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PPRP

Environmental Review of the Proposed Synergics Roth Rock Wind Power Project

August 2011

MARYLAND POWER PLANT RESEARCH PROGRAM

Martin O'Malley, Governor ♦ Anthony G. Brown, Lt. Governor

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Environmental Review of the Proposed Synergics Roth Rock Wind Power Project

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FOREWORD

This report was prepared under the direction of John Sherwell at the Maryland Department of Natural Resources, Power Plant Research Program (PPRP). Under contract to PPRP, the following organizations were responsible for conducting the work associated with this environmental review:

- Environmental Resources Management, Inc., Annapolis, MD, under Contract # K00B5200072;
- Versar, Inc., Columbia, MD, under Contract # K00B5200176; and
- Metametrics, Inc., Charlottesville, VA, under subcontract to Exeter Associates (Contract #K00B5200175).

ABSTRACT

This environmental review summarizes the State of Maryland's evaluation of the potential environmental and cultural resource impacts of the proposed Synergics Roth Rock Wind Power plant in Garrett County, Maryland.

The Maryland Department of Natural Resources (DNR) Power Plant Research Program (PPRP), coordinating with other State agencies prepared this environmental review document as part of the PSC licensing process, pursuant to Section 3-304 of the Natural Resources Article of the Annotated Code of Maryland. The results of PPRP's analyses were used, as necessary, as the basis for establishing recommended license conditions, pursuant to Section 3-306 of the Natural Resources Article. PPRP's recommendations are made in concert with other programs within DNR as well as other Executive Branch State Agencies – Departments of Agriculture, Business and Economic Development, Environment, Planning, and Transportation, and the Maryland Energy Administration.

As originally proposed, the Roth Rock Wind Power facility would consist of up to 24 wind turbines, with a total maximum generating capacity of 40 MW. The project is recognized as having air quality benefits due to the fact that wind energy is emissions free. The State evaluated the potential for adverse impacts, particularly with respect to ecological impacts, visual impacts, and noise. Detailed evaluation of bird and bat impacts led to recommended licensing conditions that require the applicant to perform post-construction mortality studies.

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1.0 INTRODUCTION

Synergics Wind Energy, LLC, has applied to the Maryland Public Service Commission (PSC) for approval to construct a wind power facility in Garrett County on Backbone Mountain. The proposed project would consist of a maximum of 24 turbines with a total generating capacity of up to 40 megawatts (MW).

Before the facility can be constructed, Synergics must obtain a Certificate of Public Convenience and Necessity (CPCN) from the PSC. As part of the licensing process, the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources (DNR) has evaluated the facility's potential impacts to environmental and cultural resources in Maryland, pursuant to Section 3-304 of the Natural Resources Article of the Annotated Code of Maryland. This environmental review was performed in coordination with other State agencies.

PPRP used the analysis of potential impacts as the basis for establishing initial recommended license conditions for operating the proposed facility, pursuant to Section 3-306 of the Natural Resources Article. PPRP's recommendations are made in concert with other programs within DNR as well as the Departments of Agriculture, Business and Economic Development, Environment, Planning, and Transportation, and the Maryland Energy Administration. The recommended conditions are included in Appendix A.

Synergics applied for a CPCN in June 2004, and the Hearing Examiner issued a proposed order in October 2006. The order, if finalized, would have granted the CPCN with the conditions recommended by PPRP; the proposed order is included in Appendix B. However, Synergics appealed the proposed order and ultimately withdrew its application in May 2008 following an amendment by the Maryland General Assembly to the CPCN application procedure. Wind power generation facilities may now request a waiver of the CPCN requirement under the following conditions:

- the generating station is land-based;
- the capacity of the generating station does not exceed 70 MW;
- the electricity that my be exported for sale from the generating station to the electric system is sold only on the wholesale market

pursuant to an interconnection, operation, and maintenance agreement with the local electric company; and

- the Commission provides an opportunity for public comment at a public hearing.

Such facilities will still be subject to any federal, State, and local approvals needed to address (among other things) erosion and sediment control, Federal Aviation Administration lighting requirements, and threatened and endangered species impacts.

This document describes the analysis that was conducted by PPRP during the licensing proceeding. The applicant did seek and receive from the PSC a waiver from the CPCN process. Hence this document does not reflect subsequent design changes that occurred during the development of the wind facility plan. A modified version of the wind turbine facility was constructed and began commercial operation in August 2011.

1.1 SITE DESCRIPTION

The proposed wind power site is located along an undeveloped ridge of Backbone Mountain, in the vicinity of Table Rock and Roth Rock, extending approximately 3 miles along Backbone Mountain. For most of the site's length, the ridge has a steep slope on the northwest side. Site elevation is generally more than 3,100 feet above mean sea level. Figure 1-1 shows the general site location.

The proposed facility would be constructed on private lands consisting of mostly wooded areas. Over time, almost all of the land has been selectively logged. The Mettiki deep mine is adjacent to and east of the southern portion of the site. More details on the ecological characteristics of the site are included in Section 2 of this report; Section 3 discusses the socioeconomic setting.

1.2 DESCRIPTION OF PROPOSED FACILITY

The proposed facility will consist of up to 24 wind turbines of 1.65 MW capacity each, to be located on lands under easement located on Backbone Mountain near Roth Rock. The wind power facility will have a maximum generating capacity of approximately 40 MW.

In addition to the turbines themselves, the facility will include an underground electric energy collection system, pad-mounted

transformers, a substation, and an automated data acquisition and control system. Three meteorological data collection towers equipped with anemometer cups and wind direction sensors will also be located within the project site.

The project will connect to an existing Allegheny Power Company 138-kV transmission line passing near the site. Synergics' project will include an on-site substation and transformer(s) where the output of all turbines will be collected and stepped up to 138 kV. The remainder of the interconnection equipment will belong to Allegheny Power and is not a part of this application.

The actual wind turbine model to be installed is currently being determined; however, the size of the wind turbines is based upon the 1.65 MW unit manufactured by NEG Micon (now acquired by Vestas Wind Systems). A comparable established manufacturer with a unit of proven design, reliability, reputation, cost effectiveness, efficiency, and availability may be considered, depending upon changing project and market conditions. DNR's analysis was based upon quantitive information regarding number of turbines, noise emissions, total vertical reach above ground level, and total swept area of all the rotors. In general, the State's impact evaluation included in this environmental review document would be valid for any turbine design that does not exceed the values of these parameters.

The NEG Micon model that may be specified for this project uses a three-bladed rotor with pitch regulation to maximize power output. Each turbine will be mounted on top of a free-standing tubular tower approximately 262 feet in height. With the rotor and the blades mounted to the tower, the maximum height of the unit will be approximately 390 feet. Each tower will be secured by a concrete foundation and will be accompanied by a pad-mounted transformer on a steel reinforced concrete slab. The pad-mounted transformer will collect the power from the turbines and transfer it to the substation via the underground electrical collection system. Both the transmission and communication cables running from the turbines to the proposed substation will be buried in trenches running along the access roads for the site.

The on-site substation yard will be approximately 150 feet by 150 feet with a gravel finish and will be completely fenced. A small control room will be located within the fenced substation yard and will house all of the safety and control systems.

Synergics filed a request for interconnection with PJM, the regional electricity grid operator, in January 2005. Feasibility and system impact studies will be performed to determine the interconnection needs and to identify any local system reinforcements required to run the facility at full capacity. The schedule for a completed Interconnection Agreement is not known at this time.

1.3 BACKGROUND ON WIND POWER

Wind energy is a form of solar energy, as wind is the movement of air caused by the uneven heating of the earth's surface by the sun. Because warm air is less dense than cooler air and tends to rise while cooler air sinks, the movement of air (wind) occurs as a result. This is further accentuated by the tilt of the earth's axis, the earth's rotation around the sun, the uneven heating of the atmosphere by the sun, and the irregularities of the earth's surface. A wind energy turbine converts the kinetic energy of wind into mechanical energy that can be used for specific tasks (e.g., grinding grain or pumping water) or to power an electrical generator.

Wind energy has been used for thousands of years to move ships, grind grain, and pump water. Some documentation exists that wind energy was used to move boats along the Nile River as early as 5000 B.C. In the United States, millions of windmills were constructed during the settling of the western region of the country in the 19th century. By 1900, small wind turbines were designed to generate direct current electricity, but many wind turbines fell into disuse when grid power was extended to rural areas in the 1930s (DOE 2002).

1.3.1 Types of Wind Turbine Designs

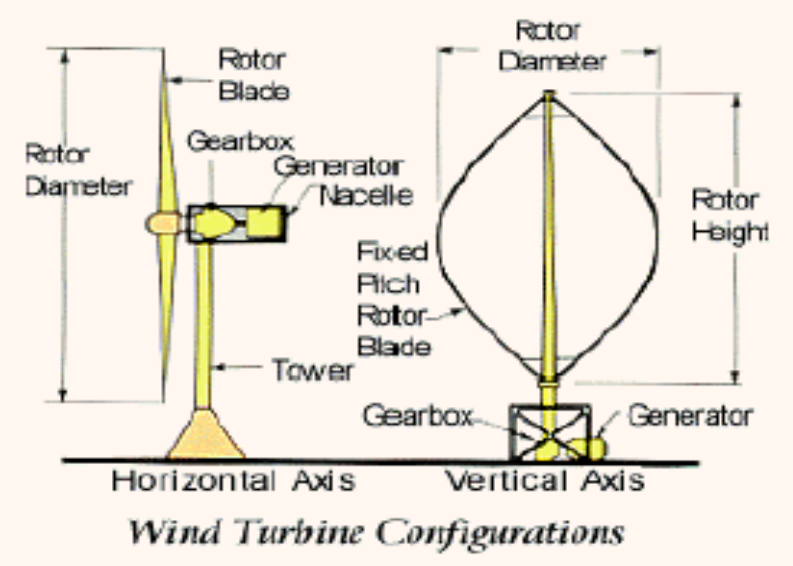
The basic turbine design is a horizontal axis wind turbine, or HAWT that constitutes most of the utility-scale (generally 100 kW or higher) wind turbines. HAWTs typically have two or three rotor blades; a few early models had four or five. HAWTs can be further categorized into upwind machines, where the blades turn in front of the tower, and downwind machines, where the blades turn in the back.

Another, less common turbine design is the vertical axis, or "egg-beater" wind turbine, also known as a VAWT turbine. The VAWT wind turbine turns around a vertically mounted rotor like a spinning coin. The VAWT wind turbine can accept wind from any direction and does not need a

large tower. However, higher costs and poor performance have held the VAWT back, and no wind turbine company offers VAWTs commercially.

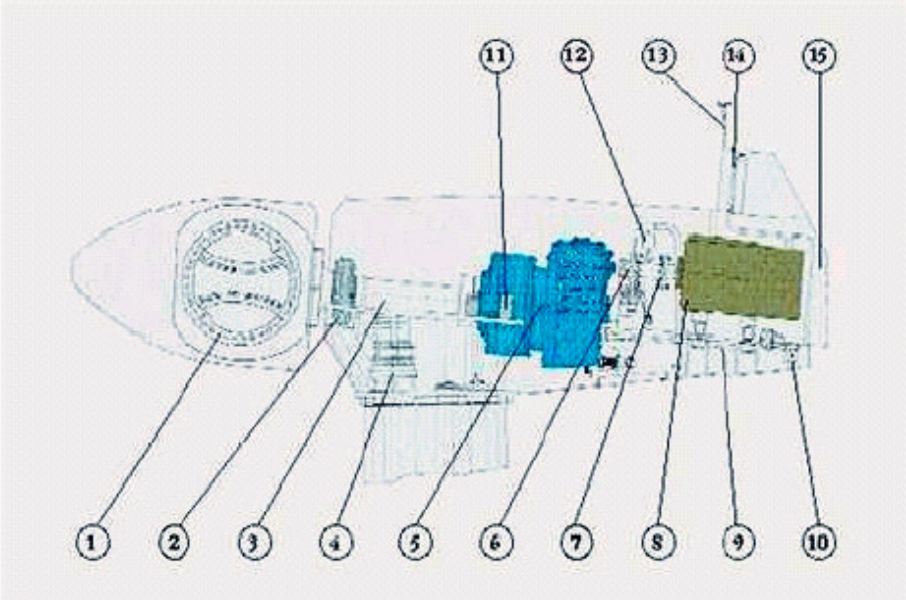
Wind turbine components include a *rotor* or *blades* that turn the energy of the wind into rotational shaft energy; a *nacelle* that is the enclosure which contains the *drive train*, *gearbox,* and a *generator*; a *tower* that supports the rotor and drive train; and electronic equipment such as controls, electrical cables, and equipment to interconnect the wind turbine to the utility grid (see Figure 1-2). Figure 1-3 illustrates the inside of the nacelle of a wind turbine.

Figure 1-2 Types of Wind Turbine Designs



Source: AWEA 2004.

Figure 1-3 The Components of a Wind Turbine Nacelle



1. Spherical hub
2. Main bearing
3. Main shaft
4. Yaw gear
5. Gearbox
6. Fail safe hydraulic disc brake unit
7. Flexible coupling
8. Liquid-cooled generator
9. Frame
10. Heat exchanger for cooling of the gearbox oil
11. Gearbox suspension
12. Crane for maintenance work
13. Anemometer and wind vane
14. Radiator
15. Cover

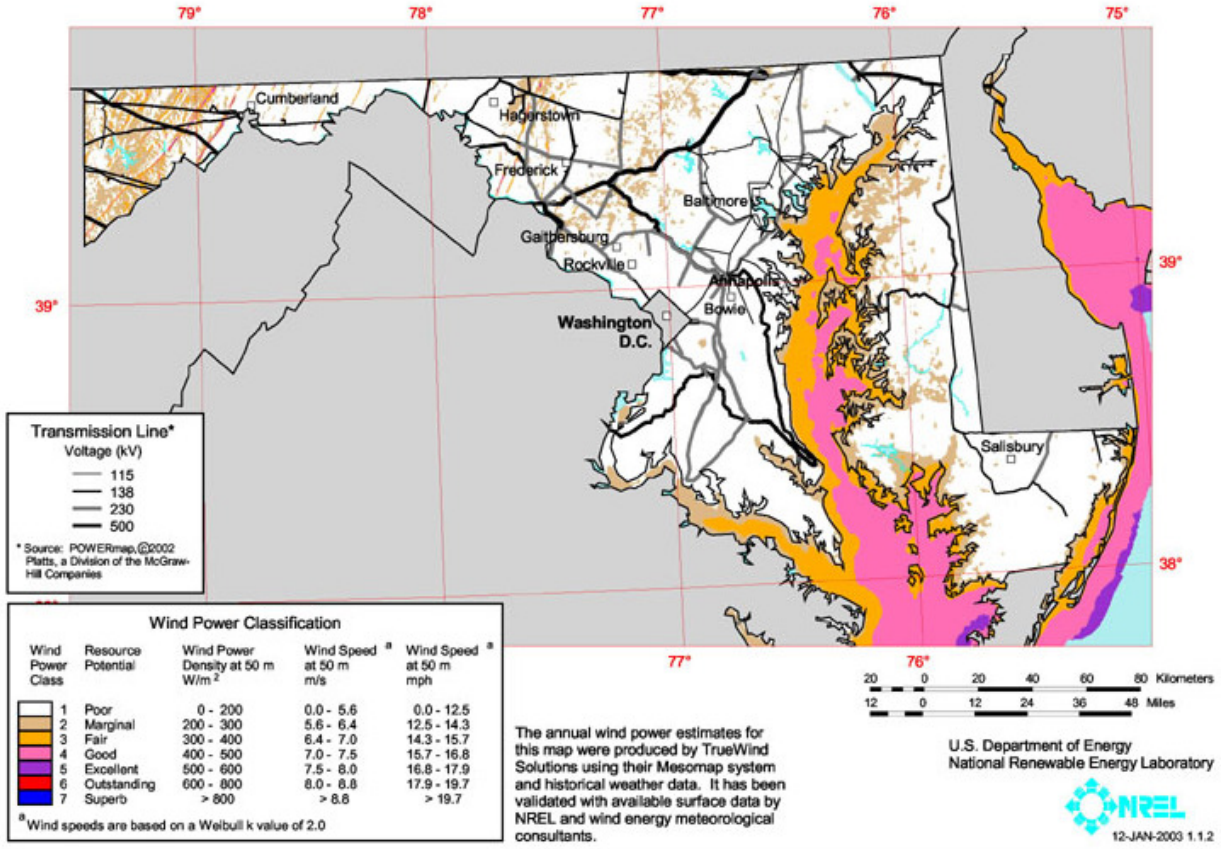
Source: AWEA 2002.

For electricity applications, wind turbines are generally grouped together in "wind power plants" or "wind farms." Wind power plants can range in capacity from a few megawatts to hundreds of megawatts.

1.3.2 Wind Resources

Wind resources for electricity generation are categorized into "resource classes," with Class 1 the lowest (zero mph to 12.5 mph) and Class 7 the highest (greater than 19.7 mph). Generally, utility-scale wind projects need at least Class 2 wind resources (12.5 mph and higher), and become more economically attractive as wind speed increases. Maryland's best onshore wind resources are found in the western part of the state (see Figure 1-4).

Figure 1-4 Wind Resources in Maryland



Source: DOE 2004a.

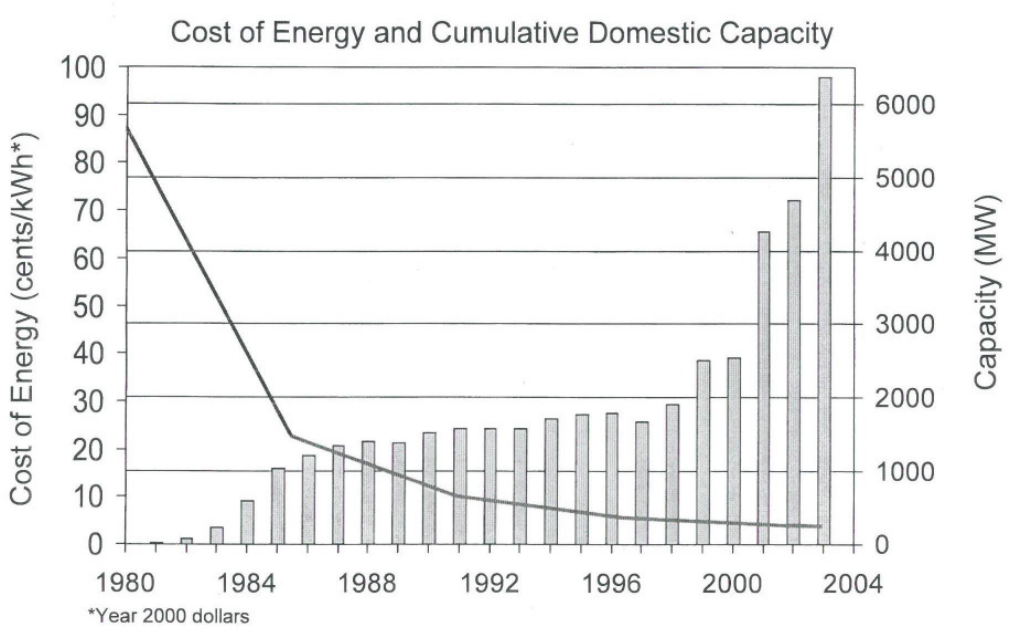
Wind speed is a critical element in wind project development. The power accessible in the wind is proportional to the cube of the wind speed, meaning that doubling the wind speed increases the available wind power by a factor of eight. Therefore, a 3 percent difference in average wind speed can change power production by almost 10 percent. Indeed, a one mph difference in wind speed can affect wind energy costs by about 0.5 cents per kWh (Parsons 2000).

1.3.3 Market Status of Wind Energy

Wind energy is the world's fastest growing energy resource, with more than 47,000 megawatts installed around the world as of the end of 2004 (GWEC 2005). As of the end of 2004, wind energy capacity in the United States was at 6,740 MW. Of this, 1,687 MW of wind energy capacity came on-line in 2003 and 389 MW in 2004. The American Wind Energy Association projects that more than 2,000 MW of additional wind energy capacity will come on-line in the United States in 2005 (AWEA 2005a).

Wind's growth has been driven by a combination of environmental benefit (as an electricity generating technology with no emissions) and increased cost-competitiveness. The cost of wind-generated electricity at good wind sites has dropped from more than 85 cents/kWh (year 2000 dollars) in 1980 to as low as 3-6 cents/kWh today (see Figure 1-5). However, it appears that wind generating costs will increase somewhat in 2005, and perhaps in 2006, because of unfavorable exchange rates between the U.S. dollar and the euro, surging worldwide demand for steel, and a correspondingly high demand for wind turbines.[1]

Figure 1-5 Wind Energy Capacity and Cost Trends



Source: DOE.

[1] The higher number (6 cents/kWh) is from U.S. Department of Energy. *Wind Power Today and Tomorrow*, DOE/GO-102004-1894, March 2004, p. 3. DOE uses a range of 4 to 6 cents/kWh. Assumptions include balance sheet financing, 30 year levelized cost in 2002 dollars, a project of 100 wind turbines or larger, and no financial incentives such as the federal production tax credit. Available at http://www.nrel.gov/docs/fy04osti/34915.pdf. The 3 cents/kWh is from Parsons 2000. See also Ryan Wiser, "An Overview of Policies Driving Wind Power Development in the West," Presentation Before the National Wind Coordinating Committee's Western Transmission Workshop, February 1, 2005. Available at http://www.nationalwind.org/events/transmission/western/2005/presentations/Wiser.pdf.

The drop in cost of wind-generated electricity can be attributed to technological advances and scale economies. Wind energy costs dropped by 15 percent with each doubling of installed wind capacity worldwide, and wind capacity doubled three times during the 1990s (AWEA 2001). Contributing factors include using much larger turbines and rotor diameters. Table 1-1 presents the characteristics of wind generating plants in 1981 and 2000. As can be seen, wind generating projects in 2000 generated 120 times more energy than wind projects installed in 1981, at only 20 times the cost (AWEA 2001). Wind projects installed in 2005 will continue this trend of using larger turbines and rotor diameters, although as noted before, wind energy costs may rise somewhat because of unfavorable exchange rates, worldwide demand for steel, and a high demand for wind turbines.

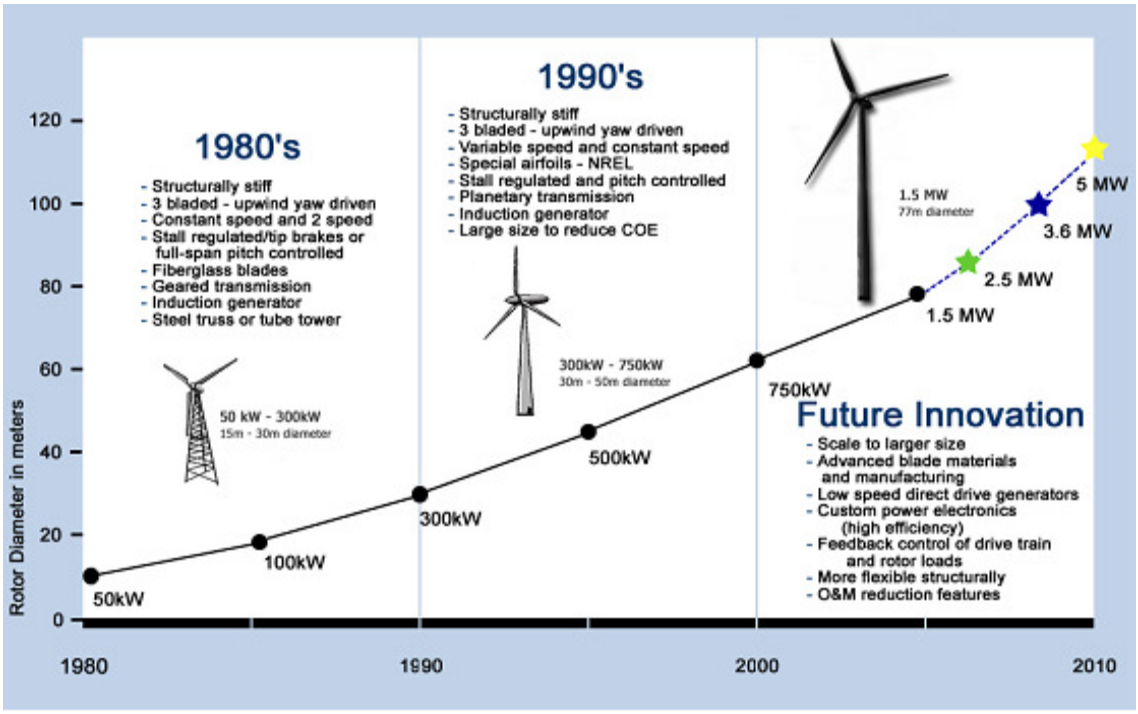
Table 1-1 Characteristics of Wind Projects Installed in 1981, 2000, and 2005

	1981	**2000**	**2005**
Rated Capacity	25 kW	1,650 kW	1,800 kW
Rotor Diameter	10 meters	71 meters	80 meters
Total Cost ($000)	$65	$1,300	$1,890 - $2,520
Cost Per kW	$2,600	$790	$1,050 - $1,400
Output, MWh/year	45	5,600	5,990

Source: AWEA 2005b for 1981 and 2000. Estimates for 2005 are based on wind turbines being installed in the U.S. in 2004 and 2005.

Figure 1-6 illustrates the changes in wind turbine development, in size and in technology, as well as potential changes that may be forthcoming in the future.

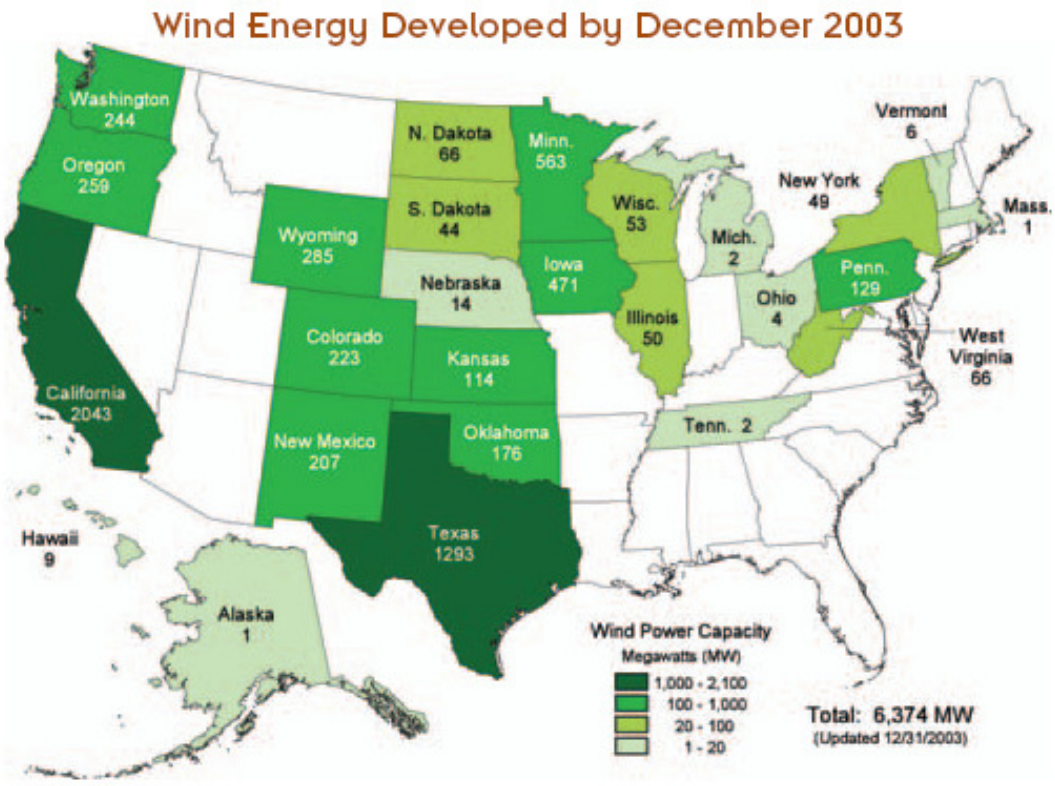
Figure 1-6 The Evolution of Commercial U.S. Wind Technology



Source: Flowers 2005.

Wind development occurred first in California, thanks to a combination of tax incentives and favorable utility power purchase contracts. California still has the most installed wind energy capacity in the United States, followed by Texas (see Figure 1-7). More recently, wind power development has been spurred at least in part by state renewable portfolio standards and the Federal Production Tax Credit, both of which are discussed in the next section.

Figure 1-7 Installed Wind Energy Capacity by State in December 2003



Source: DOE 2004b.

1.4 *RENEWABLE ENERGY POLICY*

There are two significant policy initiatives that are affecting the timing of the Synergics licensing case, as well as other renewable energy projects in Maryland. These initiatives are the Federal Production Tax Credit for wind power and other renewable energy technologies, and the renewable portfolio standards recently enacted in Maryland and several other states in our region.

1.4.1 *Federal Production Tax Credit*

As part of the Energy Policy Act of 1992 (EPAct), Congress enacted a Production Tax Credit (PTC) for wind power and closed-loop biomass projects that become operational by a statutory deadline. The PTC provides an inflation-adjusted 1.5 cents-per-kWh tax credit for energy produced from wind and closed-loop biomass for 10 years. The PTC can

offset nearly a third of the capital cost of a wind power project, and has been a major impetus for the doubling of installed wind capacity since 2000.

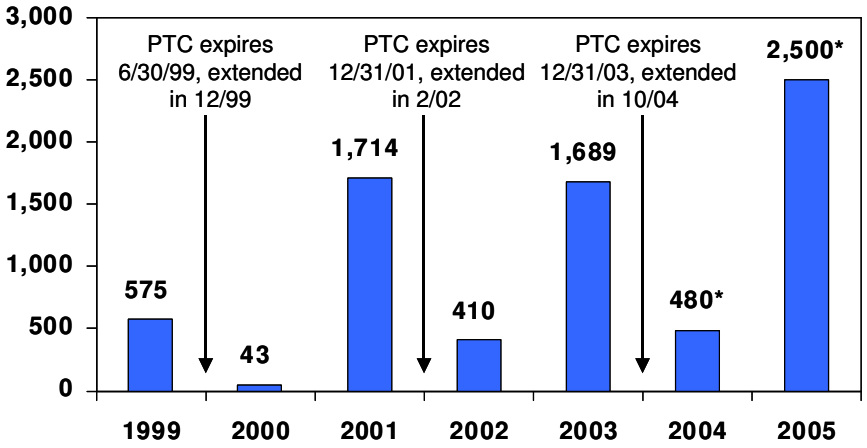
The PTC has expired three times in the past five years. In each instance, Congress has extended the PTC but for shorter periods than the five years authorized in EPAct. The PTC began in June 1994 and was allowed to expire in June 1999. Congress extended the PTC in December 1999 until the end of December 2001. Again, the PTC expired, and again, Congress extended the PTC in March 2002, to expire at the end of 2003. The PTC lapsed again, and Congress did not extend the PTC until September 2004. At that time, Congress extended the PTC for wind energy and closed-loop biomass and made several other renewable energy technologies eligible for the PTC as well, although at different incentive levels and for different lengths of time. For all eligible renewable energy technologies, the PTC is scheduled to expire again at the end of 2005. Table 1-2 lists the technologies eligible for the PTC, the amount of the credit (in cents/kWh), and the number of years that the PTC is available for each renewable technology.

Table 1-2 Availability and Length of PTC by Technology

Technology	Level of PTC per kWh	Availability of PTC (years)
Closed-loop Biomass	1.8¢	10
Open-loop Biomass	0.9¢	5
Geothermal	1.8¢	5
Irrigation Water	0.9¢	5
Landfill Methane	0.9¢	5
Municipal Solid Waste	0.9¢	5
Solar	0.9¢	5
Wind	1.8¢	5

The on-again, off-again availability of the PTC has led to a "boom/bust" cycle for the wind industry (see Figure 1-8). It also can lead to wind companies requesting expedited regulatory treatment for permit applications.

Figure 1-8 U.S. Wind Power Capacity Additions, 1995-2005

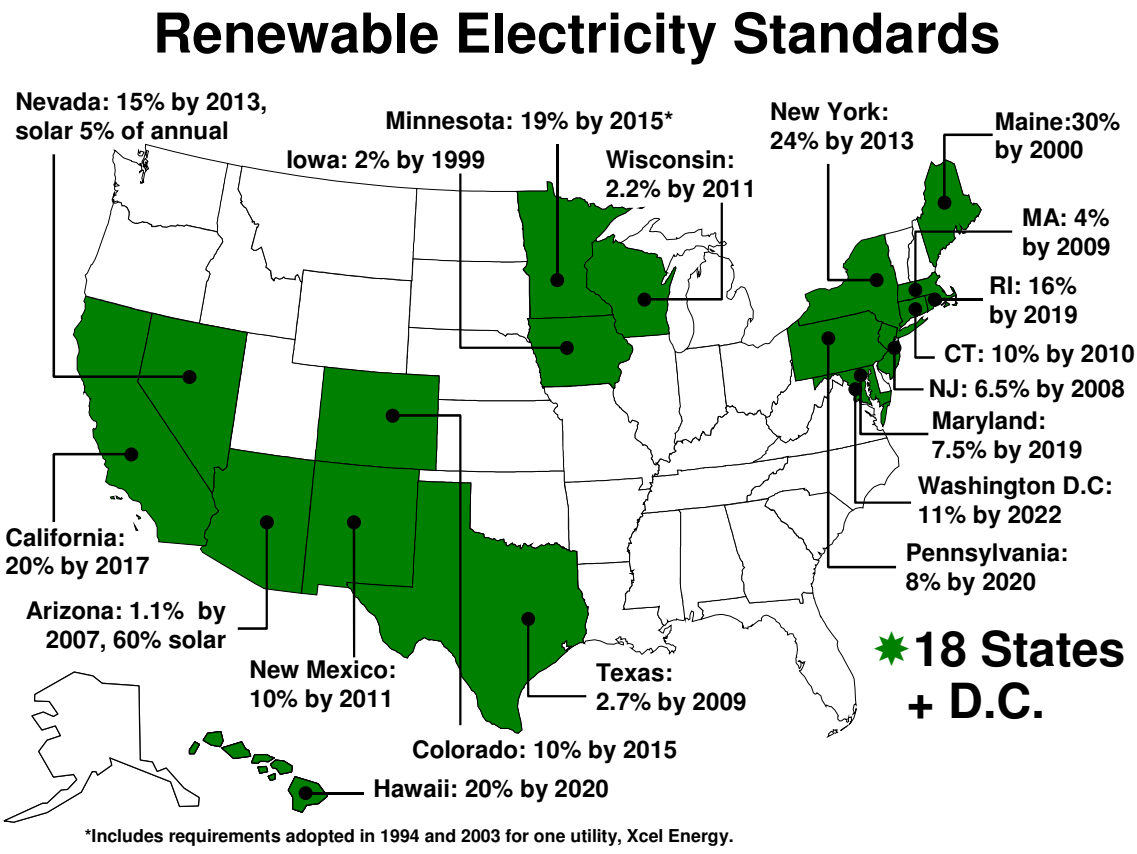


Source: Union of Concerned Scientists 2005.

1.4.2 State Renewable Portfolio Standards

A renewable portfolio standard (RPS) is a requirement on load-serving entities (such as electric utilities) that a certain percentage of the energy used to serve retail customers come from eligible renewable energy sources. In some instances, renewable energy credits (RECs), representing a megawatt-hour of renewable generation, are used to comply with a state RPS. Eighteen states and the District of Columbia have RPS policies in place or pending (see Figure 1-9).

Figure 1-9



Source: Union of Concerned Scientists 2005.

In 2004, Maryland, Pennsylvania, and the District of Columbia all enacted RPS policies, joining New Jersey, which adopted an RPS in 1999 and significantly revamped it in 2004. As is typical with many other state RPS policies, the mid-Atlantic state RPS policies will rely on the selling and trading of RECs as a compliance mechanism and as a means of minimizing the above-market costs of renewable energy technologies. RECs represent the non-energy attributes of renewable energy, such as cleaner air or water, and can be viewed as the monetary premium for renewable energy resources. All of the states envision using the Generator Attribute Tracking System (GATS) that is under development by PJM, scheduled to become operational in mid-to-late 2005. Table 1-3 summarizes the various RPS policies in place in the District of Columbia, Maryland, New Jersey, and Pennsylvania. Wind is an eligible renewable resource under all the mid-Atlantic states' RPS policies. The impact of these RPS policies is to ensure a market for projects such as the proposed Roth Rock wind facility.

Table 1-3 Provisions of Mid-Atlantic State Renewable Portfolio Standard Policies

State	Level of RPS	Eligible Technologies
District of Columbia	Tier 1 renewables: 1.5% in 2007, increasing 0.5% per year to 7.5% in 2019, to 8.5% in 2020, 9.5% in 2021, and 11% in 2022 and thereafter. Of this, 0.005% must come from solar in 2007, rising to 0.386% in 2022 and thereafter. Tier 1 or 2 renewables: 2.5% from 2007-2015, decreasing by 0.5% per year to 0% in 2020 and thereafter.	Tier 1: "Demand metered" solar, wind, qualifying biomass, methane from landfills and wastewater treatment plants, ocean, and fuel cells from biomass or methane. Tier 2: Hydro and municipal solid waste (MSW) in operation as of January 2004. MSW limited to 20% of Tier 2 through 2012, and ineligible after that.
Maryland	Class I or II technologies: 2.5% through 2019, 0% thereafter. Class I technologies: 1% by 2006; increases 1% every two years to 7% by 2018; 7.5% by 2019 and thereafter.	Class I: Solar, wind, qualifying biomass, landfill methane, anaerobic digestion from animal or poultry waste, ocean energy, fuel cells from methane or qualifying biomass, small hydro less than 30 MW. Class II: Hydro other than pumped storage, poultry litter, MSW.
New Jersey	Class I or II technologies: 2.5% until 2008. Class I Technologies: 0.75% in 2004; 1% in 2005 and rising by 1% per year to 4% in 2008. Of that, 0.01% must come from solar RECs in 2004, rising to 0.017% in 2005; 0.036% in 2006; 0.076% in 2007; and 0.16% in 2008.	Class I: Solar, wind, fuel cells from renewable fuels, geothermal, wave or tidal, methane gas from landfills or gas from the anaerobic digestion of food waste and sewage sludge, sustainable biomass. Class II: Hydro facilities less than 30 MW and MSW.
Pennsylvania	Tier 1: 1.5% by 2006; 2% by 2007, increasing by 0.5% per year to 8% by 2019. Of that, 0.0013% of Tier 1 requirements must come from solar between 2006-2009, increasing to 0.0203% between 2010 and 2014; to 0.25% between 2015 and 2019; and to 0.5% in 2020 and thereafter. Tier 2: 4.2% 2005-2008; 6.2% from 2009-2013; 8.2% 2014-2018; 10% in 2019 and thereafter.	Tier 1: Solar, wind, low-impact hydro, geothermal, landfill methane and anaerobic digestion, qualifying biomass, coal mine methane, and fuel cells. Tier 2: Fluidized bed waste coal, distributed generation, demand-side management, large-scale hydro (including pumped storage), wood byproducts, integrated combined coal gasification.

2.0 ECOLOGICAL IMPACTS

This section discusses the potential ecological impacts likely to arise from construction and operation of the proposed Roth Rock wind power facility. Resources of concern include birds and bats, terrestrial resources (including vegetation, wildlife, and wetlands), environmentally sensitive areas, threatened and endangered species, water resources (both surface water and groundwater), and air quality.

The analysis and conclusions in this section are based on PPRP's evaluation of field studies and assessments conducted by Synergics, independent research and discussion with outside experts, site visits by PPRP and DNR's Natural Heritage Program (DNR-Heritage), and consultation with DNR-Heritage. Specifically, Synergics conducted a Phase I Avian Risk Assessment (observational studies designed to detect potential effects of large magnitude). In addition, the applicant conducted an assessment for Indiana bat roosting and foraging habitat. As part of the CPCN application, Synergics submitted information from several studies (conducted within the region, but not at the proposed Roth Rock site) performed in support of two wind power projects located in West Virginia. These included assessments of Indiana bat and Virginia big-eared bat, and observational and radar studies of birds during fall migration at the Mount Storm Wind Project, and fatality studies at Mountaineer Wind Energy Center.

In addition to the application, PPRP based its evaluation on information on bird impacts from wind turbines generally, and bird migration data from Maryland. Information on birds and bats in the immediate vicinity of the project site was derived from a recent PPRP study of the planned Allegheny Heights wind power facility on Backbone Mountain. PPRP and DNR-Heritage conducted field visits to view affected ridgetop habitats and reconfirm known occurrences of species of concern.

During the CPCN proceeding, Synergics submitted other studies that provided specific information about the Roth Rock site. These included a nesting bird survey, a botanical survey, and a delineation of wetlands.

2.1 BIRD AND BAT IMPACTS

The effects of wind turbines on birds have been studied since the late 1980s in the United States and earlier in Europe. Early studies focused on bird fatality due to collisions with turbines. The most notable was the high number of

raptor fatalities documented at Altamont, California, the first large-scale wind power development in the United States (CEC 1989). In subsequent studies of wind power facilities from other parts of the country, mortality of bats has become an important issue. Bat fatality rates measured at wind power facilities recently developed on Appalachian Mountain ridges were much higher than those for both birds and bats anywhere else in the United States (Kerns and Kerlinger 2004, Kerns 2004, Erickson 2004).

2.1.1 Bird Impacts

2.1.1.1 Background

Wind power development imposes two types of adverse effects on birds. The first is disturbance impacts resulting from the presence of new infrastructure, particularly in situations where turbines have been built in open pastures and fields (Sharp 2004). The second type of impact is the collision with turbines that result in fatalities. After more than a decade of studying these impacts, there is evidence that the numbers of bird fatalities resulting at wind power facilities are small. On average, two to three birds are killed annually per turbine (Erickson *et al*. 2001). Approximately 4,700 turbines had been installed outside of California by the end of 2003 (NWCC 2004). Based on fatality estimates, more than 10,000 birds are killed annually by these wind power facilities. Recent studies at new wind facilities constructed on eastern Appalachian ridges reported bird fatality rates comparable to those in other parts of the country (NWCC 2004).

In most cases, bird fatalities are spread over a variety of species such that no single species is disproportionately affected. However, some wind turbine sites can have greater effects on certain kinds of birds, e.g., raptors may be attracted to large prey bases such as ground squirrels in open habitats, leading to higher mortality in that group. Overall, the impacts from wind turbines have not been shown to cause the decline of any species, nor has there been a demonstrated reduction in numbers of birds at an individual site. The greatest concern is for regionally declining species that may already suffer high mortality during migration; wind power structures may impose an additional burden contributing to these declines. While the Migratory Bird Treaty Act prohibits "taking" any migrating bird, the U.S. Fish and Wildlife Service (USFWS), in practice, only requires that good faith efforts be employed to avoid the take of migratory birds (USFWS 2003).

USFWS has issued voluntary interim guidance (USFWS 2003) on avoiding or minimizing impacts to wildlife through: (1) proper evaluation of potential development sites; (2) proper location and design of turbines and associated structures; and (3) pre- and post-construction monitoring to assess impacts.

USFWS recommendations on site development include the following (note that these are generic guidelines and not recommendations for the Roth Rock project in particular):

- Avoid locations with documented federally threatened or endangered species.
- Avoid locations of known high avian use or concentration (e.g., migration pathways, rookeries).
- Avoid locations of known high bat use or concentration (e.g., winter hibernacula, breeding colonies).
- Avoid landscape features known to attract raptors, such as cliffs and ridges.
- Orient turbine arrays to minimize avian fatality (e.g., space wider, set parallel to migration direction).
- Avoid fragmentation of important wildlife habitats.
- Avoid habitats known to be occupied by species that exhibit extreme avoidance to vertical structures such as prairie grouse.
- Minimize infrastructure such as roads and fences.
- Develop a habitat restoration plan that avoids or minimizes impacts to wildlife.
- Reduce availability of carrion so as not to attract some raptor species.

USFWS guidelines on turbine design and operation include the following:

- Use tubular designs for wind turbines to minimize the bird perching and nesting. Birds are less likely to encounter turbine blades on towers without perch sites. Also, avoid placing external ladders or platforms on towers. Avoid the use of guy wires.
- If the turbine towers are required to be lit for aviation safety, the minimum level of lighting allowed by the Federal Aviation Administration should be used. White strobe lights are preferable to red. In effect, the least number of lights should be used at minimum intensity and minimum number of flashes per minute.
- If feasible, adjust the tower height of turbines when the height of the rotor-swept area poses a higher risk to wildlife.
- Bury or shield electric power lines to avoid electrocution of birds.
- An average of three years of operational monitoring of wildlife impacts should be conducted to identify periods of greatest risk.

Should high seasonal concentrations of wildlife be adversely affected, shutdown of turbines should be considered at those times.

- For existing turbines, follow the guidelines to the closest extent possible when upgrading or retrofitting. If high mortality is evident at a specific turbine already in place, retrofitting or relocating is recommended.

The role that wind turbines play in the cumulative impacts on birds, when combined with other adverse effects, is not precisely known. On a relative scale, however, bird fatalities resulting from wind turbines are 100 to 10,000 times smaller than those resulting from other human activities, such as vehicles, buildings and windows, and communication towers (Erickson *et al.* 2001). Development of wind power may also result in less adverse impacts to birds when compared to other potential uses of the same land that would eliminate more natural habitats (e.g., use as home sites).

2.1.1.2 Bird Resources at Roth Rock Site

As part of the Phase I Avian Assessment, Synergics conducted a field visit to the proposed wind power project site during July 2004, in part, to identify bird species present. A total of 34 species were identified comprising mostly resident or migratory breeding birds (Table 2-1). Most of these species are considered woodland birds, occupying the forested habitats along the ridge. Seven are classified as forest interior dwelling species (FIDS) which require large forest areas to breed successfully and maintain viable populations (Table 2-1; CBCAC 2000). Furthermore, two of these, black-throated green warbler and hooded warbler, are regarded as "highly area-sensitive" and most vulnerable to forest loss, fragmentation, and overall habitat degradation (CBCAC 2000). Two Maryland "species of concern" were observed during the site visit — the winter wren and dark-eyed junco, both considered rare breeding birds by the State. Bird species of concern as well as FIDS are addressed more fully in the Threatened and Endangered Species section of this document.

The avian assessment describes the Carolina chickadee as not uncommon on the site. More than likely, this identification is incorrect but refers to the black-capped chickadee. Breeding bird surveys show the range of the Carolina chickadee in Maryland as no further west than Allegany County, whereas the black-capped chickadee is common in Garrett County (Robbins and Blom 1996). Black-capped chickadees were identified on the project site from a DNR site visit during April 2005.

DNR-Heritage personnel visited the proposed Roth Rock wind power site on 30 July 2004. Several state-listed species of concern were noted including

common raven (rare), dark-eyed junco (rare-breeding), and winter wren (rare-breeding). In addition, seven FIDS were identified: the pileated woodpecker, yellow-billed cuckoo, hermit thrush, blue-headed vireo (with fledgling), black-throated green warbler, scarlet tanager, and rose-breasted grosbeak.

Table 2-1 Bird Species Identified at Roth Rock Site during Phase I Avian Risk Assessment Conducted by Synergics, July 1 and 2, 2003 with Notes as to their Relative Abundance

Species	Note	Species	Note
Turkey Vulture	Common	Wood Thrush*	Common
Red-tailed Hawk	A few	Gray Catbird	Not uncommon
American Kestrel	One	Ovenbird*	
Ruffed Grouse	Not uncommon	Chestnut-sided Warbler	Very common
Northern Flicker	A few	Black-throated Green Warbler*	Not uncommon
Downy Woodpecker	Not uncommon	Common Yellowthroat	Common
Red-bellied Woodpecker	Uncommon	Hooded Warbler*	Not uncommon
American Crow	Off top of ridge	Canada Warbler	One
Blue Jay	Common	Red-eyed Vireo*	Common
Eastern Wood Pewee	A few	Blue-headed Vireo	One
Great Crested Flycatcher	A few	Indigo Bunting	Very common
White-breasted Nuthatch	Uncommon	Scarlet Tanager*	
Cedar Waxwing	A few	Orchard Oriole	One
Carolina Chickadee	Not uncommon	Eastern Towhee	Somewhat common
Carolina Wren	A few	Field Sparrow	A few
Winter Wren	Not uncommon	Song Sparrow	Common
Veery*	A few	Dark-eyed Junco	Not uncommon

* Forest Interior Dwelling Bird species (FIDS)

As part of the Phase I Avian Risk Assessment, data from Breeding Bird Survey (BBS) routes closest to the project site were used to determine the types of birds that are likely to nest on or near the project site. The BBS is a 24.5-mile-long road survey of nesting birds. The BBS suggests a moderate diversity of nesting species at the project site, most of which are common nesters of forest, forest edge, brush, grassland, and farmyard. Based on surveys conducted from 1993 to 2002, more than 95 species of breeding birds were recorded in the vicinity of the project site. Of these, none was listed as federally threatened or endangered. A few were listed as Maryland species of concern including Mourning Warbler (endangered), Blackburnian Warbler (threatened), and Alder Flycatcher (in need of conservation); all of these species are addressed in the Threatened and Endangered Species section of this document.

Historical records show that major raptor flights were known to occur regularly over Big Savage, Backbone, and Dans Mountains (Stewart and Robbins 1958). More recent accounts show that between 14 and 370 hawks per day can be viewed in areas in the vicinity of the project site (Heintzelman 1986). Historically, approximately 25 species of migratory waterfowl and 17 species of sandpipers and plovers have been identified in Deep Creek and Mountain Lakes (Stewart and Robbins 1958). Golden eagles are now more abundant in Garrett and Allegany Counties than they were 10 years ago, where they can be observed flying up and down the ridges, scavenging for food (Presley 2002). In the nearby Appalachian Mountains of Pennsylvania , the golden eagle is now more commonly observed during migration than the bald eagle (McWilliams and Brauning 2000). While smaller birds, such as songbirds, tend to fly at lower heights and to stop often to feed or rest, it has been shown that raptors such as hawks fly at altitudes between 1,950 and 2,925 feet above the ground surface (Heintzelman 1986). In Western Maryland, the principal migration route is spread over a wide geographic area with few locations where large numbers concentrate during active migration or stopovers (Kerlinger 2003). The ridges of the project attract some migrants including songbirds and hawks.

A pre-construction risk and fatality assessment for birds was conducted at the proposed Allegheny Heights wind power site on Backbone Mountain adjacent to and northeast of the Roth Rock site during 2003 (Gates *et al*. 2004). Birds were identified from March to November using point counts and transect surveys (focusing on rare species), and encompassing spring and fall migration and breeding periods. In addition, collision risk was assessed by observational surveys that categorized flight passage relative to a "zone of risk" or position relative to hypothetical wind turbine locations. Fifteen rare species were identified on the project site including two state listed species: a Blackburnian Warbler (threatened) was identified during spring migration

and a few Mourning Warblers (endangered) were identified with at least one present during the breeding season. The remaining species are regarded as rare breeders of which six were found within safe breeding-date intervals for Maryland. In general, birds were more common on the ridge top during migration in the spring and fall. Migration periods are also the time when large birds, including raptors, vultures, ravens, and crows, were most likely to pass through zones of highest risk.

Although the Allegheny Heights wind power site is close to the Roth Rock site, the number of birds observed in the aforementioned study may be lower than what should be expected for Roth Rock. An average number of 5 bird species was identified from 10-minute point counts during the breeding season at Allegheny Heights. A long-term study conducted on the ridge top of Backbone Mountain in the vicinity of the Roth Rock fire tower recorded much higher numbers of birds during the breeding season (Robbins and Boone 2004).

2.1.1.3 Impacts

Synergics' Phase I Avian Risk Assessment addressed the potential impact of the proposed Roth Rock facility on birds occurring on the project site (Kerlinger 2003). The evaluation considered birds that are resident, seasonally breed, or migrate through the project site. Overall, the assessment concluded that the collision mortality risk posed by the facility would not be biologically significant for most species. Federal and state-listed threatened and endangered species would not be at risk principally because of the lack of suitable habitat. Migrating bird species would likely not be at risk, as the area does not support significant migrations by major bird groups. The assessment concludes that the most likely significant impact would stem from the fragmentation of extensive forest habitat in the northern portion of the site that supports forest interior nesting species.

The State agrees that most bird species would not suffer significant direct mortality from the project. Avian fatality monitoring at the nearby Mountaineer wind power facility in West Virginia recorded moderate fatality levels (4 birds/turbine during the spring to fall survey period; Kerns and Kerlinger 2004). However, the State does have concern for the loss of breeding habitat that may result, given the number of listed bird species that occur on the site. In the Phase I avian assessment, Kerlinger (2003) recommended that a nesting bird survey be conducted for species of concern and FIDS to identify the site's most sensitive habitats; however, Synergics has not yet conducted such a survey. Impacts to bird species of concern are discussed more fully in the Threatened and Endangered Species section of this report.

An important result of the Mountaineer bird mortality study was the high proportion of neotropical migrants among the fatalities (see Table 2-2). In total, a dozen or so species that suffered fatalities during 2003 undergo annual long-distance migration to and from neotropical regions. Current research on the stopover ecology of neotropical migrants underscores the importance of the Appalachian Mountains as a migration feature in the eastern United States (Tankersley 2003). In related studies, forest fragmentation negatively influenced habitat selection of long-distance forest migrants (Tankersley and Orvis 2003). The development of the Roth Rock site would exacerbate forest fragmentation in the region, especially in the northern portion of the project area that accounts for more than a third of the project. The Synergics application described the northern portion of the site as having relatively unbroken canopy, showing few signs of impact, and being fairly intact, although since that time some selective logging has occurred within the tract.

Table 2-2 Bird Species Found During Fatality Searches at Mountaineer Wind Power Facility, 2003

American Robin	Magnolia Warbler*
American Redstart*	Red-eyed Vireo*
Black-billed Cuckoo*	Red-tailed Hawk
Blackpoll Warbler*	Rock Dove
Black-throated Blue Warbler*	Rose-breasted Grosbeak*
Canada Warbler*	Ruffed Grouse
Chestnut-sided Warbler*	Swamp Sparrow
Common Yellowthroat*	Turkey Vulture
European Starling	Veery*
Hooded Warbler*	Wood Duck
House Sparrow	Wood Thrush*
Indigo Bunting*	Yellow-billed Cuckoo*
* Neotropical migrant species breeding in temperate North America and wintering primarily in Central and South America	

Should the Roth Rock wind power project be authorized, the State recommends that Synergics be required to undertake post-construction studies of bird (as well as bat) fatality associated with the operation of the turbines. USFWS interim guidance recommends post-construction monitoring to identify impacts to wildlife at all newly developed wind power sites. If seasonal concentrations of wildlife result in bird high fatalities, monitoring data collected over an average of three years should be used to define the interval and conditions (e.g., weather, wind speed, temperature) when the turbines should be shut down.

The three years of monitoring should cover three each of spring and fall migration periods for both birds and bats. It is likely that more fatalities will occur at these times, thus more intensive monitoring would be required during these migration periods. Monitoring data would be reported on a quarterly basis and include both observed and estimated mortality by observation date and turbine. Species affected and specific weather conditions should be noted. As appropriate, summer breeding studies should be conducted to evaluate habituation of sensitive species to

the project. The detailed monitoring plan would be developed by the applicant and subject to the approval of DNR-Heritage.

In addition to post-construction monitoring, available technologies should be employed in the facility design to minimize bird and bat fatalities. The newer, industry-standard wind turbine technology (without lattice structures or guy wires) should be used, with heights not to exceed 400 feet as stated in Synergics' CPCN application. Impacts to nocturnal migratory songbirds would be most likely during low clouds and fog, when they could be attracted to tower lighting. Subject to FAA approval, lighting on the turbines should be minimized by lighting the least number of turbines, using white strobes that flash the minimum number of times per minute (longest duration between flashes). Furthermore, as advances in deterrent technologies are made, turbines should be upgraded to minimize impacts to birds and bats.

PPRP is undertaking an independent monitoring program in western Maryland to improve our understanding of the potential impacts to birds and bats from wind power facilities. The results of the State's monitoring effort, in addition to the information gathered from the site-specific Synergics monitoring, will improve future assessments and facilitate the siting of potential new wind power facilities to avoid or minimize adverse effects to wildlife species.

2.1.2 Bat Impacts

2.1.2.1 Background

Ostensibly, bats are subject to the same adverse effects imposed by wind turbines as are birds, i.e., displacement from habitat due to construction and collision fatalities during operation. To date, no studies have addressed habitat loss as it relates to bats. Studies of this kind ordinarily follow a "before and after" approach, where pre-construction baseline data on bat species and abundance are compared to post-construction operational data. Collision fatality studies for bats developed as an offshoot of bird fatality monitoring. During many of the early bird monitoring studies, bats were merely collected or noted in conjunction with bird fatalities and no effort was made to estimate overall bat mortality.

In the western United States, the numbers of bats killed at wind power facilities appear to be similar to that for birds and have averaged from 2 to 3 per turbine per year (G.D. Johnson 2004). However, among these earlier studies, total fatalities were often not estimated and no effort was made to adjust estimates for scavenger or observer efficiency. To date, bat fatality

estimates have been made for only a handful of existing facilities and only six projects have been studied directly (G.D. Johnson 2004). Johnson and Arnett (2004) have prepared a bibliography of bat and wind turbine interactions published to date.

Shortly after wind power facilities appeared in the eastern United States, a disturbing pattern emerged. During 2003, in its first year of operation, the Mountaineer facility in West Virginia recorded the highest bat fatality rates ever witnessed, 46 bats per turbine per year. That same year, the Buffalo Mountain wind power facility in Tennessee reported a fatality rate of 21 bats per turbine per year. These rates may be conservative as they were estimated from formulas that were developed for birds (which have not considered possible differences in detection probabilities between bats and birds). With these reports of high numbers of bat kills at newly built wind energy facilities on Appalachian Mountain ridges, bats have become the primary wildlife concern relative to wind turbine impacts.

To address the bat fatality problem, bat researchers and conservationists, wind industry representatives, and several state and federal agencies formed the Bats and Wind Energy Cooperative (BWEC). The cooperative aims to develop solutions to minimize or prevent bat mortality at wind energy facilities (Arnett and Tuttle 2004). The first field studies conducted under the auspices of BWEC were performed in 2004 and focused on refining fatality search methods, which had heretofore been more appropriate for birds, as well as developing better estimates of searcher efficiency and scavenging rates. In addition, thermal imaging was employed to gain better perspective on the mechanism of bat collision with wind turbines. An interim report was issued in December (Arnett *et al.* 2004); a final report is due in the first quarter of 2005 and will provide much needed refinements for the study of bat fatalities at wind power sites.

A significant difference between the bird and bat issues is that the former are protected under the Migratory Bird Treaty Act, which prohibits the killing of migratory birds. No such broad federal protection applies to bats; however, several bat species are currently protected under the Endangered Species Act. So far, no federal or state listed threatened or endangered bat species has been documented to have been killed by wind power structures. USFWS (2003) cautions specifically against placing turbines near known bat hibernation, breeding, and maternity/nursery colonies, or in migration corridors or flight paths between colonies and feeding areas.

At present, it appears that species of bats most affected by wind turbines are highly migratory, making expansive seasonal movements during spring and fall between their northern and southern ranges. In particular, two species,

red bat and hoary bat, have accounted for a substantial proportion of bats killed at wind energy facilities. One theory to account for the high number of bat fatalities is that bats use acoustic navigation less frequently during migration movements and therefore they are essentially blind to the turbines (Van Gelder 1956, Griffen 1970, Timm 1989). Others speculate that the movement of the wind turbine blades might cause air disturbances that interfere with the flight of bats and effectively cause them to fall to the ground. Once on the ground, many bats are helpless to regain flight without having something to climb up on to launch themselves into the air. Evidence arguing against this theory is that most bats recovered from fatality studies at wind power facilities show trauma indicative of collision.

An additional factor that may bear on the higher fatality observed for these species is physical design. Red and hoary bats are among the largest of North American bat species, and are regarded as less maneuverable than smaller species (*Myotis* spp.). BWEC showed bats interacting with wind turbine blades using thermal imagery (NWCC 2004). Many of the bats demonstrated avoidance behaviors and maneuvered away from the approaching blade; however, the species of bats were not identified. A final report from BWEC is due in Spring 2005 and may provide greater understanding of how and why these bat species are killed.

Until recently, the effects of wind power on wildlife in the eastern United States were unknown because the industry is new. Wind power facilities now operating in West Virginia, Pennsylvania, and Tennessee have provided much needed comparative data for bird and bat fatality estimates. The Mountaineer wind power facility in West Virginia offers the best comparison for estimating potential fatality rates for the Roth Rock project area. Both project areas are located along the ridge of Backbone Mountain and would be separated only by about three miles.

2.1.2.2 Bat Resources at Roth Rock Site

Ten species of bats potentially occur in the vicinity of the proposed Roth Rock site and include eastern small-footed myotis, little brown bat, northern long-eared bat, Indiana bat, silver-haired bat, eastern pipistrelle, big brown bat, eastern red bat, hoary bat, and Virginia big-eared bat (Whitaker and Hamilton 1998).

Both the Indiana bat and the Virginia big-eared bat are listed as federally endangered. Although the Indiana bat has a broad distribution in the eastern United States, most individuals are known to hibernate in only 15 caves (Whitaker and Hamilton 1998). Small numbers of this species are found in many other caves, two of which are within 20 miles of the proposed facility

(Gates *et al*. 1984). During the summer, Indiana bats disperse throughout their range and form small maternity colonies typically beneath the bark of dead trees (Humphrey *et al*. 1977). The Virginia big-eared bat is non-migratory and resides in caves year-round. Although not known to occur in caves in Maryland (Gates *et al.* 1984), this bat is resident in several caves in nearby counties in West Virginia and Virginia (Linzey 1998). As part of its CPCN application, Synergics included a study to assess the project area for Indiana bat nursery roosting and foraging habitat to address concerns that the proposed wind power facility would eliminate summer habitat for this species (J.B. Johnson 2004). In addition, they included two reports prepared for the nearby proposed Mount Storm wind project to assess the risk to Indiana bats and Virginia big-eared bats migrating between summer and winter roosts (Johnson and Strickland 2004). Further description of these two species and potential impacts to them are discussed in the Threatened and Endangered Species section of this report.

Another bat species of concern potentially occurring at the proposed site is the eastern small-footed myotis. This species is state-listed as "in need of conservation" and occurs in Maryland throughout the year. It has been captured during spring emergence and fall swarming studies conducted at the entrances to caves and mines (Johnson and Gates 2005), and is known to hibernate in several of Maryland's caves (Gates *et al*. 1984). Whitaker and Hamilton (1998) speculated that maternity colonies might be found under rocks or within burrows and crevices among rocks, in circumstances similar to those in which they hibernate. At least one maternity colony of this species is known to occur in rock outcrop habitat within 30 miles of the project site. Further description of this species and potential impacts to it are discussed in the Threatened and Endangered Species section of this report.

DNR conducted a brief pre-construction bat survey during fall 2003 for the Allegheny Heights wind power facility (Gates *et al*. 2004). The project area for this facility is immediately to the northeast of the Roth Rock site and occupies the adjacent region of the Backbone Mountain ridge top. Over the course of six nights, net capture and acoustic techniques were used to identify bats occurring along the ridge during the period of migration for most species of bat. In general, nightly bat activity commenced around 10:00 PM and dropped off around 3:00 AM. Seven species of bats were identified including little brown bat, northern long-eared bat, silver-haired bat, eastern pipistrelle, big brown bat, eastern red bat, and hoary bat. Although the species of concern, Indiana bat and small-footed myotis, were not identified among the bats detected, it should be noted that acoustic calls among the myotis group of bats are not identifiable to species. In addition, because of the brevity of the survey, the migration characteristics of some species were not fully

represented. The evaluation of risk for bats was also constrained by the limited ability to detect bats at turbine height (between 40 and 120 m) and therefore it is not possible to rule out the presence of species of concern.

2.1.2.3 Impacts

All of the materials submitted by Synergics in support of the development of wind power on Roth Rock contend that federally and state listed bat species will not suffer adverse effects. A basic tenet of their argument is that none of these species have heretofore been documented as having been killed by collision with a wind turbine. The State agrees that these species are less likely to be killed than other bat species, but that fatalities may occur and eventually be cumulatively significant given the scale of wind power development proposed for the Appalachian Mountain ridge tops. Impacts to each of these species are addressed more fully in the Threatened and Endangered Species section of this report.

Perhaps of greater concern are those species already suffering the highest ever documented fatalities for any wind power site at the nearby Mountaineer project. Not much is known about the population characteristics of the bats most frequently killed by wind turbines: red bat, hoary bat, silver-haired bat, and eastern pipistrelle (Whitaker and Hamilton 1998). All of these species appear to be linked by similar natural history characteristics that include long-distance migrations, and for most, preferences for roosting in trees rather than caves.

The State recommends that Synergics be required to undertake post-construction studies of bird and bat fatality associated with the operation of the turbines. USFWS interim guidance recommends post-construction monitoring to identify impacts to wildlife at all newly developed wind power sites. If seasonal concentrations of wildlife result in high fatalities, monitoring data collected over an average of three years should be used to define the interval and conditions (e.g., weather, wind speed, temperature) when the turbines should be shut down.

The three years of monitoring should cover three each of spring and fall migration periods for both birds and bats. It is likely that more fatalities will occur at these times, thus more intensive monitoring would be required during these migration periods. Monitoring data would be reported on a quarterly basis and include both observed and estimated mortality by observation date and turbine. Species affected and specific weather conditions should be noted. As appropriate, summer breeding studies should be conducted to evaluate habituation of sensitive species to

the project. The detailed monitoring plan would be developed by the applicant and subject to the approval of DNR-Heritage.

In addition to post-construction monitoring, available technologies should be employed in the facility design to minimize bird and bat fatalities. Furthermore, as advances in deterrent technologies are made, turbines should be upgraded to minimize impacts to birds and bats.

With the recent development of wind power facilities along Appalachian Mountain ridge tops in nearby West Virginia and Pennsylvania, impacts to birds and bats are becoming better understood. The impact to bats is likely to be greatest during fall migration. Most bat fatalities from wind turbines have been recovered during August and September when they are making a seasonal movement. In actuality, the term of fall migration is much broader and extends from July to November. Gates *et al*. (2004) identified seven species of bats along the ridge top of Backbone Mountain during fall migration monitoring. Bat activity peaked twice nightly, between 10 pm and midnight and between 1 am and 3 am, but it broadly spanned from 8 pm to 6 am. Further, bat activity may also be dependent on wind speed. There is evidence to suggest that bats are more active on nights with wind speeds less than 7 meters per second (m/s). In addition, slow ("feathered") rotation of the turbine blades appears to significantly reduce the risk to bats. A single turbine (No. 11) at the Mountaineer facility was operated in feathered mode throughout the fall 2004 migration period and had no reported fatalities.

Should bat fatalities become significant, it may be necessary to curtail turbine operation (this would involve allowing the turbine blades to rotate slightly to maintain bearing integrity) on nights when weather conditions are conducive to bat movement (e.g., light winds). The State recommends including a license condition that specifies mitigation measures to be taken in the event of significant mortality, defined as five or more dead bats being found at the facility on two or more occasions during the period from July 1 through November 30. Curtailment would occur between the hours of 8 pm to 6 am when wind speed falls below 4 m/s.

In operation, the turbine controller typically starts the machine at wind speeds slightly above 4 m/s. Feathering the turbine blades at wind speeds below this value should not adversely affect the generation potential of the turbines, although going to a feathered mode of operation during low wind speed situations may delay the ability of the operator to take advantage of rising wind speeds. Figure 2-1 shows the cumulative distribution of the duration in hours of wind speed categories at 90 m above ground level for the Roth Rock location, from July 1 through

November 30, 2002. As can be seen, there were about 400 hours during this period when the wind speed was less than 4 m/s. Therefore, implementing this operational restriction should afford bats significant protection. The level of operational curtailment would be capped so as not to exceed 400 hours for the facility as a whole.

Should new technologies or operating methods that lower bat mortalities be implemented at the Roth Rock wind power project, the need for curtailing operation of the turbines during migration could be reduced in the future.

As mentioned earlier, PPRP is undertaking an independent monitoring program in western Maryland to improve our understanding of the potential impacts to birds and bats from wind power facilities. The results of the State's monitoring effort, in addition to the information gathered from the site-specific Synergics monitoring, will improve future assessments and facilitate the siting of potential new wind power facilities to avoid or minimize adverse effects to wildlife species.

2.2 TERRESTRIAL RESOURCES

2.2.1 Description

The Roth Rock project site is located along the narrow ridge top of Backbone Mountain roughly centered on either side of a peak outcrop called Roth Rock. Most of the ridge top consists of forests with a few fields and pastures. Small unimproved roads also extend along and over some of the ridge. There is little old forest remaining in the project area due to regular harvesting over the past century. Much of the forest on the ridge top has been logged in the past and trees generally range in age from 30 to 60 years. Selective logging has occurred recently in some areas leaving cleared or sparsely wooded areas along the ridge.

The application for CPCN did not include a comprehensive survey of vegetation at the project site, although general characterizations were made and are the basis of much of the description that follows. Trees commonly found along the ridge of Backbone Mountain within the project site include northern red oak, red maple, sugar maple, black cherry, and a small amount of yellow birch and striped maple. Shagbark hickory, tulip tree, sassafras, and witch hazel are also present. American chestnuts used to be common in the area, but have all but disappeared as large trees. Small specimens of this species, some exceeding 15 feet in height, are present. American beech is also present in some areas in small numbers. A site visit by DNR during April

2005 noted ten or so red spruce trees in the northern portion of the site; another conifer, eastern hemlock, was also present in small numbers. The understory is comprised of various shrubs, forbs, and herbaceous plants. Many of the rocks are covered with bryophytes and an array of lichens.

The forest canopy varies somewhat along the ridge. In some sections, the canopy is mostly intact and in others, it is broken by logging — both on the project site and immediately adjacent to the site (especially on adjacent coal mine property). Upridge from the Roth Rock fire tower to the northern end of the project site there is a road along which the canopy is somewhat open. The trees here are large, but widely spaced.

From the Roth Rock fire tower to the large transmission line corridor that traverses the mountain about 0.75 miles downridge, the forest canopy is unbroken except for a section of recent logging. This portion of the project site possesses many rocky outcroppings consisting of large boulders, deep crevices, and occasionally, very high precipices. In a few places the rocks rise to the canopy level. As this area is difficult to traverse, trails are scarce and there are few signs of human disturbance. The sides of the ridge along some of this stretch are very steep, especially on the east side. Continuing downridge from the transmission line corridor for another 0.5 mile, the canopy resumes its unbroken character.

In the southern third of the project area, there is significant fragmentation of the canopy and forest. The forest here is more mature, with the canopy being about 60 to 70 feet high in places with relatively large black cherry, maple, and red oak. In some of the rockier locations, the trees are not as large.

For much of the project area, forestry practices and disease (e.g., chestnut blight), as well as clearing for agriculture and homes, have shaped the forest structure. Large, old trees are scarce. Canopy heights seldom exceed 60 feet and many stands are thin or do not exceed 30 feet in height. Stands of planted pines and spruce are present in several places, but most occur adjacent to the project site.

Wetlands

In response to a data request, Synergics produced a figure showing several wetland features in relation to the ridge and proposed wind turbine locations. Several of the turbine locations appear to overlap wetlands. To date, wetlands of the project site have not been delineated in the field. A second data request has been submitted to Synergics, requesting that all potentially jurisdictional wetlands and other waters of the United States in the vicinity of the proposed project be delineated and

surveyed in the field by a qualified professional wetland scientist. This delineation has not yet been submitted.

Wildlife

The project area has undergone significant habitat degradation in the past; some areas, however, have recovered to the extent that they provide suitable habitat to forest interior dwelling birds (FIDS). The area has been affected by logging, mining, and clearing for hunting cabins, homes, power lines, communications towers, and off-road vehicle use. Nonetheless, the Backbone Mountain area has diverse vegetation communities that provide favorable habitats for a wide variety of animal species including several that within the state are found only in western Maryland. Species associated with ridgetop forest, rocky habitats, forest edge, brush, and grasslands are found within the project area. Large mammal species expected to inhabit the forest habitat include the black bear and the white-tailed deer.

2.2.2 Extent of Disturbance

PPRP conducted an independent analysis of the extent of disturbance that is expected due to construction of the proposed facility. This analysis was intended to provide a rough estimate of the amount of land area that is likely to be disturbed, based on a review of aerial photography from the Mountaineer wind power facility in West Virginia and on Synergics preliminary turbine layout. The evaluation concluded that the amounts of disturbance described in the application for the Roth Rock project appear to understate the extent of disturbance. Both the roadway construction and turbine site construction disturbances will be greater than stated in the application.

2.2.2.1 Access Roadway

The slopes on the northwest face of Backbone Mountain near the crest of the ridge exceed 25 percent and can approach 40 percent. The application discusses the construction of 36-foot wide roadways including a 20-foot cart-way and 8-foot shoulders. To construct this as a level (horizontal) feature near the crest will necessitate additional disturbance for construction of an embankment with side slopes on one or both sides of the roadway to "catch up" to the descending ridge side slopes. The overall width of disturbance for roadway construction will be between 60 and 85 feet, wider in areas where the ridge side slope is steeper. Hence the total area of disturbance for construction of the approximately 2.5 mile long roadway is likely double that described in the application (i.e., 22 acres for an average 72-foot wide disturbance versus 11 acres for a 36-foot wide

disturbance). From a review of aerial photographs of the completed Mountaineer project (on Backbone Mountain), it appears clear that roadway construction disturbances on that project in similar terrain ranged from at least 50 to 75 feet.

The actual roadway construction disturbance area will depend upon roadway longitudinal profile as well as cross sectional width. The roadway will presumably be designed for access by normal vehicles and maintainable for year-round access. To establish a profile suitable for such access, the roadway construction will likely consist of a combination of cuts (excavations) and fills to attempt to balance material use/handling and minimize importing of roadway construction materials. The ridge top, at the same time, has fairly shallow soils, boulders, and bedrock outcrops. Some boulders and broken rock may be suitable for use in roadway construction, but some quantity will be too large to be part of the road's sub-base. The application indicates that excess rock material will be left on the mountain in an aesthetic manner, which may mean there will be additional disturbance.

2.2.2.2 Wind Turbine Sites

The application describes an installation process which minimizes the disturbance to the ridge top. In the completed project, each turbine is indicated to have a 1,125-square-foot footprint (38 feet in diameter or 33.5-foot square). This footprint is described as being surrounded by a 45-foot square disturbed buffer area (2,025 square feet) to be finished in a gravel surface. The relatively steep slopes of the proposed turbine sites will affect the amount of disturbed area at each site similar to the way in which the slopes affect the roadway construction. More disturbance will occur in the areas around each turbine associated with the construction phase.

Aerial photographs of the completed Mountaineer project construction show that vegetation clearing and physical disturbance at each turbine site were significantly greater than what the application describes for the Roth Rock project. Vegetation clearing for turbine sites ranged from about 3 to 4.5 acres. Inside the disturbed area, at a typical turbine site, an area of approximately 1.5 acres showed evidence of greater disturbance, involving some degree of re-grading, presumably to level a workspace for materials storage and turbine construction.

Erection of the turbines involves the use of large cranes. These cranes need to operate in close proximity, but not immediately adjacent to the turbine towers; that is, the cranes will need some room to maneuver and that area will need to be level. Synergics' project description indicates that

the turbine towers will be raised a section at a time by one crane. A second, larger crane will lift the turbine, minus the blades, and place it on the erected tower. This larger crane will then be used to attach the blades attached to the turbine one at a time. The smaller, tower erection crane would meanwhile be raising the next tower.

According to Synergics' application, the primary plan for staging and storage during construction is to use space along the access roadways and in the areas adjacent to the turbine foundations. With more than one turbine under construction at a time, the access will need to remain open to at least the furthest tower under construction. Hence, virtually all the area required for materials storage will involve additional disturbance. Since the slopes around the Mountaineer project turbine sites are not as steep as at the Roth Rock project area, the disturbed area for construction and materials at the Roth Rock turbine sites will almost certainly be more like 2 to 2.5 acres each. With 24 turbines, the turbine site disturbance is likely to total more than 50 acres.

2.2.2.3 Total Disturbance

In consideration of the topography of the Roth Rock project, the total disturbed area (areas subject to soils and rock surface disturbance – excavation or backfilling) can be expected to exceed 60 acres. Additional areas surrounding this disturbance will be subject to tree removal and/or trimming and other vegetation clearing.

2.2.3 Impacts

Up to 60 acres of forested land would be disturbed during construction of the project, including creating approximately 2.5 miles of new access roads and installing 20 to 24 tower sites. Construction would result in the removal of trees within these footprints and additional removal to allow for the movement of large construction machinery (e.g., bends in roads require clearing greater widths). It is also likely that large "laydown" areas may be required to assemble the turbine blades. Initial road widths would be 36 feet and subsequent widths would be maintained at 20 feet (allowing regrowth along road edges). If major repairs are required at a turbine, clearing of this regrowth to allow machinery access will be required. The effects of tree removal will vary. Much of the land in the southern portion of the project site is already of low to moderate tree density due to logging. In the northern portion, as far up the ridge as the Roth Rock fire tower, the forest is mostly intact and the project construction would fragment a largely contiguous area.

Forested habitats that exist within the project area would be fragmented by construction. Some existing forest habitat would also be lost. Some wildlife species with large home ranges will no longer be supported by the remaining habitat as a result of construction and operation of the project. Impacts to wildlife habitat could include the loss of food, cover, and breeding sites. Loss of hunting area for raptors and other predators may also occur. The long-term impact to wildlife species will vary; more common species that use a diversity of habitats will likely acclimate; species dependent on unique habitat features such as rocky outcrops and boulder fields may be extirpated from the area. The permanent disruption of travel corridors for species with large home ranges (e.g., bobcat) and species with home ranges that shift along the ridge (e.g., Allegheny woodrat) represent additional long-term impacts.

2.3 ENVIRONMENTALLY SENSITIVE AREAS

2.3.1 Description

The State of Maryland enacted the Forest Conservation Act in 1991 to reduce the number of forested acres cleared when land is changed from forests or agriculture to residential, commercial, or industrial development (DNR 2000). Garrett County is one of two Maryland counties that have been exempted from the State's Forest Conservation Act because it possesses more than 200,000 acres of forest.

Garrett County is home to Maryland's largest lake, Deep Creek Lake, located at the center of the county. The lake is approximately 15 miles from the Roth Rock project area.

Although there are no federal, state, or county forests or parks located adjacent to the project site, the Monongahela National Forest extends along West Virginia's border with Maryland at its northern end and is only a few miles from the Roth Rock project area. Backbone Mountain extends southwest into West Virginia and eventually enters the national forest.

The Youghiogheny River flows north through the western part of Garrett County, and along the base of Backbone Mountain to the south. In 1976, a 21-mile long segment of the river was designated as Maryland's first Scenic and Wild River. This protected river corridor is farther downstream of the proximate section of the river, and begins north of Oakland about 13 miles from Roth Rock.

According to the Maryland Environmental Resource & Land Information Network (Merlin), there are two Sensitive Species Project Review Areas (SSPRAs) within the project boundaries. The SSPRAs are identified by the staff of DNR-Heritage and represent the general locations of documented rare, threatened, and endangered species. SSPRAs contain non-attributed areas and do not delineate or strictly represent habitats of threatened and endangered species. The SSPRA data incorporate various types of regulated areas under the Critical Area and other areas of concern statewide, including Natural Heritage Areas, Listed Species Sites, Local, or other Significant Habitat Areas.

The environmental and land information network shows no Nontidal Wetlands of Special State Concern or Geographic Areas of Particular Concern within the project area.

Garrett County has adopted a "Sensitive Areas Ordinance" to, among other things, conserve the county's important natural features, which will help promote tourism and thereby strengthen the county's economy (Garrett County 1997). Among the landscape features classified as sensitive areas are steep slopes of more than 30 percent grade. The Generalized Sensitive Areas Map for Garrett County shows a continuous band of steep slope terrain all along the ridge top of Backbone Mountain from the West Virginia border in the southwest to Allegheny Heights, approximately seven miles up-ridge. The proposed Roth Rock wind power project area falls entirely within this delineated area.

2.3.2 Impacts

The Roth Rock facility as proposed will have a significant impact on several of the environmentally sensitive areas defined above. Foremost, the SSPRAs on the project site that host several species of concern including those that are State threatened or endangered will be adversely affected. Most of these species are linked to the unique ridgetop habitat comprised of boulder fields, rocky outcrops, and small precipices. (Species of concern associated with these habitats are addressed more fully in the following section on Threatened and Endangered Species.) Should this project be licensed, sensitive areas that will be disturbed should be avoided prior to construction. Final positioning of turbines and the access road must be approved by DNR-Heritage to minimize impact to sensitive areas. It is likely that several of the proposed turbine locations cannot be constructed without adversely affecting this sensitive habitat.

The proposed facility may also have an indirect impact on wildlife of the Monongahela National Forest. Species that reside in the National Forest

but range widely (e.g., bats and bobcats) would lose a portion of their available habitat. Another potential impact to the National Forest could occur if species with large or small ranges that reside on the project area are displaced to the National Forest, where they would compete for resources with residents there.

Ecological impacts to Deep Creek Lake and the Scenic and Wild Rivers section of the Youghiogheny River are not anticipated.

The proposed facility would adversely affect an area delineated by the Garrett County's Sensitive Areas Ordinance as steep slope of more than 30 percent grade. Synergics will need to submit a site plan to the Garrett County Office of Planning and Zoning. This office will review the site plan for compliance with the ordinance, and issue a permit for construction provided all requirements are met (Garrett County 1997).

2.4 THREATENED AND ENDANGERED SPECIES

2.4.1 Description

The Roth Rock site, for the most part, is densely forested with deciduous hardwood trees (oaks, hickories, maples), although several openings occur along its length. In many places along the ridge top, prominent rocky habitats occur including large boulders and outcroppings, steep precipices, and numerous small crevices. In particular, the northern half of the site harbors many of these features, specifically from the Roth Rock fire tower down the ridge to Roth Rock itself. These rocky habitats are rare in Maryland. Many of the species of concern identified as inhabiting or potentially inhabiting the project site are linked to these kinds of rocky habitat. The site also contains several small wetland areas, including spring seeps and spring heads. Several other species of concern dependent on these types of habitats, including a number of plants, may also occur at this site. During the CPCN proceeding, Synergics provided a vegetation survey and wetlands delineation for the project area that mapped the locations of these resources.

In response to a letter by Synergics requesting information on federally listed species that might occur on the Roth Rock wind power site, USFWS indicated that the federally endangered Indiana bat (*Myotis sodalis*) may be present at certain times of the year (Ratnaswamy 2003). The agency indicated that the bat might use the area for foraging and roosting between 1 April and 14 November. Recently, the USFWS designated Garrett County as both summer and winter range for Indiana bats (see Figure 2-2). USFWS also cautioned

that the Indiana bats are a tree-roosting species that could be affected by construction activity that involves removal of roost trees and maternity habitat. USFWS stated that many species of bats are known to follow linear features on the landscape during migration. Ridges such as Backbone Mountain may serve as movement corridors for Indiana bats migrating between their summer and winter habitats, many of which are located adjacent to western Maryland in Pennsylvania and West Virginia.

To address the concern for endangered bats, the Synergics application included reports that evaluated Indiana bat habitat on the Roth Rock site, and assessed risk to Indiana bats and Virginia big-eared bats (also federally endangered) at the nearby proposed Mount Storm wind project in West Virginia. The habitat assessment for the Indiana bat focused on the project site's potential to provide nursery roosts and foraging area during the summer breeding season. The study concluded that Indiana bats most likely do not use the site during the breeding season based on habitat preferences, but recommended additional surveys for this species. The two risk assessment reports for Indiana bats and Virginia big-eared bats evaluated the risk of collision for the bats during migration while traveling to and from caves. The reports concluded that neither species would be at risk from ridge top wind power facilities. A conclusion based on telemetry studies of Indiana bats stated that this species does not use ridgeline features as travel corridors during migration, however most bats in the study crossed ridges during migration. None of these studies, however, included a survey of endangered bats on the Roth Rock site.

In response to a letter by Synergics requesting information on state listed species that might occur on the Roth Rock site, DNR-Heritage identified eight plant and animal species of concern known to occur at the Roth Rock site; these are presented in Table 2-3. In addition, DNR indicated that there are recent records for six species of concern known to occur within the vicinity of the Roth Rock site; these are presented in Table 2-4. DNR also expressed concern regarding the project's impact on forest interior dwelling birds (FIDS) as a result of tree clearing and habitat fragmentation on the site.

Table 2-3 Plant and Animal Species of Concern Known to Occur at the Synergics Roth Rock Wind Power Site in Garrett County

Scientific Name	Common Name	Current Maryland Status
Oporornis philadelphia	Mourning warbler	Endangered (breeding)
Dryopteris campyloptera	Mountain wood fern	Endangered
Troglodytes troglodytes	Winter wren	Rare (breeding)
Juncus hyemalis	Dark-eyed junco	Rare (breeding)
Carex aestivalis	Summer sedge	Endangered
Cuscuta rostrada	Beaked dodder	Endangered
Crotalus horridus	Timber rattlesnake	Globally Rare
Erethizon dorsatum	Porcupine	In Need of Conservation

Source: Byrne 2003.

Table 2-4 Plant and Animal Species of Concern Known to Occur within the Vicinity of the Roth Rock Wind Power Site

Scientific Name	Common Name	Current Maryland Status
Rhododendron calendulaceum	Flame azalea	Rare
Streptopus roseus	Rose twisted-stalk	Threatened
Sitta canadensis	Red-breasted nuthatch	Rare (breeding)
Neotoma magister	Allegheny woodrat	Endangered
Sorex dispar	Long-tailed shrew	In Need of Conservation
Myotis leibii	Eastern small-footed myotis	In Need of Conservation

Source: Byrne 2003.

DNR visited the Roth Rock site on three occasions and confirmed the presence of several state-listed species as disclosed above. On 30 July 2004, in the company of Synergics personnel, they observed common raven (rare), dark-eyed junco (rare-breeding), and winter wren (rare-breeding), as well as a

timber rattlesnake (globally rare) in the vicinity of Middle Rocks. A subsequent visit on 16 August (primarily in the southern section of the site, in the vicinity of Roth Rock and Middle Rocks) verified the presence of mountain wood fern (State endangered) at two locations on the ridge. Once again, winter wren and timber rattlesnake were noted. Based on the site visits, DNR also concluded that long-tailed shrew and small-footed myotis (both listed as In Need of Conservation) probably occur on the Roth Rock site. They also advised that the site appears to provide suitable habitat for Wehrle's salamander (*Plethodon wehrlei*, In Need of Conservation) and southern rock vole (*Microtus chrotorrhinus carolinensis*, State endangered; email from E. Thompson, DNR-Heritage to J. Sherwell, PPRP, August 30, 2004).

Synergics conducted a site visit of the proposed Roth Rock wind power site July 1 and 2, 2003, as part of a Phase I Avian Risk Assessment. In total, it identified 34 bird species including two State rare breeding species, winter wren (three, not uncommon) and dark-eyed junco (not uncommon). They also consulted Breeding Bird Surveys from two regional locations (Steyer, Maryland, and Bismark, West Virginia). Species of concern identified over a 10-year period (1993-2002) included mourning warbler (State endangered breeding), alder flycatcher (In Need of Conservation), and Blackburnian warbler (State threatened).

2.4.2 Impacts

Given the number of species of concern known and likely to inhabit the Roth Rock wind power site and the rarity of the habitats with which they are associated, the State concludes that construction and operation of the wind power facility, as proposed, would result in significant adverse impacts to threatened and endangered species. Development of this site would likely reduce the amount or quality of critical habitat and thus constitute a "take" of these species. "Take," as defined in the Annotated Code of Maryland, Nongame and Endangered Species Conservation Act, § 10-2A-01 through § 10-2A-09, prohibits actions that "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

The ridgetop habitats represented by the large boulders, rocky outcroppings, precipices, and numerous small crevices on the site are among the highest quality of their kind in the State. These rocky habitats can be adversely affected by direct disturbance and clearing of forests within 100 to 300 feet (which can change local climate and induce drying of microhabitats). As proposed, the placement of wind turbines, and perhaps more importantly, the establishment of an access road across these features would almost certainly affect species population levels. Additional adverse impacts include

the fragmentation of a largely contiguous forest that is habitat for forest interior dwelling birds. It is possible that eliminating several of the turbine locations could allow Synergics to avoid affecting these sensitive habitats.

As part of its CPCN application, Synergics prepared an initial assessment of potential Indiana bat habitat at the proposed project (Appendix B of Synergics CPCN application for Roth Rock wind power project). The assessment concluded that the Roth Rock project area possesses trees of the correct size-class and physical nature (loose bark, crevices, cavities, previously documented tree species, etc.), but could not determine whether Indiana bats would actually roost on the site. The report also indicated that the effects of the proposed project on migrating and foraging Indiana bats are inconclusive, because it is not known whether this species regularly follows valleys, or crosses over or flies along ridge tops such as Backbone Mountain. The report concluded that the proposed Roth Rock project poses little threat to the overall Indiana bat population because only a small percentage of the population occurs locally. It stated that the local population likely roosts and forages in the valleys and mid-slope of the mountain, rather than on the ridge tops where the wind turbines would be located, but this is far from certain.

Recent research using radio telemetry to study the movements of Indiana bats has greatly improved our knowledge of the ecology of this species. In south central Pennsylvania, bats tracked following spring emergence from hibernacula have been shown, among other things, to forage along ridge tops and to cross mountains readily during migration (Butchkoski 2003). In West Virginia, this species has been found to forage and roost above 3,000-ft elevation (Sanders 2005). Indiana bats have been captured in Maryland during fall swarming bat surveys. At least two important winter roost sites of are known to occur within 30 miles of the proposed Roth Rock wind power site; two more are within 70 miles (Limpert 2004). Bats can travel considerably longer distances during migration. This species has been documented to travel more than 300 miles between winter and summer roosts (Gardner and Cooke 2002; Kurta and Murray 2002). In Pennsylvania, migration between seasonal roosts was typically from 30 to 60 miles (Sanders and Chenger 2000).

As a federally endangered species, all Indiana bat populations should be protected, even the small population occurring near Backbone Mountain. Several known and documented Indiana bat hibernacula exist in neighboring West Virginia and Pennsylvania. The USFWS recommended two years of pre-construction monitoring for bats at the Roth Rock site, and should the project be constructed, at least three years of post-construction monitoring to determine bat fatality rates (letter from USFWS to Paul Kerlinger dated September 17, 2003 – Appendix II of Kerlinger

2003). DNR supports the need for monitoring; as a condition to permitting this project, the State recommends three years of post-construction monitoring for bird and bat fatality with emphasis on spring and fall migration periods.

The development of wind power on Roth Rock would more than likely adversely affect the eastern small-footed myotis, state-listed as "in need of conservation." The ridge top of the project site almost certainly would provide suitable roosting habitat, beneath rocks or within crevices. As stated previously, at least one maternity colony of this species is known to occur in rock outcrop habitat within 30 miles of the project site. Roosts and maternity colonies at 3,000-ft elevation on Big Savage Mountain were in ridge top, rocky habitat very similar geologically to that at the Roth Rock site. Recent information from telemetry studies in West Virginia and New York confirmed that these bats prefer roosting in rocky habitats, and also forage in mature oak forest canopy along ridge tops (Stihler and Chenger 2005). Further research from banding studies suggests that this species may hibernate close to its summer range (van Zyll de Jong 1985).

Development of the Roth Rock wind power project could negatively affect the cited avian species of special concern, which include mourning warbler, blackburnian warbler, winter wren, dark-eyed junco, and red-breasted nuthatch. Although recent data compiled by Kerlinger and others at existing facilities have suggested that avian mortalities from turbine collisions are relatively low at most modern wind power projects, these data do not account for adverse effects of these projects on local breeding birds owing to increased human presence, vehicles, noise, and other factors. Additionally, they have not fully considered the uniqueness of this ridge top habitat to Maryland as indicated by the number of state-listed species present.

Wind power development at Roth Rock would likely remove breeding habitat for the state endangered mourning warbler. Historically, mourning warblers are known to breed at the site in the vicinity of the fire tower (Robbins 2005). Mourning warblers are known to be shy and secretive; it is feasible that the traffic, human presence, and noise relating to the project could cause nesting individuals to move off the Roth Rock site. Further, recent information from DNR indicates that mourning warblers in this remote part of their breeding range behave differently from the main population, and prefer "scrubby" habitats at the highest elevations in Maryland (Robbins 2005). If this is the case, mourning warblers displaced from the Roth Rock site would not likely breed in nearby similar habitats at lower elevations, but may seek higher sites in West Virginia or Pennsylvania.

The winter wren and dark-eyed junco (both observed on the Roth Rock site), and the red-breasted nuthatch (cited by DNR as possibly occurring in the vicinity of the site), are all species that are common and relatively secure within the main parts of their breeding range – primarily the northeastern U.S. and Canada. Breeding populations of all three birds are rare in Maryland (they only occur in Garrett County), however, and are protected. Of these three species, winter wren could be most affected by the proposed project, as it breeds in forested habitats. During the 2004 breeding season, this species was observed on the project site by the Phase I Avian Assessment and noted from two site visits by DNR personnel. DNR also found a fresh nest, indicating recent breeding activity. Considering that as much as 60 acres of forest would be cleared for construction of the project, and the fact that winter wrens are also shy, it is possible that a breeding population of this species could be negatively affected by the project. To minimize adverse impacts to local breeding populations of winter wrens, and other forest interior species, construction must avoid large parcels of forested habitats for turbine construction. These large parcels of forested habitat are concentrated in the northern part of the project. In addition, winter wrens place their nests in overhangs, narrow ledges, and rock crevices in forested habitats; disturbance to the rock outcrops on site could also negatively impact this species.

The state-rare dark-eyed junco breeds at the Roth Rock site. DNR has a record of a fledging bird on the site as well as a number of records of singing males during the breeding season (G. Brewer, personal communication). As indicated, this species was often noted on site visits during 2004. Further, the regional breeding bird atlas documents a number of confirmed instances of breeding in the immediate vicinity of the site in the southwest portion of Garrett County; a comparison with a historical survey suggested the breeding distribution had become more restricted (Robbins *et al*. 1996). Above 3000-ft elevation, the dark-eyed junco prefers brushy cutover hardwood forests as breeding habitat. Despite the premise that the Roth Rock project would create edge habitat favored by the dark-eyed junco, there is no evidence that the bird would breed under these circumstances. Kerlinger (2000) reported this species seemed to habituate easily to turbines at a Vermont wind power facility, but he did not confirm whether they successfully nested.

According to the Maryland and District of Columbia breeding bird atlas, the red-breasted nuthatch may nest regularly in Garrett County in small numbers and is associated with coniferous forests (Robbins *et al*. 1996). In its primary range (north of Maryland), the red-breasted nuthatch is apparently relatively common and its general population is secure. It appears unlikely that red-breasted nuthatch would be negatively affected by the proposed Roth Rock project, unless it is present in remaining hemlock and pine habitats.

Blackburnian warbler and alder flycatcher were identified as potentially occurring on the Roth Rock site from regional breeding bird surveys. Blackburnian warbler, listed as threatened in Maryland, may be adversely affected by the project. This species prefers to nest in mature coniferous trees (e.g., eastern hemlock, Norway spruce), several of which occur on or near the project site. Siting of turbines and placement of access roads should take this species into account; suitable nesting trees should not be removed or disturbed in such a way that precludes nesting. Alder flycatcher, a Maryland species in need of conservation, frequents wetland forests or swamp habitat and is less likely to be affected by the project.

It is also likely that construction of the Roth Rock wind power project would adversely affect FIDS where forested habitats are present. DNR-Heritage provides the following guidelines to minimize impacts on these species as well as on other native forest plants and wildlife:

- Concentrate development in nonforested areas.
- If forest loss or disturbance is absolutely unavoidable, concentrate or restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), particularly in narrow peninsulas of upland forest less than 300 feet wide.
- Limit forest removal to the "footprint" of structures and to that which is absolutely necessary for the placement of roads and access ways.
- Wherever possible, minimize the number and length of roads and access ways.
- Roads and access ways should be as narrow and short as possible — preferably less than 25 feet and 15 feet, respectively.
- Maintain forest canopy closure over roads and access ways.
- Maintain forest habitat up to the edges of roads and access ways; do not create or maintain mowed grassy berms.
- Maintain or create wildlife corridors.
- Do not remove or disturb forest habitat during May-August, the breeding season for most forest interior dwelling species. This seasonal restriction may be expanded to February-August if certain early nesting birds (e.g., barred owl) are present.
- Afforestation efforts should target (1) riparian or streamside areas that lack woody vegetation; (2) forested riparian areas less than 300 feet; and (3) gaps or peninsulas of nonforested habitat within or adjacent to existing habitat for forest interior dwelling birds.

According to DNR-Heritage, timber rattlesnakes were observed on both field visits to the project site during 2004. One was noted in the vicinity of the fire tower, the other was in the middle of the project area near "Middle Rocks." As this species is becoming globally rare throughout its native range, measures must be taken to protect it during planning, construction, and operation of the Roth Rock wind power project. Construction of turbines should be avoided in the vicinity of rock outcrops to the north and south of the existing transmission line right-of-way. Timber rattlesnakes use exposed boulder fields extensively for basking and hunting prey. Permanent disturbance of any boulder areas must be avoided, including for access road construction. A significant risk of mortality for this species (as well as other species of snakes and reptiles that likely also use the boulder fields for basking) is being run over by construction vehicles, trucks, and cars. The presence of readily passable access roads could also lead to other unnecessary human interactions with timber rattlesnakes that could result in the death of these reptiles. For these reasons, and in light of negative impacts to other species, all boulder fields must be avoided for turbine siting and access roads. A recommended condition for this project is the development and implementation of a rattlesnake training protocol for site workers that emphasizes the protection of this species.

Porcupines have also been observed by DNR at the Roth Rock project site in the vicinity of "Middle Rocks." Because of its relative rarity in Maryland, combined with disappearing habitat in some areas, the State has designated porcupine as In Need of Conservation and in the future may officially list it as threatened if current conditions persist. In the winter, porcupines den in rock outcrop areas with deep crevices with 83 percent of foraging occurring within 300 feet of the den site (Roze 1989). For this reason, Synergics must avoid clearing within large parcels of forest for turbine siting and access road construction throughout the project area, to avoid negative impacts to porcupines and other interior forest fauna.

Other animal species of concern identified by DNR as potentially being adversely affected by the wind power project include the Allegheny woodrat, long-tailed shrew, smoky shrew, southern rock vole, and Wehrle's salamander. To date, none of these species have been observed on the project site; however, because the land comprising the site is privately held, very few records are available. It is the opinion of DNR and other experienced wildlife scientists that appropriate habitats for these animals exist at the Roth Rock site. These habitats were observed in the field by DNR during site visits on July 30 and August 16, 2004, and April 12, 2005. Given that these animals are all state-listed species, good quality habitat should be avoided. To avoid negative impacts to these species, Synergics must avoid clearing within boulder fields and large

parcels of forest for turbine siting and access road construction throughout the project area.

The Allegheny woodrat (endangered) is known to have existed in the northern end of the project area during the past 20 years, and habitat further north is currently occupied. It is typical for colonies of this species to move within a larger landscape of suitable habitat through time, sometimes returning to previously occupied sites. The Allegheny woodrat has declined in the northern parts of its range; it has recently been extirpated from most of eastern Pennsylvania, New York, and New Jersey (Whitaker and Hamilton 1998).

The nearest record of long-tailed shrew to Synergics site is Shields Run located two miles to the southeast. The habitat at this site is characterized by talus slopes, cliffs, and rock slides in cool deciduous and mixed forests. Rocks are loosely arranged, forming an extensive network of deep crevices, the primary habitat of the species. Under partial to full forest canopy, the rocks are moss and lichen covered and often interspersed with ferns and other herbaceous plants. In Maryland, long-tailed shrew sites at lower elevation are often associated with streamside or spring-fed areas, however several higher elevation sites on or near ridge crests appear drier. Higher precipitation rates and more frequent fog at higher elevation sites would maintain the cool, moist microhabitat within the deep rock crevices. The habitat at the Synergics Roth Rock site is virtually identical in all respects to the long-tailed shrew capture site, including cliff outcrop, talus below, degree of crevice development, moss and lichens present, elevation, geologic member, and forest type. This species and the rock vole require special knowledge and unique trapping techniques to capture. As a result of this requirement and their rarity, few people, even professional mammalogists, have observed or captured this species. DNR-Heritage biologists are responsible for discovering 14 of the 15 site records for this species in Maryland. All areas identified as potential long-tailed shrew habitat by Natural Heritage biologists in the last 15 years were positively confirmed through subsequent capture of specimens.

The nearest record of smoky shrew to the Roth Rock site is also from Shields Run. This species has also been taken from ridgetop habitat in Frederick County within oak forest (record by Gordon Kirkland). Most records in Maryland are from mixed forest habitat adjacent to streams. This species is known to occur on the ridge top of Backbone Mountain at its northern end.

The nearest record of the State endangered southern rock vole is approximately two miles away from the Roth Rock site along the

Backbone Mountain ridge top, southwest of the project site (Gwen Brewer, personal communication). The record location shares similar ecological attributes with the project site, specifically the presence of boulders and loose rock with many crevices interspersed. Another record approximately 10 miles away is within the Potomac State Forest in rock scree habitat on a slope above Laurel Run. The habitat preference of this species is similar to the long-tailed shrew, although typically more moisture dependent. They are more likely to be found in rocky areas with underground springs; however, the regularity of fog occurring along Backbone Mountain may provide the necessary moisture for the site (Gwen Brewer, personal communication). DNR-Heritage biologists have documented all five confirmed records for this species in Maryland. Identification of rock vole habitat is not as definitive as for the long-tailed shrew. Seemingly appropriate habitat may not be utilized because of narrow habitat requirements of this species, uncertain past land use history that may have extirpated populations, and that they may occur at very low densities, which would make capture more difficult. This is a very uncommon species whose ecology is still largely unknown.

DNR has confirmed that three State-listed plants, mountain wood fern, summer sedge, and beaked dodder, are known to occur on the Roth Rock site. The full extent of their populations at the Roth Rock site have not yet been determined, although mountain wood fern was noted at two locations on August 16, 2004. DNR has also indicated that flame azalea and rose twisted-stalk are known to occur in the vicinity of the proposed project, and may possibly exist at the Roth Rock site. These plants and their habitats must be accurately documented and mapped on site by a qualified botanist prior to detailed site planning and construction of the Roth Rock wind power project. Turbines, access roads, and other project features must be located away from the specific locations of these plants and their habitats at a minimum distance to be determined by DNR.

2.5 WATER RESOURCES

2.5.1 Surface Water

Although several small wetlands and seep are present, there are no flowing streams or open water on the project site. A number of streams, however, originate on the lower elevations of Backbone Mountain. Runoff from the project site may affect these streams. Sand Spring Run and an unnamed stream that flow to the Youghiogheny River are fed from the west side of the ridge. The North and South Fork of Sand Run and a small tributary of Laurel Run flow to the Potomac River and originate on the east side of the ridge.

2.5.2 Ground Water

There are no wells or other information regarding the depth of groundwater on the ridge top in the vicinity of the proposed project site. Information on nearby wells was obtained from the Garrett County Health Department. Health Department records for a well located on the ridge top of Backbone Mountain about one-half mile south of the proposed project boundary indicates water at a depth of 295 feet.

Although the CPCN application stated no springs are known on the proposed project lands, DNR personnel noted spring-fed areas during a field visit. In response to a data request, Synergics provided a map showing wetlands, including spring seeps and springheads, on the project site. Several of these areas appear to overlap proposed turbine locations. A second data request was submitted asking for a more thorough delineation of these resources. Other springs are known in the vicinity of the project, mostly on the lower slopes of the mountain.

2.5.3 Impacts

Synergics maintains that no direct impacts to surface water are expected during either construction or operation of the project. However, until a more accurate delineation of surface water and ground water resources in relation to proposed wind turbine and access road locations is provided, impacts to these resources cannot be fully evaluated. Synergics indicates that water required during construction and operation will be transported by truck to the project site.

Should the CPCN be granted, standard operating procedures should be developed to safeguard the area from erosion and runoff due to construction activities. A Stormwater Management Plan should be devised to minimize adverse impacts from stormwater runoff during construction. Synergics has indicated that during operation, there would only be occasional need, if any, for water during facility operation.

Temporary changes in soil compaction during construction, as well as permanent topography changes due to placement of the turbine pads and the access roads could alter the pattern of stormwater runoff on the project site. Procedures to properly direct runoff should be utilized to prevent localized soil erosion and the transport of soil to the headwaters of streams located in the vicinity of the project area.

Synergics stated that access roads will be surfaced with crushed stone to minimize the increase of impervious surface in the project area. Impervious

surface on the project site will increase with the wind turbine foundations, but the impact due to localized changes in surface flow during storms is expected to be minor. Each wind turbine pad is relatively small, approximately 1,125 square feet, and turbine pads will be spaced widely apart.

It is not expected that turbine blades will require washing during operation of the Roth Rock facility, but if the need arises water will be transported to the site and used sparingly. Surface water runoff from the blade washing area is expected to be minor since only small quantities would be involved and the water would be dispersed during the washing process.

There will be no impact to groundwater availability as a result of the construction and operation of this project, since groundwater will not be used. There is a possibility that fuel or hydraulic fluid spills from construction equipment or from the turbines themselves could affect groundwater quality, but this potential impact would be minimal owing to the limited quantities of these fluids present in each turbine, the thick and hardened steel crankcase walls, the natural containment vehicle provided by the wind turbine towers, and the depth of groundwater along the ridge top in the vicinity of the project area. In addition, a Spill Prevention, Countermeasure, and Control (SPCC) Plan and remote monitoring of operations will further safeguard the soil and groundwater from contamination.

The SPCC plan will include specific response measures to be taken in the event of a hazardous material spill. Additionally, any spills that occur during construction or operation of the facility will be contained and the contaminated soil removed before any contaminants would reach the groundwater table along the ridge top in the vicinity of the project area.

2.6 AIR QUALITY

Because it is a non-combustion process relying on the direct conversion of mechanical energy into electrical energy, the operation of wind turbines does not produce air emissions. This differs drastically from conventional fossil-fired electric power plants. To quantify the air quality benefits from wind power generation, PPRP calculated the avoided emissions of three significant air pollutants:

- carbon dioxide (CO_2), a greenhouse gas that contributes to global warming;

- nitrogen oxides (NO_x), which contribute to ground-level ozone and acid rain;
- sulfur dioxide (SO_2), another acid rain precursor that also contributes to smog and visibility problems; and
- particulate matter, which diminishes visibility and can contain toxic materials.

PPRP estimated the pollutants that would be emitted if the Synergics facility's output were generated by a new fossil fuel source rather than wind power. Typically, a new generation source constructed in Maryland would consist of one or more natural gas-fired combustion units with some level of control for NO_x emissions. Based on information provided by Synergics, the expected annual output of 24 turbines would be approximately 132 million kilowatt-hours. The resulting emissions are listed below:

- CO_2 – 63,000 tons per year (tpy)
- NO_x – 6.7 tpy
- SO_2 – 1.7 tpy
- Particulates – 1.1 tpy

A new generating facility proposed in Maryland with these approximate emissions characteristics would require a detailed evaluation of impacts to air quality. Electricity generated by wind turbines represents a way of meeting our region's growing demand for electric power without emitting these combustion-related air pollutants.

3.0 VISUAL, CULTURAL RESOURCES, AND SOCIOECONOMIC IMPACTS

3.1 REGIONAL SETTING

The proposed project would be located along a three-mile stretch of Backbone Mountain in southern Garrett County, approximately 12 miles south of the county seat of Oakland.

Garrett County is Maryland's westernmost jurisdiction, located about 180 miles west of Baltimore and approximately 100 miles southeast of Pittsburgh, Pennsylvania. It is bordered to the north by the Pennsylvania counties of Somerset and Fayette, to the east by Allegany County, Maryland, to the west by Preston County, West Virginia, and to the south and southeast by the West Virginia counties of Mineral and Grant.

The county is Maryland's largest in area, covering approximately 664 square miles, of which approximately 7.5 square miles are water (Maryland Geological Survey 2002). However, its estimated population of 30,049 makes it the third least populated of the state's 24 jurisdictions. Its large physical area combined with its low population gives Garrett County a population density of just 46 persons per square mile, the lowest in the state (Maryland Department of Planning 2004).

Approximately 20 percent of the county consists of parks, lakes, and publicly accessible forestland, and recreational tourism is a major component of the county's economy. The county boasts 10 state parks, the highest elevation in Maryland (Hoyes-Crest on Backbone Mountain, 3,360 feet), and Deep Creek Lake, the state's largest inland body of water. Total tourism tax revenue for fiscal year 2004 (FY04) was over $7 million, the eighth highest in the state (Maryland Office of Tourism 2004).

Four highways traverse the county, three of them (I-68, US 40, and US 50) running east-west, and one (US 219) running north-south and providing access to Oakland and Deep Creek Lake.

Garrett is the most rural county in the state, with an estimated 76 percent of the population living outside incorporated limits (Garrett County Chamber of Commerce 2005). There are no countywide zoning regulations, and although there are seven zoning districts within the county, the proposed facility does not fall within any of them. The county does have a Sensitive Areas Ordinance that prohibits or places

requirements on site development on four defined areas of concern: steep slopes; stream buffers; habitat of rare, threatened or endangered species; and flood-prone areas.

The county's per capita local income tax revenue is less than 75 percent of the statewide average, qualifying it for additional state aid in the form of an annual disparity grant. Because the basis for this aid is personal income and not real property, the proposed facility would have no measurable impact on the calculation (Burch 2005).

3.2 VISUAL AND CULTURAL RESOURCES

3.2.1 Visual Resource Impacts

Garrett County lies within the Appalachian Plateau, with an average elevation of 2,300 feet above sea level. Terrain relief is evident throughout the county, with elevations increasing to 3,360 feet at Hoyes-Crest on Backbone Mountain, the highest point in Maryland. Heavily forested mountains surround several lakes, rivers, and rolling farmland. Garrett County's elevation results in cooler summers and colder winters with greater snowfalls than elsewhere in the state, making it a popular tourist destination year-round. Although its economy was originally dominated by natural resource extraction and agriculture, service and retail industries driven by tourism are now more important and are expected to show the most significant growth over the next 10 years (Garrett County Chamber of Commerce 2005).

Because the turbines are located along the ridgeline of Backbone Mountain, the proposed facility would be potentially visible from much of the surrounding area. The area of potential effect (APE) from visual impacts associated with facility structures can be roughly estimated from georeferenced turbine locations and a digital elevation model of western Maryland. From these inputs, geographic information system (GIS) software can calculate locations from which parts or all of one or more wind turbines are visible, given the intervening terrain. The aggregation of all visually affected locations comprises the *visibility zone* for the facility.

Visibility zones from digital elevation models must be interpreted with caution because the computation from a digital elevation model ignores the mitigating effects of (primarily) vegetative screening and distance. Vegetation, particularly trees, which may be located anywhere between a viewer and landscape alteration, contracts a visibility zone by blocking the view of a visual intrusion. Distance influences the visual thresholds in the

detection, recognition, and visual impact of an introduced landscape object, such as a wind turbine.

The key predictor for visual detection, recognition, and visual impact assessment is contrast-weighted visual magnitude (Shang and Bishop 2000). This concept has been extended by Bishop (2000) to use the relative perceived size of a turbine, its contrast level, and the effect of atmospheric scattering to estimate the probability of turbine detection, recognition, and visual impact at distances up to 30 km. Models from controlled perception studies suggest the following.

- Object **detection or recognition** will occur in the absence of atmospheric reduction in contrast from 30 km for about 5 percent, and from 20 km for about 10 percent of the population.
- Most of the drop in object **detection** rates occurs between 8 and 12 km in clear conditions, and between 7 and 9 km in light haze.
- The percentage of population **visually impacted**, in clear air, drops rapidly at 4 km and is below 10 percent at 6 km.

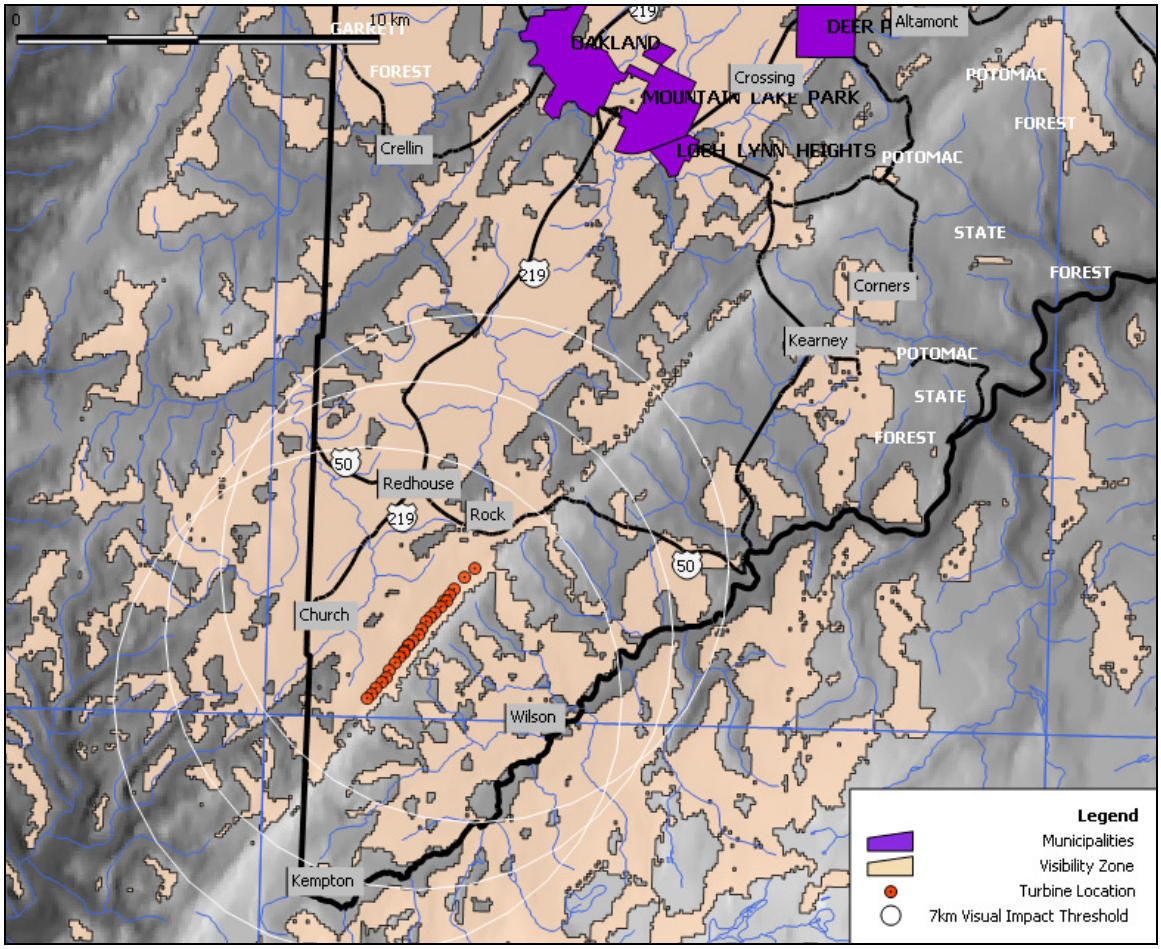
In general, distance thresholds are significantly reduced by atmospheric scattering from haze, and increased by special conditions of high contrast, such as an approaching storm.

The models estimated by Bishop lend support for the use of distance thresholds in the application of visual models, although there is considerably more uncertainty regarding visual impact thresholds than those associated with detection and recognition. This is because the degree of impact is also dependent on landscape content and the attitudinal composition of potential viewers. However, Bishop suggests that visual impact from wind turbines could potentially be minimal beyond 5 to 7 km even in clear air. This is slightly more distant but consistent with a visual impact threshold suggested by Stanton (1996) where wind turbines are thought to form the dominant landscape element for up to 2 km and, from 2 to 5 km, are seen as an important part of the landscape.

Terrain-enabled visibility of the proposed project is illustrated in Figure 3-1, with the shaded area indicating areas from which at least the rotors of one or more wind turbines would be visible in the absence of vegetation. Circles in the figure delineate a seven kilometer visual impact threshold within which most visual impacts would probably be confined according to the visual threshold models of Bishop (2000). The illustrations suggest that the rotors of one or more turbines would be visible from much of the area surrounding Backbone Mountain, but the

placement of the towers just below the ridgeline would accentuate visibility from the west in the Youghiogheny River valley. The predicted visibility zone extends from Gortner in the north to scattered ridge tops and higher elevations in West Virginia, from parts of US 219 from the West Virginia border to north of US 50, and from parts of US 50 in Garrett County west of Backbone Mountain. Views from the east would also be affected, but these are dominated by strip mining operations along the eastern slope of Backbone Mountain.

Figure 3-1 ***Estimated Visibility Zone and Visual Impact Threshold from Roth Rock Project***



Scenery is an integral part of the recreational experience. Attitudinal surveys associated with proposed wind farm projects in New England suggested that scenic views are important components of recreation, although the importance of scenery varies by activity (Planning Decisions Inc. 1998). These studies also suggested a lower valuation of scenic views by local residents than by visitors (Palmer 1997). Although most groups

in the New England survey indicated overall support for wind energy and the acceptance of some visual trespass of the landscape for wind energy facilities, the data suggested that the perceived attractiveness of a view is reduced by wind turbines and most respondents express a preference for the landscape prior to development. Whether these attitudes translate directly to seasonal visitors to Garrett County, or would have a negative impact on tourism on the county, is uncertain.

Clearly, the focus for tourism in Garrett County is Deep Creek Lake, Maryland's largest freshwater lake, around which a burgeoning community of seasonal and rental homes has sprouted. Also on the shores of Deep Creek Lake is Maryland's only alpine ski resort (Wisp) and an associated conference center with an 18-hole golf course. Visibility zone estimates indicate that Deep Creek Lake is outside the predicted visual impact threshold of the proposed project.

Garrett County hosts 80,000 acres of public parks, forests and wildlife management areas, and open space. These lands are used for camping, hiking, backpacking, cross country skiing, and snowmobiling. Hunting, ice fishing, and whitewater activities offer additional recreational opportunities to residents and visitors. Much or all of the county land dedicated for recreational purposes appears to be outside the visual impact threshold of the proposed project.

The Youghiogheny River runs northeast along the base of Backbone Mountain from Grant County in West Virginia before heading west and meandering back into West Virginia where it is spanned by US 50. This section of the river is within the predicted visual impact threshold of the facility, although vegetation along the shoreline is expected to screen views from most locations, mitigating the effect on the recreational experience of users. A 21-mile segment of the river is designated as a Scenic and Wild River, but the protected corridor is farther downstream, beginning north of Oakland about 13 miles from Roth Rock, and is outside of the visual impact threshold zone.

Visual impacts in the form of light trespass would also be associated with the facility, although the magnitude of the impact on the surrounding landscape at night will depend upon lighting requirements. All structures more than 200 feet in height must have aircraft warning lights in accordance with requirements specified by the Federal Aviation Administration (FAA), and lighting requirements are determined by the regional FAA Obstruction Hazard Analyst (AWEA 2002). Since requirements vary widely from region to region, visual impacts from

lighting are currently unknown. To the extent possible, Synergics should avoid undue glare from turbine lighting onto adjoining properties.

3.2.2 Cultural Resource Impacts

Garrett County was formed in 1872 from a western triangle of Allegany County. It was the last county to be added to Maryland and was named after John W. Garrett, president of the B&O Railroad. It was a seasonal home for some Native American tribes, part of an annual migration pattern that archeologists believe existed from the Archaic Period. Several "shelter cave" sites dating to the Early Woodland period of Indian culture have been identified in the county. Although Cherokee, Delaware, and Shawnee Indian culture artifacts can be found throughout Garrett County, evidence shows that the indigenous Mingo tribe returned to the area each year to hunt, fish, trade, and plant crops where open land was available (Garrett County Historical Society 2002).

Much of the land was surveyed in the mid-1700s by a young George Washington for Lord Fairfax of Virginia. In 1755, during the French and Indian War, Washington guided General Braddock using Indian trails from Fort Cumberland over the rugged mountains to Fort Duquesne (Pittsburgh) where he was defeated by the French. The old National Pike was built over this same trail in the northern part of Garrett County between 1811 and 1819. Some of the old stagecoach inns can still be found in the Grantsville area. Today's US 40 also follows much of the same path of the old National Pike. Washington used another Indian trail in the south of the County when he surveyed the area for Lord Fairfax of Virginia. This road later became the present-day US 50 (Garrett County Historical Society 2002).

Archeological surveys have been conducted along portions of Backbone Mountain with meager results. In 1981, the Maryland Coal Region Survey concluded that the major ridge tops in western Garrett County are low potential zones for archeological resources. Ridge tops like those in the vicinity of the project, which are narrow, lack fresh water, and are strewn with large boulder deposits, cause severe limitations on settlement (Wall 1983). The archeological potential increases with proximity to surface water and proximity to major waterways or high order streams (Wall 1981). Two potential prehistoric cairn zones and one rock shelter site were discovered in a Phase I archeological survey along Backbone Mountain (Goodwin & Associates 2002), conducted for Clipper Windpower, but these are north of the project area. In 2003, the Maryland Historical Trust (MHT) reviewed the proposed Roth Rock project for effects on historic and archeological properties and found no known archeological sites or

historic structures within the project area. MHT also stated that further archeological investigations are not warranted for this site.

There are 104 inventoried properties within the potential visual impact threshold (7 km) of the project. In response to a request from the applicant, MHT identified approximately 51 historic properties within two miles of the project and, while noting that any effects on these properties would be visual only, it did not characterize the effect (Maryland Historical Trust 2003). A survey by Synergics found that 11 of the structures have no view of the project and another 11 have only a partial or winter view of a portion of the project. MHT has not yet made a determination of adverse effect on historic properties.

3.3 SOCIOECONOMICS

3.3.1 Employment and Income

Approximately 936 employers operate in Garrett County (including 36 governmental units) with an estimated total labor force of just over 14,100. As of November 2004, the county's unemployment rate stood at 4.8 percent, down from 6.2 percent in the previous year, but still above the statewide average of 3.9 percent (MDLLR 2004). Between 1970 and 2000, employment in the county grew by an annual average rate of approximately 2.1 percent. Forecasts call for a slower rate of growth over the next 10 years, averaging roughly 1.4 percent annually (Maryland Department of Planning 2004).

Seventy-nine percent of county residents graduated from high school, and about 14 percent of residents aged 25 years and over hold a bachelors degree or higher. Approximately 3,500 county residents commute to a workplace outside of the county, including nearly 1,500 who commute to Pennsylvania or West Virginia (U.S. Census 2000).

Relative to statewide averages, Garrett County's jobs depend more heavily on resource extraction, manufacturing, leisure and tourism, and trade (Table 3-1).

Table 3-1 Employment Categories of Garrett County Residents vs. Statewide, 2004

Category	Maryland Statewide (%)	Garrett Co. (%)	Index
Natural Resources & Mining	0.25	4.2	1680
Construction	6.9	8.8	127
Manufacturing	6.0	7.9	132
Trade/Transportation /Utilities	18.8	22.3	119
Information	2.1	1.2	57
Financial Activities	6.4	4.1	64
Professional & Business Services	15.0	6.0	40
Education & Health Services	13.7	12.4	73
Leisure & Hospitality Services	8.6	13.2	153
Other Services	3.6	4.1	114
State/Local/Federal Government	18.8	16.0	85

Source: MDLLR 2004.

In 2002, Garrett County's per capita personal income (PCPI) was $23,686, ranking it 22nd out of 24 jurisdictions in Maryland. The PCPI was only 65 percent of the state average of $36,303, and approximately 76 percent of the national average of $30,906 (Bureau of Economic Analysis 2004). The county's PCPI is projected to increase by 2.07 percent annually between 2005 and 2010.

Garrett County has a favorable business environment. Businesses pay a local real property tax of $0.0996 plus a landfill bond tax of $0.04 for an effective tax rate of $1.036 per $100 assessed valuation. The county is one of just four in Maryland that do not tax ordinary business personal property. There is no county corporate income tax surcharge. A 4 percent hotel/motel tax applies to accommodations and the revenue from the tax is earmarked for use in promoting economic development and tourism in the county. Presently, the county income tax rate is 2.65 percent of taxable income.

With more than 107,000 acres of farmland, Garrett County accounts for roughly 4.9 percent of the state's total. Its 632 farms make up about 5.2

percent of farms in the state. The market value production of the county's farms was estimated to be $20.8 million in 2001, composed of roughly $17 million in livestock sales and $3.7 million in crop sales. The county ranks fourth in the state both in beef cattle and dairy production with the bulk of the milk going to markets in Pennsylvania (U.S. Department of Agriculture 2002).

Mining and timber harvesting played major roles in the county's development and are still significant factors in the county's economy. Garrett contains almost 70 percent of Maryland's recoverable coal reserves (MDE 2004). At least three companies actively mine coal in the county, including Mettiki Coal LLC on Backbone Mountain, one of the county's largest employers. State forests cover 64,037 acres in Garrett County, more area than in any other county in Maryland. State-sanctioned timber sales from those acres alone totaled more than $2 million in FY00, resulting in payments to the county of approximately $500,000.

Tourism is a major component of the county's economy. The hotel/motel tax rate is 4 percent, a relatively low rate by statewide measures. However, revenue from the tax for FY04 amounted to slightly more than $920,000, ninth highest in the state. Amusement and admission taxes added another $463,000 to county tax revenues. The Youghiogheny Overlook Welcome Center in Friendsville saw 80,095 visitors in FY04, up 5 percent from the previous year (Maryland Office of Tourism 2004).

The construction phase of the proposed Synergics facility would have a minor positive effect on employment and income for Garrett County and the State. The applicant estimates that the construction time frame to be between 8 and 12 months. The number of persons employed during this period would vary from a low of 31 to a high of 63. Synergics estimates that payroll over the period would be $967,565.

Using multipliers from the Maryland Department of Business and Economic Development (DBED), the added income would result in the creation of about 42 additional indirect person-years of employment and approximately $892,000 of indirect income in Garrett County and the surrounding region during the construction period.

The applicant estimates spending a total of approximately $45.1 million dollars on goods and services for construction of the turbines and associated infrastructure, with approximately $35.1 million of that total going towards equipment purchases. Wind turbines are specialized equipment not manufactured in Maryland. Purchases of $10 million for goods and services other than the turbines would generate an additional

$7.9 million of sales from supplying industries over the construction period, according to DBED multipliers. Not all of this economic impact would remain in Maryland due to the proximity of the site to West Virginia and Pennsylvania.

Once the facility is operational, the employment requirements of the facility would decline to four full-time employees. Synergics estimates these jobs would generate a total annual payroll of $75,460. Multipliers from DBED suggest that the indirect benefits from facility's O&M payroll would be two new jobs creating an additional $30,000 in earnings.

Synergics estimates that O&M expenditures will be approximately $960,000 annually, which would generate additional downstream purchases of approximately $687,000. However, due to the specialized nature of much of the equipment it is likely that some portion of that total would flow out of state.

3.3.2 Population and Housing

The proposed project would not perceptibly affect population or the demand for housing in Garrett County. With a construction labor force that is expected to commute on a daily basis to the project site, no population effects are expected from construction of the facility. The small size of the O&M contingent means that even if workers were recruited from outside the area to work at the facility, the effects from in-migration on population and housing would be minimal.

3.3.3 Transportation

Deliveries of large components would reach the construction site along a route identified by the applicant as moving from I-68 to US 219 (Keysers Ridge – Oakland Road) south through the town of Oakland (where it becomes Elkins – Oakland Road) and continuing south to the intersection with US 50 (George Washington Highway). From there, traffic would flow east up the mountain to the intersection with Table Rock Road and then south to Roth Rock Road which provides access to the northern terminus of the proposed wind farm. Roth Rock Road is a single-lane, unpaved private road. According to one of the property owners along the road, an easement was granted to DNR for use of the road during construction and operation of the fire tower, with the easement expiring when it was decommissioned. Synergics will have to negotiate a new easement with the property owners in order to make any improvements to the road or use it for construction and operation of the facility.

To gain access to the southern end of the facility, workers would continue down Table Rock Road to its intersection with Kempton Road and then proceed west along Red Oak Road. Most workers traveling to the project site from the northern part of Garrett County would commute to the area along this same route or use MD 495 and MD 135 through Swanton and Loch Lynn Heights. MD 135 also links Westernport and the Potomac Basin of Allegany County, and would be a commuting corridor from this direction. Workers from West Virginia would reach the project site from US 219 through Silver Lake, US 50 from the east or west, or through Hutton on MD 39. With a peak employment level of 63, traffic impacts associated with construction worker traffic are expected to be insignificant.

Large loads would be transported on trailers up to 90 feet in length. On the identified route, trucks must negotiate a 90-degree left turn through a signalized intersection in Oakland. This movement would likely disrupt local traffic for brief periods (15 to 30 minutes at a time, based on limited field observations). Maximum sizes and loads for motor carriers for commercial travel on Maryland highways are specified in the Maryland Motor Carrier Handbook published by the Maryland Department of Transportation State Highway Administration and are the same standards used by the County Roads Department of Garrett County. Transporters would require permits from both the State and Garrett County to travel on interstate, federal and state highways and on county roads to the site. It is presently unknown whether the weight of vehicles carrying wind turbine components or erection cranes would exceed the weight limits of any bridges along the proposed route. Road and bridge restrictions on state and federal highways and county roads would be reviewed prior to the issuance of permits.

The applicant also indicates that improvement and use of Gnegy Church Road may be considered depending on the final turbine configuration. Gnegy Church is an unimproved road that does not conform to current county road standards. Plans for improving any sections would have to be permitted by the Garrett County Roads Department.

Only four permanent employees would be required to operate the turbines. Therefore, no adverse effect to the state highway system or local roads is expected from the operation and maintenance of the project.

3.3.4 Land Use

The proposed project would be constructed on private lands along a continuous stretch of Backbone Mountain beginning in the vicinity of the

DNR fire tower and extending south for approximately three miles. Depending upon its final configuration, the facility would sit in either the Youghiogheny River Southern Section drainage basin or the North Branch Potomac River Southwest Portion drainage basin, two of the twelve major basins that form the basis for the land use plan component of the Garrett County comprehensive plan (Nelson 2005).

The project area is generally classified as "Remaining Rural Area", which are lands that remain after designating specific areas for all other land use categories in the plan. This classification accommodates every possible activity including residential, agriculture and commercial, but the plan discourages activities controlled by state or county regulations that constitute public health or safety hazards. The plan specifically states that the Remaining Rural Area category "leaves fundamental decisions about the precise use of individual areas to the area's owners. The breadth of this category leaves ample opportunity for private initiative to respond to market forces" (Garrett County Commissioners 1995). The project site is very near areas designated as sensitive areas, primarily steep slopes with grades over 30 percent where the comprehensive plan discourages development. There are no zoning regulations covering this part of the county.

To construct and operate the wind turbines, Synergics would purchase easements from private landowners. Thus, ownership of the land hosting wind turbines on Backbone Mountain would remain in the hands of landowners. The terms of the easement agreements between Synergics and landowners are confidential.

Land use impacts would come from both the construction and operation of the turbines as well as the construction of the access road. Synergics estimates each wind turbine would have a foundation pad 30 feet by 30 feet in area sitting on a total cleared area 45 feet by 45 feet. This would preempt 2,025 square feet (0.046 acre) of land from current uses for the life of the project. If 24 turbines are built, as proposed, the total footprint associated with generation facilities would be 1.1 acres. An operations and maintenance center is included in the plans, taking another 2,000 to 2,500 square feet (0.046 to 0.057 acre). The new substation is estimated to require 22,500 square feet (0.5 acre). Additionally, about 2.5 miles of new gravel surfaced road linking each turbine site is anticipated. Synergics estimates the road would be roughly 20 feet wide bordered by eight-foot shoulders for a total area of approximately 475,200 square feet (10.9 acres). Initial road widths would be 36 feet and subsequent widths would be maintained at 20 feet (allowing regrowth along road edges). In total,

Synergics estimates the project would remove approximately 20 acres of land from current use for the life of the project.

DNR undertook an independent review of the expected extent of land disturbance from construction of the Synergics project (see discussion in Section 2.2.2). Based on a review of the topography in the project location and the extent of disturbance typical of the Mountaineer wind power project, the amounts of disturbance described in the application for the Roth Rock project appear to be significantly understated. Both the roadway construction and turbine site construction disturbances are expected to be greater than stated in the application. The total disturbed area can be expected to exceed 60 acres. Additional areas surrounding this disturbance will be subject to tree removal and/or trimming and other vegetation clearing.

While Garrett County has no regulations pertaining to the construction of private roads (with the exception of those within a subdivision), a grading permit for such roads is typically required. Additionally, a permitting process is required for joining a private road to an existing county road (Emory 2005).

Land area that is temporarily disturbed for construction staging or access would be returned to its prior state, where practical. Commercial hunting would be prohibited during certain periods when O&M personnel or their agents are on site. Hunting by landowners and their guests would not be restricted during these periods although normal caution is expected to be applied.

3.3.5 Property Values

The Roth Rock facility would have an uncertain impact upon property values of neighboring properties. The applicant suggests that land values would be unaffected, based on a report published by the Renewable Energy Policy Project (REPP 2003). REPP evaluated the effects of eleven wind energy development projects on nearby property values. The study was based on the premise that property value impacts from wind energy facilities can be observed by comparing the average change in value of real estate transactions within the zone of influence of a wind energy project to the average change in value in a corresponding control area. Using simple regressions that related average monthly sales price to time, the study estimated three different models corresponding to pre-development, post-development and pre- and post-development time periods. Regressions failed to reveal any negative relationship between property sales prices and proximity to wind energy projects and, in fact,

suggested a positive relationship in some cases. The study concluded, as a result, that there is no support that wind development will harm property values.

The REPP findings should be interpreted with caution, however. The statistical significance of model coefficients was not reported, and most of the regression equations had poor goodness of fit. The analysis was severely limited by data and the report lends little statistical weight to the nature of the relationship between property values and proximity to wind energy projects.

In a survey of its members with experience in transactions affected by wind farms, the Royal Institution of Chartered Surveyors found that wind farm development in the United Kingdom has reduced property values to some extent and that the impact starts in the planning application stage (RICS 2004). The influence of wind farm development on agricultural property values is significantly less than for other types of property, and a significant minority of surveyors reported no impact on residential property values. Visual impact was cited as a major reason for a decline in residential property values, although fear of blight and proximity were also suggested as contributory factors. The survey found that once a project is completed, the negative impact persists, but declines after two years, and that wind farms do not affect property values in a uniform way.

Price effects have been observed in properties that are proximate to other types of energy facilities, although the findings are not universal and are, in some cases, ambiguous. It is plausible, however, to suggest that property values of some nearby properties, particularly those with near views or within the sound print of wind turbines, could be affected.

The argument that the Roth Rock facility would affect property values is strictly hypothetical because the project has not been permitted nor has the housing market had time to adjust. On the other hand, the Allegheny Heights (Clipper) wind energy project, located north of the Roth Rock project, was announced in 2002 and permitted in March 2003. RICS (2004) observed that property value impact from wind energy projects starts in the planning application stage and, because of this, it might be possible to estimate property value effects from the Allegheny Heights project and infer the likely effect from Roth Rock.

Assessment and attribute data are available for residential properties in Garrett County through the MDProperty View 2004 database. Information in the database permits the specification of a simple hedonic

model relating the total assessed value of a residential property to both structural and dimensional attributes and to distance from the project. Since wind projects are linear facilities, distance to the nearest turbine was calculated and all residential properties within 7 km (in deference to Bishop's (2000) visual impact threshold) of at least one turbine were included in the sample, resulting in 2,075 observations.

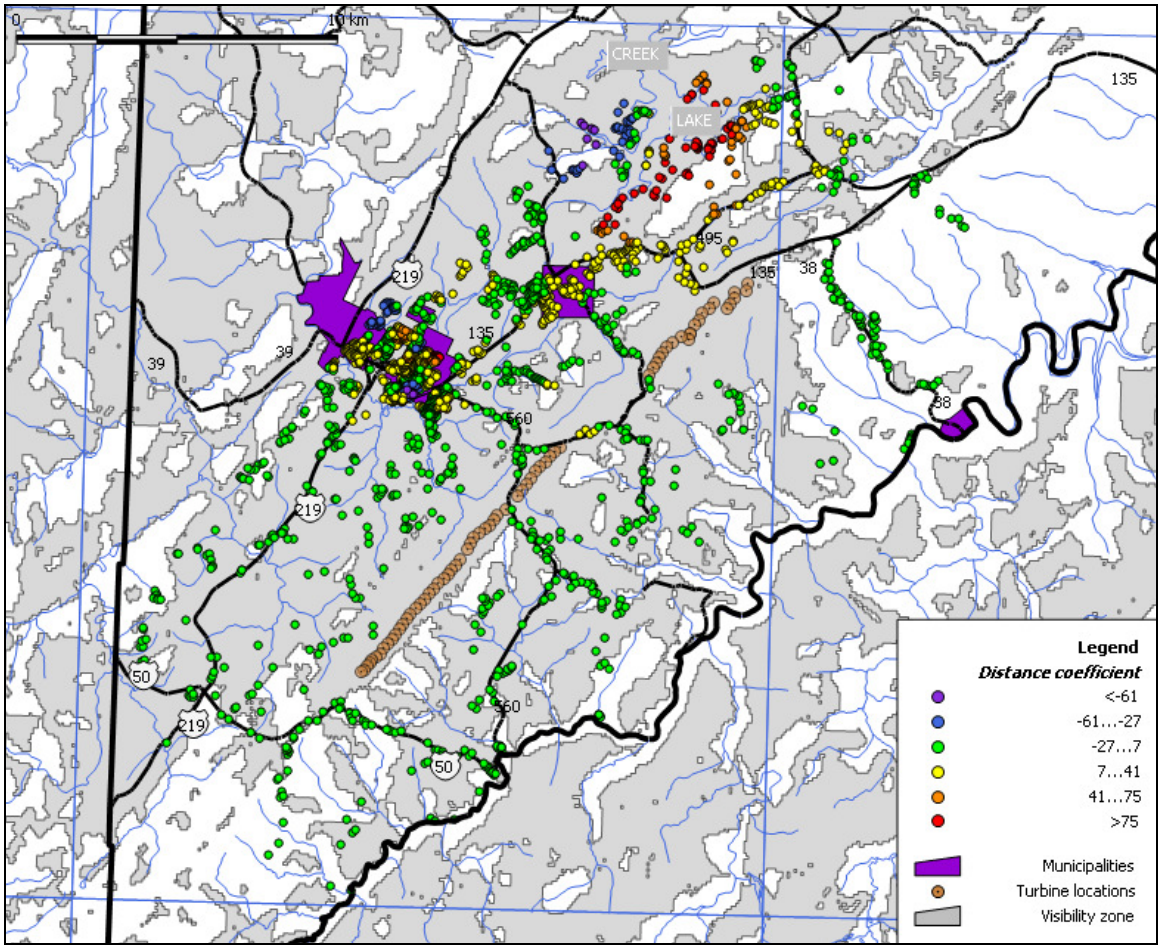
Using an ordinary least squares (OLS) estimator, a global hedonic model revealed a positive and significant relationship between property values and distance from a wind turbine (Table 3-2). This suggests that proximity to the Allegheny Heights project may be having an adverse effect on property values. But with an adjusted R-square value of 0.374886, the model has a poor goodness of fit to the data and a usually important explanatory variable associated with lot size (acres) has the wrong sign and is not significant.

Table 3-2 OLS Regression Results for Global Hedonic Model

Parameter	*Estimate*	*Std Err*	*T*
Intercept	-2046152.51	109929.07	-18.61
dist_min	7.92	1.08	7.27
acres	-1421.65	1056.52	-1.34
sqftstrc	68.11	2.39	28.45
yearblt	1015.15	55.71	18.22
Effective number of parameters		5.000000	
Sigma		70185.272489	
Akaike Information Criterion		52205.038662	
Coefficient of Determination		0.376393	
Adjusted r-square		0.374886	

Subsequent estimation of a geographically weighted regression (GWR) model (Fotheringham 2002) on the same specification improved the model's goodness-of-fit (adjusted R-square improved to 0.794735) and revealed significant spatial drift in the distance coefficient which, when mapped (Figure 3-2), showed no apparent relationship between residential property values and distance to the Allegheny Heights wind energy project. The largest coefficients on the distance attribute are associated with properties located on Deep Creek Lake, not with properties nearest to the project.

Figure 3-2 ***Spatial Distribution of Distance Coefficient in GWR Hedonic Model for the Allegheny Heights Wind Power Project***



These findings are not entirely definitive. The Maryland Department of Assessments and Taxation appraises each property only once every three years, and many properties in the sample were probably appraised before the Allegheny Heights project was announced. The data may therefore be obfuscating post-project announcement effects on residential properties near the Allegheny Heights facility. However, the GWR model clearly shows distance from the project to be a surrogate for proximity to Deep Creek Lake, where vacation homes are highly valued. The observed relationship in the global hedonic model between distance of a property to the closest Allegheny Heights wind turbine and residential property values could therefore be entirely spurious.

To date, there is no evidence that wind farm development in Garrett County has had an adverse effect on residential property values.

3.3.6 Fiscal

During construction, fiscal impacts associated with the proposed facility would be positive to Garrett County and the State of Maryland. In this period, tax revenues would accrue mainly to the State through sales taxes levied upon the purchases of construction materials and services by Synergics and its contractors, and the consumption expenditures of construction workers. State tax revenues would also accrue from income taxes on construction worker and indirect earnings associated with the project, which are estimated to be $967,000 and $892,000, respectively. Furthermore, although most major generating components would be purchased out-of-state, as much as $10 million of materials and services would be purchased in Maryland or nearby states during facility construction.

The primary source of revenues to Garrett County from the project over the construction period would be from the county personal income tax, which is currently 2.65 percent. Income tax revenues would be highly dependent on the proportion of the construction and indirect labor residing in Garrett County, but can be estimated at $28,000 if 80 percent of Maryland workers on the project are county residents. In addition, the Garrett County commissioners established in January 2005, a new building permit fee schedule effective February 1, 2005 for utility and public telecommunications towers of $1 per foot. This fee would be assessed on each turbine erected at the facility (The Republican 2005).

Once operational, the facility would be a major revenue source for Garrett County and less of one for the State. Revenue sources for the State would be corporate income taxes, sales taxes from O&M expenditures, and personal income taxes on O&M worker incomes. Synergics did not estimate corporate income tax payments to Maryland in its application. Total O&M expenditures (including indirect spending) are estimated to be approximately $1.64 million annually, although the proportion that would be spent within the state is unknown. Personal income taxes on O&M worker incomes would be approximately $4,000 per year.

The primary tax revenue source for Garrett County after the facility is operational would be from property taxes. Property tax revenues are based on real property and personal property components of the applicant's facilities. The real property tax component is the tax on land and buildings. Most business personal property is exempt from taxation in Garrett County. However, this exemption does not apply to Class (c) subclass (6) machinery and equipment used to generate electricity or steam for sale (Kittel 2005). Thus most, if not all, of the applicant's

personal property would be subject to taxation. Real property is assessed at a rate of 1.036 percent, while personal property is assessed at the rate of $2.59 per $100 valuation in Garrett County.

The estimated personal property tax basis is $43 million and the value of structures and improvements is estimated at $10 million. Most personal property associated with electric generation is classified under Category G assets, which have an allowable depreciation rate of 5 percent per year. Section 7-237 of the Tax Property Article of the Annotated Code of Maryland gives generating facilities a 50 percent exemption for personal property that is machinery or equipment used to generate electricity for sale. All personal property is subject to a minimum assessment of 25 percent of the original cost. Assuming all of the facility's personal property would be subject to the 50 percent exemption clause, Garrett County would receive approximately $432,000 in personal property tax revenues in the first year, declining to about $227,000 annually after assets are fully depreciated (Year 14). The real property components of the project would generate an additional estimated $98,000 in the first year of operation, declining to about $37,000 after 20 years. Total estimated property tax revenues from the project would range from $530,000 in Year 1 to $264,000 in Year 20.

While the facility is under construction, state and local police services might be required during the transport of turbine components over public roads, although these costs would be recovered from the applicant. Escort by private or Maryland State Police personnel is determined under Title 11 of the Code of Maryland Regulations (COMAR) when carriers make application to the SHA Hauling Permits Section for oversize or overweight vehicle use. The holder of the permit is responsible for the costs of such escort as indicated in COMAR 11.04.01.07, while the hauler is responsible for assuring the safety and rights of the public. Garrett County imposes a fee on every oversize motor vehicle using highways in the county (Garrett County Code §248-4).

During construction and operation, the facility would rely upon county emergency services, such as fire and police. The Garrett County Sheriff's Department, based in Oakland, has 16 active road patrol units covering the county. In Garrett County, the Maryland State Police is stationed at Barrack "W" in McHenry. Nearby fire and rescue services include the Oakland Volunteer Fire Department, Deer Park Community Volunteer Fire Department, Gorman Volunteer Fire Department and the Southern Garrett Rescue Squad. The Garrett County Office of Emergency Management is responsible for receiving 911 calls and dispatching appropriate response units for emergency assistance for fire, ambulance

and police incidents. Garrett County Memorial Hospital in Oakland includes a full-service emergency services department with staff certified in advanced trauma life support.

3.4 CUMULATIVE EFFECTS

The assessment of cumulative socioeconomic effects of wind energy development is primarily concerned with cumulative landscape and visual impacts and, through associations, with effects on tourism and general amenity. Guidelines for assessing landscape and visual effects of wind energy facilities are described extensively in a report prepared by Landscape Design Associates (LDA 2000) for the U.K. Department of Trade and Industry. This study supports the principle of assessing the effects on the landscape and effects on visual quality separately.

Potential cumulative effects on the *landscape* relate to the degree to which wind energy development becomes a significant or defining characteristic of the landscape, and the degree to which it affects the values and experiences that are associated with the landscape. On the other hand, cumulative *visual quality* effects concern the degree to which wind energy development predominates in particular views or sequences of views, and the effect this has on the viewer.

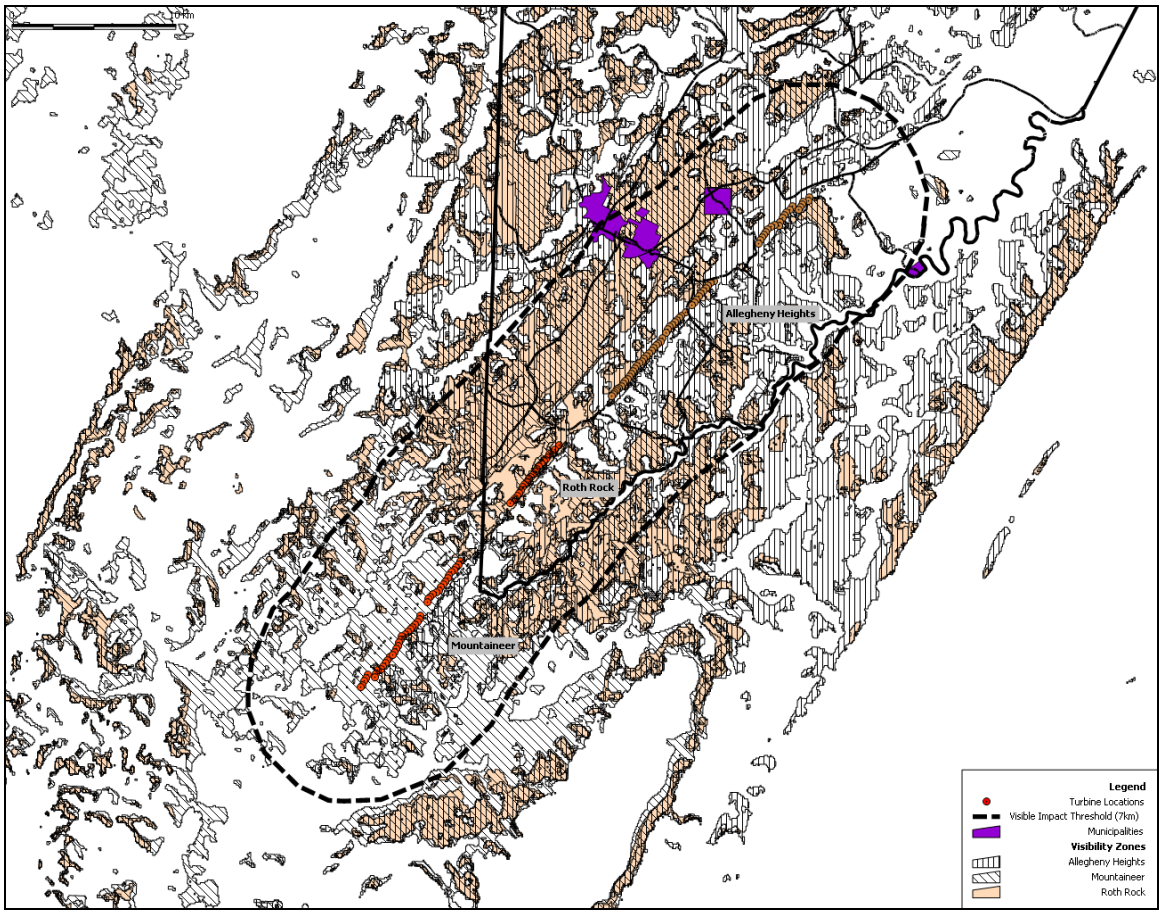
Cumulative landscape and visual effects occur when two or more projects are simultaneously visible, or when they are seen sequentially when a viewer passes through a landscape. In other words, it is not necessary for two or more energy projects to be simultaneously visible for cumulative effects to be experienced.

From a visual perspective, the three wind energy developments arrayed along Backbone Mountain in the vicinity of southern Garrett County must be considered in the assessment of cumulative effects – Allegheny Heights (Clipper), Roth Rock, and Mountaineer in West Virginia. A fourth permitted project located on Savage Mountain in Allegany County is geographically separated from the other projects to the extent that it is not expected to contribute to the overall effect.

Cumulative landscape and visual effects from wind energy developments along Backbone Mountain were estimated by first characterizing a preliminary area of potential effect (APE) from overlays of the three visibility zones associated with the projects (Figure 3-3). As before, visibility zones are identified as those areas from which the rotor would

be visible, using a digital elevation model of western Maryland and West Virginia.

Figure 3-3 Cumulative Visibility Zone of Roth Rock, Allegheny Heights, and Mountaineer Wind Energy Projects



The APE for the three projects extends from northern West Virginia to mid-Garrett County along the Youghiogheny and Potomac River valleys that parallel Backbone Mountain. Within an estimated visual impact threshold of about 7 km (Bishop 2000), potential receptors include the communities of Oakland, Mountain Lake Park, Loch Lynn Heights, and Deer Park, and parts of the Potomac State Forest and Savage River State Forest. In addition, the APE overlays major roads, including US 219, US 50, MD 560, and MD 135. None of the public roads is classified as a scenic drive, and there are no documented special viewpoints within the APE. None of the land within the visual impact threshold is publicly accessible, although some is used for hunting and other recreational activities. At 3,360 feet, Hoyes-Crest on Backbone Mountain is considered by

backpackers to be one of the toughest high points in the eastern United States. The view from the summit is pastoral, but is punctuated by the Mount Storm power plant to the southeast.

Within the potential visibility zones of the individual projects, there are several areas where views intersect. This includes parts of the Youghiogheny River valley south of Oakland and some segments of the Potomac River valley. The Youghiogheny River is considered "scenic" within Maryland. However, only the segment from Millers Run to the southern corporate limits of Friendsville is designated by the Maryland General Assembly as "wild" and subject to land use regulations associated with the Scenic and Wild Rivers Act. The Garrett County comprehensive plan designates the Rural Resource Area over the scenic segment of the Youghiogheny River in the southern section drainage basin. Remaining lands are designated Agricultural Resource Area or Remaining Rural Area. Steep slopes over 30 percent are designated Sensitive Areas. Some parts of US 219 and US 50 are in the intersecting visibility zones of the Allegheny Heights, Roth Rock, and Mountaineer projects.

Land to the east of Backbone Mountain in the APE is in the North Branch Potomac River southwestern section drainage basin, which is very rural with scattered development. Most of the potentially affected area is classified Remaining Rural Area, although an Agricultural Resource Area extends from US 50 to the Kelso Gap over Backbone Mountain. Much of the land in this drainage basin has been forested or mined. Designated Sensitive Areas are steep slopes over 30 percent, streams, and 100-year floodplains.

Towns to the west of Backbone Mountain in the APE of the projects are Mountain Lake Park, Deer Park, Loch Lynn Heights, and Oakland, the county seat. Gorman is the only settlement east of Backbone Mountain in the North Branch Potomac River southwestern section drainage basin. Although construction of the B&O Railroad through Oakland made Mountain Lake Park a favored resort area for populations to the east, since the mid-twentieth century, tourism has been developed most extensively in mid-county around Deep Creek Lake, which has many recreational amenities and is more readily accessible from eastern Maryland via I-68 and US 40. There appear to be few cultural associations with the landscape in this area either from indigenous peoples or modern settlers. The uniqueness of Backbone Mountain in southern Garrett County has been degraded by communications towers, strip mining, clear cutting, and other man-made activities, although the ridgeline south of US 50 is primarily forested.

Of the three wind farms proposed for the ridge along Backbone Mountain in Maryland and West Virginia, only the Mountaineer project is currently operational. As a result, the ridgeline of Backbone Mountain in southern Garrett County is in a mostly natural state, although some properties within the Clipper project area have been cleared and are used for agriculture or are residential. Backbone Mountain also hosts several tall communications towers in the southern part of the county, and two 138-kV transmission lines that traverse the mountain north between Table Rock and Eagle Rock. In the Roth Rock project area, some of the land is being actively logged using clear-cut techniques. To the east of the Roth Rock project area are active strip mining activities, which extend north from Kempton for approximately 6 km. In West Virginia, wind turbines associated with the Mountaineer project are the major landscape alterations on Backbone Mountain that extend above a natural canopy of vegetation. The alteration of the landscape is most evident where the project crosses US 219 near Thomas (in West Virginia) where there is also an active quarry. Trees and terrain block views of the Mountaineer project from many perspectives in southern Garrett County and from traffic on US 219. Several turbines associated with the northern part of the Mountaineer wind energy facility are visible from the southern part of the proposed Roth Rock facility.

The capacity of a landscape to absorb wind energy developments without significant detriment or change to its character is related to the sensitivity of the landscape. In the case of Backbone Mountain, sensitivity has been reduced by strip mining, logging, settlement, communications towers and, to a lesser extent, by the Mountaineer project, which has introduced wind turbines into the landscape in extreme southern Garrett County. Still, adding more than 90 wind turbines to the Backbone Mountain ridgeline, in the form of the Allegheny Heights and Roth Rock facilities, would change the character of the landscape from a mostly natural setting to one where wind energy development would be a significant defining characteristic. Wind project development is not anticipated to be a dominant landscape characteristic, however, because visibility is expected to be constrained by natural buffers in the line of sight from most viewpoints. This is expected to limit extensive, simultaneous views of two or more wind energy projects from both fixed and linear (e.g. public roads) locations, which are conditions for identifying a landscape with wind energy development.

4.0 NOISE IMPACTS

This licensing review incorporates an evaluation of noise impacts to ensure compliance with Maryland regulations. The analysis of potential noise impacts focuses on the potential for generating equipment to exceed numerical limitations at the proposed Roth Rock facility. Information provided by Synergics was utilized to estimate noise levels at the nearest residence, which were then compared to relevant State limits.

4.1 DEFINITION OF NOISE

Noise generally consists of many frequency constituents of varying loudness. Three decibels (dB) is approximately the smallest change in sound intensity that can be detected by the human ear. A tenfold increase in the intensity of sound is expressed by an additional 10 units on the dB scale, a 100-fold increase by an additional 20 dB. Because the sensitivity of the human ear varies according to the frequency of sound, a weighted noise scale is used to determine impacts of noise on humans. This A-weighted decibel (dBA) scale weights the various components of noise based on the response of the human ear. For example, the ear perceives middle frequencies better than low or very high frequencies; therefore, noise composed predominantly of the middle frequencies is assigned a higher loudness value on the dBA scale. Typical A-weighted sound levels for various noise sources are shown in Table 4-1.

Because sound levels are expressed as relative intensities, multiple sound sources are not directly additive. Rather, the total noise is primarily a result of the source of highest intensity. For example, two sources, each having a noise rating of 50 dBA, will together be heard as 53 dBA; a source of 65 dBA combined with a source of 85 dBA will result in a noise level of 85.1 dBA. As the intensity difference between the two sources increases, the effects of the lower sound sources become negligible.

Table 4-1 Typical Sound Levels for Common Sources

Noise Source	**Typical Sound Pressure Level (dBA)**
Lowest sound audible to human ear	10
Soft whisper in a quiet library	30-40
Light traffic, refrigerator motor, gentle breeze	50
Air conditioner at 6 meters, conversation	60
Busy traffic, noisy restaurant, freight train moving 30 mph at 30 meters	70
Subway, heavy city traffic, factory noise	80
Truck traffic, boiler room, lawnmower	90
Chain saw, pneumatic drill	100
Rock concert in front of speakers, sand blasting, thunder clap	120
Gunshot, jet plane	140

4.2 SUMMARY OF REGULATORY REQUIREMENTS

Maryland State noise regulations specify maximum allowable noise levels, shown in Table 4-2 (COMAR 26.02.03). The maximum allowable noise levels specified in the regulations vary with zoning designation and time of day. Maximum allowable noise levels for residential areas are 55 dBA (A-weighted decibel scale) for nighttime hours and 65 dBA for daytime hours. A noise source may not produce sound pressure levels exceeding these standards at the nearest residential property boundary. A source also may not produce discernible vibrations (caused by low-frequency components of noise).

Table 4-2 Maximum Allowable Noise Levels (dBA) for Receiving Land Use Categories

	Zoning Designation		
	Industrial	**Commercial**	**Residential**
Day	75	67	65
Night	75	62	55

Source: COMAR 26.02.03

Note: Day refers to the hours between 7 AM and 10 PM; night refers to the hours between 10 PM and 7 AM.

The State regulations also specify a guideline of 55 dBA measured as a day-night average (L_{dn}). The L_{dn} calculation adds a 10-dBA penalty to nighttime noise. A 24-hour constant noise of 48.6 dBA would result in an L_{dn} of 55 dBA. Therefore, for noise sources that may operate continuously for a 24-hour period, the resulting noise levels at nearby receptors should remain below 48.6 dBA. While this goal is not used as an enforcement criterion, exceeding the goal may indicate that noise levels could be a source of complaints by persons living on property exposed to those levels.

Noise from construction activities may not exceed 90 dBA at any receiving property line during daytime hours under the State regulations. Construction activities must comply with the nighttime limits listed in Table 4-2.

4.3 IMPACT EVALUATION

The construction phase of the Roth Rock facility is expected to take approximately six to eight months. The noise generated by facility construction activities is expected to comply with the daytime limit of 90 dBA for construction activities under the State noise regulations. There will be no significant nighttime construction activities.

The applicant provided information indicating that, at full operation, each of the wind turbines would generate a sound power level of 104 dBA. This is consistent with data from previous wind power projects in Maryland. The applicant also stated that the nearest residence is located about half a mile (820 meters) from the proposed turbine array. PPRP

evaluated the potential noise impacts by calculating estimated noise levels at a theoretical nearby residence that would be maximally affected by turbine noise. This theoretical scenario assumes that a residence is located as close as possible to multiple turbines in a line, with a minimum spacing between the turbines of 1.5 rotor diameters (see Figure 4-1).

Noise impacts were calculated using the following formula (Kurze and Beranek 1980):

$Lp = Lw + DI - 20\log(R) - Ae - 11$

where:

Lw is the known sound power level of each turbine (104 dBA in this case);

DI is a source directivity factor (we assumed hemispherical spreading, DI = 3);

R is the distance from the source to the receptor location (a minimum of 820 meters in this case); and

A_e is the excess attenuation due to absorption in air (we conservatively assumed no excess attenuation, $A_e = 0$).

Based on these calculations and the noise specifications provided, the wind turbines are expected to produce noise levels no higher than 45 dBA at the closest residence. Based on available data, it can be concluded that construction and operation of the proposed units will comply with all applicable noise requirements.

It should be noted that, in a rural setting, 45 dBA may still represent a noticeable increase over existing background noise levels. While noise from wind turbines is frequently masked by the sound of wind at ground level, there may be times when the wind speed at hub height of the turbines is greater than that at ground level and therefore the noise from the turbine blades does not coincide with ground level wind noise. At these times, the turbine noise, while in compliance with State noise regulations, may be more noticeable.

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Appendix A
Initial Recommended Conditions
PSC Case No. 9008

INITIAL RECOMMENDED CONDITIONS - PSC Case No. 9008

1. Except as otherwise provided for in the following provisions, the Synergics Wind Energy, LLC (Applicant) application for the Certificate of Public Convenience and Necessity (CPCN or certificate) filed with the Maryland Public Service Commission (PSC) on June 29, 2004, together with any supplemental information submitted to the PSC (cumulatively, the Application) is considered to be part of this CPCN for the Roth Rock Wind Energy Project (Project). Construction and operation of the Project shall be undertaken in accordance with these conditions. The wind turbines which form part of the Project (Turbines) shall be constructed within the numerical parameters as to the number of Turbines, vertical reach above ground level and total swept area for all the rotors, and total acreage of the Project site found in the Application and amendments thereto incorporated in the CPCN. Changes to these specifications must be reviewed by the Power Plant Research Program (PPRP) and approved by the PSC. If there are any inconsistencies between the certificate conditions specified below and the application, the conditions in this certificate shall take precedence.

2. If any provision of this certificate shall be held invalid for any reason, the remaining provisions shall continue in full force and effect, and such invalid provision shall be considered severed and deleted from this certificate.

3. Construction and operation of the Turbines and all associated facilities shall be undertaken in accordance with this certificate and shall comply with all applicable local, State, and Federal regulations, including but not limited to the following:

    a) Nontidal Wetlands – to the extent any nontidal wetlands exist on the Project site, and will be impacted by Project construction, COMAR 26.23.01 through 26.23.06 will apply to activities conducted in those areas.

    b) Water Quality and Water Pollution Control - COMAR 26.08.01 through COMAR 26.08.04 applies to discharges to surface water and maintenance of surface water quality.

    c) Erosion and Sediment Control - COMAR 26.17.01 applies to the preparation, submittal, review, approval, and enforcement of erosion and sediment control plans.

    d) Stormwater Management – COMAR 26.17.02 applies to the submission, review, approval and implementation of local stormwater management plans.

4. Construction of the Turbines must be completed within five years of issuance of this CPCN.

5. Applicant shall provide as-built details on the following to PPRP, the Maryland Department of the Environment (MDE) and the PSC in accordance with COMAR 20.80.04: engineering and construction plans for the Turbines including total acreage of the Project site; Turbine

structure and foundation type, dimensions, and locations; and distance between Turbines. Where the as-built details are identical to those submitted with the certificate application, Applicant should provide a statement to this effect and not resubmit the information.

6. Prior to construction of the Project, Applicant will identify any off-site roads, road expansions, right-of-way use, or access points that will need to be built for construction or operation of the Project and will work with the State Highway Administration and the Garrett County Roads Department to develop a plan to govern any such improvements. Applicant will obtain all permits required for such improvements. In addition, prior to construction, Applicant shall work with the above agencies to plan the routes and appropriate safety and traffic-flow measures, and obtain permits for delivery of large-load equipment to the Project site. Applicant shall also provide advance notification to these agencies of the actual deliveries

7. All portions of the Project site disturbed during construction shall be stabilized immediately after the cessation of construction activities within that portion of the Project site, followed by seed application, except in actively cultivated lands, in accordance with the best management practices presented in the MDE document 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, and as approved by Garrett County.

8. It has been determined that the project is subject to review under the Section 106 of the National Historic Preservation Act of 1966 as amended or Sections 5-617 and 5-618 of Article 83B of the Annotated Code of Maryland. Hence the Applicant shall, prior to the close of the record, and as requested in the October 6, 2003 letter from the Maryland Historical Trust that indicated that there are approximately 50 Maryland Inventory of Historic Properties (MIHP) locations within two miles of the project site and that also provided a list of items necessary to evaluate the effect of the project on these historic properties, provide to the Maryland Historical Trust the following information:

    a) Detailed maps and site plans illustrating the proposed locations of the turbines, substation, and any associated facilities such as access roads and power lines.

    b) A map showing the location of all historic resources within the area of potential effects (APE).

    c) Determination of Eligibility (DOE) forms for each Maryland Inventory of Historic Properties location within the APE for visual effects and for each building or structure over 50 years old that will be demolished or physically altered as part of the project.

    d) Simulated photographs showing the view of the proposed facility from each property in the APE that is listed or determined eligible for listing in the National Register of Historic Places.

9. Prior to construction, Applicant shall submit to the Maryland Historical Trust (MHT) a copy of training programs, or guidelines provided to Applicant inspectors or contractors, to identify and/or protect unforeseen archeological sites that may be revealed during construction of the project. If such relics are identified in the project area, Applicant, in consultation with and as approved by MHT, shall develop and implement a plan for avoidance and protection, data recovery, or destruction without recovery of the properties adversely affected by the project.

10. Applicant shall submit a Project-specific sedimentation and erosion control plan to the Garrett County Soil Conservation District. Sediment control during construction of all aspects of the Project will include some or all of the following best management practices: construction of earth dikes in appropriate locations, sediment traps, use of silt fences, stabilizing disturbed areas as quickly as possible, and converting silt traps to permanent features as soon as practicable. The Plan will be developed consistent with Garrett County requirements. The plan shall also be provided to the PSC and PPRP prior to construction. The plan must be on site during all phases of construction.

11. Representatives of the Department of Natural Resources (DNR), MDE and the PSC shall be afforded access to the property at any reasonable time to conduct inspections and evaluations necessary to ensure compliance with the CPCN. Applicant shall provide such assistance as may be necessary to conduct these inspections and evaluations effectively and safely, which may include but need not be limited to the following:

    a) inspecting construction authorized by this CPCN;

    b) having access to or copying any records required to be kept by Applicant pursuant to this CPCN or applicable regulations;

    c) obtaining any photographic documentation and evidence; and

    d) determining compliance with the conditions and regulations specified in the CPCN.

12. Applicant shall construct and operate the project in compliance with all applicable State and local noise regulations.

13. Prior to putting the Project in service, Applicant shall file with the Commission a listing of the interconnection requirements imposed by the interconnecting transmission owner or regional transmission organization, as may be the case, in the Facilities Study, and certification that these interconnection requirements have been met. It is important to note that this CPCN does not include the interconnection of the Project to the Mettiki Tap 138 kV line. The applicant shall obtain appropriate approvals prior to placing the Project

in service and provide all required supporting information and documentation in support of its request for approval.

14. Decommissioning of turbines shall be undertaken by the Applicant as directed by the PSC. The PSC shall determine the appropriate measurers to ensure that future funds are available to support decommissioning. Such measures may include, but are not limited to, a bond or similar funding mechanism. In the event that any Turbine does not operate for a period of one year, the Applicant shall remove that Turbine assembly unless the Applicant obtains an extension from the PSC. If the Applicant requests an extension of the one-year period, the request shall be in the form of a written motion to the PSC describing the operational difficulty and describing the steps that the Applicant is taking to resolve it.

15. To reduce the potential for avian and visual impacts, and only as consistent with the lighting and other safety requirements imposed on the Project by the Federal Aviation Administration (FAA), lighting on the turbines shall be minimized by (a) installing lighting on the fewest possible number of turbines; and (b) installing red strobes, as opposed to white strobes, with frequency cycles no shorter than 24 per minute. In the event the FAA requirements conflict with the avian and visual impact-related requirements imposed by this condition, the FAA requirements shall govern.

16. Construction may not proceed until the DNR Natural Heritage Program has determined that there will be no take of species as defined in Natural Resources Article of the Annotated Code of Maryland §10-2A-01 through §10-2A-09.

    a) In that two endangered species are known to occur on the project site, as well as a number of threatened, rare, and other species of concern and habitat for these species, there shall be no project related construction on the following two portions of the ridge top of Backbone Mountain:
        i. From the northernmost limit of the proposed project area at N39º 17.267'/W79º 26.034' southwest along the ridge to ecologically important rock features below Roth Rock Fire Tower at N39º 16.930'/W79º 26.388', and presently identified as Turbines 1 through 5 in the Synergics application, and
        ii. from the 500 KV power-line that crosses the ridge at N39º 16.714'/W79º 26.608' southwest along the ridge to the dissipation of ecologically important rock features at N39º 16.251'/W79º 27.062', and presently identified as Turbines 8 through 12 in the Synergics application.

    For the purposes of this condition, ridge top shall be defined as the area formed by a 500' margin from the center-line of the ridge along the northwest and southeast flanks of Backbone Mountain (Coordinates defined using North American Datum, 1983).

b) For the remaining areas of the Project site, the Applicant shall submit a site plan to PPRP and to the Natural Heritage Program illustrating the proposed placement of all turbines and associated equipment, access roads, construction laydown areas, the substation and any other areas directly affected by construction activities. Upon receipt of the site plan, the Natural Heritage Program will conduct an environmental review analysis in accordance with established procedures to determine if any proposed activities will impact rare, threatened, or endangered species and that the placement of turbines is otherwise in accordance with all federal and State environmental laws and regulations. In order to complete the environmental review analysis, it may be necessary for the Applicant to mark locations of site plan features in the field. A full review will be completed no later than 60 days after the receipt of the site plan and marking of site features, if requested. The Natural Heritage Program review will provide specific guidelines for siting at any location where a potential take is identified. Construction at the location in question may proceed when the Applicant has demonstrated to the Natural Heritage Program that the guidelines have been met. If the Natural Heritage Program determines that placement of a turbine in a particular area will have unacceptably adverse impacts on rare, threatened, or endangered species, or will not otherwise be in accordance with all federal and State environmental laws and regulations, Heritage may disallow placement of that turbine, regardless of the total number of turbines otherwise permitted in the CPCN. This condition will affect only those locations that have not received prior approval from the Natural Heritage Program.

c) In the event that the Applicant and the Natural Heritage Program representative cannot work out a mutually satisfactory siting agreement for any turbine, the Natural Heritage Program assessment shall control. The Applicant may appeal the Natural Heritage Program determination by requesting an expedited hearing before the PSC. If the Applicant demonstrates that the proposed site is in accordance with all federal and State environmental laws and regulations or would not have adverse impacts upon rare, threatened, or endangered species, the PSC may issue an order allowing the use of the proposed turbine location subject to the Secretary of Natural Resources' right to seek judicial review.

17. The Applicant shall undertake a post-construction study of bird and bat mortality associated with the operation of the turbines. The study protocol shall be submitted to the DNR Natural Heritage Program for approval, and to PPRP for informational purposes, no later than 30 days after issuance of the CPCN, which approval shall be forthcoming within 30 days of receipt so long as the Applicant substantially and in good faith complies with the following minimum requirements:
    a) At a minimum, monitoring shall be conducted for three years and cover three each of spring and fall migration periods.

b) More intense monitoring will be required during the spring and fall migration periods.
c) Monitoring data shall be reported to the Natural Heritage Program, PPRP and the PSC on a quarterly basis and shall include both observed and estimated mortality by observation date and turbine.
d) Species impacted and weather conditions should also be reported.

In the event that a catastrophic mortality event occurs, the Applicant shall notify the DNR Natural Heritage Program and PPRP within one working day. For the purpose of this condition, a catastrophic mortality event is one in which more than 40 birds or bats of any combination of species are killed in a 24-hour period within the boundaries of the project.

18. To minimize the potential for long-term harm to bat populations and as part of post construction mortality studies in the first three years of operation, the applicant will conduct bat mortality studies during the period of fall migration from July 1 through November 30 using a DNR Natural Heritage Program approved protocol. If on two occasions five or more bat fatalities are observed at the site then the Applicant will adopt the following operational curtailment:
    a) The curtailment will occur at the entire facility during the period July 1 through November 30 and between the hours of 8 pm to 6 am,
    b) Curtailment will occur when the wind speed falls below 4m/s
    c) The number of hours per year of curtailed operation for the facility as a whole will not exceed 400.
    d) A record of this feathering activity will be provided to PPRP each December as long as this condition is in force.

    For purposes of this condition, curtailment means feathering the blades and reducing the rate of rotation of all the turbines that comprise the project to zero or the minimum that may be necessary to provide bearing lubrication for the turbines.

    This condition may be reviewed if and when the high bat mortality observed at eastern windpower facilities is understood and determined to be manageable.

19. DNR, based on monitoring and other scientific information, and after consultation with the Applicant and other interested parties, may make a determination that one or more wind turbines are collectively causing significant bird or bat mortalities. DNR shall submit any such determination to the PSC. The PSC shall direct the Applicant to prepare and submit to DNR for approval a plan for reducing the mortality to an acceptable level. The plan may include such actions as moving or restricting the operation of one or more towers. The level of restriction in hours per calendar year will not exceed 54 times the number of turbines constructed. The plan may also include provisions for a period, not to exceed two years, during which tests may be conducted, such as varying the operating parameters of one or more towers, changing the tower lighting scheme, or other

measures, to determine how best to reduce the mortality. Following approval of the plan by DNR, the PSC shall direct the company to implement the plan. For purposes of this condition, the term "significant mortalities" means a number or rate of mortalities that could result in an ecologically significant population decline in federal or state rare, threatened or endangered species, or bird species protected by the Migratory Bird Treaty Act.

20. The Applicant shall complete additional field surveys at the project site. The purpose of these surveys will be to obtain additional information on ecologically sensitive areas in sufficient detail to allow the Applicant to ensure that construction activities will not cause unacceptable disturbances. At a minimum, site surveys must address:
    a) a vegetation survey of all plant species existing at the project site, to be conducted prior to the close of the record,
    b) a wetlands delineation to be conducted prior to the close of the record, and
    c) a nesting bird survey emphasizing species of concern and including forest interior dwelling species to be conducted prior to construction.

    Prior to construction, the Applicant shall submit to DNR Natural Heritage Program a site-worker training plan that defines protocols to minimize impacts to rattlesnakes on the project site. During construction and operation, site-workers shall adhere to the training plan and under no circumstances shall rattlesnakes be killed. It should be borne in mind that the seasonal activity of the Timber Rattlesnake extends from mid-April to late September. Any construction activity that involves dynamiting rocky substrate shall be reported to DNR Natural Heritage Program in advance and be subject to their oversight.

21. The Applicant shall submit a site plan to the Garrett County Planning and Zoning Office and obtain a building permit from that office prior to the start of construction.

22. The Applicant shall design and construct the Project in such a way as to maintain a minimum buffer distance to nearby residences of two times the height of the turbine tower. The distance between any turbine and any residential structure must be at least two times the height of that turbine tower, measured from ground level to the top of the nacelle.

23. All towers constructed on the property, to include meteorological data collection towers as well as wind turbines, shall be free-standing structures with no guy wires or similar supports.

24. Except as otherwise provided herein, the Applicant shall not transfer ownership or control of the Project so as to divest the Applicant of its ability to control the construction or operation of the Project without the written consent of the PSC. In the event of any such proposed transfer, the Applicant shall notify the proposed successor of the existence of the requirements of this CPCN by letter and shall send a copy of that letter to the

Secretary of the PSC and the Director of PPRP. Any such successor shall be subject to the CPCN and all applicable requirements and obligations therein. Prior to the commencement of its operations of the Project, any such successor shall provide any assurances required by the PSC that the Project will be operated in compliance with this CPCN and its conditions. The approval of the PSC shall not be required if (i) the Applicant transfers a collateral security interest in the Project, or (ii) the Applicant sells its interest in the Project to a person or entity that becomes a passive owner of the facility solely for financing purposes, nor shall such transferee or purchaser be subject to the CPCN and the requirements and obligations therein solely by virtue of acquiring and holding such interests. In the event that an entity holding a collateral security interest in the Project or passive ownership for financing purposes acquires ownership or control of the Project so as to divest the Applicant of its ability to control the construction or operation of the Project, such entity shall be subject to this CPCN and its conditions.

Appendix B
Proposed Order
PSC Case No. 9008

IN THE MATTER OF THE APPLICATION OF SYNERGICS WIND ENERGY, LLC FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO CONSTRUCT A 40 MW WIND POWER FACILITY IN GARRETT COUNTY, MARYLAND.	*	BEFORE THE PUBLIC SERVICE COMMISSION OF MARYLAND CASE NO. 9008

PROPOSED ORDER OF HEARING EXAMINER

On June 30, 2004, Synergics Wind Energy, LLC ("Applicant" or "Synergics") filed an application with the Public Service Commission ("Commission") for a Certificate of Public Convenience and Necessity ("CPCN") seeking authorization to construct a 24 turbine 40 megawatt ("MW") wind generating electric facility along a portion of the ridgeline of Backbone Mountain in Garrett County, Maryland. For the reasons discussed below, the determination is made that the application should be granted subject to the terms and conditions proposed to ameliorate impact that the building and operation of the facility might impose on the environment and ecology of the area.

Synergics has filed its application for the CPCN pursuant to Sections 7-207 and 7-208 of the Public Utility Companies Article ("PUC Article") of the *Annotated Code of Maryland*. The application, initially, proposed a project to construct a 24 turbine 40 MW wind turbine wind generating energy facility. However, subsequent to filing the initial application,

the proposed project was modified and Synergics filed a supplemental application. The supplemental application reduces the proposed number of turbines and seeks authorization to construct a 19 turbine 40 MW facility.[1]

Synergics proposes to construct its wind power facility along a ridge on Backbone Mountain referred to as the Roth Rock site. This site is at a location in the southern most part of Garrett County about 1.5 miles from the West Virginia border along a ridge that is the highest point on Backbone Mountain. The project site is 15 miles south of the County's most notable recreational area, Deep Creek Lake, and about 11 miles south of Oakland and Mountain Lake, the County's two most significant towns. Garrett County is the western most county in the State and has a population of about 30,000 and is largely rural with a large number of parks and recreational forestland.

The proposed project site was selected because it is at a location close to the highest point on Backbone Mountain and as a result has very strong winds that move along its ridgeline and over the mountaintop. This site was also selected because its location is such that it is not visible from Deep Creek Lake or other areas of recreation. The site sits on privately owned forest land that is disturbed by past and current logging operations, and there is a large area near the site in which there is a major ongoing

[1] During the evidentiary hearing on the application, the Synergics President, Wayne Rogers, testified that if agreement is reached with DNR the number of turbines would be reduced to 17 to avoid potential habitat for certain endangered species.

underground coal mining operation by the Mettiki Coal Company. A significant feature of the mining area is a large pile of coal tailings that sits atop the land as a result of the active mining operation and associated industrial activity. The forest area of the site has been selectively logged by Interstate Hardwoods resulting in some areas along the site that are cleared and other areas that are not cleared. The area is characterized by roads that criss-cross the site in support of the logging and mining operations. The roads are in various states of condition and can provide access that will be used in constructing turbine facilities. The site also has two existing transmission lines – one 138 kV line and one 500 kV line. The wind turbines will be connected to each other through underground lines that in turn will connect to a substation built by Synergics. The substation will connect to the existing electric 138 kV transmission line and the electricity generated will be delivered to the PJM interconnection grid.

The Public Utility Companies Article Section 7-207(b) provides that a person may not begin construction of a generating station in Maryland unless a Certificate of Public Convenience and Necessity is first obtained from the Commission. Section 7-207(e) provides that the Commission shall take final action on an application for a CPCN after due consideration of:

> (1) the recommendation of the governing body of each county or municipal corporation in which any portion of the construction of the

> generating station or overhead transmission line is proposed to be located; and
>
> (2) the effect of the generating station or overhead transmission line on:
>
> (i) the stability and reliability of the electric system;
>
> (ii) economics;
>
> (iii) esthetics;
>
> (iv) historic sites;
>
> (v) aviation safety as determined by the Maryland Aviation Administration and the administrator of the Federal Aviation Administration;
>
> (vi) when applicable, air and water pollution; and
>
> (vii) the availability of means for the required timely disposal of wastes.

On October 7, 2004, a pre-hearing conference was held at which appearances were noted for the Applicant, Synergics Wind Energy, LLC, the Office of People's Counsel ("OPC" or "People's Counsel") and the Department of Natural Resources Power Plant Research Program ("PPRP").[2] Petitions to Intervene were presented

[2] Under Maryland's Power Plant Siting Act of 1991, the PPRP is directed to coordinate among various State Agencies a detailed program of power plant site evaluation, including related environmental and land use considerations. Consistent with this direction, PPRP coordinated a comprehensive review of the potential environmental and socioeconomic impacts from the proposed Synergics project. The State Agencies that participated in evaluation of the project included the Departments of Agriculture, Business and Economic Development, Environment, Natural Resources, Planning and Transportation, the Maryland Energy Administration, and the Office of Smart Growth. PPRP noted the air quality benefits associated with the emissions-free nature of wind energy. The State Agencies have recommended that a CPCN be granted to the project but also recommended that several conditions be imposed as part of the Certificate to insure that any potential adverse impacts are minimized.

by a number of persons and organziations. All requests to intervene were opposed by Synergics except for the request by the Audubon Naturalist Society. Synergics suggests that the Audubon Naturalist Society, as an umbrella organization, would be a beneficial representative of birding and wildlife interests and should be granted intervenor status. Permission to intervene was granted to Mrs. Thomas B. Eastman, D. Daniel Boone, the Audubon Naturalist Society and the Maryland Alliance for Greenway Improvement and Conservation (collectively, Eastman, *et al.*); Jon Boone; and Paul Sprenger. The Maryland Ornithological Society was granted permission to participate in the proceeding as an interested party.

An evidentiary hearing on the Synergics application was held over a period of several days from September 14 through September 16, 2005 beginning at the Commission offices in Baltimore, Maryland and concluding on September 22, 2005 in Oakland, Maryland at the Garrett County Health Department. Prefiled testimony was admitted in evidence on behalf of the Applicant, Intervenors, the Department of Natural Resources Power Plant Research Program, and Staff and was subject to cross-examination at the hearing. A summary of that testimony is attached hereto as Appendix A. A hearing was held on the evening of September 22, 2005 at Southern High School in Oakland in order to receive comment from the public regarding the Synergics application. The comments presented expressed a range of citizen concerns about the Synergics application both in opposition to and in favor

of the proposed project.[3] A number of persons opposed to the project expressed the sentiment that turbines placed on Backbone Mountain will destroy the scenic view of the mountain because of the height of the turbines. Others raised concerns about the noise created by turbines as well as the potential for bird and bat mortality resulting from turbine operations. Still others expressed the view that this project should not be approved because strict siting criteria had not been established that considered the large turbine size. It was felt that the project would degrade property values and many persons complained that this project would have a negative impact on the mountain environment that was not outweighed by the relatively small overall amount of electricity generated. On the other hand, those in favor of the project did not feel that the turbines were visually polluting or that the noise of turbine operations had a negative impact. Those favoring the project expressed the view that it is important for the environment that windpower be utilized as an alternative source of renewable energy.

After the hearings, the parties filed briefs in support of their respective positions. Synergics, obviously, urged that its application for a CPCN be granted. DNR recommends that the CPCN be granted subject to certain conditions that would apply to

[3] In addition to the comments received at the public hearing, numerous written comments were received by letter and e-mail. The written and public comments have all been reviewed and considered as part of the evaluation of Synergics' application for a CPCN. All of the concerns raised were weighed and evaluated in light of the statutory criteria that must be considered to determine if an application for a CPCN should be granted.

the grant of the application. The Commission Staff also recommends granting Synergics' application subject to the conditions recommended by DNR, in addition to several conditions recommended by the Staff. Synergics opposes DNR's findings and recommendations that propose to exclude construction from certain sections of the proposed site and require Synergics to comply with the condition for decommissioning.

The Intervenors oppose the Synergics application and recommend its disapproval. Eastman, *et al.* contend that the Synergics application should be denied because implementing the project will violate environmental laws related to threatened and endangered species and is contrary to the public interest. Alternatively, Intervenors argue that if approval of the CPCN is granted, the Commission should amend DNR's proposed conditions to, among other things, extend the exclusion zone, require pre-construction studies, require "independent parties" to conduct monitoring and have "independent consultants" participate in the micrositing process. Jon Boone's opposition is based on his claim that, in the broadest sense, the Synergics project will not benefit the public. In his view, the proposed project will not lessen dependence on fossil fuels; produce the claimed economic benefits; will result in the reduction of property values; and will damage rare natural habitat and eliminate certain endangered species. Lastly, Paul Sprenger argues for denial of the application based on a concern for the project's impact on property development in the county, focusing on noise and the diminution of property values.

The presentations of the Intervenors have been reviewed and considered in light of the statutory factors that must be evaluated in assessing whether to grant an application for a CPCN.

By motion, the Intervenors challenge Synergics opposition to the DNR exclusion conditions. According to Intervenors, elimination of the exclusion conditions will result in Synergics placement of two wind turbines at sites in the excluded areas. The Intervenors claim, in effect, that Synergics has revised the turbine array in a manner "that is fundamentally different" from the proposal presented by Synergics at the hearing. DNR's Final Recommended Condition,[4] Condition 16A, establishes two areas of exclusion along the ridgetop of Backbone Mountain in which construction related to the project is prohibited. This exclusion, according to Synergics, is objectionable because it is overly broad and unsupported by law and not justified by the evidentiary record of this case. "Synergics believes that any area avoided should be based upon scientific findings, such as observation of species, not based upon mere speculation as to the viability of certain areas as habitat for species. Instead, the State agencies broadly conclude that exclusion zones are necessitated by a generalized potential for various species, some endangered some not, to find viable habitats within areas of the site." Synergics Post Hearing Reply Brief, p. 6. Since no "taking" of endangered or protected species

[4] DNR conditions are 24 in number. Viewed in totality, the conditions provide the basis for allowing construction and operation of a wind generating energy facility on the Roth Rock site consistent with appropriate environmental considerations.

has been shown, Synergics urges that there should be no prohibition against its use of those portions of the site within the exclusion zones.

Synergics' claim that there must be evidence of a "take" of a threatened and/or endangered species in order to prohibit construction on a certain portion of the Roth Rock site is without merit. In making its Final Recommendations and Conditions to the Commission to grant the Synergics application for a CPCN, the Secretary of Natural Resources, as coordinator of the State agencies evaluating the application, stated:[5]

> Based on the review of the application and associated environmental information available, it has been determined that sections of the site are not *suitable* but that a project can be constructed and operated on the remainder of the site in accordance with all applicable environmental regulations provided the Certificate incorporates all the attached final recommendations as conditions to the CPCN. This decision is based upon our evaluation of the environmental impacts associated with the proposed facility that are summarized in the document entitled "Environmental Review Report of the Proposed Synergics Roth Rock Wind Power Project" and supplements thereto which have been supplied as exhibits in this proceeding. (Emphasis added.)

The Secretary has primary responsibility under the Power Plant siting Act[6] to assess the *suitability* of a proposed power plant site. If a site is not suitable, "it cannot be approved by the PSC

[5] *See*, Docket Item No. 101 of PSC Case No. 9008.

[6] Natural Resources Article, Section 3-304.

unless and until the reason for the determination of unsuitability has been satisfied or removed." DNR Reply Brief, p. 7. *Suitability* of a proposed site may well be determined by the characteristics of the site's habitat. As described:

> The Roth Rock site, for the most part, is densely forested with the deciduous hardwood trees (oaks, hickories, maples), although several openings occur along its length. In many places along the ridgetop, prominent rocky habitats occur including large boulders and outcroppings, steep precipices, and numerous small crevices. In particular, the northern half of the site harbors many of these features, specifically from the Roth Rock fire tower down the ridge to Roth Rock itself. These rocky habitat are rare in Maryland. Many of the species of concern identified as inhabiting or potentially inhabiting the project site are linked to these kinds of rocky habitat. The site also contains several small wetland areas, including spring seeps and spring heads. Several other species of concern dependent on these types of habitats, including a number of plants, may also occur at this site.[7]

The description of this site clearly shows the presence or potential presence of certain species in need of conservation; and as a result, the characteristics of this habitat make it appropriate for determining the "suitability" of this site for construction of the project. Consequently, the prohibition of construction

[7] DNR Exhibit 2, *Environmental Review of the Proposed Synergics Roth Rock Wind Power Project*, p. 37; Section 2.4.1.

activity in the two exclusion zones established in Condition 16 is justified.[8]

The DNR Final Recommendation and Proposed Conditions will be adopted and are attached hereto as Appendix B. These conditions impose a variety of requirements to include the requirement that construction and operation of the project proceed in accordance with these conditions, and that the wind turbines for the project be constructed in the number; within the height and rotor sweep; and total acreage of the project site found in the application and amendments thereto and incorporated in the CPCN. The conditions ensure that the impacts of project construction and operation are minimized and that the project conforms to Maryland environmental laws. The conditions encompass a variety of subjects including impacts to water quality, transportation resources, historical sites, erosion control, noise regulations, interconnection requirements, decommissioning of the turbines, potential takes of species, avian impacts, and transferal of ownership of the Project. The conditions related to potential takes of species and avian impacts are of significant importance. As to the latter, these conditions provide the Commission can order measures to mitigate bird mortality if significant bird mortality occurs. The measures

[8] On April 4, 2006, Synergics filed a motion seeking to re-open the record to consider, as new evidence, information about "the owner and operator of a commercial logging and milling company ... [in the exclusion zones that is] engaged in road building, logging and clearing." Synergics Motion to Reopen, p. 2. In reviewing this record, the presence of existing commercial operations and land use is clearly evident, and, as a result, this information is not new evidence. Consequently, with this decision, this motion is denied.

that can be imposed include curtailing the operations of one or more towers or moving the towers. Moreover, so as to reduce the potential for avian impacts, the conditions also provide that lighting requirements on the turbines be minimized and installed on the fewest possible number of turbines. The potential for the takes of species is avoided by imposing a condition that prohibits construction activity in two exclusion zones in areas in which the characteristics of the habitat at the site are or could be supportive of threatened or endangered species. The conditions also require that objective, post-construction studies of bird mortality be conducted at the site for three years. The condition relating to transfer of ownership ensures that a subsequent owner of the project will be subject to this CPCN and the conditions adopted in Appendix B.

DISCUSSION OF STATUTORY CRITERIA

As noted previously, the Commission is directed to take final action on an application for a CPCN after due consideration of the recommendation of the governing body of each county in which any portion of the construction of the generating station is proposed to be located. It should be noted with respect to this criterion that the Board of Garrett County Commissioners has expressed support for the project and has urged the Commission to approve it. The Board indicates that the value of this project "is

enhanced by the economic development benefits to surrounding communities." *See*, Docket Item No. 14 of PSC Case No. 9008.

The Commission is also directed to consider the effect of the proposed generating station on the stability and reliability of the electric system. The record establishes, with respect to this criterion, that the project will not adversely affect the stability and reliability of the electric system.

Before coming on line, the project will be required to sign interconnection agreements with PJM Interconnection, LLC (the Regional Transmission Operator for Maryland and other states) and with Allegheny Power System, the owner of the local transmission facilities. These agreements will specify the system enhancements, if any, required for the physical and electrical interconnection of the generators to the grid. The agreements may also specify requirements related to the operation and maintenance of the system enhancements and will ensure the safety and reliability of the electric system. These agreements will incorporate the reliability criteria established by the East Central Area Reliability Coordination Agreement ("ECAR"), the regional reliability council which establishes reliability standards for this geographic area.[9]

The effect of the proposed project on economics is the next criterion specified in the law that must be considered. The

[9] Following the hearing, Synergics filed the PJM Feasibility Study. This is one of the several studies performed by PJM in the application process that determines the requirements necessary to permit the project to be interconnected to the electric grid without degrading the reliability and stability of the transmission system. With this order, Synergics' request to include the Feasibility Study in the administrative record is granted.

record establishes in this regard that the project will have a positive, albeit small, economic effect. The project will create a small number of temporary construction jobs and permanent operations and maintenance jobs. The project will also produce some tax revenue for both the State and Garrett County. No State or County expenditures are required for infrastructure improvements to support the project. No significant impacts are expected on any public services and facilities.

The effect of the proposed project on esthetics is the next criterion to be considered. The record indicates that because the project is to be located along the ridgeline of Backbone Mountain, it is potentially visible to much of the surrounding area. However, Deep Creek Lake, a significant center of tourism within Garrett County is, according to the record, outside the zone of visibility and thus will not be visually impacted by the project. Similarly, much of the county's acreage of public parks, forest and wildlife management areas, and open space used for recreational purposes is outside the zone of visual impact for the project. The Yougheogheny River, which runs northeast along the base of Backbone Mountain in West Virginia to US 50 near the West Virginia border, is within the visual impact zone. However, vegetation along the shoreline is expected to screen views from most locations along the river thus mitigating the view impact on recreational users of the river.

The Commission is also required to consider the effect of the project on historic sites. The record indicates in this

regard that the Maryland Historical Trust ("MHT") reviewed the proposed project for effects on historic and archeological properties. MHT records revealed no known historical or archaeological properties in the project area. However, PPRP, in a preliminary assessment, found 47 properties listed in the Maryland Inventory of Historic Properties ("MIHP") that lie within two miles of one or more of the wind turbines. There is no indication that any of the inventoried properties would be negatively impacted by introduction of the project.

The Commission is also required to consider the effect of the proposed project on aviation safety, as determined by the Maryland Aviation Administration and the administrator of the Federal Aviation Administration ("FAA"). While it appears neither of these agencies has directly commented on this application, DNR Condition 15 requires installation of turbine lighting to reduce potential avian and visual impacts not inconsistent with any aviation-related requirements of the FAA.

The next matter to be considered is the effect of the proposed generating station on air and water pollution. The project will produce no air emissions because it uses the energy of the wind to produce electricity rather than burning fossil fuels for this purpose. Indeed, not only does the project produce no emissions, it allows the avoidance of significant pollutants (CO_2, NO_x, and SO_2) which would be produced by a conventional fossil-fuel burning plant of comparable capacity. PPRP has estimated that the level of pollutants avoided is 63,000 tons per year of CO_2,

6.7 tons per year of NO_X, 1.7 tons per year of SO_2, and 1.1 tons per year of particulates.[10] The record also establishes that the project will cause no significant impacts to surface or ground waters. There will be no discharges to groundwater or appropriations of groundwater. The project will not require the appropriation of any surface waters and will not use groundwater resources either. Stormwater management systems, sediment control facilities, and spill control features will be installed to accommodate construction activities. *See*, Recommended Conditions 3 and 10. The project will provide environmental benefits in terms of avoided air pollution.

The final factor which must be considered pursuant to § 7-207(e) is the availability of means for the required timely disposal of wastes produced by the generating station. The record is silent on this factor. Synergics shall be required as a condition of the grant of this CPCN to dispose of waste material in the appropriate manner. Among other things, waste materials will be disposed of at licensed treatment or disposal facilities in accordance with local and State regulations. Temporary portable sanitary facilities will be installed during construction and a permanent septic system will be installed during operation of the facility. Solid wastes will be disposed of at a licensed off-site

[10] These estimates were based on the output from the original 24 turbine plan. Although the parties indicated disagreement as to the level of benefits, Synergics claiming higher and Intervenors lower, DNR agrees that there is some level of benefit derived as a result of the offset of a portion of capacity provided by fossil fuel powered generation.

landfill. Should the project generate waste oil, this waste will be recycled or disposed of in accordance with applicable Federal, State, and local regulations.

Intervenors Eastman, *et al.*, argue that the Synergics application should not be granted because the project will violate environmental laws that protect certain threatened and endangered species and is not in the public interest. Alternatively, if the CPCN is granted DNR should amend its proposed conditions. Of particular concern is the potential impact that operation of the project will have on certain bird, bat, small mammal and reptile and amphibian populations.

DNR agrees that, as initially proposed, the 24 wind turbine project would have significant environmental impact:

> Given the number of species of concern known and likely to inhabit the Roth Rock wind power site and the rarity of the habitats with which they are associated, the State concludes that construction and operation of the wind power facility, *as proposed*, would result in significant adverse impacts to threatened and endangered species. Development of this site would likely reduce the amount or quality of critical habitat and thus constitute a "take" of these species. "Take," as defined in the [statute] prohibits actions that "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The ridgetop habitats represented by the large boulders, rocky outcroppings, precipices, and numerous small crevices on the site are among the highest quality of their kind in the State. These rocky habitats can be adversely affected by direct distur-bance and clearing of forests within 100 to 300 ft (which can change local climate and

> induce drying of microhabitats). As *proposed*, the placement of wind turbines, and perhaps more importantly, the establishment of an access road across these features would almost certainly affect species population levels. Additional adverse impacts include the fragmentation of a largely contiguous forest that is habitat for forest interior dwelling birds. *It is possible that eliminating several of the turbine locations could allow Synergics to avoid affecting these sensitive habitats.*[11] (Emphasis added.)

Synergics has modified its initial proposal and reduced to 17 the number of turbines to be built on the Roth Rock site. DNR recommends that Synergics' application be granted and the CPCN incorporate the conditions discussed above to mitigate any environmental impact.

Neither reduction of the number of turbines nor the conditions recommended by DNR affect Intervenors' claim that the proposed project will violate the environmental laws. For instance, one issue in this proceeding concerns the potential impact of the project on the bird population. The evidence presented with respect to the potential avian impacts of the project is inconclusive; that is, the data provided by the Applicant and PPRP cannot absolutely rule out the possibility of significant avian impacts at the project site and the data provided by the Intervenors falls far short of establishing that significant impacts are likely. The State Agencies believe that the risk of large-scale deaths of birds at the project site is low but that uncertainty remains. The

[11] DNR Exhibit 2, *Environmental Review of the Proposed Synergics Roth Rock Wind Power Project*, pp. 40-41; Section 2.4.2.

conditions proposed by the State Agencies and incorporated herein should eliminate that uncertainty. Similar concerns are raised with respect to the potential adverse impact on certain species of bats and some small mammals, reptiles and amphibians. According to Intervenors, as a result of inadequate study by Synergics, the parties lack knowledge about the full impact that this project will have on these species of concern. As with consideration of the potential impact of the project on avian populations, the evidence with regard to bats and the other species of concern is inconclusive as to establishing whether or not the proposed project will have significant environmental impact. Site-specific studies will provide much needed information about the number and species of birds and bats migrating over the project site, and the height at which they are flying. Other conditions provide the means for mitigating impacts on birds, if such measures prove to be necessary. The reduced number of turbines will also likely result in a lower risk of adverse impact to birds and bats.

Intervenors contend that operation of the proposed project, even with the recommended DNR conditions, will result in harm to bats and the other species of concern and consequently, the CPCN should not be granted. However, if the CPCN is granted, Intervenors assert that the proposed conditions should be amended to, among other things, expand the exclusion zones; require pre-construction studies; curtail turbine operations under certain weather conditions; require "independent parties/consultants" to be involved in site selection and monitoring. Intervenors would also

require that significant mortality events affecting birds/bats be provided public notice and removal or decommissioning of turbines that cause such events.

Both Synergics and Intervenors Eastman, *et al.*, propose changes or amendments to the DNR recommended conditions. After review of each party's proposed modifications, the determination is made that the DNR conditions will be accepted without change or modification. It is clear that a number of DNR conditions reflect many of the recommendations contained in the U.S. Fish and Wildlife Service *Interim Guidance on Avoiding and Minimizing Wildlife Impacts From Wind Turbines* (*see*, Exhibit ANS 4). These conditions are reasonable and rational, based on current science, and strike a balance between protecting and preserving habitat supportive of species that may be threatened or endangered and allowing for the development of a wind generating energy facility that will contribute to achieving the goal of increasing alternative renewable energy resources in this state.

Opposition to this project has also been raised on claims that the development will have adverse noise impact and reduce property values to surrounding property. The record evidence does not support these claims. With respect to adverse noise claims, the PPRP has concluded that during the construction phase of the project "noise generated by facility construction activity [during daytime] is expected to comply with ... State

noise regulations."[12] After construction when the facility is in full operation, PPRP has concluded that noise impact to residential property will also be in compliance with State regulations.[13]

On the issue of property values, the evidence does not support the claim that property values will be negatively impacted by this project. The evidence to support DNR's conclusion that the project will not have an adverse effect on property values is based on an evaluation of a large cross-section of residential properties within several miles of the project using a methodology of analyzing assessed property value to evaluate property market value. The evidence from this analysis is more persuasive than the largely anecdotal evidence in support of the claims that the project will result in lowered property values.[14]

Upon consideration of the record developed in this proceeding and the criteria set forth in Public Utility Companies Article § 7-207(e), I find that a Certificate of Public Convenience and Necessity should be granted to Synergics Wind Energy, LLC for the construction of a 40 MW wind energy facility in Garrett County, Maryland, subject to the conditions set forth on Appendix B hereto. The project will add to the diversity of fuel sources used to meet Maryland's growing electric load and will produce electricity with no air emissions or impacts to air or water quality.

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[12] DNR Exhibit 2, *Environmental Review of the Proposed Synergics Roth Rock Wind Power Project*, p. 75; Section 4.3.

[13] *Id.* The DNR conclusion is based on a technical evaluation that calculates noise levels based on a theoretical mathematical model specific to the project site.

[14] *Id.*, Section 3.3.5.

IT IS, THEREFORE, this 30th day of October, in the year Two Thousand Six,

ORDERED: (1) That a Certificate of Public Convenience and Necessity for the construction of a 40 MW wind energy electric generation facility in Garrett County, Maryland is issued to Synergics Wind Energy, LLC.

(2) That the Certificate of Public Convenience and Necessity is issued subject to the conditions set forth in this Order and as contained within the DNR Final Recommendation and Proposed Conditions attached hereto in Appendix B.

(3) That this Proposed Order will become a final order of the Commission on November 30, 2006, unless before that date an appeal is noted with the Commission by any party to this proceeding as provided in Section 3-113(d)(2) of the Public Utility Companies Article, or the Commission modifies or reverses the Proposed Order or initiates further proceedings in this matter as provided in Section 3-114(c)(2) of the Public Utility Companies Article.

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David L. Moore
Hearing Examiner
Public Service Commission of Maryland

Appendix A

WITNESSES FOR SYNERGICS

Wayne Rogers, President of Synergics Wind Energy. (Synergics Exhibits 1-10; 11A; 12.)

Wayne Rogers, President of Synergics Wind Energy, LLC, testified in support of the CPCN application. Mr. Rogers has spent 25 years in the business of developing and building renewable energy projects throughout the United States and around the world. According to Mr. Rogers, selection of the site for this project was affected by a number of considerations. The Roth Rock project site is in the very southern part of Garrett County, about 1.5 miles from the West Virginia border on a ridge that is the highest point along Backbone Mountain. This location is one that provides the strong wind conditions needed for wind power. Next, the site location is rural in nature and some distance away from populated areas. Garrett County is a largely rural county with a total population of approximately 30,000 and a large amount of parks and recreational forestland. The County has some 80,000 acres and over 200,000 acres of forestland. In relationship to populated areas, Deep Creek Lake, the County's most notable recreational area, is 15 miles north of the site; and the two significant towns in the county, Oakland and Mountain Lake with a total population of about 4,000, are about 11 miles north of the project site. Additionally, the project site is located on property that is privately owned and

is the subject of current and past logging and there is an active coal mine in operation at the site. There are two transmission lines that cross the site -- one, a 500 kV line and the other, a 130 kV line -- and as a result, there is no need to build a transmission line with this project. Synergics will build a substation to connect the power generated to the existing transmission lines.

Synergics amended its application in May 2005 to reduce the number of wind turbines being built from 24 to 19 turbines. According to Mr. Rogers, two factors affected the decision to reduce the number of turbines. First, technological advances in wind turbine design since filing its original proposal. Newer turbines produced lower noise, a slower wind regime, and a greater megawatt output. This would allow a lower number of turbines on the site while still achieving the same generated output as proposed in the original application. As a result of this reduction, Mr. Rogers says that there would be even less environmental impact to the proposed site. In addition to this reduction, Mr. Rogers testified that, if agreement could be reached with the Department of Natural Resources ("DNR"), Synergics would commit to further reducing the turbine layout to 17 turbines. This reduction would address certain concerns raised by DNR. Mr. Rogers indicated that the 17 turbine configuration would avoid habitat of the mourning warbler; rock formations that provide habitat for certain small mammals; and lessen the impact of any wetlands areas.

With respect to the proposed project's effect on historic sites and its visual impact in the project area, Mr. Rogers

first noted that there are no archeological sites or historic structures in the project area. Mr. Rogers indicated that as to the issue of visual impact, the Maryland Historical Trust ("MHT") had indicated that the view should be evaluated within two miles in either direction of a historic structure. To address the issues raised, Synergics engaged a historical consultant who performed an evaluation of the proposed site in accordance with the requirements of the MHT. The consultant's evaluation indicated that within the impacted area there was a single property that was eligible for nomination to the National Historic Register and seven properties that individually could not be nominated for the registry but together, could possibly, constitute a district, and with respect to these properties there was no adverse impact.

As to noise impact, Mr. Rogers stated that with respect to residences in the affected area, the turbines are located at the top of the mountain, with a considerable distance between the residences and the turbine atop the mountain. As a result, Mr. Rogers stated that he did not anticipate there would be any noise impact on nearby residences; and it was expected that the turbines proposed for operation on this project would meet the noise standards set by the State.

The economic impact of this project, according to Mr. Rogers, will be positive for State and local government. Garrett County has a population of about 30,000 with about 12,000 people employed in the entire county. During the construction phase of the project, Mr. Rogers indicates that approximately

63 short-term construction jobs will be created and an additional 71 jobs ancillary to the construction. The anticipated 124 jobs created, while small in number, amounts to about one percent of the workforce; and Mr. Rogers says that this is a significant impact in a county with an overall seven percent unemployment rate. Once in operation, the project will create only four jobs on an ongoing basis. However, implementing the project will result in a tax impact resulting in property taxes being paid and other taxes, such as sales and use taxes, resulting from the purchase of building materials and other expenditures in the local economy. Mr. Rogers noted that the proposed project has received the support of the County government.

Scott Reynolds, Ph.D., Biologist and Expert in the Field of Bat Ecology; Managing Partner, Northeast Ecological Services, Ecological Consultants. (Synergics Exhibits 13-16.)

Dr. Reynolds presented testimony regarding his analysis of the potential impact this project might pose for two species of bats -- the eastern small footed bat and the Indiana bat. His analysis focused on these species for two reasons. First, the Indiana bat is designated as a federally endangered species; and the eastern small footed bat, while not federally protected, is State protected as endangered in Maryland and throughout the northeast portion of the country. As to the Indiana bat, Dr. Reynolds testified that he sought to determine the likelihood that this species would reside at the project site by comparing what was known of the bat's biology to the physical features of the

site. Assessment of the bat biology included an evaluation of bat habitat characteristics and preferences; and bat forging behavior and forging height, as known from the elevations at which the bats are captured. The habitat of the Indiana bat is usually found in lowland watershed and river areas typically at low elevations. The bats use trees in forest areas as a place to sleep, or roost, in the summer habitat and then hibernate in the winter months to the south and southwest of the project area.

According to Dr. Reynolds, the habitat preferences of the Indiana bat is not consistent with the high elevation and highly disturbed tree growth of the project site. Most of the trees on the site are smaller than trees typically used by the bat; there is no perennial water within the site; and the high winds of the site make it "a very atypical habitat" for the Indiana bat. Dr. Reynolds noted that there was no record of Indiana bats observed in the project areas, and his assessment of the biological characteristics led him to conclude that the project site was not likely to be a habitat for the Indiana bat and therefore would not likely adversely affect the species.

With respect to the potential impact of the project on the eastern small footed bat, Dr. Reynolds testified regarding the habitat preferences of this species. While acknowledging that little is generally known about the eastern small footed bat, Dr. Reynolds indicated that the primary habitat for the bat is rocky outcrops in areas of higher elevation with a southern exposure. On the project site, Dr. Reynolds identified the type of

outcrop feature that could support bat habitat. However, the outcrops observed were located on the northwest exposure and not likely to receive enough sunlight to support the bats' observed roosting, or sleeping, habitat in summer.

The observed exposed outcrops are at a location on the project site where proposed turbines have been eliminated by Synergics' reduction of the total number of turbines for the project. According to Dr. Reynolds, the only known colony of eastern small footed bats was more than 30 miles from the project site on Backbone Mountain. As a result of there being no other features that would support bat forging or provide access to water Dr. Reynolds expressed the opinion that the Synergics project would have only marginal impact on the eastern small footed bat.

With respect to the Mountaineer Wind project, Dr. Reynolds testified about a study at the Mountaineer Project that looked at the mortality impact on bats at this site. According to Dr. Reynolds, results of the study indicated that there is no evidence of Indiana or eastern small footed bats being killed. However, the study did indicate that, with regard to the overall impact of wind turbines on bat mortality, most mortality concentrated on non-hibernating migratory bats. These species of bats are abundant and are found throughout North America and migrate south during the winter and north during the summer.

The Mountaineer study revealed a large bat mortality. Although reasons for the high mortality are not known, Dr. Reynolds indicated that the study suggested that turbine operation during

low wind conditions may be contributory. As a result, the recommendation was made that because of low power output during low wind conditions, the turbine blades should be locked or feathered during these conditions in the migratory season, resulting in substantial reduction of mortality.

Paul Kerlinger, Ph.D., Biologist and Expert in the Field of Bird Migration and Avian Ecology; Principle in Curry and Kerlinger, LLC, Environmental Consultants. (Synergics Exhibits 17-22.)

Dr. Kerlinger provided testimony regarding the impact of the Synergics project on birds. According to Dr. Kerlinger, he conducted an avian assessment to evaluate the potential risk of collision impacts and the impact of habitat displacement to birds in the project area. The avian risk assessment is a three-part process that entails a review of the literature to determine the number and distribution of birds at the site. This literature review includes a review of empirical studies of known impacts to birds at wind turbines and other tall structures. The second part of the process involved a visit to the site to evaluate the habitat. This required walking the site looking at trees and searching for bodies of water and wetlands to determine the types of birds that are likely to be present. The last component of the process involved interviews and consultation with various agencies and others with knowledge or information about the site. This consultation provided information about bird species at the site that may be threatened or endangered. Dr. Kerlinger indicated that the Department of Natural Resources ("DNR") had identified the

mourning warbler as an endangered species, and the winter wren and junko were noted to be two species of concern.

In the course of his site visit, Dr. Kerlinger said that he found habitat for both the winter wren and the junko. The junko was found to be common to the site, however the winter wren, though present at the site, was less common than the junko. Dr. Kerlinger also indicated that he found habitat that would support the mourning warbler.

The other aspect of Dr. Kerlinger's risk assessment involved a nesting bird study to determine the species of nesting birds present and to map the occurrence and location of endangered or threatened species. With respect to the mourning warbler, Dr. Kerlinger determined that there were three places on the site where nesting pairs of mourning warblers are located. Three locations were at the northern most part of the line of turbines and one to two pairs in the approximate middle of the line of turbines. The other species of concern, the winter wren and the junko, are located at a larger number of sites.

Dr. Kerlinger indicated that he did not expect there to be significant impact from the project on the population of birds. Nesting birds, according to Dr. Kerlinger, generally do not fly above the top layer of trees, which are 40 to 50 feet tall. The rotors of wind turbines are roughly 100 to 130 feet so there is a buffer between the rotors and the space where most birds fly. Consequently, most of the nesting birds are going to fly well below the turbine rotors and are not likely to collide with the rotors.

With respect to the displacement or disturbance to mourning warbler habitat from the project, Dr. Kerlinger stated that siting of turbines at locations on warbler habitat would obviously remove habitat; but based on his observations in other locations where habitat has been removed, the expectation is that the mourning warbler would establish habitat in new areas on the site. Based on his study, Dr. Kerlinger concluded that as to collision impacts to migrant, nesting and wintering birds would not be biologically significant. As to bird habitat, construction on the site and the presence of new wind turbines would result in some minor impact as a result of habitat fragmentation.

Edwin Michael, Ph.D., Expert in the Field of Wildlife Ecology and the Study of Wood Rats and Other Forest Small Mammals; and *Emeritus* Professor at West Virginia University. (Synergics Exhibits 23-25.)

Dr. Michael provided testimony as to his evaluation of the wind project's potential impact on small mammals within the project site. The small mammals that were the focus of concern were the long-tailed shrew, the rock vole, the Allegheny wood rat, and the porcupine. Dr. Michael described the two least familiar of these small mammals. The long-tailed shrew is described as a very small animal that, at a distance, looks like a mouse. On close inspection, however, the animal's physical features include a pointed snout with very small eyes that make the animal appear almost eyeless and external earlobes that are rarely visible. The animal feeds on insects, primarily, and some small invertebrates that can be captured. The animal spends most of its time in leaf

litter and slightly underground under rocks. The other animal, the rock vole, is a small mouse -- best known by the title *lemming*. This mammal is a ground dweller that spends most of its time underground and is not likely to be seen above ground.

Dr. Michael testified that he reviewed the records of documented captures and survey of small mammals throughout the Allegheny ridge from West Virginia to Pennsylvania. In addition, Dr. Michael conducted field site examinations of habitat on Backbone Mountain in West Virginia and extending into the highest ridge point in Maryland on Backbone Mountain. Based on his knowledge of the project site habitat, Dr. Michael concluded that it is unlikely that the rock vole or wood rat are present on the site. First, as to the rock vole, Dr. Michael indicates that the habitat of this site is inconsistent with habitat that is preferred by the rock vole. According to Dr. Michael, the rock vole is an underground species that spends most of its time around rock cover that is likely to be damp. There are few sites on the project area that provide this habitat. Dr. Michael noted that there was one location that has a prominent spring seep and associated rock cover that could have rock vole nearby. With respect to the long-tailed shrew, its preferred habitat is most likely to be rocky outcrops that are not damp. However, this animal is few in number and Dr. Michael expressed the view that the long-tailed shrew was probably not at the site. If the long-tailed shrew and the rock vole are at the site, Dr. Michael indicates that wind turbines could be positioned within the site so as to avoid rocky

outcroppings and thereby reduce the potential impact to the habitat of these animals. For the porcupine, Dr. Michael indicates that this animal is very common and highly adapted to humans and habitat modified by humans. As a result, Dr. Michael expressed the review that porcupine habitat would not be impacted by this project. For the wood rat, Dr. Michael testified that this animal is present within the site and makes use of rocky outcrops for its habitat. The animal is adaptive to habitat disturbance and if rocky outcrops are avoided in the positioning of turbines, Dr. Michael indicates that the habitat of the wood rat would not be impacted.

Thomas K. Pauley, Ph.D., Expert in the Field of Herpetology; Professor of Conservation Biology at Marshall University. (Synergics Exhibits 26-29.)

Dr. Pauley's testimony addressed the concern that this project's impact could have on the timber rattlesnake and the Wehrle's salamander. Dr. Pauley first reviewed the literature to determine the geographic range where the rattlesnake is found. The determination was made that the range extends from the southeastern United States up to New Hampshire, extending across the Allegheny Mountains. Thus, according to Dr. Pauley, the habitat of the timber rattlesnake is common and can be found in a variety of places on the project site, as determined by the three different types of habitat required by the rattlesnake. The rattlesnake's den can exist around rocky outcrops and be found in a hole in the ground or under rocks in places where rock has fallen from a cliff or rocky outcrop. The rattlesnake requires a transit area from where the

snake migrates from its den to a foraging area. In that habitat, Dr. Pauley expressed concern that the rattlesnake might be killed simply because it is a snake or the habitat is impacted by the disturbance resulting from building the project. The impact to the rattlesnakes' habitat could be mitigated, according to Dr. Pauley, through proper training of project workers to not kill snakes and by positioning wind turbines so as to avoid rocky outcroppings.

For the salamander, because it is an animal without lungs and, therefore, breaths through its skin or the lining of its mouth, Dr. Pauley indicates that it generally requires a moist habitat. As a result, removing trees removes canopy thereby increasing ground temperature causing the soil to dry out. The salamander forages in leaf litter which must be moist to support the animal. In addition, the salamander is a territorial animal relying on overlapping territories, as small as one meter in area, to support animal reproduction. The placement of roads could fragment habitat and disrupt animal reproduction. Thus, the concern raised is the affect of drying out the ground resulting from tree removal and the fragmentation of habitat due to the placement of roads. However, Dr. Pauley expressed the opinion that based on his understanding of the road placement to avoid rocky outcrops and the micrositing of the wind turbines, this would appropriately mitigate the impact to habitat. Consequently, Dr. Pauley stated that he was of the opinion that this project would not have a significant impact on the total species when comparing the small area of affected habitat against the entire range covered by the species.

Michael S. Hollins, Consultant and Expert in the Field of Botany and Plant Ecology and Wetland Science. (Synergics Exhibits 30-35.)

The purpose of Mr. Hollins' testimony was to provide an assessment as to the presence of wetlands and to identify the existence of rare and/or endangered plant species on the site. Wetlands are described as areas of ground inundated or saturated with wetness with a prevalence of vegetation. Mr. Hollins indicated that using a standard methodology recognized by the Army Corps of Engineers, six wetland areas were found on the site. In the aggregate, the wetlands covers less than one acre in area. Based on his review of Synergics' plan for development of the site, all of the wetlands will be avoided by both road placement and turbine location. Consequently, the project will not impact the wetlands on the site.

Mr. Hollins conducted a vegetation study of the site that identified three rare species of vegetation. The species identified were Somersedge, Mountain Wood Fern (common names), and Clintonia Borealis. For the most part, these species are found on rock formation on the west side of the mountain ridge located roughly between turbines 12 and 14. In describing the location of this rare vegetation, Mr. Hollins expressed the judgment that the proposed location of the roads connecting turbines and the location of turbines would not impact these plants.

WITNESSES FOR INTERVENORS

Thomas A. Hewson, Jr., Expert in the Field of Energy Economic Analysis and Energy Environmental Analysis; Principle in the Consulting Firm Energy Ventures Analysis. (Eastman Exhibits 1A, 1B.)

The purpose of Mr. Hewson's testimony was to review and assess the energy claims in the Synergics application. Synergics' revised application claims that the proposed project would produce 132,000 MW hours of energy, which is equivalent to 38.1 percent of the project's capacity. Without site-specific data as to the wind resources in the project area, Mr. Hewson indicated that he conducted a comparison of the Synergics claims to actual wind production data from all reporting wind projects in the United States. Based on this comparison, Mr. Hewson found that the capacity claim for this proposed project was 41 percent above the national average and approximately 30 percent more than the output of the nearby Mountaineer project. Based on this comparison and because there was no data from Synergics to indicate that its wind resources were greater than the resources at the Mountaineer project or at other places, Mr. Hewson states that he concluded that the Synergics capacity estimate was overstated.

Testimony elicited from Mr. Hewson during cross-examination indicated, among other things, that the claimed capacity produces a miniscule amount of electricity as compared to the kilowatthours of electricity produced by the grid. According to Mr. Hewson, the amount of electricity produced by this project

would not displace electricity produced from a coal plant or have the other beneficial effects as claimed by Synergics.

William Evans, Expert in the Field of Ornithology and the Study of the Night Migration of Birds. (Eastman Exhibits 2A, 2B.)

Mr. Evans reviewed the Synergics application to assess the wind project's impact on night migrating birds. Mr. Evans first noted that there are no site-specific mortality studies of night bird migration; and because there are only three or four mortality studies in eastern North America, it is not possible to draw any conclusion about the likely mortality produced by a new wind generating facility. In addition, Mr. Evans expressed an objection to testimony of Dr. Kerlinger because in his view that testimony "overgeneralized" the concept of bird movement through the project site at night. Mr. Evans disagreed with Dr. Kerlinger's portrayal of bird migration "as a broadfront" movement through the site because bird movement is affected by the altitude of the site and variations in density of site over the mountain range.

Mr. Evans also criticizes Dr. Kerlinger's view that pre-construction studies are not useful in predicting the risk of mortality at a wind site. According to Mr. Evans, the predictive capability of pre-construction studies cannot be verified unless a wind project is actually built and a concurrent mortality study of bird migration is done, evaluating bird migration that measures the number and species of birds on a given night and correlating that information to the mortality that occurs. So contrary to concluding

that pre-construction studies are not effective, Mr. Evans contends that the studies that have been done have not been verified, so it is not possible to draw any conclusion with statistical confidence in the pre-construction data. Mr. Evans expressed the opinion that site-specific migration studies should be done to properly assess the potential impact and risk to avian migration. Any such studies, according to Mr. Evans, should be conducted in accordance with guidelines recommended by the U.S. Fish and Wildlife Service.

Robert C. Whitmore, Ph.D., Professor of Wildlife Management at West Virginia University and an Expert in the Study of the Effects of Pesticides on Birds and In the General Area of Bird Ecology. (Eastman Exhibits 3A, 3B; 4.)

The testimony of Dr. Whitmore was provided to assess the information and data supporting Synergics' CPCN application. First, Dr. Whitmore was critical of the Synergics' Phase I avian risk assessment. The risk assessment was based on a one-day visit to the project site and its nesting bird study was based on a four-day visit to the site. According to Dr. Whitmore, the biological systems are diverse and variably complex and therefore the data developed to support the application based on a "snapshot in time" is not, in Dr. Whitmore's opinion, sufficient to support Synergics' application. Dr. Whitmore was critical of the failure of Synergics' risk assessment to consider bird banding data collected over nearly 50 years. This data, according to Dr. Whitmore, shows the extent of bird migration over the mountain ridges throughout the fall of the year. Data is not available for spring because bird banding

cannot be done due to snow on the ground. However, Dr. Whitmore indicates the years of data for the fall suggests that data based on a one-day assessment done in July is insufficient.

In addition to the lack of data regarding bird migration, Dr. Whitmore also criticizes the risk assessment for the mourning warbler. Dr. Whitmore noted that Dr. Kerlinger's Phase I risk assessment does not identify the mourning warbler, but in his four-day nesting bird study, he found probably three pair of nesting mourning warbler. According to Dr. Whitmore, the nesting study was inadequate because it was only a series of point counts done at different locations over a four-day period, and in Dr. Whitmore's view, the study is not adequate because there was no search for the nest with resulting monitoring to follow the progress of the nests.

Moreover, Dr. Whitmore questions the point count data because the number of species in the recorded point count is less than the number reported by Synergics in ancillary data. In Dr. Whitmore's view, there is a lack of site-specific data about the nesting biology of birds resident to this site and an insufficient amount of data for monitoring migratory birds, as well. In his opinion, data is needed from a multi-state, multi-year study along the mountain ridges to determine the risks to birds. However, Dr. Whitmore acknowledged that while a pre-construction study would be a prediction of potential mortality, actual mortality data would avail only if the project is actually built.

Russell William Bounds, Licensed Realtor; Testimony Provided for Intervenor Paul Sprenger, as an Expert on Property Value in Garrett County, Maryland. (Sprenger Exhibits 20-21.)

Mr. Bounds is a real estate agent who has sold real estate in Garrett County, Maryland, for over 10 years. During this time, Mr. Bounds indicates that he has sold large acreage or mountain properties and lake properties. The kind of property sold is affected by the geographic character of Garrett County, which is dominated by mountain landscape and lake properties in the vicinity of Deep Creek Lake. The purpose of Mr. Bounds' testimony was to support opposition to the CPCN application by Intervenor, Paul C. Sprenger. Based on his training and experience in real estate, his personal observations of wind turbines operating in nearby Pennsylvania and West Virginia, and information in the public record regarding property transactions, Mr. Bounds opined that property within one-half to one mile of wind turbines are negatively impacted by a loss of property value.

Thomas H. Kunz, Ph.D., Professor at Boston University and Director of the Center for Ecology and Conservation of Biology and Expert in the Field of Bat Ecology and Behavior. (Eastman Exhibits 5A, 5B and 5C.)

The testimony of Dr. Kunz was provided as a result of his review of the Synergics application to evaluate the wind project's impact on bats. Dr. Kuntz's testimony critiqued Dr. Reynold's testimony in support of Synergics CPCN application. Overall, it was Dr. Kunz's view that Synergics' site-specific study regarding bat impacts was inadequate. According to Dr. Kunz, the

Synergics study focused only on the potential impact to the Indiana and Small footed bat, but did not consider other bat species that occur in the area. In addition, the Synergics study did not consider relevant available evidence of the roosting habits, migratory behavior or foraging habitats of the Indiana bats. In short, Dr. Kunz was critical of what he characterized as the "absence of any science" done by Synergics to evaluate potential impacts. This "absence of science" was important to Dr. Kunz because of the significant bat kills at the Mountaineer site in West Virginia in 2003 and 2004. These mortalities, according to Dr. Kuntz, should have prompted Synergics to use modern technology to identify the problems that caused bats to be killed and thereby better understand bat impacts around the operation of wind turbines.

Dr. Kunz was also critical of the testimony of Wayne Rogers, President of Synergics. His testimony about the noise level characteristics of the proposed turbine was with reference to turbine noise affecting human hearing. According to Dr. Kunz, noise beyond the level of human hearing, called ulttrasound, is produced by the turbine and could affect bat functioning as it relates to their navigational system and their feeding behavior. In addition, the speed and height of rotating turbine blades has an affect on bat impacts and mortality; and Dr. Kuntz suggests that Synergics has not sufficiently studied the relationship of the turbine blade operation to bat impact and mortality.

Jon Boone, Garrett County Resident and *Pro Se*, Intervenor. (Boone Exhibits 1-4.)

The testimony of Mr. Boone is in opposition to the Synergics CPCN application and is provided "to encourage and enlighten public policy, and to insert a dose of reality about what the application means to Garrett County residents." Transcript, Vol. V, p. 828. Mr. Boone says that he is in agreement with the State's objective of reducing dependence on fossil fuels; however, he opposes "promoting wind power initiatives at any cost without fully investigating potential negative consequences, and with no apparent knowledge of even recent environmental history." *Id.*, p. 829. In his view, the industrial wind plants of this project will be environmentally harmful to citizens of Garrett County; will disrupt their right to quiet enjoyment of their property; and will be destructive of endangered wildlife and important and significant historic views.

This project seeks "to place 17, 19 structures around one of the most compelling natural features in the state." *Id.*, p. 831. The burden of proof for substantiating the claims of this application rests on Synergics and according to Mr. Boone, as Intervenor, he should not have to verify the claims made by Synergics in this application. In his opinion, Synergics has not shown how this project will reduce below current levels dependence on fossil fuels. Mr. Boone says "[i]t would take 100 wind plants like this project ... straddled over 300 miles of forested ridge-tops to generate as much electricity as one 1,600 MW coal plant."

Id., p. 832. Moreover, Mr. Boone asserts that the Synergics claim about the impact this project will have on jobs and local taxes is questionable. In his view, Mr. Boone asserts that the evidence shows that the Synergics application should not be approved.[15]

WITNESSES FOR THE DEPARTMENT OF NATURAL RESOURCES, POWER PLANT RESEARCH PROGRAM

John Sherwell, Ph.D., Project Manager for Evaluation of the CPCN for the Wind Project. (DNR Exhibits 1-14.)

Dr. Sherwell's testimony first explained a number of photographs, admitted in evidence, that showed among other things, the geography and habitat of the project site along the line of locations proposed for siting the wind turbines. Dr. Sherwell also suggested that testimony asserting that the wind project should not be licensed until the impact of the project is really understood is impractical. Dr. Sherwell explained "there is nothing that prescribes somebody submitting a wind power for a CPCN ... [W]e have [ ] taken ... an adaptive management approach where ... in our conditions [we have tried to] be interactive in the way in which these projects operate and allow ourselves to come back and make adjustments in the way the project is operating so that we can be

[15] The above encapsulates the direct testimony provided by Mr. Boone at the evidentiary hearing on September 16, 2005. This testimony broadly summarizes more than several hundred pages of pre-filed written testimony of Mr. Boone, admitted in evidence as Boone Exhibits 1 through 4. The entirety of that pre-filed testimony has been reviewed and considered in the process of evaluating the evidence in this case.

sure that we are not impacting the environment in any kind of adverse fashion." Transcript, Vol. V, p. 893.

DNR has proposed conditions to be placed on Synergics' operation of its wind power facility. The proposed conditions are intended to mitigate the impact of the facility operation on bat/bird mortality. Dr. Sherwell testified that Synergics would be required to conduct a post-construction bat mortality study overseen by the Department of Natural Resources Natural Heritage Program. Information produced by the study will be used with implementing a condition that sets in place a curtailment option. This condition requires curtailment of the facility operation in the event of a bat fatality that exceeds established criteria. Dr. Sherwell also explained that curtailment could occur during periods of bat migration based on known wind speeds over the site; and if curtailment were required, it would apply to the entire facility. Curtailment could be required up to 400 hours during the course of the bat migratory season.

Gary Emmanuel, a Professional Engineer Registered in the State of Maryland Who Has 27 Years Experience in Designing Solid Waste Water Facilities and Other Public Service Projects. (DNR Exhibits 15-16.)

The testimony of Mr. Emmanuel describes, from an engineering perspective, how the project is to be built. Construction of the wind turbines will require that roads be built. The roads will be needed to allow access to the turbine sites on the mountain ridges. Road construction must be done in concert

with the terrain of the land which, according to Mr. Emmanuel, is "very steep and irregular." Transcript, Vol. V, p. 997. Creating a road base requires disturbing the terrain in order to build a generally level road suitable to allow turbine parts to be moved to construction locations. According to Mr. Emmanuel, building a level road on a steep slope requires a lot of fill material to create a pathway wide enough for truck traffic and that material will be obtained from a nearby quarry. In Mr. Emmanuel's opinion, the amount of disturbance[16] to the land necessary to construct a suitable roadway would be, approximately twice that represented in Synergics' application. Mr. Emmanuel also stated that the Synergics application underestimated the amount of turbine placement disturbance. The application estimates about 2/3 of an acre per turbine as opposed to Mr. Emmanuel's estimate of more than 2 to 2.5 acres per turbine.

Mark T. Southerland, Ph.D., Principle Ecologist With Versar, Inc., and Expert in the Assessment of Potential Environmental Impacts to Terrestrial and Freshwater Species; Consultant to the Maryland Department of Natural Resources Power Plant Research Program. (DNR Exhibits 17-18.)

Dr. Southerland's testimony was directed to certain ecological concerns regarding the Synergics application. Bird fatalities, as a result of collisions with turbines, according to Dr. Southerland, are to be expected; however, best estimates, after

[16] Mr. Emmanuel indicated that his use of "disturbance" referred to "creating a road, not simply cutting trees, but actually reshaping the land to create a profile that can be driven up, turns that can be made through the topography to access the specific desired turbine locations." Transcript, Vol. V, p. 1002.

more than 20 years of study, are that such fatalities are low – on the order of two to four birds per turbine per year – as reflected in mortality results over the past two years of study at wind turbine project sites in West Virginia and Pennsylvania. Uncertainty as to the extent of bird fatalities at wind project sites has caused DNR to propose three conditions to address bird fatalities resulting from collisions. "The first one being Condition 15, which is the lighting one, which we believe will reduce, minimize the effect in bad weather, which is a principle concern, by having the lighting at the minimum number of towers and with the longest off period allowed by the Federal Aviation Administration ... Condition 17 is the monitoring of follow up construction. Then Condition 19, which would have restriction on turbine operation given large number of fatalities." Transcript XI, pp. 1060-61. These conditions will serve to mitigate bird fatalities based on the best state of knowledge about potential impacts at this time.

With respect to bats, Dr. Southerland expressed an even greater concern for potential collision impacts. Based on a recent federal government report, there is an expectation that significant bat fatalities might occur at wind power facilities. Over the life of the project, but fatalities could number in the thousands, however "there is [ ] uncertainty ... whether endangered species such as the Indiana bat would be involved, and there is also the possibility that deterrents could be developed in the future to reduce those levels." *Id.* p. 1061. Dr. Southerland indicates that

the best approach for mitigating bat collision fatalities is the application of Condition 17 and 19, previously discussed, along with Condition 18 that requires turbine shut down during periods of seasonal movement when bats are at greatest risk.

For the ecological resources, Dr. Southerland says that the greatest concern is for the loss of terrestrial habitat as a result of the "relatively unusual" habitat along the ridge on the project site. The uniqueness of the habitat is a result of its characteristics. The habitat is cool and moist because of its elevation, fog and weather conditions resulting in "unique communities of plants and animals ..." *Id.* p. 1063. Dr. Southerland expressed a number of concerns about the ecological impact that construction and placement of roads would have on this unique habitat. The mitigation of adverse impacts to the ecological resources of this site is addressed in Condition 16. Dr. Southerland notes this condition protects sensitive habitat by prohibiting the start of construction in this area until DNR has determined that there will be no take of known endangered or threatened/rare species. In addition, the Condition prohibits siting in exclusion zones south of the 500 kV transmission line and below the Roth Rock Fire Tower in the northern portion of the project site. Although sensitive areas of habitat are subject to exclusion, Dr. Southerland expressed concern that the need for road placement will result in the elimination of some areas of this unique habitat by fragmentation and the loss of forest canopy. According to Dr. Southerland, fragmentation will cause degradation

and stress on the unique vegetation and loss of canopy will dry out the areas of rocky habitat.

Gwenda Lynn Brewer, Ph.D., Science Program Manager, Natural Heritage Program, Maryland Department of Natural Resources; Expert in the Area of Avian Ecology and Behavior. (DNR Exhibits 20-21.)

The testimony of Dr. Brewer assesses the ecological impact of this project on rare, threatened and endangered species at the proposed site. Dr. Brewer is responsible for oversight of the State's Natural Heritage Program. Under this program, a formal process is initiated to review projects and identify the potential impact to the wildlife and habitats of known locations of rare, threatened or endangered species. Dr. Brewer's testimony identified a number of plants and animals that are subject to impact in the project area. Of particular concern is that placement of turbine pads and roads will result in the removal of habitat, impact dispersal patterns, and result in negative effects due to forest fragmentation. Dr. Brewer noted particular concern for the mourning warbler indicating that placement of turbines and roads in the vicinity of known nesting habitat could jeopardize the continued existence of the mourning warbler in the State. Dr. Brewer also identified a number of other animal species that could be impacted by the project. Of particular note are the southern rock vole and the Wehrle's salamander. These are rare species that reside in habitats within the project site that, according to Dr. Brewer, would be negatively impacted by the placement of turbines.

Dr. Brewer also provided testimony expressing concern about the impact the project could have on the eastern small footed bat and the Indiana bat. Known locations for these two species are within 30 miles of the project site. "The closest known location for the eastern small footed bat ... for a maternity or a breeding colony in Maryland is about 22 miles away from the project site. The closest known hibernaculem for eastern small footed Indiana bats is about 25 miles away." Transcript, Vol. VI, pp. 1067-68. These bats have been determined to have roosted at elevations of 3,000 feet and have foraged along ridgetops at this elevation in areas of Pennsylvania and West Virginia. According to Dr. Brewer, this information is "in contrast to what Dr. Reynolds said about records for Indiana bats roosting and foraging at 3,000 feet in northern West Virginia, and also crossing ridges during migration in Pennsylvania." *Id.* pp. 1068-69. Bats captured at cave and mine entrances during fall swarming suggests that the species is present in the State throughout the year in summer and winter roosts. Disturbance to rock outcrops and forest cover along with direct mortality by wind turbines during flight could have a significant impact on the species.[17]

In referring to Synergics' revised CPCN application reducing the proposed number of wind turbines on the project site,

[17] In addition to bats, Dr. Brewer noted that the unique habitat of this site was likely to contain some 22 species of concern. Dr. Brewer also testified there is a possibility that certain endangered plant species might be present on the site, and consequently a vegetation survey should be completed before construction begins in order to define those areas of the site that should avoid impact to the habitat of rare vegetation.

Dr. Brewer testified that "exclusion of the northern end of the project and protection of rock outcrops ... will assist in protecting these species, but protecting rock outcrops and the exclusion of the northern end of the project area alone will not ... avoid take in these species of concern." Transcript, Vol. VI, p. 1070. In addition to the exclusion of the designated areas, Dr. Brewer indicates that mitigation of the impacts can be affected by implementing the conditions referenced by Dr. Southerland, and she, too, recommends that these conditions be adopted in granting this application.

Daniel J. Feller, Biologist, National Heritage Program, Maryland Department of Natural Resources; Expert in the Areas of Small Mammal Ecology, Aquatic Invertebrate Ecology, Cave Ecology, Water Quality Analysis, Herpetology, Endangered Species Monitoring, and Natural Resources Planning. (DNR Exhibit 22.)

Mr. Feller is responsible for reviewing the Synergics application and evaluating the proposed project site to determine the habitat characteristics and assess the impact of the project on two State endangered species – the Allegheny woodrat and southern rock vole – and several other species on the State list of species in need of conservation. With respect to the rock vole, Mr. Feller testified that this project site had habitat characteristics that correlated with the presence of the species. Mr. Feller, however, disputes the testimony by Dr. Michael suggesting that the rock vole could withstand disturbance to its habitat resulting from this project's construction. According to Mr. Feller, Dr. Michael's conclusion that rock vole habitat would not be impacted by this

project was based on a comparison to a site that was not comparable to the Synergics site. That site was at a much higher elevation in a red spruce forest and thus is very different, ecologically, than the Synergics site. Also, Dr. Michael's claim of a gain in rock vole population after clear cut of the site is offset by a rapid decline of population in clear cuts three to eight years old. "So there was an initial increase, and then there was a rapid decline. The long-term prospects of disturbance are negative ... [thus] elevation is very important in these sites. It makes a big difference in the moisture level." Transcript, Vol. VI, p. 1082. On the Synergics site, a clear cut removing trees means that "all the moss dies off the rocks [and] the herbaceous layer completely changes" the habitat of the rock vole.[18] *Id.*

The Synergics site also has habitat characteristics that could be supportive of the Allegheny woodrat. Although the characteristics include rocky cliffs, caves, fissures or tumbled boulders that form deep crevices, Mr. Feller could only say that the species was "probably" present on the site based on the existence of some known active sites in areas some distance north/south and west of the Synergics site.

According to Mr. Feller, development at the Synergics site should be done with consideration given to the habitat that is supportive of the species of concern. In that regard, Mr. Feller

[18] Mr. Feller also identified several other species – long tailed shrew; smoky shrew; and porcupine – considered in need of conservation, that are probably present because the characteristics of the site supports the habitat.

indicated that mitigation of potential negative impact to the habitats of concern could be accomplished by the "micrositing" of turbines and road placements. As a result, Mr. Feller recommends adoption of the procedure specified in Condition 16 of the DNR recommended licensing conditions. Mr. Feller described "micro-siting" as a process involving a large group of people including wind engineers, construction people and DNR experts that evaluate each proposed site for the presence of rare, threatened or endangered species habitat. If a proposed site has habitat that could be impacted, that site is eliminated and a search is directed to a different area. This process is applied in identifying the location for the placement of each turbine on the project site. Following this procedure would, according to Mr. Feller, reduce the adverse impact to the species of concern by avoiding habitat and limiting development activity.

Peter D. Hall, Ph.D., President of Metametrics (Subcontractor to the Department of Natural Resources, Power Plant Research Program), Consulting Economist With More Than 20 Years Experience in Regional Economic Analysis and Socioeconomic Impact Analysis. (DNR Exhibits 23-24.)

The testimony of Dr. Hall addresses his assessment of the potential socioeconomic impact that the Synergics project will have on the area surrounding the wind generating facility. The assessment involves an analysis of the project's impact on potential employment, income, population housing as well as impact to land use, transportation, visual quality, and historical and cultural resources related to the construction and operation of the

facility. Dr. Hall's initial assessment is contained in his written pre-filed testimony. *See*, Ex. DNR23. That assessment is based on Synergics original proposal of a project consisting of 24 wind turbines.[19] Dr. Hall's evaluation was developed as a result of his understanding of the project area; an evaluation of the documentation submitted by Synergics; and a review and analysis of data published from various sources. The DNR Environmental Review Document identifies the sources of data used in this socioeconomic analysis. *See*, Ex. DNR2.

The following summarizes the essential aspects of Dr. Hall's pre-filed testimony regarding each socioeconomic impact evaluated:

1. Land Use Impact – The roadway and turbine construction will create disturbances to the land greater than stated in Synergics' application.

2. Population and Housing Impacts – Population or housing in Garrett County will not be affected by the proposed project. Four employees will be required to operate and maintain the facility.

3. The Economic Impact – During the construction phase, the proposed project will have minor effect on employment and income in the county and State. Not all economic impact will be retained in Maryland but because of proximity of site may impact West Virginia or Pennsylvania.

[19] In supplemental pre-filed testimony, Dr. Hall updated his assessment as a result of Synergics' amended application reducing the number of wind turbines in the proposed project.

4. Impact on Government Revenues and Expenditures – During the construction phase, State revenues will be positively impacted by tax revenues resulting from State sales taxes on purchases of construction material and consumption expenditures of construction workers.

   For the county, the primary revenue source, during the construction phase, will be the county personal income tax.

   After construction, operation of the facility will generate revenue for the county based on the real and personal property components of the facility.

5. Visual Impacts of the Facility – Turbines located along the mountain ridgeline are potentially visible to much of the surrounding area. Turbines placed below the ridgeline are much more visible from the river valley in the west. Turbines will affect the view from the east but this view is dominated by strip mining along the eastern slope of the mountain.

6. Impact of the Proposed Facility on Historical and Cultural Resources – There are no known archaeological sites or historical structures in the project area.

7. Transportation Impact of the Proposed Facility – There is no expected significant impact to traffic as a result of construction activity.

8. Impact of the Proposed Facility on Property Values Associated with the Project – The facilities' impact on properties near the project is unclear.

Mikhail Ratushny, Staff Engineer for the Public Service Commission. (Staff Exhibits 1-2.)

Mr. Ratushny's testimony provides a discussion of the reliability and stability of the electric system with the addition

of the generation proposed by the Synergics project. Mr. Ratushny noted that PJM, the provisional Regional Transmission Operator of the electric grid for Pennsylvania, New Jersey, Maryland, Delaware, and a portion of Virginia, determines the impact the project will have on the electric system. Mr. Ratushny describes the process that PJM has to evaluate the proposed project to determine what facilities are necessary for the project to interconnect to the grid without degrading the reliability and stability of the electric system. If the CPCN is granted, Mr. Ratushny recommends that the Commission require the applicant to file with the Commission, prior to putting the project in service, a listing of the transmission improvements required by PJM and the interconnecting transmission line owner and a certification that the interconnection requirements have been met.