and do not always accurately depict the proposed project.

Based on the review presented in section 3.7 Visualizations, which did not encompass all simulations but rather a subset, we have detected errors in the selection of viewpoints (lack of immediate foreground views), choosing prominently visible locations (Deerfield Historic District, NH Route 145 and Victor Head), low original and simulated photograph resolution (see Table 4), cropping of the simulations (see Figure 11 from Coleman State Park), resolution of the photosimulation PDF files provided with the NPT VIA (see Figure 12), depicting views that have no visibility rather than a view that does (Lagace Beach), incorrect structure depiction (Turtle Pond, Weeks State Park, Little Diamond Pond, and Route 110), and errors in structure orientation and structure material representation (Route 110 and Big Dummer Pond).

The above items are all important elements for this project. Confidence in the accuracy of photosimulations provided by the Applicant is important both for the results of the evaluation of Visual Effect as well as for correctly representing the proposed conditions to the SEC and the general public. Regardless of cause, the methods used to create these photosimulations may have resulted in a series of material errors, both human and software, that at least partially undermine the intent and credibility of all of the NPT VIA photosimulations.

3.14.4 Inability to evaluate viewer effects at specific scenic resources

The NPT VIA acknowledges that there is a lack of useful data about Viewer Effects, including viewer expectation, extent, nature and duration of use, and continued use and enjoyment. During the Aesthetics Technical Sessions, DeWan & Associates' experience with research about these factors involved wind projects in Maine. However, they have determined that the Viewer Effect to nearly all scenic resources is none or low. However, hundreds of people have made it known at public hearings that they believe the NPT will have a very negative Viewer Effect. The NPT VIA fails to provide a basis for determining the Viewer Effect at specific scenic resources, or propose a process to obtain the data necessary to responsibly evaluate Viewer Effect. Intercept surveys are the most effective way to gather this type of information.

3.14.5 Inadequate consideration of reasonable mitigation

Overall, the proposed avoidance, minimization and mitigation strategies represent a very modest effort to address the visual impacts to the scenic resources that were analyzed in the NPT VIA. Any analysis of the proposed elements and how visibility can be effectively screened or mitigated from scenic resources using vegetation mitigation must be included with the NPT VIA. No typical or specific mitigation plans are included with the application and no commitments or assurances are given that landscape mitigation would be needed or installed at any scenic resource. It is unacceptable for a project of this magnitude to eschew landscape maintenance, landscape restoration or landscape mitigation as a reasonable, viable and necessary alternative to simply removing vegetation as needed for construction, clearance requirements and maintenance. It appears the Applicant has essentially avoided responsibility for this undertaking, which would not conform to other recent transmission projects proposed elsewhere in New England, as discussed in Chapter 4.

Site control issues do not change the Applicant's responsibility to mitigate potential adverse impacts to public views from scenic resources, including roadways. Proposing this Project without an effort to include and describe vegetative mitigation at each of the scenic resources, road crossings, transition stations, and substations would potentially absolve the NPT of any requirement to plant vegetative mitigation if the Project is approved. The Applicant should have taken reasonable efforts to contact towns and landowners. The SEC should require the Applicant to prepare a plan as to how and where negative impacts will be addressed using accepted landscape mitigation techniques for a project of this magnitude. Examples of landscape mitigation proposed for other projects are discussed further in Chapter 4.

Chapter 4. Independent Analysis

This chapter presents the results of several independent analyses conducted to further evaluate the NPT under the SEC Rules. Specifically, it provides additional materials and opinions that expand upon and differ from those presented in the NPT VIA. The structure of Chapter 4 will proceed as follows:

4.1 Identification of Scenic Resources – T. J. Boyle will present its own findings regarding the identification of potential scenic resources. For comparison, DeWan & Associates identified approximately 680 resources. However, T. J. Boyle has identified over 18,000 potential scenic resources.

4.2 User Expectation and Effect on Future Use and Enjoyment – Limited information is available regarding user expectation for scenery and how impacts to scenic quality may impact the future use and enjoyment of scenic resources. The few studies from New England are reviewed and new analyses of data from a 2006 study sponsored by the New Hampshire Lakes Association and Counsel for the Public's 2016 Community Workshops will be presented.

4.3 Evaluation of Potential Visual Impacts to Scenic Resources – T. J. Boyle provides an independent evaluation for a limited selection of scenic resources and the potential visual impact to those resources. Each resource is also reviewed under Site 301.14 criteria to determine if the Project would result in an unreasonable impact.

4.4 Mitigation – A review of available and recommended mitigation that was not incorporated by NPT. The independent analysis discusses a range of mitigation options and some locations they could be put to effective use.

4.5 Independent Analysis: Findings and Conclusions – As a final section to the Independent Analysis, we will summarize our findings for each of the sections reviewed under the independent analysis.

4.1 Identification of Scenic Resources

4.1.1 Introduction

Scenic resources, their definition and identification are central to conducting a VIA under the Site 301.05. As reviewed in chapter 2 of this report, Site 102.45 defines scenic resources, and outlines a broad range of areas that should be considered. In chapter 3, the methods used by DeWan & Associates to identify scenic resources were reviewed. Their methods were found to be flawed and not to meet the SEC requirements. This resulted in significant inadequacies in the identification of scenic resources which compromises the overall findings of the NPT VIA.

T. J. Boyle conducted a separate analysis to identify potential scenic resources for comparison. Section 5.1 describes the process used by T. J. Boyle to identify potential scenic resources and presents the results of that analysis. Two separate methods were used: (1) identification through existing resource databases, and (2) nomination of scenic resource through a series of Community Workshops organized by the Counsel for the Public. To support the following section, two series of maps are provided in Appendix D including: (1)

terrain viewshed mapping (bare earth); and (2) vegetated viewshed mapping. Appendix D also includes lists of identified potential scenic resources, categorized by type for each Town. Resources on these lists are based on the terrain viewshed mapping, and does not account for the effect of screening by vegetation and other obstruction.

4.1.2 Methods

4.1.2.1 Scenic Resource Databases

T. J. Boyle Associates obtained existing databases to document the various types of scenic resources identified in Site 102.45. It is assumed that all or nearly all of the resources identified in these databases "possess a scenic quality," as Site 102.45 requires for some types of scenic resources. Extensive field investigation found that almost all locations documented by T. J. Boyle possessed at least a minimum level of scenic quality. The following section briefly describes these databases, and where they were obtained.

A. Designated Scenic Resources

1. **Scenic Byways** (file name: Scenic_Byways_MERGED) is a database T. J. Boyle Associates assembled from various files showing federal and state scenic byways obtained from the NH DOT Scenic and Cultural Byways Program.[1] In some cases, we corrected the location of roads to coincide with the New Hampshire Public Roads database. Scenic roads are often a single line, and not separated into segments the way that the Public Roads database is separated.

2. **Designated Rivers** (file name: Designated_Rivers) are managed and protected for their outstanding natural and cultural resources in accordance with RSA 483, The Rivers Management & Protection Act.[2] While there is not a "scenic" designation category, scenic quality generally plays a role in their nomination report and management plan.

B. Conservation Lands or Easements

1. **Conservation/Public Lands** (file name: consnh) are parcels of land of two or more acres that are mostly undeveloped and are protected from future development. Unique or adjoining smaller parcels, as well as selected state-owned parcels may also be included.[3]

C.1 Lakes, Ponds and Rivers

1. **Great Ponds** (file name: Public_Waters_WB_Polys) are natural waterbodies of 10 acres or more in size. By law, the state holds public waters in trust for the people of New Hampshire. This file was obtained from the NH DES, Water Quality Assessment Program.[4]

2. **Public Rivers** (file name: Public_Waters_WB_Lines) rivers and streams are also public waters. The list primarily shows rivers that fall under the jurisdiction of the Comprehensive Shoreland Protection Act (RSA 483-B:4), but there are many other public rivers in New Hampshire that are not on the list. This file was obtained from the NH DES, Water Quality Assessment Program.[5]

C.2 Scenic Drives

1. **Public Roads** (file name: roads_dot) is the NH Department of Transportation dataset containing the location of state, local and selected private roads and their associated attributes.[6] The file is composed of road segments, typically the line between two road intersections. These

[1] Available by request from https://www.nh.gov/dot/programs/scbp/
[2] Available by request from http://des.nh.gov/organization/divisions/water/wmb/rivers/desigriv.htm
[3] Available from NH GRANIT, New Hampshire's statewide GIS clearinghouse: http://www.granit.unh.edu/data/downloadfreedata/category/databycategory.html
[4] Available by request from http://des.nh.gov/organization/divisions/water/dam/public_waters/index.htm
[5] Available by request from http://des.nh.gov/organization/divisions/water/dam/public_waters/index.htm.
[6] Available from NH GRANIT.

roads are publicly accessible and most "possess a scenic quality," and driving for pleasure is one of America's most popular recreation activities. Public roads are also listed as scenic resources under D.2 Scenic Drives.

C.3 Other Tourist Destinations

An existing spatial database has not been identified for these resources. However, a good start would be the New Hampshire Visitor's Guide, which is published by NH Department of Resources and Economic Development, Division of Travel and Tourism Development.[7] A copy of the Guide has been provided in Appendix D.

D.1 Recreation Trails

1. **Recreational Trails** (file name: nhtrails) data compiled by NH Office of Energy and Planning and NH Fish and Game Department from multiple public information sources.[8] This dataset is intended to give an approximation of recreational trail locations for planning use only. Positional accuracy will vary. Coverage and attributes should not be construed as complete.

D.2 Parks and Other Recreation Areas

1. **Access Sites to Public Waters** (file name: nh_access_sites) contains point locations of public access sites to water bodies.[9]

2. **Recreation Inventory: Points** (file name: nhrec_points) contains points representing recreation sites (parks, playing fields, water, recreation, etc.).[10]

3. **Public Roads** (file name: roads_dot) is the NH Department of Transportation dataset containing the location of state, local and selected private roads and their associated attributes.[11] The file is composed of road segments, typically the line between two road intersections. Roads are publicly accessible and supported with public funds—driving for pleasure is one of the most popular recreation activities. Public roads are also listed as scenic resources under C.2 Scenic Drives.

4. **Current Use Recreation Adjustment** provides qualified land owners an additional 20 percent reduction in their current use tax assessment. In return the public is granted year-round recreation use without fee for skiing, snowshoeing, fishing, hunting, hiking or nature observation. An existing spatial database has not been identified for these resources, the parcel level tax assessment data are maintained locally. However, the NH Department of Revenue Administration (2016) prepares an annual *Current Use Report: Acreage, Percentages and Other Statistics*. The summary acreage and percent area of current use tax assessment and recreation adjustment by town for 2015 is shown in Table 5.

E. Historic Sites

1. **Listed Historic Resource: Polygons** (file name: Historic_2015_NRHP_listed_Poly) are historic sites listed on the National Register of Historic Places.[12] These sites use boundary points listed on the nomination form to create a polygon, which is frequently misshapen because the points are not connected in proper order.

[7] Available online at https://www.visitnh.gov/information/order-your-free-visitors-guide.aspx
[8] Available from NH GRANIT.
[9] Available from NH GRANIT.
[10] Available from NH GRANIT.
[11] Available from NH GRANIT.
[12] Available at https://www.nps.gov/nr/research/index.htm.

2. **Listed Historic Resource: Points** (file name: Historic_2015_NRHP_listed_Pts) are historic sites listed on the National Register of Historic Places.[13] These sites are mapped as visual centroid points and do not indicate the full extent of the property.

3. **Potential Historic Resources** (file name: Historic_000_HRA_all) includes points within 1 mile of the NPT centerline representing properties constructed before 1968 as identified by Preservation Company (2015) during their field assessment.

F. Town and Village Centers

1. **Community Center Areas** (file name: communitycenterareas) identifies the community centers of municipalities delineated by staff at the nine Regional Planning Agencies based on a common methodology, with input and review from staff at the NH Department of Environmental Services.[14]

4.1.2.2 Community Identified Resources

The NPT VIA limited its analysis to designated scenic resources and did not consider the great many non-designated scenic resources defined by Site 102.45. Given this situation, Counsel for the Public determined that it was important to give the public an opportunity to identify scenic resources and thus convened six Community Workshops between July 26 and August 17, 2016. Workshops were conducted in Concord, Ashland, Littleton, Lancaster and Colebrook.

> Community members are invited to participate in structured workshops to identify places and areas of beauty, use, history, and tradition that are within ten miles of the proposed Northern Pass transmission corridor that may be affected by the NP Project.
>
> These workshops include a short presentation by the experts. Then, those present will break into small groups representing the communities present and use maps, forms and discussions to identify, and describe resources, places or areas important to them and their communities. The workshops are opportunities to work together rather than give testimony or make comments about the NP Project. (Foster 2016)

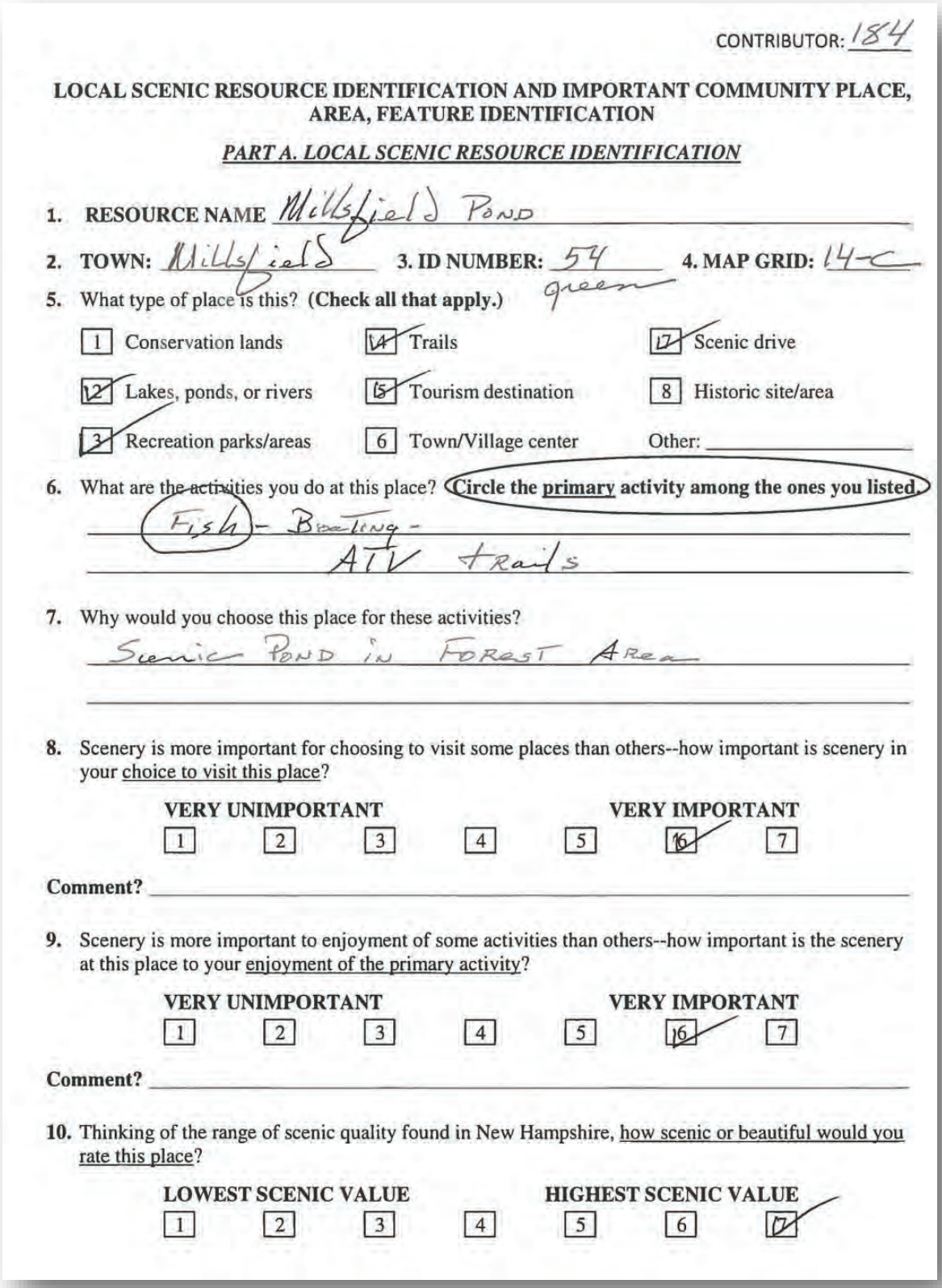
Participants in the workshops completed resource identification forms for scenic, historic and cultural resources important to them, and located them on large town maps. In total, 170 people completed 991 resource identification forms like the one in Figure , or nearly six per person. We do not represent that these data constitute a random sample of New Hampshire residents. Rather, the community workshops were an attempt to engage people from affected communities in a constructive way to describe in simple terms how the landscape is important to them.

Each identified resource was mapped as a point. The process of locating resources involved placement of a numbered adhesive "dot" on a paper map of each town within 10 miles of the NPT centerline. The location of each dot was manually digitized into a GIS database that is linked to the information on the identification forms. Some dots are linked to more than one nomination form, either because of multiple nominations for the same resource, or because more than one resource is located in the same general area. The accuracy of an individual resources' precise location is unknown, but it is to be expected that some of them are located incorrectly, perhaps by a substantial amount. For instance, a participant may have been uncertain exactly where along a road a historic house was located. In addition, location points do not reflect the size of these resources (e.g., a state park).

The community workshops have demonstrated that it is possible to constructively engage the public in order to identify important local scenic resources that may not be part of existing databases, and to get a

[13] Available at https://www.nps.gov/nr/research/index.htm.
[14] Available from NH GRANIT.

sense of the importance of the resources to the people in the community. The next obvious step would be to conduct additional research and fieldwork to verify the location and boundaries of these resources, and obtain other information relevant to evaluating the NPT's potential visual impacts upon them.



CONTRIBUTOR: 184

LOCAL SCENIC RESOURCE IDENTIFICATION AND IMPORTANT COMMUNITY PLACE, AREA, FEATURE IDENTIFICATION

PART A. LOCAL SCENIC RESOURCE IDENTIFICATION

1. **RESOURCE NAME** Millsfield Pond
2. **TOWN:** Millsfield **3. ID NUMBER:** 54 green **4. MAP GRID:** 14-C
5. What type of place is this? **(Check all that apply.)**

[1] Conservation lands	[14] Trails	[17] Scenic drive
[12] Lakes, ponds, or rivers	[15] Tourism destination	[8] Historic site/area
[3] Recreation parks/areas	[6] Town/Village center	Other:

6. What are the activities you do at this place? **Circle the primary activity among the ones you listed.**
   Fish - Boating - ATV + Trails
7. Why would you choose this place for these activities?
   Scenic Pond in Forest Area
8. Scenery is more important for choosing to visit some places than others--how important is scenery in your choice to visit this place?

VERY UNIMPORTANT					VERY IMPORTANT	
[1]	[2]	[3]	[4]	[5]	[16]	[7]

Comment?

9. Scenery is more important to enjoyment of some activities than others--how important is the scenery at this place to your enjoyment of the primary activity?

VERY UNIMPORTANT					VERY IMPORTANT	
[1]	[2]	[3]	[4]	[5]	[16]	[7]

Comment?

10. Thinking of the range of scenic quality found in New Hampshire, how scenic or beautiful would you rate this place?

LOWEST SCENIC VALUE				HIGHEST SCENIC VALUE		
[1]	[2]	[3]	[4]	[5]	[6]	[7]

Figure 32. A sample of a completed Community Identified Resource form.

4.1.2.3 Defining the APVI

As required by Site 301.05(b)(1), we performed a visibility analyses for both bare ground conditions, and screening by vegetation or other factors (see Appendix D). The analysis extended for a 10-mile radius from each overhead transmission structure.

The bare earth or terrain analysis used 5-meter resolution InterMap elevation data (DTM) within 1.5 miles of NPT's center line. For the area between 1.5 and 10 miles of the NPT centerline, we used National Elevation Data (NED) with a nominal 10-meter resolution.

The screened visibility analysis used the higher resolution and more accurate commercially available data from InterMap for the area within 1.5 miles of the NPT centerline. It included the DTM and remotely sensed land cover heights with a spatial resolution of 5-meters (DSM). For the area between 1.5 and 10 miles of the NPT centerline, we used the NED and 2011 National Land Cover Data (NLCD) with a 30-meter resolution. We assigned forest land cover a height of 40 feet, which generally is a slight understatement of its screening effect. We did not assign other land covers a height because their most common height was zero, and the remaining heights had high variability, as described in the article by Palmer (2016) included in Appendix B. The screened visibility analysis was originally conducted as part of the U.S. Department of Energy's environmental impact assessment and the methods are described in the associated VIA (T. J. Boyle 2015, p. 23).

4.1.2.4 Assembling the List of Scenic Resources

The APVI includes those areas within 10 miles of the NPT centerline that have potential visibility of new transmission structures. Many of the potential scenic resources identified above are recorded as single points that represent much larger areas, and they may be very approximate locations at that. Therefore, terrain visibility is used to define the APVI, which errs on the side of greater inclusion. If a screened visibility analysis were used, scenic resources could be excluded simply because a point does not represent their full extent, or because the location of the point is imprecise.

We used ArcMap software to identify the scenic resources in the databases described above that potentially would have visibility of the NPT. We removed duplicate Community Identified Resources. All of the databases extend to 10-miles from the NPT centerline, except for the Potential Historic Resources identified within 1 mile of the centerline by the Preservation Company (2015).

4.1.3 Results

A new database is created that lists each scenic resource that would have visibility of the project, its town, and the number of structures potentially visible. A complete list of identified scenic resources is provided in Appendix D. Table 6 provides a summary of the number of scenic resources by category and town that would have visibility of the NPT.

Table 5. Acreage and Percent Area of Current Use Tax Assessment and Recreation Adjustment by Town

Town	County	Host Community	Total Area (acres)	Total Land (acres)	Current Use (acres)	Current Use (%)	Recreation Adj. (acres)	Recreation Adj. (%)	Owners in CU (#)	Parcels in CU (#)
Barnstead	Belknap	No	28,758.6	27,483.73	17,542.05	63.83	10,389.60	59.23	358	511
Belmont	Belknap	No	20,427.5	19,293.67	9,210.02	47.74	3,553.15	38.58	225	369
Center Harbor	Belknap	No	10,394.4	8,532.57	4,117.38	48.25	380.34	9.24	115	180
Gilford	Belknap	No	34,243.7	24,826.74	9,322.16	37.55	2,441.75	26.19	164	292
Gilmanton	Belknap	No	38,127.1	36,891.38	23,722.73	64.30	9,781.03	41.23	424	610
Laconia	Belknap	No	16,712.2	12,860.52	3,892.85	30.27	1,599.26	41.08	96	273
Meredith	Belknap	No	34,919.7	25,804.37	10,367.65	40.18	3,967.21	38.27	255	463
New Hampton	Belknap	Yes	24,559.9	23,560.69	15,663.00	66.48	9,861.00	62.96	250	394
Sanbornton	Belknap	No	31,774.4	30,261.93	20,753.73	68.58	5,995.28	28.89	375	535
Tilton	Belknap	No	7,637.8	7,304.18	3,294.07	45.10	797.96	24.22	93	146
Moultonborough	Carrol	No	48,048.3	38,425.39	12,201.14	31.75	7,534.88	61.76	131	235
Sandwich	Carrol	No	60,250.8	58,394.34	23,813.83	40.78	14,394.79	60.45	341	478
Atkinson & Gilmanton	Coos	No	12,351.3	12,351.30	12,298.78	99.57	12,298.78	100.00	2	3
Berlin	Coos	No	39,805.7	39,338.11	9,554.65	24.29	8,697.76	91.03	69	185
Cambridge	Coos	No	33,098.7	32,683.97	27,873.26	85.28	27,873.26	100.00	4	11
Carroll	Coos	No	32,187.5	32,171.41	9,671.07	30.06	5,746.24	59.42	77	123
Clarksville	Coos	Yes	39,915.8	38,685.93	32,654.97	84.41	26,243.10	80.36	152	196
Colebrook	Coos	No	26,106.5	26,087.36	21,368.92	81.91	15,104.45	70.68	323	545
Columbia	Coos	No	39,220.1	39,181.10	30,689.22	78.33	16,555.00	53.94	277	472
Crawford's Purchase	Coos	No	5,242.8	5,242.86	0	0.00	0	0.00	0	0
Dalton	Coos	Yes	18,104.3	17,624.05	14,360.16	81.48	3,222.62	22.44	213	392
Dix's Grant	Coos	No	12,843.5	12,843.60	12,812.00	99.75	12,812.00	100.00	1	2
Dixville	Coos	Yes	31,455.3	31,369.93	30,782.74	98.13	30,782.74	100.00	7	22
Dummer	Coos	Yes	31,461.4	30,629.57	27,588.22	90.07	23,371.09	84.71	86	145
Errol	Coos	No	44,443.0	38,930.19	32,784.10	84.21	31,385.80	95.73	60	134
Erving's Location	Coos	No	2,401.7	2,401.71	2,177.00	90.64	0	0.00	1	1
Jefferson	Coos	No	32,206.6	32,061.52	16,703.01	52.10	11,211.38	67.12	259	383

Town	County	Host Community	Total Area (acres)	Total Land (acres)	Current Use (acres)	Current Use (%)	Recreation Adj. (acres)	Recreation Adj. (%)	Owners in CU (#)	Parcels in CU (#)
Kilkenny	Coos	No	16,444.2	16,440.38	0	0.00	0	0.00	0	0
Lancaster	Coos	Yes	32,763.6	32,129.91	24,636.87	76.68	9,912.78	40.24	337	642
Low & Burbank's Grant	Coos	No	16,728.2	16,728.20	0	0.00	0	0.00	0	0
Milan	Coos	No	41,247.1	40,916.29	29,264.22	71.52	22,549.83	77.06	164	311
Millsfield	Coos	Yes	28,937.8	28,715.83	27,140.85	94.52	27,140.85	100.00	13	11
Northumberland	Coos	Yes	23,558.9	23,505.48	16,628.62	70.74	9,309.24	55.98	164	330
Odell	Coos	No	28,806.8	28,613.96	11,740.00	41.03	0	0.00	1	1
Pittsburg	Coos	Yes	186,430.5	180,680.46	130,746.93	72.36	126,875.04	97.04	122	252
Randolph	Coos	No	30,142.3	30,114.14	2,715.28	9.02	1,980.38	72.93	57	87
Second College Grant	Coos	No	26,773.9	26,742.30	26,615.72	99.53	26,615.72	100.00	1	4
Stark	Coos	Yes	38,221.8	37,901.86	11,079.12	29.23	7,339.59	66.25	129	248
Stewartstown	Coos	Yes	30,019.1	29,772.67	23,448.15	78.76	16,151.24	68.88	246	393
Stratford	Coos	No	51,231.5	51,146.78	35,807.34	70.01	32,638.97	91.15	159	273
Success	Coos	No	36,491.6	36,184.99	27,301.90	75.45	27,301.90	100.00	4	7
Wentworth's Location	Coos	No	12,326.1	11,885.79	8,863.94	74.58	8,863.94	100.00	7	7
Whitefield	Coos	Yes	22,231.9	21,949.63	16,983.29	77.37	4,728.23	27.84	246	429
Alexandria	Grafton	No	27,921.2	27,867.66	19,085.93	68.49	2,372.20	12.43	228	445
Ashland	Grafton	Yes	7,533.8	7,244.43	3,126.60	43.16	1,634.79	52.29	56	98
Bethlehem	Grafton	Yes	58,205.9	58,164.53	18,365.00	31.57	4,904.00	26.70	259	465
Bridgewater	Grafton	Yes	13,890.3	13,743.33	8,587.00	62.48	4,148.00	48.31	110	180
Bristol	Grafton	Yes	14,022.2	10,928.75	6,189.50	56.64	3,970.27	64.15	132	202
Campton	Grafton	No	33,619.9	33,240.27	21,470.22	64.59	16,830.41	78.39	199	362
Easton	Grafton	No	19,934.0	19,929.03	4,658.04	23.37	2,346.72	50.38	61	74
Franconia	Grafton	No	42,124.1	42,073.06	7,145.22	16.98	627.23	8.78	144	220
Grafton	Grafton	No	27,139.0	26,626.16	19,717.99	74.05	3,255.58	16.51	245	409
Groton	Grafton	No	26,085.2	26,056.40	18,004.24	69.10	13,051.41	72.49	102	177
Hebron	Grafton	No	12,150.5	10,789.93	4,007.46	37.14	3,487.83	87.03	31	44
Holderness	Grafton	No	22,970.3	19,539.33	11,549.52	59.11	3,234.05	28.00	169	247
Landaff	Grafton	No	18,223.6	18,181.35	11,425.22	62.84	5,357.96	46.90	135	247

Town	County	Host Community	Total Area (acres)	Total Land (acres)	Current Use (acres)	Current Use (%)	Recreation Adj. (acres)	Recreation Adj. (%)	Owners in CU (#)	Parcels in CU (#)
Lincoln	Grafton	No	83,843.7	83,701.56	1,261.49	1.51	317	25.13	12	13
Lisbon	Grafton	No	17,065.6	16,960.82	13,346.99	78.69	3,738.62	28.01	215	329
Littleton	Grafton	No	34,555.3	32,021.11	18,866.77	58.92	7,539.84	39.96	256	272
Lyman	Grafton	No	18,355.9	18,173.01	16,228.47	89.30	3,955.11	24.37	228	334
Orange	Grafton	No	14,799.7	14,775.65	8,585.13	58.10	3,863.30	45.00	94	134
Plymouth	Grafton	No	18,232.6	18,063.11	12,924.94	71.55	3,155.00	24.41	244	367
Rumney	Grafton	No	27,270.2	26,863.89	10,177.70	37.89	7,064.72	69.41	184	271
Sugar Hill	Grafton	No	11,027.6	10,955.99	8,089.52	73.84	2,931.97	36.24	170	270
Goffstown	Hillsborough	No	24,064.5	23,771.76	10,179.00	42.82	3,290.00	32.32	228	364
Manchester	Hillsborough	No	22,354.6	21,150.74	1,225.97	5.80	0	0.00	25	45
Weare	Hillsborough	No	38,463.5	37,795.49	17,479.30	46.25	6,380.85	36.51	416	813
Allenstown	Merrimack	Yes	13,167.4	13,097.91	3,096.61	23.64	1,919.22	61.98	71	114
Andover	Merrimack	No	26,271.5	25,720.10	17,470.43	67.93	8,542.55	48.90	217	302
Boscawen	Merrimack	No	16,252.1	15,912.78	9,937.31	62.45	6,735.29	67.78	153	226
Bow	Merrimack	No	18,269.3	18,029.70	4,768.57	26.45	2,428.33	50.92	138	229
Canterbury	Merrimack	Yes	28,696.6	28,123.94	19,834.76	70.53	10,801.12	54.46	376	545
Chichester	Merrimack	No	13,628.1	13,564.59	8,008.13	59.04	3,524.04	44.01	212	318
Concord	Merrimack	Yes	42,999.8	40,933.68	15,663.06	38.26	4,780.91	30.52	305	489
Danbury	Merrimack	No	24,343.4	24,161.79	16,993.01	70.33	9,202.20	54.15	164	272
Dunbarton	Merrimack	No	20,045.6	19,733.94	8,706.38	44.12	3,468.00	39.83	245	285
Epsom	Merrimack	No	22,152.7	22,066.73	14,948.59	67.74	911.57	6.10	258	448
Franklin	Merrimack	Yes	18,661.6	17,708.94	8,690.47	49.07	3,473.52	39.97	148	241
Hill	Merrimack	Yes	17,107.1	17,068.51	10,268.51	60.16	4,201.10	40.91	153	225
Hooksett	Merrimack	No	23,760.6	23,164.24	5,772.44	24.92	1,808.00	31.32	95	243
Hopkinton	Merrimack	No	28,851.6	27,698.36	14,664.60	52.94	1,061.02	7.24	338	595
Loudon	Merrimack	No	29,896.6	29,452.51	18,162.05	61.67	9,594.02	52.82	324	469
Northfield	Merrimack	Yes	18,485.7	18,299.61	11,909.45	65.08	6,902.08	57.95	224	351
Pembroke	Merrimack	Yes	14,597.2	14,486.99	8,227.79	56.79	2,710.45	32.94	203	296
Pittsfield	Merrimack	No	15,558.7	15,440.25	10,140.18	65.67	3,437.22	33.90	221	380
Salisbury	Merrimack	No	25,468.3	25,318.43	18,154.84	71.71	9,295.30	51.20	246	338

Town	County	Host Com-munity	Total Area (acres)	Total Land (acres)	Current Use (acres)	Current Use (%)	Recreation Adj. (acres)	Recreation Adj. (%)	Owners in CU (#)	Parcels in CU (#)
Warner	Merrimack	No	35,502.0	35,352.29	23,507.85	66.50	11,621.67	49.44	395	613
Webster	Merrimack	No	18,425.8	18,089.48	12,127.28	67.04	5,718.78	47.16	213	349
Wilmot	Merrimack	No	18,955.4	18,819.23	12,921.90	68.66	4,042.19	31.28	214	365
Auburn	Rockingham	No	18,437.9	16,308.08	3,364.33	20.63	1,110.72	33.01	90	104
Brentwood	Rockingham	No	10,863.0	10,860.84	4,767.84	43.90	1,149.00	24.10	189	133
Candia	Rockingham	No	19,557.1	19,408.37	9,759.01	50.28	0	0.00	254	319
Chester	Rockingham	No	16,717.7	16,661.63	7,208.00	43.26	1,251.00	17.36	197	149
Deerfield	Rockingham	Yes	33,347.7	32,496.62	19,484.51	59.96	5,022.60	25.78	388	552
Epping	Rockingham	No	16,775.6	16,690.35	9,327.92	55.89	4,934.66	52.90	169	350
Fremont	Rockingham	No	11,142.4	11,043.22	6,405.59	58.00	924.36	14.43	160	260
Newmarket	Rockingham	No	9,080.3	8,042.28	2,985.46	37.12	428	14.34	86	148
Northwood	Rockingham	No	19,356.9	18,002.60	9,593.06	53.29	2,925.42	30.50	243	365
Nottingham	Rockingham	No	30,996.6	29,775.88	17,782.47	59.72	9,983.83	56.14	292	419
Raymond	Rockingham	No	18,943.5	18,440.21	5,658.69	30.69	102	1.80	113	164
Barrington	Strafford	No	31,117.2	29,887.06	12,218.90	40.88	3,660.63	29.96	292	505
Lee	Strafford	No	12,927.2	12,788.34	7,040.53	55.05	2,148.24	30.51	229	320
Madbury	Strafford	No	7,799.0	7,390.13	3,660.81	49.54	705.06	19.26	100	149
Strafford	Strafford	No	32,778.8	31,342.75	21,249.00	67.80	8,711.00	40.99	369	597
TOTALS			**2,793,845.1**	**2,698,670.5**	**1,514,368.5**	**56.12**	**884,100.14**	**58.40**	**18,035**	**28,704**

Table 6. The Number of Potential Scenic Resources within the NPT Terrain Viewshed by Town

Town Name	A.1. Scenic Byways	A.2. Designated Rivers	B.1. Conservation/Public Lands	C.1 1. Great Ponds	C.1 2. Public Rivers	C.2 1. Scenic Drives/Public Roads	D.1 1. Recreational Trails	D.2 1. Access Sites to Public Waters	D.1 1. Recreation Inventory	E. 1. Listed Historic Resource: Polygons	E.2. Listed Historic Resource: Points	E.3. Potential Historic Resources	F.1. Community Center Areas	2.1 Community Identified Resources	Grand Total
Alexandria			9	1	11	132	58		1						212
Allenstown		1	8	8	27	353	88	5	7		2	30	1		530
Andover			22	2	9	40	9			1					83
Ashland		12	6	4	19	225	2		5		5	28	1	4	311
Auburn			2			8									10
Barrington			13	1	1	75	4								94
Belmont			2	1	4	51			2						60
Berlin	1		4	2	11	16	69							1	104
Bethlehem	45	1	19	5	66	269	24		11	2		68	1	14	525
Boscawen		2	43	7	26	289	19	2	6		4	10	1		409
Bow		1	41	2	19	459	48	1	6						577
Bridgewater		10	6	2	10	101		1						12	142
Bristol		19	16	2	23	331	6	8	8		2	70	2	8	495
Cambridge	1		4		6	1	6	1							19
Campton			3		7	16	7								33
Candia	3	1	15		10	94	4	1	3				1		132
Canterbury	8	1	54	12	36	246	15	2	6	1	1	84	1	5	472
Carroll	9		10		13	44	16		1						93
Chester			3		2	10									15
Chichester			17	1	14	168	1		1				1		203
Clarksville	2	4	13	3	17	67	28	1				29		11	175
Colebrook	1		5		11	152	18		2	1			1	11	202
Columbia		1	20		5	56	21							5	108

Town Name	A.1. Scenic Byways	A.2. Designated Rivers	B.1. Conservation/Public Lands	C.1 1. Great Ponds	C.1 2. Public Rivers	C.2 1. Scenic Drives/Public Roads	D.1 1. Recreational Trails	D.2 1. Access Sites to Public Waters	D.1 1. Recreation Inventory	E. 1. Listed Historic Resource: Polygons	E.2. Listed Historic Resource: Points	E.3. Potential Historic Resources	F.1. Community Center Areas	2.1 Community Identified Resources	Grand Total
Concord	2	2	189	28	83	2,581	207	13	43	13	18	177	2	64	3,422
Dalton	1	1	6	4	29	106		1				16		18	182
Danbury			6	1	3	10	6								26
Deerfield	5	5	64	8	35	278	22	2	5	1	1	123	1	48	598
Dixs Grant				1	9		4							1	15
Dixville	1		4	2	18	3	44		2					7	81
Dummer	2		10	5	24	52	2	5				22		8	130
Dunbarton	11		16		3	50	2						1		83
Epping			7			17									24
Epsom			24	3	36	331	3		7		1	31	1		437
Errol	2		42	3	16	62	13	1	1				1		141
Ervings Location			2		1										3
Franconia			2		4	1	18								25
Franklin	1	21	22	13	55	610	10	8	17	2	1	123	1		884
Fremont						3									3
Gilmanton			1			2									3
Groton			2		2										4
Hebron			8	1	8	74	5	3	5	1					105
Hill		12	25	2	16	144	9	1	2	1	1	14	1	3	231
Holderness	2	2	12	2	8	71	6		3		2			7	115
Hooksett		1	35	7	18	344	6	1	3				2		417
Hopkinton	3		24	1	3	102	6		1				2		142
Jefferson	31		49	6	37	237	31	2	8	1		16	1	8	427
Kilkenny			1		7		21							3	32
Laconia	2		4		1	34	8		2						51
Lancaster	20	1	28	9	50	328	47	2	11		5	41	1	37	580
Lee			10		2	59			4				1		76

Town Name	A.1. Scenic Byways	A.2. Designated Rivers	B.1. Conservation/Public Lands	C.1 1. Great Ponds	C.1 2. Public Rivers	C.2 1. Scenic Drives/Public Roads	D.1 1. Recreational Trails	D.2 1. Access Sites to Public Waters	D.1 1. Recreation Inventory	E. 1. Listed Historic Resource: Polygons	E.2. Listed Historic Resource: Points	E.3. Potential Historic Resources	F.1. Community Center Areas	2.1 Community Identified Resources	Grand Total
Lisbon						1									1
Littleton	29	1	9	2	18	261			8		1		1	3	333
Loudon			23	1	11	175	4		3					3	220
Low & Burbanks			2		4		2								8
Manchester						7									7
Meredith	1		28	3	11	105	9		3		1		1		162
Milan	2		11	2	21	118	8							3	165
Millsfield	1		2	4	28	1	17	1	2			7		5	68
New Hampton		43	40	7	36	284	2	3	3		5	51	1	19	494
Northfield		1	4	8	25	283	1		6		2	24	2		356
Northumberland	3	1	15	4	30	156	9	1	5			26	1	10	261
Northwood	1	1	23	3	13	105	9		2						157
Nottingham		9	26	5	21	97	10		2				1		171
Odell			3	1	8		1								13
Orange			1				1								2
Pembroke		1	18	4	46	287		3	9			106	1	7	482
Pittsburg	1	2	25	2	32	219	29	1	3		1	11	1	10	337
Pittsfield			4		2	58				1			1		66
Plymouth	4	10	3		10	158	1	1	1		2	4	1	13	208
Randolph			4		3	1	3								11
Raymond		2	11	2	15	219	2	1	2				1		255
Rumney			2		2	1									5
Salisbury	1		10	1	8	35	1	1	1				1		59
Sanbornton		12	21	3	18	140	11	1	5	1			2	2	216
Second College			1		13		1								15
Stark	1		30	6	44	158	33	3	1		1	40	1	24	342
Stewartstown	2	1	18	3	16	181	46	1	1			24	1	26	320

Town Name	A.1. Scenic Byways	A.2. Designated Rivers	B.1. Conservation/Public Lands	C.1 1. Great Ponds	C.1 2. Public Rivers	C.2 1. Scenic Drives/Public Roads	D.1 1. Recreational Trails	D.2 1. Access Sites to Public Waters	D.1 1. Recreation Inventory	E. 1. Listed Historic Resource: Polygons	E.2. Listed Historic Resource: Points	E.3. Potential Historic Resources	F.1. Community Center Areas	2.1 Community Identified Resources	Grand Total
Strafford			6		1	5								1	13
Stratford	1	1	19		12	37	27	1	1					4	103
Success			1												1
Sugar Hill	1		5		1	15								2	24
Tilton			5	1	6	170			3		1		1		187
Warner			4		4	2	9								19
Weare	2					3									5
Webster	1		12	1	2	46					1				63
Wentworth's Location			1	1	6		2								10
Whitefield	20		22	5	29	283	5	4	8	1		115	1	37	530
Wilmot			1				2								3
Grand Total	**224**	**183**	**1,338**	**218**	**1,311**	**12,313**	**1,158**	**83**	**242**	**27**	**58**	**1,290**	**44**	**444**	**18,933**

4.1.4 Summary

The results of this exercise provide a preliminary identification of scenic resources as defined by Site 102.45 using standard spatial databases that are mostly available through the State of New Hampshire. The results found a very large number, possible more than 18,000 potential scenic resources within APVI that should be further evaluated. This systematic approach further illustrates the clear deficiencies in the number of scenic resources that were identified in the NPT VIA.

Nonetheless, some of the scenic resource categories are clearly not adequately represented, which would further increase the number of scenic resources:

- Potentially historic resources eligible for listing on the National Register of Historic Places located beyond 1 mile of the NPT centerline are not identified.
- Other tourist destinations are not inventoried because a special data source could not be identified. The official New Hampshire Visitor's Guide included in Appendix D might provide a starting point.
- Recreation lands open to the public as a condition of current use tax assessment are not identified, which includes approximately a third of the land area for towns within 10 miles of the NPT centerline.

In addition, the spatial structure of the constituent data effects the number of scenic resources being identified.

- Public roads are inventoried by segment, normally the stretch between two intersections. As a result, each road segment that potentially would have visibility is identified as a scenic resource.
- Scenic byways are mostly organized into very long segments, resulting in fewer segments that potentially would have visibility.

Finally, some databases overlap or are closely related.

- Scenic byways are all also public roads.
- Designated rivers are all also public rivers.
- Listed historic resources within 1 mile of the NPT centerline are all included in the potential historic scenic resources.
- Recreation inventory includes a point within many of the conservation land areas.
- Access sites to lakes and rivers are all located adjacent to public waters.
- Community identified resources may already covered in other categories.

The significance of Table 6 is not the absolute marginal values for each town or scenic resource, but that there are a great number of scenic resources that need to be visited and evaluated, as required by Site 301.05(b)(5) and (6). In addition, these results demonstrate the viability of holding public workshops to identify locally important community resources. Many of these resources are not part of a state-wide spatial database, and their significance can fall through the cracks.

The NPT VIA (2015) identified 680 scenic resources, of which 115 are identified as having possible visibility.[15] Most of these scenic resources are within 3 miles of the NPT centerline, though some are as distant as 5 miles. DeWan & Associates submitted additional information in February 2016 that included 99 additional scenic resources with potential visibility that are within 10 miles of the NPT centerline. Clearly

[15] NPT Scenic Resources Spreadsheet.xlsx, provided on September 9, 2016 as part of the "unofficial" discovery information (DeWan & Associates 2016 provided by the applicant's attorney)

this falls far short of the number of scenic resources that potentially would be visible, as indicated in Table 6.

This independent investigation of scenic resources is intended as the preliminary identification of scenic resources for the required VIA analysis. It demonstrates that existing databases could be used to greater effect than they were in the NPT VIA (2015). It also demonstrates a reasonable approach to involving the public in the identification of scenic resources. The intent is that this investigation would be used to guide fieldwork to document the conditions, gather further information and initiate the visual impact evaluation as required by Site 301.05(b)(5) and (6).

4.2 User Expectations and Effect on Future Use and Enjoyment

4.2.1 Introduction

The SEC Rules (Site 301.05(b)(6)) require that in the evaluation of potential visual impacts to a scenic resource, the evaluation must take into consideration several factors, including:

a. The expectations of the typical viewer;
b. The effect on future use and enjoyment of the scenic resource;

In addition, the SEC Rules (Site 301.14(a)) direct the SEC to consider the following additional criterion relative to findings of unreasonable adverse effects:

(3) The extent, nature, and duration of public uses of affected scenic resources;

Research fields investigating recreation experience and landscape perception have developed relatively independent of each other. As a result, there is relatively little research about the relationship between scenery and recreation (or other) activities. Even less is known about how visual impact might affect a typical viewer's expectations, enjoyment and future use of a scenic resource.

The most relevant experience from New England that applies these two (or three) evaluation criteria comes from intercept surveys of users of scenic resources in Maine. These surveys were conducted to evaluate the scenic impact of proposed wind energy projects. Maine's Wind Energy Act (35-A MRSA § 3452) includes two similar criteria:

3. Evaluation criteria. In making its determination pursuant to subsection 1, and in determining whether an applicant for an expedited wind energy development must provide a visual impact assessment in accordance with subsection 4, the primary siting authority shall consider:

   C. The expectations of the typical viewer;
   E. The extent, nature and duration of potentially affected public uses of the scenic resource of state or national significance and the potential effect of the generating facilities' presence on the public's continued use and enjoyment of the scenic resource of state or national significance;

These criteria are investigated in part by having scenic resource users evaluate photographic simulations at or near a simulation's viewpoint. A review and analysis of the data from intercept surveys conducted for 10 wind projects found that:

Overall respondents found that the scenic impacts were very large (Hedges $g < 1.1$), while the effect of the change on enjoyment was so small that it is difficult to distinguish ($0.2 < g < 0.5$), and

> respondents say that the change will have a trivial effect ($g < 0.2$) on their continued use of the scenic resource where they were surveyed (Palmer 2015).

Intercept studies have greater validity because the respondents are being asked to make their evaluation in the context of the effected activities and scenic resource. However, these intercept studies concerned wind energy development, and the results may not be transferable to large transmission lines.

One of the Maine wind studies included a supplementary web-based survey managed by e-Rewards (Portland Research Group 2011). A panel of respondents was invited to participate because they lived in northern New England, regularly participated in non-motorized outdoor activities, and had hiked in Maine in the past 3 years. The survey was conducted between August 20 and 31, 2010, and was submitted into the public record as part of the Highland Wind Project permit application. In this survey, 104 respondents compared the effects of several types of development in the Western Maine mountains, including energy facilities such as wind farms and electrical transmission lines. An independent analysis of these data shows that the respondents' expectation that they would see a wind farm or a transmission line was neither very likely nor very unlikely. However, they thought the effect on their overall enjoyment would be slightly positive for wind farms and slightly negative for transmission lines, and the difference between the two is large enough that it would have a noticeably different effect on their experience. Respondents were neutral about how the presence of a wind farm would affect their likelihood of returning, but transmission lines had a slightly negative effect; the difference between the two was more moderate than the effect on enjoyment. These results suggest that the experience of people who regularly participate in non-motorized outdoor recreation may be more negatively affected by the visual impacts of transmission lines than wind farms.

There do not appear to be any other published studies applying these same evaluation criteria to specific projects.

However, there is another study from New England that investigated the relationship between participation in recreation and perceptions of clearcuts in the White Mountain National Forest (Palmer 1999). Recreation activities were grouped into four guilds:

1. Campcraft (e.g., bicycling, canoeing, camping, cross-country skiing, horseback riding, backpacking, and gathering edible plants);
2. Studying (e.g., nature study, visiting cultural sites, and environmental education);
3. Motorized (e.g., ATVing, snowmobiling, and power boating); and
4. Prey (e.g., fishing, and hunting)

The respondents included a sample of hikers, intercepted at the viewpoints used for the simulations, members of two NH government committees, and USFS employees. The study results are summarized as:

> All respondents have similar high scenic ratings for unharvested views. However, motorized and prey recreationists tend to rate harvested views as more scenic than do non-participants of these sports.
>
> Prey sports enthusiasts also associate positive recreation opportunities with clearcutting. Motorized recreationists also have this tendency, though it does not achieve statistical significance. For both prey and motorized recreationists there is an interaction effect such that the greater the recreation opportunity they anticipate from harvesting, the higher their scenic value ratings of harvested areas (Palmer 1999).

In summary, this study provides evidence that participants in outdoor recreation activities do not all share a similar sensitivity to the visual impacts associated with clear-cut harvests. In particular, people engaged in motorized and prey sports are relatively less sensitive than those engaged in campcraft and study. However,

this study considers only the relation between recreation activity and perceived scenic impact, not the effect on enjoyment and future use.

The remainder of this section evaluates two previously unreported analyses that relate the importance of scenery in New Hampshire to the enjoyment of various activities. The first is a reanalysis of the data from a 2006 survey sponsored by the New Hampshire Lakes Association. One of the reasons this survey is important is because it pre-dates public knowledge of the NPT. The second analysis comes from the data collected through the community workshops sponsored by Counsel for the Public, and described in section 4.1, describing the identification of scenic resources.

4.2.2 New Hampshire Lakes Association's Survey

The New Hampshire Lakes Association sponsored a survey of water-based summer recreation users in 2006. This study was conducted to determine the economic contribution made by multiple recreation uses of freshwater in the state. In particular, the study investigated people engaged in five water-based recreation activities, and the effect on future visits if the "quality of natural beauty and scenery would become poorer" (Nordstrom 2007, p. 82). The results from the survey are reported in *The Economic Impact of Potential Decline in New Hampshire Water Quality: The Link Between Visitor Perceptions, Usage and Spending*, (Nordstrom 2007). An excerpt from the Executive Summary describes the study design:

> This study collected primary data from resident and non-resident recreationalists who fish, boat and swim in New Hampshire lakes, ponds, rivers and streams. There are more than 400 public and quasi-public access points to the approximately 1000 lakes, ponds and 12,000 miles of rivers and streams in New Hampshire. This research commenced by selecting a random sample of access points, stratified by the seven designated tourism regions in New Hampshire, to represent all access points in New Hampshire. A total of 75 sites throughout the state were identified as data collection points. Data collection consisted of a four-page questionnaire administered on-site to recreationalists who were angling, boating or swimming. Data collection took place from Memorial Day weekend through Labor Day weekend, 2006--- during an unusually cold and rainy summer in New Hampshire. (Nordstrom 2007, p. 3)

Though the weather was less than optimal, the survey was able to attract a good cross-section of freshwater resource users. The following excerpt from the report characterizes the response:

> A total of 912 people were surveyed, 843 of whom provided usable data. The majority of visitors in the sample were New Hampshire residents (65%), and 60% of all visitors were away from home for less than 1 day. Visitors traveled a median of 25 miles from home to the site where they were interviewed: non-residents traveled about 130 miles while residents traveled 15 miles. Twenty percent of all visitors were from Massachusetts.
>
> Non-residents, who made up 35% of the sample, tended to be away from home a median of seven days, three of which were spent visiting the site where they were interviewed. Of the non-resident visitors, 57% were from Massachusetts; 8% from Connecticut; 5% each were from Vermont and Maine, and the remainder of visitors were from a variety of other states and countries. (Nordstrom 2007, p. 24)

Ann Nordstrom and the New Hampshire Lakes Association have provided the survey data for the purpose of preparing custom tabulations pertinent to reviewing the relationship between scenic quality or visual impact and recreation activities.

The study did not include autumn or winter based activities such as hunting, ice-fishing, skiing and snowshoeing, or snowmobiling, all of which commonly occur on New Hampshire lakes, ponds and rivers in the autumn and winter seasons.

Results

The study focused on five common water-based summer activities, as shown in Table 7, with swimming being the most common by far, but substantial numbers of respondents also engaged in boat and shore fishing, and power and non-power boating. There are 11 respondents that indicated some other activity—they are not included in the results reported here.

Table 7. Primary Activity

Activity	Count	Percent
Freshwater swimming	322	38.7
Boat fishing	158	19.0
Shore fishing	131	15.7
Power boating	115	13.8
Non-power boating	106	12.7
Total	**832**	**99.9**

Question: What is your primary freshwater recreation activity for this entire trip or day?

The interviews were conducted at water-based recreation sites, and the respondents were asked: "How would you characterize the quality of the natural views and scenery at this water body?" There were only three possible responses, but the overwhelming majority indicated the highest rating available, as shown in Table 8.

Table 8. Quality of Scenery by Primary Activity

Activity	Percent			Total Count
	Poor	Fair	Good	
Freshwater swimming	0.3	4.7	95.0	320
Boat fishing	0.6	10.2	89.2	157
Shore fishing	0.8	15.3	84.0	131
Power boating	0.9	4.6	94.5	110
Non-power boating	1.0	9.5	89.5	105
Total	**0.6**	**8.0**	**91.4**	**823**

Question: How would you characterize the quality of the natural views and scenery at this water body?

A follow-up question asked: "How satisfied are you with the quality of natural views and scenery at this site?" The results given in Table 9 are very similar to those in Table 8, the differences may be attributed to using a four-level scale. The upshot is that users considered the scenery at water-based recreation sites to be generally good, and the people using these sites find it very satisfactory. Information about the relative importance of scenery to the experience of each activity was not investigated.

Table 9. Satisfaction with Scenery at Site by Primary Activity

Activity	Percent				Total Count
	Not very	Somewhat	Satisfied	Very	

Freshwater swimming	0.0	4.7	25.0	70.3	320
Boat fishing	0.0	5.1	36.3	58.6	157
Shore fishing	0.0	10.7	41.2	48.1	131
Power boating	0.0	5.5	27.5	67.0	109
Non-power boating	0.0	2.9	30.8	66.3	104
Total	**0.0**	**5.6**	**30.8**	**63.6**	**821**

Question: How satisfied are you with the quality of natural views and scenery at this site?

Respondents were then asked: "If you knew that the quality of natural beauty and scenery would become poor(ER) in the next year, would you change your number of planned visits to this site?" The cause of this degradation of scenic quality was not stated, and it seems ambiguous whether the term "poor(ER)" refers to the lowest possible level of scenic quality reported in Table 8, or some unknown level of degradation, and we discuss the strengths and weaknesses of this approach below. In any case, the results in Table 10 show that there is some variation among recreation activities concerning how scenic impacts are anticipated to affect future use. Users of non-power boating (i.e., kayaks and canoes) are most likely effected by scenic degradation, and power boat users are the least likely, but people engaged in all these activities expected that scenic degradation would negatively affect their future use of the area.

Table 10. Effect of Poorer Scenery on Future Use

Activity	Percent		Total Count
	No Effect	Yes, Negatively	
Freshwater swimming	41.4	58.6	321
Boat fishing	51.6	48.4	157
Shore fishing	46.6	53.4	131
Power boating	58.7	41.3	109
Non-power boating	26.0	74.0	104
Total	**44.7**	**55.3**	**822**

Question: If you knew that the quality of natural beauty and scenery would become poor(ER) in the next year, would you change your number of planned visits to this site?

One of the early questions in the survey was how many days they expected to visit this same area in the coming year. The last question about scenic quality asked how many fewer days they anticipated visiting the area if the scenic quality were poorer. Table 11 reports the results, which are similar to the results in Table 4. Swimmers and people fishing from the shore anticipate the greatest reduction in the number of days. However, non-power boaters anticipate the greatest percent reduction in visitation, while power boaters anticipate the least percent reduction in their visitation to the area.

Table 11. Effect of Poorer Scenery on Next Year's Visitation by Activity

Activity	Total Visits Next Year (Days)	Effect of Poor Scenery		Total Count
		Fewer Days	Percent Reduction	

Freshwater swimming	18.5	8.4	43.7	317
Boat fishing	19.0	5.6	33.0	158
Shore fishing	19.8	6.9	38.1	128
Power boating	28.6	5.9	26.4	114
Non-power boating	13.9	6.7	59.9	104
Total	**19.6**	**7.1**	**40.6**	**821**

Question: If you knew that the quality of natural beauty and scenery would become poor(ER) in the next year, would you change your number of planned visits to this site? How many days?
Note: Percent Reduction = Fewer Days / Total Days * 100.

Discussion

It is quite fortuitous that New Hampshire Lakes Association conducted the NH LAKES survey and the data are still available at the time that VIA professionals are working to understand the meaning of the SEC evaluation criteria and how to apply them. However, the study was designed and conducted to understand the economic contribution of freshwater recreation to New Hampshire's economy. As a result, it provides both strengths and weaknesses for the purposes to which it is applied here.

From one perspective, the study has relatively strong ecological validity, in that it is conducted at freshwater sites, and the respondents were engaged while recreating at these sites. In addition, the evaluation of scenic quality is related to the specific site at which the respondents are recreating. This is in contrast to most landscape perception studies, which employ photographs and are conducted away from the sites and experiences being evaluated. For instance, students in a darkened room may evaluate slides of summer scenes while it is snowing outside. There is some research to indicate that such practices reduce a study's validity (Palmer 1990).

On the other hand, this survey was not designed specifically to investigate the VIA criteria adopted by the SEC—expectations of a typical viewer, and the effect on future use and enjoyment. The questions about existing scenic quality are specific to the site, but there is no real context for judging future scenic quality other than it is "poorer," which could be due to all manner of natural or human causes. Nor is there any clear indication of the degree of scenic degradation. For instance, the intercept surveys conducted to evaluate wind energy projects in Maine concern a specific visual change that is portrayed by a photorealistic simulation of a wind turbine, which has a different visual impact than a transmission project.

The results reported here add some support to the idea that there are differences in sensitivity to scenic quality among people engaged in different recreation activities. It also indicates poor scenery would negatively effect future use and reduce the number of future days visited at the sites surveyed. However, we are not able to project the effect of specific scenic impacts from specific viewpoints and for a specific mix of recreationists. Since this is the task required of those preparing a VIA, intercept surveys should be conducted to increase the ecological validity of the assessment. Then the specific results can be discussed in the context of past results linking scenic quality to recreation activity.

4.2.3 Community Identified Resources

Community Workshops that are described above in 4.1.2.2, were held between July 26 and August 17, 2016. Participants in the workshops completed resource identification forms for scenic, historic and cultural resources important to them, and located them on large town maps depicting towns within 10 miles of the ROW. On one side of the form (see Figure 32 above, participants responded to questions about scenic resources:

a. Type of resource (i.e., as defined in Site 102.45)

b. The activities they do at this place

c. Their primary activity

d. Why they chose this place for these activities

e. Rate the importance of scenery in their choice to visit this place

f. Rate the importance of scenery at this place to their enjoyment of the primary activity

g. Rate how scenic or beautiful this place is

In total, 170 people completed 991 resource identification forms at these workshops, or nearly six per person. Four participants identified more than 20 resources, twenty-three identified between 10 and 20 resources, thirty-three people identified between 6 and 9 resources, ninety-one identified between 2 and 5, and nineteen identified a single resource. Some people—about 110—only responded to the historic and cultural side of the form, while others did not complete all of the scenic resource questions.

We do not claim that these data represent a random sample of New Hampshire residents. Rather it is an attempt to engage people from potentially affected communities in a constructive way to describe in simple terms how the landscape is important to them. The analysis presented here summarizes the scenic resource information collected on the identification forms.

Results

Types of Scenic Resources. The type of scenic resource was filled out on the forms for 848 nominated resources. Participants were able to characterize a scenic resource as belonging to more than one type. For instance, a lake could be a recreation area and conservation land; a historic site could be in a village center and be a tourist destination. The results in Table 12 indicate that except for Town centers, each of the scenic resource types applies to 40 to 50 percent of the identified scenic resources. The importance of this table is not the specific numbers, which are acknowledged not to be based on a scientific sample, but the range of places that the people who attended the workshops indicated are important to their community.

Table 12. Characterization of Community Identified Resources

Type of Scenic Resource	Number	Percent Total
Conservation lands	343	40.45
Lakes, ponds, or rivers	351	41.39
Recreation parks/areas	350	41.27
Trails	382	45.05
Tourism destination	374	44.10
Town/Village center	117	13.80
Scenic drive	356	41.98
Historic site/area	401	47.17
Number of Scenic Resources	848	100.00

Scenic Quality of Community Identified Resources. Site 102.45 stipulates that a scenic resource must "possess a scenic quality," unless it is a recreation area "established, protected or maintained in whole or in part with public funds." Site 102.44 states:

> "Scenic quality" means a reasonable person's perception of the intrinsic beauty of landforms, water features, or vegetation in the landscape, as well as any visible human additions or alterations to the landscape.

Workshop participants, who are all assumed to be reasonable people, were asked: "thinking of the range of scenic quality found in New Hampshire, how scenic or beautiful would you rate this place?" The rating scale ranges from 1 for lowest scenic value to 7 for highest scenic value. The frequencies listed in Table 13 show that while the full range of the scale was used, it was heavily skewed toward the highest scenic value. The overall mean ratings for each type of scenic resource shown in Table 14 indicate that overall scenic value for community identified resources is high. The importance of this table is not the specific numbers, which are acknowledged not to be based on a scientific sample, but to demonstrate what a wide range of places people identify as important to their community have scenic quality.

Table 13. Scenic Quality of Community Identified Resources

Rating	Number	Percent Total
1 – Lowest scenic value	1	0.12
2	6	0.72
3	14	1.69
4	47	5.66
5	131	15.78
6	185	22.29
7 – Highest scenic value	446	53.74
Number of Responses	830	100.00

Table 14. Scenic Quality of Community Identified Resources by Scenic Resources Type

Type of Scenic Resource	Mean	Std. Deviation	Number
Conservation lands	6.29	1.004	342
Lakes, ponds, or rivers	6.31	0.940	348
Recreation parks/areas	6.36	0.987	348
Trails	6.31	0.979	380
Tourism destination	6.49	0.848	368
Town/Village center	6.29	1.028	112
Scenic drive	6.44	0.805	355
Historic site/area	6.19	1.090	387

Importance of Scenery in Place Selection. People go to places to participate in an activity, but scenery may play a role in choosing one place over another. Workshop participants were asked "scenery is more important for choosing to visit some places than others—how important is scenery in your choice to visit this place?" The rating scale ranges from 1 for very unimportant to 7 for very important. Table 15 shows that the full range of the scale was used; the overall mean ratings for each type of scenic resource shown in Table 16 indicates that overall scenery is an important reason why they choose to use these places. The importance of these tables is not the specific numbers, which are acknowledged not to be based on a scientific sample, but to demonstrate that people choose one place over another, in part because of their scenic quality.

Table 15. Importance of Scenery to Place Selection

Rating	Number	Percent Total
1 – Very Unimportant	5	0.60
2	3	0.36
3	13	1.56
4	30	3.61
5	80	9.62
6	173	20.79
7 – Very Important	528	63.46
Number of Responses	832	100.00

Table 16. Importance of Scenery to Place Selection for Different Types of Scenic Resources

Type of Scenic Resource	Mean	Std. Deviation	Number
Conservation lands	6.56	0.867	342
Lakes, ponds, or rivers	6.55	0.818	348
Recreation parks/areas	6.53	0.857	348
Trails	6.53	0.890	381
Tourism destination	6.57	0.832	369
Town/Village center	6.41	1.031	111
Scenic drive	6.57	0.843	354
Historic site/area	6.34	1.112	388

Activities. Participants were asked to provide a short description of what activities they did at the identified scenic resource, and to circle the primary activity. A total of 770 participants described their activities, and 427 identified a primary activity. Forty-six distinct activities were mentioned, of these 39 were identified as a primary activity. The number of people mentioning each activity is reported in Table 17, along with the number of times it was identified as the primary activity. This table is sorted so that the most frequently mentioned activities are listed first. The importance of this table is not the specific numbers, which are

acknowledged not to be based on a scientific sample, but the wide range of activities that people indicate they are doing at places they believe are important to their community.

Table 17. Mentioned and Primary Activities

Activity	Mentioned		Primary	
	Number	Percent	Number	Percent
Hiking	251	32.60	87	20.38
Appreciate scenery	204	26.49	75	17.56
Walking & dog walking	113	14.68	20	4.68
Fishing	99	12.86	30	7.03
Appreciate nature	91	11.82	14	3.28
Swimming	87	11.30	7	1.64
Canoeing, kayaking & sailing	75	9.74	12	2.81
Driving	70	9.09	39	9.13
Bicycling	62	8.05	5	1.17
Appreciate History	54	7.01	29	6.79
Photography	48	6.23	19	4.45
Picnicking	44	5.71	2	0.47
Community & town Events	41	5.32	5	1.17
Cross Country Skiing	39	5.06	2	0.47
Reflection & relaxation	35	4.55	4	0.94
Bird watching	34	4.42	3	0.70
Boating--motorized or unspecified	32	4.16	3	0.70
Agriculture	30	3.90	9	2.11
Misc. outdoor activities	30	3.90	2	0.47
Hunting	29	3.77	2	0.47
Snowmobiling	29	3.77	5	1.17
Skiing (unspecified)	28	3.64	3	0.70
Socializing	28	3.64	3	0.70
Camping	27	3.51	5	1.17
Lectures & educational	26	3.38	7	1.64
Shopping	21	2.73	10	2.34
Snowshoeing	19	2.47	2	0.47

Activity	Mentioned		Primary	
	Number	Percent	Number	Percent
ATVing	15	1.95	1	0.23
Fruit picking & foraging	15	1.95	3	0.70
Religious Ceremonies	14	1.82	2	0.47
Business Related	12	1.56	4	0.94
Dining	12	1.56	1	0.23
Golfing	12	1.56	6	1.41
Running & jogging	9	1.17	1	0.23
Lodging & accommodations	7	0.91	1	0.23
Rock Climbing	7	0.91	--	--
Horseback riding	6	0.78	1	0.23
Mountain biking	6	0.78	--	--
Parades & fairs	6	0.78	1	0.23
Airport/airplane	4	0.52	2	0.47
Gardening	4	0.52	--	--
Concerts	3	0.39	--	--
Sunbathing	3	0.39	--	--
Downhill skiing	2	0.26	--	--
Markets	2	0.26	--	--
Painting	1	0.13	--	--
Number of people identifying activities	**770**	**100.00**	**427**	**100.00**

Most common Activities by Type of Scenic Resource. The most common activities for each of the eight types of scenic resources—those activities mentioned by at least 10 percent of the respondents, or identified as the primary activity by 5 percent of the respondents—are reported in Table 18. Some activities are common across all types of scenic resources, for instance hiking, walking, and appreciate scenery, while others are associated primarily with one or two types of scenic resources. Photography is associated with scenic drives and tourist destinations. Appreciating history is associated with historic sites, town or village centers, and tourist destinations. Lecture and educational events, and shopping are only associated with town or village centers.

Table 18. Mentioned and Primary Activities †

Most Common Activities	Mentioned		Primary	
	Number	Percent	Number	Percent

Most Common Activities	Mentioned		Primary	
	Number	Percent	Number	Percent
Conservation Areas				
Hiking	153	49.68	54	35.53
Appreciate scenery	68	22.08	24	15.79
Walking & dog walking	61	19.81	14	9.21
Appreciate nature	59	19.16	--	--
Fishing	42	13.64	8	5.26
Swimming	38	12.34	--	--
Canoeing, kayaking & sailing	36	11.69	--	--
Hiking	153	49.68	54	35.53
Driving	--	--	11	7.24
Lakes, Ponds or Rivers				
Hiking	102	33.44	31	21.83
Fishing	90	29.51	30	21.13
Swimming	80	26.23	--	--
Canoeing, kayaking & sailing	68	22.30	10	7.04
Walking & dog walking	52	17.05	13	9.16
Appreciate nature	51	16.72	10	7.04
Appreciate scenery	50	16.39	15	10.56
Boating--motorized or unspecified	31	10.16	--	--
Recreation Park or Area				
Hiking	133	44.48	43	33.86
Appreciate scenery	64	21.40	15	11.81
Swimming	58	19.40	--	--
Fishing	53	17.73	9	7.09
Walking & dog walking	49	16.39	--	--
Canoeing, kayaking & sailing	42	14.05	9	7.09
Appreciate nature	39	13.04	--	--
Picnicking	34	11.37	--	--
Bicycling	30	10.03	--	--

Most Common Activities	Mentioned		Primary	
	Number	Percent	Number	Percent
Trails				
Hiking	212	60.74	76	52.06
Appreciate scenery	91	26.07	18	12.33
Walking & dog walking	72	20.63	--	--
Appreciate nature	57	16.33	--	--
Swimming	46	13.18	--	--
Fishing	44	12.61	9	6.16
Bicycling	38	10.89	--	--
Tourism Destination				
Hiking	102	32.90	34	19.77
Appreciate scenery	95	30.65	36	20.93
Swimming	37	11.94	--	--
Canoeing, kayaking & sailing	34	10.97	--	--
Fishing	34	10.97	--	--
Photography	33	10.65	19	11.05
Appreciate History	--	--	10	5.81
Driving	--	--	10	5.81
Walking & dog walking	--	--	9	5.23
Town or Village Center				
Appreciate scenery	23.00	27.38	10	21.28
Driving	12.00	14.29	7	14.89
Community & town Events	11.00	13.10	--	--
Hiking	11.00	13.10	3	6.38
Lectures & educational	11.00	13.10	4	8.51
Appreciate History	10.00	11.90	7	14.89
Shopping	--	--	3	6.38
Walking & dog walking	--	--	3	6.38
Scenic Drive				
Appreciate scenery	115	37.95	50	29.76

Most Common Activities	Mentioned		Primary	
	Number	Percent	Number	Percent
Hiking	75	24.75	19	11.31
Driving	64	21.12	36	21.43
Walking & dog walking	47	15.51	10	5.95
Bicycling	44	14.52	--	--
Swimming	35	11.55	--	--
Fishing	33	10.89	--	--
Photography	--	--	11	6.55
Historic Site or Area				
Appreciate scenery	99	30.56	37	21.77
Hiking	90	27.78	27	15.88
Walking & dog walking	54	16.67	11	6.47
Appreciate History	47	14.51	24	14.12
Driving	36	11.11	16	9.41

† Mentioned by 10 percent or more respondents; primary for 5 percent or more.

Importance of Scenery to the Enjoyment of Activity. People go to a place in order to participate in a particular activity, but scenery may play a role in their enjoyment of that activity. Workshop participants were asked "scenery is more important to the enjoyment of some activities than others—how important is the scenery at this place to your enjoyment of the primary activity?" The rating scale ranges from 1 for very unimportant to 7 for very important. Table 19 shows that the full range of the scale was used; the overall mean ratings for the ten most common primary activities is shown in Table 20 and indicates that while scenery is important to all these activities, it is more important to some activities than others. For instance, it is most important to people hiking, walking and photographing; it is relatively less important to shopping, historic appreciation, and fishing—though it is still important. The importance of these tables is not the specific numbers, which are acknowledged not to be based on a scientific sample, but to demonstrate that scenery plays an important role in the enjoyment of the most common activities that occur at places they identify as important community resources.

Table 19. Importance of Scenery to Enjoyment of Primary Activity

Rating	Number	Percent Total
1 – Very Unimportant	6	0.68
2	5	0.57
3	11	1.25
4	47	5.33
5	91	10.32

Rating	Number	Percent Total
6	175	19.84
7 – Very Important	547	62.02
Number of Responses	882	100.00

Table 20. Importance of Scenery to Enjoyment of Activity for the Ten Most Common Primary Activities

Type of Scenic Resource	Mean	Std. Deviation	Number
Hiking	6.55	0.714	86
Appreciate scenery	6.49	1.010	74
Driving	6.37	0.942	38
Fishing	5.70	0.877	30
Appreciate history	5.38	1.347	29
Walking & dog walking	6.50	0.827	20
Photography	6.58	1.121	19
Appreciate nature	5.92	1.256	13
Canoeing, kayaking & sailing	6.42	1.730	12
Shopping	5.11	1.270	9

Discussion

The Community Workshops sponsored by Counsel for the Public demonstrate an effective approach to involving the public in the identification of scenic resources, as defined by Site 102.45. There was a good distribution among the different types of scenic resources, and overall they possessed the required scenic quality. Respondents found that scenery was an important factor in why they went to the specific places they identified. There were a great number of activities that were identified as occurring at these scenic resources, and in general scenery plays an important role in the enjoyment of the most common activities.

4.2.4 Summary

The SEC requires consideration of how the NPT will effect viewers at scenic resources. Specifically, the VIA must consider:

a. The expectations of the typical viewer;

b. The effect on future use and enjoyment of the scenic resource;

However, there is little empirical research that can be used to guide a response to these criteria. The published studies investigating the relationship between activities and scenic quality that have been conducted in New England are reviewed. A study of the scenic impacts associated with clearcutting in the White Mountain National Forest found that people who engaged in motorized activities, hunting and

fishing activities are less sensitive to scenic quality and visual impacts than those who engaged in activities such as hiking, camping or kayaking. An analysis of 10 surveys of users at scenic resources about the potential visual impacts of proposed wind energy developments found that the change in scenic quality would be very large, but the effect on enjoyment would be very modest and there would be little to no effect to continued use of the scenic resource. We acknowledge that wind energy resources are likely perceived differently that transmission projects.

This section also presents finding from two additional studies that support somewhat different conclusions. A reanalysis of data from a 2006 survey conducted at a sample of access points to NH public waters found that in general people appreciated the scenery at these sites and that it was an important part of their experience. Overall, 55 percent of respondents indicated that if the scenery were poorer in the future, it would have a negative effect on their continued use. However, respondents whose primary activities are power boating or boat fishing would be less effected than those engaged in non-power boating or swimming.

The Community Workshops used to identify locally important scenic resources also provided information about the relation between scenic quality and activities at scenic resources. A rich diversity of activities occurs at the identified scenic resources. Overall, scenic quality was an important consideration of why they chose to visit specific scenic resources, as well as being important to the enjoyment of their primary activity.

These two new analyses indicate that scenery is an important consideration when choosing where to recreate, and that a significant degradation of scenic quality may be accompanied by a corresponding reduction in enjoyment and continued use of the affected scenic resources.

The results reported here add some support to the idea that there are differences in sensitivity to scenic quality among people engaged in different recreation activities. However, we are far from being able to project the effect of specific scenic impacts from specific viewpoints and for a specific mix of recreationists. Site 202.19 states that the applicant "shall bear the burden of proving facts sufficient for the committee or subcommittee, as applicable, to make the findings required by RSA 162-H:16" (i.e., "The site and facility will not have an unreasonable adverse effect on aesthetics."). It further states that "the party asserting a proposition shall bear the burden of proving the proposition by a preponderance of the evidence." NPT and DeWan Associates failed to conduct intercept surveys at potentially effected viewpoints, asking scenic resources users how they anticipate simulated visual conditions would affect their expectations, enjoyment and continued use of the scenic resources. In the absence of such NPT-specific data, the more generalized data from the New Hampshire Lakes Association survey and the Community Workshops provides the best available data.

4.3 Evaluation of Potential Visual Impacts to Scenic Resources

4.3.1 Introduction

Factors to consider in the evaluation of scenic resources for potential visual impacts are specified by the SEC in Site 301.05(b)(6), and described in Chapter 2. As discussed in Chapter 3, review of the NPT VIA found several deficiencies in their evaluation of visual impacts. Chapter 2 also discusses criteria outlined in Site 301.14(a), which presents the criteria the Committee shall consider relative to findings of whether a proposed energy facility will have an unreasonable adverse effect on aesthetics. The following section provides an independent analysis of potential visual impacts for a selection of scenic resources.

We could evaluate only a small portion of scenic resources identified in the previous section for potential impacts. Time limitations imposed by the SEC review process prevent a more in-depth or full analysis of all

identified scenic resources. Per Site 301.05(b)(6), the applicant is responsible to evaluate visual impacts for all scenic resources that "would be visible."

For scenic resources that are evaluated, our assessment begins by applying the criteria outlined in Site 301.05(b)(6), which concludes with "a characterization of potential visual impacts…on identified scenic resources as high, medium or low." We then proceed to evaluate each scenic resource under the criteria listed in Site 301.14 to see if impacts to that particular resource would result in an unreasonable adverse impact to the aesthetics of the resource. We have included two levels of review. The first is a systematic check list that simply rates whether each criterion makes a high, medium, low or no contribution to an adverse visual impact. For a selection of scenic resources additional review has been conducted and a second, more detailed assessment is provided. These resources represent examples from which the initial evaluation indicated there is a likely potential for high impacts and/or that impacts are found to result in an unreasonable adverse effect, additional assessment has been provided with more description.

4.3.2 Evaluation of Potential Visual Impacts

Scenic Resource Evaluation Forms

The initial review of impacts to scenic resources relies upon T. J. Boyle's familiarity with Project plans and details, field investigation and understanding of the scenic resource locations, and our broad experience in assessing electrical transmission projects. The assessment of each resource is documented on a Scenic Resource Evaluation Form. How each factor contributes to the overall visual impact is described as none, low, medium and high; these descriptions are not intended to be quantitative ratings and are not averaged to determine the overall impact. The description of overall impact is based on the evaluator's knowledge of the Project and professional judgement.

We evaluated forty-one scenic resources to demonstrate the range of scenic resources and conditions that are found throughout the Project APVI. Table 17 provides a summary of the Scenic Resource Evaluation Forms, the completed forms are included in Appendix F. However, this number is far short of what the applicant must assess based on our identification of scenic resources. Site 301.05(b)(5 and 6) requires that all identified scenic resources from which the proposed facility would be visible must be described and the potential visual impacts characterized as high, medium or low. For example, any road segment that may be used to drive for pleasure or possesses a scenic quality and would have visibility of the Project must be evaluated.

Table 21. Scenic Resource Evaluation Form Summary

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Moose Path Scenic Byway (Rt. 26)	Millsfield	Attachment 9 (DeWan & Associates)	9-39 to 9-46	Medium	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the elevated location of the corridor and additional mitigation measures could have been taken. Although the applicant notes that the route selected prevents structures from being seen against the sky, the alignment is still proposed at an elevated location that creates visibility from open areas of this scenic resource. A route that does not elevate the Project would be preferable. Alternative colors and treatments to structures could also be considered. The applicant did not propose landscape mitigation at the road crossing.. Since additional reasonable mitigation was not pursued, the impact to this resource is found to be unreasonable.
Bear Brook State Park	Allenstown	Attachment 9 (DeWan & Associates)	9-191 to 9-194	Medium	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures could have been taken. Additional reasonable mitigation measures would help to further reduce adverse impacts. The combination of both monopole and lattice structures will be visible from overlooks within the park. Horizontal configuration of the transmission structures (i.e. H-Frame) would significantly help reduce the visibility and prominence of proposed structures and is more typical for 345 kV construction.
Big Dummer Pond	Dummer	Attachment 9 (DeWan & Associates)	9-57 to 9-66	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because the route chosen for the corridor causes the Project to be prominently visible on the hillside and in the valley. The extent of contrast with the existing surroundings will be significant and result in unreasonable degradation to the scenic quality of this resource. The applicant must investigate alternative corridor alignment at this location to reduce the prominence of the Project. Other mitigation measures must also be considered, including alternative structure design, color, and/or materials.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Burns Pond	Whitefield	Attachment 9 (DeWan & Associates)	9-127 to 9-134	Medium	Yes	No	No	
Coleman State Park / Entrance	Stewarts-town	Attachment 9 (DeWan & Associates)	9-19 to 9-22	Medium	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because the route chosen for the corridor causes the Project to be prominently visible on top of a ridge in a natural area with no transmission corridor. The corridor alignment will result in the Project being skylined from the park. Alternate corridor alignments must be investigated.
Webster Farm	Franklin	Attachment 9 (DeWan & Associates)	9-173 to 9-176	Low	Yes	No	Yes	The largest impact at this location is the skylined structure cresting the background hill. Suggested mitigation would include evaluating alternate structure locations and/or lowering the height of structures to reduce the overall prominence of the Project on this hill. The converter station is well located to avoid visual impacts.
Diamond Pond Road	Colebrook	Attachment 9 (DeWan & Associates)	9-31 to 9-38	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the selection of the corridor alignment up against Coleman State Park, multiple structure types that would be visible from the road, and the location of a galvanized lattice structure located approximately 65 feet from the edge of the road crossing. Evaluation of this resource includes middle ground views (simulation) and immediate views at the corridor crossing. Additional mitigation measures are warranted at this location, including possible relocation or continued burial from the nearby transition station.
Mountain View Grand Hotel	Whitefield	Attachment 9 (DeWan & Associates)	9-117 to 9-126	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. Specifically, use of non-specular conductors would lessen Project visibility. Additionally, feasibility of lowering the overall height must be evaluated. Evaluation of this resource considers visibility from the front porch, hotel rooms, cupola, and decks.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Slim Baker Rec. Area - Inspiration Point	Bristol	Attachment 9 (DeWan & Associates)	9-143 to 9-158	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. Additional mitigation which would help reduce impacts include alternate structure type and/or color and use of non-specular conductors.
The Rocks Estate	Bethlehem	Attachment 9 (DeWan & Associates)	9-135 to 9-138	Medium	Yes	No	Yes	We suggest all structures visible from the Rocks Estate that are clearly visible be switched to monopole to maintain continuity of HVDC structure materials within the corridor and to better blend with the surrounding landscape.
Woodland Heritage Scenic Byway (Route 110)	Stark	Attachment 9 (DeWan & Associates)	9-81 to 9-92	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. Additional mitigation which would help reduce impacts include switching to all monopole structures to maintain continuity of materials within the corridor and to better blend with the surrounding landscape. Non-specular conductors must also be used to reduce visibility of the Project.
Deerfield Road / Middle Road	Allenstown /Deerfield	Attachment 8 (DeWan & Associates)	8-79 to 8-81	Medium	Yes	Yes	Yes	Co-location within the existing corridor does not accommodate the proposed Project without significant visual impacts. Horizontal configuration of structures would significantly reduce the visibility and overall prominence of the Project from this location. Non-specular conductors must also be used to reduce visibility of the Project.
Halls Stream Road	Pittsburg	Attachment 8 (DeWan & Associates)	8-3 to 8-5	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable due to the proximity of the structure to the roadway, which is setback approximately 50 feet from the edge of road, and the lack of an existing corridor in existing conditions. Simply relocating the structure further from the road would significantly reduce impacts.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Connecticut River Scenic Byway (Route 3 near Howland Road)	Clarksville	Attachment 8 (DeWan & Associates)	8-6 to 8-8	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the proposed elevated location of the corridor alignment, and the lack of an existing corridor in existing conditions. No attempts appear to have been made at this location to mitigate adverse effects. Alternative corridor alignment, alternative structures, alternative materials, and non-specular conductors and/or colors must be considered.
North Road	Lancaster	Attachment 8 (DeWan & Associates)	8-21 to 8-23	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable due to the proximity and scale of proposed structures to the roadway and buildings, and because of the lack of proposed vegetation mitigation. Relocating structures further from the roadway, evaluating use of delta configuration for 115 kV structures, landscape mitigation, and non-specular conductors are all measures that could reduce impacts at this location.
Northside Road / Upper Ammonoosuc River Crossing_(Northern Forest Canoe Trail)	Stark	Attachment 8 (DeWan & Associates)	8-15 to 8-17	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts and because of the proximity of structures adjacent to the roadway. Ideally alternative structure designs in horizontal configurations would help reduce the height of the transmission lines and visual prominence. Relocating structures further from the edge of the roadway and vegetative mitigation would reduce impacts.
Route 28 / 105 N Pembroke Road	Pembroke	Attachment 8 (DeWan & Associates)	8-76 to 8-78	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. Suggested mitigation includes possible alternative structure design, such as delta configuration of the proposed 345kV structure to match the existing delta configuration of the 115kV structure and to reduce the overall height of the 345kV structure. Vegetation mitigation would help screen visibility from roadways.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Shaker Road	Concord	Attachment 8 (DeWan & Associates)	8-61 to 8-63	Medium	Yes	No	Yes	Suggested mitigation that could further reduce impacts at this location is re-evaluation of structure configuration for the rebuilt 115kV line, specifically using a delta configuration and/or wooden material to match the existing 115kV line. Vegetation mitigation would help to further reduce visibility. The proposed 345kV line in horizontal configuration at this location illustrates the benefit of reduced height and overall visibility.
Presidential Range Trail Scenic Byway (US Route 302)	Bethlehem	NPT DOE VIA (T. J. Boyle Associates)	BT-1	High	Yes	Yes	Yes	We found that impacts to this resource are adverse as a result of the proximity of the transition station to the roadway. There is substantial benefit from undergrounding the proposed line as it continues south from this location. Relocating the transition station further north and away from the roadway would substantially reduce impacts. The efficacy of proposed landscape mitigation cannot be evaluated without detailed planting plans, though vegetation mitigation is warranted to screen the corridor from this resource.
Presidential Range Trail Scenic Byway (Route 116)	Bethlehem	NPT DOE VIA (T. J. Boyle Associates)	BT-6	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts and because of the proximity of the proposed HVDC structure to the edge of the scenic byway (structure just outside of the view in the simulation). The variation of visible HVDC structures also contributes to discontinuity of structure type and materials within the corridor. Relocating the HVDC structure further from the edge of the roadway, changing all visible HVDC structures to monopoles and including vegetative mitigation would help reduce impacts.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Boyce Road	Canterbury	NPT DOE VIA (T. J. Boyle Associates)	CB-1, CB-2	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts and because of the proximity of the proposed new structure to edge of the roadway. Relocating new structures further from the edge of the roadway, reconfiguring the relocated 115kV structures in a delta configuration and wood material to match the existing 115kV structures to remain, and including vegetative mitigation would reduce impacts. The horizontal configuration of the proposed 345kV structures helps to limit visibility at this location.
Moose Path Trail Scenic Byway (Route 145)	Clarksville	NPT DOE VIA (T. J. Boyle Associates)	CL-1	High	Yes	No	Yes	We found that impacts to this resource are not unreasonable, even though impacts were determined to be high, as a result of appropriate siting and potential long term screening of the transition station. However, the Applicant must submit detailed landscape mitigation plans so the SEC can review the efficacy of proposed vegetation mitigation measures. The Applicant must also ensure site control is established east of the transition station to preserve existing screening vegetation. There are also multiple structure types when approaching the transition station. Switching all visible structures to weathering steel monopoles, considering alternate colors or materials for the transition station and using non-specular conductors would further reduce visual impacts.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Loudon Road	Concord	NPT DOE VIA (T. J. Boyle Associates)	CO-1	High	Yes	Yes	Yes	The Project is located in the Gateway Performance District, which includes the following description in the City of Concord Code of Ordinances, Article 28-2: "the uses developed within this District are expected to adhere to high standards for appearance in order to ensure that the gateways to the City are attractive and functional." Impacts to this area as a result of the Project would not adhere to this standard and therefore would be considered unreasonable. The industrial character, prominence and proximity of the proposed structures to this resource cannot be mitigated without significant measures, such as undergrounding or rerouting at this area.
Pembroke Road	Concord	NPT DOE VIA (T. J. Boyle Associates)	CO-2	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable as a result of the visual change, mostly due to the height configuration of the new 115kV structures and location of the three-pole, deadend 345kV structure in close proximity to the roadway. Vegetative mitigation is not proposed at this location, which would help to reduce adverse impacts. Reconfiguration of structures must be considered to lower overall height of 115kV structures.
Turtletown Pond (Turtle Pond)	Concord	NPT DOE VIA (T. J. Boyle Associates)	CO-4	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable due to the lack of additional mitigation measures. Due to the sensitivity of this resource, all available mitigation measures must be considered, including use of non-specular conductors, eliminating the 345kV three-pole structure, matching existing 115kV delta configuration to reduce the height of the relocated 115kV structures, as well as undergrounding of the Project at this location.
Oak Hill Vista – Oak Hill Trails	Concord	NPT DOE VIA (T. J. Boyle Associates)	CO-5	Medium	Yes	No	Yes	The use of non-specular conductors and shorter 115kV configuration would help to further reduce adverse impacts at this location.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Nottingham Road	Deerfield	NPT DOE VIA (T. J. Boyle Associates)	DE-1	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the scale, height, and industrial character of the proposed structures when compared to the existing character of the area and corridor. A wider corridor would accommodate lower structures. Alternate materials and/or configuration must be considered. Additional mitigation must be proposed to reduce unreasonable adverse effects.
Deerfield Center Historic District	Deerfield	NPT DOE VIA (T. J. Boyle Associates)	DE-2	Medium	Yes	Yes	Yes	We found that impacts to this resource are unreasonable due to the height and industrial character of the proposed 345kV structure when compared with the existing character of the town center. Although switching to a weathering steel structure helps to reduce adverse impacts, ultimately the height of the 345kV line needs to be lowered to avoid visibility from this resource.
Little Dummer Pond	Dummer	NPT DOE VIA (T. J. Boyle Associates)	DU-1	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because the route chosen for the corridor causes the Project to be prominently visible on the hillside. The extent of contrast with the existing surroundings will be significant and result in unreasonable degradation to the scenic quality of this resource. Alternate corridor alignment must be investigated at this location to reduce the prominence of the Project from this resource. Other mitigation measures must be considered, including alternate structure design, color, and/or materials. Possible co-location with the existing 115kV line must also be considered.
Pontook Reservoir_/ Moose Path Trail Scenic Byway (Route 16)	Dummer	NPT DOE VIA (T. J. Boyle Associates)	DU-2	Medium	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because the route chosen for the new corridor causes the Project to be prominently visible on the hillside. Alternative route alignment must be investigated to lower the overall visibility of the corridor, including possible co-location with the existing 115 kV line.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Presidential Range Tour (US Route 2)	Lancaster	NPT DOE VIA (T. J. Boyle Associates)	LA-1	Low	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, using non-specular conductors would significantly reduce visibility of the conductors and minimize adverse impacts.
Weeks State Park	Lancaster	NPT DOE VIA (T. J. Boyle Associates)	LA-2	Medium	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, using non-specular conductors and utilizing weathering steel for all HVDC structures that are visible would significantly reduce visibility of the Project from this resource. Note that additional galvanized lattice structures will be visible continuing to the right of the simulation as currently proposed.
Dana Hill Road	New Hampton	NPT DOE VIA (T. J. Boyle Associates)	NH-1	Low	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, using non-specular conductors and utilizing weathering steel for all HVDC structures that are visible would significantly reduce visibility of the Project from this resource.
Interstate 93 (near mile 72)	New Hampton	NPT DOE VIA (T. J. Boyle Associates)	NH-2	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. Additional mitigation measures must include alternative structure type, configuration, colors and/or materials to help reduce the industrial character of the proposed Project elements. Vegetation mitigation must be proposed to help screen visibility of the corridor from the interstate.
Pemigewasset River Crossing – Franklin Falls Reservoir Area	New Hampton/ Hill	NPT DOE VIA (T. J. Boyle Associates)	NH-3	Medium	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, additional mitigation measures to reduce adverse visual impacts are recommended, including using non-specular conductors, incorporating vegetation mitigation and utilizing weathering steel for all HVDC structures that are visible from this resource.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Cross Country Road	Pembroke	NPT DOE VIA (T. J. Boyle Associates)	PE-1	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the contrast created between the scale, height, and industrial character of the proposed structures compared with the existing character of the area and corridor. A wider corridor would accommodate lower structures. Alternate materials and/or configuration must be considered. Structure types visible from the resource must be uniform to promote continuity within the corridor. Additional measures, including vegetation mitigation and relocating structures immediately adjacent to the road must be proposed to reduce unreasonable adverse effects.
Little Diamond Pond – Coleman State Park	Stewarts-town	NPT DOE VIA (T. J. Boyle Associates)	SE-3	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the proposed location and resulting prominence of a new transmission corridor and transmission facilities within a natural and undeveloped landscape. The proposed location skylines new structures that would be clearly visible from a significant resource. The Project must be redesigned to avoid visibility from this location.
Victor Head in Nash Stream Forest	Stark	NPT DOE VIA (T. J. Boyle Associates)	ST-2	Low	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, using non-specular conductors would further reduce adverse effects of the Project from this resource.
Cohos Trail	Stark	NPT DOE VIA (T. J. Boyle Associates)	ST-4	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because of the contrast created between the scale, height, and industrial character of the proposed structures compared with the existing character of the area and corridor. Utilization of galvanized steel for both the 115 kV and HVDC structures adds to the industrial of the proposed conditions. Alternative structure type, configuration, materials, and colors must be incorporated to reduce the height and overall industrial character of the proposed conditions.

Scenic Resource	Town	Source	Page or Site #	Potential Visual Impact	Adverse	Unreason-able	Additional Mitigation Required	Discussion
Peaked Hill Road	Bristol	T.J. Boyle NPT SEC Simulations	BR-1	High	Yes	Yes	Yes	We found that impacts to this resource are unreasonable because additional mitigation measures would help reduce adverse aesthetic impacts. The variation of visible HVDC structures also contributes to a discontinuity of structure type and materials within the corridor. Mitigation that must be incorporated to include vegetation mitigation, non-specular conductors, and changing all visible HVDC structures to monopoles.
Apple Hill Farm	Concord	T.J. Boyle NPT SEC Simulations	CO-6	Medium	Yes	No	Yes	Although we do not consider impacts at this resource unreasonable, using non-specular conductors would further reduce adverse effects of the Project from this resource. Lowering the relocated 115kV structure should be considered to further reduce adverse aesthetic impacts.

Descriptive Evaluation of Scenic Resources The second way that potential impacts are reviewed is based on a descriptive analysis of each review criteria. While more informative in providing insight for each scenic resource, this comprehensive review of all scenic resources is beyond the scope of this report and only a small illustrative sample will be evaluated. Resources reviewed in this section represent a very limited sample of locations that are critical to consider when reviewing potential unreasonable adverse impacts to aesthetics as a result of the Project. The review of these resources is as follows:

Scenic Resource Name: Big Dummer Pond

Potential Visual Impact: HIGH

Will the Project Result in Unreasonable Impacts: YES

Simulation: DeWan & Assocs Attachment 9: Photosimulations of leaf-off conditions (Revised) page 9-57 to 9-66
Town: Dummer, New Hampshire

Field Documentation Notes and Ratings
Scenic Attractiveness: Distinctive / Noteworthy
Number of Visible Residences: 0
Number of Visible Existing Transmission Structures: 8 / 10
Scenery Interest: Moderate / High

1. Narrative

Big Dummer Pond is in Dummer, NH.

2. Site 301.05(6) Criteria used to characterize potential visual impacts.

a. Expectations of typical viewer

Based on observations during field investigation, we would expect the typical viewer to engage in water based activities including non-motorized boating, fishing, swimming, and hiking along the shoreline. Views from the lake consist of the lake, with minimally developed shorelines and surrounding forested hills. Use expectation for the lake is informed by the New Hampshire Lakes Association's Survey, which indicates typical viewers have a high expectation of scenery at New Hampshire water features.

b. Effect on future use and enjoyment

The Project will introduce a new man-made component with an industrial character into a natural landscape, which will be out of character with the existing conditions in views from Big Dummer Pond. The Project will have a negative effect on the future use and enjoyment of the Pond.

c. Extent of proposed facility, including all structure and disturbed areas, visible from the scenic resource

The extent of the Project that will be visible from Big Dummer Pond will vary based on the location from within the resource. It is likely that up to 16 galvanized steel lattice towers will be visible from different locations on the pond. Simulations provided by DeWan & Assocs show at least 8 visible structures from a single location, with additional structures that will likely be visible beyond the extents of the simulations. Clearing for the corridor will also be visible from Big Dummer Pond, with parts of the ROW floor being visible from certain locations.

d. The distance of the proposed facility from the scenic resource

Distances between the Project and locations within the scenic resource that will have visibility range from approximately .25 miles up to 1 mile.

e. The horizontal breadth or visual arc of the visible elements of the proposed facility

The visual arc or visual angle will vary and at locations will be more than 90 degrees. This accounts for structures that will likely be visible for an approximately 1.5-mile-long stretch of corridor.

f. The scale, elevation and nature of the proposed facility relative to surrounding topography and existing structures

Portions of the NPT will be prominent based on the siting of the corridor near the top of the surrounding ridge and the design of structures. Structure heights range from 75 to 105 feet in height, with some structures being almost entirely visible. The location of the corridor elevated on the hillside will result in several structures being skylined above the background landform and vegetation. An existing transmission line is located near the base of the surrounding landform. Up to 10 structures were noted as being visible during field investigation, but this line has a much lower visual presence in the landscape based on its location at lower elevations and is largely screened by surrounding vegetation. Further north, a wind generation project is visible on top of distant hill tops.

g. The duration and direction of the typical view of elements of the proposed facility

Visibility of the Project will be to the north, west, and south depending on the view location from Big Dummer Pond. Activities include fishing, paddling, and other passive recreational uses. Duration of views vary, but can be can last for the length of the activity.

h. The presence of intervening topography between the scenic resource and elements of the proposed facility

The open views across the open waters of Big Dummer Pond, backgrounded by the surrounding hillsides will elevate that prominence and visibility of the NPT. Landform will screen additional structures to both the north and south of structures that will be visible. Additionally, surrounding forest also helps to screen additional structures, portions of the structures that are visible, and views of the cleared ROW. The eight visible structures are based on screened views, including the effect of surrounding vegetation. Overall, topography will elevate the appearance of the Project

Impact Rating

In summary, at Big Dummer Pond, we determined that there is a high expectation for scenery. The Project will introduce a built element into the landscape with an overwhelming industrial character. The Project will be prominent and result in a high level of contrast from a large portion of this scenic resource. There will be a negative degradation to the scenic quality, which will result in a negative effect to the future use and enjoyment of users for Big Dummer Pond. We therefore would rate the potential visual impact as **High.**

3. Mitigation - Site 301.05(10)

The NPT VIA notes that mitigation at Big Dummer Pond includes that, "(m)ost of the corridor is located well below the crest of the hill on the west side of the pond and is sited close to the Granit Reliable generator lead line. Most of the lattice structures will be seen against a wooded backdrop." (NPT VIA at 1-71)

4. Site 301.14(a) Criteria Relative to Findings of Unreasonable Adverse Effect on Aesthetics

(1) Existing character of the area of potential visual impact

While the landscape surrounding Big Dummer Pond includes disruptions to the natural landscape, including an existing transmission line, forest harvesting activities and a wind generation facility, the overall character retains a relatively high scenic quality. The pond has minimal development along the shorelines and the existing transmission line is located in a manner in which it is mostly screened and otherwise subordinate within views. The surrounding landscape includes a high level of diversity, including varying shorelines and surrounding landform. During separate field investigation visits, a rating of **Distinctive & Noteworthy** were given to the Scenic Attractiveness at the simulation location.

(2) The significance of affected scenic resources and their distance from the proposed facility

Big Dummer Pond is a publicly owner body of water. Water resources are valued for their scenic quality in the state of New Hampshire, and there are a limited number of ponds and lakes with little or no development along the shorelines. The closest visible portions of the Project are approximately .25 miles from locations on Big Dummer Pond.

(3) The extent, nature, and duration of public uses of affected scenic resources

Public uses at little diamond pond include shore fishing, non-motorized boat fishing, non-motorized boating, swimming, and hiking. These are all generally considered passive recreational uses. The duration of use varies, but would typically be longer than a few minutes and up to a full day.

(4) The scope and scale of the change in the landscape visible from affected scenic resources;

The scope and scale of change is high. Although existing views include other surrounding electrical transmission and generation facilities, the particular siting of the new NPT corridor, design and character of proposed structures, and extent of visibility will result in a significant change to the existing visual landscape. Changes to the landscape are both, dominant and prominent.

(5) The evaluation of the overall daytime and nighttime visual impacts of the facility as described in the visual impacts assessment and other relevant evidence

This review of visual impacts per 301.05(b)(6) criteria found the Project to result in high visual impacts. The NPT VIA found the visual impact from Big Dummer Pond to be medium.

(6) The extent to which the proposed facility would be a dominant and prominent feature within a natural or cultural landscape of high scenic quality or as viewed form scenic resources of high value or sensitivity

The Project would result in visibility of portions of up to 16 new electrical transmission structures and changes to the forest canopy as a result of ROW clearing. A significant portion of several of these structures will be visible at elevated locations along the surrounding hillsides, with some structure being skylined above the hill tops. As a result, the Project will be inevitably noticeable from a large portion of views from the Big Dummer Pond and would be considered a very prominent feature within the landscape. Existing views to the north, west, and south retain the character of a predominantly natural landscape. The elevated position and high level of contrast with surrounding features would result in the NPT also becoming a dominant feature of the landscape in views from the pond.

(7) The effectiveness of the measures proposed by the applicant to avoid, minimize, or mitigate unreasonable adverse effects on aesthetic, and the extent to which such measures represent best practical measures

Mitigation at Big Dummer Pond is limited to <u>not</u> siting the proposed corridor along the top of the opposing hill and locating the corridor near another transmission line. The differences between location of the NPT and existing line are clearly illustrated in the simulation. While the existing line is well screened, the location and design of the NPT is highly visible and poorly sited. The effectiveness of the proposed measures do little to avoid, minimize or mitigate unreasonable adverse effects and do not represent best practical measures.

5. <u>Discussion of Unreasonable Adverse Effect on Aesthetics</u>

The most effective form of mitigation for transmission line projects is the proper siting and alignment of the corridor. In general, siting an aerial transmission line at elevated locations does not follow generally accepted professional standards in avoidance of visual impacts. Our review of the Project found that it introduces a manufactured element, with industrial characteristics into a scenic and natural appearing landscape. It also found that the Project would result in a high contrast to the existing conditions and would

be both, a prominent and dominant element in the visual landscape. Degradation to the scenic setting will negatively affect the future use and enjoyment of Big Dummer Pond according to results from the New Hampshire Lakes Association's Survey and based on responses collected during the Counsel for the Public's Community Workshop's. The NPT application does not provide justification for the location of the corridor at this location or discuss whether alternative locations or configurations were evaluated. Proposed mitigation is not effective. Alternative mitigation, such as undergrounding the line at this location would likely avoid impacts, but were not discussed by NPT. Without additional justification for the location of the new corridor at this location, the Project will result in an unreasonable adverse impact to the aesthetics at Big Dummer Pond.

Scenic Resource Name: Little Diamond Pond

Potential Visual Impact: HIGH

Will the Project Result in Unreasonable Impacts: YES

Simulation: T. J. Boyle NPT DOE VIA Simulation - SE-3 Little Diamond Pond, Coleman State Park
Town: Stewartstown, New Hampshire

Field Documentation Notes and Ratings
Observation Notes: Shore fishing and boat fishing
Scenic Attractiveness: Distinctive
Number of Visible Residences: 0
Number of Visible Existing Transmission Structures: 0
Scenery Interest: Moderate-High

6. Narrative

Little Diamond Pond is within Coleman State Park in Stewartstown, NH. Viewpoint SE-3 is located at the northwest corner of Little Diamond Pond approximately 2,000 feet north of the Coleman State Park campground. Coleman State Park offers many outdoor activities, including camping, fishing, boating, cross-country skiing, ATV and snowmobile trails, hiking and picnicking, and cabin/yurt rentals. The park is open year-round, though typically only staffed from Memorial Day to Columbus Day. Other than a beach and boating activities, the view from Little Diamond Pond is of the immediately surrounding rolling forested hillsides. This site was selected because it is within a NH State Park with no existing visibility of transmission infrastructure. The proposed HVDC structures and some new right-of-way clearing would be visible from this location. The state of New Hampshire does not record annual visitation numbers, but the park is noted as a medium sized state park. Coleman State Park is a significant state resource that is visited throughout the year, and therefore has special scenic concern.

7. Site 301.05(6) Criteria used to characterize potential visual impacts.

i. Expectations of typical viewer

The typical viewer at Little Diamond Pond is a visitor to Coleman State Park. Visitors travel specifically to engage with the surrounding resources, the most dominant of which is Little Diamond Pond. Views from the lake consist of generally undeveloped shorelines and surrounding forested hills. Use expectation for the lake is informed by the New Hampshire Lakes Association's Survey, which indicates typical viewers have a high expectation of scenery at New Hampshire water features.

j. Effect on future use and enjoyment

The Project will introduce a new man-made component within a mostly natural landscape, which will be out of character with the existing conditions in views from Little Diamond Pond. The Project will have a negative effect on the future use and enjoyment of the Pond.

k. Extent of proposed facility, including all structure and disturbed areas, visible from the scenic resource

The Little Diamond Pond simulation illustrates portions of eight (8) new electrical transmission structures and changes to the forest canopy because of ROW clearing that will be visible. This view represents visibility from the northwestern end of the lake were the most visibility will be possible. The Terrain Viewshed indicates there would be visibility from the entirety of the water surface without the benefit of

the surrounding forest. The Vegetated Viewshed indicates visibility from approximately 75 percent of the water surface.

l. The distance of the proposed facility from the scenic resource

Distances between the Project and locations within the scenic resource that will have visibility range from approximately 1.5 to 2 miles.

m. The horizontal breadth or visual arc of the visible elements of the proposed facility

The visual arc or visual angle is approximately 22.5 degrees of the view illustrated in simulation SE-3. This accounts for structures that will be visible for an approximately 1-mile-long stretch of corridor.

n. The scale, elevation and nature of the proposed facility relative to surrounding topography and existing structures

Six of the visible structures will be located along the top of the ridge when looking southeast from portions of Little Diamond Pond. These structures range from 85 to 130 feet in height. Simulation SE-3 indicates that more than half of the height of the structures are likely to be visible from Little Diamond Pond. The upper portions of these structures will be skylined above the tops of the surrounding forest canopy. The siting of the corridor along the ridge top make visibility of the proposed structures very prominent.

o. The duration and direction of the typical view of elements of the proposed facility

Visibility of the Project will be to the southeast from Little Diamond Pond. Activities include fishing, paddling, and other passive recreational uses. Duration of views vary, but can last for the length of the activity. For example, people were fishing from the shore near the KOP location used in the photosimulation. Views of the NPT for these users will be persistent for the duration of that activity at this location.

p. The presence of intervening topography between the scenic resource and elements of the proposed facility

Landform will screen additional structures to both the north and south of structures that will be visible. Additionally, surrounding forest also helps to screen additional structures, portions of the structures that are visible, and views of the cleared ROW. The eight visible structures are based on screened views, including the effect of surrounding vegetation. Overall, topography will elevate the appearance of the Project

Impact Rating

In summary, we determined that at Little Diamond Pond there is a high expectation for scenery. The Project will introduce an element with industrial character into a landscape that is primarily natural and undeveloped. Within views that will be possible, the Project will be prominent and result in a high level of contrast. There will be a negative degradation to the scenic quality, which will result in a negative effect to the future use and enjoyment of users for little Diamond Pond. We therefore would rate the potential visual impact as **High.**

8. <u>Mitigation - Site 301.05(10)</u>

NPT has proposed the use of tubular "weathering steel transmission structures to reduce contrasts in color and form." (NPT VIA at 1-33)

9. <u>Site 301.14(a) Criteria Relative to Findings of Unreasonable Adverse Effect on Aesthetics</u>

(8) Existing character of the area of potential visual impact

Little Diamond Pond is within Coleman State Park. The lake has minimal development along the shorelines or within the surrounding landscape that is visible from the water surface and surrounding shore. Views from the lake include a predominantly natural landscape that includes wooded shorelines and surrounding hills. During field investigation, a rating of **Distinctive** was given to the Scenic Attractiveness at the simulation location. This location was rated as part of the DOE VIA. The mean rating for Scenic Quality was 6 out of 7, which equates to very high scenic quality.

(9) The significance of affected scenic resources and their distance from the proposed facility

Little Diamond Pond is a great pond within Coleman State Park, which is a scenic resource with state designation supported with public funds. Water resources are valued for their scenic quality in the state of New Hampshire, and there are a limited number of ponds and lakes with little or no development along the shorelines. The closest visible portions of the Project are approximately 1.75 miles from the KOP.

(10) The extent, nature, and duration of public uses of affected scenic resources

Public uses at little diamond pond include shore fishing, non-motorized boat fishing, non-motorized boating, swimming, and hiking. These are all generally considered passive recreational uses. The duration of use varies, but would typically be longer than a few minutes and up to a full day.

(11)The scope and scale of the change in the landscape visible from affected scenic resources;

The scope and scale of change is high. Although visible components of the Project are distant and to some extent partially screened, the change occurs within a visual landscape that is in an almost entirely natural state. Changes to the landscape are both, dominant and prominent.

(12) The evaluation of the overall daytime and nighttime visual impacts of the facility as described in the visual impacts assessment and other relevant evidence

This review of visual impacts per 301.05(b)(6) criteria found the Project to result in high visual impacts. The NPT VIA found the overall visual impact from Coleman State Park to be medium.

(13) The extent to which the proposed facility would be a dominant and prominent feature within a natural or cultural landscape of high scenic quality or as viewed form scenic resources of high value or sensitivity

The Project would result in portions of eight (8) new electrical transmission structures and changes to the forest canopy as a result of ROW clearing to be visible from Little Diamond Pond as reviewed from the KOP. A significant portion of 4 of these structures will be visible above the distant ridgeline on which they are located, therefore 'skylining' these structures. As a result, the Project will be inevitably noticeable in views to the southeast and would be considered a very prominent feature within the visual landscape. Existing views to the southeast are predominantly of a natural landscape. Visibility of the surrounding hillsides are of a uniform forest cover. The elevated position and high level of contrast with surrounding features would result in the transmission structures also becoming a dominant feature of the landscape in views to the southeast.

(14) The effectiveness of the measures proposed by the applicant to avoid, minimize, or mitigate unreasonable adverse effects on aesthetic, and the extent to which such measures represent best practical measures

NPT has proposed the use of tubular "weathering steel transmission structures to reduce contrasts in color and form." (NPT VIA at 1-33) However, it is our contention that for this particular location, this mitigation measure will result in greater contrast as opposed to lattice towers. The most prominent visibility of the Project from Little Diamond Pond will be the transmission structures 'skylined' above the background ridgeline. The dark color and concentrated bulk of the weathered steel structures will result in more contrast

with the background sky, particularly on days with low cloud cover and high visibility. From Little Diamond Pond, mitigation as proposed by NPT is ineffective.

10. Discussion of Unreasonable Adverse Effect on Aesthetics

The most effective form of mitigation for transmission line projects is the proper siting and alignment of the corridor. In general, siting an aerial transmission line along a ridgeline does not follow best practices in avoidance of visual impacts. Our review of the Project found that it introduces a manufactured element, with industrial characteristics into a scenic and natural landscape. It also found that the Project would result in a high contrast to the existing conditions and would be both, a prominent and dominant element in the visual landscape. Little Diamond Pond is part of Coleman State Park. Users of the park are in part drawn to the scenic attractiveness of the setting. Degradation to the scenic setting will negatively affect the future use and enjoyment of Little Diamond Pond according to results from the New Hampshire Lakes Association's Survey and based on responses collected during the Counsel for the Public's Community Workshop's. The NPT application does not provide justification for the location of the corridor at this location or discuss whether alternative locations or configurations were evaluated. Proposed mitigation is not effective. Alternative mitigation, such as undergrounding the line at this location would likely avoid impacts, but were not discussed by NPT. Without additional justification for the location of the new corridor at this location, the Project will result in an unreasonable adverse impact to the aesthetics at Little Diamond Pond.

4.3.3 Findings and Conclusion Regarding Evaluation of Adverse Impacts

The independent evaluation of potential visual impacts to scenic resources and whether adverse impacts would be considered unreasonable only assessed a small portion of identified scenic resources. However, review of this small sample of resources revealed several deficiencies with the NPT proposal and also resulted in differing conclusions from the NPT VIA.

Summary of Independent Evaluation of Adverse Impacts

Of the 41 scenic resources evaluated, we found that the NPT would result in:

- Adverse visual impacts at all 41 resources including:
  - 24 characterized as high
  - 13 characterized as medium
  - 4 characterized as low
- Unreasonable adverse effects at 29 resources
- Additional mitigation is suggested at 40 resources

Review of impacts at these resources revealed several repetitive issues that were resulting in findings of unreasonable adverse impacts to the aesthetics of these resources.

1. Inappropriate Siting of New Transmission Corridor

The siting of a new transmission corridor for the northern portions of the Project does not follow recommended guidelines for the placement and alignment of new transmission corridors. At several locations the corridor is proposed along ridgelines and at high elevations that significantly increase visibility and prominence of the Project. At several locations, the Project will introduce an industrial feature into an otherwise natural appearing and highly scenic landscape. There is no justification provided for the location of the new corridor or whether alternative alignments were investigated. At many locations, the we consider the introduction of the Project into a highly scenic landscape unreasonable and we recommend an alternative alignment or undergrounding of the proposed facilities be used.

2. Mix of Structure Types

NPT proposes the use of weathering steel monopole transmission structures at several locations throughout the project. However, the inclusion of these structures results in a mix of structure types and materials that will be visible from several scenic resources. This results in a more cluttered and less organized appearance to the corridor.

3. Significant Contrast to Existing Character

The new structure types, and the overall organization of the corridor has an overwhelming industrial character. The existing transmission structures along most of the existing corridor are wooden. The NPT proposes to use predominantly galvanized steel lattice towers. The project will also convert many wooden 115 kV structures to a mix of weathering steel and galvanized steel monopole structures. We consider the contrast of the proposed character compared to the existing character significant and at many locations unreasonable.

4. Height of Proposed Structures

The height of proposed structures are out of scale in comparison to similar size transmission lines. This appears to be the result of incorporating the Project into existing corridors that are restricted in width. At several locations, rebuilt 115 kV structures will be nearly twice as tall as the existing structures they are replacing. The constricted width of the corridor also requires the use of vertically oriented structures at

many locations. It appears that structures and clearances are even higher than would otherwise be required due to the proximity of transmission lines to the edge of the corridor. The additional height significantly increases visibility and prominence of the NPT. Although it is understood that the Project is unable to utilize eminent domain to acquire additional width for the corridor, it is unclear if attempts were made to purchase additional ROW, which could ultimately result in much lower structures and significantly reduce visibility and adverse visual impacts.

5. Lack of Mitigation

Even if the design of the Project at all locations was found to be appropriate, NPT fails to incorporate reasonably available mitigation that could significantly reduce adverse impacts. Incorporation of mitigation measures such as vegetative screening and non-specular conductors are not proposed or adequately detailed. The following section goes into additional detail on the necessity of mitigation and why it is effective. We find that by not incorporating these simplistic, but highly effective forms of mitigation, several locations along the NPT result in unreasonable effects to aesthetics.Our evaluation of a limited number of scenic resources determined the Project would result in unreasonable impacts at 29 of 41 locations. Additional mitigation is recommended at 40 of the 41 scenic resources reviewed. The evaluation indicates that overall design inadequacies are repetitive and that similar findings of unreasonable effects would be concluded along the entire length of the Project.

4.4 Avoidance, Minimization and Mitigation Alternatives

This section summarizes traditional methods of avoiding, minimizing and mitigating a large transmission line and whether these have been included as part of the Application. Options include vegetative mitigation, offset mitigation, minimizing conductor reflectance, alternative structure designs, corridor configuration, and corridor routing. The Applicant has provided the SEC with limited generally accepted professional standards for avoiding, minimizing, or mitigating potential adverse aesthetic effects of the proposed facility per the requirements set forth in Site 301.05(a), and effective mitigation measures to avoid, minimize, or mitigate unreasonable adverse effects on aesthetics were not always provided per the requirements set forth in Site 301.14(a)(7).

Any new transmission corridor must incorporate available means of lessening visual impacts to surrounding areas, and new corridors must be routed or designed to avoid sensitive areas or scenic impacts and take advantage of natural features, such as topography and land use. Further described below, these strategies represent reasonable alternatives that must be incorporated into planning and permitting for any major transmission line.

4.4.1 Vegetative Mitigation Alternatives

Once the most effective location and design of a transmission project have been determined, one of the most cost effective mitigation measures used to reduce negative aesthetic impacts that arise from a transmission corridor is the use of vegetative mitigation, particularly within the corridor at sensitive scenic resource locations such as road crossings and visible corridors. Correct application of vegetative mitigation can significantly reduce otherwise unavoidable aesthetic impacts caused by a transmission line upgrade or new transmission installation. A plan for vegetative mitigation should be included with the project application, and usually consists of specific measures to be undertaken for each area of potential negative effect. At the very least, a typical plan for how vegetative mitigation will be instituted for typical conditions must be provided in order for Site 301.05(a) and Site 301.05(b)(10) to be satisfied.

The Applicant did not appear to consult or reference previous studies regarding siting and screening of a new utility system, such as the National Forest Landscape Management Volume 2, Chapter 2 – Utilities (USFS 1975). This Chapter from the USFS 1975 states in part:

Utility crossings. Crossings at roads, railroads, rivers, and streams must be designed to minimize their visual impact. Toward this end, designers apply these basic criteria:

- When possible, crossings should be made at a right angle.
- Structures should be set as far back from the crossing as possible.
- In areas with tree and shrub cover, the right-of-way and structures should be screened from the crossing area.
- Wire with the least shine and gauge should be used to avoid reflection and glare.
- The site chosen for the crossing should be the one that will result in the least disturbance or alteration of the natural landscape.

(USFS 1975, p. 17)

4.4.1.1 Previous DeWan & Associates and T. J. Boyle Associates Examples

The Applicant's aesthetic expert has experience with vegetative mitigation practices and associated efficacy related to transmission line impacts. In the application for the Maine Power Reliability Program (MPRP Application) from 2010, DeWan & Associates proposed vegetative mitigation as part of the Visual Impact Assessments (VIAs) that it performed for the application:

> The Maine Power Reliability Program (MPRP) consists of approximately 344 miles of new 115 kV and 345 kV transmission line corridor system upgrades in Penobscot, Waldo, Knox, Kennebec, Oxford, Cumberland, and York Counties. A Visual Impact Assessment (VIA) has been prepared for each segment where physical changes will be occurring. (MPRP Application, p. 6-1)

> In addition, visual buffer plantings, consisting of native, non-capable species will be installed at certain road crossings to minimize views into cleared transmission line corridors and to offset some of the visual changes from the MPRP activities. CMP has made an initial determination of where to install roadside buffers, using the criteria that are presented in the Roadside Visual Buffer Report…. Over 300 road crossings were evaluated by TJD&A using the criteria in the Roadside Visual Buffer Report, site photographs, the consultant's knowledge of the crossings, and their professional judgment. Data sheets were completed for each road crossing and are available upon request to TRC. Table 6-1 (Proposed Roadside Buffers) presents a summary of the locations where buffer plantings are being proposed in each of the segments. Detailed planting plans will be prepared by landscape architects for each road crossing… Following completion of construction activities associated with the transmission line road crossing the planting plans will be implemented. (MPRP Application, p. 6-11 and 6.12).

The 2010 Roadside Visual Buffer Report (RVBR) prepared by DeWan & Associates outlines an evaluation process to determine the appropriateness of utilizing vegetative mitigation to screen transmission line upgrades, particularly at road crossings. In this report:

> Terrence J. DeWan & Associates, Landscape Architects, (TJD&A) worked with TRC and CMP to develop an objective methodology to identify situations where visual buffer treatments were both desirable and achievable at public viewing areas, (primarily road crossings)" (RVBR, p. 3).

The MPRP Application also includes information about how vegetation mitigation will be employed:

> A variety of mitigation strategies have been employed in the development of the site plans for the new and expanded substations to reduce their potential visual impact and achieve a harmonious balance between the facility and the surrounding landscape. (MPRP Application, p. 6-14)

> Schematic plans showing visual buffers have been developed for the substations and are illustrated on the site plans in Exhibit 6-5 (Substations).

> The selection of trees and shrubs for buffer plantings at individual locations will be based on specific site conditions to determine the optimum species mix.
>
> A master list of plant material that may be suitable for buffers has been developed by TJD&A and is included in Exhibit 6-2 (Roadside Visual Buffer Report). In some locations where plantings are not within transmission line corridors (e.g., to provide visual buffers around substations), species capable of achieving heights in excess of 10 feet may be used.
> (6-15)

The RVBR also includes two typical diagrams illustrating how vegetative mitigation will be employed at road crossings, one of which is depicted in Figure 33.

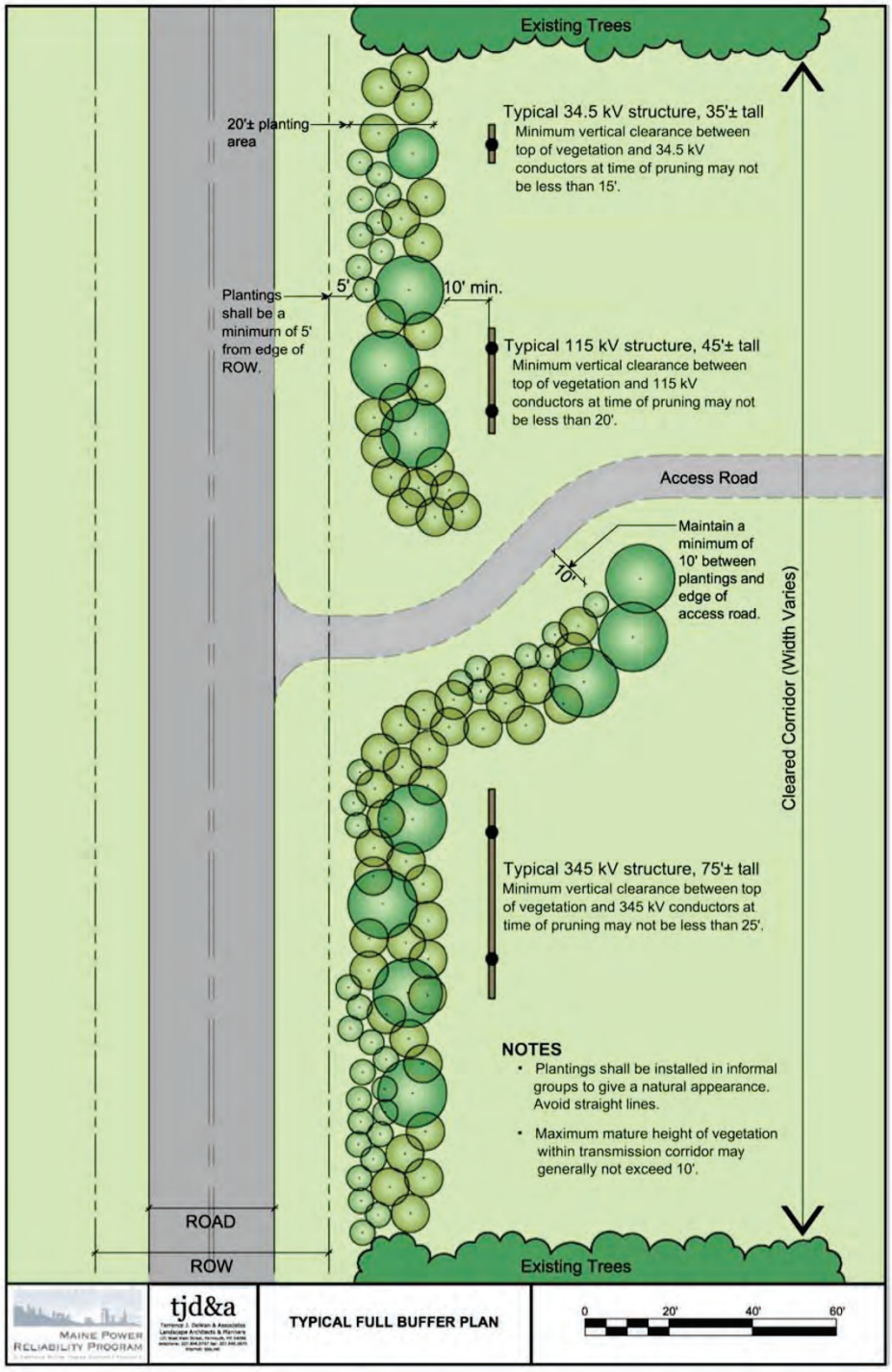
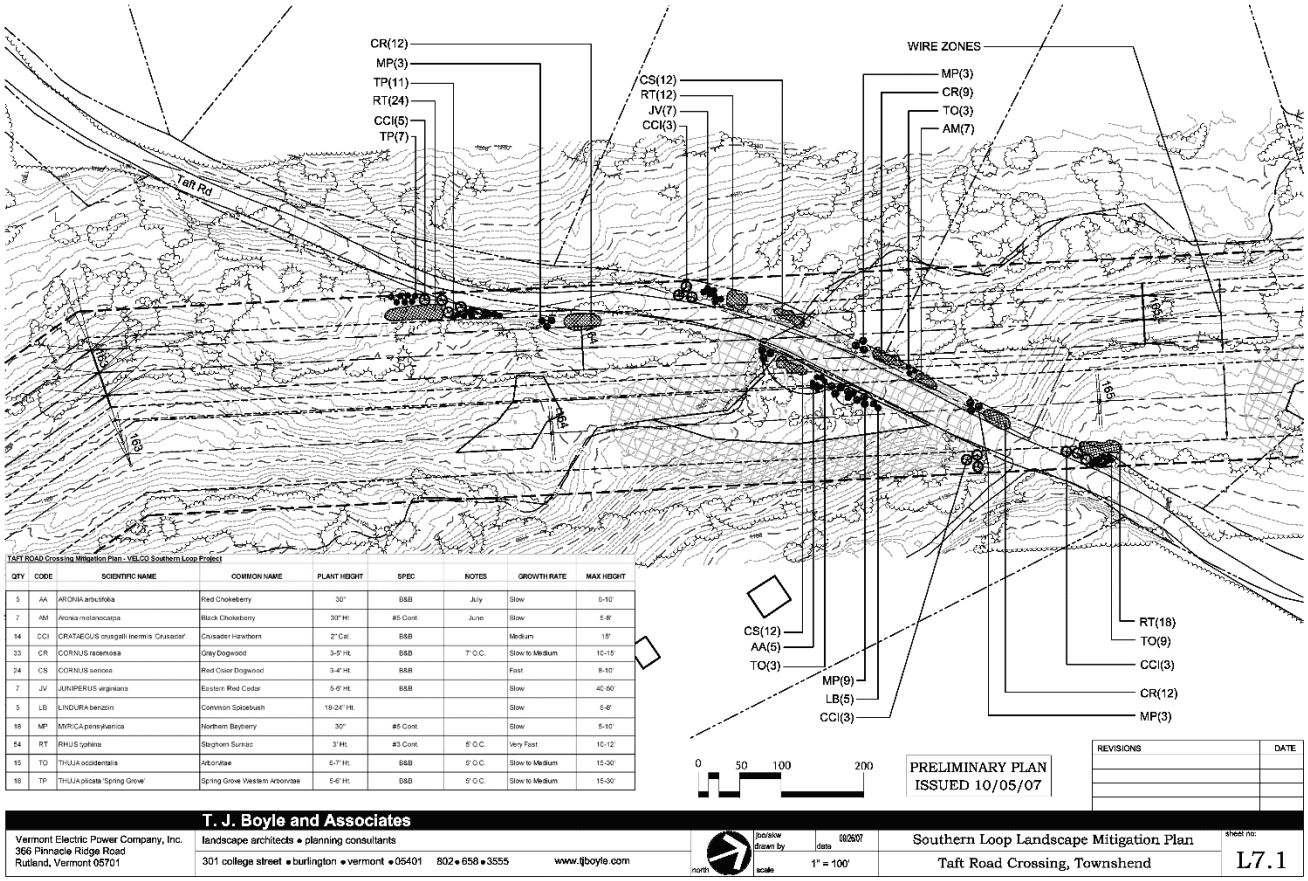


Figure 33. Typical vegetation mitigation plan in DeWan & Associates' Roadside Visual Buffer Report, referenced in the MPRP Application (RVBR, p. 19).

In the case of the MPRP Application, the DeWan & Associates outlined and instituted the method for determining vegetative mitigation prior to applying for a permit. Dewan & Associates also provided examples of how this form of mitigation would be employed and a list of proposed plantings were provided. This allows the reviewing body to assess the proposed impacts as well as the proposed method to mitigate those impacts.

4.4.1.2 Previous T. J. Boyle Associates Examples

T. J. Boyle Associates has also prepared visual impact assessments for proposed transmission projects. Similar to the MPRP Application, these have included an assessment of visibility and proposed vegetative mitigation, particularly at road crossings. The VELCO Southern Loop Project (Southern Loop) involved the introduction of a new 345 kV transmission line that traversed over 50 miles from Vernon, VT to Ludlow, VT, and included two substation expansions. Example vegetative mitigation plans filed with the applications for the Southern Loop Project are shown in Figures 34 and Figure 35.



TAFT ROAD Crossing Mitigation Plan - VELCO Southern Loop Project

QTY	CODE	SCIENTIFIC NAME	COMMON NAME	PLANT HEIGHT	SPEC	NOTES	GROWTH RATE	MAX HEIGHT
3	AA	ARONIA arbutifolia	Red Chokeberry	30"	B&B	July	Slow	5-10'
7	AM	Aronia melanocarpa	Black Chokeberry	30" Ht.	#5 Cont.	June	Slow	5-8'
14	CCI	CRATAEGUS crusgalli inermis 'Crusader'	Crusader Hawthorn	2" Cal.	B&B		Medium	15'
33	CR	CORNUS racemosa	Gray Dogwood	3-5' Ht.	B&B	7' O.C.	Slow to Medium	10-15'
24	CS	CORNUS sericea	Red Osier Dogwood	3-4' Ht.	B&B		Fast	8-10'
7	JV	JUNIPERUS virginiana	Eastern Red Cedar	5-6' Ht.	B&B		Slow	40-60'
5	LB	LINDURA benzoin	Common Spicebush	18-24" Ht.			Slow	6-8'
18	MP	MYRICA pensylvanica	Northern Bayberry	30"	#5 Cont.		Slow	5-10'
54	RT	RHUS typhina	Staghorn Sumac	3' Ht.	#3 Cont.	6' O.C.	Very Fast	10-12'
15	TO	THUJA occidentalis	Arborvitae	6-7' Ht.	B&B	5' O.C.	Slow to Medium	15-30'
18	TP	THUJA plicata 'Spring Grove'	Spring Grove Western Arborvitae	5-6' Ht.	B&B	5' O.C.	Slow to Medium	15-30'

Figure 34. Vegetation mitigation plan prepared for a road crossing and included in the *initial filing* for the VELCO Southern Loop Project in Vermont.

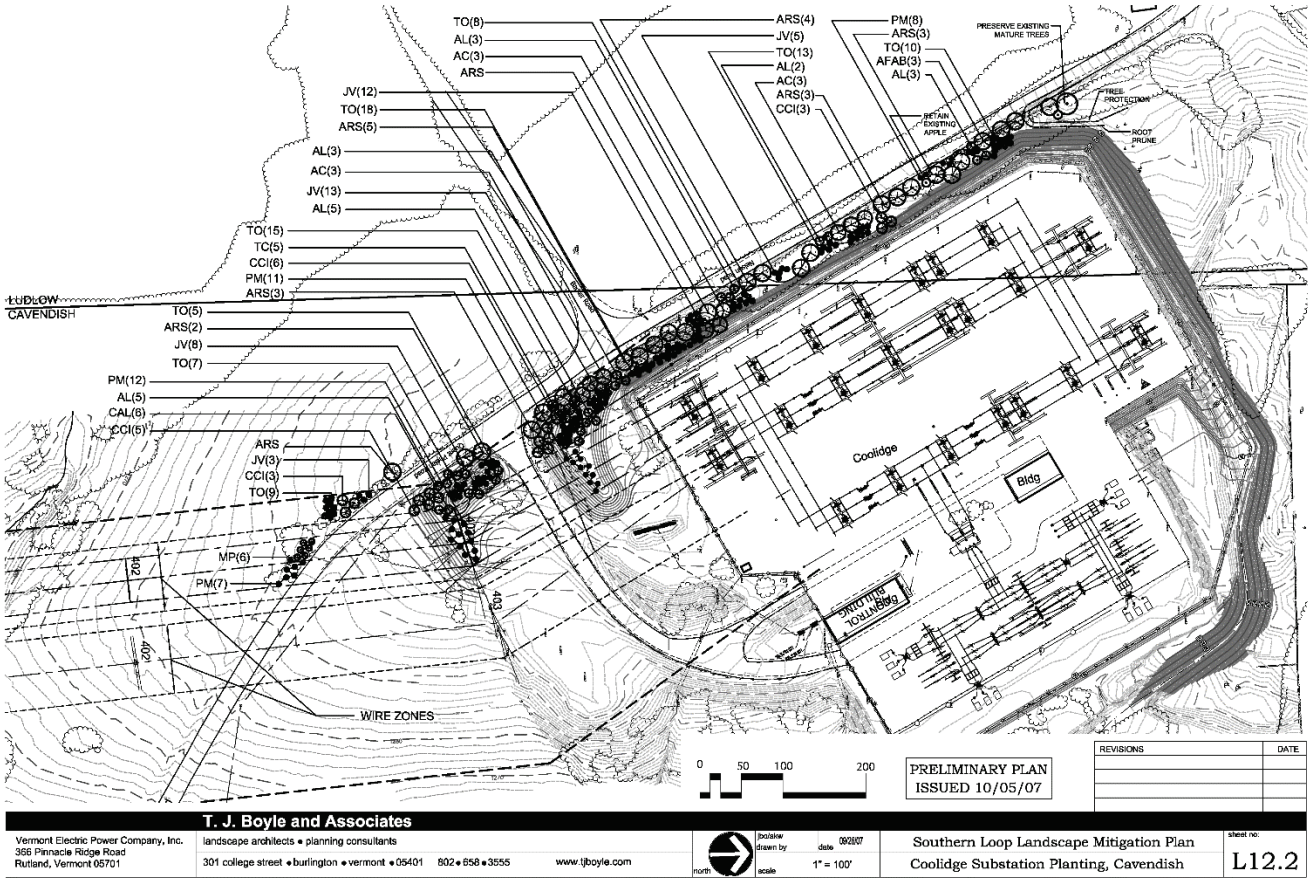


Figure 35. Vegetation mitigation plan prepared for a substation and included in the *initial filing* for the VELCO Southern Loop Project in Vermont.

T. J. Boyle Associates has also prepared vegetative mitigation plans for other transmission projects, such as the VELCO East Avenue Loop Project in Chittenden County, Vermont, and the VELCO Northwest Reliability Project in parts of the Champlain Valley, Vermont. Example photographs of the effectiveness of the vegetative mitigation installed these projects are shown in Figures 36 through Figure 42.

Figure 36a. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project, at the time of installation.

Figure 36b. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project, after 9 years of growth.

Figure 37a. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project to screen a 115 kV weathering steel tubular transition structure, after installation.

Figure 37b. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project to screen a 115 kV weathering steel tubular transition structure, after 6 years of growth.

Figure 38a. Vegetation mitigation permitted and installed to screen a substation as part of the VELCO Northwest Vermont Reliability Project, after installation.

Figure 38b. Vegetation mitigation permitted and installed to screen a substation as part of the VELCO Northwest Vermont Reliability Project, after 6 years of growth.

Figure 39a. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project to screen a 345 kV and 115 kV structure, after installation.

Figure 39b. Vegetation mitigation permitted and installed for the VELCO Northwest Vermont Reliability Project to screen a 345 kV and 115 kV structure, after 6 years of growth.

Figure 40a. Vegetation mitigation permitted and installed to screen a substation as part of the VELCO Northwest Vermont Reliability Project, after installation.

Figure 40b. Vegetation mitigation permitted and installed to screen a substation as part of the VELCO Northwest Vermont Reliability Project, after 6 years of growth.

Figure 41a. Vegetation mitigation permitted and installed for the VELCO East Avenue Loop Project to screen 115 kV structures, after construction.

Figure 41b. Vegetation mitigation permitted and installed for the VELCO East Avenue Loop Project to screen 115 kV structures, after 6 years of growth.

Figure 42a. Vegetation mitigation permitted and installed for the VELCO East Avenue Loop Project to screen a 115 kV corridor, at the time of installation.

Figure 42b. Vegetation mitigation permitted and installed for the VELCO East Avenue Loop Project to screen a 115 kV corridor, after 9 years of growth. The immediate structures were not able to be screened, but the remainder of the structures in the corridor have been completely screened. Vegetation will be maintained over time to avoid clearance issues.

For each of these examples, the applicant proposed vegetation mitigation as part of the permitting process, reviewed by all parties to the application, and revised as needed upon review, without the use of eminent domain. The applicant undertook reasonable efforts in these projects to plan for and address proposed aesthetic impacts prior to filing for a permit, including reaching out to underlying property owners if necessary. For the NPT Project, the Applicant cites impediments caused by site control, maintenance and open areas as reasons why mitigation was not proposed (see EXP-133). As discussed above, these issues need not be an impediment to mitigation and mitigation is not an impediment to successful project development.

4.4.2 Structure Material and Design Alternatives

Northern Pass has proposed two general types of structures within the proposed corridor for the Project: a galvanized steel lattice structure, which can be light in color and highly reflective, and a weathered steel monopole structure, which appears as a dark rust color over time. The weathered steel structure is proposed for some locations where the NPT VIA revealed potential aesthetic impacts. Generally accepted professional standards considers the use of weathered steel structures as a mitigating structure type reasonable in many instances, but there are other options that were not proposed, discussed or otherwise disclosed in the application that may further reduce aesthetic impacts. Simply switching to a weathered steel structure type may not always be the professional standard for mitigation associated with structure types, because in some instances these poles stand in too great of contrast to the surroundings, or more effective mitigation may be warranted. The Applicant did not appear to consult or reference previous studies regarding planning of a new utility system, such as the National Forest Landscape Management (NFLM) Volume 2, Chapter 2 – Utilities in the application or NPT VIA. For instance, the NFLM states:

> **Color.** Colors for utility structures must be chosen after thorough analysis of site conditions. Structures that are colored to blend with their settings in direct sunlight may contrast with their settings in shade. Natural surfaces are usually well textured and have shade and shadow effects that darken them; surfaces of utility structures are usually smooth and reflect light even if dull-finish paint is used. So, as a rule of thumb, structures that must blend with their surroundings should be painted somewhat darker than the appearance of the background.
> (NFLM Chapter 2, p. 17)

4.4.2.1 Painted or Natina

As mentioned in the NFLM Chapter 2, dark dull-finish paint can be applied to proposed structures, which is potentially useful if a dark color is desirable but not the heavy profile of a monopole structures. Galvanized metal can also be stained prior to installation, such as a product called Natina Steel[16] (Figure 43).

Figure 43. Close up of a galvanized steel lattice tower treated with Natina Steel.

The effect of this or similar treatments is to darken galvanized steel structures to make them less visible in the landscape, which helps to reduce negative impacts associated with the light color and reflectance of a galvanized steel lattice structure. Example images of a large galvanized steel lattice structures treated with Natina Steel are depicted in Figure 44.

Figure 44. Left: Large galvanized steel lattice tower treated with Natina Steel. Right: Galvanized lattice structure at left compared to structures treated with Natina Steel at right. Changing the color of the galvanized lattice structures has the effect of blending the structures into the landscape.

[16] http://natinaproducts.com/galvanized-steel-projects/lattice-power-towers/

The possibility of using galvanized structures treated with paint or a product such as Natina Steel was not proposed, discussed or otherwise included in the NPT VIA as a mitigation option. Considering the obvious and documented aesthetic benefits of painting or staining galvanized steel lattice structures, and considering that over 700 galvanized lattice structures are proposed in the New Hampshire landscape as part of this Project, best practices and the applicable Rules in 301.05(a) and 301.14(7) would require the Applicant to include or evaluate structure treatments in addition weathering steel monopoles as mitigation options. Example locations where utilizing alternative colors for lattice rather than galvanized lattice or weathering steel monopoles would more appropriately mitigate potential adverse aesthetic effects of the proposed facility in a manner consistent with 301.05(a) and 301.14(7) include but are not limited to:

Route 3 at Howland Road, Clarksville,
Old Canaan Road, Pittsburg
Diamond Pond Road, Stewartstown
Ride-the-Wilds OHRV Trail Crossings, Dixville and Millsfield
Structures visible from Route 26 / Moose Path Trail, Millsfield
Structures visible from Little Dummer Pond and Big Dummer Pond, Dummer
Structures visible from Wiswell Road, Route 145, and Howland Road, Clarksville
Pontook Reservoir / Route 16 /Moose Path Trail, Dummer
Structures Visible from I-93

4.4.2.2 Utilize Wooden Structures for 115 kV Lines

As discussed in Chapter 3, NPT proposes as mitigation:

> Matching materials for relocated 115-kV structures and proposed transmission structures to minimize contrasts in color and texture and contribute to a sense of visual continuity within the corridor.

As further discussed in that section, the existing wooden 115 kV structures that will remain are an existing part of the landscape, and arguably already use the best material for New Hampshire's landscapes, even when placed beside a larger metal structure. An alternative that is not proposed by the NPT VIA is to utilize wooden or laminated wooden poles for all proposed 115 kV structures. This alternative would help avoid the sense of visual discontinuity within the corridor that arises by the variation in proposed structure types visible throughout the corridor, and maintain the existing materials currently used in the corridor where possible. This alternative measure would be more consistent with 301.05(a) and 301.14(7) than the proposal to match the more industrial character of the closest proposed metal HVDC structure.

4.4.2.3 Unify the Form and Color for Proposed NPT Structures Within the Corridor

The Applicant's proposal to use weathering steel monopole structures in sensitive visible locations along the corridor is not without merit. However, there are several areas where the two different types of proposed NPT structures are visible from one viewpoint, further discussed in Chapter 3. The best practice would be to unify the form and color for the proposed NPT structures where possible, and especially in areas with relatively dense populations, maintaining continuity between various areas of the line that are visible as travelers move through the landscape, and especially at the locations such as those identified in Chapter 3 that will have visibility of multiple types of NPT structures from the same viewpoint.

4.4.3 Reflectivity Alternatives

Other widely-used mitigation measures for transmission lines involve the use of insulators and conductors with low reflectance. These are employed to reduce visual contrast of proposed elements of a transmission line, lessening impact on aesthetics.

4.4.3.1 Insulators

Insulator materials used for transmission lines can have a substantial impact on how a project is perceived.

For instance, in the study Electric Transmission Visibility And Visual Contrast Threshold Distances In Western Landscapes (Sullivan et al.), it was determined that:

> If translucent glass insulators are used, in certain lighting conditions they may refract light strongly, such that they appear very bright and can constitute strong sources of visual contrast especially at distances of less than a few miles. This effect is shown in Figure 45.

Figure 45. Translucent Glass Insulators Can Be Strong Sources of Visual Contrast (Sullivan et al. 2014)

In the Northern Pass Response to Data Request VIS-12 from October 5, 2015, which is a part of the NPT DOE application, NPT states that:

> For the HVDC line, the insulators will be DC class insulators made from either porcelain or toughened glass. The dimensions of the individual bells are not finalized but will most likely be either 5.75 inches in height with a diameter of 11 inches or 6.75" inches in height with a diameter of 13 inches. The string of insulators will be approximately 10 feet in length. Color for porcelain insulators will most likely be gray bells with a galvanized metal cap and pin. The toughened glass insulators will have transparent glass bells with a galvanized metal cap and pin.
> (NPT DOE VIS-12, p. 2)

Glass insulators are translucent and likely to be visually prominent, and porcelain insulators would be less likely to be visually prominent from scenic resources. Using glass insulators would not be consistent with 301.05(a) and 301.14(7).

4.4.3.2 Conductors

The reflectivity of conductors may also have an impact on how a project is perceived, especially when several transmission lines are grouped within a single corridor. Normal aluminum conductors scatter light in varying directions depending on the angle of the sun, time of day and position of the viewer, sometimes obtrusively. In the Northern Pass Response to Data Request TL-1 from November 21, 2013, which is a part of the NPT DOE application, NPT states that:

> Northern Pass is proposing to employ untreated conductors based on its understanding that, after a period of exposure to the atmosphere, because of weathering, there is no visual difference between untreated and treated conductor.

We find this statement to be wholly inaccurate. In a technical support article, Transmission Conductors - A Review of the Design and Selection Criteria, F. Ridley Thrash, Jr. writes:

> The most common surface treatment and one normally required for conductors used for transmission and distribution lines crossing undeveloped Federal Government park lands is one to reduce the reflectivity of aluminum conductors. This type of surface finish is referred to as non-specular.
>
> NON-SPECULAR CONDUCTOR - The term non-specular is used to infer that the surface of an aluminum conductor, any type aluminum conductor, has been either mechanically or chemically treated to produce reduced reflectivity. The conductor surface must have a smooth matte gray finish which blends naturally and unobtrusively with the environment.
>
> This non-specular finish is typically achieved by passing the finished conductor through a deglaring machine (a type of sandblast machine) in which the conductor surface is blasted with a very fine mild abrasive grit producing a dull matte gray finish. The reflectivity and color of the finished cable is specified by ANSI C7.69 Specifications.
>
> The abrasive action of the blast media is extremely mild and in no way affects the mechanical characteristics of the conductor. The ampacity of current carrying capability of non-specular conductors is slightly increased because the emissivity of the conductor is increased from approximately 0.23, for bright shiny conductors, to approximately 0.42 because of the darker matte gray surface. An increase in current carrying capacity in the range of 5% can be achieved, for the same temperature rise, due to this increase in surface emissivity.

Again, the Applicant does not appear to have consulted or referenced previous studies regarding siting and screening of a new utility system, such as the National Forest Landscape Management Volume 2, Chapter 2 – Utilities (NFLM Chapter 2). Regarding utility crossings and as mentioned above, the NFLM states in part:

- Wire with the least shine and gauge should be used to avoid reflection and glare.

(NFLM Chapter 2, p. 17)

T. J. Boyle Associates has recommended the use of non-specular conductors for other transmission projects in the region, and has conducted field research to determine the effectiveness of using non-specular conductors. As seen in Figure 46 through Figure 49, locations where non-specular conductors were used adjacent to normal conductors (i.e. non-treated) were photographed, and help illustrate the differences between the two technologies.

Figure 46a. Photo of the VELCO Southern Loop corridor where two 345 kV transmission lines are located in southern Vermont. The line on the left was installed circa 1971 using untreated conductors; the line on the right was installed in 2011 and used non-specular conductors. Fifty years of weathering has not eliminated the specular glare; the new transmission line with non-spectral treatment is much less visible.

Figure 46b. Cropped photo of the photograph in Figure 13a. The line on the left was installed circa 1971 using untreated conductors; the line on the right was installed in 2011 and used non-specular conductors. Fifty years of weathering has not eliminated the specular glare; the new transmission line with non-spectral treatment is much less visible.

Figure 47a. Photo of the VELCO Southern Loop corridor where two 345 kV transmission lines are located in southern Vermont. The line on the left was installed circa 1971 using untreated conductors; the line on the right was installed in 2011 and used non-specular conductors. Fifty years of weathering has not eliminated the specular glare; the new transmission line with non-spectral treatment is much less visible.

Figure 47b. Cropped photo of the photograph in Figure 14a. The line on the left was installed circa 1971 using untreated conductors; the line on the right was installed in 2011 and used non-specular conductors. Fifty years of weathering has not eliminated the specular glare; the new transmission line with non-spectral treatment is much less visible.

Figure 48a. Photo of the VELCO Southern Loop corridor where two 345 kV transmission lines are located in southern Vermont. The line on the bottom was installed circa 1971 using untreated conductors; the line on the top (see Figure 15b) right was installed in 2011 and used non-specular conductors. Fifty years of weathering has not eliminated the specular glare; the new transmission line with non-spectral treatment is much less visible.

Figure 48b. Cropped portion of the photograph in Figure 15a. The line on the bottom was installed circa 1971 using untreated conductors; the line on the top with non-spectral treatment is much less visible.

Figure 49a. Photo of the VELCO Northwest Vermont Reliability Project where a 345 kV transmission line (top) with non-specular paired conductors is located next to a 115 kV transmission line (bottom) with untreated conductors. Even though the 345 kV transmission line uses six total conductors, they appear less visible than the three adjacent 115 kV conductors.

Figure 49b. Cropped portion of the photograph in Figure 16a. Even though the 345 kV transmission line uses six total conductors (top), they appear less visible than the three adjacent 115 kV conductors (bottom).

In the NPT Data Request Response to EXP 1-129, the Applicant states that:

> Based upon our observations of high-voltage transmission lines in the northeast, glare is a relatively infrequent occurrence, and is most noticeable during those times of the day when sunlight strikes the conductors at relatively low angles and reflects light back to the observer. It is most commonly seen in

situations where there is a wooded backdrop that emphasizes the color contrast between dark and light. Under most situations, conductors will either appear as dark lines when they are backlit or in shade, or as light gray lines when they are lit from the front.

To the Applicants' knowledge, there are no documents that find or conclude that glare is determined not to be a visual concern, and that conductors not treated for glare are equivalent to conductors treated to reduce glare. The few references to glare from conductor reflectivity that we have found are from situations in the southwestern part of the US, which is characterized by much different atmospheric, vegetation, and topographic conditions that allow conductors to be visible at much greater distances than in the northeast.

No special care was taken, or is necessarily required, when photographing the difference between the untreated and non-specular conductors shown in Figure 46 through Figure 49. Images were taken from roadways at normal times of day, and the sun did not need to be at a special position in the sky for the difference to be noticeable. Using non-specular conductors would have been consistent with 301.05(a) and 301.14(7).

4.4.4 Corridor Configuration Alternatives

There are several configurations of the transmission lines within the corridor that may reduce aesthetic impacts, including co-location of the various transmission lines, acquiring a wider corridor to reduce structure heights, standardizing road setbacks, and undergrounding additional portions of the line.

4.4.4.1 Co-location of Transmission Lines

In areas where two 115 kV lines will exist in the corridor adjacent to the NPT transmission line, namely in the towns of Concord, Pembroke, Allenstown and Deerfield, the two 115 kV lines could potentially have been co-located together on the same structures to reduce the total number of structures proposed in this corridor, and potentially reducing the required height of the 345 kV structures lattice structures. This could have a significant benefit in areas where three lines and associated structures will crowd the corridor. There is also the potential for one of the 115 kV lines to be co-located with the 345 kV line through this area. Neither the NPT VIA nor the Applicant discussed these possibilities as potential mitigation measures, which would have been consistent with 301.05(a) and 301.14(7).

4.4.4.2 Acquire Wider Corridor

Although difficult in densely populated areas, the acquisition of additional corridor width could reduce the height of 115 kV, 345 kV and HVDC structures. However, neither the NPT VIA nor the Application discussed this possibility as a potential mitigation measure, which would have been consistent with 301.05(a) and 301.14(7).

4.4.4.3 Standardize Road Setbacks for New Structures

There are many locations where NPT proposes structures in close proximity to roadways throughout the length of the line, sometimes as close as 30 feet. Considering that total spans between structures are regularly above 400 feet, and can reach spans above 900 feet in length, utilizing a minimum road setback (where possible) for new NPT structures would be a reasonable mitigation measure that would have significant benefit to aesthetics. However, neither the NPT VIA nor the Application discussed this possibility as a potential mitigation measure, which would have been consistent with 301.05(a) and 301.14(7).

4.4.4.4 Undergrounding

As discussed in Chapter 3, the NPT VIA did not provide explanation as to why some areas were chosen for an underground configuration and others were not. The NPT VIA should have included the portions of the Project proposed for undergrounding as a circumstance of the proposed project design rather than a mitigating measure intended to reduce impacts to scenic resources. However, undergrounding could still

play an important role in mitigating the Project as proposed, especially in Coos County and nearby other scenic resources. Undergrounding can also be utilized as offset mitigation as discussed in section 5.4.6 below.

4.4.5 New Corridor Alignment Alternatives

Corridor alignment can be used as a primary form of mitigation, and the properties on which the Project is proposed may have been suitable for a different route that alleviates aesthetic impacts. Several studies have been prepared regarding new corridor alignment, including the National Forest Landscape Management Volume 2, Chapter 2 – Utilities (NFLM Chapter 2) and the ±450 Transmission Line Study Quebec New England Intertie (450 Transmission Study). These are not the only publications that cover new transmission corridor planning, but include typical best practices and reasoning for placement of new corridors. For instance:

> Utility installations must be regarded as permanent fixtures that have lasting effects on land management. Therefore, the visual aspects of such installations must be considered in detail from the outset of project planning….Such planning, to be successful, must be reflected in every stage of development of a utility installation. (NFLM Chapter 2, p. 7)
>
> To find the best route for any utility, all possible corridors must first be identified and analyzed. At the outset, studies should *not* be concerned with land ownership – the preliminary goal must be optimum corridor selection.
>
> The corridor selected should be the one that best satisfies three major criteria:
>
> - The environmental and visual impact of the utility must be kept to the minimum.
> - The corridor must create the best combination of socioeconomic benefits for the consumers, the utility company, the landowners, and the general public.
> - Within the constraints of the land, the engineering and economics of the corridor must be feasible.
>
> (NFLM Chapter 2, p. 9)
>
> Place transmission lines at edges of valleys, so that they blend into the background of hills and mountains and maintain the undisturbed continuity of the valley floor.
>
> Place lines around hills, in draws, and in low areas parallel with drainage ways where possible.
>
> Position lines over hills obliquely, rather than perpendicular to the contours, and on the side shoulders of hills rather than over the top.
>
> Locate line to provide intervening screen, or utilize vegetation and/ or topography to avoid skylining of structures.
> (450 Transmission Study, p. 52)

Additionally, locations where a viewer is below the corridor and the top part of structures are exposed and create a high contrast against sky is specifically called out as poor siting for a transmission corridor in the 450 Transmission Study (p. 53). Selective clearing and new vegetation at road and river crossings are also recommended throughout the 450 Transmission Study, which because it was in northeastern Vermont involved similar landscapes to that of the NPT Project, particularly in Coos County.

4.4.5.1 Proposed Route

The route selection for a new transmission line corridor through the Great North Woods Region (Coos County) does not include supporting evidence for the proper selection of a new transmission corridor as the NPT application states in part.

> 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.
>
> Many route alternatives were considered and NPT modified the Project along the way to meet specific concerns expressed by citizens in New Hampshire.
> (Application for Certificate of Site and Facility, p. 44-45)

The NPT VIA did not provide other information about route selection, specific aesthetic concerns raised or associated mitigation to explain the choice in corridor. We expect that had the NPT VIA addressed potential "alternative measures considered but rejected by the applicant" as required per Site 301.05(b)(10) relating to why the new corridor alignment was chosen, the NPT VIA would have explained why an alternative corridor was not selected to avoid aesthetic impacts to the following locations:

i. Halls Stream Road, Pittsburg
ii. Old Canaan Road, Pittsburg
iii. Wiswell Road, Clarksville
iv. Route 145, Clarksville
v. Howland Road, Clarksville
vi. Heath Road, Stewartstown
vii. Coleman State Park, Stewartstown
viii. Diamond Pond Road, Stewartstown
ix. Ride-the-Wilds OHRV Trail crossings, Dixville and Millsfield
x. Route 26 / Moose Path Trail, Millsfield
xi. Big Dummer Pond, Dummer
xii. Little Dummer Pond, Dummer
xiii. Pontook Reservoir / Route 16 /Moose Path Trail, Dummer

4.4.6 Offset Mitigation Examples

Another form of mitigation includes the concept of offset mitigation, wherein aesthetic impacts to one area are allowed by mitigating impacts to another area. This practice is often associated with wetland impacts, but can also qualify for aesthetic mitigation.

4.4.6.1 Undergrounding at Loudon Road

The City of Concord is currently working to bury non-municipal utility infrastructure as a way to revitalize and beautify certain areas within the City.

> SECTION 26 Non-Municipal Utilities
>
> 26.01 General Requirements: All subdivisions shall make adequate provision for non-municipal utilities as may be necessary and appropriate for the subdivision. The applicant is responsible for all coordination with the utility companies to assure that non-municipal utilities are installed in accordance with plans approved by the Board pursuant to these regulations.
>
> 26.02 Design Standards: The following standards shall govern the design and construction of the non-municipal utilities for a subdivision:

> (1) Underground Utilities: Except in the Industrial (IN) Zoning District, all utility facilities including, but not limited to, gas, steam, electric power, telephone, telecommunication, and CATV cables, shall be located underground throughout the subdivision. Whenever existing utility facilities are located above ground on the property proposed for subdivision, the above ground utilities shall be removed and placed underground.
>
> (Concord Subdivision Regulations, p. 112 – 113)

This includes Loudon Road, a mixed residential and commercial strip east of the downtown area. Options for offset mitigation exist in this location, such that scenic impacts elsewhere in the City or State are tolerated in return for altering portions of the Project in more sensitive or highly used areas. At Loudon Road, this could involve undergrounding the proposed 345 kV portion of the Project and other lines in the corridor as they cross through the area, furthering the City's goal of undergrounding non-municipal utility infrastructure. An example of the benefits of this type of mitigation at Loudon Road is included in Appendix E, CO-1 Loudon Road Simulation.

4.4.6.2 Undergrounding at Turtle Pond

A second example of allowing aesthetic impacts in one area is Turtle Pond. A similar option for offset mitigation exist in this location, where undergrounding all lines through the Turtle Pond area would significantly reduce aesthetic impacts to that particular scenic resource. An example of the benefits of this type of mitigation at Turtle Pond is included in Appendix E, CO-4 Turtletown Pond Simulation.

4.4.7 Summary of Avoidance, Minimization and Mitigation Alternatives

Vegetative Mitigation Alternatives. The Applicant's response in EXP 1-133 wholly avoids responsibility for mitigating impacts caused by the Project with new vegetation. By stating that "there are no locations where the visual impact from the proposed transition stations was determined to be unreasonable", plantings "will be installed where necessary", and presenting an argument about the lack of site control for plantings along roadways, the Applicant avoids taking responsibility for proposing or installing plantings and does not meet the requirements set forth in Site 301.5(a) or 301.14(a)(7). Generally accepted professional standards including mitigation not just at locations where the aesthetic impacts are unreasonable, but rather anyplace where there are potential adverse effects (Site 301.5(a)). The Applicant's approach leads to a situation where no vegetative mitigation is specifically proposed as part of the Application, and a decision must be made by the SEC as to whether impacts to scenic resources caused by the proposed NPT project are acceptable as proposed. It is assumed that the SEC must somehow force the Applicant to install vegetative screening "where necessary," and because the assertion by the Applicant is that the Project elements are not unreasonable, no expectations about effectiveness of any vegetation mitigation would need to be met if the Project is approved. This strategy would be a major deviation from the way in which other recently proposed transmission lines have been proposed, permitted and installed in the New England Region and is not consistent with generally accepted professional standards.

To meet the standards set by Site 301.5(a) and Site 301.14(a)(7), easements for planting and maintaining vegetative mitigation need to be obtained, and other mitigation such as selective clearing for right-of-way and overhead wire-zone compatible species must be explored and proposed as part of the application to the SEC. Both Dewan & Associates and T. J. Boyle Associates have included vegetative mitigation in conjunction with visual impact assessments for recent transmission line projects elsewhere in New England, and there is no reason why this Project should be considered any different. Vegetative mitigation is an accepted, reasonable and effective practice for reducing visual impacts that arise from transmission line installations—whether impacts are determined to be reasonable or not—and is consistent with 301.05(a) and 301.14(7). A project of this magnitude must include the practice of vegetative mitigation as part of the overall mitigation strategy. The lack of information about potential vegetation mitigation measures and waiving responsibility for its omission is unreasonable and unacceptable for a Project of this scale, and does not satisfy the Applicant's obligations under Site 301.05(a) and 301.14(a)(7).

Structure Material and Design Alternatives. The NPT VIA includes no analysis of how variation in structure types would affect the study area as a whole, and it may be difficult for the general public to interpret how the proposed Project relates to the landscape in which it is visible. For instance, where the Project follows the existing corridor between Dummer and Bethlehem (a length of approximately 40 miles), the structure design switches between weathered steel monopole to galvanized steel lattice a total of 16 times. The best practice would be to unify the form and color for the proposed NPT structures where possible, and especially in areas with relatively dense populations, maintaining continuity between various areas of the line that are visible as travelers move through the landscape, and especially at the locations such as those identified in Chapter 3 that will have visibility of multiple types of NPT structures from the same viewpoint.

Reflectance Alternatives. Based on the NPT VIA, it does not appear that insulator material was an important factor in determining visual impacts. Glass as a material for insulators does not appear to be used in the various simulations provided with the NPT VIA. Given the existence of glass insulators on large transmission lines elsewhere in New Hampshire, the use of a darker material with low reflectance for the insulators would be an acceptable form of mitigation. However, it appears that the use of glass insulators is still being considered, which could have additional visual impacts throughout the length of the line, and would not be consistent with 301.05(a) and 301.14(7). As using gray porcelain as an insulator material is a readily available and reasonable option for mitigating reflectance, its use is warranted in areas where mitigation is necessary, and arguably should be used throughout the entire Project in order to mitigate potential adverse aesthetic effects of the proposed facility.

As can be seen in Figure 46 through Figure 49, using non-specular conductors would significantly reduce glare caused by the proposed NPT project. A regularly used form of mitigation for transmission lines, treating the conductors to reduce visibility is a reasonable alternative that would have significant aesthetic benefits, and must be a consideration for this Project. Based on the above response from NPT and lack of inclusion of this treatment as mitigation option on page M-16 of the NPT VIA, it does not appear that the Applicant has been sufficiently informed of – or has seriously considered – these readily available and widely used mitigation alternatives. Using non-specular conductors would have been consistent with 301.05(a) and 301.14(7).

Corridor Configuration Alternatives. Other configurations for structures within the proposed corridor are possible mitigation measures that the Applicant has not employed. In particular, additional undergrounding specifically to reduce proposed impacts to scenic resources such as Little Diamond Pond is a mitigation option that must be considered more closely. Other similarly sized projects have been able to incorporate significant undergrounding in their design, such as the Champlain Hudson Power Express,[17] so it would appear that undergrounding additional segments of the proposed line in the chosen corridor could be considered reasonable mitigation in response to potential impacts to scenic resources. Using alternative configurations would have been consistent with 301.05(a) and 301.14(7).

New Corridor Alignment. There is nothing included in the Application indicating that the applicant performed new corridor selection in a way that is sensitive to scenic resources, and it appears that DeWan & Associated did not consult or reference previous studies regarding siting of a new utility system. As the proposed transmission corridor would likely be a long-term fixture on the landscape, future land uses in areas where the corridor is proposed could also potentially be affected by poor siting.

A new large-scale transmission corridor planned in a rural area that New Hampshire prides for its aesthetic qualities must be carefully considered, and as much as possible should strictly adhere to established practices for siting transmission corridors in a visually sensitive way. Any limitations imposed by the lack of property acquisition and associated alternatives must be examined very carefully, and reasoning for why new aesthetic impacts associated with a given transmission line route are acceptable versus other options must be

[17] http://www.chpexpress.com/route-maps.php

described in the Application and associated VIA per the requirement in Site 301.05(b)(10). Other routes or alternative configurations (e.g. undergrounding) may be necessary to avoid the proposed impacts. Because this corridor will likely exist in perpetuity, permitting a new transmission corridor that was predominantly sited based on willing landowners rather than accepted siting practices is not in the best interest of the State of New Hampshire due to long term impacts to scenic resources.

Offset Mitigation Examples. The concept of offset mitigation is not widely used to offset the impacts of aesthetics, though it is often associated with wetland impacts. Nonetheless, its use in certain areas may indeed offset impacts to the landscape in other areas, and should be considered a valid mitigation option that could result in a net reduction in aesthetic impacts to scenic resources associated with the proposed Project.

4.5 Independent Analysis – Findings and Conclusions

In review of the several independent analyses conducted to further evaluate the Project, the following findings and conclusions:

1. Identification of Scenic Resources:

T. J. Boyle was able to conduct an analysis of potential scenic resources based on existing databases that were readily available. This was supplemented with resources that were nominated by local citizens through Community Workshops, sponsored by Counsel for the Public. The results of the process found over 18,000 potential scenic resources. The lack of existing databases for certain scenic resource as defined by Site 102.45 would indicate that even more resource are likely to exist.

As indicated in our review of the NPT VIA in Chapter 3, this reinforces our conclusion that NPT's identification of scenic resources was significantly flawed, fails to appropriately identify scenic resources and therefore compromises the legitimacy of the NPT VIA's findings.

2. User Expectations and Effect on Future Use and Enjoyment

Limited information is available regarding user expectations and effect on future use on enjoyment for the different types of scenic resources and the range of activities that occur there. However, what data are available indicates that there is generally an expectation for high scenic quality at most locations in New Hampshire to would be considered scenic resources. Available data also indicates that a reduction of scenic quality generally would result in a negative effect of future use and enjoyment of those resources.

3. Evaluation of Potential Visual Impacts to Scenic Resources

Our independent analysis of potential impacts at 41 scenic resources found the Project to result in adverse impacts at all 41 locations. At 29 of the resources, we found the impacts unreasonable. We found the Project unreasonable as a result of:

- Inappropriate Siting of new Transmission Corridor
- Mix of Structure Types
- Significant Contrast to Existing Character
- Height of Proposed Structures
- Lack of Mitigation

This analysis represents a very limited number of scenic resources that were evaluated. The results indicate that upon a full analysis of all scenic resources, similar findings would be concluded along the length of the Project. As currently proposed, we expect the Project will result in unreasonable adverse effects to aesthetics at multiple scenic resources.

4. Avoidance, Minimization and Mitigation Alternatives

As a final component, the independent analysis evaluated in detail if the best practical measures were proposed by the applicant to avoid, minimize, or mitigate adverse effects on aesthetics. This section reviews measures that are expected to be incorporated into an electrical transmission facility proposal, including:

- Vegetative Mitigation
- Structure Material and Design Alternative
- Reflectance Alternatives
- Corridor Configuration Alternatives
- New Corridor Alignment
- Offset Mitigation

Overall, our review found that Project does not adequately address and/or incorporate best practical measures for effectively avoiding, minimizing, or mitigating potential adverse aesthetic effects of the proposed facility, which would have been consistent with 301.05(a), 301.05(b)(10) and 301.14(7).

5.0 Conclusions

Findings of this review are divided into two sections, the technical review of the NPT VIA and our overall assessment as to whether the Project will result in an unreasonable adverse effect on aesthetics.

1. This study found significant errors in the methodology employed by the NPT VIA to assess potential adverse impacts. As a result, the NPT VIA does not fulfill the SEC requirements outlined by Site 301.05 and should not be used to assess whether the Project will result in an unreasonable adverse impact on aesthetics.
2. More importantly, our analysis continues to provide an opinion as to whether the Project will result in an unreasonable adverse effect on aesthetics pursuant to RSA 162-H:16, IV(c). An independent analysis evaluates potential adverse visual impacts at a limited sample of scenic resources and determines that out of 41 resources evaluated, the Project will result in an unreasonable adverse effect on aesthetics at 29 of those resources. Generally, the Project fails to implement measures that we would expect to be incorporated for similar projects to avoid, minimize, or mitigate adverse effects of the Project.

Our overall conclusion is that the Northern Pass Transmission Line, as is currently proposed, will result in an unreasonable adverse effect on aesthetics.

5.1 Conclusions from the Technical Review

This section reviews the NPT VIA's responsiveness to the technical requirements described in Site 301.05. Site 202.19(b) states that "an applicant for a certificate of site and facility shall bear the burden of proving facts sufficient for the committee or subcommittee, as applicable, to make the findings required by RSA 162-H:16." Investigating the potential visual impacts of the Project is a large undertaking, but this is not a reason to lower the expectations for a thorough analysis. There are substantial deficiencies in the NPT VIA, which limits the ability to understand and review the Project's potential visual impacts. This may be sufficient cause for concluding that the Applicant has not provided sufficient evidence for the Committee to make the findings concerning aesthetics. Our primary conclusions are summarized below.

5.1.1 Inadequate Identification of Scenic Resources

In violation of SEC rules, the NPT VIA limits scenic resources primarily to those designated by an institution or otherwise recognized for their scenic or recreational quality and as a result identifies only 680 scenic resources in the 3,209 square miles within 10 miles of the Project's overhead structures. However, Site 102.45(a) is the only type of scenic resource that requires such "designation." Scenic resources defined by Site 102.45(b, c, e & f) are required only to "possess a scenic quality"—not high scenic quality—and Site 102.45(d) includes all "recreation areas established, protected or maintained in whole or in part with public funds." Using the SEC's more expansive definition, in Chapter 4 and Appendix D we identify over 18,000 potential scenic resources using readily available databases, and identified categories of scenic resources that could be inventoried with additional effort (e.g., historic sites, lands given a public use recreation tax abatement). When there is a full accounting of scenic resources, it becomes clear that they are not a few isolated sites, but constitute the major portion of New Hampshire's landscape. The failure to properly identify scenic resources in itself, renders the NPT VIA non-reliable.

5.1.2 Failed to Consider Visibility Based on Bare Ground Conditions

Site 301.05(b)(1) associates the phrase "would be visible" with a visibility analyses "based on both bare ground conditions using topographic screening only and with consideration of screening by vegetation or other factors" (Emphasis added). Using bare ground visibility for long range planning is recommended by standard VIA handbooks (e.g., USFS 1995, p. 4.5; TLI & IEMA 2013, p. 103). The NPT VIA failed to consider visibility from scenic resources based on bare ground conditions. This and other issues with the visibility analysis are considered in Chapter 3. The number of potentially impacted scenic resources significantly increases if the visibility analysis is based on bare ground conditions.

5.1.3 Unsupported Introduction of New Evaluation Factors

The NPT VIA uses Scenic Significance to eliminate scenic resources from consideration during the Visual Impact evaluation step in violation of the SEC rules. Scenic Significance is a combined rating of Visual Quality and Cultural Value. Site 301.05(b)(6) clearly states the factors that are to be considered. Many, but not all scenic resources are required to "possess a scenic quality," but there is no suggestion in Site 301.05(b)(6) that the degree of scenic quality should be considered. Once a scenic resource is identified as having visibility of the Project, the potential visual impacts are to be evaluated. Similarly, the SEC rules provide no indication that that applicant can consider Cultural Value, which is an indicator of the scenic resource's significance, in the VIA evaluation. While Site 301.14(2) directs the Committee to consider significance, the SEC rules do not support the NPT VIA's approach to add this to the 301.05(b)(6) factors that the VIA is to consider. The effect of the decision to add Scenic Significance to the VIA is discussed in Chapter 3.

5.1.4 Simulations Do Not Meet SEC Standards

Site 301.05(b)(8) establishes the standards for the photosimulations, several of which the NPT VIA does not meet.

- The original photography normally used the medium rather than the required high resolution camera setting.
- The simulation resolution at 11 of the 28 viewpoints is below SEC and generally accepted professional standards.
- The simulations are distributed as PDFs with JPEG compression that further deteriorates the sharpness and clarity of the proposed facilities, inappropriately reducing their apparent visual presence.
- The procedure used to create the visual simulations does not follow the best professional practice in New England. The use of Google Earth Pro for laying out simulations is a new untested methodology; Google does not document the accuracy of its data and there is wide concern expressed on the internet about its accuracy for professional use. The 3D models of the individual structures are created using trial-and-error and scaled by eye until they "look right" when placed in the simulation. The NPT VIA does not use the standard professional practice of creating a rendered 3D model of the proposed structures located on the terrain that is based on the parameters of the landscape and view.

These and other issues concerning the simulations are discussed in Chapter 3.

5.1.5 Undervalue the Expectations of the Typical Viewer and the Effect on Future Use and Enjoyment of the Scenic Resource

The NPT VIA assigns relatively low ratings to "expectations of the typical viewer," and the "effect of future use and enjoyment of the scenic resource," both of which the Applicants are required to consider in their

VIA. For instance, the Project's effect on continued use and enjoyment is determined to be low or none for all evaluated scenic resources. However, the NPT VIA cited no evidence to support this assertion.

In contrast, scenery was important to the enjoyment and choice to visit over 90 percent of the scenic resources identified at Counsel for the Public's Community Workshops. Similarly, a 2006 study sponsored by the New Hampshire Lakes Association found that 55 percent of the surveyed lake users thought that if the quality of the natural beauty and scenery would become poorer in the next year, they would change the number of planned visits to the site. These and similar findings are presented in Chapter 4.

5.2 Conclusions Regarding Adverse and Unreasonable Visual Impacts

It is the Committee's responsibility to determine findings of unreasonable adverse effect based on the criteria in Site 301.14. T. J. Boyle has undertaken several independent investigations and analyses in Chapter 4 to provide evidence to the Committee to consider in reaching their findings. Our primary findings are summarized below.

5.2.1 Evaluation of Potential Visual Impacts to Scenic Resources

Our independent evaluation of potential visual impacts to scenic resources found that of 41 resources evaluated, the Project would result in adverse visual impacts at all 41 resources; we found those impacts unreasonable at 29 of the 41 locations. We found these impacts unreasonable in the given instances for one or more of the following reasons

- **Inappropriate Siting of new Transmission Corridor.** The proposed location of a new transmission corridor through highly scenic landscapes in northern New Hampshire will result in unreasonable adverse impacts on aesthetics.
- **Mix of Structure Types.** Several structure types are proposed, including a mix of alternating structure types along the NPT line, as well as for existing transmission lines that need to be rebuilt as part of the Project. The consequential mix of structure configurations, materials, and colors will create discontinuity from views within scenic resources and will result in adverse impacts on aesthetics that are otherwise avoidable.
- **Significant Contrast to Existing Character.** New structure types, and the overall organization of the corridor will result in an overwhelmingly industrial character. The contrast when compared to the existing corridor will result in unreasonable adverse impacts on aesthetics.
- **Height of Proposed Structures.** The height of proposed structures is out of scale in comparison to similar size transmission lines. This is likely a result of attempting to incorporate an additional transmission line within corridors that do not have adequate width. The proposed height of new structures will significantly increase the visibility and prominence of the Project and will result in unreasonable adverse impacts on aesthetics.
- **Lack of Mitigation.** The Project fails to incorporate reasonably available mitigation that could significantly reduce adverse impacts and will result in unreasonable adverse impacts on aesthetics.

In conclusion, review of potential impacts at this small sample of scenic resources clearly indicates that the Project will result in unreasonable adverse impacts as currently proposed. These findings indicate that if all scenic resources were evaluated in accordance with the SEC's rules, similar findings could be determined along the length of the NPT. Based on this small sample alone, we would recommend that the SEC find that the Project will have an unreasonable adverse impacts on aesthetics.

5.2.2 Avoidance or Minimization through Corridor Configuration

In many places, the existing corridor width is inadequate to appropriately accommodate the Project. As a result, the Applicant has greatly increased structure heights, putting them well above the surrounding landscape elements and creating adverse visual impacts. There are alternatives that should be considered to address this problem.

- **Proper routing of the new corridor**. There is no indication in the NPT VIA that visual effects were taken into consideration when selecting the new corridor alignment. The result is a large number of locations documented in Chapter 4 where the proposed new corridor results in unreasonably adverse visual impacts.
- **Co-location of transmission lines**. In areas where two 115 kV lines exist in the corridor, there may be opportunities to co-locate them on the same structure. This would lessen the space demands on the corridor and allow the Project structures to be lowered.
- **Acquire a wider corridor**. The height of proposed structures could be reduced if the corridor were widened. The NPT VIA fails to explore this opportunity.
- **Standardize road setbacks for new structures**. There are many locations where proposed structures are in close proximity to roads, sometimes as close as 30 feet. The span between structures is sufficient that a minimum road setback guideline of 200 feet in combination with vegetation planting where appropriate would have significant aesthetic benefits.
- **Undergrounding**. Undergrounding avoids visual impacts, and should be considered for additional areas.

5.2.3 Adverse Effects Are Not Effectively Mitigated

Site 301.05(b)(10) requires the VIA to provide a "description of the measures planned to avoid, minimize, or mitigate potential adverse effects of the proposed facility, and of any visible plume that would emanate from the proposed facility, and the alternative measures considered but rejected by the applicant." Visual impacts need not be unreasonable to require measures that avoid, minimize or mitigate them. This necessitates considering details at a site-level that are not generally evaluated in the NPT VIA.

Many of the actions represented in the NPT VIA as visual mitigation are taken for other reasons. The most substantive mitigation proposed is burial and the use of weathered steel monopole structures; there is no discussion of alternative measures considered but rejected. Examples of measures that could be employed to avoid, minimize and mitigate potential adverse effects are described in Chapter 4 and include:

- **Vegetative mitigation alternatives**. There are numerous locations that warrant an evaluation of whether they would benefit from vegetation planting to mitigate visual impacts. For instance, these include all road and river crossings. DeWan & Associates have experience doing this type of analysis as part of a transmission line VIA and it should have been incorporated into the NPT VIA.
- **Structure material and design alternatives**. There is extensive use of galvanized steel lattice and monopole structures, which can create a significant visual impact in many situations. The use of paint or a product such as Natina Steel should be considered at specific locations, such as those listed in Chapter 4.
- **Harmonizing new structures with existing wooden structures**. In many cases the wooden structures on the existing 115 kV line will remain. Consideration should be given to employing new wooden structures that better harmonize with the existing structures to remain, rather than surrounding them with larger steel monopole or lattices structures that have a more industrial appearance.

- **Unify the form and color of all structures within the corridor**. The existing 115 kV line uses one type of structure for long stretches, creating a unified appearance. The NPT proposed to introduce several new structure types into the corridor and frequently change them after a short distance. Where possible, structures should exhibit a unified form and color for long stretches of the corridor.
- **Use non-reflective materials**. The Applicant has asserted that reflection from conductors and insulators is not very visible, and that it quickly goes away with weathering. The documentation in Chapter 4 illustrates that this is not the case. Best practice is to use non-reflective conductors and insulators from the outset.

There are many viewpoints where a typical person would find the visual impact of the Project unreasonably adverse. Examples are the large number of road crossings and river crossings where structures are in the immediate foreground, and locations where the Project is located along ridgelines so that the structures are "skylined." Mitigation for these and other unreasonable adverse views are ineffective or not proposed at all. We review a number of alternative mitigation measures that represent best practice measures that are not adequately considered in the NPT VIA and are reviewed in Chapter 4. Failure to adequately consider best practical mitigation measures results in the Project as proposed having an unreasonable adverse impact.

References

+450 Transmission Line Study Quebec New England Intertie. Office of Terrence J. Boyle. 1982.

Application for Certificate of Site and Facility. Northern Pass Transmission. 201506_2015-10-19_nptllc_psnh_app.pdf

Applicants' Responses to Counsel for the Public's Expert Assisted Data Requests and Interrogatories – Set 1. SEC Docket NO. 2015-06.

City of Concord, NH. Subdivision Regulations. Revised July 18, 2016. City of Concord Planning Board, Planning Division, Community Development Department

Cordell, Ken H. 2012. *Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment.* Ashville, NC: USDA Forest Service, Southern Research Station.

Deering, M. 1998. The Limits of Human Vision, in 2nd International Immersive Projection Technology Workshop. http://www.swift.ac.uk/about/files/vision.pdf

DeWan, Terrence, and Jessica Kimball. 2015. The State of New Hampshire Before the New Hampshire Site Evaluation Committee Docket No. 2015-06 Joint Pre-Filed Direct Testimony of Terrence Dewan and Jessica Kimball in Support of the 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. Dated October 16, 2015.

Driscoll, Jr., Edward C., Brian A. Gray, William G. E. Blair, and John F. Ady. 1976. Measuring the visibility of high voltage transmission facilities in the Pacific Northwest. Seattle, WA: Jones & Jones. 55 p.

Dumville, Adam M. 2016. Re: Northern Pass Transmission LLC, Docket 2015-06. [Transmittal letter for "unofficial" discovery information provided by legal counsel Adam Dumville, dated September 9, 2016.]

Getz, Thomas B. (2016) Re 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 (the "Applicants") for a Certificate of Site and Facility - Revised Photosimulations. (Memo dated September 29, 2016) Concord, NH: McLane Middleton.

ERC. 2009. Reply: Can I transform from MGA 56 GDA94 to Google Projection and align property boundaries properly. Google Earth Help Forum. https://productforums.google.com/forum/?hl=en#!category-topic/earth/imagery--data--layers/6-4HUc-bWqk

Foster, Joseph A. 2016. Schedule for Counsel for the Public Workshops on Northern Pass. [Press advisory dated July 19, 2016]

F. Ridley Thrash, Jr. Transmission Conductors - A Review of the Design and Selection Criteria. Wire & Cable Technology Group. Southwire Company. http://www.southwire.com/support/TransmissionConductoraReviewOfTheDesignandSelectionCriteria.htm

Horner + Maclennan, and Envision. 2006. *Visual Representation of Windfarms Good Practice Guidance*. Technical Appendix C: Human Vision. Inverness: Scottish Natural Heritage.

Maine, Department of Environmental Protection. 2003. Guidance for Assessing Impacts to Existing Scenic and Aesthetic Uses under the Natural Resources Protection Act. DEPLW0541-A2003.

New Hampshire Department of Environmental Services. 2016. *Official List of Public Waters*. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwi_6d-jwPvPAhWm5oMKHZsQAZwQFggeMAA&url=http%3A%2F%2Fdes.nh.gov%2Forganization%2Fcommissioner%2Fpip%2Fpublications%2Fwd%2Fdocuments%2Folpw.pdf&usg=AFQjCNFfFxpStSSVQ3iTidOTgGTIYZrWyw&sig2=9ra98fZ8VZRqlf4fut83UQ

New Hampshire Division of Parks and Recreation. 2012. *New Hampshire Outdoor 2013-2018*. [SCORP] http://www.nhstateparks.org/about-us/division/reports.aspx

New Hampshire Division of Travel and Tourism Development. 2016. *New Hampshire: The Official Visitors' Guide 2016-2017*. http://www.visitnh.gov/eGuidebook.aspx

Normandeau Associates. 2015. Review of Land Use and Local, Regional and State Planning: Northern Pass Transmission Project. (Appendix 41) http://www.nhsec.nh.gov/projects/2015-06/application/Volume-XXXIII/2015-06_2015-10-19_nptllc_psnh_app_41_review_land_use_local_regional_state_planning.pdf

Northern Pass Transmission LLC. 2016. Applicants' Responses to Counsel for the Public's Expert Assisted Data Requests and Interrogatories – Set 1. SEC Docket No. 2015-06.

Northern Pass Response to Data Request VIS-12 from October 5, 2015. Department of Energy. DOE_Proposed_61Mile_UG_Route_Data_Update.gdb geodatabase, Proposed_Structures_Oct1 feature class

Palmer, J.F. 2015. Effect size as a basis for evaluating the acceptability of scenic impacts: Ten wind energy projects from Maine, USA. *Landscape and Urban Planning* 140: 56-66.

Palmer. James F. 2016. Assigning a fixed height to land cover screen for use in visibility analysis. *Journal of Digital Landscape Architecture* 2016(1): 125-132.

Portland Research Group. 2011. *Highland Wind Project Surveys of Hikers March 2011: Report of Trail Intercept and Web Survey Research Conducted Summer and Fall 2010*. Portland, ME: Portland Research Group.

Preservation Company. 2015. Northern Pass Transportation Project Assessment of Historic Properties. http://www.nhsec.nh.gov/projects/2015-06/application/Volume-XVI/pages_from_2015-06_2015-10-19_nptllc_psnh_app_18_npt_project_assessment_historic_properties_oct2015_part1_pgs_1-500.pdf

Rohner, Sina, Michael Roth, and Christian Tilk. 2016. Cloud-based visibility analysis for energy infrastructure: investigating the cost-efficiency and validity as preconditions for practical implementation. *Journal of Digital Landscape Architecture* 2016(1): 207-213.

Rubin, Fay. 2016. Subject: Fwd: FW: New Hampshire Conservation/Public Lands database. Email to James F. Palmer dated August 8, 2016.

Site Evaluation Committee. 2016. IN RE: DOCKET NO. 2015-05 SITE EVALUATION COMMITTEE: Joint Application of New England Power Company d/b/a National Grid and Public Service Company

of New Hampshire d/b/a Eversource Energy for a Certificate of Site and Facility. Day 1 Deliberations, June 14, 2016.

Site Evaluation Committee. 2015. RE: Final Proposal 2015-11 Adoption of Final Rules Site 100 and Site 201-204 - Organizational Rules and Rules of Practice and Procedure of the Site Evaluation Committee SEC Docket No. 2014-04.

Site Evaluation Committee. 2015. RE: Final Proposal 2015-12 Adoption of Final Rules Site 205 and Site 300 - Explanation of Proposed Rule and Certificates of Site and Facility Rules of the Site Evaluation Committee SEC Docket No. 2014-04.

Site Evaluation Committee. 2013a. IN RE: DOCKET NO. 2012-01: Application of Antrim Wind, LLC, for a Certificate of Site and Facility for a 30 MW Wind Powered Renewable Energy Facility to be Located in Antrim, Hillsborough County, New Hampshire. Day 1 Deliberations, Afternoon Session Only, February 5, 2013.

Site Evaluation Committee. 2013b. Antrim Decision & Order Denying Certificate, Docket No. 2012-01. [Dated April 25, 2013] http://www.nhsec.nh.gov/projects/2012-01/documents/130425decision.pdf

Smardon, R.C., S.R.J. Sheppard and S. Newman. 1981. *Prototype Visual Impact Assessment Manual.* Syracuse, NY: SUNY College of Environmental Science and Forestry. http://www.esf.edu/es/via/pviamanual.pdf

Smardon, R.C., J.F. Palmer, and J.P. Felleman (Editors.). 1986. Foundations for Visual Project Analysis. New York: John Wiley & Sons. http://www.esf.edu/via/

Solmeta. 2012. Geotagger Pro 2 user Manual. (Version 1.0) Shenzhen, China: Shenzhen Solmeta Technology Company.

Sullivan, Robert G., Jennifer M. Abplanalp, Sherry Lahti, Kevin J. Beckman, Brian L. Cantwell, and Pamela Richmond. 2014. Electric transmission visibility and visual contrast threshold distances in western landscapes. In Changing Tides and Shifting Sands. Conference Proceedings of the 39th Annual NAEP Conference. April 7-10, 2014, St. Petersburg, FL. https://www.filesanywhere.com/fs/v.aspx?v=8b6c6a8e5a6275bcaa69

Terrence J. DeWan & Associates. 2015. *Visual Impact Assessment: Northern Pass Transmission Project.* http://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf

Terrence J. DeWan & Associates. 2016a. *Visual Impact Assessment – Adddendum: Northern Pass Transmission Project.* http://www.nhsec.nh.gov/projects/2015-06/2015-06_application.htm

Terrence J. DeWan & Associates. 2016b. NPT Scenic Resources Spreadsheet [Microsoft Excel file] [Transmitted by Dumville (2016)]

T. J. Dewan & Associates. 2010. Site Law Application – Maine Power Reliability Program. 6.0 Visual Quality and Scenic Character. [Provided in response to data request TS 4-1].

Terrence J. DeWan & Associates. 2010. Exhibit 6-2 Roadside Visual Buffer Report – Maine Power Reliability Program.

USDA, Forest Service. 1995. [page revisions 2000] *Landscape Aesthetics: A Handbook for Scenery Management.* Agricultural Handbook Number 701. http://www.esf.edu/es/via/

USDA, Forest Service. 1975. *National Forest Landscape Management: Utilities.* Volume 2, Chapter 2. Agricultural Handbook Number 478.

USDI, Bureau of Land Management. 1986a. *Visual Resource Inventory*. Manual H-8410-1. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.31679.File.dat/H-8410.pdf

USDI, Bureau of Land Management. 1986b. *Visual Resource Contrast Rating*. Manual H-8431. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.79462.File.dat/8431.pdf

Whitehead, Timothy. 2016. Re: Contact Google Earth Blog [#6935]. Email to James F. Palmer dated October 28, 2016.

Wikipedia. 2016a. Nyquist–Shannon sampling theorem. https://en.wikipedia.org/wiki/Nyquist%E2%80%93Shannon_sampling_theorem

Wikipedia. 2016b. Visual acuity. https://en.wikipedia.org/wiki/Visual_acuity

APPENDIX A:

SEC Rules

APPENDIX A - 2014-04_2015-12-15_ltr_site_100-204_adopted_rules.pdf
APPENDIX A - 2014-04_2015-12-15_ltr_site_205-300_adopted_rules.pdf

APPENDIX B:

Review of NPT Visibility Analysis

Palmer 2016 Assigning a Fixed Height to Land Cover Screen for Use in Visibility Analysis.pdf

APPENDIX C:

Status of Scenic Resources Identified in VIA

NPT Scenic Resource Spreadsheet.xlsx
NPT RESOURCE EVAULATION CHARTS.xlsx
Palmer Hoffman 2001 Rating reliability and representation validity.pdf
Responses to Counsel for the Public Expert Assisted Data Request Responses.pdf
Google Earth accuracy.pdf

APPENDIX D:

List of Potential Scenic Resources

Statistics_Summary_All Towns.pdf
Towns_Within_APE_Terrain_Viewshed.pdf
Towns_Within_APE_Vegetated_Viewshed.pdf
Area of Current Use Appraisal by Town.pdf
NH Visitors Guide 2016-17.pdf

APPENDIX E:

Mitigation Examples

CO-1 Loudon Road Simulation.pdf
CO-4 Turtletown Pond Simulation.pdf

APPENDIX F:

Scenic Resource Analysis

Scenic Resource Evaluation Forms
T. J. Boyle NPT DOE FEIS VIA Simulation Excerpts.pdf
T. J. Boyle NPT SEC Simulations.pdf