Appendix G: Visual Resource Reports for Beech Ridge Wind Energy Project

Report G-1. Beech Ridge Wind Farm – Greenbrier County, West Virginia, Visual Resource Assessment, Final Draft Report, October 27, 2005 (Saratoga 2005)

Report G-2. Beech Ridge Energy – Phase II Expansion/Modification Visual Resource Assessment (Saratoga 2011)

SARATOGA ASSOCIATES

BEECH RIDGE WIND FARM –

GREENBRIER COUNTY, WEST VIRGINIA

VISUAL RESOURCE ASSESSMENT

FINAL DRAFT REPORT

OCTOBER 27, 2005

Prepared For:

Invenergy, LLC
3460 Olney-Laytonsville Road, Suite 200
Olney, MD 20832

Invenergy

Landscape Architects, Architects,
Engineers and Planners, P.C.

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INTRODUCTION

At the request of Invenergy, LLC (Invenergy), Saratoga Associates Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga) was asked to create a series of exhibits in order to illustrate the potential visual impact of a proposed wind farm. This wind farm is known as the Beech Ridge Wind Farm (Project) and is located in northern Greenbrier County, West Virginia (Figure 1). Saratoga completed four (4) viewshed maps, two (2) field evaluations, and five (5) photo simulations. A 20-mile wide Study Area around the proposed site was analyzed.

METHODOLOGY

Below is the methodology used in completing each exhibit.

Viewshed Mapping

The first step in identifying the potential visual impact is to determine the geographic area within which there is a relatively high probability that some portion of the proposed Project would be visible. The potential visibility was determined for each proposed turbine (control point) at its highest point (401.5 feet - tip of blade in upright position) for the entire Study Area. In this evaluation 124 control points were established based upon the location and height of each turbine. The resulting composite viewshed map identifies where any portion of the wind farm may be visible within the Study Area. All viewshed maps created for this Project indicate a range of how many turbines may be visible from a particular location.

The viewshed map (Figure 2: Sheet 1 of 4) was prepared illustrating the probable screening effect caused by topography and existing mature vegetation. The viewshed, although not considered absolutely definitive, acceptably identifies the geographic area within which one would expect the project to be screened. An additional map illustrating this information was also prepared for a 5-mile area (Figure 2: Sheet 2 of 4). This map was produced using the same data for the 20-mile Study Area and depicts potential visibility on a regional scale.

In order to assist in evaluating potential nighttime visibility, Saratoga completed a viewshed map using the approximate height (275 feet) of the FAA required strobe lights (Figure 2: Sheet 3 of 4) as the control point. Although only one-third (approximately) of the turbines will have FAA lighting, this viewshed map incorporates each turbine and illustrates how many light sources may be visible. In addition, a map illustrating this information was also prepared for a 5-mile area (Figure 2: Sheet 4 of 4). Again, this map was produced using the same data for the 20-mile Study Area and depicts potential visibility on a regional scale.

By itself, viewshed maps do not determine the degree of visual impact, but rather identify the geographic area within which there is a relatively high probability that some portion of the proposed project would be visible. Their primary purpose is to assist in determining the potential visibility of the proposed project from various locations throughout the Study Area and from which further analysis is needed.

To construct each viewshed map, publicly available digital topographic and vegetation data sets were acquired by Saratoga and analyzed using ArcView 3D Analyst and ArcGIS software. Viewshed overlays were created by first importing a digital elevation model (DEM) of the Study Area. This DEM, obtained from the United State Geological Survey (U.S.G.S.), is based on 1:24,000-scale U.S.G.S. 7.5' topographic quadrangle maps (10-foot contour intervals) and is accurate to a 10-meter grid cell resolution. The GIS then scanned 360 degrees across this DEM from each control point, distinguishing between grid cells that would be hidden from view and those that would be visible based solely on topography. Areas of the surrounding landscape were identified where each control point would be visible; areas in shadow would not be visible.

Vegetation data was extracted from the Multi Resolution Land Characteristics (MRLC) data set, also obtained through the U.S.G.S. The MRLC data set, produced by the U.S.G.S. EROS Data Center as part of the MRLC Consortium, was developed from Thematic Mapper (TM) LandSat imagery (1992) and is accurate to a 30-meter grid cell resolution. The screening effect of vegetation was then incorporated by adding 40 feet in height to DEM grid cells that are completely forested (according to MRLC data set) and repeating the calculation procedure. Based on field observation, most trees in forested portions of the Study Area are significantly taller than 40 feet. This height thus represents a conservative estimate of the effect of vegetative screening.

It is important to note that the MRLC dataset is based on interpretation of forest areas that are clearly distinguishable from infrared satellite imagery. As such, the potential screening value of site-specific vegetative cover such as small hedgerows and individual trees, and other areas of non-forest tree cover may not be represented in the viewshed maps. It also does not take into account recent deforestation activities and the potential screening value of existing man-made structures (e.g. homes, silos, commercial structures, etc.). With these conditions, the viewshed maps generally are conservative in indicating potential Project visibility in areas where the project may be substantially screened from view. Moreover, the viewshed maps indicate locations in the surrounding landscape in which one or more high points of the proposed Project might be visible. The maps do not imply the magnitude of visibility (i.e., how much of each turbine is visible) or the character of what may be seen.

Field Evaluation

A field reconnaissance was performed, by Saratoga, on August 10-11, 2005 and September 19, 2005 in order to evaluate the accuracy of the viewshed maps, and to identify and photograph potential locations where simulations would best illustrate the project. Once on-site, it was confirmed that topography and existing vegetation screened much of the Project from surrounding areas. Field assessments revealed few locations where a significant number of turbines may clearly be visible with little or no obstructions (absence of screening caused by intervening landform, vegetation, or structures).

During each field review, numerous roadways were traveled and highpoints were visited in order to find representative open views of the Project. The importance placed on the search for open views does not mean that there are not limited or intermittent views of the Project. Opportunities to photograph the Project site during ideal atmospheric conditions (i.e. sunny, clear long distance viewing) were limited by

meteorological conditions typical during the months of May through August [an average of 3.93" of precipitation fell per month (Weather.com)]. Generally, hazy and cloudy conditions prevailed. Weather for each day during the field review consisted of temperatures in the 80's and 90's; relatively clear skies, and somewhat hazy conditions typical of summer.

During the September 19, 2005 field evaluation, photographs were taken from 13 publicly accessible locations (see Figure 1). All photos were taken using a digital SLR Canon Rebel EOS with an appropriate lens setting (e.g. 50 mm) that replicates the cone of vision of human eyesight. Specific data was collected at each location including, GPS coordinates (using a Garmin eTrex Legend unit), viewer angle, date/time, and specific viewpoint location information. Views toward the Project site were determined by uploading the latitude and longitude of select mountain high points (i.e. Bee Knob, Blue Knob, Cold Knob, Ellis Knob and Jobs Knob) into the GPS unit, then utilizing its navigation tool. The navigation tool shows the direction towards selected highpoints.

Locations photographed during the field evaluation are identified below.

VP #	Receptor Name
1 and 2	County Route 17 – East of Williamsburg
3	Trout Road – Williamsburg Medical Center
4	Intersection of County Routes 9 and 10
5	Cold Knob
6	County Route 4/5 – Lewisburg
7	Ann Avenue
8	US Route 60 – Sweet Grass Village
9	US Route 60 – North of I-64
10	Intersection of US 60 and County Route 60/12
11and 12	County Route 223 – South of Highway 39/55
13	Droop Mountain Battlefield State Park

Selection of Viewpoints for Completion of Photo Simulations

As a result of the field evaluations, five (5) locations were chosen for photo simulations. These locations are identified below.

VP #	Receptor name	Approx. distance from nearest turbine	Direction of view
1	County Route 17 – East of Williamsburg	21,314 feet/4.0 miles	Northwest
4	Intersection of County Routes 9 and 10	17,200 feet/3.3 miles	Northwest
10	Intersection of US 60 and County Route 60/12	62,972 feet/12.0 miles	North
11	County Route 223 – South of Highway 39/55	18,375 feet/3.5 miles	Southwest
13	Droop Mountain Battlefield State Park	39,150 feet/7.4 miles	Southwest

Photo Simulations

Views of the Project site were photographically documented from the selected locations identified above. Photographs were taken with a digital SLR camera using a lens setting to simulate normal human eyesight. As previously mentioned, the location of each photograph was recorded using a handheld GPS unit to assure accuracy in setting camera locations for subsequent photographic simulation.

A photo simulation of the proposed Project was prepared from five (5) locations (Figure 1). Photo simulations were developed by superimposing a rendering of a three-dimensional computer model of the proposed Project and existing terrain into the base photograph taken from each corresponding location (Figure 3). The three-dimensional computer model was developed in *Autodesk Architectural Desktop and Autodesk Viz (Viz) software*.

Simulated perspectives (*Viz* camera views) were matched to the corresponding base photograph for each simulated view by matching the X, Y and Z coordinates of the field camera position (as recorded by GPS) and the focal length of the camera lens used. The camera's target position was set on known points (e.g. Cold Knob) or by using a compass angle. The horizon of the model was matched to the horizon of the base condition photograph which was displayed as a "viewport background" within the *Viz* camera viewport.

The proposed condition model was rendered at the same output size/digital resolution (3072x2048 pixels) as the base photograph, and using the base photograph as a "*Viz* background environment map." The three-dimensional model was rendered using sunlight settings approximating the date and time of day the base photograph was taken. To the extent practicable, the hazy conditions experienced were replicated using the *Viz* fog tool and incorporated into the photo simulation. Consequently, the scale, alignment, and location of the visible elements provide an adequate representation of the Project. The rendered view was then superimposed into a digital version of the base photograph using *Adobe Photoshop* software for post-production editing (e.g. color correction, fine tuning of model). Mitigation measures and limited tree clearing were not illustrated in the simulations.

ANALYSIS

The following is an analysis of the illustrations that were completed by following the methodology described above.

Viewshed Mapping

After reviewing the prepared viewshed maps, it was concluded that the overall visibility of the proposed Project is minor. Generally, there is little visibility of the Project within 5-miles with a slight increase of visibility between approximately 7 and 18 miles. Within 5-miles of the proposed Project, most visibility occurs in the Trout and Williamsburg area.

Scattered throughout the viewshed, there are a few small pockets of potential visibility, with a minor concentration of potential views of the Project towards the south and southeast of the Project site. This area of concentration tends to follow portions of roadways (e.g. US 219) and adjacent open fields (e.g. agricultural land). However, here the visibility of the Project is expected to be minor.

There are many contributing factors that could cause the number of potential views of the proposed Project to be lessened or even eliminated. These factors include, but are not limited to:

- Road orientation (i.e. horizontal alignment), and configuration (e.g. "S" curves);
- Road speeds;
- Concentration of drivers on road conditions;
- On-site activities (e.g. farming operations, participating in an active recreational activity) and the concentration to perform such activity;
- Distance between viewer and turbine(s);
- Atmospheric conditions; and
- The slender form and color of the turbine.

In addition, it is important to recognize that the viewshed map does not distinguish the visibility of an entire turbine versus the top 6 inches of a blade. Therefore, the map exaggerates the geographic extent of true visibility.

Field Evaluation

As previously mentioned, once on-site, it was evident that the topography and existing vegetation screened much of the proposed Project from the surrounding area. Between the efforts of Saratoga and Invenergy, the Study Area was visited a number of times throughout 2004 and 2005. These visits resulted in the identification of only a few publicly accessible locations with the potential to afford views of the entire Project without at least some obstruction.

Field reviews revealed that views of the proposed Project would be limited confirming the discussion and characterizations of the viewshed analysis. Generally, potential opportunities to view the Project were confirmed to exist on the eastern half of the Study Area. These locations include, but are not limited to, the Trout/Williamsburg area, Droop Mountain Battlefield State Park overlook (views of the Project were confined to the overlook), County Route 223 overlook, segments of US 219 and US 60, and north and west of Lewisburg. Except for the County Route 223 and the Droop Mountain Battlefield State Park overlooks, views of the Project site were limited.

Although the Project would be visible from other locations, visibility from the western half of the Study Area appears to be extremely limited. Potential views in this area were fleeting and often screened.

While evaluating the Study Area, Saratoga noted that many County Routes were very narrow, winding and, in many locations enclosed by mature vegetation. For the motoring public it will be hard to gaze towards the project due to the concentration needed to navigate the curving roadways. While this is especially true for those unfamiliar with the roadways (e.g. tourists), it is also true for experienced

travelers (e.g. residents, commuters). In addition, distance and atmospheric conditions (e.g. haze, fog, rain) will further reduce visibility of the Project for all categories of observers.

Photo Simulations

As previously mentioned, Saratoga searched for the most open, unobstructed views of the Project site. These were limited, but nevertheless occurred and were located. Saratoga constructed simulations of the proposed Project from five (5) locations with unobstructed views of the Project site. Only one opportunity to view a significant portion of the Project was discovered - most views contained only a limited number of turbines. In addition to simulating the proposed Project with unobstructed views, viewpoint locations at varying distances were also selected in order to illustrate the affect of distances and atmospheric conditions. A brief description of the simulated views of the Project is provided below.

Viewpoint #1: County Route 17 0- East of Williamsburg

This is a northwest view from a cemetery located approximately 21,314 feet (4.0 miles) from the closest proposed turbine. Less than 10% (approximately) of the proposed Project is visible from this viewpoint. The view contains Nunly Mountain, open fields, structures (e.g. homes, barns, etc.), evidence of logging operations, and groupings of mature trees and established hedgerows. This is a fairly typical view of the proposed Project site, where available, and it demonstrates that topography and vegetation help screen the majority of the proposed Project from the casual observer.

However, as the simulation illustrates there is a potential to view a small number of proposed turbines. These turbines generally follow the ridgeline of Nunly Mountain and, may therefore, draw the attention of some viewers. However, their visual dominance in the landscape is reduced by the distance between them and the viewer. In addition, the visual proximity of foreground vegetation and vertical elements (e.g. fence posts) also compete for viewer attention.

This simulation shows how impacts are reduced due to their color, slender form and layout (avoidance of concentration of turbines in one area). In addition, atmospheric conditions also serve to reduce the visibility of the proposed turbines.

Viewpoint #4: Intersection of County Routes 9 and 10

This is a northwest view from the intersection of two County Routes located approximately 17,200 feet (3.3 miles) from the closest proposed turbine. Less than 13% (approximately) of the proposed Project is visible from this viewpoint. The view contains Cold Knob and associated ridgeline, open fields, structures (e.g. homes, barns, silos, etc.), and groupings of mature trees and established hedgerows. Similar to Viewpoint #1, this is a fairly typical view of the proposed Project site, where available.

The simulation illustrates that there is a potential to view a small number of proposed turbines. These turbines generally follow the ridgeline of Cold Knob Mountain and may therefore draw the attention of a viewer. Similar to Viewpoint #1, the proposed turbines, while skylined,

nevertheless, have competing foreground elements (e.g. vegetation and fence posts) that draw the attention of observers.

Topography and vegetation help screen the majority of the proposed Project from the viewer. As is most often the case, the potential impact of the turbines visible in the simulation is reduced due to color, their slender form and layout (avoidance of concentration of turbines in one area). Turbines located below the ridgeline are less noticeable due to the darker and patterned background, when compared to those that break the ridgeline. In addition, atmospheric conditions can also reduce the visibility of the proposed turbines.

Viewpoint #10: Intersection of US 60 and County Route 60/12

This is a northerly view from the intersection of US 60 and County Route 60/12 located approximately 62,972 feet (12.0 miles) from the closest proposed turbine. Less than 10% (approximately) of the proposed Project is visible from this viewpoint. There view contains various landforms (e.g. Miller Ridge), open fields, structures (e.g. homes, barns, silos, etc.), and groupings of mature trees and established hedgerows visible from this location. This is an example of long distance views of the proposed Project site, where available.

The simulation illustrates that from this location there is a potential to view a small number of proposed turbines generally located west of Miller Ridge. They appear as faint, light colored vertical elements. Without prior knowledge of where to look and what to look for, it is likely that most viewers would not be significantly impacted by the view of the proposed Project; the visual impact of the turbines are substantially reduced by the optical effects of size and atmospheric perspective.

Viewpoint #11: County Route 223 – South of Highway 39/55

This is a southwest view overlooking the Project site from just off of County Route 223. This location is approximately 18,375 feet (3.5 miles) from the closest proposed turbine. Approximately 70% of the proposed Project is visible from this viewpoint. The view contains numerous ridgelines and mountaintops, open fields, groupings of mature trees and established hedgerows, large vegetated forests, and remnants of past logging activities (e.g. clear-cutting of forested areas). This is one of the few locations where a high number of proposed turbines may be visible. It should be mentioned that although this location offers a panoramic and scenic view of the Project site, it lacks vehicular access and is not identified as publicly accessible.

The turbines depicted in the simulation are generally located above Sugartree Bench Mountain and appear as faint, light colored vertical elements. The simulation illustrates that there is a potential to view a significant number of proposed turbines from the location selected. From here, those turbines located below the ridgeline are less noticeable due to the darker and patterned background, especially when compared to those that break the ridgeline. Those that break ridgeline also follow the contours of the landform and therefore, act in concert with the linearity and verticality of the ridgeline.

From this location topography and vegetation screen the base of the majority of turbines. This overlook effect serves to diminish the visual dominance of the turbines. In addition, the potential impact of those turbines visible in the simulation is further reduced by their color, slender form, and in this instance atmospheric condition.

Viewpoint #13: Droop Mountain Battlefield State Park

This is a southwest view overlooking the Project site from an overlook on the Droop Mountain Battlefield State Park. This location is approximately 39,150 feet (7.4 miles) from the closest proposed turbine. Less than 7% (approximately) of the proposed Project is visible from this viewpoint. This view contains various ridgelines and mountains, and dense vegetated forests. The view of the Project is confined to an overlook that is accessible via a walking trail. Although there is a panoramic and scenic view towards the Project site, there are relatively few proposed turbines visible from this location.

Those turbines located below the ridgeline are less noticeable due to the darker and patterned background, especially when compared to those that break the ridgeline. Similarly to Viewpoint #11 those turbines that break ridgelines follow the contours of the landform and do not conflict with their linearity. Although it is likely that the turbines will draw the attention of viewers, the distance to the viewer reduces their apparent size and visual clarity.

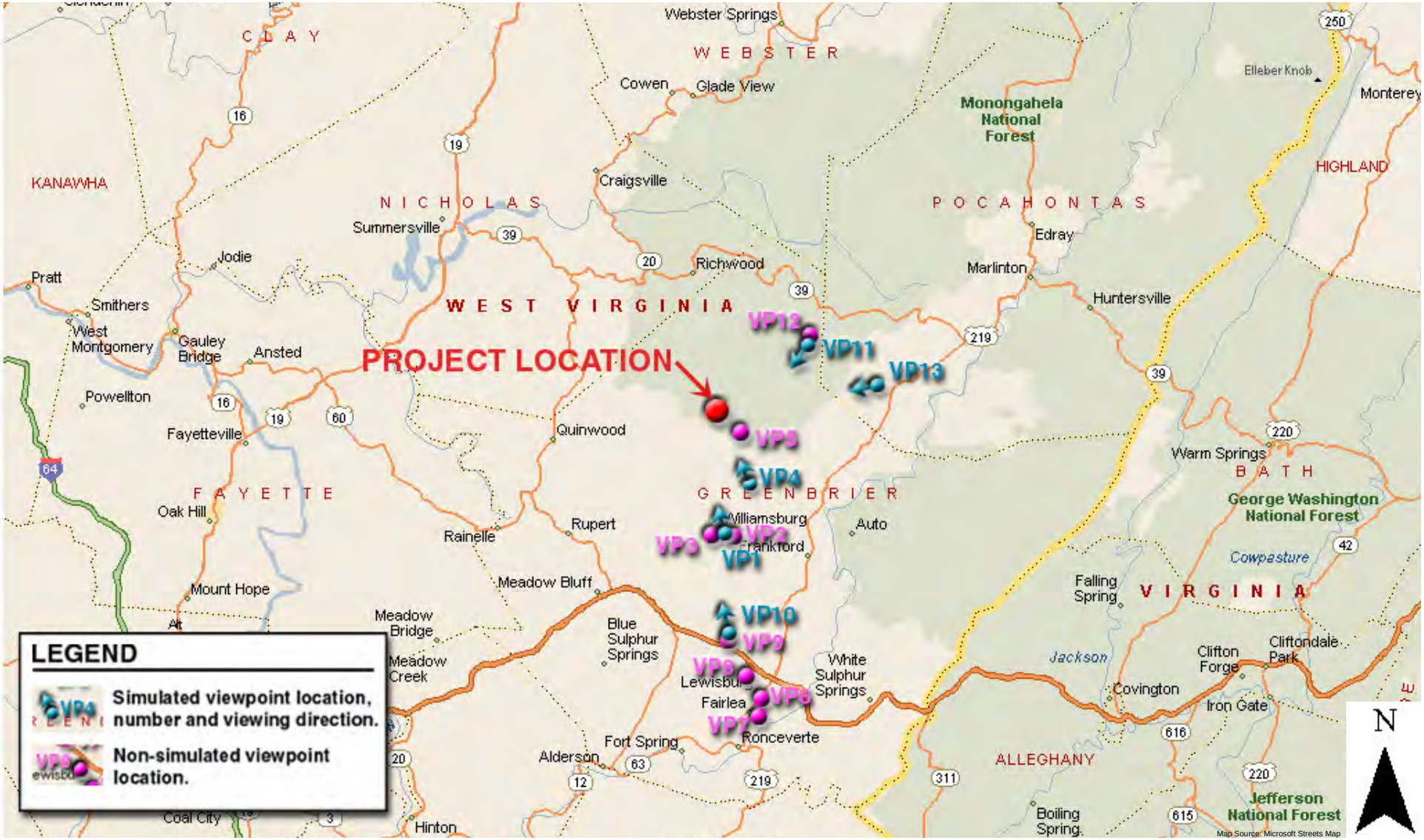
Topography (e.g. Jacox Knob) and vegetation screen the majority of the Project site from the viewer. In addition, the potential impact of those turbines that are shown in the simulation is further reduced by their color and slender form.

Combined, these simulations depict both typical views and those locations with a potential to view a large number of turbines. Generally, the following can be concluded:

1. With few exceptions only a small portion (less than 15%) of the proposed Project will be seen from most views even those that are most open;
2. The vertical form of the turbines are similar to existing landscape elements (e.g. silos, utility poles, fence posts, building edges);
3. From most locations vegetation and topography screen a significant portion of the proposed Project;
4. Turbine form, color, and layout reduce the potential visual impact;
5. The optical effects of distance reduce the visibility and dominance of the proposed turbines; and
6. The effects of past, current and future logging operations detract from the aesthetic value of existing views.

Appendices

Figure 1:
Site Location Map



Notes: **Project location represents the center of the proposed project. For location of individual turbine locations and 20-mile Study Area, please refer to Viewshed Maps.**

SCALE: N.T.S

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Figure 1
Site Location Map
October 27, 2005

Figure 2:
Viewshed Maps

BEECH RIDGE WINDFARM BLADE TIP VIEWSHED (401.5' HEIGHT)

Maximum Turbine Layout (124 WTG)
Figure 2: Sheet 1 of 4

KEY

TURBINES VISIBLE (401.5' HEIGHT)

- 1 - 10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-75
- 76-100
- 101-124
- WIND TURBINE LOCATIONS
- 20 MILE STUDY AREA
- MUNICIPAL BOUNDARIES
- COUNTY BOUNDARIES
- STATE/FED. HWYS, MAJOR COUNTY RTS
- COUNTY ROUTES
- LOCAL ROADS
- HIGHLAND NATIONAL SCENIC HIGHWAY
- MAJOR RIVERS
- SCENIC AND RECREATIONAL RESOURCES
- MONONGAHELA NATIONAL FOREST

PROJECT # 05042.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or lnad surveys are required.

File Location: S:\GIS\05042\Viewshed - Topo Only.mxd

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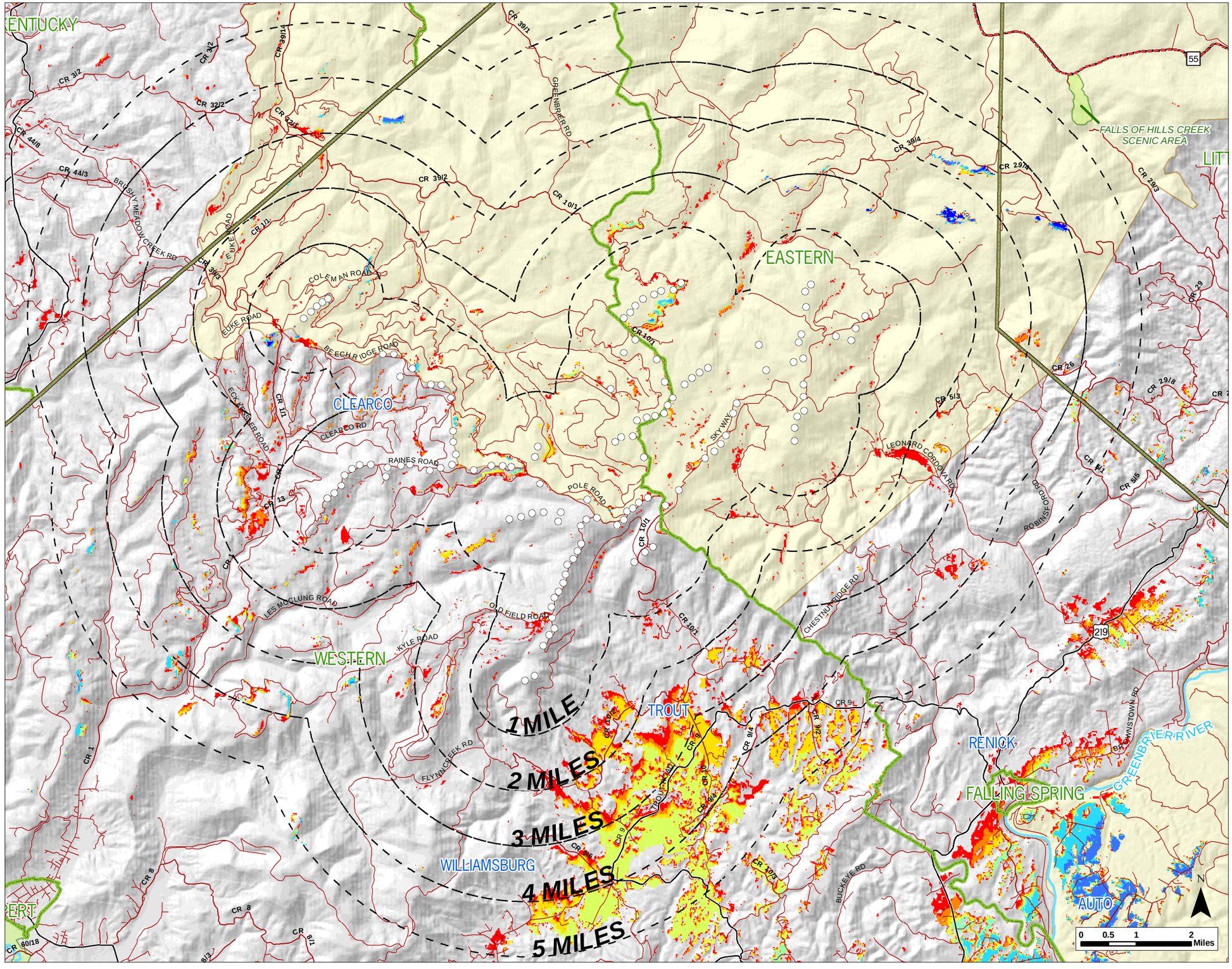
N

0 2.5 5 10 Miles



BEECH RIDGE WINDFARM BLADE TIP VIEWSHED (401.5' HEIGHT)

Maximum Turbine Layout (124 WTG)
Figure 2: Sheet 2 of 4

KEY

TURBINES VISIBLE (401.5' HEIGHT)

- 1 - 10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-75
- 76-100
- 101-124
- WIND TURBINE LOCATIONS
- MUNICIPAL BOUNDARIES
- COUNTY BOUNDARIES
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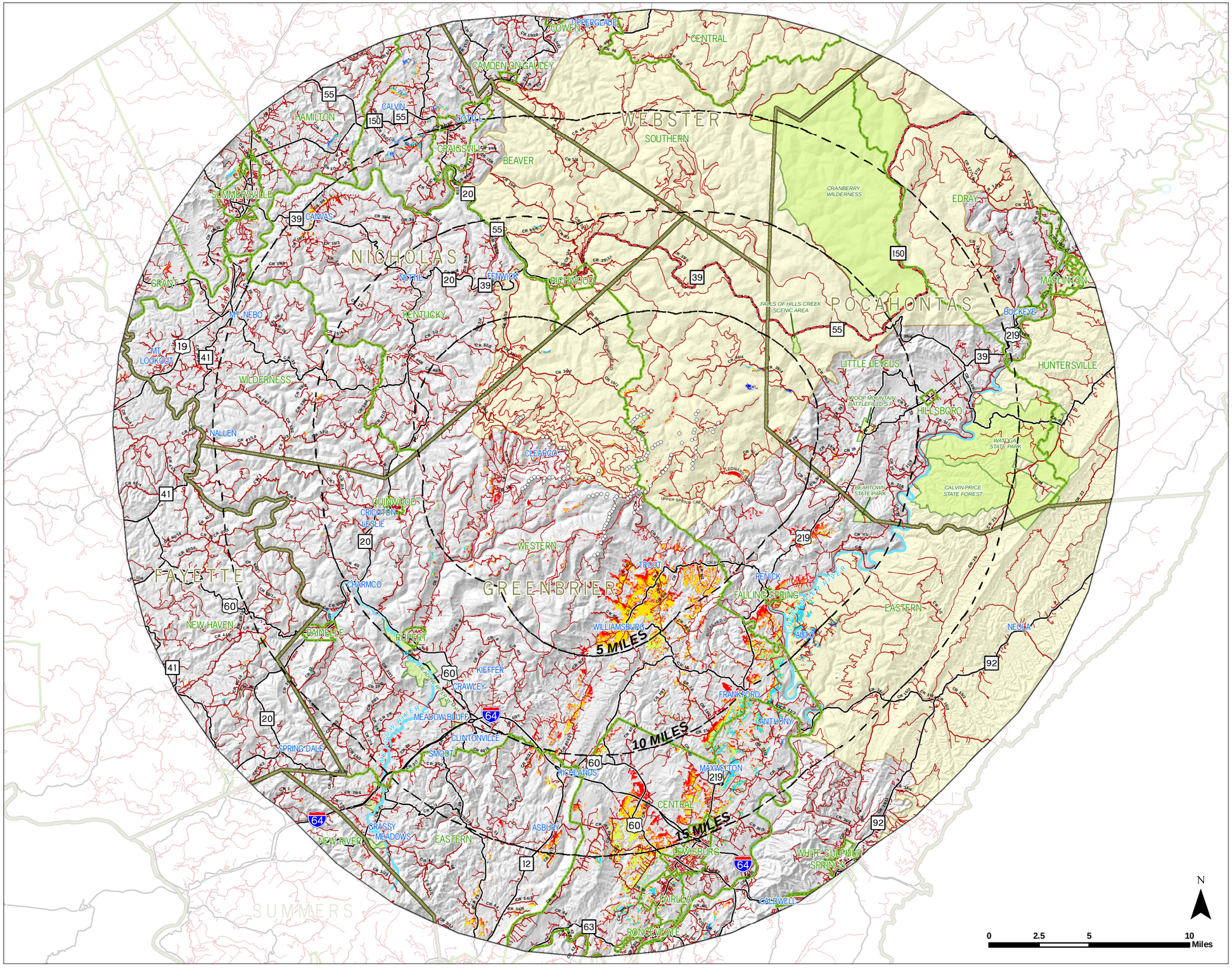
BEECH RIDGE WINDFARM HUB HEIGHT VIEWSHED (275' HEIGHT)

Maximum Turbine Layout (124 WTG)
Figure 2: Sheet 3 of 4



KEY

TURBINES VISIBLE (275' HEIGHT)

- 1 - 10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-75
- 76-100
- 101-124
- WIND TURBINE LOCATIONS
- 20 MILE STUDY AREA
- MUNICIPAL BOUNDARIES
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- COUNTY ROUTES
- LOCAL ROADS
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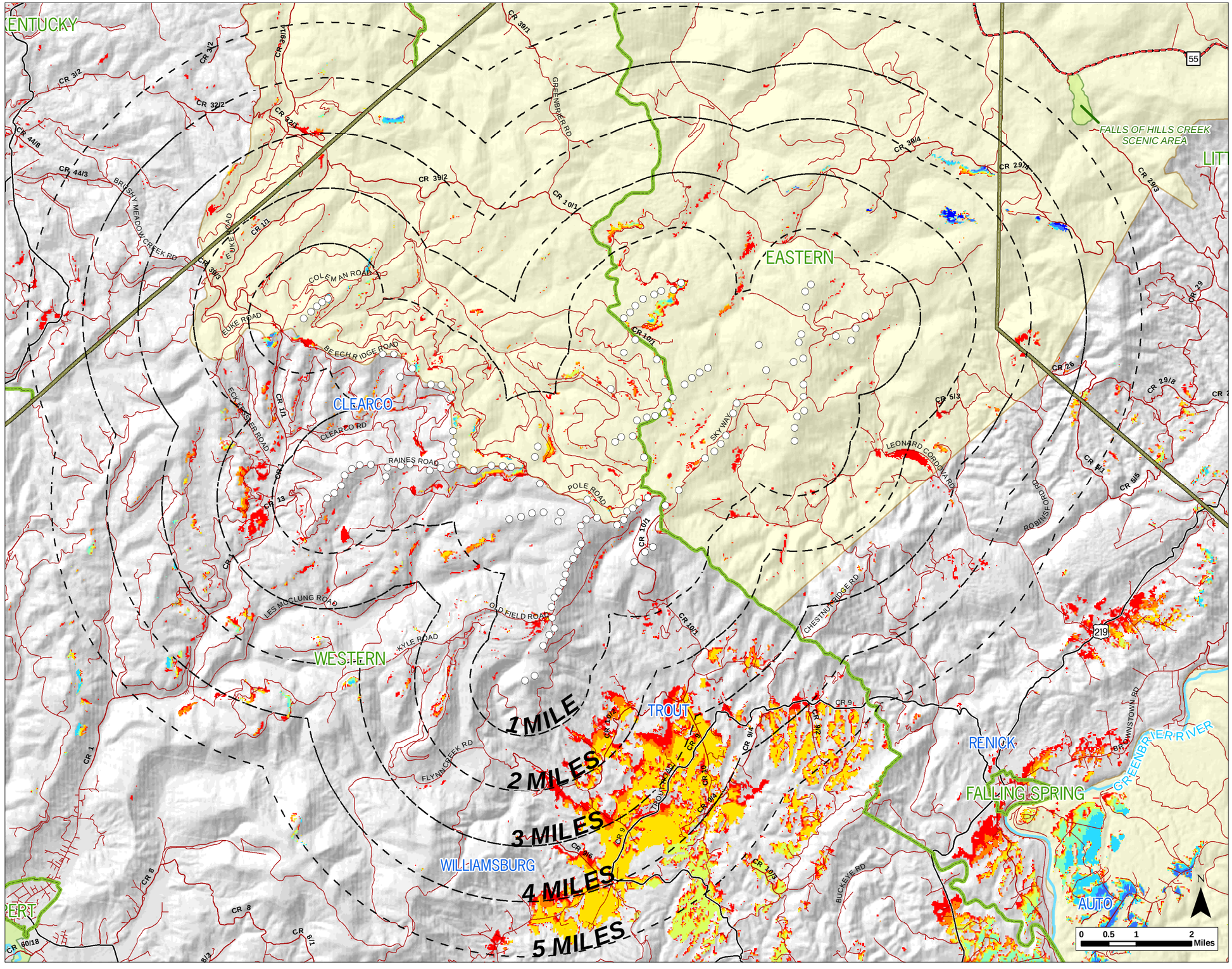

BEECH RIDGE WINDFARM HUB HEIGHT VIEWSHED (275' HEIGHT)

Maximum Turbine Layout (124 WTG)
Figure 2: Sheet 4 of 4

KEY

TURBINES VISIBLE (275' HEIGHT)

- 1 - 10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-75
- 76-100
- 101-124
- WIND TURBINE LOCATIONS
- MUNICIPAL BOUNDARIES
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Figure 3:
Photo Simulations

Existing Condition

Note: Photo taken on September 19, 2005 at approximately 10:35 a.m.

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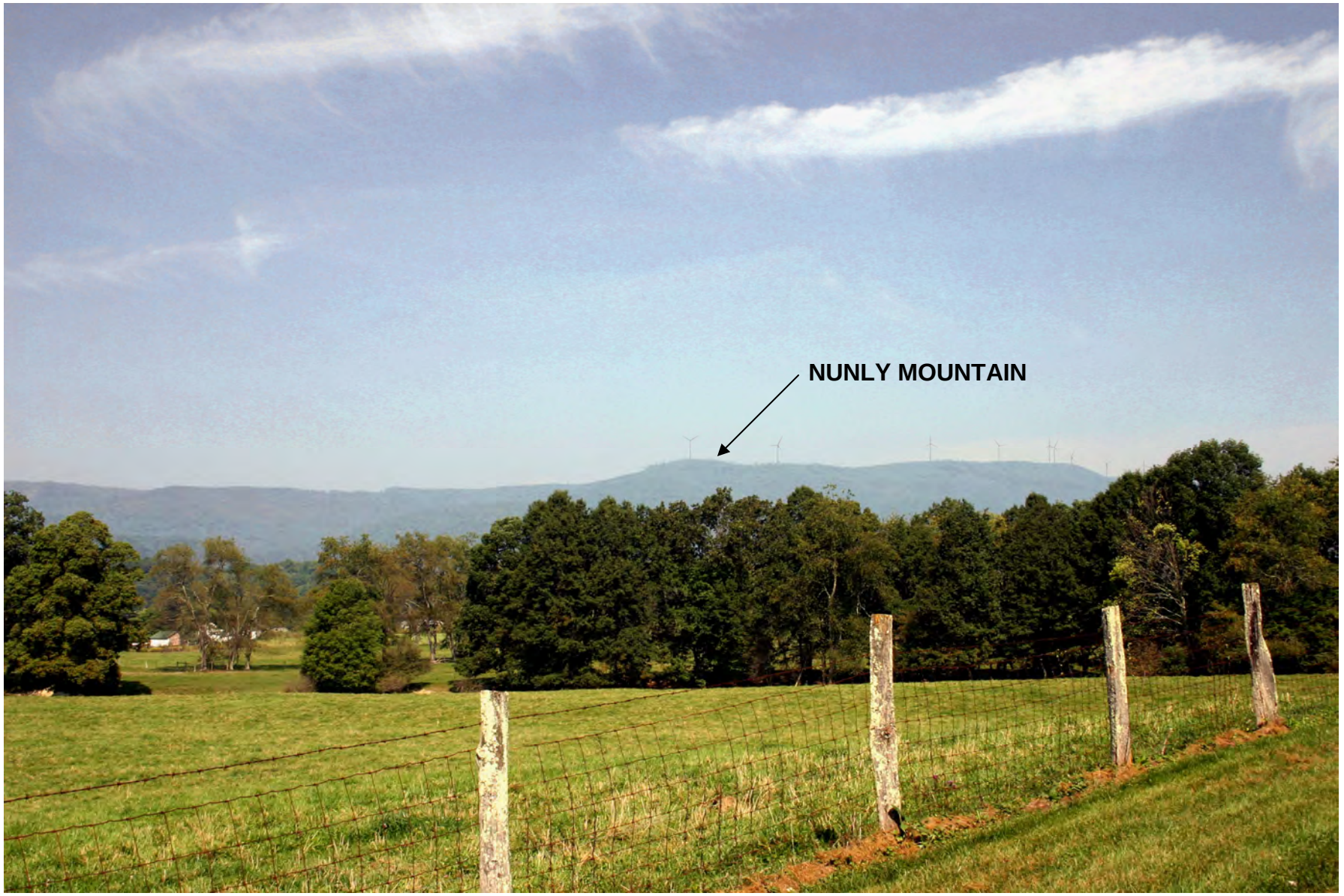
Figure 3: Sheet 1 of 10
Photo Simulation: VP#1 — CR 17—East of Williamsburg
October 27, 2005



Simulation

Note: The closest turbine is approximately 4.0 miles from the viewer.

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Figure 3: Sheet 2 of 10
Photo Simulation: VP#1 — CR 17—East of Williamsburg
October 27, 2005

Existing Condition

Note: Photo taken on September 19, 2005 at approximately 11:00 a.m.

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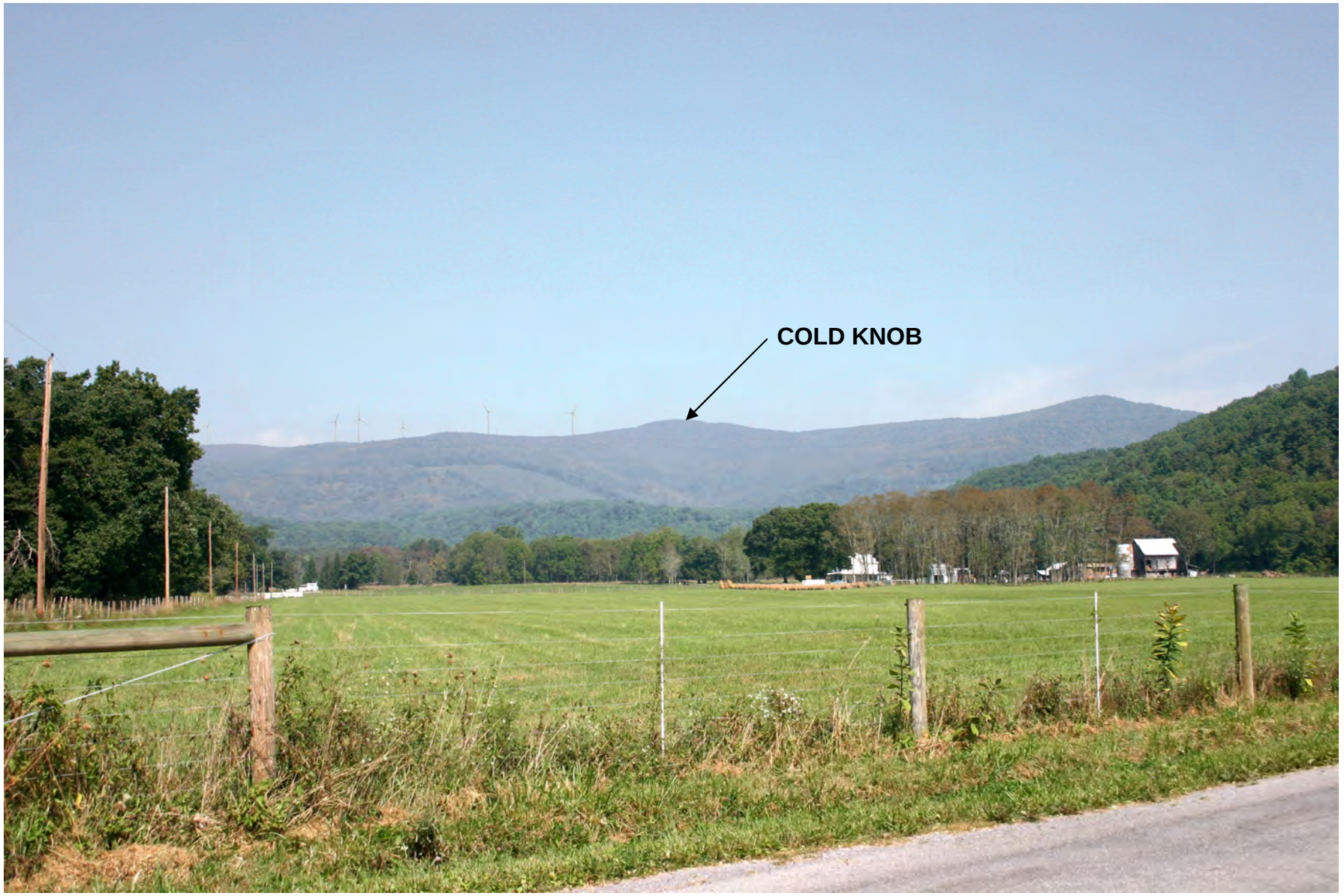
Figure 3: Sheet 3 of 10
Photo Simulation: VP#4 — Intersection of CR 9 and 10
October 27, 2005



Note: The closest turbine is approximately 3.3 miles from the viewer.

Simulation

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Figure 3: Sheet 4 of 10
Photo Simulation: VP#4 — Intersection of CR 9 and 10
October 27, 2005

Existing Condition

Note: Photo taken on September 19, 2005 at approximately 2:00 p.m.

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Figure 3: Sheet 5 of 10
Photo Simulation: VP#10 — Intersection of US 60 and County Route 60/12
October 27, 2005

Simulation

Note: The closest turbine is approximately 12.0 miles from the viewer.

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Figure 3: Sheet 6 of 10
Photo Simulation: VP#10 — Intersection of US 60 and County Route 60/12
October 27, 2005

Existing Condition

Note: Photo taken on September 19, 2005 at approximately 3:25 p.m.

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Figure 3: Sheet 7 of 10
Photo Simulation: VP#11 — County Route 223—South of Highway 39/55
October 27, 2005

Simulation

Note: The closest turbine is approximately 3.5 miles from the viewer.

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Invenergy

Figure 3: Sheet 8 of 10
Photo Simulation: VP#11 — County Route 223—South of Highway 39/55
October 27, 2005

Existing Condition

Note: Photo taken on September 19, 2005 at approximately 4:10 p.m.

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Figure 3: Sheet 9 of 10
Photo Simulation: VP#13 — Droop Mountain Battlefield State Park
October 27, 2005

Simulation

Note: The closest turbine is approximately 7.4 miles from the viewer.

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Invenergy

Figure 3: Sheet 10 of 10
Photo Simulation: VP#13 — Droop Mountain Battlefield State Park
October 27, 2005

SARATOGA ASSOCIATES

BEECH RIDGE ENERGY – PHASE II EXPANSION/MODIFICATION

VISUAL RESOURCE ASSESSMENT

Prepared for:

Invenergy Wind Development, LLC
51 Monroe Street
Suite 1604
Rockville, MD 20850

June 2011

Landscape Architects, Architects,
Engineers and Planners, P.C.

#2010-044.10

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1.0 INTRODUCTION

Beech Ridge Energy II LLC, an affiliate of Invenergy Wind North America LLC (Invenergy), is proposing to expand its current operating project of 67 turbines by an additional 33 turbines or up to 82.5 megawatts (MW). The proposed Beech Ridge Energy - Phase II Expansion/Modification (hereafter referred to as "Project") will be located in northern Greenbrier County, West Virginia.

The Beech Ridge Wind Energy Facility was granted a Siting Certificate by the PSC on August 26, 2006, and on reconsideration, on January 11, 2007. The approval included 124 wind turbine generators of 1.5 megawatts each for a total of 186 megawatts of generating capacity. Construction began in April 2009.

On December 8, 2009, a United States District Court in the State of Maryland enjoined the construction of all but 40 centrally located turbines (then being constructed) until further specified actions were taken. Pursuant to a settlement agreement among the parties to the injunction proceeding, on January 26, 2010 the District Court amended its December 8th Order to allow the opportunity to complete construction of a wind energy facility (or "wind farm") provided a number of conditions were met, including the movement of a large number of turbines from the eastern portion of Greenbrier County to the west. This amended Order also allowed the immediate completion of 27 additional turbines for a total of 67. The total of 67 turbines were completed and brought on line between April and August 2010 ("Phase I").

In order to comply with the portion of the Amended Order of the District Court requiring movement of certain turbines from the eastern portion of the Beech Ridge Wind Energy Facility to locations in the west, Invenergy has designed and planned for, the construction of a 33 turbine project ("Phase II") immediately to the west of the original footprint for the Beech Ridge Wind Energy Facility.

To assess potential visual impacts, Beech Ridge Energy II LLC (BRE) has retained Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga Associates) to complete a Visual Resource Assessment (VRA) of the Project. The purpose of this VRA is to identify potential visual and aesthetic impacts and to provide an objective assessment of the visual character of the Project, using standard accepted methodologies of visual assessment, from which agency decision-makers can render a supportable determination of visual significance.

Although 33 turbines will actually be constructed during Phase II, this report evaluates the potential visual impacts associated with 47 turbine locations. The additional 14 turbines included in this analysis are alternative locations. A number of the 33 preferred turbines were included in the original 124 turbine Beech Ridge project and are dependent on certain project related variables in order to be included in the final construction layout. Those preferred turbines that cannot be constructed would be replaced by the best possible alternate turbine. It is important to note that the removal of 14 turbines from this analysis will likely decrease the

potential overall viewshed visibility and will likely change the geographic area visually affected by the Project.

1.1 Methodology

This evaluation addresses the requirements identified in the West Virginia Public Service Commission Legislative Rule Title 150 Series 30, Rules Governing Siting Certificates for Exempt Wholesale Generators, and includes both quantitative (how much is seen and from what locations; or visual impact) and qualitative (how it will be perceived; aesthetic impact) aspects of visual assessment. The study area for the VRA extends to a 20-mile radius from the outermost turbines (hereafter referred to as the "20-mile study area" or "study area ").

1.2 Project and Existing Beech Ridge Wind Farm Descriptions

The proposed Project will result in the construction of 33 turbines. However, for the purpose of this evaluation the visual assessment considered 47 turbines, of which 14 are considered alternate locations. The Project turbines, proposed in northern Greenbrier County, will be located on private land under a lease agreement with the property owner.

Image 1 - Example of GE 2.5 MW Turbine

Although it is likely that BRE will consider an alternate turbine (e.g. General Electric 1.6 MW) for this Project, the VRA analyzes the visibility of a GE 2.5 XL turbine. This turbine has a rated power of 2.5 MW and has been used in order to identify the Projects maximum potential visibility

All of the GE 2.5 turbine towers will be off-white in color and approximately 328 feet (100 meters) tall. The base and top of the tower will be 17 feet and 9.5 feet, respectively. Each of the three turbine blades will be 169 feet in length (rotor diameter of 338 feet or 103 meters) with the apex of blade rotation reaching approximately 497 feet (151.5 meters) above ground elevation. The maximum operating speed of the rotor will be approximately 14.1 revolutions per minute (rpm), or approximately one revolution every four seconds. One FAA required light (L-864 red strobe light) would be affixed to the rear portion of the nacelle on select turbines; all of which will flash in unison. In comparison, the shorter GE 1.6 turbine tower will be approximately 328 feet (100 meters) tall with a rotor diameter of 328 feet or 100 meters) with the apex of blade rotation reaching approximately 492 feet (150 meters) above ground level.

In addition to the turbines, the Project will include gravel access roads, interconnection cables (anticipated to be buried), up to two 80-meter tall permanent meteorological towers, and if required, one concrete batch plant. Although it is anticipated that the Project will utilize the

existing Beech Ridge collection station[1], it should be noted that there is a possibility a secondary substation and associated transmission line may be required.

The existing Beech Ridge Wind Farm, which is owned by Beech Ridge Energy LLC, a subsidiary of Invenergy Wind LLC, generates up to 100.5 MW of electricity. The wind farm, located in Greenbrier County, is 0.8-5.5 miles east of the proposed Project and consists of 67 GE 1.5 MW wind turbines. The turbine is similar to that being proposed for Phase II, but has an approximate height of 389 feet at the apex of blade rotation. The wind farm also includes two MET towers, a substation, 138 kV transmission line, access roads, and an operations and maintenance building.

2.0 LANDSCAPE CHARACTER/VISUAL SETTING

Landscape character is defined by the basic pattern of site geography (landform, vegetation, water features), land use, and human development. This section offers an overview of the study region and establishes the baseline condition from which to evaluate visual change.

2.1 SITE GEOGRAPHY

The majority of the study area is located in the Kanawha section of the Appalachian Plateau Province, with a smaller portion in the Valley and Ridge section, all of which are part of the Appalachian Highlands Region. Rugged mountains and steep valleys characterize this region, with elevations in the study area varying from 900 feet to 4,600 feet above sea level. In contrast, topography in the southeast portion of the study area becomes more rolling and while variable, is less dramatic. Elevations in this area are generally lower.

Much of this region is heavily vegetated. However, large tracts of the study area are still in actively managed timberlands and logging remains an important industry. For this reason, forested lands constantly experience variable states of cover from mature vegetation to cleared lots. Agricultural fields characterized by cleared areas, hedgerows, and woodlots are particularly common in the southeastern portion of the study area.

Water features occupy a relatively small portion of the study area. The most prominent water resources within the study area include the Cranberry River, Cherry River, Gauley River, Greenbrier River, Meadow River, Williams River, and Summersville Lake.

2.2 TRANSPORTATION

The primary roadways within the study area include US Routes 19, 60 and 219, State Routes 12, 20, 39, 41, 55, and 150, and Interstate 64 (See Figure 1 for locations). These roadways are typically 2 or 4 lane asphalt paved roadways. One to two lane local roadways (also referred to as County Routes) are also common within the study area. These roadways are typically narrow and winding, and have surfaces varying between asphalt and/or dirt.

[1] Location where the 34.5 kV collection lines will be stepped up to an existing aboveground 138 kV transmission line.

2.3 Population Centers

Population centers of varying size and density may be found within the study area. Examples of population centers include: Camden-on-Gauley, Cowen, Craigsville, Falling Spring, Hillsboro, Meadow Bridge, Quinwood, Rainelle, Richwood, Rupert, and Summersville. These centers are characterized by a mix of low to medium density residential neighborhoods, small-scale manufacturing, commercial, and institutional uses (e.g. schools and churches).

Smaller population centers such as Calvin, Duo, Fenwick, Meadow Bluff, Trout, and Williamsburg are scattered throughout the study area and may consist of homes, industrial operation centers, institutions (e.g. churches), and small businesses. A variety of architectural styles and periods are exhibited within all the centers within the study area.

3.0 Visual Impact Assessment

3.1 Viewshed Mapping (Zone of Visual Influence)

3.1.1 Viewshed Methodology

Viewshed mapping identifies the geographic area within which there is a possibility that some portion of the proposed Project would be visible from a given location. Control points were established at the turbine high point (497 feet) for each of the 47 turbines being evaluated. The resulting viewshed identifies the geographic area within the twenty-mile study area where some portion of the Project is theoretically visible. The primary purpose of this exercise is to provide a general understanding of a project's potential visibility and identify areas where further investigation is appropriate.

One viewshed map was prepared defining the area within which there would be no visibility of the Project because of the screening effect caused by intervening topography (See Figure 1). This treeless condition analysis is used to identify the maximum potential geographic area within which further investigation is appropriate. A second map was prepared illustrating the probable screening effect of existing mature vegetation. This vegetated condition viewshed acceptably identifies the geographic area within which one would expect the Project to be screened by intervening forest vegetation (See Figure 2).

For this evaluation, ArcGIS 9.2 and ArcGIS Spatial Analyst software were used to generate viewshed areas based on publicly available digital topographic and land cover datasets. Viewshed maps were created using a ten-meter resolution digital elevation model (DEM)[2] of the study area. The computer then scanned from each control point to all cells within the DEM, distinguishing between grid cells that would be hidden from view and those that would be visible based solely on topography. All grid cells within the study area were coded based on the number of proposed turbines that would be visible to a theoretical observer whose eye height is conservatively estimated at two meters above ground level.

[2] DEM data was obtained through the United States Geological Survey National Elevation Dataset

Vegetation data was extracted from the National Land Cover Data Set 2001 (NLCD), which depicts cover types in a 30-meter resolution raster graphic. The screening effect of vegetation was incorporated by including an additional 40 feet (12.2 meters)[3] of height for those DEM grid cells that are forested (according to NLCD dataset) and then repeating the viewshed calculation procedure. Forested areas were then removed from the viewshed to account for areas located within a full forest canopy.

The NLCD dataset does not depict small vegetation lots (i.e. landscape vegetation), hedgerows, or built structures and may therefore overestimate the potential visibility. This is a particularly important distinction in populated areas such as Quinwood, Richwood, Rupert, and Summersville where existing structures are likely to provide significant screening of distant views. Conversely, recently cleared lots within the study area may not be reflected in the NLCD data.

3.1.2 Viewshed Interpretation

Figure 1 and Table 1 suggest that, based solely of screening from intervening topography, 79 percent of the 20-mile study area will be screened from views of the proposed turbines. Highly variable and steep topographic changes contribute to the screening of the turbines in most locations (Image 2).

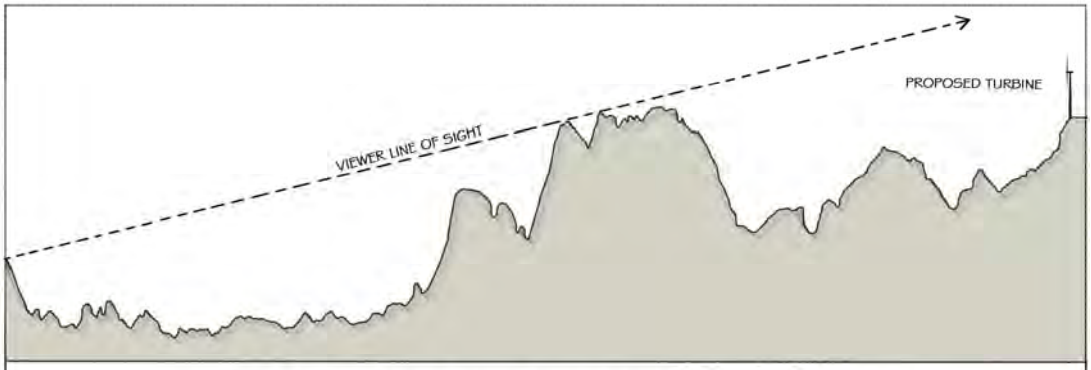


Image 2 - Typical Line of Sight Showing a View Blocked by Topography

[3] A tree height of 40 feet is considered conservative, as most trees in forested portions of the study area appear to be taller than 40 feet.

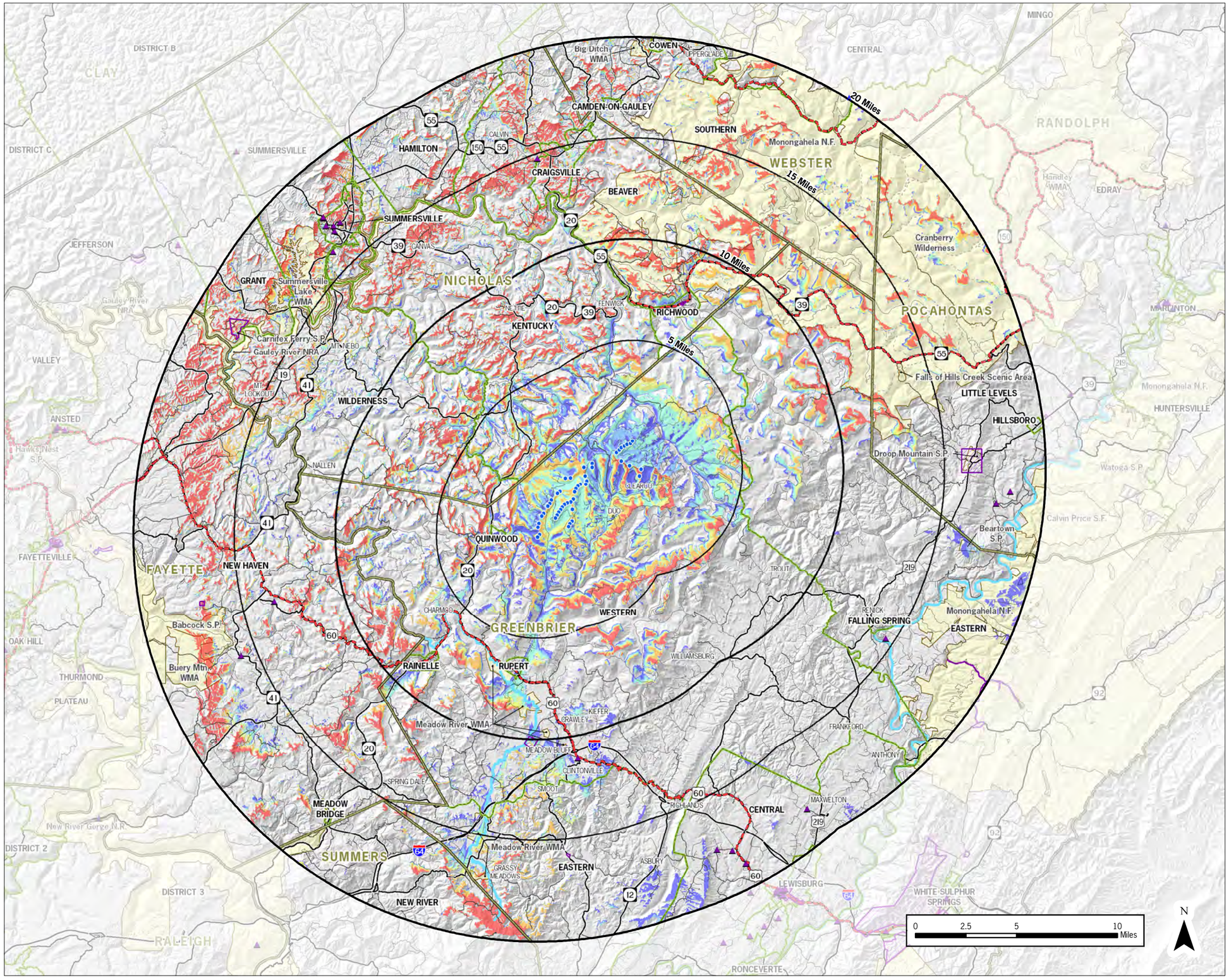
Table 1 Viewshed Coverage Summary

	Topography Only Viewshed (Figure 1 – Topographic Viewshed)		Vegetation and Topography Viewshed (Figure 2 – Vegetated Viewshed)	
	Acres	**Percentage of Study Area**	**Acres**	**Percentage of Study Area**
No Turbines Visible	789,453	79.0%	968,504	96.9%
1-5 Turbines Visible	33,945	3.4%	7,166	0.7%
6-10 Turbines Visible	21,225	2.1%	4,106	0.4%
11-20 Turbines Visible	35,870	3.6%	6,243	0.6%
21-30 Turbines Visible	26,283	2.6%	3,825	0.4%
31-40 Turbines Visible	30,304	3.0%	3,756	0.4%
41-47 Turbines Visible	62,674	6.3%	6,153	0.6%
Total	999,753	100.0%	999,753	100.0%

*Table 1 and Figure 1 illustrate that one or more structures are theoretically visible from approximately 21 percent of the 20-mile study radius. This bare earth condition analysis is used only to identify the maximum potential geographic area within which further investigation is appropriate. This viewshed is not representative of the anticipated geographic extent of visibility and is not intended for public interpretation. In Table 1, Acreage and Percent of Study Area are rounded to the nearest whole number and tenth, respectively.

As illustrated in Figure 2 and Table 1, due to the prevalence of forested areas, visibility of the turbines is generally limited to several small pockets distributed throughout the study area. Table 1 indicates that screening from vegetation and topography will restrict views of the proposed turbines from 96.9 percent of the 20-mile study area.

It is important to note that the viewshed analysis considers a 47-turbine project, however, only 33 turbines will actually be built. This will likely decrease overall viewshed visibility depending on which 33 turbines are ultimately built.



Beech Ridge Energy
Phase II Expansion/Modification

Figure 1

Topographic Viewshed

June 2011

Key

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 47
- Proposed Wind Turbine (497' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\GIS\2010\10044\Maps\Figure1_Proposed_TopographyOnly_Viewshed.mxd

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New York City > Saratoga Springs > Syracuse

Beech Ridge Energy

Beech Ridge Energy
Phase II Expansion/Modification

Figure 2

Vegetated Viewshed*

*- Assumes a uniform tree height of 40' (12.192m) in forested areas.

June 2011

Key

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 47
- Proposed Wind Turbine (497' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\GIS\2010\10044\Maps\Figure2_Proposed_Veg-Adjusted_Viewshed.mxd

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New York City > Saratoga Springs > Syracuse

Beech Ridge Energy

Beech Ridge Energy
Phase II Expansion/Modification

Figure 2A

Vegetated Viewshed*
With Visual Resources

*- Assumes a uniform tree height of 40' (12.192m) in forested areas.

June 2011

Key

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 47
- Proposed Wind Turbine (497' ht. to Blade Tip)
- Receptors
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

File Location:
B:\GIS\2010\10044\Maps\Figure7_ReceptorLocations.mxd

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Landscape Architects, Architects, Engineers, and Planners, P.C.
New York City > Saratoga Springs > Syracuse

Beech Ridge Energy

0 2.5 5 10 Miles

N

3.2 Inventory of Visually Sensitive Resources

3.2.1 Inventory Criteria

Because it is not practical to evaluate every conceivable location where the proposed Project might be visible, it is accepted visual assessment practice to limit detailed evaluation of aesthetic impact to locations generally considered by society, through regulatory designation or policy, to be of cultural and/or aesthetic importance. For the purpose of this study, resources were identified as having National, Statewide, or County significance. Table 2 identifies the relevant resources and their inclusion criteria.

Resources of National and Statewide Significance – Aesthetic resources of National or Statewide Significance may be derived from one or more of the following categories:

- A property on the National Register of Historic Places[4];
- State Designated Parks;
- Designated State Forest Preserves;
- National Wildlife Refuges, designated State Game Refuges, and designated State Wildlife Management Areas;
- National Natural Landmarks;
- The National Park System, Recreation Areas, and Forests;
- Rivers designated as National or State Wild, Scenic, or Recreational;
- A site, area, lake, reservoir, or highway designated as scenic;
- A State or federally designated trail; and
- Designated State Nature and Historic Preserve Areas.

County Level Resources – County owned and operated places of sensitivity or high intensity of use (based on local context) was also inventoried. These resources may be derived from one or more of the following categories:

- County owned and operated recreation area including recreational facilities/attractions;
- County owned areas devoted to the conservation or the preservation of natural environmental features (e.g., reforestation areas/forest preserves, wildlife management areas, open space preserves);
- A bicycling, hiking, ski touring, or snowmobiling trail designated as such by a County agency;

[4] It should be noted that a full study has been completed assessing the impacts to cultural and historic resources. The purpose of this inventory is to identify visual resources from which analysis may be appropriate.

- Parkways, highways, or scenic overlooks and vistas designated as such by a County agency; and
- An interstate highway or other high volume (relative to local conditions) road of regional importance.

Resources were identified through a review of published maps and other paper documents, online research, and windshield survey of publicly accessible locations.

3.2.2 Visibility Evaluation of Inventoried Resources

Within the 20-mile study area, 68 visual resources were identified. These resources and their potential project visibility are listed in Table 2. The viewshed analysis suggests that 36 of these resources would be screened by intervening topography and vegetation (29 resources are screened by topography alone and 7 are screened by intervening vegetation). Based on the viewshed results these 36 resources were eliminated from further review.

Table 2 Visual Resource Visibility Summary[5]

Key
● *Visibility Indicated*[6]
○ *No Visibility Indicated*

Receptor No.	Receptor Name	County (Within Study Area)	Inventory Type	Potential Visibility: Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (Figure 1)	Potential Visibility: Theoretical View Indicated by Viewshed - Including Existing Vegetation (Figure 2)	Distance to Nearest Proposed Turbine (in miles)
Cultural Resources						
9	Downtown Richwood Historic District	Nicholas	National Register Historic District	○	○	7.2
13	Beaver Mill	Nicholas	National Register Historic Site	○	○	14.8
17	Carden, James B., House	Nicholas	National Register Historic Site	○	○	17.5
18	Brown, Dr. Flavius, House	Nicholas	National Register Historic Site	○	○	16.7
19	Nicholas County High School	Nicholas	National Register Historic Site	●	●	17.2
20	Brock Hotel	Nicholas	National Register Historic Site	○	○	16.9
21	Hamilton, Martin, House	Nicholas	National Register Historic Site	○	○	17.6
22	Nicholas County Bank	Nicholas	National Register Historic Site	●	○	16.9
25	Carnifex Ferry State Park	Nicholas	National Register Historic District / State Park	●	●	17.4
26	Nicholas County Courthouse	Nicholas	National Register Historic Site	○	○	16.1

[5] Additional historically significant properties within the study area will be identified as part of the studies being prepared by others, for the West Virginia State Historic Preservation Office.
[6] Viewshed visibility is based on a 47-turbine layout. As only 33 turbines will actually be built, some receptors may no longer have visibility of the Project.

Table 2 Visual Resource Visibility Summary[5]

Key

● *Visibility Indicated*[6]

○ *No Visibility Indicated*

Receptor No.	Receptor Name	County (Within Study Area)	Inventory Type	Potential Visibility: Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (Figure 1)	Potential Visibility: Theoretical View Indicated by Viewshed - Including Existing Vegetation (Figure 2)	Distance to Nearest Proposed Turbine (in miles)
35	Camp Washington-Carver Complex	Fayette	National Register Historic District	●	●	16.8
39	Hughart, Dr. John, House	Fayette	National Register Historic Site	○	○	15.8
40	Tyree Stone Tavern	Fayette	National Register Historic Site	○	○	13.4
47	Deitz Farm	Greenbrier	National Register Historic District	●	●	9.9
48	Herns Mill Covered Bridge	Greenbrier	National Register Historic Site	●	○	17.6
49	Blue Sulphur Springs Pavilion	Greenbrier	National Register Historic District	○	○	15.7
51	Sam Black Church	Greenbrier	National Register Historic Site	○	○	11.1
52	Alexander W. Arbuckle House	Greenbrier	National Register Historic Site	●	○	18.3
53	Morlunda	Greenbrier	National Register Historic Site	●	○	18.0
55	Tuckwiller Tavern	Greenbrier	National Register Historic Site	●	○	18.8
56	Hopkins Mountain Historic District	Greenbrier	National Register Historic District	○	○	17.7
58	Renick Farm	Greenbrier	National Register Historic Site	○	○	14.6
60	Locust Creek Covered Bridge	Pocahontas	National Register Historic Site	○	○	17.6
63	Droop Mountain Battlefield	Pocahontas	National Register Historic District	○	○	15.8
64	Beard, Richard, House	Pocahontas	National Register Historic Site	○	○	18.3
Highway Resources						
14	State Highway 20	Fayette Greenbrier, Nicholas, Summers, Webster	State Highway	●	●	2.2
15	State Highway 39	Fayette, Greenbrier, Nicholas, Pocahontas	State Highway	●	●	6.5
28	US Highway 19	Fayette, Nicholas	US Highway	●	●	13.7
37	State Highway 41	Fayette, Nicholas,	National and State Scenic Byway	●	●	11.9
50	Interstate Highway 64	Greenbrier, Summers	Interstate Highway	●	●	10.6
54	US Highway 60	Fayette, Greenbrier	US Highway	●	●	5.4
59	US Highway 219	Greenbrier, Pocahontas	US Highway	○	○	13.2
5	Highland Scenic Highway	Greenbrier, Nicholas, Pocahontas	State Highway	●	●	7.3

Table 2 Visual Resource Visibility Summary[5]

Key

● *Visibility Indicated*[6]

○ *No Visibility Indicated*

Receptor No.	Receptor Name	County (Within Study Area)	Inventory Type	Potential Visibility: Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (Figure 1)	Potential Visibility: Theoretical View Indicated by Viewshed - Including Existing Vegetation (Figure 2)	Distance to Nearest Proposed Turbine (in miles)
7	Wiliams River State Backway	Pocahontas, Webster	US Highway	○	○	18.0
38	Midland Scenic Byway	Fayette, Greenbrier	National and State Scenic Byway	●	●	5.4
67	Coal Heritage Trail	Fayette	National and State Scenic Byway	●	●	18.8
68	State Highway 55	Nicholas	State Highway	●	●	14.7
National Recreational Resources						
8	Monongahela National Forest	Greenbrier, Nicholas, Pocahontas, Webster	National Forest	●	●	6.8
32	Gauley River NRA	Fayette, Nicholas	National Park	●	●	14.4
43	New River Gorge National River	Fayette, Raleigh, Pocahontas	National River	○	○	17.8
2	Cranberry Glades Nature Center	Pocahontas	National Forest	○	○	17.3
3	Falls of Hills Creek Scenic Area	Pocahontas	National Forest	○	○	13.5
6	Cranberry Wilderness	Pocahontas, Webster	National Forest	●	●	16.0
State and County Recreational Resources						
1	Highland Scenic Bikeway	Pocahontas	State Bikeway/National Scenic Byway	●	●	18.1
4	Link Trail	Greenbrier, Nicholas, Pocahontas	State Trail	●	●	7.2
10	Cranberry Tri-Rivers Rail-Trail	Nicholas, Webster	State Trail	●	●	6.4
11	Tri-Rivers to Rockhouse Rail-Trail	Nicholas, Webster	State Trail	○	○	15.4
12	Big Ditch WMA	Webster	State WMA	●	●	18.9
16	Muddlety Rail-Trail	Nicholas	State Trail	●	●	16.1
23	Muddlety Trail	Nicholas	State Trail	●	●	17.3
24	Summersville Lake WMA	Nicholas	State WMA	●	●	16.9
27	Hughes Bridge-Brock Br. Trail	Nicholas	State Trail	●	○	14.3
29	Fayette County Bike Routes	Fayette	County Trail	●	●	17.3
30	Meadow/Gauley River Rail-Trail	Fayette, Nicholas	State Trail	●	○	12.1
31	Unknown Soldier Trail	Nicholas	State Trail	●	●	15.9

Table 2 Visual Resource Visibility Summary[5]

Key

● *Visibility Indicated*[6]

○ *No Visibility Indicated*

Receptor No.	Receptor Name	County (Within Study Area)	Inventory Type	Potential Visibility: Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (Figure 1)	Potential Visibility: Theoretical View Indicated by Viewshed - Including Existing Vegetation (Figure 2)	Distance to Nearest Proposed Turbine (in miles)
33	Thurmond to Cunard Rail-Trail	Fayette	State Trail	○	○	20.0
34	Route 19 Bikeway	Fayette, Nicholas, Raleigh	State Bikeway	●	●	14.1
36	Middle Meadow-Babcock S.P. Rail-Trail	Fayette	State Trail	●	●	12.1
41	Babcock State Park	Fayette	State Park	●	●	15.9
42	Buery Mountain WMA	Fayette	State WMA	●	●	16.9
44	Midland Trail Bikeway	Fayette, Greenbrier	State Bikeway	●	●	5.4
45	Meadow River WMA	Greenbrier, Summers	State WMA	●	●	6.2
46	Meadow River Wetland Trails	Greenbrier	State Trail	●	●	5.6
57	Greenbrier River Rail-Trail	Greenbrier, Pocahontas	State Trail	○	○	13.9
61	Beartown State Park	Greenbrier	State Park	●	●	16.2
62	Droop Mountain State Park	Pocahontas	State Park	○	○	15.9
65	Watoga State Park	Pocahontas	State Park	○	○	19.3
66	Calvin Price State Forest	Greenbrier, Pocahontas	State Forest	○	○	18.8

3.3 Factors Affecting Visual Impact

3.3.1 Landscape Units

Landscape units are areas with common characteristics of landform, water resources, vegetation, land use, and land use intensity. While a regional landscape may possess diverse features and characteristics, a landscape unit is a relatively homogenous, unified landscape of visual character. Three landscape units were identified within the 20-mile study area.

Community Center – Community centers include, but are not limited to, Quinwood, Richwood, and Summersville. These communities are primarily residential and commercial centers with built structures and streets dominating the visual landscape. Views are generally short distance and focused along streets due to existing structures and vegetation. Filtered or framed views may be possible through foreground vegetation and buildings, particularly from the perimeter of the communities.

Mountain Forest – This unit consists of numerous mountain ranges, peaks and ridges, as well as National and State Forests. Although this unit is primarily wooded, it does include occasional open views along mountain roads and clearings. Filtered views through woodland vegetation may be available during leaf-off seasons. Population densities are low and the building stock (e.g. housing and accessory buildings) is sparsely located within small community centers (e.g. Duo and Nettie) or scattered along winding narrow roadways. Although mostly undeveloped, this unit contains a variety of recreation opportunities.

Agricultural Landscape Unit – This unit is predominantly a patchwork of open land, including working cropland and fallow fields with successional growth. Often these properties are transected by hedgerows and interspersed with woodlots (especially on steeper slopes). The terrain itself consists largely of rolling hills and areas of smaller rounded hillocks. Views are often fairly long distance across open fields. Population densities are low and building stock is sparsely located within small community centers (e.g. Trout and Williamsburg) or scattered throughout the unit.

3.3.2 Viewer/User Groups

Viewers engaged in different activities, while in the same landscape unit, are likely to perceive their surroundings differently. The description of viewer groups is provided to assist in understanding the sensitivity and probable reaction of observers to visual change resulting from the proposed Project.

Local Residents, Workers, and Commuters – These individuals would view the Project from homes (and surrounding private property), businesses, and local roads. Such viewers could have frequent and/or prolonged views of the Project. Local residents and workers know the local landscape and may be sensitive to changes in particular views that are important to them. Conversely, the sensitivity of an individual observer to a specific view may be diminished over time due to repeated exposure. Commuters and through travelers are typically moving and focusing on the road in front of them resulting in views of the Project that may be peripheral, intermittent, and/or of relatively brief duration.

Recreational Users and Tourists – This group generally includes residents involved in outdoor recreational activities, as well as visitors and tourists who come to the area specifically to enjoy the cultural, recreational, scenic resources, and open spaces.

The sensitivity of recreational users to visual quality is variable; but to many, visual quality is an important and integral part of the recreational experience. Visitors and recreational users commonly experience the natural, rural landscape around which recreation resources are generally centered. In many instances these users are focused on recreating (i.e. white water rafting or rock climbing) and may not be affected by views of the Project. On the other hand, when regional landscape views are considered an integral part of a recreational experience (i.e. hiking or sightseeing), the user may have a higher sensitivity visual change.

3.3.3 Distance Zones

Distance affects the apparent size and degree of contrast between an object and its surroundings. Distance zones established by the U.S. Forest Service and are used in this VRA are described below.

Foreground (0-½ mile) – At a foreground distance, viewers typically have a very high recognition of detail. Cognitively, in the foreground zone, human scale is an important factor in judging spatial relationships and the relative size of objects. From this distance, the sense of form, line, color and textural contrast with the surrounding landscape is highest. The visual impact is likely to be considered the greatest at a foreground distance.

Middleground (½ mile to 3 miles) – This is the distance where elements begin to visually merge or join. Colors and textures become somewhat, but are still identifiable. Detail is reduced, although distinct patterns may still be evident. Viewers from middleground distances characteristically recognize surface features such as tree stands, building clusters and small landforms. Scale is perceived in terms of identifiable features of development patterns. From this distance, the contrast of color and texture are identified more in terms of the regional context than by the immediate surroundings.

Background (3-5 miles to horizon)[7] – At this distance, landscape elements lose detail and become less distinct. Atmospheric perspective[8] changes colors to blue-grays, while surface characteristics are lost. Visual emphasis is on the outline or edge of one landmass or water resource against another.

3.3.4 Duration/Frequency/Circumstances of View

The analysis of a viewer's experience must include the distinction between stationary and moving observers. The length of time and the circumstances under which a view is encountered is influential in characterizing the importance of a particular view.

Stationary Views – Stationary views are experienced from fixed viewpoints such as residential neighborhoods, recreational facilities, historic resources and other culturally important locations. Characteristically, stationary views offer sufficient time for the viewer to interpret and understand the physical surroundings and therefore have a higher potential for understanding the elements of a view than do moving viewers.

Moving Views – Moving views are those experienced in passing, such as from moving vehicles, where the time available for a viewer to cognitively experience a particular view is limited. As the tendency of automobile occupants is to focus down the road, the actual time a viewer is able to focus on individual elements of the surrounding landscape may be a fraction of the total available view time.

[7] The background distance zone includes out to the 20 miles around the outermost turbines (study area).

[8] Atmospheric Perspective: Even on the clearest of days, the sky is not entirely transparent because of the presence of atmospheric particulate matter. The light scattering effect of these particles causes a reduction in the intensity of colors and the contrast between light and dark as the distance of objects from the observer increases. Contrast depends upon the position of the sun and the reflectance of the object, among other items. The net effect is that objects appear "washed out" over great distances.

3.4 Degree of Project Visibility

3.4.1 Field Observation and Photography

On November 8, 2010 through November 10, 2010 a field observer drove public roads and visited many of the potentially affected visual resources (as determined through viewshed mapping) to document existing visibility in the direction of proposed wind turbines. Photographs were taken from these locations with a lens setting of approximately 50mm[9] to simulate normal perspective. The coordinates of each photo location were recorded using a global positioning system (GPS) unit.

3.4.2 Photo Simulations

To illustrate how the turbines will appear, eight daytime photo simulations were prepared. The specific location of these simulations was chosen for their relevance to the factors affecting visual impact (viewer/user groups, landscape units, distance zones and duration/frequency) and circumstances of the view. The simulations provide representative examples of how the Project will appear under varying circumstances, distance, and landscape character. Table 3 lists the key locations selected for photo simulation (presented in Appendix A).

Table 3 Key Receptors Selected for Photo Simulation

Viewpoint Number	Location Description
4	Beech Ridge Road, Greenbrier County
15	County Route 18 (Near State Route 39), Nicholas County
18	State Route 39, Nicholas County
41	Overlook Road (Cold Knob), Greenbrier County
44	Deitz Farm Historic Property, County Route 28, Greenbrier County
51	Village of Quinwood (Coal Miners Memorial), Greenbrier County
55	Laurel Creek Road (Nr. General Lee Tree and the Midland Scenic Byway), Fayette County
65	State Route 20, Nicholas County

Photo simulations were developed by superimposing a rendering of a three-dimensional computer model of the Project and surrounding landforms into the base photograph. The 3D application accounts for the day and time of the base photograph and applies the appropriate lighting and shading to the 3D model in each view.

Post-production editing was completed to simulate the Project elements appearing behind foreground elements and for minor color correction.

3.4.3 Photo Simulation Viewing Instructions

Arms Length Rule – The standard photo simulations, contained in Appendix A, should be printed using an 11"x17" page format. At this image size, the page should be held at approximately arms length[10] so that the scene will appear at the correct scale. Viewing the image closer would make the scene appear too large and viewing the image from greater

[9] A Canon EOS Rebel XSi digital SLR with an 18-55milimeter (mm) zoom lens was used for standard Project photography. This digital camera, similar to most digital SLR cameras, has a sensor that is approximately 1.6 times smaller than a comparable full frame 35mm film camera. Recognizing this differential, the zoom lens used was set to approximately 31mm to achieve a field-of-view comparable to a 50mm lens on a full frame 35mm camera (31mm x 1.6 = 50mm).

[10] Viewing distance is calculated based a 39.6-degree field-of-view for the 50mm camera lens used, and the 15.5" wide image presented in Appendix A. "Arm's length" is assumed to be approximately 22.5 inches from the eye. Arm's length varies for

distance would make the scene appear too small compared to what an observer would actually see in the field.

3.5 Character of Project Visibility

3.5.1 Compatibility with Regional Landscape Patterns

The visual character of a landscape is defined by the patterns, forms and scale relationships created by lines, colors, textures, and scale/dominance. The qualitative impact of a project is determined by evaluating the compatibility of these visible patterns with the visual character of the surrounding landscape. The following describes the compatibility of the proposed Project within the surrounding landscape. This evaluation is depicted in the photographic simulations provided in Appendix A.

Form – Form refers to the shape and structure of the landscape. The landscape within the majority of the study area consists of steep, sometimes angular ridges. The wind turbines from the existing Beech Ridge project, when visible from foreground and middleground distances, become a series of noticeable vertical elements disrupting the form of a mountainous terrain. Similarly to the existing project, the addition of man-made kinetic structures, when visible will create a noticeable visual addition to the landscape. In instances where the existing turbines, located to the east of the Project, are not visible, the proposed turbines will create a visual addition. Furthermore, in instances where both are visible, the magnitude of vertical elements will be extended.

Line – The existing landscape maintains sinuous curvilinear lines formed by peaks or ridges along the horizon that often begin to layer as a result of several ridges at varying distances. Some higher elevation areas have steeper, rugged terrain that may create more angular and irregular lines. Within the study area, many locations will have views of existing turbines distributed throughout the landscape. Where the existing turbines are not visible, the well-defined vertical form of the Project's turbines may introduce a contrasting and distinct perpendicular element into the landscape.

Color – The neutral off-white color of the proposed turbine tower, nacelle and blades will

Image 3 Image 4 Image 5

often be viewed against the background sky (Image 3). Under these conditions the turbines would be compatible with the hue, saturation and brightness of the background sky and distant elements of the natural landscape. When the turbines are backlit (turbine facing viewer is in shade) it is anticipated that it will be less compatible with the background sky as the contrast

with the lighter sky color may increase (Image 4). Less frequently, the white turbines, or portions thereof, will be seen against the landscape which may appear as hues of green or brown earth tones. In this instance, the turbine color may contrast with their background. (Image 5).

Texture – The turbines will consist of a tubular style monopole tower, which provides a simple, visually appealing form. However, turbines have a ridged, engineered texture that may contrast with existing organic textures.

Scale/Spatial Dominance – In some instances the proposed turbines will be the tallest visible elements on the horizon. From most foreground and middleground vantage points the contrast of the proposed turbines with commonly recognizable features, such as structures and trees, will result in the Project being perceived as a dominant visual element. However, when viewed from background vantage points, perceived scale and spatial dominance of the turbines begins to lessen, particularly beyond 10 miles.

3.6 Cumulative Analysis

A cumulative analysis of the existing Beech Ridge Wind Farm and the proposed Project was completed as part of this VRA. The cumulative analysis of these two projects includes topography only, and a topography and vegetated viewshed maps, and simulations.

Table 4 Cumulative Vegetated Viewshed Coverage Summary

	Vegetation and Topography Viewshed (Figure 4 - Cumulative Vegetated Viewshed)	
	Acres*	**Percentage of Study Area**
No Structures Visible	942,768	94.3%
1-15 Structures Visible	23,698	2.4%
16-30 Structures Visible	16,577	1.7%
31-45 Structures Visible	6,951	0.7%
46-60 Structures Visible	3,285	0.3%
61-75 Structures Visible	2,751	0.3%
76-90 Structures Visible	1,397	0.1%
91-105 Structures Visible	1,273	0.1%
106-114 Structures Visible	1,053	0.1%
Total	999,753	100.0%

* Acreage and Percentage of Study Area are rounded to nearest whole number and tenth, respectively.

The cumulative viewshed maps were created to show where there was a potential to see turbines of the Project and the existing Beech Ridge Wind Farm from a specific location within the Projects 20-mile study area (See Figures 3 and 4). Recognizing that the existing project will be seen within the Projects 20-mile study area, additional viewshed maps were created to illustrate where the Project would introduce new visibility within the study area (See Figures 5 and 6). The heights used for the cumulative viewshed map can be found in Section 1.2.

Within the Projects 20-mile study area, the potential visibility of the cumulative wind project was further quantified to illustrate the number of turbines that may be visible from any given area. This cumulative degree of visibility is summarized on Table 4.

3.6.1 Cumulative Viewshed Analysis

Based on Table 4 and Figure 4 the total cumulative visibility of both projects is approximately 56,986 acres or 5.7% of the total study area. The proposed Project, when compared to the existing Beech Ridge project, would result in an increase of 14,132 acres of visibility or a 1.4% increase within the 20-mile study area. This leaves a relatively small area from which the Project can be viewed, without seeing the existing turbines.

The introduction of the proposed turbines within the same viewshed will increase the number of structures potentially visible from affected vantage points – thus creating a potential higher density of visible turbines or an expansion of the horizon within which turbines are potentially visible.

3.6.2 Cumulative Photo Simulations

Of the eight simulations prepared for the VRA, five locations contain views of the existing Beech Ridge turbines. Specifically,

> Viewpoint 4 from Beech Ridge Road (See Figure A1);
> Viewpoint 18 from State Route 39 (See Figure A3);
> Viewpoint 41 from Overlook Road (See Figure A4);
> Viewpoint 55 from Laurel Creek Road (See Figure A7); and
> Viewpoint 65 from State Route 20 (See Figure A8).

These locations illustrate the potential visibility of both projects. In addition, views at varying distances were chosen to demonstrate how foreground, middleground, and background views would be affected by the addition of the proposed Project. For example, Viewpoint 41 (See Figure A4) is 0.6 miles from the nearest operational Beech Ridge turbine and 5.9 miles from the nearest proposed turbine. Thus, the proposed wind turbines are less apparent with the existing turbines in place. Conversely, Viewpoint 65 (See Figure A8) shows the existing turbines at approximately 10-14 miles distant, while the proposed turbines are seen at 8-10 miles distant. In this particular view, the proposed turbines would appear more prominent and also provide infill to areas where turbines were not previously visible.

Beech Ridge Energy
Phase II Expansion/Modification

Figure 3

Cumulative Topographic Viewshed
Beech Ridge Energy Phase II Expansion/
Modification&Existing Beech Ridge Wind Farm

June 2011

Key

Number of Turbines Visible

- 1 - 15
- 16 - 30
- 31 - 45
- 46 - 60
- 61 - 75
- 76 - 90
- 91 - 105
- 106 - 114
- Proposed Wind Turbine (497' ht. to Blade Tip)
- Existing Wind Turbine (389' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\GIS\2010\10044\Maps\Figure3_CumulativeViewshed_TopographyOnly.mxd

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Beech Ridge Energy

0 2.5 5 10 Miles

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Beech Ridge Energy
Phase II Expansion/Modification

Figure 4

Cumulative Vegetated Viewshed*
Beech Ridge Energy Phase II Expansion/
Modification&Existing Beech Ridge Wind Farm

*- Assumes a uniform tree height of 40' (12.192m) in forested areas.

June 2011

Key

Number of Turbines Visible

- 1 - 15
- 16 - 30
- 31 - 45
- 46 - 60
- 61 - 75
- 76 - 90
- 91 - 105
- 106 - 114
- Proposed Wind Turbine (497' ht. to Blade Tip)
- Existing Wind Turbine (389' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
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- Scenic and Recreational Resources

PROJECT # 2010-044.10M

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File Location:
B:\GIS\2010\10044\Maps\Figure4_CumulativeViewshed_Veg-Adjusted.mxd

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Phase II Expansion/Modification

Figure 5

Cumulative Topographic Viewshed
Beech Ridge Energy Phase II Expansion/
Modification&Existing Beech Ridge Wind Farm
Areas of Additional Visibility

June 2011

Key

- Additional Visibility from Proposed Expansion
- Proposed Wind Turbine (497' ht. to Blade Tip)
- Existing Wind Turbine (389' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

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File Location:
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Beech Ridge Energy

Beech Ridge Energy
Phase II Expansion/Modification

Figure 6

Cumulative Vegetated Viewshed*
Beech Ridge Energy Phase II Expansion/
Modification&Existing Beech Ridge Wind Farm
Areas of Additional Visibility

*- Assumes a uniform tree height of 40' (12.192m) in forested areas.

June 2011

Key

- Additional Visibility from Proposed Expansion
- Proposed Wind Turbine (497' ht. to Blade Tip)
- Existing Wind Turbine (389' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
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Beech Ridge Energy

The majority of views of the Project will contain some turbines from the existing project. Exceptions occur south of the Project where discreet views of a small number of proposed turbines occur through valleys oriented in a northerly direction (i.e. Figure A5-B and A6-B) or where vegetation may block views of the existing turbines, but offer views of the proposed turbines (See Figure A2-B).

4.0 MITIGATION PROGRAM

The Project was designed in a manner to minimize potential visual impacts. Strategies include:

- To minimize visual complexity, all turbines will be of similar style as the existing Beech Ridge turbines. All turbines will have the same number of blades and rotate in the same direction.
- Turbines will not be used for commercial advertising, or include conspicuous lettering or corporate logos identifying the Project owner or equipment manufacturer.
- Subsurface routing of electrical interconnects used to transmit power between turbine locations will be maximized to the extent possible.
- The existing Beech Ridge O&M building and 138 kV transmission line will be utilized.
- Where possible, existing roadways should be utilized to provide access to the proposed turbine locations. Clearing along existing and new roadways should be kept to a minimum; however, it should not impede the transportation of materials.
- Vegetation clearing around the base of the turbines should be kept to a minimum; however, it should not impede operation.
- The color of the blades, nacelle, and tower will be a neutral off-white. Where specifications permit, non-specular paint will be used on all outside surfaces to minimize reflected glare.

5.0 SUMMARY AND DISCUSSION OF POTENTIAL VISUAL IMPACT

Viewshed Visibility Summary

The Vegetated Viewshed map (See Figure 2) indicates that approximately 96.9 percent of the study area will likely be screened from views of the proposed turbines due to intervening landform or vegetation. Additionally:

- 1-10 turbine's highpoints could potentially be visible from approximately 1.1 percent of the 20-mile study area;
- 11-30 turbine's highpoints could potentially be visible from approximately 1.0 percent of the 20-mile study area; and

- 31-47 turbine's highpoints could potentially be visible from approximately 1.0 percent of the 20-mile study area.

Turbine visibility is more common in the immediate vicinity and within five miles of the proposed turbines. Visibility within this area can be attributed to exposed ridge tops and slopes or ridges orientated toward the project. Smaller areas of visibility occur to the west and northwest of the Project in the 10-20 mile range. Filtered or framed views of the Project are possible through foreground vegetation and buildings in some community centers such as Quinwood and Craigsville. Visibility from the southeast lowland areas of the study area is very limited. This is generally due to the existence of interceding ridges and peaks between the lowlands and the project site.

It is likely that the overall visibility will be reduced, as only 33 of the 47 turbines included in this study will be constructed. This reduction is likely to affect multiple views throughout the study area. Additionally, the viewshed analysis considers visibility to the turbines blade tips in the upright position. This portion is the most narrow of a wind turbine and may not be discernable beyond 10 miles.

Simulation Summary

Table 5 summarizes the factors affecting visual impact that are described within this VRA for each of the eight simulated locations.

Photo simulations provided in Appendix A show that the existing Beech Ridge Wind Farm is visible from many of the locations where the proposed turbines are visible. Within foreground vantage points, all or most of the 263-foot tall turbine tower, nacelle and 271 foot diameter turbine rotor will be commonly visible above intervening vegetation. From middleground views a substantial portion of individual turbines will be seen above intervening landform and vegetation. Foreground and middleground vegetation and landforms will provide screening of both near and distant turbines. Intervening landform and vegetation will prevent many long distance views (background views). However, as illustrated in the simulations there are a number of opportunities, at higher elevations, to view all or most of the proposed turbines. At greater distances, the turbines will appear small and occupy a smaller portion of the overall view. Also, the final Project layout will be reduced by 14 turbines resulting in a fewer number of turbines that will be visible in some of the simulations.

Table 5 Photo Simulation Summary

VP Number	Location Description	Resource Number	Municipality	Inventory Type	Landscape Unit	Factors Affecting Visual Impact Viewer/ User Group(s)	Distance (miles) /Distance Zone (nearest visible turbine)	Moving/ Stationary
4	Beech Ridge Road, Greenbrier County	N/A	Richwood	N/A	Mountain	Local Residents/ Workers	1.5 Middleground	Moving
15	County Route 18 (Near US Route 39), Nicholas County	15	Summersville	US Highway	Mountain	Local Resident/ Workers & Through Travelers	13.3 Background	Stationary & Moving
18	SR Route 39, Nicholas County	15	Craigsville	US Highway	Mountain	Local Resident/ Workers & Through Travelers	6.8 Background	Stationary & Moving
41	Overlook Road (Cold Knob), Greenbrier County	N/A	Eastern	Unofficial Overlook	Mountain	Local Resident/ Workers	5.9 Background	Stationary
44	Deitz Farm Historic Property, County Route 28, Greenbrier County	47	Meadow Bluff	National Register Historic Site	Agricultural	Local Resident/ Workers	10.2 Background	Stationary
51	Village of Quinwood (Coal Miners Memorial), Greenbrier County	14	Quinwood	State Highway	Community Center	Local Resident/ Workers & Visitors & Tourists	2.2 Middleground	Stationary & Moving
55	Laurel Creek Road (Nr. General Lee Tree and the Midland Scenic Byway), Fayette County	38	Rainelle	Near Midland Scenic Byway	Mountain	Local Resident/ Workers & Visitors & Tourists	10.0 Background	Stationary
65	State Route 20, Nicholas County	14	Craigsville	State Highway	Mountain	Local Resident/ Workers & Visitors & Tourists	8.2 Background	Stationary & Moving

Impact on Visual Resources

The results of the viewshed analysis suggest that views of one or more turbines would occur at 32 of the 68 inventoried resources. The remaining 36 would be screened by intervening topography and vegetation.

Resources of National and Statewide Significance – The study area contains 68 resources of National and Statewide Significance. Based on the vegetated viewshed analysis (See Figure 2) 32 could potentially have views of the Project. Four of those are listed on the National Register of Historic Places, namely: Nicholas County High School, Carnifex Ferry State Park Historic District, Camp Washington-Carver Complex Historic District, and Deitz Farm Historic District. However, field confirmation suggests that views will not be available from the Camp Washington-Carver Complex Historic District and the Carnifex Ferry State Park

Historic District. The Deitz Farm Historic District is represented in the visual simulations (See Figure A5) and has a limited view of up to six proposed turbines. Views toward the Project were not observed from the main road outside the Nicholas County High School.

Field confirmation also suggests a substantial decrease in the number of potentially affected resources. This reduction in actual visibility can be attributed to the presence of multiple structures, and significantly higher forest vegetation than the conservative estimate of 40 feet used in the viewshed analysis. For example, views toward the proposed project were not observed from the Monongahela National Forest, the Cranberry Wilderness or the Gauley River NRA. In these three locations, the vegetation viewshed analysis suggests almost indistinguishable pockets of visibility. In reality, the small clearings suggested by the NLCD data (used for vegetative cover) were actually surrounded by mature dense vegetation in excess of 60 feet high. It is likely that this vegetation will close the visibility gaps in these small cleared areas.

While State, Interstate, and US Highways (including State and National Scenic Byways) are shown by the vegetated viewshed analysis to have visibility of the Project throughout the study area, these pockets of visibility will be localized and or short duration. Views were observed and documented along State Route 39, but not along the Highland National Scenic Byway portion of the highway. Several representative views from or near highways are represented in the simulations (Appendix A).

The vegetated viewshed analysis also suggests pockets of visibility from three State Parks, including: Babcock State Park, Carnifex Ferry State Park, and Beartown State Park. Field verification determined that views of the project would not be available from any of these state parks due to intervening vegetation in excess of 40 feet tall.

In addition to several Wildlife Management Areas, many trails fall within portions of the visible viewshed. Based on the size and frequency of these visible areas, if any views occur, it is unlikely that they will be prolonged or expansive.

Character of View

When visible from highpoints and vistas, the existing Beech Ridge turbines add a noticeable vertical element to the landscape from several locations within 10 miles of the Project. However, the turbines become much less noticeable beyond 10 miles. At a distance of 15-20 miles, in this dynamic landscape, some viewers may fail to notice the turbines. Despite these existing vertical elements, the addition of the proposed turbines on the horizon will expand the areas from which a distinct perpendicular element is visible. In locations where the existing turbines are not visible, or are partially visible, the proposed turbines will be the tallest visible elements and will be disproportionate to other built elements on the regional landscape. The moderately paced sweeping rotation of the turbine blades will heighten the conspicuity of the turbines no matter the degree of visibility. Although turbines exist in the study area and are visible from many locations, the Project may create an additional visual element within the landscape from some locations.

Affected Viewers

This portion of West Virginia is rural with a small population. According to the US Census, populations within the study area range from 4 people per square mile in the immediate Project vicinity, to 546 people per square mile in the higher density community centers (such as Summersville). Despite the relatively low population, the region can receive large numbers of tourists each year. Tourists often come to this region to enjoy the recreational and scenic resources of the area. The sensitivity of individuals to visual quality is variable; but to many, visual quality is an important and integral part of their outdoor experience. The presence of the existing and proposed wind turbines may diminish the aesthetic experience depending on the individual perception of the viewer. Visitors are generally sensitive to the visual quality and landscape character, regardless of the frequency of duration of their exposure to the proposed Project. Conversely, tourists may also find the Project visually interesting. It is not uncommon for tourists to intentionally visit an area to see the turbines and photograph them in the landscape. Additionally, some will see the turbines as a necessary part of the visual landscape to provide renewable power. To these viewers, the turbines may be less likely to impact their visual experience.

Other Project Components

Night Lighting – This region has very little existing light intrusion on the night sky. Existing residences and commercial buildings, communications towers, streetlights, and headlights from cars are generally the only point sources of light pollution in the study area. While red flashing aviation obstruction lights on existing turbines are visible nighttime elements within the study area, the additional concentration of lights within the turbine area may be evident from some locations. Although aviation obstruction lighting is generally directed upward, the relatively low intensity does not result in perceptible atmospheric illumination (sky glow). Currently, several existing turbines have FAA light fixtures that can be seen from multiple locations throughout the study area, but generally only a few lights can be seen from a given location since the lighted turbines are distributed across a relatively large geographic area. Although it is anticipated that every third turbine will be lit, it is reasonable to assume that the proposed Project will not add significantly to the existing visual intrusion caused by the FAA lights.

Roadways – Access roads to each turbine will be constructed in order for personnel to perform maintenance. These roadways will be similar in characteristic to local roadways visible throughout the study area. Where appropriate, local roadways may be improved (e.g. widened) so that large construction vehicles can transport materials to each turbine location. In some areas where logging or local roads do not currently exist, or where existing roads are inadequate, vegetative clearing may be necessary to construct new/expanded roads. This clearing may be apparent in the immediate vicinity of the project, but will likely become less evident or unperceivable from more distant locations. Generally, access roads are relatively minor components of the Project and it is anticipated that they will not be highly visible, or seen as being out of place, by local residents or passer-bys.

Construction Related Impacts – Construction of the Project will require the use of large mobile cranes and other large construction vehicles. Turbine components will be delivered in sections via large semi-trucks and stored at a designated laydown area until used. The construction period for each turbine is expected to be quite short. As such, construction related visual impacts will be brief and are not expected to result in adverse prolonged visual impact to area residents or visitors.

Cumulative Impact

With the existing Beech Ridge Wind Farm and introduction of the proposed Project, one or more turbines will be theoretically visible from approximately 5.7% of the 20-mile study area. The total cumulative visibility of the projects is approximately 56,985 acres. The Project, when compared to the existing Beech Ridge Wind Farm, would create an increase of 14,132 acres of visible viewshed area or a 1.4% increase within the 20-mile study area. This leaves a relatively small region from which the proposed Project can be viewed, without seeing the existing turbines.

The introduction of additional turbines within the same viewshed will increase the number of structures visible from most affected vantage points – thus creating a potential higher density of visible structures. However, visibility of both projects is dependent on viewer location/orientation, distance, and other factors discussed in the VRA. For example, Appendix A provides several instances in which the addition of the proposed turbines, in the context of the existing turbines provides very little additional visual intrusion (See Figure A4-B). In other areas, the proposed Project will infill areas of a view that did not previously contain wind turbines, thus the visibility from that position may increase slightly (See Figure A8-B). Further, in distant views where the existing turbines currently have little impact on the view, it is unlikely that the proposed turbines will add significantly to Project visibility or impact (See Figure A7-C).

Visual Impact Conclusion

Several views from within the study area will likely contain existing wind turbines, but it is also possible that previously unaltered views may have visibility of the Project. The level of impact will be dependent on the viewers sensitivity to visual change among other influencing factors discussed in the VRA. Where the Project is visible from longer distances (e.g.15-20 miles), it is unlikely to diminish the quality of the view and may go completely unnoticed by some people. Similarly, throughout the entire study area, views of the Project may, at first appear in contrast with the unaltered landscape, but over time will become an integral part of the landscape.

As suggested by the topographic and vegetated viewshed analysis, the majority of 20-mile study area will not have views of the proposed Project. Additionally, of the 68 identified resources, the viewshed analysis suggests that 36 will not have views of the proposed Project. Field verification suggests the number of visible resources will be significantly less due to vegetative cover in excess of 40 feet tall.

Based on the information presented in this VRA, the overall visibility is limited to small areas distributed throughout the study area. With up to 97 percent (based on Figure 2) of the study area screened from views of the proposed turbines, it is anticipated that in most locations, the Project will have little to no impact on the surrounding landscape.

Glossary[11]

Aesthetic impact: Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision-making. Instead a project, by virtue of its visibility, must clearly interfere with or reduce the public's enjoyment and/or appreciation of the appearance of an inventoried resource (e.g. cooling tower plume blocks a view from a State Park overlook).

Aesthetically significant place: A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, millions of people visit Niagara Falls on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Niagara Falls (a designated State Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the state probably has Statewide Significance. A place visited primarily by people whose place of origin is local generally is generally of local significance. Unvisited places either have no significance or are "no trespass" places.

Aesthetic Quality: There is a difference between the quality of a resource and its significance level. The quality of the resource has to do with its component parts and their arrangement. The arrangement of the component parts is referred to as composition. The quality of the resource and the significance level are generally, though not always, correlated.

Atmospheric perspective: Even on the clearest of days, the sky is not entirely transparent because of the presence of atmospheric particulate matter. The light scattering effect of these particles causes atmospheric or aerial perspective, the second important form of perspective. In this form of perspective there is a reduction in the intensity of colors and the contrast between light and dark as the distance of objects from the observer increases. Contrast depends upon the position of the sun and the reflectance of the object, among other items. The net effect is that objects appear "washed out" over great distances.

Control Points: The two end points of a line-of-sight. One end is always the elevation of an observer's eyes at a place of interest (e.g. a high point in a State Park) and the other end is always an elevation of a project component of interest (e.g. top of a stack of a combustion facility or the finished grade of a landfill).

Line-of-sight profile: A profile is a graphic depiction of the depressions and elevations one would encounter walking along a straight path between two selected locations. A straight line depicting the path of light received by the eye of an imaginary viewer standing on the path and looking towards a predetermined spot along that path constitutes a line-of-sight. The locations along the path where the viewer stands and looks are the control points of the line-of-sight profile.

Scientific Perspective: Scientific, linear, or size perspective is the reduction in the apparent size of objects as the distance from the observer increases. An object appears smaller and smaller as an observer moves further and further from it. At some distance, depending upon the size and degree of contrast between the object and its surroundings, the object may not be a point of interest for most people. At this hypothetical distance it can be argued that the object has little

[11] NYSDEC Visual Policy (2000) pp. 9-11.

impact on the composition of the landscape of which it is a tiny part. Eventually, at even greater distances, the human eye is incapable of seeing the object at all.

Viewshed: A map that shows the geographic area from which a proposed action may be seen is a viewshed.

Visual Assessments: Analytical techniques that employ viewsheds, and/or line-of-sight profiles, and descriptions of aesthetic resources, to determine the impact of development upon aesthetic resources; and potential mitigation strategies to avoid, eliminate or reduce impacts on those resources.

Visual impact: Visual impact occurs when the mitigating effects of perspective do not reduce the visibility of an object to insignificant levels. Beauty plays no role in this concept. A visual impact may also be considered in the context of contrast. For instance, all other things being equal, a blue object seen against an orange background has greater visual impact than a blue object seen against the same colored blue background. Again, beauty plays no role in this concept.

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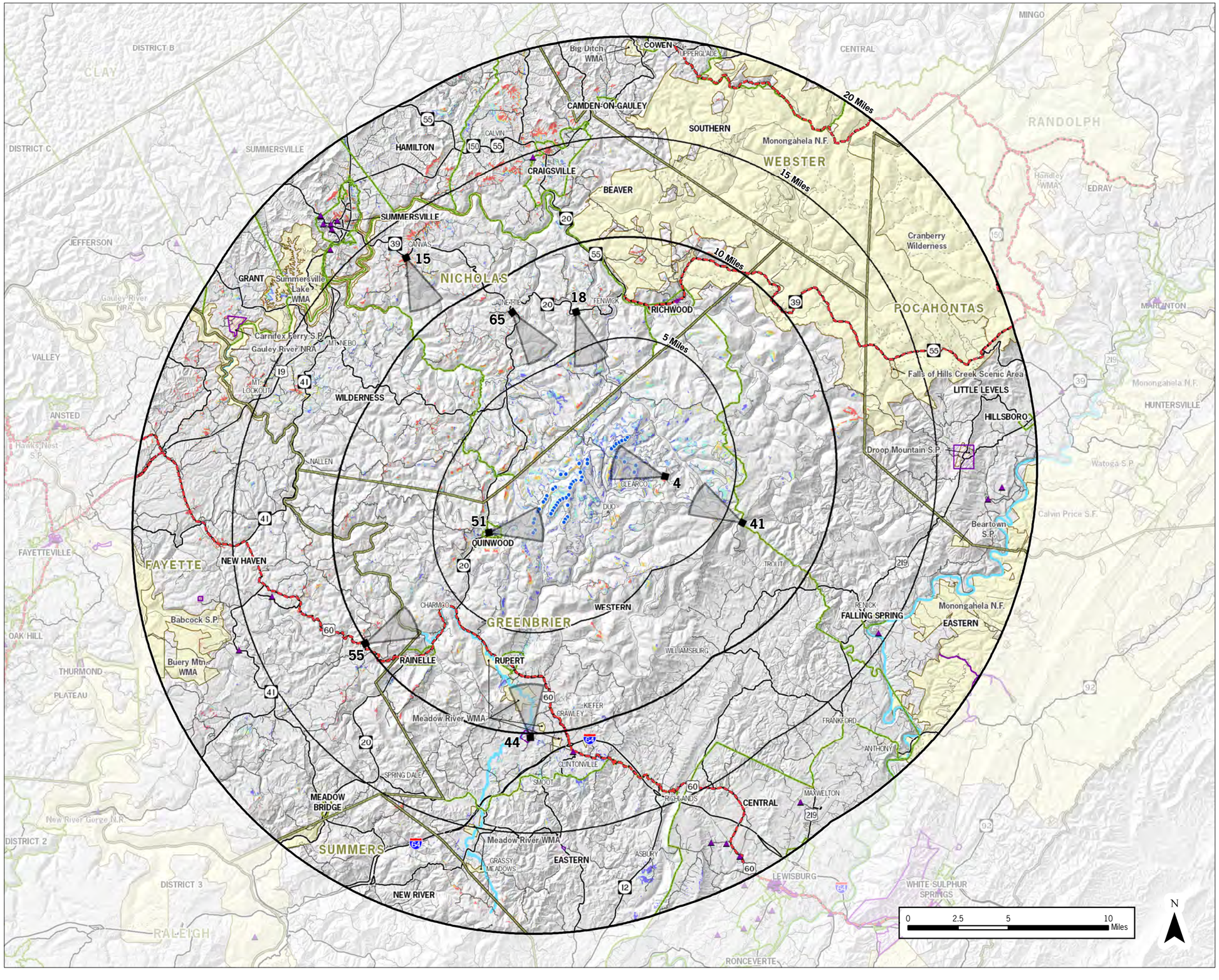
Appendix A
Photographic Simulations



Beech Ridge Energy
Phase II Expansion/Modification

Figure A1

Vegetated Viewshed*
With Photosimulation Locations

*- Assumes a uniform tree height of 40' (12.192m) in forested areas.

June 2011

Key

Number of Turbines Visible*

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 47

41 Simulation Location & Viewer Direction

- Proposed Wind Turbine (497' ht. to Blade Tip)
- National Register of Historic Places
- Historic Districts
- Scenic Byways
- Federal Highways, State Routes
- County Routes
- Local Roads
- Major Rivers
- Municipal Boundaries
- County Boundaries
- Scenic and Recreational Resources

PROJECT # 2010-044.10M

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\GIS\2010\10044\Maps\FigureA1_SimulationLocation.mxd

SARATOGA ASSOCIATES

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New York City > Saratoga Springs > Syracuse

Beech Ridge Energy

Existing Condition

Beech Ridge Energy

FIGURE A2-A

Photo Simulation

Viewpoint 4 - Beech Ridge Road, Greenbrier County

Approximately 1.5 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A2-B

Photo Simulation

Viewpoint 4 - Beech Ridge Road, Greenbrier County

Approximately 1.5 Miles From Nearest Proposed Project Turbine in View

Existing Condition

FIGURE A3-A

Photo Simulation

Viewpoint 15 - County Route 18 (Near State Route 39), Nicholas County

Approximately 13.3 Miles From Nearest Proposed Project Turbine in View

Beech Ridge Energy

SARATOGA ASSOCIATES

Photo Simulations should be viewed in full color and 11"x17" format .

Proposed Condition

Beech Ridge Energy

FIGURE A3-B

Photo Simulation

Viewpoint 15 - County Route 18 (Near State Route 39), Nicholas County

Approximately 13.3 Miles From Nearest Proposed Project Turbine in View

Proposed Condition - 2X Magnification

Beech Ridge Energy

FIGURE A3-C

Photo Simulation

Viewpoint 15 - County Route 18 (Near State Route 39), Nicholas County

Approximately 13.3 Miles From Nearest Proposed Project Turbine in View

Existing Condition

Beech Ridge Energy

FIGURE A4-A

Photo Simulation

Viewpoint 18 - State Route 39, Nicholas County

Approximately 6.8 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A4-B

Photo Simulation

Viewpoint 18 - State Route 39, Nicholas County

Approximately 6.8 Miles From Nearest Proposed Project Turbine in View

Existing Condition

Beech Ridge Energy

FIGURE A5-A

Photo Simulation

Viewpoint 41 - Overlook Road (Cold Knob), Greenbrier County

Approximately 5.9 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A5-B

Photo Simulation

Viewpoint 41 - Overlook Road (Cold Knob), Greenbrier County

Approximately 5.9 Miles From Nearest Proposed Project Turbine in View

Existing Condition

Beech Ridge Energy

FIGURE A6-A

Photo Simulation

Viewpoint 44 - Deitz Farm Historic Property, County Route 28, Greenbrier County

Approximately 10.2 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A6-B

Photo Simulation

Viewpoint 44 - Deitz Farm Historic Property, County Route 28, Greenbrier County

Approximately 10.2 Miles From Nearest Proposed Project Turbine in View

Proposed Condition - 2X Magnification

Beech Ridge Energy

FIGURE A6-C

Photo Simulation

Viewpoint 44 - Deitz Farm Historic Property, County Route 28, Greenbrier County

Approximately 10.2 Miles From Nearest Proposed Project Turbine in View

Existing Condition

Beech Ridge Energy

FIGURE A7-A

Photo Simulation
Viewpoint 51 - Village of Quinwood (Coal Miners Memorial), Greenbrier County
Approximately 2.2 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A7-B

Photo Simulation
Viewpoint 51 - Village of Quinwood (Coal Miners Memorial), Greenbrier County
Approximately 2.2 Miles From Nearest Proposed Project Turbine in View

Existing Condition

Beech Ridge Energy

FIGURE A8-A

Photo Simulation

Viewpoint 55 - Laurel Creek Road (Nr. General Lee Tree and the Midland Scenic Byway), Fayette County

Approximately 10.0 Miles From Nearest Proposed Project Turbine in View

Proposed Condition

Beech Ridge Energy

FIGURE A8-B

Photo Simulation

Viewpoint 55 - Laurel Creek Road (Nr. General Lee Tree and the Midland Scenic Byway), Fayette County

Approximately 10.0 Miles From Nearest Proposed Project Turbine in View

Proposed Condition - 2X Magnification

Beech Ridge Energy

FIGURE A8-C

Photo Simulation

Viewpoint 55 - Laurel Creek Road (Nr. General Lee Tree and the Midland Scenic Byway), Fayette County

Approximately 10.0 Miles From Nearest Proposed Project Turbine in View

Existing Condition

FIGURE A9-A

Photo Simulation

Viewpoint 65 - State Route 20, Nicholas County

Approximately 8.2 Miles From Nearest Proposed Project Turbine in View

Beech Ridge Energy

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Photo Simulations should be viewed in full color and 11"x17" format .

Proposed Condition

Beech Ridge Energy

FIGURE A9-B

Photo Simulation

Viewpoint 65 - State Route 20, Nicholas County

Approximately 8.2 Miles From Nearest Proposed Project Turbine in View