

**Review of the
Highland Wind Project
Visual Impact Assessment**

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1. Introduction

On December 29, 2010, Highland Wind LLC submitted a permit application for the Highland Wind Project with a proposed nameplate capacity of 117 megawatt (MW). The turbines are located in two strings on the ridges of the “Watering Tub,” Witham Mountain, Bald Mountain, Burnt Hill, and Brigs Hill in Highland Plantation, Somerset County, Maine. The project is within the area designated for expedited grid-scale wind development. The generation facilities include:

- **Turbines.** Thirty-nine wind turbines with a nameplate capacity of up to 3.0 MW each. While the model of turbine is not specified, the VIA assumed use of a General Electric 2.5xl turbine. The height is 85 meters (approximately 279 feet) to the hub center plus 50 meters (approximately 164 feet) for the rotor blades, resulting in a total potential height of 135 meters (443 feet) to the tip of an upright blade. The turbines will be painted white. Red warning lights will be installed according to Federal Aviation Administration (FAA) guidelines. Typically lights are placed on the two end turbines, and on alternating turbines between them.
- **Collector line and substation.** An underground collector line system will join a new 28,300± square foot substation.

Associated facilities include:

- **Road.** The access road will be 16± feet wide and the ridgeline crane path will be 36 feet wide. Of the 18.2 miles of roads, 15.1 miles will be new constructed. It appears that roadways will be allowed to revegetate naturally to a 16-foot width.
- **Building.** An approximately 7,875 square foot Operations and Maintenance building located 450 feet up the access road on the northeast side of Long Falls Damn Road. It will be painted in neutral colors and have a dark roof.
- **Meteorological towers.** There will be five permanent 80-meter (262-foot) guyed lattice meteorological towers. The towers will have a triangular cross section of approximately 18 inches on a side.
- **Generator lead line.** The collector substation will be connected to the Wyman Substation by a 9.5± mile long 115 kV generator lead line. It will be located in a 100-foot wide cleared transmission corridor. Much of this distance it will run parallel to an existing transmission line, resulting in a wider cleared corridor.

The report entitled *Highland Wind Project Visual Impact Assessment* by Terrence J. DeWan and Associates was submitted as part of Highland Wind, LLC’s permit application (TJD&A 2010). This review was prepared to evaluate the adequacy of the visual impact assessment (VIA).¹ In addition, it presents the findings of a field investigation and additional analyses of the Highland Wind Project’s potential visual impacts. This is followed by an independent evaluation of the potential visual impacts to state and nationally significant scenic resources, using the Evaluation Criteria presented in the Wind Energy Act. These criteria are described Appendix 1. The final section of this report presents the Conclusions of this review.

¹ For the purposes of this review, aesthetic, scenic and visual impacts will be considered synonymous.

2. Adequacy of the Report

There is a standard process that is followed by all VIAs, which includes: (1) project description, (2) landscape character, (3) visibility analysis, (4) significant scenic resources, (5) public use and expectations, and (6) evaluation of potential impacts. This section reviews what the *Highland Wind Project Visual Impact Assessment* by Terrence J. DeWan & Associates (2010) reported for each portion of the standard VIA process. This will include the survey of recreation users at two locations on the Appalachian Trail that was conducted on five days in July, August and October 2010. In addition a web-based survey was also conducted (Portland Research Group 2010). This review is supported by two days of fieldwork on October 28 and 29, 2010 visiting most of the identified scenic resources within 8 miles of the proposed project. In addition, the geographic information system (GIS) data used for the VIA were reviewed and additional analysis conducted. In particular, a standard visibility analysis was performed using ArcMap software, and the visual simulations were compared to a three-dimensional ArcScene model to determine representational accuracy.

2.1 Project Description

The project's elements are described (TJD&A 2010, pages 1-2, 10-12). The visible characteristics of a prototypical turbine are described include color, height to the hub center and tip of an upright blade, rotor movement, and hazard beacons. "Associated facilities" include the operations and maintenance building, access roads, generator lead line, and substation are also described. There are no scaled drawings of the turbines or other project elements, such as the extent of cut-and-fill associated with the roads. All Study Area and Viewshed Maps show the location of each turbine and the transmission line (TJD&A 2010).

2.2 Landscape Character

The VIA describes the landform, water resources, vegetative patterns and cultural character of the area surrounding the proposed project (TJD&A 2010, pages 12-21). The major features are identified, including each of the state or nationally significant scenic resources, as well as some locally significant scenic resources. This description is interspersed with comments about whether the project may be visible from particular areas.

2.3 Visibility Analysis

Visibility is reported only for turbine blade tips, not other parts of the turbine or other generation facilities. There is no visibility analysis for any of the associated facilities.

TJB&A used WindPRO to conduct the visibility analysis of the wind turbine blade tips using the National Elevation Dataset 1/3 Arc-Second (NED 1/3), which is "the best available raster elevation data for the conterminous United States" (USGS 2009a). The NED 1/3 arc-second data has a resolution of about 10 meters with a with ≤ 4 meter absolute vertical height accuracy (USGS 2009b). The VIA includes a topographic viewshed map as Map A that indicates areas where as many as 1 to 10, 11 to 20, 21 to 29 and 30 to 39 turbine blade tips may be visible.

There is also a visibility map that takes into account the screening effect of forest trees using the Maine Office of GIS land cover data (Map B). Few details are given, the VIA only states that "Conservative estimated heights of vegetation were assigned to the various cover types" and

“Vegetation heights assumed an average tree height of 40” in most situations” (TJD&A 2010, page 6). This map indicates if a turbine, but not how many turbines may be visible.

Additional information was provided in response to a data request (TJD&A 2011). Maine Land Cover Data (MELCD) were used to estimate forest canopy height. “Assumed heights: Deciduous-40’ (12.2m), Evergreen- 40’ (12.2m), Mixed 40’(12.2m), Wetland-30’ (9.1m), Light Partial Cut-40’ (12.2m), Heavy Partial Cut-40’ (12.2m), and Regenerating-20’(6.1m)” (TJD&A 2011). Forested Wetland is assumed to be 30 feet high. It is dominated by trees that are 16 feet high but the total vegetation coverage need only be 20 percent. One assumes that the 80 percent not covered by vegetation could be low wetland plants. In addition, Light and Heavy Partial Cuts are both assigned a height of 40 feet. Light Partial Cuts can have an overstory canopy as low as 50 percent, but Heavy Partial Cuts can have an overstory canopy of just a few percent. It seems quite possible that there are normal circumstances where these classes would provide little to no screening. Finally, Forest Regeneration is assigned a height of 20 feet, even though these trees are seedling to sapling sized, and could be below eyelevel. A truly “conservative” viewshed analysis would not include these harvested areas as a visual screen. A more appropriate way to demonstrate the screening effect of these four classes would be to measure the height of trees at specific locations in the field where their screening effect could be observed and then illustrate this screening effect by drawing a scaled cross-section.

One error was observed in Map A: Viewshed Topography Only—the map includes turbines that are greater than 8-miles from the viewer. The Wind Energy Act stipulates that beyond 8 miles, the scenic impact of turbines is insignificant.² The number of visible turbines should drop off viewpoints approach the edge of the 8-mile study area as shown in this review’s Map 1 Topographic Viewshed for Blade Tip, and in Map A they do not. TJD&A has indicated that they will submit a corrected map.

In addition to the two visibility maps, Tables 1 and 2 lists all of the great ponds with significant or outstanding scenic value and whether they have a potential view of the project, how many turbines are potentially visible, and the distance to the nearest turbine. Table 3 provides the same description for the peaks in the Bigelow Preserve. The visibility reported in these tables seems to be informed by the field work as well as the visibility maps.

Distance zones. The concept of distance zones is presented in section 5.2 of the VIA. The thresholds that are listed were developed by the USDA Forest Service for the more arid western part of the country, and may not be appropriate for the more humid conditions in the northeast. In any case, the perceptual definition of distance zones is what really matters, and wind turbines confound these traditional thresholds. So, the foreground for a wind turbine may be less than a half-mile because they are composed of smooth materials without much apparent texture, and foreground is defined as the distance where “observers are able to detect surface textures, details, and a full spectrum of color (TJD&A 2010, p. 22). However, the middle distance may extend further than 4 miles because the basic elements of a turbine are so large that they remain recognizable at distances where most naturally occurring landscape elements (e.g., trees) have ceased to be individually recognizable. Objects, such as trees or buildings, or groupings of objects in the landscape are most obvious at this distance and create a characteristic visual pattern or

² 35-A MRSA, § 3452, §§ 3

texture—“within this zone the details found in the landscape become subordinate to the whole. ... [and] development patterns are readily apparent” (TJD&A 2010, p. 22). I believe that this is fundamentally the reason why the threshold where wind turbines were determined to no longer have a significant potential impact was set at 8 miles by the Wind Energy Act. This is the beginning distance of the background for the current generation of grid-scale wind turbines, where atmospheric effects and distance result in a simplified image—“texture has disappeared and color has flattened, but large patterns of vegetation or rock are still distinguished, and landform ridgelines and horizon lines are the dominant visual characteristics” (USDA 1995, p. 4-11). While turbines may be visible beyond 8 miles, they will be relatively indistinct and it may not be possible to detect the motion of the blades.

2.4 Significant Scenic Resources

As part of the Project Study Area, Existing Character of the Surrounding Area (section 5.1), the VIA identifies all of the state and nationally significant scenic resources within 8 miles of the proposed wind turbines. The state and nationally significant scenic resources includes one Great Pond with outstanding and two with significant scenic quality (TJD&A 2010, Tables 1 and 2). In addition, there is one site and one district listed on the National Register of Historic Places, one scenic river, one area of Maine Public Reserved Land and one scenic trail designated by the Department of Conservation as a scenic resource (DOC 2010), and two turnouts on Scenic Byways. A brief description of those scenic resource within the topographic viewshed is included in the VIA section 6.0 Visual Impacts on Scenic Resources of State or National Significance, and located on the Study Area and Viewshed Maps. Table 1 below summarizes visibility information from the VIA for the state and nationally significant scenic resources, including name, distance to nearest turbine, and number of turbines potentially visible.

2.5 Visual Simulations

Visual simulations are prepared for most scenic resources that appear to have a potential view of turbine blade tips within 8 miles of the viewer based on the results of Map B Viewshed Topography and Vegetation, supplemented by field investigation. The only possible exceptions are viewpoints on Wyman Lake (which is part of the Kennebec River) and the Appalachian Trail overlooking the north end of East Carry Pond.

Visual simulations are a primary tool to investigate the impact to significant scenic resources. TJD&A prepared eight photosimulations as part of their VIA, five of which are from the Appalachian Trail. Two different cameras were used, a Nikon D70 capable of capturing an image that is 3008-by-2000 pixels, and a Nikon D300 capable of capturing an image that is 4288-by-2848 pixels. Two different lenses were used. One was a prime lens that assures all the images had the same focal length. In this case the lens' focal length was 35 mm with a 37.3° horizontal angle of view, which is very close to the convention for a “normal” lens. The other was a zoom lens with a variable focal length. There is no way to assure precisely what focal length is being used, as there is with a prime lens, but with experience the photographer can come close to the “normal” lens length. The location of each photograph is “tagged” using a Jobo photoGPS. Basic information about the photographs used for the simulations and their appropriate viewing distance is presented in Table 2.

Table 1. Summary of Scenic Resources of State and National Significance within 8 Miles of the Generating Facilities as Identified by TJD&A

Scenic Resources of State or National Significance in the Surrounding Area	Distance to Nearest Turbine (miles)	Number of Turbines Visible w/in 8 miles
Historic Sites		
Arnold Trail to Quebec Historic District (West Carry Pd)	4.9	15
Bingham Free Meetinghouse	6.2	0
Great Ponds		
Flagstaff Lake	3.8	Up to 9
Jackson Pond	5.9	0
Gilman Pond	6.1	7 to 23
Scenic River		
Kennebec River (Wyman Lake)	3	6 to 23
Maine Public Reserved Land and Scenic Trails		
Appalachian Trail (Viewpoint 16 is closest)	4.7	16
Bigelow Preserve	4.7	18
Scenic Byway Turnout		
Old Canada Rd. Scenic Byway, Wyman Lake Turnout	5.0	0
Route 27 Scenic Byway Turnout	4.6	0

Table 2. Establishing Viewing Distance for the VIA Photosimulations

Simulation	Camera	Focal Length	Equivalent Focal Lens [†]	Horizontal Angle	Simulation Width	Viewing Distance
Flagstaff Lake	D300	35 mm	53.4 mm	37.3°	13.25"	19.6"
Arnold Trail on West Carry Pond	D70	34 mm	58.0 mm	38.3°	13.25"	19.1"
Gilman Pond	D300	38 mm	58.0 mm	34.5°	13.25"	21.3"
Wyman Lake Scenic Turnout	D70	38 mm	58.0 mm	34.5°	*	*
Bingham Free Meetinghouse	D70	35 mm	53.4 mm	37.3°	*	*
Appalachian Trail—Viewpoint 4	D300	35 mm	53.4 mm	37.3°	14.25"	21.1"
Appalachian Trail—Viewpoint 9b, 9c, 9d	D300	35 mm	53.4 mm	37.3°	14.25"	21.1"
Appalachian Trail—Viewpoint 16	D300	34 mm	58.0 mm	38.3°	13.25"	19.1"

[†] Using Nikon's DX format (23.6mm-by-15.7mm). <http://www.isotton.com/misc/lens-angle-calculator/>

* Only a multi-frame panorama is shown, no simulation is prepared.

TJD&A uses WindPRO to prepare a digital perspective drawing of the wind turbines and the horizon line as seen from the same location and using the same “lens” as the photograph used. This horizon line is based only on topography and is limited to the extent of the study area. This drawing is superimposed over the photograph and the simulation technician registers them by matching the topographic horizon line to the horizon line of the photograph, as shown in Figure 1. This registration must take into account the height of the trees that are typically covering topography in the photo. WindPRO has tools to assist in removing parts of the turbines that are behind landscape elements in the photograph and making other adjustments. Sometimes PhotoShop may also be used to graphically clean up the image.

The photosimulations presented in the VIA appear generally accurate and well constructed, particularly with respect to portraying the wind turbines. However, there are some state or nationally significant scenic resources that may be scenically impacted for which there are no simulations. There will be views of as many as 27 turbines from the Kennebec River/Wyman Lake.³ There may also be the possibility of visual impacts from associated facilities that should be investigated, for instance the generator lead line may be visible from the Bingham Free Meetinghouse. An additional analysis of the simulations is presented in section 3.3 Visual Simulations.



Figure 1. A draft of the photosimulation from the Arnold Trail on West Carry Pond showing how the WindPRO drawing is registered to the photograph by aligning the landform ridge line. In this case the fit with the landform ridgeline on the right appears quite good, though on the left the landform ridgeline is

³ Wyman Lake is clearly considered part of the Madison to The Forks segment of the Kennebec River, which the *Maine Rivers Study* identifies as a scenic river.

unseen below the shoreline vegetation. Later drafts will remove the yellow line along the ridge, incorporate realistically rendered drawings of the turbines, and remove parts of the turbine that are not visible behind the mountain ridge. *Source:* TJD&A.

2.6 Public Use and Expectations

Section 6 of the VIA attempts to provide a description of the extent, nature, and duration of public uses, and the typical viewer's expectations for scenic resources that the topographic visibility analysis indicated had the potential of views to Project turbines. However, with one exception described below, these descriptions are very brief and do not include information about the number of users or their length of stay. The nature of the use appears to be based on common sense or perhaps brief descriptions located through an internet search. Similarly, the description of viewer expectations appears to be based on conventional wisdom rather than any systematic investigation—at least the VIA does not cite any sources to substantiate the assertions of public use and viewer expectations.

This lack of real information is not surprising. It is unusual to find a park or other scenic resource with accurate visitation numbers, let alone length of stay, types of activities, the nature of visitor expectations, or the quality of their experience. The Maine State Comprehensive Outdoor Recreation Plan (SCORP) primarily reports statewide statistics rather than statistics for specific parks (Maine DOC BPL 2009).

Intercept survey. Recognizing the lack of information to responsibly address the Wind Energy Act's Evaluation Criteria concerning public use and expectations, the Land Use Regulation Commission has encouraged wind energy developers to conduct a survey from at least one scenically significant resource to better understand these issues. Highland Wind, LLC commissioned a survey of visitors at two points on the Appalachian Trail, where it meets the Safford Brook Trail and on the eastern end of Little Bigelow Mountain. These sites were chosen to capture all hikers on the Appalachian Trail within eight miles of a wind turbine. In addition, the interviews at Little Bigelow Mountain site were conducted near one of the simulation viewpoints. Large panoramic photographs of the existing and simulated future views from Little Bigelow Mountain viewpoints 4 and 9D were evaluated, as well as other views from this area. Those interviewed at viewpoint 9 also evaluated their actual view. Fifty-eight interviews were conducted by Portland Research Group on July 17 and 24, August 6 and 7, and October 3 2010 (Portland Research Group 2010). Except for July 24, all days had good weather and good visibility. Their general reported findings include:

- 81 adults and 7 children were observed during the survey.
- 31% mentioned views as a motivation for hiking in the Bigelow Preserve; 9% cited it as the one primary reason.
- In general, the scenic rating of the actual view from Little Bigelow Mountain viewpoint 9 (mean rating of 7.1 out of 10.0) was comparable to the photograph of the view (mean rating of 7.5). (Not including the July 24 respondents, since they did not have a clear view due to low clouds.)
- The apparent scenic impact the proposed turbines reduce the scenic rating from viewpoint 9 by over 2.1 points on a 10-point scale, which is statistically significant.

- In general, visitors thought that the proposed turbines would have a very slight negative effect on their enjoyment of a recreation experience on Little Bigelow Mountain (mean rating of 4.8 on a 10-point scale where 5.5 would be no change in enjoyment at all).
- In general, visitors thought that the proposed turbines would have almost no effect on the likelihood that they would return to Little Bigelow Mountain (mean rating of 5.2 on a 10-point scale where 5.5 would be no effect at all on likelihood to return).
- During the five days of conducting the survey, no one was observed climbing down to viewpoint 9D, which will have the clearest view toward the turbines.

An independent analysis of the data verified these results.

Web survey. In addition, Portland Research Group partnered with eRewards to conduct a web-based survey of respondents drawn from a panel who lived in northern New England or eastern Massachusetts and who participated in non-motorized outdoor activities. Respondents were screened to include only those who had hiked in Maine in the past 3 years.

- There are 304 adult respondents, of which 104 had hiked in Western Maine and 49 had some familiarity with the Bigelow Preserve.
- 67% of Western Maine hikers mentioned views as a motivation for hiking in the Western Maine mountains; 22% cited it as the one primary reason.
- Western Maine hikers indicated that the overall affect to their enjoyment while hiking would be negative (rating of 1 to 3 on a 10-point scale) if they saw industrial facilities such as paper mills (66%), second home developments (61%), cut over forest lands (57%), electrical transmission lines (40%), communication towers (35%), and energy facilities such as wind farms (14%).
- Western Maine hikers rated the scenic value of the photograph of the view from Little Bigelow Mountain viewpoint 9 (mean rating of 8.0 out of 10.0) was higher than the simulation of the turbines (mean rating of 7.3). The apparent scenic impact the proposed turbines reduce the scenic rating from viewpoint 9 by over 0.7 points on a 10-point scale, which is statistically significant.
- 89% of Western Maine hikers indicated they would stop and look at the existing view and 79% indicated they would stop and look at the view with turbines in it..
- Western Maine hikers were asked “to what extent would the view in this photo make you more or less likely to hike this trail again?” The rating for both the existing view (7.2 on a 10-point scale where 5.5 would be no effect at all on likelihood to return) and the view with the turbines (7.0) were slightly positive and not significantly different.

Further review and analysis of this study are included later in this review.

2.7 Evaluation of Potential Scenic Impacts

Logically, the information about the project, surrounding area, and scenic resources’ character and use should be presented first in a VIA. Then the scenic impact and whether it is Not Adverse, Adverse, or Unreasonably Adverse can be systematically evaluated by applying the Evaluation Criteria to what is presented about each scenic area and their views of the proposed development. By and large this is the way that the *Highland Wind Project Visual Impact Assessment* presents

the information and evaluation using the following framework, which rearranges the Evaluation Criteria slightly but retains their substance.

- **Context:** “*The existing character of the surrounding area,*” and “*the context of the proposed activity.*” (§§ 3452.3.B and 3452.3.D). This section describes the physical characteristics of the resource and the landform, water bodies, vegetation, and cultural patterns of the land that surrounds it. The context descriptions are supplemented by photographs presented in Appendices B, C, and D
- **Significance:** “*The significance of the potentially affected scenic resource of state or national significance.*” (§ 3452.3.A). This section describes the reasons that the area has been designated a scenic resource of state or national significance; e.g., the ratings from the Maine Rivers Study or Maine Wildlands Lake Assessment; descriptions from the Flagstaff Region Management Plan; and/or the rationale behind the National Natural Landmarks designation. Where available, descriptions from guidebooks and other current media that describe the resource’s significance and uniqueness are included. Levels of significance (e.g., outstanding, significant) are included where they are part of the reports responsible for designation.
- **Public Uses:** “*The extent, nature and duration of potentially affected public uses of the scenic resource of state or national significance.*” (§ 3452.3.E). This section describes public use patterns to the extent that they have been documented. Estimates have been compiled from available resources and supplemented by survey or other research by Highland Wind’s consultants.
- **Viewer Expectations:** “*The expectations of the typical viewer*” who would be using and enjoying the scenic resource of state or national significance. (§ 3452.3.C). This section describes the primary reason(s) that viewers are drawn to the scenic resource and how visual cues influence how people perceive the resource.
- **Project Impact:** “*The scope and scale of the potential effect of views of the Project on the scenic resource of state or national significance, including but not limited to issues related to the number and extent of turbines visible from the scenic resource of state or national significance, the distance from the scenic resource of state or national significance, and the effect of prominent features of the development on the landscape.*” (§ 3452.3.F). This section describes the visual impact that the turbines and associated facilities may have on the scenic resource. Where possible, quantitative measurements are provided to illustrate the degree and character of the anticipated changes to the landscape (e.g., distance to project, length of viewing area or viewpoint, number of turbines within eight miles visible, amount of turbine visible, angle of view, percent of panoramic view occupied by the project, etc.). Photosimulations are used to supplement the narrative description by illustrating whether the wind turbines will dominate the landscape, interrupt notable views, conflict with important focal points, contribute to visual clutter, or otherwise impact the scenic resource. The photosimulations are representative of worst case conditions, i.e., public viewpoints where the most number of turbines will typically be seen.

- **Potential Effect on Public Use:** “*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.*” (§ 3452.3.E). This section examines how the typical viewer would react to the presence of the wind turbines as seen from the scenic resource. To the extent that it is known, this section is based on an understanding of the users’ experience and expectations, the effect that the Project would have on that experience, and the effect that the Project would have on the public’s continued use of the resource.
- **Conclusion:** An evaluation of whether “*the development significantly compromises views from a scenic resource of state or national significance such that the development has an unreasonable adverse effect on the scenic character or existing uses related to scenic character of the scenic resource of state or national significance.*” (§ 3452.1). The conclusion describes the overall scenic impact of the project on the scenic resource, considering the significance of the resource, the relative numbers and expectation of the users, the scarcity of the resource, and the degree of impact that the project would have on the resource. (TJD&A 2010, page 23)

This approach is systematic and clearly drawn from the Wind Energy Act’s evaluation criteria. The criteria are more fully described, with examples of how the criterion might be implemented. For most of these criteria, some description is given or implied about how they might be used to evaluate scenic impact. However it is not clear how the Context criterion is used to evaluate scenic impact. Nor is a process described to synthesize these evaluation criteria into the Conclusion that could be reliably reached by independent evaluators. Nonetheless, this description of how to implement the Wind Energy Act’s evaluation criteria is an improvement of previous descriptions.

The VIA evaluates 6 of the 10 identified significant scenic resources within 8 miles of the project turbines. As a result Bingham Free Meetinghouse, Jackson Pond, and the turnouts on the Old Canada Road (Route 201) and Route 27 Scenic Byways were not evaluated. The primary criterion of whether to evaluate a scenic resource or not appears to be whether it was found to have potential views of the project based on TJD&A’s Viewshed Maps A and B plus field verification. However, these maps record the visibility of turbine tips, not associated facilities. No analysis concerning the associated facilities is presented.

2.7.1 Arnold Trail

Context: The route of the Arnold Trail through the study is described in some detail. It is made clear that changes have come to this landscape—dams, harvested areas, logging roads, and other forms of development. As a result, it is asserted that “a person following the Arnold Trail would not expect to encounter the same conditions that were present in 1775.” No evidence is presented about “expectations.” While I do not dispute that the landscape has changed, I would only note that based on the web interviews, approximately half of the Western Maine hikers were uncertain whether they might see common intrusions of civilization, such as recreation resorts, communications towers, electrical transmission lines, cut over forest lands, snowmobile trails, and wind farms. And many thought that it was unlikely that they would see these types of development (Portland Research Group 2011, page 67). And a sizable proportion thinks that seeing these types of development would be unlikely.

Significance: The Arnold Trail is on the National Register for Historic Preservation because of its historic significance; there is no mention of scenic value.

Public Uses: “There is no evidence of frequent public use of the Arnold Trail in the study area (TJD&A 2010, page 30). However, there is no evidence presented of about the extent, nature and duration of use at all. For instance, there is no report that the Arnold Expedition Historical Society was contacted and verified that use of the Arnold Trail was infrequent.

Viewer Expectation: “It is reasonable to conclude that re-enactors and other visitors who are drawn to the Arnold Trail in the study area are making the visit for its historic value and not with an expectation that the scenic resources they will encounter along the Trail are unchanged from the Revolutionary War era” (TJD&A 2010, page 30). Again, there is no evidence presented to support this assertion, and the web survey did indicate that many Western Maine hikers did not expect or were uncertain whether they would see such common signs of civilization as communications towers or harvested forest land.

Project Impact: It is recognized that the turbines may be seen from the Arnold Trail; associated facilities are not discussed. A photosimulation is presented showing the hubs and portions of blades of up to 15 turbines from the Arnold Trail on West Carry Pond. It is noted that the turbines on Stewart Mountain were removed from the project, in part because they would have been highly visible from West Cary Pond.

Potential Effect on Public Use: “The Project will have minimal impact on the public’s continued use and enjoyment of the Arnold Trail as a nationally significant historic resource” (TJD&A 2010, page 31). No evidence or reasoning is presented to support this assertion.

Conclusion: It is asserted that “The Highland Wind Project will not significantly compromise views from the Arnold Trail. The Project will not have an unreasonable adverse effect on its scenic character or the uses related to the scenic character of the trail” (TJD&A 2010, page 31). This conclusion appears to be based on (1) scenic quality playing no role in its nomination to the National Register of Historic Places, (2) use is low, (3) the landscape has changed and users must expect to see modern technology and land uses, and (4) use will not be effects. No evidence is presented for reasons 2, 3 and 4.

2.7.2 Flagstaff Lake

Context: Flagstaff Lake is a large impoundment that “experiences significant fluctuations in water levels during the year” (TJD&A 2010, page 32). It has a highly configured shoreline. The Maine Huts and Trails System, and Northern Forest Canoe Trail and two significant recreation resources make use of the lake.

Significance: The Maine *Wildlands Lake Assessment* rates this lake as a “significant” scenic resource. The ratings from the State Planning Office’s *Scenic Lakes Character Evaluation in Maine’s Unorganized Towns* are presented and show that it received the maximum possible points for relief and shoreline configuration, as well as the maximum number of points subtracted for inharmonious development.

Public Uses: These uses include the full range of water-based sports. FPL Energy Maine “estimated total [2009] annual activity for all uses covering the entire lake and shoreline at about 44,000 visits” (TJD&A 2010, page 34). The VIA down-plays this figure in as being low for a lake of this size and asserting that the portion of the lake within 8 miles of the wind turbines is the less used part. “Indian Pond behind the Harris Dam west of Greenville, which is one-fifth the size of Flagstaff Lake, received four times the use” “About 23% of the lake will be within 8 miles of the Project (measured at full pond elevation), all in what appears to be the lesser-used eastern portion. The turbines will be visible from approximately 67.8% of this area, or about 15.5% of the lake” (TJD&A 2010, page 34). This latter assertion is supported by boat counts by Portland Research Group on four separated days during the summer (TJD&A 2010, page 34).

Viewer Expectations: Expectations of scenic quality are assumed to be moderate to high. This is based on “the dramatic combination of mountain and lake scenery, and the descriptions available in guidebooks and other media” and is “tempered at certain times of the year by the fluctuating lake levels” (TJD&A 2010, page 36). However, no evidence is presented to support this. While this may describe the actual situation, the web survey demonstrated that expectations may not include common realities such as communication towers and harvest activity.

Project Impact: There will be portions of up to 9 turbines visible within the 8-mile study area. They “will be visible over approximately 15.5% of the lake at high water level” (TJD&A 2010, page 36). We are not reminded that this is “approximately 67.8%” of the lake within 8 miles of a turbine (TJD&A 2010, page 34). It is asserted that “the Project will not dominate the landscape nor will it block views of the primary focal points,” which is the Bigelow Range (TJD&A 2010, page 36). The Flagstaff Lake simulation supports this assertion—the turbines have a significant presence but do not dominate the image, particularly if understood in its panoramic context.

Potential Effect on Public Use: The Project should have a relatively minor impact on the public’s continued use and enjoyment of Flagstaff Lake (TJD&A 2010, page 36). This is supported by the turbines being mostly seen by canoeists and boaters from a distance of 6 to 8 miles, and their not being in the view of the Bigelow Range. No empirical evidence is presented.

Conclusion: No reasoning is presented why the project “should not significantly compromise views” or “have an unreasonable adverse effect on its scenic character or [related] uses” (TJD&A 2010, page 37). Turbines will have a significant visual presence for 68% of the lake within 8 miles of a turbine. While we do not know what proportion of the 44,000 annual visitors use that portion of the lake within 8-miles of the turbines, it may be several thousand (e.g., more than hike the portion of the Appalachian Trail within the study area). It seems that some discussion of the synthesis that led to this conclusion is warranted.

2.7.3 Gilman Pond

Context: The surrounding mountains are named and their elevation given. Though it is described as Undeveloped and Accessible in the *Maine Wildlands Lake Assessment*, “there are over a dozen homes and seasonal cottages located at the southwestern end of the pond” and “no apparent public boat landing or other public access point” (TJD&A 2010, page 37).

Significance: The *Maine Wildlands Lake Assessment* rates this lake as a “significant” scenic resource. The ratings from the State Planning Office’s *Scenic Lakes Character Evaluation in Maine’s Unorganized Towns* are presented and show that all factors contribute to its rating. It was given a penalty for existing development, which has increased since the ratings were made. Its significance is would not change if the presence of the turbines increased the penalty for Inharmonious Development to the maximum possible.

Public Uses: There is no apparent boat launch. “TJD&A is unaware of data on public use of Gilman Pond, but it is likely very low” (TJD&A 2010, page 37).

Viewer Expectations: It is assumed that “people who gain access to Gilman Pond ... likely have high expectations of scenic quality,” though no supporting documentation is provided.

Project Impact: A description of the number of turbines that may be visible from different parts of the pond is given—up to 19 within 8 miles of a viewer, and a few that would be more distant. The simulation has a dramatic dark sky and the turbines are relatively indistinct on the ridgeline, which is in stark contrast to the clearer visual presence of the turbines from viewpoint 4 and 9 on the Appalachian Trail, which are a comparable distance.

Potential Effect on Public Use: It is asserted that “because public access to the lake appears to be very limited and there is no widespread public use, the potential impact of the Project on public use will be low” (TJD&A 2010, page 38). However, the number of users is irrelevant to the effect on their use. The question is what is the effect on those (perhaps few) users? This is not discussed.

Conclusion: “The Highland Wind Project will not have an unreasonable adverse effect on its scenic character or the uses related to the scenic character of Gilman Pond” (TJD&A 2010, page 39). There is no description of the synthesis that led to this description.

2.7.4 Kennebec River (Wyman Lake)

Context: The Kennebec River is one of the largest in the state. Within the study area it is largely undeveloped. Wyman Lake, which was created by damming the Kennebec, is a prominent feature in the study area. The Arnold Trail is located across a portion of the Kennebec River and Wyman Lake. The Old Canada Road Scenic Byway parallels it to the east.

Significance: The portion of the Kennebec River within the study area, including Wyman Lake, is identified as a scenic river in the *Maine Rivers Study*. However, “the *Maine Wildlands Lake Assessment* does not consider Wyman Lake to have significant or outstanding scenic resources” (TJD&A 2010, page 39).

Public Uses: Recreation sites along the Kennebec River are described. There is no known data on numbers of users.

Viewer Expectations: It is stated that “people who use Wyman Lake for boating, fishing, and swimming likely have a moderate to high expectation of scenic quality, tempered by the presence of Route 201” (TJD&A 2010, page 40). No evidence is presented to support this assertion.

Project Impact: Based on the Map A Viewshed Topography Only “the Project would be visible from approximately 2.8 miles of the Kennebec River on Wyman Lake, immediately upstream from the Wyman Dam. The number of turbines that would be seen varies from approximately 6 near the dam to 22 in an area approximately 0.5 miles long and 2.5 miles northwest of the dam” (TJD&A 2010, page 40). It is noted that the generator lead line would be visible below Wyman Dam. No photosimulations are presented from Wyman Lake.

Potential Effect on Public Use: It is thought that “the Project will have a minor impact on the public’s continued use and enjoyment” (TJD&A 2010, page 40) because the turbines will be visible from a relatively small area (I am guessing 20%) of Wyman Lake (though it is near a boat launch and may receive relatively high use) and views of the generator lead line below the dam will be in the context of other energy-related facilities. While this description of the environment may be accurate, it does not address how people will behave, and no evidence about this is presented.

Conclusions: “The Highland Wind Project will not significantly compromise views from Wyman Lake and will have a low impact on the views from the Kennebec River below Wyman Dam. The Project will not have an unreasonable adverse effect on its scenic character or the uses related to the scenic character of the lake and river” (TJD&A 2010, page 40). There is no description of the synthesis that led to this description. The lack of information about user expectations, the extent, nature and duration of use, and the effect on enjoyment and continued use makes it difficult to present a supportable conclusion.

2.7.5 Appalachian Trail

Context: Approximately 19.4 miles of the AT are located within 8 miles of a turbine. It passes from the south over the Bigelow Range and Little Bigelow Mountain in the Bigelow Preserve, and then at lower elevations to the south of Flagstaff Lake, goes up and over Roundtop Mountain, to the south of West Carry Pond and the north of East Carry Pond. For a couple of miles it is coincident with the Arnold Trail.

The portion of the AT in the Bigelow preserve is described in detail. There are 20 viewpoints on the portion of AT in the Bigelow Preserve that are within 8 miles of a turbine. The character of landscape views from each viewpoint is described and documented photographically. Other locations on the AT with potential views of the Highland Wind Project are not described (e.g., a viewpoint over East Carry Pond).

Significance: The Appalachian Trail (AT) is a National Scenic Trail; the National Park Service coordinates its management.

Public Uses: “Data on the use of the AT along this segment is sparse” (TJD&A 2010, page 48). The Maine Bureau of Parks and Lands estimated that there were 2,100 visitors on the Little Bigelow Mountain portion of the AT in 2002 (TJD&A 2010, page 48). While doing fieldwork and conducting the hiker interviews over eight days, 62 people were observed. The VIA estimates that “this translates into around 1,700 hikers for a season” (TJD&A 2010, page 48). The survey found that “62% of hikers to the east peak of Little Bigelow were day hikers, 30% were AT Through-hikers, and 8% were other overnight hikers (Portland Research Group 2011, page 14).

These 10 to 13 hikers per day during the hiking season are thought to be below-to-moderate use. This is about half of the use of the AT recorded by MATC at the Horns, and significantly less than the trails in Baxter State Park.

Viewer Expectations: “The expectations for Little Bigelow as reflected in the guides are positive but less than those for the higher peaks in the main Bigelow Range or for a number of other hikes in western Maine and statewide.” (TJD&A 2010, page 48). Only 12% of the surveyed hikers indicated that views beauty/spectacular were the primary reason for their hike on Little Bigelow Mountain (Portland Research Group 2011, page 36). The VIA and the hiker survey report present an extensive picture of user expectations. The VIA summarizes it as: “In general, people who hike the section of the Appalachian Trail in the Bigelow Preserve within 8 miles of the proposed Project likely have high expectations of scenic quality. However, the expectations for Little Bigelow appear to be lower than for other sections of the AT in the Bigelow Preserve; are shaped by multiple motives and not only summit views; and their viewing experience is strongly influenced by elements of the landscape that are oriented to the west and south, away from the proposed project and, if thru- or multi-day hikers, by their focus on the high peaks in the Preserve” (TJD&A 2010, page 51).

Project Impact: The turbines “would be visible (both open and filtered views) from approximately 350 feet (0.07 mile) of the AT within the Bigelow Preserve within an 8-mile radius” (TJD&A 2010, page 51). In particular there will be clear open views from Viewpoints 4, 9 and 19. While not emphasized, the importance of panoramic viewpoints was illustrated in the hiker survey data, where 79% of the adult hikers at viewpoint 9 climbed onto a ledge with a panoramic view rather than simply stay on the trail where there was no view. So while the space occupied by these viewpoints may be insignificant, they are the most important locations on the AT (Palmer 1983). The hiker survey also notes that people have viewing preferences, and at Viewpoint 9 no one was observed oriented toward the south where the project is proposed, but rather they all sat looking north toward the Bigelow Range, which is a much more dramatic view.

The project is described as occupying a 15° arc of view from Viewpoint 9 that extends approximately 200°. “Portions of the access roads, cuts and fills, and clearings surrounding the turbines would be visible and appear as changes in color and texture, compared to the surrounding forestland.” While “the potential impact of the project has been minimized by revising this application to remove all turbines from Stewart Mountain,” it is also recognized that “where there are open views of the Project, it would be perceived as a significant object...similar in scale to the recreational and community development on Sugarloaf Mountain” (TJD&A 2010, page 51).

Potential Effect on Public Use: It is noted that surveys of hikers about the effect of proposed a wind development at Redington Mountain and Spruce Mountain showed that there were be a slightly negative to neutral effect on the hiking experience.

Conclusions: A substantial amount of evidence about the potential visual impacts to the AT in the Bigelow Preserve within 8 miles of the turbines is presented. The Conclusion from this presentation is consequently more nuanced.

The Highland Wind Project will introduce large-scale man-made elements into an expansive landscape that is characterized by dramatic landforms, wide valleys, significant recreational development, and other cultural modifications. A majority of AT viewpoints within 8 miles of the Highland Wind Project – 12 of 20 viewpoints – will not have any views of the Project; and at three of the remaining viewpoints, visibility will be so minor or so far to the edge of the view that in some cases they may be easily missed. Where the Project will be visible, important steps have been taken to avoid or minimize the impacts. As a result the Project would occupy a non-prominent location in the landscape and a relatively small part of the view, without interfering with focal points, views of significant mountains, or open ridgelines.

The Project will not have an unreasonable adverse effect on its scenic character or the uses related to the scenic character of the Appalachian Trail. The presence of the Project and associated facilities will have a medium impact on several of the views from the Appalachian Trail within 8 miles. The Project will have a low impact on the public's continued use and enjoyment of the Appalachian Trail in the Bigelow Preserve, and most who presently enjoy the affected section of trail will continue to return to it when the Highland Wind Project is in place. Overall the scenic impact on the AT within 8 miles of the Project will be low to medium (TJD&A 2010, page 53).

2.7.6 Bigelow Preserve

Context: The Bigelow Preserve includes two of Maine's 14 summits over 4,000 feet in elevation. There is relatively little discussion of its context beyond identification of the peaks and their distance from the project. Importantly, the Appalachian Trail passes over these peaks. About a quarter of the Preserve is within 8 miles of the Project.

Significance: The Maine Department of Conservation (2010) designated the Bigelow Preserve as one of the Public Reserved Lands of state or national scenic significance. It was acquired as the result of a citizen-initiated referendum in 1976; the resulting Bigelow Act "mandated the State to 'set aside land to be retained in its natural state for the use and enjoyment of the public.'" The *Bigelow Preserve Management Plan* indicates that the Preserve was established in part to maintain the visual quality of the mountain and the 35,843-acre Preserve that surrounds it" (TJD&A 2010, page 24).

Public Uses: The Bigelow Preserve is managed as a backcountry recreation area. No information about the extent, nature or duration of use is presented. While not referenced, user numbers for the AT are presented in its section of the VIA.

Viewer Expectations: The Preserve is prominently mentioned in guide books. The proximity of Sugarloaf ski resort is thought to temper expectations.

Project Impact: The primary scenic impacts will be to Little Bigelow Mountain, and these impacts are described under the section on the AT.

Potential Effect on Public Use: Again, the primary scenic impacts are described in the section on the AT.

Conclusions: “The Project will also have minimal impacts on the recreational resources that are found within the Bigelow Preserve, with the exception of a limited section of the Appalachian Trail... The Project will not have an unreasonable adverse effect on the Preserve’s scenic character or the uses related to the scenic character of the Preserve” (TJD&A 2010, page 28). While not explicitly stated, it is assumed that this conclusion is reached because the affected portions of the Preserve are relatively small and do not include the more dramatic and highly used Bigelow Range.

2.7.7 Visual Impact of Associated Facilities

The associated facilities—access roads, ridgeline roads, electrical collection system, meteorological towers, operations and maintenance building are all discussed in a separate tree page section of the VIA (pages 54-56). This section is clearly written, but there is little supporting evidence; what is presented is simply incidental to the presentation concerning the scenic impacts of wind turbines. For instance, there is no visibility analysis for any of the associated facilities, and there are no simulations that are specific to associated facilities (e.g., the generator lead line from the Kennebec River below the Wyman Dam or from Bingham Free Meetinghouse)..

One might reasonably ask, “So why is this a problem? Doesn’t the major scenic impact come from the turbines?” Of course the turbines will have the greatest overall visual presence, but the Wind Energy Act anticipates that “the generating facilities are a highly visible feature in the landscape [and this] is not a solely sufficient basis for determination that an expedited wind project has an unreasonable adverse effect on the scenic character and existing uses.”⁴ However, the Wind Energy Act does not anticipate that associated facilities will be highly visible. It is therefore necessary that full attention be given to evaluating the potential scenic impacts from associated facilities. If a developer were proposing a 9.5± electric power line, LURC would require a complete VIA, not a 300 word statement that lacks rigor and completeness. The same concern applies to any of the associated facilities—each warrants its own thorough VIA. In particular, a visibility analysis is needed for each of the associated facilities, and visual simulations should be presented portraying a “worst case” view from all state or nationally significant scenic resources where there is possible visibility of any associated facilities.

2.7.10 Observations about the Application of the Evaluation Criteria in the VIA

Several observations can be drawn from this review of how the Evaluation Criteria have been applied in this VIA.

- The description of how to measure and apply the Evaluation Criteria has been improved.⁵ However, continued refinement to be unambiguously understood, accurately applied and usefully interpreted is warranted. For example, how does the context contribute to the evaluation of scenic impact and how are the Evaluation Criteria synthesized to systematically and reliably produce the overall Conclusion?
- This VIA does a good job of describing the number and extent of turbines visible and their distance from the significant scenic resource (Criterion F).

⁴ 35-A MRSA, § 3452, sub-§3

⁵ 35-A MRSA, § 3452, sub-§3

- Much more effective use can be made of the photosimulations when addressing the Evaluation Criteria. It is important that a “worst case” view from each state or nationally significant scenic resource be prepared if there is the potential view of the generating facilities (e.g., the generator lead line from Kennebec River below Wyman Dam and the Bingham Free Meeting house) and that they be discussed when considering the Evaluation Criteria. In this VIA particular attention was placed on the AT within the Bigelow Preserve, but it may be that simulations should be prepared for other locations on the AT too (e.g., the north end of East Carry Pond).
- The information about public use (Criterion E), viewer expectations (Criterion C), and potential effect on public use (Criterion E), is generally not based on documented data. This is primarily because the data do not already exist. Highland Wind, LLC is to be commended for conducting an original intercept survey of hikers on Little Bigelow Mountain as well as a web-based survey of people who hike in Western Maine.
- The Evaluation Criteria concerning significance (Criterion A) and existing character (Criterion B) need to better focus on scenic quality so that they will be useful in making a determination about scenic impact. While some improvement was made in the significance criterion over recent VIAs, there is still room for improvement.
- Cumulative impacts are a potentially important aspect of viewer expectations (Criterion C) and the effect on enjoyment and continued use (Criterion E). Current practice is to evaluate each viewpoint independently. However, for some state or nationally significant scenic resources use is a sequential activity (e.g., the AT and Arnold Trail). We know very little about how repeated exposure to scenic impacts relate to expectations, enjoyment and continued use of a scenic resource.

3. Field Review and Additional Analysis

This section of the review presents my independent analysis of the potential scenic impacts that may be caused by the Highland Wind Project. The analysis may not be as thorough as a complete VIA. Its primary purpose is to present the analysis that were used to conduct the assessment of the VIA's adequacy, and to share any additional analyses that were pursued.

3.1 Determination of the Area of Potential Effects and State and Nationally Significant Scenic Resources

Area of Potential Effects (APE). The VIA must evaluate potential scenic impacts to all state or nationally significant scenic resources within 3 miles of generating facilities (i.e., turbines and transmission line). The permitting authority may require within 30 days of its acceptance of the application as complete for processing the evaluation of potential scenic impacts to state or nationally significant scenic resources within 8 miles of generating facilities. It may also require within the 30 day period the evaluation of scenic impacts from associated facilities (e.g., buildings, access roads, and substations) using the "traditional" approach applied to non-wind energy projects.

In practice, VIAs have been using an APE of 8 miles from the wind turbines. Typically, the transmission line has not explicitly effected determination of the APE because it joined an existing transmission line well within this as is the case for this project. Similarly, other associated facilities are typically well within the 8-mile APE.

State and Nationally Significant Scenic Resources. The VIA correctly identifies the potential scenic resources of state and national significances under the Wind Energy Act. These are listed in Table 1.

3.2 Visibility Analysis

Visibility analysis determines whether a line-of-sight exists between two specified points. Typically a geographic information system (GIS) is used to map the viewshed from which specified targets are visible. In principle this is an objective exercise in geometry highly suited to a computer application. In practice however, since the data are only approximations of the actual condition and may include errors or require assumptions, the resulting viewshed maps are best considered a preliminary analysis of potential visibility under simplified conditions. The maps are useful for providing a preliminary investigation of the overall potential visual impact, and particularly for comparing alternatives. If potential visual impacts appear to exist for significant scenic resources, they need to be confirmed through field investigation and other visualization techniques.

For this review, visibility analyses were performed using ArcGIS 10 software (ESRI 2010). The digital data were provided by Terrence J. DeWan and Associates (2011) and appear to be the same as those available from the Maine Office of GIS. The original elevation data used for this review are based on a 10-by-10 meter grid, and have ≤ 4 meter absolute vertical height accuracy, the same as used in the VIA. However, in our visibility analysis, we resampled these data to correspond to the same 5-by-5 meter grid used for the Maine Land Cover Data dataset. The analysis procedure is

relatively standardized, though analysts can reasonably make different assumptions about the analysis variables, and the results can be presented in a variety of ways.

In addition to investigating visibility limited only by landform, the VIA conducted a vegetated viewshed analysis that assigned vegetation heights to forested wetlands and recently harvested areas, as previously described in section 2.3 Visibility Analysis. This visibility analysis of the VIA is replicated here and is called the TJD&A Forested visibility analysis. For this review a second Forested visibility analysis was conducted that assumes a dense 40-foot high visual screen where forested land cover occurs—that is deciduous, evergreen and mixed forest, but not in areas recently harvested or wetlands. Forty feet is commonly used by professionals in the northeast as a conservative, but reasonable forest canopy height in a visibility analysis.

Visibility of the Highland Wind Project. The six viewshed maps prepared to investigate several issues associated with the Highland Wind Project are included in Appendix 2. The first three maps investigate the greatest possible area from which a part of any turbine could possibly be visible. In this case it is an upraised blade tip 443 feet (135 meters) above the ground. Three different constraints on visibility are considered: (1) just bare topography, (2) topography with forest cover, and (3) topography with forest cover, harvested forest, and forested wetlands as used by TJD&A in the VIA. The resulting viewshed maps are:

Map 1: Topographic Viewshed for Blade Tip

Map 2: Forested Viewshed for Blade Tip

Map 3: Forested Viewshed for Blade Tip Using TJD&A Forest Heights

While there may be a line-of-sight to just an upraised blade tip, it may not be noticeable and would never be visually dominant. Therefore another analysis investigates the area from which a significant portion of a turbine could possibly be visible. In this case it is visibility of the turbine hub, located 279 feet (85 meters) above the ground. The same three constraints on visibility resulted in the following viewshed maps:

Map 4: Topographic Viewshed for Turbine Hub

Map 5: Forested Viewshed for Turbine Hub

Map 6: Forested Viewshed for Turbine Hub Using TJD&A Forest Heights

All six maps are included in Appendix 2 of this review.

Visual inspection indicates that this review’s topographic viewshed of blade tips shows the same area as TJD&A’s (2010) Viewshed Map A, and that this review’s forested viewshed map using TJD&A’s vegetation cover and height assumptions is the same as TJD&A’s (2010) Viewshed Map B. However, the maps from the VIA include turbines that are further away from the viewer than 8 miles. For instance look at Gilman Pond, at the southern end of the study area. There are only 7 turbines that are within 8 miles of the southern portion of this lake—so there cannot be an impact from 30 to 39 turbines as the VIA’s Viewshed Map A indicates. This is because the Wind Energy Act specifies that “the effects of portions of the development’s generating facilities located more than 8 miles, measured horizontally, from a scenic resource of state or national

significance” are “insignificant.”⁶ If the 8-mile threshold is incorporated into the analysis, then the edges of the viewshed map will appear “feathered” as turbines drop out of range for consideration as having a significant scenic impact.

Table 3 reports the size of the area from which the project may be visible given the assumptions used for each of the six visibility maps created for this review. Thirty-nine percent of the study area is screened from a potential view of an upright blade tip by landform topography. It is very unlikely that anyone at ground-level looking toward the Highland Wind Project will see any portion of a wind turbine if they are outside this area. Maine Historic Preservation Commission agreed that any potential historic resources outside the area or topographic visibility need not be surveyed for indirect visual effects from the proposed project. **This guidance to only evaluate state or nationally significant scenic resources with potential views of a turbine tip as indicated by the topographic visibility analysis is reasonable and should be adopted by others.**

It is frequently argued that accounting for the screening effect of forest cover provides a more realistic assessment of a wind project’s visibility. Approximately 19 percent of the study area has a potential view of a turbine tip if one assumes the a screening effect from assigning a height of 40 feet to the deciduous, evergreen and mixed forest land cover types. TJD&A also assign screening effects to harvested areas that have significantly less canopy closure, as described above in section 2.3 Visibility Analysis. The visibility analysis using these screening assumptions from the VIA indicate that less than 5 percent of the study area has potential views of blade tips. This difference demonstrates that assumptions about screening—what land cover types to include and what heights to assign to them—can significantly affect the results of a visibility analysis. In the vicinity of the Highland Wind Project, there has been a substantial amount of harvest activity since 1995, so whether to include or exclude a screening effect from this area has a significant impact on the analysis results. This is the reason that we caution about relying heavily on the results of visibility analysis using forest screening to make decisions about visual impacts. **Potentially “worst case” viewpoints at all state or nationally significant scenic resource need to be investigated in the field, and should also be investigated though geometrically accurate visual simulations and perhaps cross sections that include tree heights measured in the field.**

⁶ 35-A MRSA, § 3452, § 3

Table 3. Area of Highland Wind Turbine Visibility*

Visibility Analysis	Potentially Visible Area (square miles)	Percent Study Area[†]
Turbine Tip Visible		
Topographic	199.0	61.4
Forested	62.5	19.3
TJD&A	15.5	4.8
Turbine Hub Visible		
Topographic	176.0	54.3
Forested	58.5	18.1
TJD&A	14.2	4.4

* Visibility is based on an ArcGIS analysis before field verification.

† The area within 8 miles of a turbine is 324 square miles.

Table 4 summarizes the maximum number of Highland blade tips and turbine hubs that may possibly be visible from the significant scenic resources within 8 miles of the turbines using the following visibility constraints: topographic, forested, and forested with harvested areas as used by TJD&A in the VIA.

Table 4. Maximum Number of Highland Wind Turbines Visible within 8 Miles of Significant Scenic Resources

Significant Scenic Resource	Nearest Turbine (miles)	Blade Tip Visible			Turbine Hub Visible		
		Topographic	Forested	VIA	Topographic	Forested	VIA
Historic Sites							
Arnold Trail to Quebec Historic District (West Carry Pd)	4.8	25	25	8	22	18	7
Bingham Free Meetinghouse [†]	6.3	0	0	0	0	0	0
Great Ponds							
Flagstaff Lake	4.2	8	8	8	7	7	7
Jackson Pond [†]	6.2	0	0	0	0	0	0
Gilman Pond—boat launch	7.4	7	6	6	5	5	5
Gilman Pond—northern end	6.2	22	22	22	18	17	17
Scenic River							
Kennebec River (Wyman Lk)	4.6	27	27	27	22	22	18
Maine Public Reserved Land and Scenic Trails							
Bigelow Preserve and Appalachian Trail (VP 4)	7.5	2	0	0	2	0	0
Bigelow Preserve and Appalachian Trail (VP 9)	5.1	17	17	17	16	16	16
Bigelow Preserve and Appalachian Trail (VP 16)	4.7	17	17	17	16	16	16
Appalachian Trail (East Carry Pond)	6.8	26	26	9	24	22	8
Scenic Byway Turnout							
Old Canada Rd. Scenic Byway, Wyman Lk Turnout [†]	5.0	0	0	0	0	0	0
Rt 27 Scenic Byway Turnout [†]	4.7	0	0	0	0	0	0

[†] Topography screens all visibility of the project from these sites.

3.2 Field Review

I was able to visit some of the significant scenic resources on Thursday and Friday, October 28 and 29, 2010. It started our foggy on Thursday, but the weather cleared and temperature was in the low 50s. The primary purpose of this field work was to check the landscape character and viewing condition from significant scenic resources with the greatest apparent visual impact (e.g., Appalachian Trail) and as many other significant scenic resources as was practical. This fieldwork was conducted without the benefit of having read the VIA, since there was concern that the AT might not be safe after snowfall.

Historic Sites

3.2.1 Arnold Trail to Quebec Historic District. We stopped at a historic marker dating from 1916 on the Old Canada Scenic Byway (Route 201) that commemorated the point where Arnold's expedition left the Kennebec River (now Wyman Lake) and portaged to the Dead River (now Flagstaff Lake). There would be no views of the Project from this point.

Great Ponds

3.2.2 Flagstaff Lake. We went to the beach and boat launch within the Flagstaff Lake Public Reserved Land. This is a small day use park. The project is to the southeast; there would be a filtered view of turbines with leaves off the trees, but probably not any view with the leaves on. The turbines would be on the other end of the panorama from Little Bigelow Mountain, Bigelow Mountain, Mount Avery and The Horns.

3.2.3 Gilman Pond. Gilman Pond appears to be surrounded by private land; we could not find the boat launch indicated in the Delorme Atlas. We walked to the pond across private land. The turbines will be visible. A person motored into the lake from Gilman Stream, so maybe there is a boat launch down the stream and not on the pond after all.

Rivers

3.2.4 Kennebec River/Wyman Lake. We followed the Old Canada Scenic Byway (Route 201) along the east side of Wyman Lake and it was clear that there could be views from some areas of the lake.

Maine Public Reserved Land and Trails

3.2.5 Bigelow Preserve and Appalachian Trail. We hiked the AT in the Bigelow Preserve within 8 miles of the turbines stopping to discuss each of the places where there were views. At many locations, the view was away from the turbines or very heavily filtered (e.g., essentially obscured) by evergreen trees. There were various existing human interventions in the landscape that were very noticeable—a long power line, a large house, the Saddleback ski resort, and clearcuts. However, the dominant impression was of a forested landscape of valleys, mountains and lakes. We ate lunch at Viewpoint 9 and discussed all three “ledges.” I expect that many hikers will stop and climb up these boulders, anticipating the view. They will be well rewarded! I am uncertain how many will go beyond the first ledge (i.e., climb down the first ledge and up the second, and then again down the second and up the third), since its view is so wonderful. It was my experience that the visual focus was toward the Bigelow Range and down the Carrabassett Valley—away from the Highland Wind Project. On the return high we stopped at the Little Bigelow Hut and read the trail log. There was a trail log with 219 entries between August 7 and

October 28 (12 weeks). Some of these were by the same person on consecutive days; some may have been the only one to make an entry for a party. Scenic quality was not a major theme of these entries. The hut is fairly well maintained, with a large fire circle several feet away.

Along this hike, I was reminded of discussions about the effect on hiker's experience of the proposed turbines on Readington and Black Nubble. That was a situation where the AT circled for 30-plus miles around the wind energy project. While the areas with potential visibility measured less than 10 percent of the AT's length in this area, there was a concern that hikers would be regularly exposed to these views over a three day hike. There was little to no empirical information about the cumulative effects of scenic impact exposure on recreation experience. We still do not have any information about whether there is a cumulative effect or not.

Scenic Turnout

3.2.6 Old Canada Scenic Byway (Route 201). There is a scenic turnout with interpretive signs and a picnic table just south of the Moscow/Caratunk town line. The Project will not be visible from this point.

3.3 Visual Simulations

TJD&A constructed their photosimulations using WindPRO software, and checked them using Google Earth. The simulations appeared reasonable, but without access to WindPRO software, it is not possible to replicate their work. Therefore this review employs ArcScene software to provide an independent check of the reasonableness of the simulations and to explore the possibility of visibility from areas where photosimulations were not made. While not a photo-realistic image, ArcScene visualizations are accurate perspectives created with the same horizontal angle of view as the VIA photosimulations. These visualizations are located in Appendix 3: ArcScene Visualizations. They are created with the same GIS data used for the visibility analysis. In general the visualizations exaggerate the visual impact of the turbines because the tree heights are a maximum of 40 feet and the turbines are a very dark color. While setting tree height to 40 feet is normal for visibility analysis purposes, it is lower than the normal forest canopy in this region. These visualizations used the same tree heights as TJD&A used, including for harvested area and forested wetlands. This is because harvesting has been so extensive in the area, that some views would otherwise have had little forest cover.

3.3.1 Flagstaff Lake. Visualization 1 is to be compared to the Flagstaff Lake Photosimulation. The scope and scale of the project is similar in both representations; if anything the turbines appear higher in the Visualization. This could be because of how the ridgeline was matched in WindPRO or because of the 40-foot tree height used in the Visualizations. Overall, the simulation appears to be an accurate representation.

3.3.2 Arnold Trail to Quebec. Visualization 2 is to be compared to the Arnold Trail on West Carry Pond Photosimulation. This is a case where the land closest to the view has been harvested since 1995, so the tree heights in the visualization are set lower than 40 feet. However, Maine requires that a vegetated buffer be left undisturbed and this buffer of mature trees is clearly visible in the photograph used for the Photosimulation. Burnt Hill is clearly visible on the left of the Visualization, and it may be just visible in the center of the Photosimulation. This may be because the shoreline tree buffer is screening Burnt Hill in the photo, or because the turbines

were placed too low in WindPRO. I do not have field measurement for the shoreline tree buffer's height, so it is not possible to create line-of-sight profiles to accurately investigate this issue. However, I can create profiles using the tree heights used by TJD&A in the VIA. Figure 1 shows the results. Most of the turbine marked 18W in the visualization will be visible, but its foundation will not. However, turbine 18W will be visible with its foundation area and the top of the hill. There appears to be a possibility that the turbines may be more visible than indicated in the Photosimulation.

3.3.3 Gilman Pond. Visualization 3 is to be compared to the Gilman Pond Photosimulation. This particular photograph portrays a dark even stormy sky. While it is likely accurate, it does not represent the turbines as clearly as they could be seen in more optimal viewing conditions. However the scope and scale of the project is similar in both representations; the simulation appears to be an accurate representation.

3.3.4 Old Canada Road Scenic Byway (Route 201)—Wyman Lake Turnout. Visualization 4 is to be compared to the Wyman Lake Turnout panoramic photographs. The turbines will be behind the hill that is on the right side of the photograph; the Project will not be visible.

3.3.5 Bingham Free Meeting House. Visualization 5 is to be compared to the panoramic photographs for the Bingham Free Meeting House. These photographs are actually of the meetinghouse and not from it, which makes their use a bit problematic. The Visualization makes it clear that the turbines will not be visible—they are behind a local hill. However, the generator lead line, an associated facility, is represented by a 60-foot tall ribbon that is visible in the Visualization. It is important to point out that this ribbon is primarily behind the hill too, but at its top it may be visible. Because the vegetation height used for the Visualization is only 40 feet, and the Visualization does not include complete data concerning the right-of-way clearing, it provides only a preliminary visual analysis. However, it provides sufficient reason to prepare a detailed Photosimulation.

3.3.6 Appalachian Trail—Viewpoint 4. Visualization 6 is to be compared to Photosimulation from the AT at Viewpoint 4. The primary differences are that the photograph is hazy, which may realistic but is not an optimal viewing condition. It is likely that some of the crane paths and

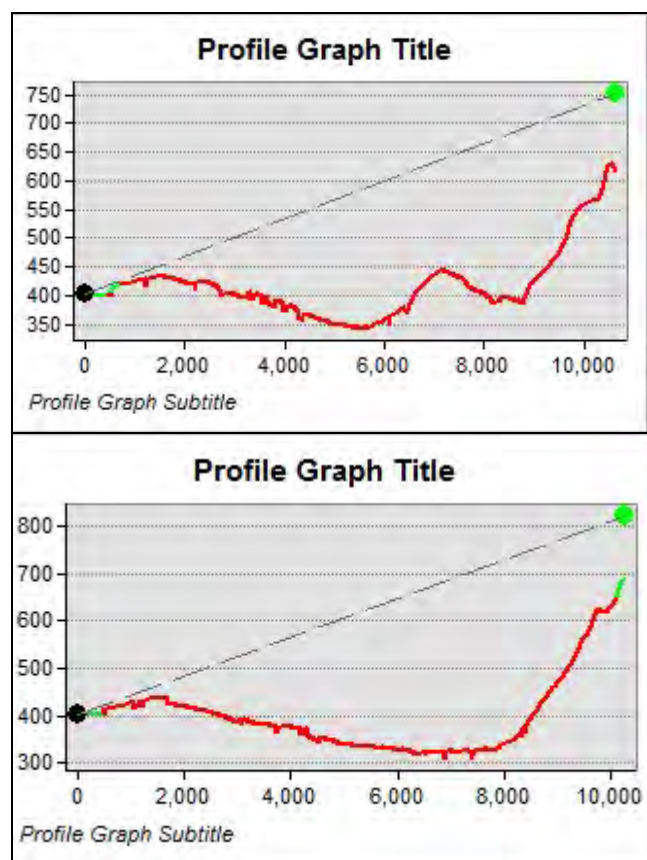


Figure 1. Profile graphs from the Arnold Trail viewpoint in West Carry Pond showing the line-of-sight to turbine 18W on the Bald Mountain (top) and 24E on Burnt Hill (bottom).

clearing around the turbines will also be visible, which are not portrayed in the Photosimulation. However, the scope and scale of these two images is similar and these differences seem rather modest.

3.3.6 Appalachian Trail—Viewpoint 9. Visualization 7 is to be compared to Photosimulation from the AT at Viewpoint 9D. The turbines on Burnt Hill appear lower in the Photosimulation than in the Visualization, but otherwise the turbines appear to be appropriately represented. However, there may be some question about whether the clearing and cut and fills are accurately represented. I recognize that the photograph submitted by the Appalachian Mountain Club (2011) of the Kibby Wind Project shows this clearing before there has been adequate time for revegetation to occur. I would like to see photographs of the clearing around wind turbines that has been revegetated by the same methods being proposed for the Highland Wind Project; if possible from a similar angle and distance.

3.3.6 Appalachian Trail—Viewpoint 16. Visualization 8 is to be compared to Photosimulation from the AT at Viewpoint 16. The turbines on Witham Mountain appear slightly smaller in the Photosimulation compared to the Visualization, but their location and scope appears to be appropriately represented. It is likely that some of the crane paths and clearing around the turbines will also be visible, which are not portrayed in the Photosimulation.

3.4 Visualizations for which there is no Photosimulation

As noted above for Bingham Free Meetinghouse, there appears to be a need for additional Photosimulations from viewpoints at state or nationally significant scenic resources. Two additional such viewpoints are the AT at the north end of East Carry Pond and on the southern end of Wyman Lake.

3.4.1 Appalachian Trail—north end of East Carry Pond. Visualization 9 portrays the possible view from or near to the AT on the northern end of East Carry Pond. This location is perhaps 12 miles from AT Viewpoint 16. The visibility analyses in the VIA (Map B) and this review indicate that as many as 26 turbines may be visible from this location. This view is substantially different than from the elevated viewpoints in the Bigelow Preserve. A Photosimulation from this viewpoint might be useful in a discussion of the cumulative impacts to a hiker's experience of seeing grid-scale wind projects on a daily basis or even more frequently. At present we do not have very much data on this issue, but we should begin the discussion and this viewpoint could help illustrate the point.

I want to make it clear that I know very little about this hypothetical viewpoint; it was not visited during my fieldwork. It is possible that there is no readily available viewpoint, and even if there were it may be so infested with mosquitoes that no hiker would stop to consider the view. The point is that the visibility analysis indicated that a nationally significant scenic resource has the potential to see many turbines at this location and it should be investigated and analyzed.

3.4.2 Kennebec River/Wyman Lake. The Kennebec River is a scenic resource of state or national significance and someone boating or canoeing on the southern portion of the lake has the potential to see as many as 27 turbines. Visualization 10 portrays what may possibly be visible. In addition to many turbines, the user may see some portions of the generator lead line

structures, and possibly evidence of the cleared right-of-way and some clearing around the turbines. A simulation needs to be prepared in order to fully evaluate the visual impacts to this scenic resource.

3.5 Interviews with Hikers on Little Bigelow Mountain and the Web-based Survey of Western Maine Hikers

Visitors to the eastern peak of Little Bigelow Mountain at Viewpoint 9 and the junction of the Safford Brook trail with the AT were interviewed over 5 days (Saturday July 17, Saturday July 24, Friday August 6, Saturday August 7, and Sunday October 3) to determine how seeing the Highland Wind Project might affect their recreation experience. The intercept interviews were conducted by Portland Research Group (2011). These interviews included the evaluation of the actual view in three directions by 37 hikers at Viewpoint 9. In addition they evaluated a Photograph of the existing condition and a Photosimulation of the proposed Project. The interviews also explored hikers' reasons for hiking, their visual expectations, how they anticipated the Highland Wind Project might affect their enjoyment and likelihood of returning.

In addition, Portland Research Group (2011) partnered with eRewards to conduct a web-based panel survey that obtained responses from 104 residents of northern New England who are hikers in Western Maine. These respondents evaluated a series of photographic images online, including the Project area from Viewpoint 9 without evidence of harvesting, the existing conditions, the simulation of the Project, the existing Sugarloaf ski resort, the existing condition at Viewpoint 4, and a simulation of the Project at Viewpoint 4. The web survey also explored in greater depth Western Maine hikers' reasons for hiking, their visual expectations, how they anticipated various cultural elements might affect their enjoyment and likelihood of returning.

The Evaluation Criteria mandated by Maine's Wind Energy Act require knowledge about visitors to state or nationally significant scenic resources and the potential impact to their experience that is not normally available. This study provides unique information directly relevant to the Highland Wind Project, and indirectly relevant to other proposed wind projects in Maine. Portland Research Group conducted interviews with 58 hikers at two locations on Bigelow Mountain and a web-based survey of 104 Western Maine hikers. Together these two surveys provide a database that is simply too rich to fully evaluate for this review. Portland Research Group has set a new standard for investigating how visual impacts may affect the expectations of users and their experience of the scenic resource.

The major limitations of the study are that 21 respondents to the hiker survey were not at the site of a Photosimulation where respondents also rated the actual view. The web-based survey did not have this opportunity to validate the photograph used for the Photosimulations. In addition, the web survey lacked the contextual immediacy that may make the responses more valid. However there do not appear to be any obvious biases being introduced into the study.

3.4.1 Public Use. The weather on four of the days was very suitable for a day hike, but there were low clouds on the fifth (July 24). All respondents to both surveys were hikers. Based on the number of people interviewed, the estimate of the number of people who use this portion of the AT annually is 1,700 (TJD&A 2010, page 48). The Maine Bureau of Parks and Lands estimated

that there were 2,100 visitors on the Little Bigelow Mountain portion of the AT in 2002 (TJD&A 2010, page 48).

3.4.2 Validity of Photograph. The viewpoint for the survey on Little Bigelow Mountain is the same that was used for the Photosimulation from AT Viewpoint 9D. The measurement of scenic impact is reliant on a static photosimulation with a limited horizontal cone of vision. It is therefore important to establish that the scenic value rating of the Actual View is comparable to the rating of the Photograph used in the Photosimulation—this is a question of validity. The mean rating is 6.05 for the Actual View and 7.51 for the Photograph (as judged by those respondents at Viewpoint 9), with 1.0 being the lowest and 10.0 being the highest scenic value. There is a statistically significant difference between these two values (Paired $t = 3.36$, $p = .0019$). The probable reason for this is that the respondents were at Viewpoint 9B, which has a partially screened view to the east, which the Photosimulation is based on a photograph from Viewpoint 9D which has an unobstructed view. In other words, this test of validation was not well designed.

3.4.3 Apparent Scenic Impact. The difference between the scenic value of the Photosimulation and the Existing Condition photograph is the apparent Scenic Impact. It can range between negative impact of -9.0 and a positive impact of 9.0, with 0.0 indicating no scenic impact. The analysis of apparent scenic impact for AT Viewpoints 4 and 9 are provided in Table 5. The results for respondents on Little Bigelow Mountain are separated from the results from the web-based survey. Both groups evaluated the scenic impact from Little Bigelow Mountain as being negative, but it was much more so to respondents who were at the site.

Table 5. Ratings of Potential Scenic Impact from Appalachian Trail Viewpoints 9 and 4

	Viewpoint 9		Viewpoint 4
	On site	Web	Web
Existing Condition	7.51	7.97	8.02
Photosimulation	2.41	7.31	7.49
Scenic Impact	-2.11	-0.66	-0.54
Test	$t = 5.74, p \leq .0001$	$t = 3.71, p = .0003$	$t = 3.30, p = .0013$
Number	37	104	104

3.4.4 Effect on Experience and Likelihood to Return. The relevant Evaluation Criterion from the Wind Energy Act is less the apparent Scenic Impact, *per se*, and more about its Effect on the Experience of users at significant scenic resources. Another possible indicator of how users of the AT on Little Bigelow Mountain might be affected by the project is their Likelihood to Return if the project were built. The study report provides the simple mean values for ratings of Effect on Enjoyment (mean = 4.76), which is statistically significant from the “no change” rating of 5.5 ($t = 2.41$, $p = .0212$). Likelihood to Return to the AT on Little Bigelow Mountain (mean = 5.16) is not statistically different from “no change” ($t = 1.15$, $p = .258$).

4. Evaluation of Scenic Impacts

4.1 Evaluation Criteria

Ten places were identified as potential state or nationally significant scenic resources under the Wind Energy Act criteria. This section evaluates the scenic impact to these resources based on my understanding of the Wind Energy Act's scenic impact Evaluation Criteria.⁷

- A **Significance of resource:** Consider the role of scenic quality in designation, and the level of significance relative to similar designations. Indicators may be obtained from the designation reports or forms, supplemented by descriptions from widely used guide books.
- B **Character of surrounding area:** Consider contrasts with the existing landscape and the presence of other contrasting elements. User surveys may provide a direct measure of the existing scenic quality. This may also be based on a descriptive landscape characterization, typically prepared by a landscape professional.
- C **Typical viewer expectation:** Consider the resource's scenic reputation, and the centrality of scenic quality in its designation. User surveys may provide an indicator of expectations. In the absence of direct empirical data, distance traveled or descriptions from widely used guide books may provide alternative indicators.
- D **Development's purpose and context:** This criterion incorporates the Wind Energy Act's goal of achieving significant wind energy development into consideration of scenic impacts. Consider site quality—wind suitability, proximity to transmission line, and potential power generation if all potential turbine sites in the area are used. Low evaluation means that if all sites in the area are developed, it makes a major contribution to Wind Energy Act's goals. High evaluation means the area makes a minor contribution when all potential sites are developed.
- E.1 **Extent, nature & duration of uses:** Consider the number of users, role of scenic quality in use of the resource, and typical length of stay. User surveys provide the most direct indicators, but trail logs or traffic counters may also be useful. Potential accessibility may be an indicator in the absence of empirical data.
- E.2 **Effect on continued use and enjoyment:** If the project were built, what is the likelihood of users returning, and the impact on their enjoyment of the scenic resource? User surveys incorporation accurate photographic visual simulations may provide indicators.
- F **Scope and scale of project views:** Consider the relative magnitude of project elements, and the proportion of total angle of view occupied by project. Accurate photographic simulations and visibility analyses may provide indicators.

The levels of severity for the Evaluation Criteria are as follows:

⁷ 35-A MRSA, § 3452, sub-§3

- **None.** The Evaluation Criterion makes no contribution to scenic impact. For some criteria a rating of None means that there is No Adverse Impact (e.g., there are no people present—Criterion E, or the project is not visible—Criterion F).
- **Low.** The severity of the contribution is low. While the scenic impact may be Adverse, it appears to be within the acceptable range for any type of development (e.g., only one or two turbines will be partially visible at a distance of nearly 8 miles—Criterion F).
- **Medium.** The severity of the contribution is medium, which is Adverse but typical of wind energy development, and within the range of impacts that the Wind Energy Act anticipates (e.g., other towers or large scale structures are present that contrast highly with the surrounding landscape).
- **High.** The severity of the contribution is high from this criterion, which in association with other criteria may make the overall scenic impact Unreasonably Adverse (e.g., a possible scenario suggesting an Unreasonable Adverse impact might be that the scenic resource is a national icon—Criterion A is High, though there are only modest numbers of viewers—Criteria E.1 is Low—to a person their enjoyment will seriously decline—Criteria E.2 is High).

The Evaluation Criteria for each of the state or nationally significant scenic resources are discussed below, and summarizes in Table 6 the Evaluation Criteria ratings for the Highland Wind Project. The VIA has employed a very similar approach to summarizing the impacts to the state and nationally significant scenic resources (TJD&A 2010, pages 56-63).

4.2 Arnold Trail to Quebec

Criterion A: Significance of resource. The Arnold Trail is on the National Register of Historic Places. However, scenic quality played no role in its nomination. Until there is some indication that it is significant for its scenic quality, it must be given a Low rating.

Criterion B: Character of surrounding area. The Arnold Trail was primarily a river route, though it left the Kennebec River at what is now Wyman Lake to portage overland to the Dead River at what is now Flagstaff Lake. The character of this passage has changed significantly within the study area because of these two dams, as well as other forms of development such as timber harvesting, paved highways, and power lines. The historic integrity of this landscape is Low to Medium.

Criterion C: Typical viewer expectation. Nothing is known about the “typical” user’s expectations of the Arnold Trail. For instance, it is not known if the primary expectations focus on the adventure of the historic expedition or if it is simply an excuse to be outdoors. Even less is known about the role of scenic quality in these expectations. A rating of Medium is assigned with the understanding that there is little basis to assign any rating.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. This is unknown. However, there is no indication of significant organized use on the Arnold Expedition Historic Society's web site archives. It is assumed that use is Low.

Criterion E.2: Effect on continued use and enjoyment. This is unknown. However a survey found that the Saddleback Ridge wind turbines would have no effect on respondents' likelihood of returning to Donnell Pond for water activities such as boating, canoeing, kayaking, swimming or fishing, and it is likely to be similar here. It is assumed that use is Low.

Criterion F: Scope and scale of project views. The nearest turbines are about 3.5 miles distant from the Arnold Trail on Wyman Lake and 4.8 miles from West Carry Pond. Many turbines will be visible from both locations, though this review is not able to verify that the view will be mostly of blades—it might be much more. There may also be views from Middle Carry Pond and Flagstaff Lake. While the turbines may have a significant presence from these locations, they do not appear to dominate the view to such an extent that it would be considered Unreasonably Adverse—the rating is Medium

Overall scenic impact. There is very little information about how a wind power project might impact users' appreciation of the scenic quality of a resource like the Arnold Trail. However, what little we do know suggests that scenic quality is not important to the Arnold Trail's significance and user experience is unlikely to be significantly effected by the presence of wind turbines. The Overall Scenic Impact is therefore placed at a Low level.

4.3 Bingham Free Meetinghouse

Criterion F: Scope and scale of project views. It appears that the turbines will be screened by topography and vegetation. However, there may be a view of the generator lead line, which was not simulated.

Overall scenic impact. None from project turbines. There may be some impact from the generator lead line, which will be evaluated using LURC's "traditional" criteria (Hilton 2011).

4.4 Flagstaff Lake

Criterion A: Significance of resource. This is a scenic resource of statewide significance. In the *Scenic Lakes Character Evaluation in Maine's Unorganized Towns*, it received a score of 40, even with the maximum possible demerit of -20 points for Inharmonious Development. Its rating is Medium.

Criterion B: Character of surrounding area. The lake has a highly configured shore and a views toward the Bigelow Range. It is a dramatic landscape. However, there are plentiful reminders that this is a cultural landscape, such as signs of harvest activity and perhaps most important people in motor boats, cars and trailers. The rating is moderate to high.

Criterion C: Typical viewer expectation. It is assumed that viewer expectations for scenic quality are generally high for users of Flagstaff Lake. However, there is some evidence that scenic quality may be less important to people engaged in fishing or motor boating as compared to those engaged in hiking or nature study (Palmer 1999). Its rating is Medium.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. The FPL Energy Maine estimated that there were 44,000 visits to Flagstaff Lake in 2009. Approximately a quarter of the lake is within the 8-mile study area, and turbines will be visible from two thirds of that. In addition to traditional water recreation uses, Flagstaff Lake is associated with the Arnold Trail, the Northern Forest Canoe Trail, Maine Huts and Trails, and the At passes to its south. The VIA suggests that the southern end of the lake receives less use than the rest of the lake—but the perhaps 6,000 visitors who would be within the impacted area would warrant a rating of Low to Medium.

Criterion E.2: Effect on continued use and enjoyment. This is unknown. However a survey found that the Saddleback Ridge wind turbines would have no effect on respondents' likelihood of returning to Donnell Pond for water activities such as boating, canoeing, kayaking, swimming or fishing, and it is likely to be similar here. It is assumed that use is Low.

Criterion F: Scope and scale of project views. The nearest turbines are 4.2 miles distant. The viewshed analysis indicates that 7 or 8 turbines will potentially be visible from much of this southern portion of the lake. While the turbines will have a significant visual presence, they are not in the focal view toward the Bigelow Range and should not be visually dominant. The rating is Low to Medium.

Overall scenic impact. While the scenic quality is Medium to High, what research we have suggests that the perception of scenic impact will be modest and not have a significant effect on enjoyment or likelihood of returning to Flagstaff Lake. Therefore the Overall Scenic Impact is set at Low to Medium.

4.5 Jackson Pond

Criterion F: Scope and scale of project views. Topography will screen views of the project. Without visibility there can be no visual impact. Therefore it will not be considered further.

Overall scenic impact. None, since there is no possible project visibility.

4.6 Gilman Pond

Criterion A: Significance of resource. This is a scenic resource of statewide significance. In the *Scenic Lakes Character Evaluation in Maine's Unorganized Towns*, it received a score of 35, with a demerit of -10 points for Inharmonious Development. Its rating is Medium to Low.

Criterion B: Character of surrounding area. Gilman Pond sits in the narrow valley of Sandy Stream surrounded by low mountains. There are a number of cabins on its shore, and while the DeLorme Atlas indicates a public boat launch, it was not apparent during the field investigation. The rating is typical of Western Maine or Medium.

Criterion C: Typical viewer expectation. It is assumed that viewer expectations for scenic quality are generally high for users of Gilman Pond. However, there is some evidence that scenic quality may be less important to people engaged in fishing or motor boating as compared to those engaged in hiking or nature study (Palmer 1999). The rating is Medium.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. This is unknown. However, there appears to be no boat launch, which would indicate low use. In addition, fishing is anticipated to be the primary use and Palmer (1999) found that fishing was an activity where people did not appear to place as high a value on scenic quality as people who hiked or were engaged in nature study. The rating is Low.

Criterion E.2: Effect on continued use and enjoyment. This is unknown. However a survey found that the Saddleback Ridge wind turbines would have no effect on respondents' likelihood of returning to Donnell Pond for water activities such as boating, canoeing, kayaking, swimming or fishing, and it is likely to be similar here. It is assumed that use is Low.

Criterion F: Scope and scale of project views. The nearest turbines are 6.2 miles distant. This GIS analysis indicates that anywhere from 5 to 17 turbine hubs and many more blades will be visible over the forested shoreline on most of the lake. The turbines will have a major visual presence to the north of the lake, though at this distance they could not be said to be visually dominant. The rating is Medium.

Overall scenic impact. Gilman Pond appears to have very public few users, and even those are anticipated to be little effected by the visual presence of wind turbines at this distance. The overall impact is judged to be Low.

4.7 Kennebec River/Wyman Lake

Criterion A: Significance of resource. Kennebec River is a scenic resource of state significance. Its rating is for this stretch is Low to Medium.

Criterion B: Character of surrounding area. The most affected area is just above Wyman Dam, a hydropower facility. Route 201 is located parallel to its eastern shore. The surrounding topography is hills and low mountains. Baker Mountain is a small ski area close to Wyman Lake. The rating is typical of Western Maine or Medium.

Criterion C: Typical viewer expectation. It is assumed that viewer expectations for scenic quality are generally high for users of Wyman Lake. However, there is some evidence that scenic quality may be less important to people engaged in fishing or motor boating as compared to those engaged in hiking or nature study (Palmer 1999). The rating is Medium.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. This is unknown. However, there are two boat launches on Wyman Lake, though there is no indication of how much use it receives. In addition, fishing is anticipated to be the primary use and Palmer (1999) found that fishing was an activity where people did not appear to place as high a value on scenic quality as people who hiked or were engaged in nature study. The rating is Low to Medium.

Criterion E.2: Effect on continued use and enjoyment. This is unknown. However the survey found that the wind turbines would be no effect on respondents' likelihood of returning to Donnell Pond for water activities such as boating, canoeing, kayaking, swimming or fishing. This may also be the case for Wyman Lake. The rating is Low

Criterion F: Scope and scale of project views. The nearest turbines are 4.6 miles distant. The viewshed analysis indicates that anywhere from 18 to 22 turbine hubs may be visible over the forested shoreline. In addition, there may be views of the generator lead line structures and right-of-way clearing. The rating is Medium.

Overall scenic impact. At the southern end of Wyman Lake, the large number of turbines will have a significant visual presence along the western side of the lake. The generator lead line may also be visible, and it will certainly be visible on the Kennebec River just below the dam, though this may not be significant within the context of the existing hydropower infrastructure. However the users are anticipated to be primarily fishing, and to be less sensitive to scenic quality when compared to hikers. The overall impact is judged to be Medium.

4.8 Bigelow Preserve

Criterion A: Significance of resource. The Bigelow Preserve is a scenic resource of statewide significance that was acquired as the result of a public referendum. It includes the well known Bigelow Range, which is outside the study area. The rating is Medium to High.

Criterion B: Character of surrounding area. The Bigelow Range contains two of Maine's 14 peaks above 4,000 feet in elevation. The Bigelow Preserve is maintained as a backcountry recreation area without significant improvements. Views from the peaks, including Little Bigelow Peak within the study area can be widely panoramic, though they include obvious human presence in the form of a power line right-of-way, harvested forest areas, and Sugarloaf ski resort. The rating is medium to High.

Criterion C: Typical viewer expectation. It is assumed that viewer expectations for scenic quality are generally high for users of Bigelow Preserve, though the real scenic attraction is the Bigelow Range and not little Bigelow Mountain. The rating is Medium to High.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. The use of that portion of the Bigelow Preserve within the study area is essentially coincident with the Appalachian Trail. The number of users has been estimated to be 1,700 and 2,100 hikers per year. Some small proportion of these may stay overnight within the study area. This level of use is Low.

Criterion E.2: Effect on continued use and enjoyment. The survey found that while the turbines would significantly reduce enjoyment if seen from an open and elevated view, this is not a common situation and is normally accompanied by views in other directions that have higher scenic value. Nonetheless, the presence of the turbines was not found to have a significant effect on the likeliness that hikers would return to this area. The rating of the effect on continued use and enjoyment is Low.

Criterion F: Scope and scale of project views. The nearest turbines are 4.7 miles distant. The viewshed analysis indicates that turbines from two viewpoints up to 17 turbines will be wholly visible from an elevated position. There are several other areas where turbines will be visible through a screen of trees. While these encounters do not occupy a very large portion of the trail's length, they are located at places where a hiker may be expected to stop and rest or eat lunch. At these couple locations, there are views of higher scenic quality away from the turbines. While not being dominant elements during the whole hike on Little Bigelow Mountain, they do have a major visual presence at these few viewpoints. Given this situation, the rating is Medium to High.

Overall scenic impact. Bigelow Preserve is an important backcountry recreation resource with modest numbers of users. The Project will be clearly visible from a couple viewpoints that also offer high scenic views away from the Project, and from several more highly filtered viewpoints. However, this is not expected to have a significant detrimental effect on the overall enjoyment of hikers or the likelihood that they will return again. The Overall Scenic Impact Rating is Medium.

4.9 Appalachian Trail

Criterion A: Significance of resource. The Appalachian Trail is a nationally significant scenic resource with an international reputation. Its significance is High.

Criterion B: Character of surrounding area. The AT passes over the Bigelow Range, which contains two of Maine's 14 peaks above 4,000 feet in elevation. However, the Bigelow Range is beyond 8 miles from the nearest turbines. Views from Little Bigelow Peak, which is within the study area can be widely panoramic, though they include obvious human presence in the form of a power line right-of-way, harvested forest areas, and Sugarloaf ski resort. Leaving the Bigelow

Preserve, the AT passes among several lakes in a forested low land—Flagstaff Lake and West, Middle and East Carry Ponds—before going beyond the study area. The rating is Medium to High.

Criterion C: Typical viewer expectation. It is assumed that viewer expectations for scenic quality are generally high for users of Bigelow Preserve, though the real scenic attraction is the Bigelow Range and not little Bigelow Mountain. The rating among the lakes in the forested lowland will be lower. Nonetheless, the rating is Medium to High.

Criterion D: Development's purpose and context. At 117 MW, the Highland Wind Project will make a substantial contribution to Maine's wind energy goal. No plans are presented to expand this project. The value of the project to this criterion is High (meaning that it provides a significant counter balance to scenic impacts).

Criterion E.1: Extent, nature & duration of uses. The most dramatic portion of the Appalachian Trail within the study area passes over Little Bigelow Mountain. The number of users in this area has been estimated to be 1,700 and 2,100 hikers per year, and it is anticipated that use of the AT in other parts of the study area is substantially lower. This level of use is Low.

Criterion E.2: Effect on continued use and enjoyment. The survey found that while the turbines would significantly reduce enjoyment if seen from an open and elevated view, this is not a common situation and is normally accompanied by views in other directions that have higher scenic value. Nonetheless, the presence of the turbines was not found to have a significant effect on the likeliness that hikers would return to this area. There is no information about the effect of seeing turbines over East Carry Pond. The rating of the effect on continued use and enjoyment is Low.

Criterion F: Scope and scale of project views. On Little Bigelow Mountain, the nearest turbines are 4.7 miles distant. The viewshed analysis indicates that turbines from two viewpoints up to 17 turbines will be wholly visible from an elevated position. There are several other areas where turbines will be visible through a screen of trees. While these encounters do not occupy a very large portion of the trail's length, they are located at places where a hiker may be expected to stop and rest or eat lunch. At these couple locations, there are views of higher scenic quality away from the turbines. While not being dominant elements during the whole hike on Little Bigelow Mountain, they do have a major visual presence at these few viewpoints.

At the northern end of East Carry Pond, there is the potential to view over 20 turbine hubs over the water. The context of this potential viewpoint is unknown, and it may or may not be a desirable spot to stop.

The rating for these most impacted viewpoints is Medium to High.

Overall scenic impact. The Appalachian Trail is an important recreation resource with modest numbers of users within the study area. The Project will be clearly visible from a very few viewpoints that may also offer high scenic views away from the Project, and from several more highly filtered viewpoints. However, this is not expected to have a significant detrimental effect

on the overall enjoyment of hikers or the likelihood that they will return again. The Overall Scenic Impact Rating is Medium.

4.10 Old Canada Road Scenic Byway, Wyman Lake Turnout

Criterion F: Scope and scale of project views. Topography will screen views of the project. Without visibility there can be no visual impact. Therefore it will not be considered further.

Overall scenic impact. None, since there is no possible project visibility.

4.11 Route 27 Scenic Byway Turnout

Criterion F: Scope and scale of project views. Topography will screen views of the project. Without visibility there can be no visual impact. Therefore it will not be considered further.

Overall scenic impact. None, since there is no possible project visibility.

4.12 Summary of Impacts

Table 5 summarizes the above findings from applying the scenic impact evaluation criteria to the 10 resources identified within 8 miles of a turbine and possibly having state or national significance as a scenic resource.

Table 5. Summary of Evaluation Criteria Ratings for the Highland Wind Project

Scenic Resources of State or National Significance	Scenic Impact Evaluation Criteria							Overall Scenic Impact
	A	B	C	D	E.1	E.2	F	
Historic Sites								
Arnold Trail to Quebec Historic District	Low	Low-Med	Medium	High	Low	Low	Medium	Low
Bingham Free Meetinghouse [†]	*	*	*	*	*	*	0	None
Great Ponds								
Flagstaff Lake	Medium	Med-High	Medium	High	Low-Med	Low	Low-Med	Low-Med
Jackson Pond [†]	*	*	*	*	*	*	0	None
Gilman Pond	Med-Low	Medium	Medium	High	Low	Low	Medium.	Low
Scenic River								
Kennebec River/Wyman Lake	Low-Med	Medium	Medium	High	Low-Med	Low	Medium	Medium
Maine Public Reserved Land and Scenic Trails								
Bigelow Preserve	Med-High	Med-High	Med-High	High	Low	Low	Med-High	Medium
Appalachian Trail	High	Med-High	Med-High	High	Low	Low	Med-High	Medium
Scenic Byway Turnout								
Old Canada Rd. Scenic Byway Turnout [†]	*	*	*	*	*	*	0	None
Rt 27 Scenic Byway Turnout [†]	*	*	*	*	*	*	0	None

Notes: The Evaluation Criteria are: (A) Significance of resource, (B) Character of surrounding area, (C) Typical viewer expectation, (D) Development's purpose and context, (E.1) Extent, nature & duration of uses, (E.2) Effect on continued use and enjoyment, and (F) Scope and scale of project views.

[†] Since there is no project visibility, there is no scenic impact.

5. Summary and Conclusions

This review evaluates the adequacy of the *Highland Wind Project Visual Impact Assessment* (TJD&A 2010). Overall this VIA is accurate and clearly presented. Additional fieldwork and analysis is completed for this review. A framework based on the Wind Energy Act's evaluation criteria is systematically applied to all of the state and nationally significant scenic resources. While there are slight differences, the Summary of Evaluation Criteria presented above is similar to the Summary of Evaluation Criteria presented in the VIA (TJD&A 2010, page 23-24 and 57). This suggests that there may be general agreement about the Evaluation Criteria and how to apply them. The difference may simply be due to a lack of information. However, there does appear to be some real differences about how to synthesize the criteria into a final judgment of the Overall Scenic Impact.

The scenic impact to the state and nationally significant scenic resources is Adverse at some locations, and may be Very Adverse at a very few specific viewpoints. However, these areas are very limited and the Overall Scenic Impact from the proposed Highland Wind Project does not appear to be Unreasonably Adverse within the guidance given by the Wind Energy Act.

The preparation of this review has resulted in several observations and recommendations are worth repeating.

1. The Wind Energy Act's evaluation criteria are so succinct as to be somewhat ambiguous. **The primary permitting authorities should further refine the evaluation so they are unambiguously understood, accurately applied and usefully interpreted. This should include identifying indicator thresholds that distinguish between Unreasonably Adverse, Adverse, and Not Adverse scenic impacts. Particular attention needs to be given to forming guidance about synthesizing the Evaluation Criteria into an Overall Scenic Impact evaluation.**
2. Assumptions made about vegetation height significantly affect a visibility analysis. The VIA chose to assign heights to certain wetlands and harvested areas that could have few canopy trees to screen views. As a result, the visibility analysis may indicate that areas are screened, when they are not. **Visibility analysis should be used primarily to guide the fieldwork. As such primary emphasis should be placed on the topographic visibility map and assumptions about screening should be used cautiously so as not to exclude sites with potential visibility from field investigation.**
3. Photosimulations were not prepared for every significant scenic resource from which potential views of the project were identified, in particular the Kennebec River/Wyman Lake and the AT at the northern end of East Carry Pond. **Photosimulations must be prepared from a "worst case" viewpoint for all state and nationally significant scenic resources which have a potential view of wind energy development components.**
4. There is real difficulty in obtaining information about the "extent, nature and duration of potentially affected public uses of scenic resources." **Future VIAs need to obtain or develop reasonable estimates of the extent, nature and duration of use for location in**

significant scenic resources with potential views of wind energy development components.

5. If a developer were to propose a 10 mile transmission line they would need to complete a thorough VIA. Yet adequately documented assessment and evaluation of Associated Facilities is not being presented. **Associated Facilities need to be thoroughly evaluated, and adequate documentation supporting the evaluation must be presented.**
6. The developer is to be commended for retaining a reputable survey research firm to conduct a user survey at a sensitive viewpoint. However, the survey primarily addressed one type of user (hiker), at a significant distance from the project (nearly 5.1 miles), for primarily one type of scenic resource (mountain summit in a state backcountry recreation area). There is little to no information about the scenic sensitivity to grid-scale wind power projects for other users (e.g., people fishing, boating, swimming, ice skating, skiing, attending an outdoor interpretive program, stopping at a scenic turnout, or using a historic site), at closer distances, during other seasons, and other types of scenic resources. **Future VIAs need to increase knowledge about how grid-scale wind energy projects effect the expectations, scenic perceptions, enjoyment and likelihood to return for a greater variety of scenic resource users, at different distances, in different seasons, and for a variety of significant scenic resources.**
7. There is a concern that repeated exposure to scenic impacts from grid-scale wind energy development may have a cumulative impact. It is unknown how to combine these repeated exposures and assign them proper weight in relation to the overall experience which includes relatively little visual exposure to the Project. **Future VIAs need to consider the cumulative exposure for users that travel through the landscape.**

6. References

- ESRI. 2010. *ArcGIS Desktop*. Redlands, CA: ESRI.
- Expedited Permitting of Grid-Scale Wind Energy Development*. MRSA Title 35-A, Chapter 34-A. <http://www.mainelegislature.org/legis/statutes/35-A/title35-Ach34-A.pdf> (accessed February 23, 2010).
- Giffen, R. Alec, Drew O. Parkin, and Frederick W. Todd. 1987. *Maine Wildlands Lake Assessment*. Augusta, ME: Maine Department of Conservation, Land Use Regulation Commission. <http://www.maine.gov/doc/mfs/windpower/pubs/pdf/Maine%20Wildlands%20Lake%20Assessment.pdf> (Accessed February 11, 2011).
- Hilton, Gwen. 2011. Second Procedural Order in the Matter of Development Permit DP 4862 Highland Wind, LLC, Highland Wind Project, April 8, 2011.
- Jones, Judy J. 1986. *Scenic Lakes Evaluation for the Unorganized Towns in Maine*. Augusta, ME: Maine Department of Conservation and Maine State Planning Office.
- Maine, Department of Conservation. 2010. Designated Scenic Viewpoints of State or National Significance, Located on Public Reserved Land or on a Publicly Accessible Trail Used Exclusively for Pedestrian Use, for Consideration in the Permitting of Expedited Wind Energy Development. <http://www.maine.gov/sos/cec/rules/04/056/056c003.doc> (accessed December 11, 2010).
- Maine, Department of Conservation, and National Park Service. 1982. *Maine Rivers Study*. <http://www.maine.gov/doc/mfs/windpower/pubs/pdf/Maine%20Rivers%20Study.pdf> (accessed March 23, 2011).
- Maine, Department of Conservation, Bureau of Parks and Lands. 2009. *Maine State Comprehensive Outdoor Recreation Plan 2009-2014*. <http://www.maine.gov/doc/parks/programs/SCORP/contents.html> (accessed March 3, 2010).
- National Register of Historic Places. 1969. Arnold Trail to Quebec. (69000018 NRIS). <http://nrhp.focus.nps.gov/natregsearchresult.do?fullresult=true&recordid=0> (accessed April 2, 2010).
- O'Shea, Robert P. 1991. Thumb's rule tested: visual angle of thumb's width is about 2 deg. *Perception* 20(3): 415-418. <http://www.perceptionweb.com/abstract.cgi?id=p200415> (Accessed January 15, 2010).
- Palmer, J.F. 1999. Recreation participation and scenic value assessments of clearcuts. In *Proceedings of the 1998 Northeastern Recreation Research Symposium*, edited by H.G. Vogel song. Gen. Tech. Rep. NE-255. Radnor, PA: USDA, Forest Service, Northeastern Forest Research Station. pp. 199-203.

- Palmer, J.F. 1983. A visual character approach to the classification of backcountry environments. *Landscape Journal* 2(1):3-12.
- Parkin, Drew, John Lortie, Robert Humphrey, and Fred DiBello. 1989. *Maine's Finest Lakes: Results of the Maine Lakes Study*. Augusta, ME: Maine Critical Areas Program, State Planning Office.
- Portland Research Group. 2011. Highland Wind Project Survey of Hikers March 11: Report of Trail Intercept and Web Survey Research Conducted Summer and Fall 2010. Portland, ME: Portland Research Group.
- Publicover, David. 2011. RE: Highland Wind (DP 4862) – FHM motion re determination of scenic effect of associated facilities. Memo to Marcia Spencer-Famous dated March 17, 2011.
- Terrence J. DeWan & Associates. 2010. *Highland Wind Project Visual Impact Assessment*. Yarmouth, ME: TJD&A.
- Terrence J. DeWan & Associates. 2011. RE: Data Request for Highland Wind Project VIA Review. Memo dated February 2011. Yarmouth, ME: TJD&A.
- USDA, Forest Service. 1995. [page revisions 2000] *Landscape Aesthetics: A Handbook for Scenery Management*. Agricultural Handbook Number 701. <http://www.esf.edu/es/via/> (accessed March 11, 2010).
- USGS. 2009a. *National Elevation Dataset (NED)*. http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/NED (accessed April 26, 2010).
- USGS. 2009b. *Vertical Accuracy of the National Elevation Dataset*. http://ned.usgs.gov/downloads/documents/NED_Accuracy.pdf (accessed April 26, 2010).

Appendix 1

Maine's Wind Energy Act and the Evaluation of Scenic Impacts

Maine's Wind Energy Act and the Evaluation of Scenic Impacts

James F. Palmer

On April 18, 2008, Governor John Baldacci signed *An Act to Implement Recommendations of the Governor's Task Force on Wind Power Development* (the Wind Energy Act). It establishes a favorable State policy encouraging grid-scale wind energy development in appropriate locations. In particular, it designates a large portion of the state for expedited grid-scale wind energy development. While most environmental impacts are evaluated in the same manner as previously, special provisions are made for scenic impacts.

While the provisions of the Wind Energy Act can be viewed as an effort to simplify and clarify visual impact assessments, questions of interpretation still remain. There are several major determinations that effect how a visual impact assessment is to be conducted. This Q&A presents the Wind Energy Acts' approach to scenic impact evaluation.

What is the standard of scenic impact evaluation? The standard is “Unreasonably Adverse,” and it only applies to views from significant scenic areas. “The primary siting authority shall determine... whether the development significantly compromises views from a scenic resource of state or national significance such that the development has an unreasonable adverse effect on the scenic character or existing uses related to scenic character of the scenic resource of state or national significance;”⁸ whether the development “fits harmoniously into the existing natural environment” is explicitly not required.⁹

Is this standard applied to all proposed facilities? It is clear that this standard applies to “generating facilities”—turbines and transportation lines. However, there is the possibility of an exception for certain “associated facilities,” making it somewhat less clear how to approach them.¹⁰ Associated facilities include “elements of a wind energy development other than its generating facilities that are necessary to the proper operation and maintenance of the wind energy development, including but not limited to buildings, access roads, generator lead lines and substations.”¹¹

“If the primary siting authority determines that application of the standard [unreasonably adverse, not harmonious fit] to the development may result in unreasonable adverse effects due to the scope, scale, location or other characteristics of the associated facilities”¹² then “the primary siting authority shall evaluate the effect of associated facilities of a wind energy development in terms of potential effects on scenic character and existing uses related to scenic character in accordance with Title 12, section 685-B, subsection 4, paragraph C or Title 38, section 484,

⁸ 35-A MRSA, § 3452, sub-§1

⁹ 35-A MRSA, § 3452, sub-§1

¹⁰ 35-A MRSA, § 3452, sub-§2

¹¹ 35-A MRSA, § 3451, sub-§1

¹² 35-A MRSA, § 3452, sub-§2

subsection 3, in the manner provided for development other than wind energy development.”¹³

In other words, if the primary siting authority determines that there may be unreasonably adverse impacts under the Wind Energy Act’s standard due to the associated facilities, then they shall evaluate the associated facilities using the standards for non-wind projects. Further, “The primary siting authority shall make a determination pursuant to this subsection within 30 days of its acceptance of the application as complete for processing.”¹⁴

What evaluation criteria are to be used? The Wind Energy Act lists six evaluation criteria:¹⁵

- A. **“Significance of...affected scenic resource;”** The Wind Energy Act does not explicitly describe how significance should be considered. One possible interpretation is that all scenic resources are equally significant. Another interpretation might be to distinguish between state and nationally designated scenic resources. However, this difference does not seem to have much to do with scenic quality, *per se*. Perhaps the most appropriate interpretation of this criterion is the significance of scenic quality to the identification and designation of a particular scenic resource. Sometimes the level of significance is indicated in the report responsible for the designation (e.g., designation as significant or outstanding scenic quality in the *Maine’s Finest Lakes* or *Maine Wildlands Lake Assessment* studies, or local, state or national significance on a Nation Register of Historic Places nomination form).
- B. **“Existing character of surrounding area;”** The Wind Energy Act explicitly states that whether “a wind energy development fits harmoniously into the existing natural environment in terms of potential effects on scenic character and existing uses related to scenic character is not required.”¹⁶ Since harmonious fit cannot be the criterion, perhaps it is whether perception of the landscape’s character type is significantly changed. For instance, does the visible presence of many wind turbines change the perceived landscape character from “wooded hillside with scattered residences,” to “industrial facility”?
- C. **“Expectations of the typical viewer;”** Viewers may have certain expectations for the visible character of certain scenic resources. For instance, they may expect that views from a particular state park or hiking trail be predominately natural appearing. However, it is reasonable to question the appropriateness of viewer expectations, such as when people describe lands intensively managed for timber as “wilderness.” In addition, viewer expectations change in reaction to changed circumstances. A few turbines may be approved because the project is small—once built people’s expectations change, making it possible to build additional turbines. Consideration of this incremental cumulative change may be the point of the next criterion.
- D. **“Expedited wind energy development’s purpose and...context;”** The Wind Energy Act makes it clear that the Legislature believes tapping the state’s wind resource is desirable, and has set substantial wind energy generation goals.¹⁷ In addition, the

¹³ 35-A MRSA, § 3452, sub-§2

¹⁴ 35-A MRSA, § 3452, sub-§2

¹⁵ 35-A MRSA, § 3452, sub-§3

¹⁶ 35-A MRSA, § 3452, sub-§1

¹⁷ 35-A MRSA, § 3402, sub-§2

Legislature recognizes that “wind turbines are potentially highly visible landscape features that will have an impact on views.”¹⁸ It seems reasonable that the Legislature intended that areas determined to be suitable for grid-scale energy development be utilized to their full capacity. This criterion may require consideration of the wind energy potential of the surrounding context, and evaluating the scenic impacts of fully building-out the area’s capacity to produce wind energy. The greatest impact comes from the initial wind turbines built in an area; additional turbines will add a smaller incremental scenic impact, making it very difficult to determine where to stop further development. It may be most responsible to consider potential cumulative wind development impacts to an area as part of an initial proposal.

- E. **“Extent, nature and duration of the... public use of the scenic resource... and the... effect... on the public’s continued use and enjoyment of the scenic resource;”** This evaluation criterion says that we need to know what activities are occurring at significant scenic resource sites, how many people engage in these activities, for how long, and what the impact of seeing the project will have on the enjoyment of these activities. Said another way, “Is an Adverse scenic impact Unreasonable if turbines are only visible from a rarely visited viewpoint, or is visible only to people engaged in an activity for which scenic quality is not central to its enjoyment?”
- F. **“Scope and scale of the... effect of views of the generating facilities... including... number and extent of [visible] turbines, ... distance [to visible facilities]... and effect of prominent features of the development on the landscape”** The issue is whether the generating facilities become dominating elements in the landscape, primarily because of their proximity to the viewer and the area they occupy in the visual field.

What constitutes a significant scenic resource? The Wind Energy Act specifies that only designated state or nationally significant scenic resources be evaluated and provides a list of qualifying designations. In this review further reference to scenic resources will assume that they are state or nationally significant.

- A national natural landmark, federally designated wilderness area or other comparable outstanding natural or cultural feature.
- A property listed on the National Register of Historic Places.
- A national or state park.
- A great pond identified as having outstanding or significant scenic quality in the *Maine’s Finest Lakes* study or *Maine’s Wildlands Lake Assessment*.
- A segment of a river or stream identified as having unique or outstanding scenic attributes in the *Maine Rivers Study*.
- Viewpoints from state public reserve land or on a trail that is used exclusively for pedestrian use, as designated by the Department of Conservation.
- Scenic turnouts on scenic highways constructed by the Department of Transportation.
- Scenic viewpoints located in coastal areas that are ranked as having state or national significance in terms of scenic quality in inventories published by the Executive Department, State Planning Office.

¹⁸ 35-A MRSA, § 3402, sub-§2(C)

While a major step toward specificity, it is anticipated that interpretation of this list will be contested. For instance, this list includes resources typically designated for non-scenic reasons (e.g., national landmark or listed historic place), and only minor portions of resources that are designated for scenic reasons (e.g., only the turnouts of a scenic byway). In addition, “the public [must have] a legal right of access” if the significant scenic resources is not on public land (e.g., listed historic place or coastal viewpoint).¹⁹

What is the area of potential effects (APE)? The regulations presume that potential scenic impacts to scenic resources must be evaluated within 3 miles of generating facilities (i.e., turbines and transmission lines). The primary siting authority may also require the evaluation of potential scenic impacts to state and nationally significant scenic resources located between 3 and 8 miles from generating facilities if there is substantial evidence that it is needed.²⁰ Interested parties have 30 days after the acceptance of the application to submit such information.²¹ The Wind Energy Act states that scenic impacts from generating facilities (i.e., turbines or transmission lines) located 8 or more miles from a scenic resource are “insignificant.”²²

What is the Process of Conducting a Visual Impact Assessment?

While the Wind Energy Act has identified specific resources from which views are to be considered and established criteria and a standard for their evaluation, there is no apparent reason that the process by which a visual impact assessment (VIA) is conducted would be changed. While there are slight variations, a professionally conducted VIA includes the following:

1. **Project Description.** The foundation of any VIA is an accurate and complete description of the visible attributes of all project elements—their location, dimensions, form, color, reflectance, surface texture, etc. It is also important to describe the surrounding site and how it will change. For instance, accurate information must be provided about the location and heights of trees that may screen the project, and the extent of site clearing and regrading. The purpose and context of the project must be described, as it is one of the evaluation criteria.²³
2. **Landscape Character.** The description of the landscape character establishes the context for evaluating any visual change from introducing the proposed development.²⁴ What is the visual character of the landform and vegetation? What is the visual character of the settlement pattern and road network? How does the project site relate to the larger regional landscape context—is it unusual or mundane? The US Forest Service describes landscape character this way:

Landscape Character descriptions are a combination of the objective information contained within ecological unit descriptions and the cultural values that people assign to landscape. Together they help define the meaning of “place”, and its scenic expression (USDA FS 1995, page 1-1).

¹⁹ 35-A MRSA, § 3451, sub-§9

²⁰ 35-A MRSA, § 3452, sub-§4

²¹ 35-A MRSA, § 3452, sub-§4

²² 35-A MRSA, § 3452, sub-§3

²³ 35-A MRSA, § 3452, sub-§3, criterion D

²⁴ 35-A MRSA, § 3452, sub-§3, criterion B

The regional landscape character is described first. Often there are several distinct landscape units to describe. The character (e.g., ecological zone) and scenic attractiveness (e.g., vividness, intactness, unity) of each landscape unit is summarized (USDA FS 1995, page 1-15). A somewhat more detailed description is given for the project site and its APE.

3. **Visibility Analysis.** A visibility or viewshed analysis identifies those areas with potential views of the proposed development. The minimum professional standard is to map the topographic viewshed for the highest point of each major project element. This shows those areas that have a potential view of the tip of an upright turbine blade if all land cover were removed. Since it is possible that views to a project could be opened by the removal of land cover, a topographic viewshed is considered a useful conservative assessment of the maximum area of potential project visibility.

Typically, a second visibility analysis includes the screening effect of forest cover. However such analyses should be used with caution and carefully field checked, since vegetation data can change quickly. The three forest classes (deciduous, evergreen and mixed) of the National Land Cover Database are most commonly used. Forest height is typically set to a regionally appropriate 40 feet for the analysis, though the minimum tree height for an area to be classified as forest is 16 feet. This use of generalized rather than location specific tree heights is another reason to use the vegetated visibility analysis with caution.

Additional visibility analyses might show how many turbines are visible, or the viewshed for larger portions of each project element (i.e., the nacelle rather than the upright blade tip). Current practice has been to only evaluate visibility of the turbines, but the transmission line must also be considered. It may also be appropriate to include associated facilities, such as access roads, substation, maintenance building and other structures.

Normally only views from scenic resources within the topographic viewshed are evaluated in detail (though the accuracy of the analysis must field checked). A visibility analysis may also be helpful in describing the potential number, extent, and distance of visible turbines.²⁵

4. **Significant Scenic Resources.** Identify the state or nationally significant scenic resources within the study area, based on the list in the statute.²⁶ A description of each identified scenic resource needs to be presented in sufficient detail that the criteria for evaluating scenic impacts can be applied.²⁷ Each scenic resource will be documented as part of the fieldwork, include the general scenic character of the resource, the “worst case” potential views of the proposed development, and perhaps other views.
5. **Public Use and Expectations.** The extent, number and duration of public uses of the identified scenic resources, and the expectations of the “typical viewer” must be described.²⁸

²⁵ 35-A MRSA, § 3452, sub-§3, criterion F

²⁶ 35-A MRSA, § 3451, sub-§9

²⁷ 35-A MRSA, § 3452, sub-§3, criterion A

²⁸ 35-A MRSA, § 3452, sub-§3, criteria E and C

6. **Evaluation of Potential Impacts.** The findings from applying each of the criteria for evaluating scenic impacts should be reported.²⁹

Accurate visual simulations are particularly useful when conducting this evaluation. The selection of viewpoints for the visual simulations is frequently a source of controversy. Opponents are likely to want simulations that represent “worst case” views, while the developer and other proponents will argue that “typical views” provide a fairer representation. Worst case views are closer, show larger portions of the project, represent situations where the project appears less compatible with its surroundings. Typical views normally do not show the project at its worst, but are at viewpoints that might have many viewers, or that are selected to represent a diversity of viewing conditions (e.g., distances from the project, types of screening, and levels of incompatibility). It is very unusual for a scientific method (i.e., random sampling) to be used to select the typical viewpoints—normally they are simply declared “typical” by the analyst. Both types of simulations are useful to decision makers. However, it is difficult to imagine why they would not want to be aware of the very worst case situations.

7. **Mitigation.** It is normal in a professional VIA that the approaches taken to mitigate adverse effects are described. Typically, if Unreasonably Adverse scenic impacts were found, approaches to further mitigation would be discussed. This might include revisions to project siting or design, or screening at impacted viewpoints. However, mitigation is not one of the evaluation criteria for scenic impacts.³⁰ The Attorney General’s Office has advised both DEP and LURC that it does not believe mitigation can be required for scenic impacts—if scenic impacts are Unreasonably Adverse, the project should be denied, otherwise it should be approved.

²⁹ 35-A MRSA, § 3452, sub-§3

³⁰ 35-A MRSA, § 3452, sub-§3

Appendix 2

Review Maps

Map 1: Topographic Viewshed for Blade Tip

Map 2: Forested Viewshed for Blade Tip

Map 3: Forested Viewshed for Blade Tip Using TJD&A Forest Heights

Map 4: Topographic Viewshed for Turbine Hub

Map 5: Forested Viewshed for Turbine Hub

Map 6: Forested Viewshed for Turbine Hub Using TJD&A Forest Heights

Visibility analysis determines whether a line-of-sight exists between two specified points. A geographic information system (GIS) is used to map the viewsheds from which the Highland Wind Project's turbines are potentially visible. In principle this is an objective exercise in geometry highly suited to a computer application. In practice however, since the data are only approximations of the actual condition and may include errors and assumptions, the resulting viewshed maps are best considered a preliminary analysis of potential visibility under specified conditions. The maps are useful for providing a preliminary investigation of the overall potential visual impact. If potential visual impacts appear to exist for significant scenic resources, they need to be confirmed through field investigation and other visualization techniques.

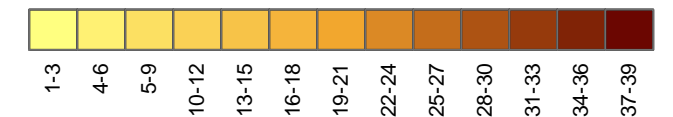
Map 1 Topographic Viewshed for Blade Tip Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Legend

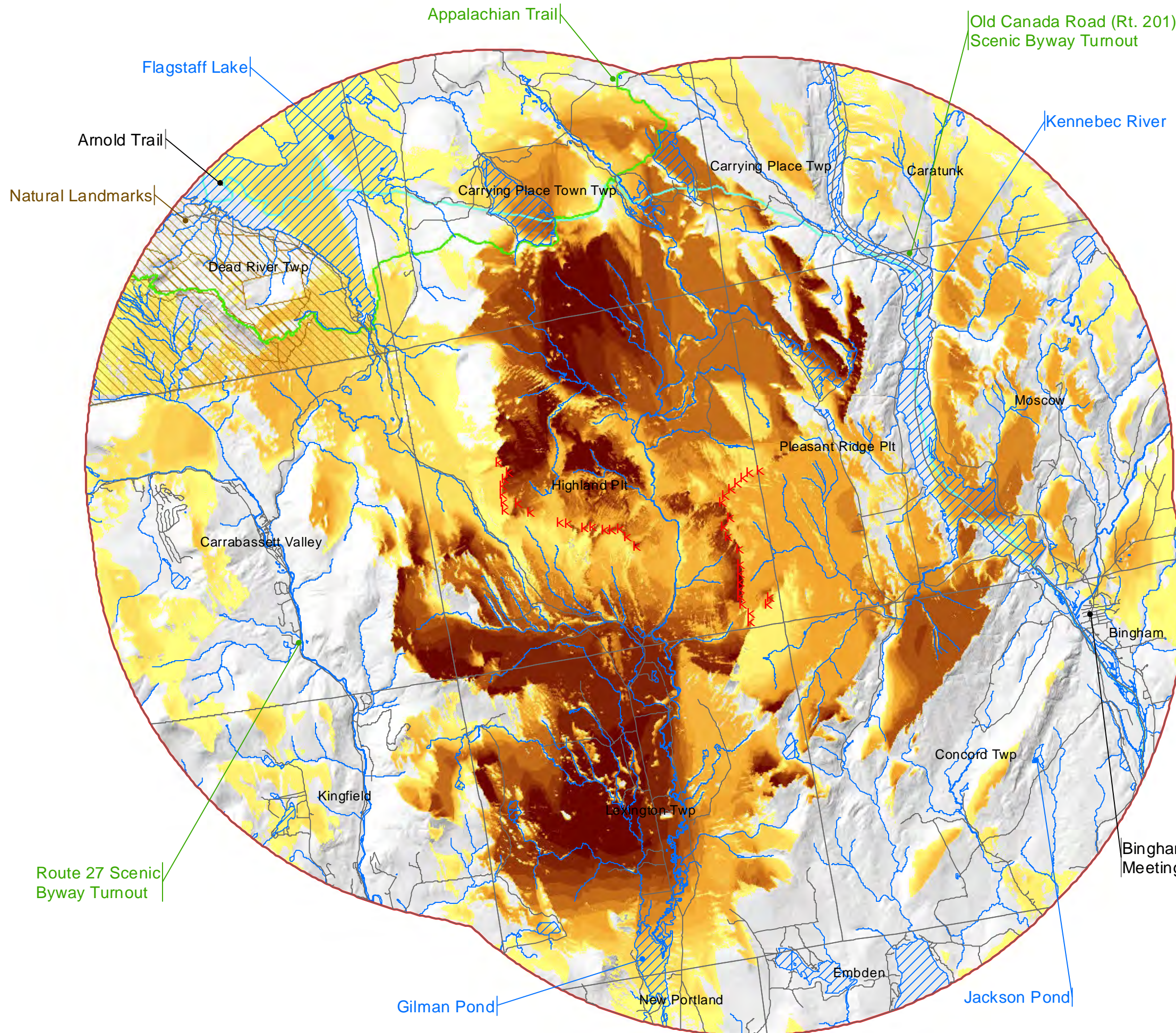
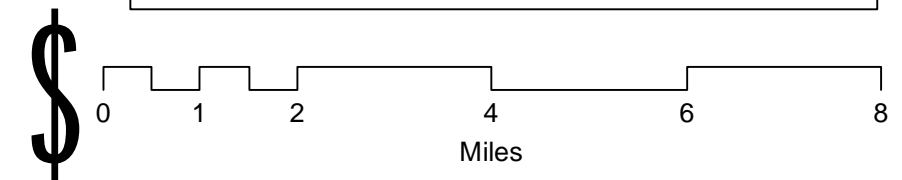
k Turbine Locations

Number Visible



Scenic Resources of State or National Significance

- Great Ponds & Rivers
- Designated Trail or Scenic Byway Turnout
- Natural Landmarks
- National Register of Historic Places



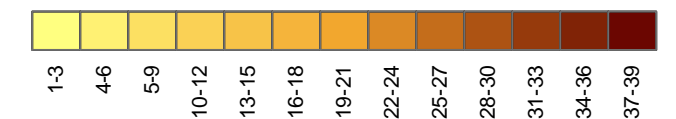
Map 2 Forested Viewshed for Blade Tip Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Legend

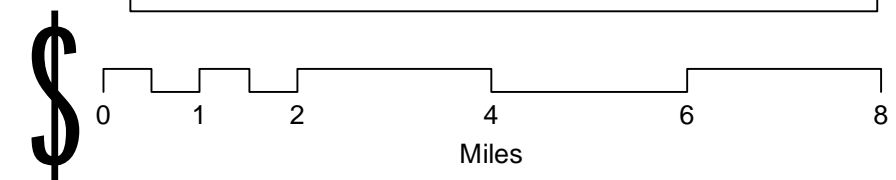
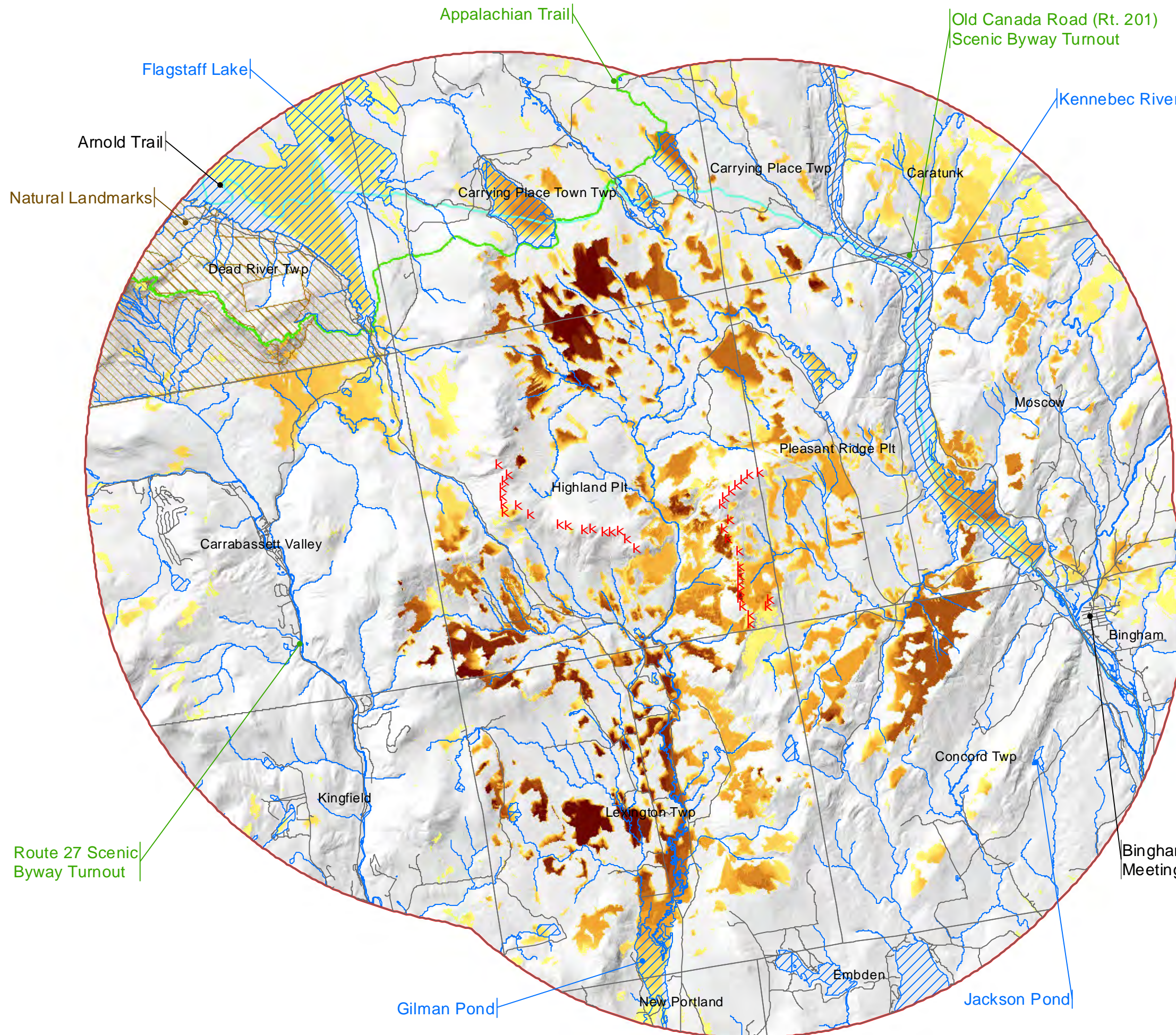
k Turbine Locations

Number Visible



Scenic Resources of State or National Significance

- Great Ponds & Rivers
- Designated Trail or Scenic Byway Turnout
- Natural Landmarks
- National Register of Historic Places



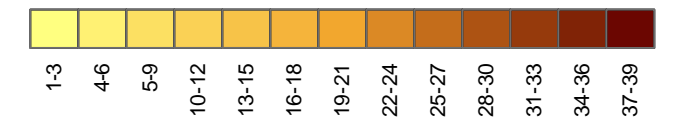
Map 3 Forested Viewshed for Blade Tip Using TJD&A Forest Heights Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.





Legend

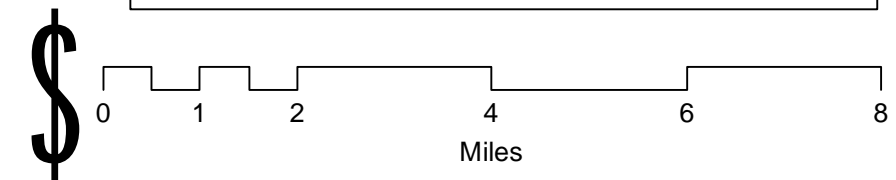
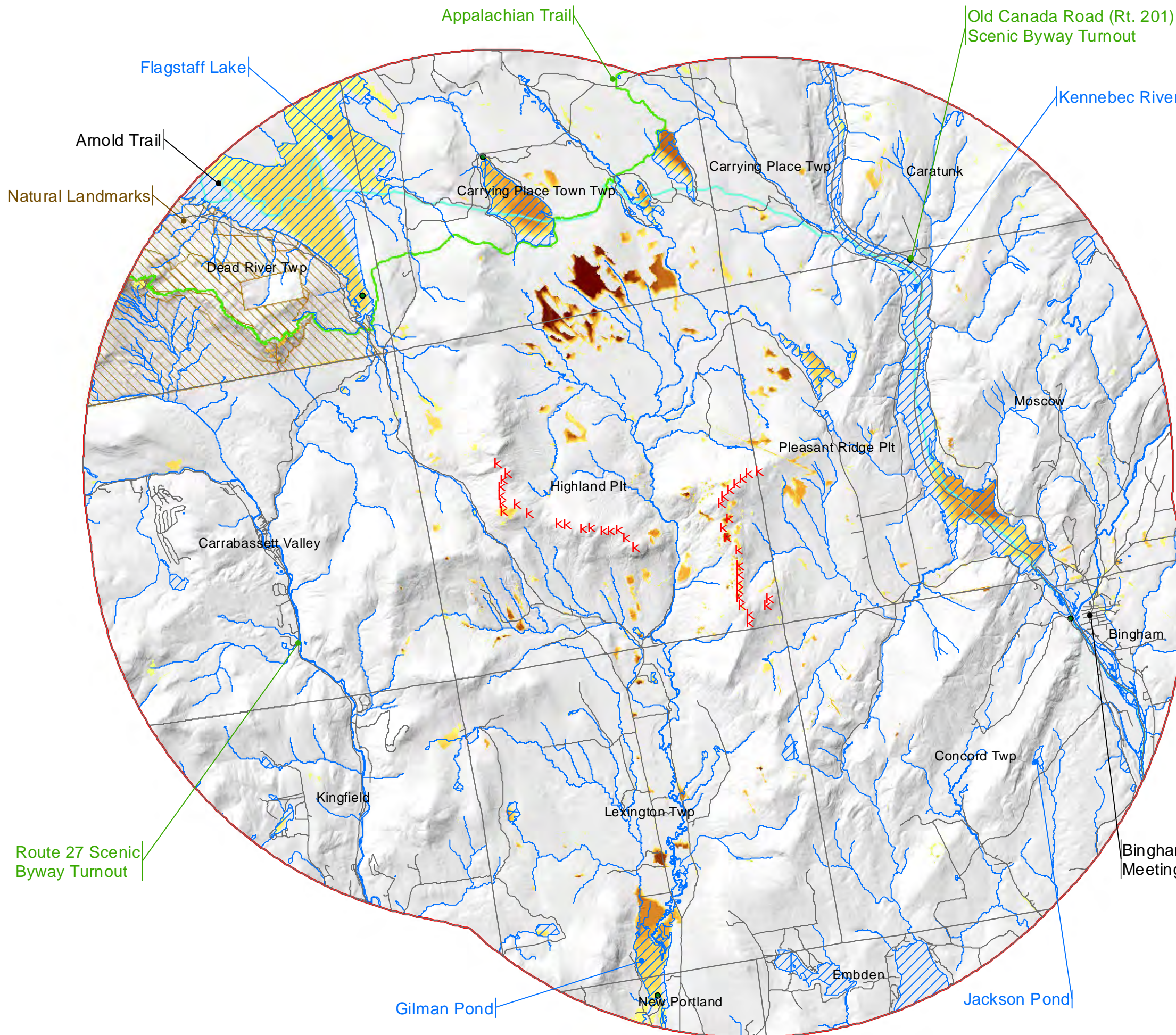
 Turbine Locations

Number Visible



Scenic Resources of State or National Significance

-  Great Ponds & Rivers
-  Designated Trail or Scenic Byway Turnout
-  Natural Landmarks
-  National Register of Historic Places



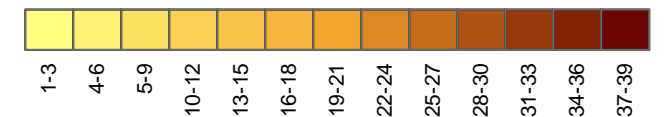
Map 4 Topographic Viewshed for Turbine Hub Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Legend

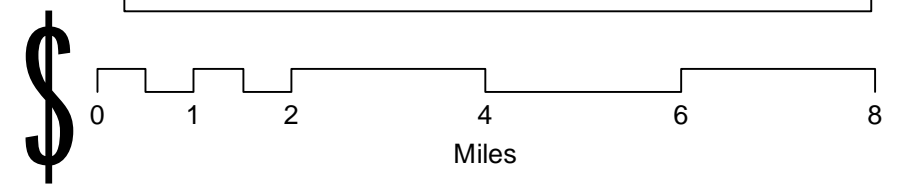
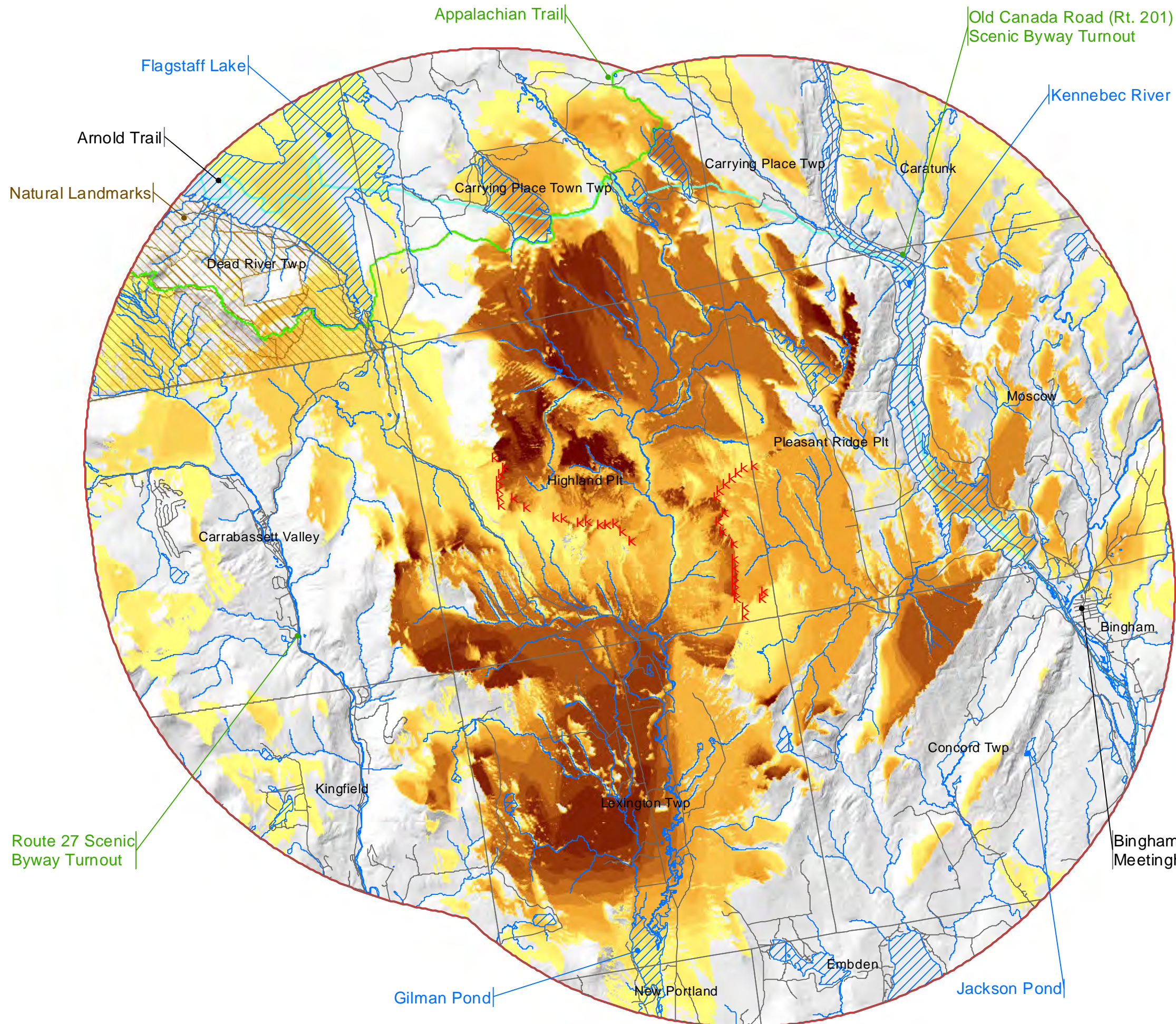
k Turbine Locations

Number Visible



Scenic Resources of State or National Significance

- Great Ponds & Rivers
- Designated Trail or Scenic Byway Turnout
- Natural Landmarks
- National Register of Historic Places



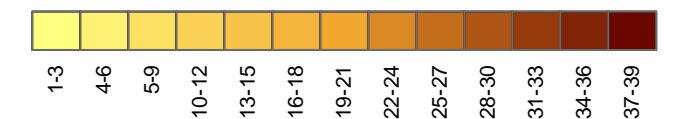
Map 5 Forested Viewshed for Turbine Hub Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Legend

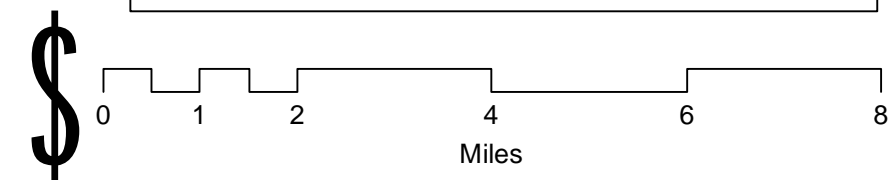
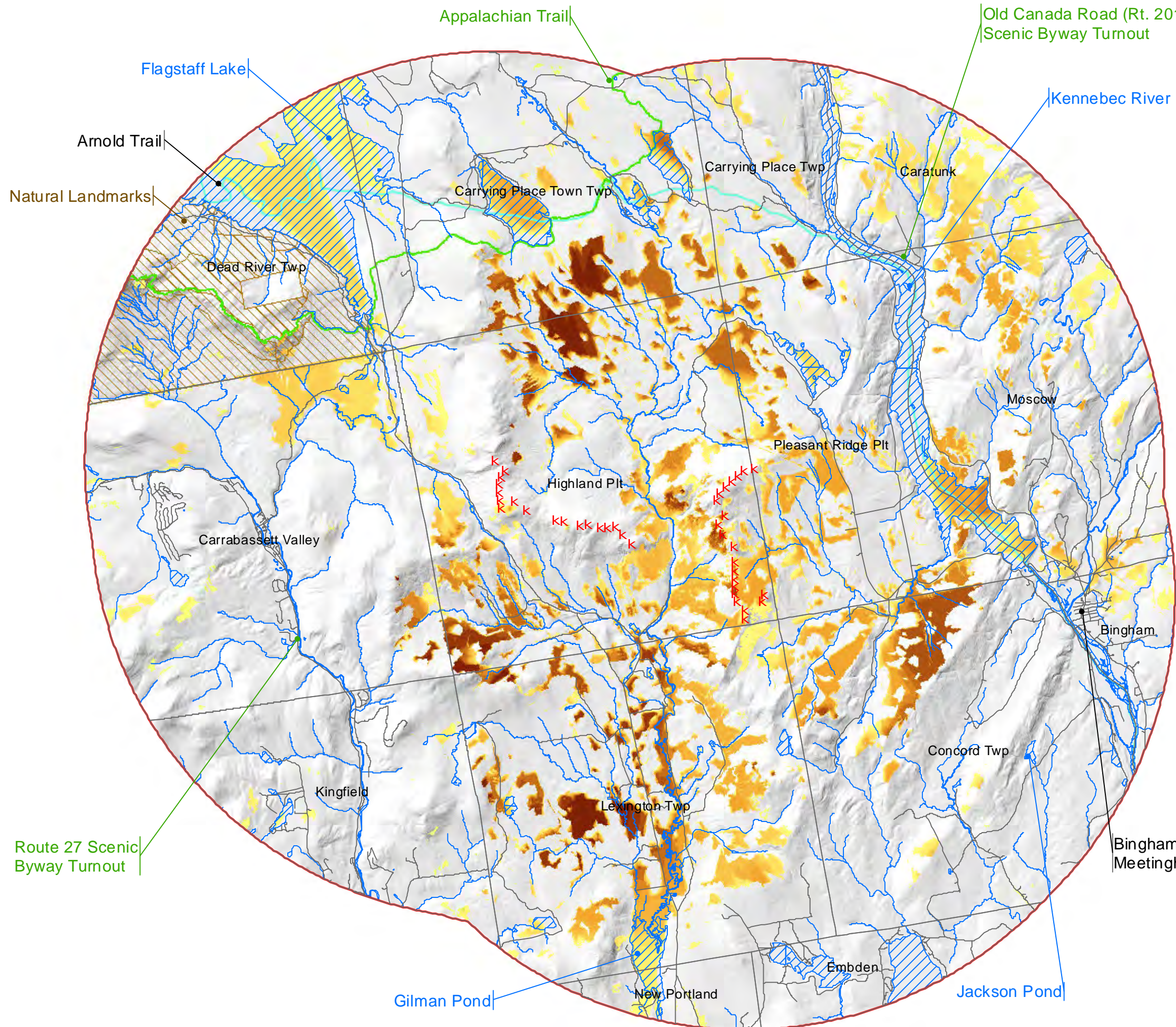
k Turbine Locations

Number Visible



Scenic Resources of State or National Significance

- Great Ponds & Rivers
- Designated Trail or Scenic Byway Turnout
- Natural Landmarks
- National Register of Historic Places



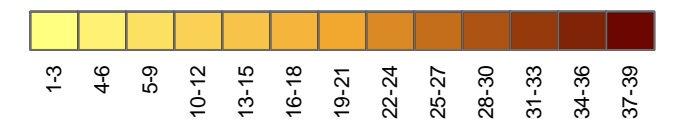
Map 6 Forested Viewshed for Turbine Hub Using TJD&A Forest Heights Highland Wind Project

GIS viewshed mapping is a preliminary means of visual analysis. While beneficial for preliminary orientation and investigation, because of data assumptions and omissions, viewshed maps are not a definitive indication of visibility. Potential visibility needs to be confirmed through field investigation and other visualization techniques.

Legend

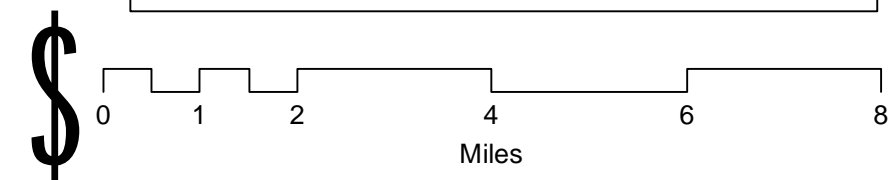
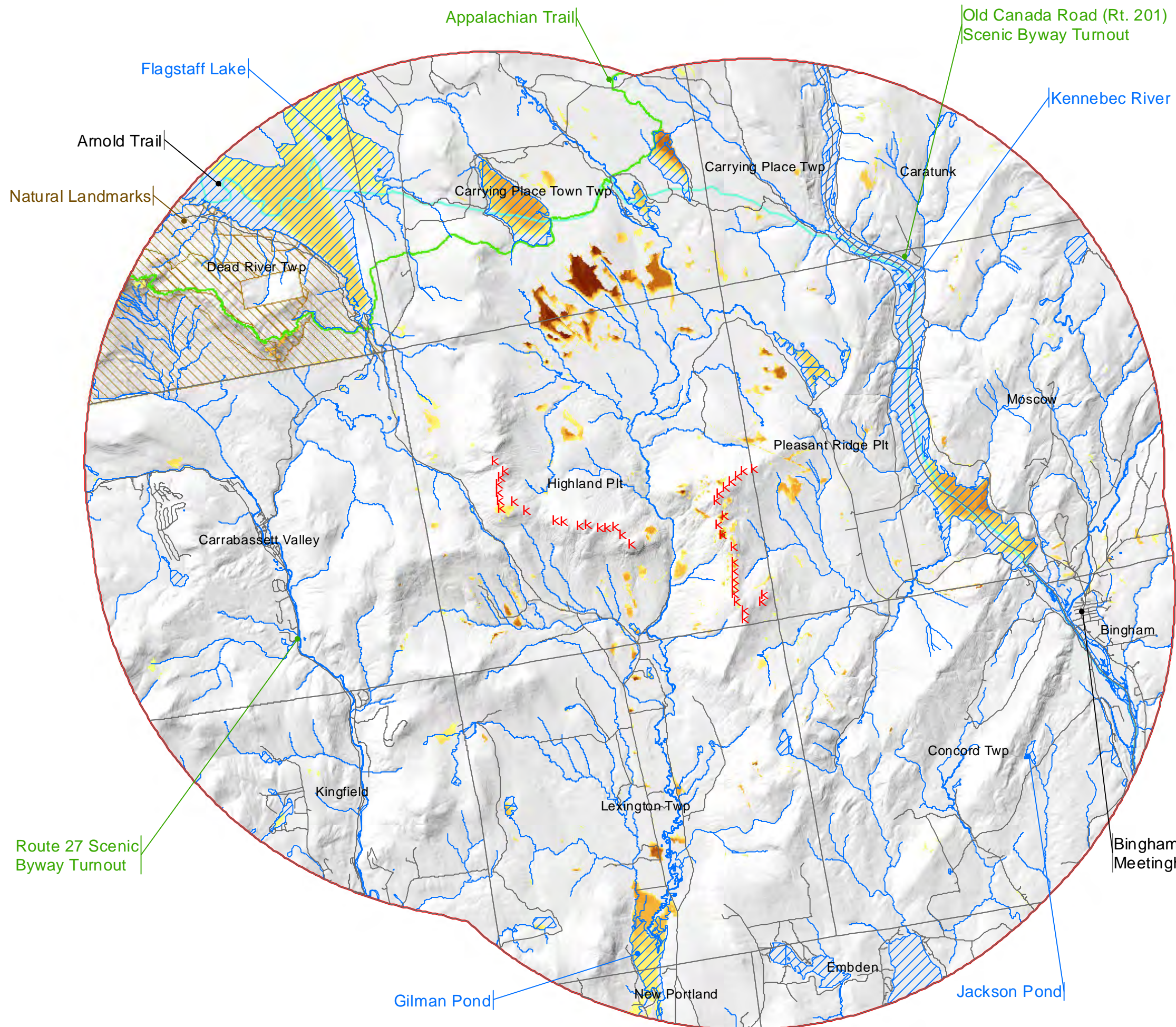
Turbine Locations

Number Visible



Scenic Resources of State or National Significance

- Great Ponds & Rivers
- Designated Trail or Scenic Byway Turnout
- Natural Landmarks
- National Register of Historic Places



Appendix 3

ArcScene Visualizations

Visualization 1: Flagstaff Lake

Visualization 2: Arnold Trail on West Carry Pond

Visualization 3: Gilman Pond

Visualization 4: Old Canada Road Scenic Byway, Wyman Lake Turnout

Visualization 5: Bingham Free Meetinghouse

Visualization 6: Appalachian Trail—Viewpoint 4

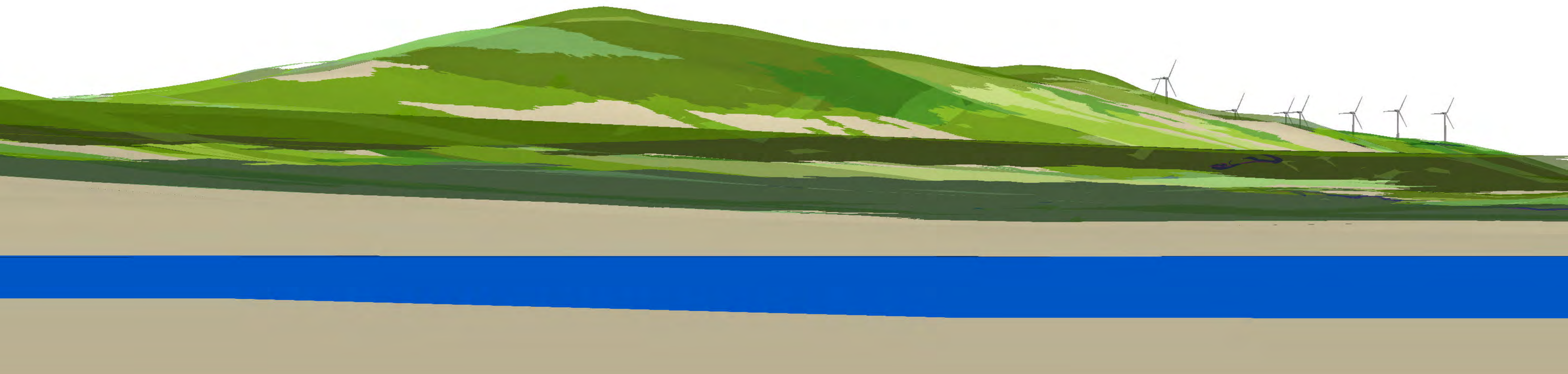
Visualization 7: Appalachian Trail—Viewpoint 9

Visualization 8: Appalachian Trail—Viewpoint 16

Visualization 9: Appalachian Trail—North end of East Carry Pond

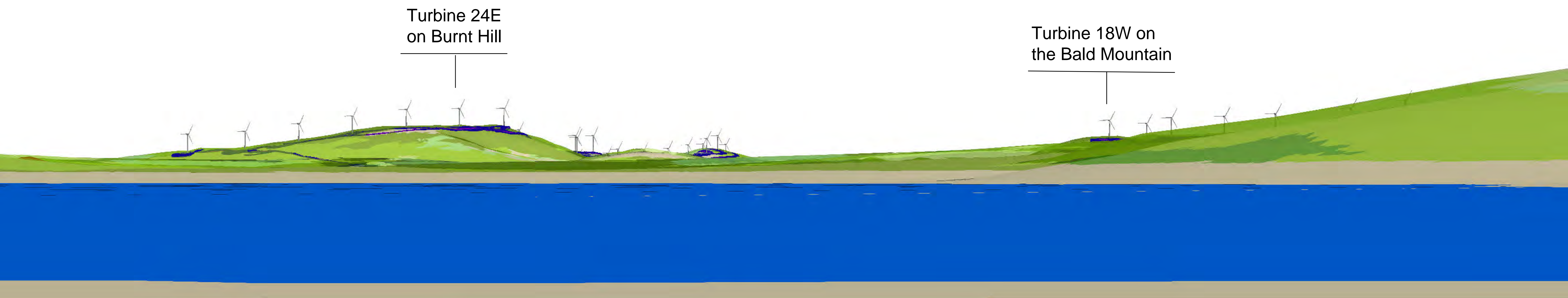
Visualization 10: Kennebec River/Wyman Lake

The purpose of these visualizations is to validate the relative accuracy of the *Highland Wind Project Visual Impact Assessment* photographic simulations (TJD&A 2010). They are created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. The assumptions about forest cover and its height follow the VIA--partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high red ribbon—these colors are intentionally unrealistic to highlight the visibility of these associated facilities. The visualization is slightly transparent to aid in locating project elements that are hidden behind topography or vegetation. If the colors of the associated facilities are bright they may be visible if the project is built as specified by the provided data; if they are dim they may be hidden. The horizontal angle of view is 40 degrees, which is similar to the VIA photosimulations, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



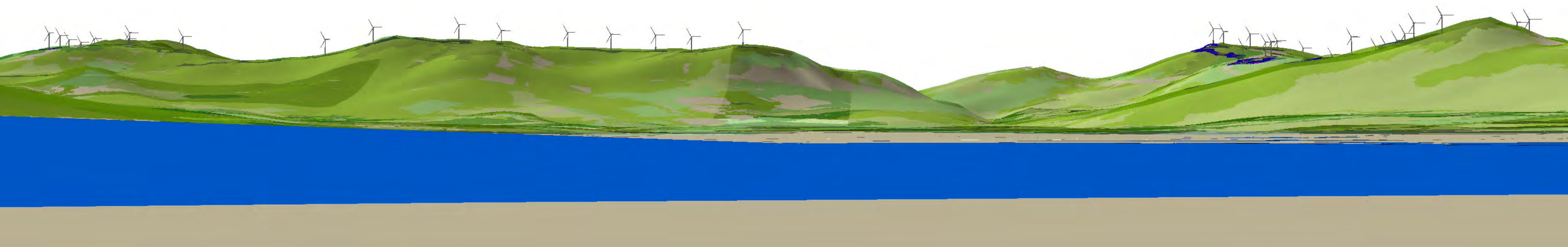
ArcScene Visualization 1: Flagstaff Lake

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



ArcScene Visualization 2: Arnold Trail on West Carry Pond

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



ArcScene Visualization 3: Gilman Pond

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



ArcScene Visualization 4: Old Canada Road Scenic Byway, Wyman Lake Turnout

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.

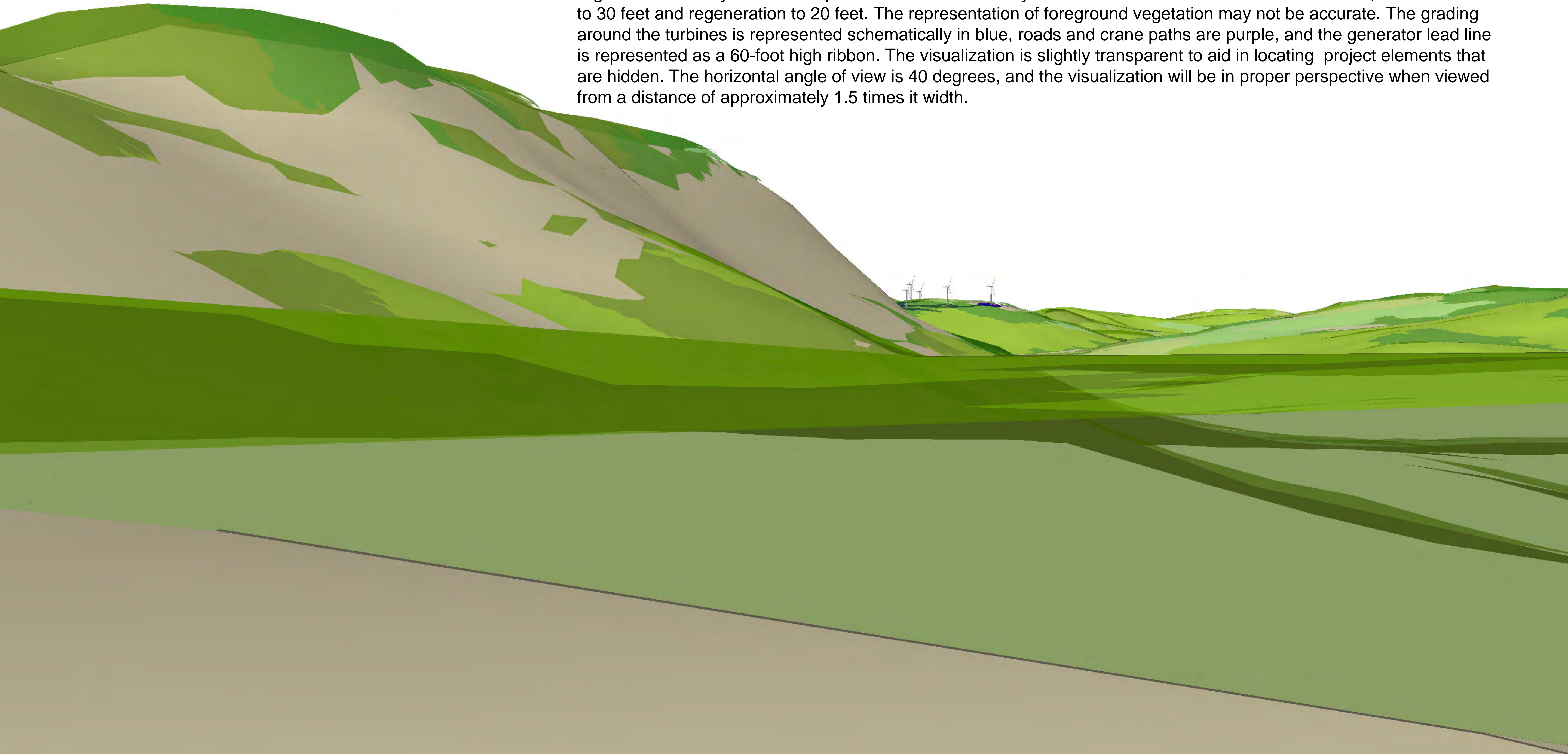
ArcScene Visualization 5: Bingham Free Meetinghouse

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



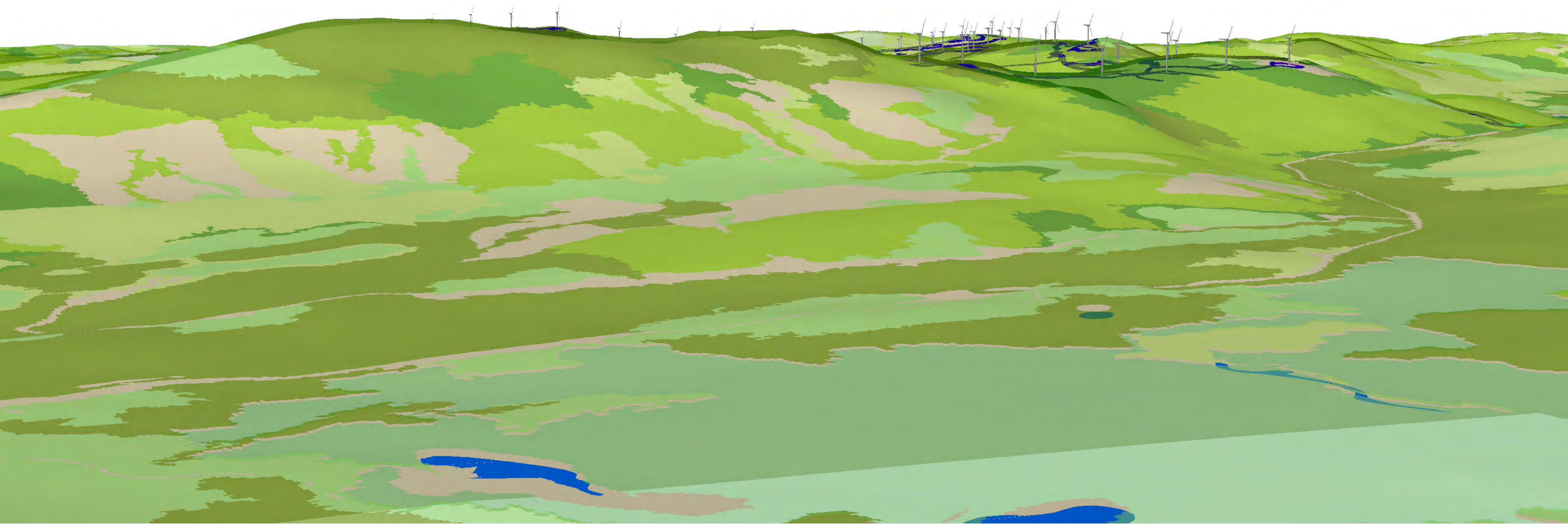
ArcScene Visualization 6: Appalachian Trail--Viewpoint 4

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



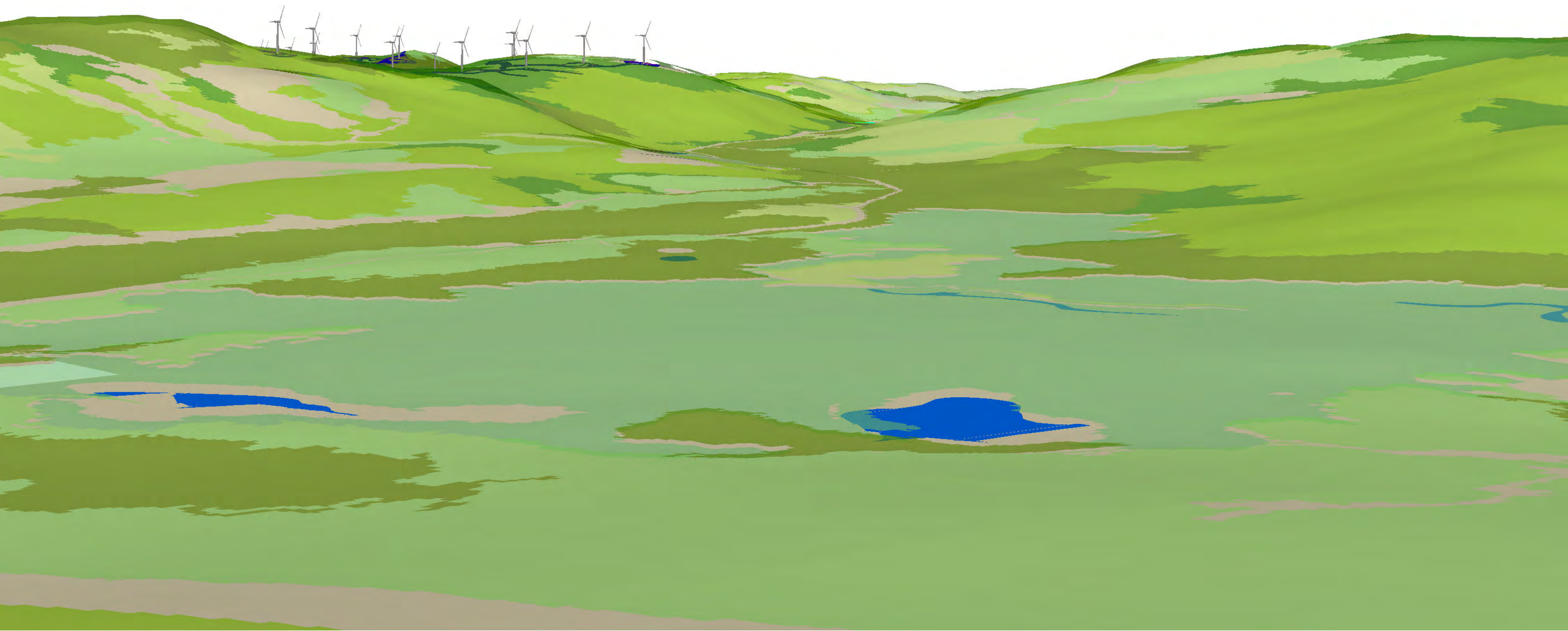
ArcScene Visualization 7: Appalachian Trail--Viewpoint 9

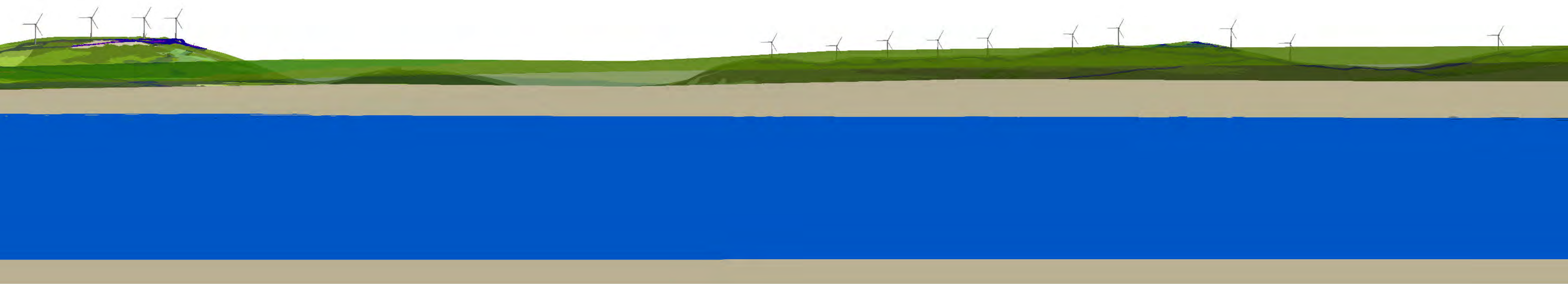
The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



ArcScene Visualization 8: Appalachian Trail--Viewpoint 16

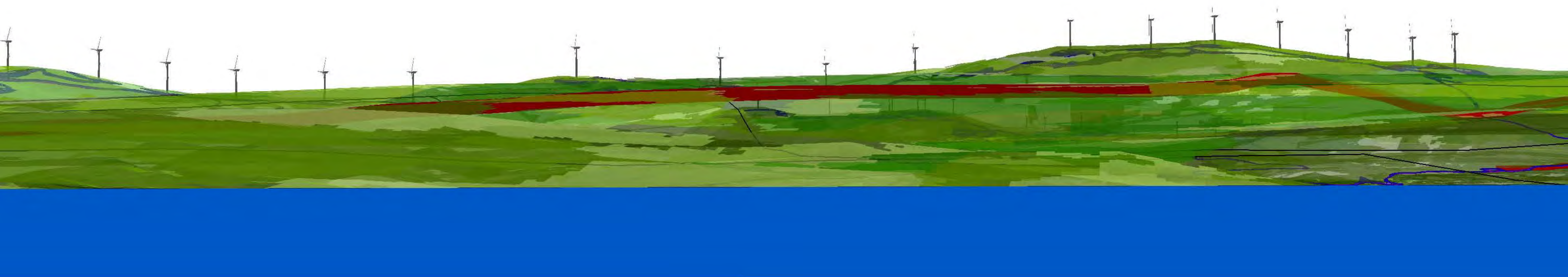
The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.





ArcScene Visualization 9: Appalachian Trail--North End of East Carry Pond

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.



ArcScene Visualization 10: Kennebec River/Wyman Lake

The purpose of this visualization is to validate the relative accuracy of a photographic simulation. It is created using the location and camera information from the photograph metadata and GIS database that were used to prepare the *Highland Wind Project Visual Impact Assessment*. Partially cut and mature forest cover is set to 40 feet; wetland forest to 30 feet and regeneration to 20 feet. The representation of foreground vegetation may not be accurate. The grading around the turbines is represented schematically in blue, roads and crane paths are purple, and the generator lead line is represented as a 60-foot high ribbon. The visualization is slightly transparent to aid in locating project elements that are hidden. The horizontal angle of view is 40 degrees, and the visualization will be in proper perspective when viewed from a distance of approximately 1.5 times its width.