

# WindWise Education

## *Wind Energy Activities for Students*

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WindWise Education Curriculum

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ISBN 978-1-4951-4354-0

# WHERE DO YOU PUT A WIND FARM?



LESSON  
**18**

## KEY CONCEPT

Students learn how to analyze data (maps, tables, and written information) to compare and contrast two potential sites for a wind farm.

## TIME REQUIRED

2 class periods

## GRADES

6–8  
9–12

## SUBJECTS

Social Studies  
Environmental Studies  
Earth Science  
Mathematics

## BACKGROUND

A wind farm developer spends a considerable amount of time and money determining the optimal location for a wind farm. A significant part of this process is the **environmental screening analysis**, in which many and various issues are critically examined—from **threatened** and **endangered** species to local zoning laws. This lesson introduces students to the types of data that developers use to prioritize potential sites.

## OBJECTIVES

At the end of the lesson, students will be able to:

- analyze and interpret maps
- synthesize data from a variety of sources
- identify the major variables considered when **siting** a large wind farm

## METHOD

Working in small groups, students use a set of maps, tables, and reading materials to compare and contrast two potential sites for a wind farm. Each group completes an evaluation table by scoring the criteria and then decides which site is optimal. Each group writes a proposal describing the assets of the site and presents it to the class.

## MATERIALS

- Information packets for two proposed wind farm locations in New York\*
  - Student reading passages and student worksheets\*
- \*included with this activity

Additional Resources for every lesson can be found at <http://learn.kidwind.org/windwise/>. Resources include presentations, videos, extension activities, and other materials.

### GETTING READY

- Download and print enough color copies of site packets for each group. The information in these packets is hard to decipher in black and white. Consider laminating paper copies for repeated use.
- Make copies of the worksheet for each student.

### ACTIVITY

#### Step 1: Beginning Questions for Students

Help students understand that there are many different factors that determine where a wind farm goes. While no site is perfect, some factors may be more important than others in determining location. Ask students to review the case study and then guide a short class discussion, using the following questions:

- Where do you think wind farms typically are?
- What are some reasons why wind farms may not always be located where wind speeds are highest?
- What factors must wind developers think about, when siting a wind farm?
- Which of these factors do you think are most important?

#### Step 2: Small group site analysis

Students will work in small groups to analyze two potential sites for a wind farm. Using the maps and reference materials, students will determine which of the two locations is the most viable. Each group will write a one-paragraph report that outlines which site they have selected and why. If time permits, each group can present its proposal to the rest of the class.

Organize students into small groups and present them with the following scenario:

*A large wind developer is interested in building a wind farm in New York. The developer has two locations in mind. The developer's investors would like to know which site should be selected. The group's goal is to analyze the information available for each site and make a recommendation to the investors.*

After you distribute the information to each group, give them time to evaluate the maps and information. It may be easiest if each student picks one or two features to evaluate for the group. Ask students to look at the questions on the worksheet and determine a score based on the answers to those questions. Encourage students to provide comments on the worksheet to explain the potential problems or advantages of each site.

Each group will evaluate the scores and key factors and select a site. Each student will write a paragraph proposal for the selected site that includes the reasons why the site is preferable. Students could also write this paragraph as homework.

### Step 3: Wrap up

Ask each group to summarize which site they selected and provide a reason for their selection. Discuss why each group selected the site. If groups selected different sites, encourage students to talk about why. Were the decisions based upon different pieces of information? Did one piece of information outweigh the others in terms of importance?

### EXTENSION

Create a WebQuest for students to obtain additional information on the potential wind farm sites.

### VOCABULARY

endangered species – A species in danger of extinction throughout all or a significant portion of its ranges

environmental screening analysis – Also called a preliminary site assessment, this is a process to assess the site's suitability for a wind farm from an environmental perspective.

regulations – Rules, orders or laws issued by an government authority

siting – The process by which the specific location of a wind energy facility, and the specific locations of wind turbines within the facility, are determined

species of special concern – Species for which a welfare concern or risk of endangerment has been documented even though current information does not justify listing these species as either endangered or threatened.

threatened – A species likely to become endangered in the foreseeable future

### RELATED ACTIVITIES

- Lesson 13: How Does a Windmill Work?
- Lesson 16: How Do People Feel About Wind?
- Lesson 17: What Are Best Locations for Offshore Wind?





## CASE STUDY: CAPE WIND PROJECT

In 2001, Cape Wind began developing the first offshore wind farm in the United States. The 130-turbine wind farm is proposed to be built over 5 miles off the coast of Massachusetts in Nantucket Sound. It is predicted that the wind farm will produce enough energy to meet 75 percent of the electricity demand for Cape Cod and the islands of Martha's Vineyard and Nantucket. As a part of the development process, Cape Wind has had to complete a comprehensive environmental impact review process with 17 federal and state agencies.

In 2007, Cape Wind completed a final environmental impact report with the Commonwealth of Massachusetts. By this time, Cape Wind had spent nearly \$30 million on their efforts to gain permissions for the wind farm. Delays in the federal permitting process occurred when the regulatory authority for offshore renewable energy projects was transferred from the US Army Corps of Engineers to the US Minerals Management Service (MMS) within the Department of the Interior.

The MMS released the final environmental impact statement in early 2009 and on April 28, 2010, the Department of Interior Secretary Salazar approved the project.

The Cape Wind Project has faced fierce opposition from a number of groups, including The Alliance to Protect Nantucket Sound. Groups opposed the Cape Wind Project for a number of reasons: potential negative impacts to the ecosystem, negative impacts on fishing, economic impacts of less tourism, lower property values, and safety hazards for air and sea navigation. In addition, Cape Cod, Martha's Vineyard, and Nantucket all have numerous historic landmarks that the Massachusetts Historical Commission (MHC) believed would be adversely impacted by the visual presence of the turbines.

Many other groups supported the project, including Clean Power Now, Greenpeace, and the Natural Resources Defense Council. After conducting their own extensive environmental and avian impact studies, the Massachusetts Audubon Society released a statement in 2006 that provided conditional support for the wind farm, asking Cape Wind to "get it right." Groups that supported the project pointed to the positive impacts that the project might have. Positive impacts include: creating new jobs and contributing to stable energy prices; using more clean energy and thus reducing harmful air pollutants and greenhouse gas emissions; and increasing general safety and security by reducing dependence on foreign energy sources, like oil.

### Sources

- Alliance to Save Nantucket Sound. [www.saveoursound.org/](http://www.saveoursound.org/)
- Clean Power Now.
- Cape Wind: America's First Offshore Wind Farm on Nantucket Sound, [www.capewind.org/](http://www.capewind.org/)
- *Boston Globe*, [www.boston.com/news/local/massachusetts/articles/2007/03/31/cape\\_wind\\_moves\\_on\\_to\\_federal\\_review/](http://www.boston.com/news/local/massachusetts/articles/2007/03/31/cape_wind_moves_on_to_federal_review/)—News article entitled "Cape Wind Moves on to Federal Review: After State OK, Roadblocks Remain" by Stephanie Ebbert, *Boston Globe*, March 31, 2007.

Additional Resources can be found at <http://learn.kidwind.org/windwise/>. Resources include presentations, videos, extension activities, and other materials.



Name \_\_\_\_\_

Date \_\_\_\_\_

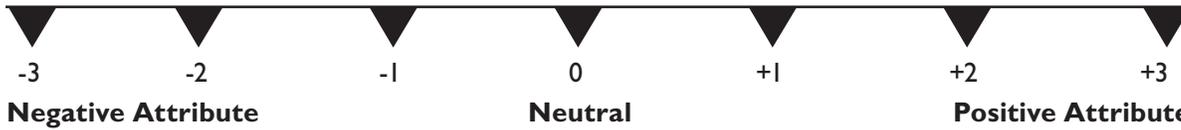
Class \_\_\_\_\_

**WHERE DO YOU PUT A WIND FARM?**

A large wind developer is interested in building a wind farm in New York. The developer has two locations in mind. The developer’s investors would like to know which site has the fewest obstacles to approval. Your group’s goal is to analyze the information available for each site and make a recommendation to the investors.

**Step 1: Compare and contrast the sites**

To help compare and contrast the two sites, use a scale to rank each feature. If the feature provides an advantage to the site, give it a positive score (+1 to +3), with +3 being the most positive. If the feature appears to put the site at a disadvantage, give it a negative score (-1 to -3), with -3 being the most negative. Think about the questions listed to help you decide how positive or negative the feature is. After evaluating each site, total the score for each site.



<b>MAP OR RESEARCH INFORMATION</b> Read the packet of information to answer the questions and determine a score.	<b>SITE 1</b> Score	<b>SITE 2</b> Score	<b>POTENTIAL PROBLEMS OR ADVANTAGES</b> Use this space to note important factors, such as average wind speed data, endangered species, or strong public opinion.
<b>PROJECT DESCRIPTION</b> ■ How many turbines will there be? ■ How much energy will they generate and how many homes would that power? ■ How many landowners are there? ■ What is the surrounding land use? ■ Are there other issues that may be important to know about for this location? ■ How many acres will the wind farm take up?			
<b>ELEVATION MAP, LAND USE MAP</b> ■ What are the 2–3 primary land uses near the site? ■ Will the elevation cause problems for construction? ■ Are there nearby towns?			
<b>WIND SPEED MAP</b> What is the average wind speed near the wind farm?			
<b>BIRD SPECIES</b> Are there any threatened or endangered bird species on or near the site?			
<b>BAT SPECIES</b> Are there any threatened or endangered bat species on or near the site?			



Name \_\_\_\_\_

Date \_\_\_\_\_

Class \_\_\_\_\_

<b>MAP OR RESEARCH INFORMATION</b> Read the packet of information to answer the questions and determine a score.	<b>SITE 1</b> Score	<b>SITE 2</b> Score	<b>POTENTIAL PROBLEMS OR ADVANTAGES</b> Use this space to note important factors, such as average wind speed data, endangered species, or strong public opinion.
<b>WETLANDS AND PROTECTED AREAS</b> Are there any wetlands near the turbine locations? If so, how close are they?			
<b>TRANSMISSION CONSIDERATIONS</b> <ul style="list-style-type: none"> <li>■ How much will the transmission connection cost?</li> <li>■ How difficult will it be to get the transmission line approved?</li> <li>■ Are there other issues that will make the transmission connection either easier or harder?</li> </ul>			
<b>VISUAL / AESTHETIC CONSIDERATIONS</b> <ul style="list-style-type: none"> <li>■ When you look at the existing and simulated photos, do you think residents will be for or against the turbines?</li> <li>■ Are there attractive views that will be altered (positively or negatively) by the wind turbines?</li> </ul>			
<b>LOCAL TOWN LAWS</b> <ul style="list-style-type: none"> <li>■ Are there any town codes that may make the wind facility easier or more difficult to build?</li> </ul>			
<b>COMMUNITY OPINION</b> <ul style="list-style-type: none"> <li>■ What is public opinion of the wind facility?</li> </ul>			
<b>PROPERTY VALUES</b> <ul style="list-style-type: none"> <li>■ Based on the projected property values, do you think residents will support or oppose the wind facility?</li> </ul>			
<b>TOTAL SCORE</b>			

## *Where Do You Put a Wind Farm?*

### **Step 2: Small group discussion**

As a group, take a few minutes to discuss the two sites.

1. What are the biggest advantages of each site?
2. What are the biggest challenges with each site?
3. Are there compromises that you have to make with either site?

### **Step 3: Write a proposal**

Based on the scores for each site and your analysis of which factors are most important, which site will your company recommend to the developer? Consider that you do not need to select the site with the highest score if there are certain factors that may outweigh that choice. Write a paragraph describing why you have selected this site.

**Step 1: Compare and contrast the sites**

To help compare and contrast the two sites, use a scale to rank each feature. If the feature provides an advantage to the site, give it a positive score (+1 to +3), with +3 being the most positive. If the feature appears to put the site at a disadvantage, give it a negative score (-1 to -3), with -3 being the most negative. Think about the questions to help you decide how positive or negative the feature is. After evaluating each site, total the score for each site.

*Students' responses will vary depending on how they interpret the information and should be used as a basis for class discussion.*

**Step 2: Small group discussion**

As a group, take a few minutes to discuss the two sites.

*Students' responses will vary depending on how they interpret the information and should be used as a basis for class discussion.*

**Step 3: Write a proposal**

Based on the scores for each site and your analysis of which factors are most important, which site will your company recommend to the developer? Consider that you do not need to select the site with the highest score if there are certain factors that may outweigh that choice. Write a paragraph describing why you have selected this site.

*Where Do You Put a Wind Farm?*



# WHERE DO YOU PUT A WIND FARM?

## PROJECT DESCRIPTION

Questions to consider:

- How many turbines will the site have? How many megawatts? How many homes would the wind farm theoretically provide power to?
- How many individuals does the wind farm need to obtain leases from?
- Are there any towns near the project site?
- Are there local laws that will impact the wind farm?
- Will the topography make it potentially easier or more difficult to develop the wind farm? Why?

Windy Hills, LLC, is proposing to develop a wind powered generating facility with 62 turbines and a capacity of approximately 100 megawatts (MW). Each turbine has a maximum height of 410 feet. The proposed Windy Hills Wind Project would meet the electrical needs of over 40,000 homes. The project will employ approximately 10 to 20 administrative and other personnel.

The project will be developed on fifty separately owned parcels of land. Land use within the project area is dominated by agriculture with farms and single-family rural residences generally along the road frontage.

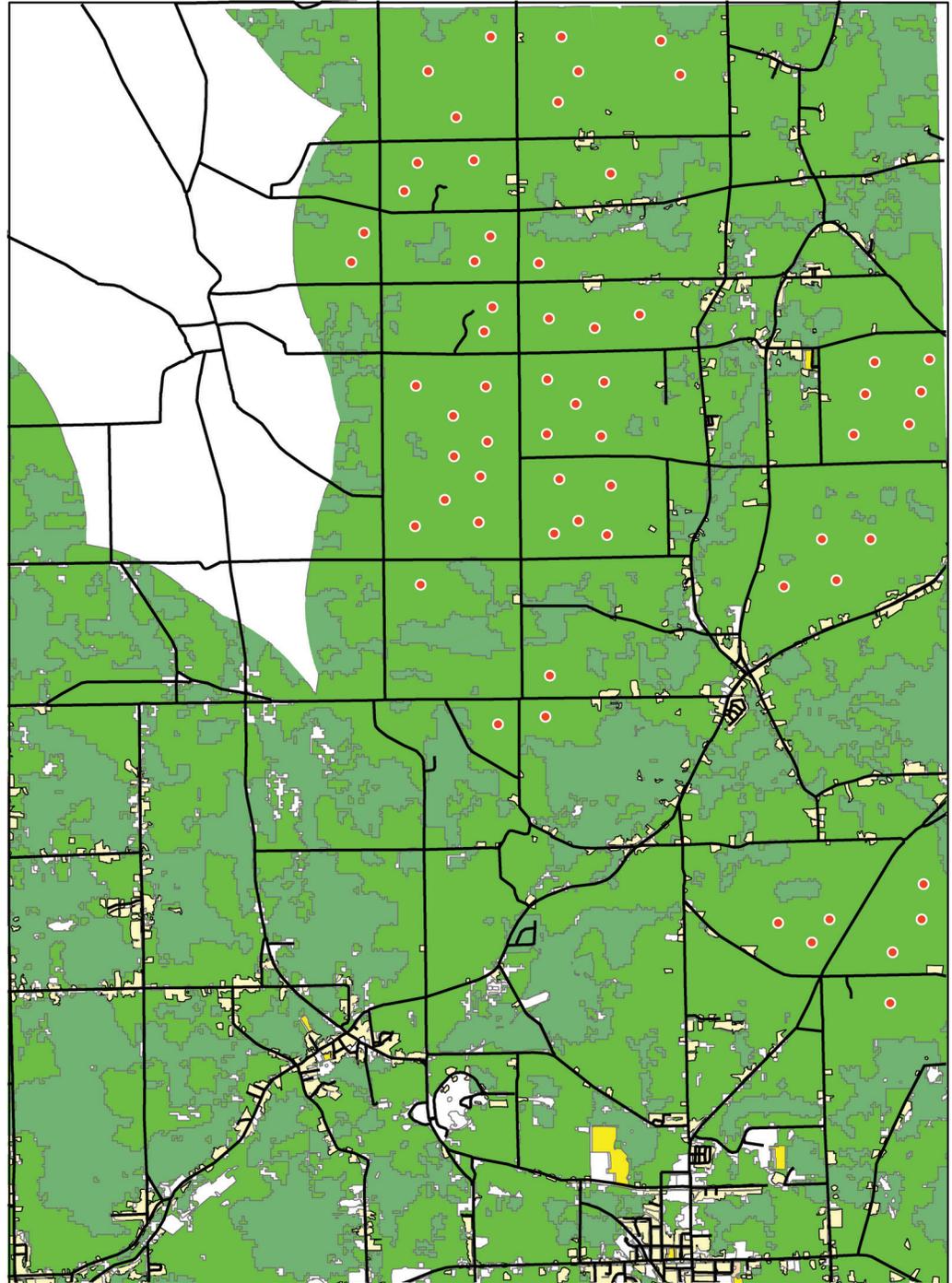
The closest town is 2 miles away. The wind farm is not located within town boundaries and would, therefore, not be subject to any town laws. The proposed 62 turbines would be located at least 2,500 feet from most nearby residences in order to minimize visual and sound effects.

This area has a hilly topography with valleys and ridges where elevations and slope increase. The majority of the turbines will be placed near hill- and ridge-tops.

## LAND USE MAP

Questions to consider:

- What are the 2–3 primary land uses in the wind farm site?
- Do you think these land uses will make it easier or harder to introduce turbines?
- For agricultural areas, how do you think the turbines will impact farming operations?
- How do you think the turbines will impact residences in the area?



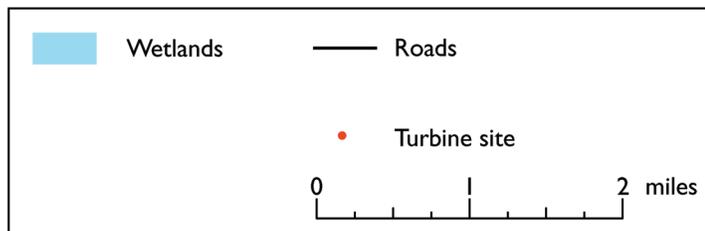
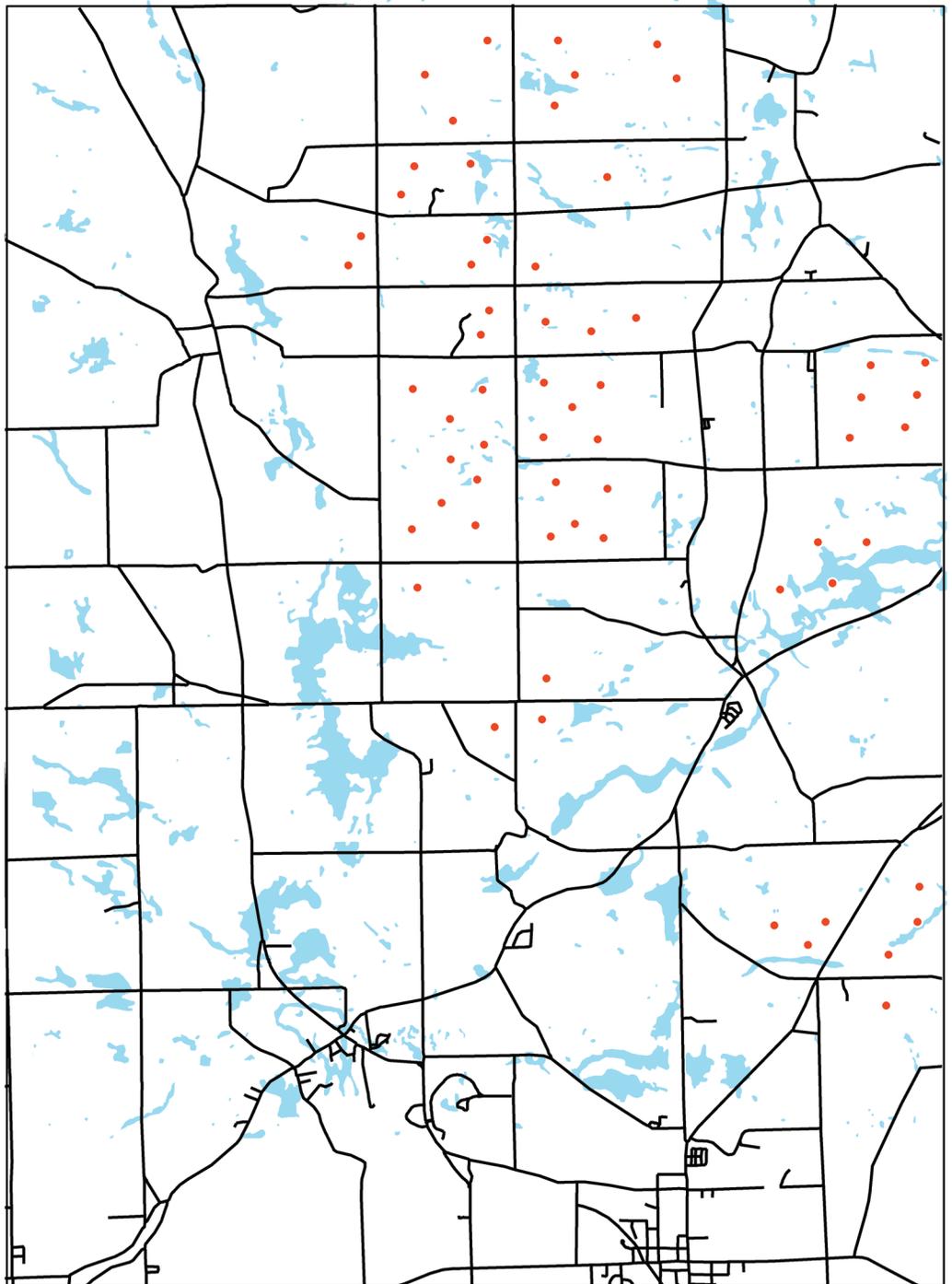
Map made by fictionalizing data from US Census Bureau, NYSDOP and USDA NASS Research & Development Division.

## WETLANDS

There is no local town law that stipulates the distance wind turbines need to be from wetlands. A few of the proposed turbines would stand within 150 feet of wetlands. These wetlands are seen as valuable habitat.

Questions to consider:

- Based on the map, how much wetland area do you believe will be impacted?
- Can you think of any way the wind farm can ensure protection of these wetlands?



Map made by fictionalizing data from US Census Bureau and New York State Department of Environmental Conservation.

## BIRD SPECIES OBSERVED

Questions to consider:

- Are there any threatened or endangered bird species within the project site or nearby?
- Have any members of threatened or endangered species been seen at the project site during surveys?  
If so, are they thought to live on the site, breed at the site, or migrate through the site?

**Table 1: Number of individual birds and groups in surveys, 2005–2007.**

SPECIES	SPRING	FALL	TOTAL
<b>Water birds</b>			
Great blue heron	4	0	4
Herring gull	0	0	0
Ring-billed gull	4	1	5
Waterfowl			
Canada goose	16	145	161
Mallard duck	3	12	15
<b>Raptors</b>			
Cooper’s hawk*	0	0	0
Sharp shinned hawk*	1	0	0
Red-tailed hawk	13	7	20
Red-shouldered hawk*	1	1	2
Northern harrier**	4	6	10
American kestrel	1	1	2
Turkey vulture	30	34	64
Osprey*	0	1	1
<b>Passerines</b>			
American crow	9	35	44
European starling	0	92	92
Red-winged blackbird	0	85	85
Blue jay	0	25	25
American goldfinch	0	8	8
American redstart	0	7	7
Tree swallow	0	3	3
Other birds			
Pileated woodpecker	2	2	2

\*New York State Species of Special Concern

\*\*New York State Threatened Status

## **THREATENED OR ENDANGERED SPECIES**

Sensitive species were observed throughout the project area and nearby areas. One New York state threatened avian species, northern harrier, was documented during surveys. This species is common in agricultural settings and is probably a breeding resident in or near the wind farm site.

Three species of concern—the sharp-shinned hawk, Cooper’s hawk, and red-shouldered hawk—were recorded during migratory raptor surveys at the wind farm site. One sharp-shinned hawk was also documented during breeding bird surveys.

Listed species seen in the area were often represented by one or two individuals passing through during migration. In some cases, individuals were seen in one season or year, but not another season or year. Based on the low occurrence of these raptors, the project is not expected to have any adverse effects on eagles or falcons migrating through the area or to substantially increase risk of eagle/falcon collisions with turbines.

## BAT SPECIES OBSERVED

Questions to consider

- Are there any threatened or endangered bat species within the project site or nearby? Have any of these been sited at the project side during survey nights?
- Of the species detected at the site, are there any that may be of special concern?

**Table 2: Summary of detected bat species during summer night surveys**

SPECIES	THREATENED/ ENDANGERED	DATE SAMPLED								
		6/25	6/26	6/27	7/08	7/09	7/10	7/23	7/24	7/25
Big brown bat <i>Eptesicus fuscus</i>	No	51	85	8	0	1	2	0	29	0
Eastern red bat <i>Lasiurus borealis</i>	No	6	6	15	1	2	64	8	9	1
Hoary bat <i>Lasiurus cinureus</i>	No	6	3	5	9	0	5	3	8	0
Tri-colored bat <i>Perimyotis subflavus</i>	No	0	1	0	0	0	0	0	0	0
Little brown bat <i>Myotis lucifugus</i>	No	3	21	12	11	1	20	24	23	1
Northern myotis <i>Myotis septentrionalis</i>	No	6	4	5	0	0	0	0	5	0
Myotis species (This category includes any bat in the genus <i>myotis</i> whose species is not identified.)	One species, the <i>Myotis sodalis</i> (Indiana bat) is endangered.	4	39	4	13	2	5	11	16	3
No species ID		15	64	24	25	43	296	34	55	21
Total detections per night		91	223	73	59	49	392	80	145	26

### **Myotis sodalis (Indiana Bat)**

The Indiana myotis, federally identified as endangered, is a small gray bat that roosts in crevices or under the loose bark of trees during the summer. Indiana myotis hibernate in caves during the winter, and the majority of them found in Indiana, Kentucky, and Missouri. While no Indiana bat fatalities have been confirmed at active wind energy facilities, other *Myotis* species (*Myotis* spp.) that exhibit similar life history characteristics and behaviors have been killed; therefore, there some risk may be associated with this species.

## **TRANSMISSION CONSIDERATIONS**

Questions to consider:

- How difficult will it be to create a transmission connection? How much will it cost?
- Are there any issues that make the transmission connection easier or more difficult?

The closest transmission connection is 10 miles away and will cost \$2 million per mile. Most of the distance can follow a major state road so would require very limited clearing of vegetation. There are no critical habitats along this corridor. This connection has a very high likelihood of approval.

## **PROPERTY VALUES**

Questions to consider:

- Are property values predicted to go up or down with the installation of the wind farm?
- What are the pros and cons of the wind farm for specific groups of people such as farmers, non-farming residents, and business owners?
- Are there any significant issues that would delay or prevent the installation of the wind farm?

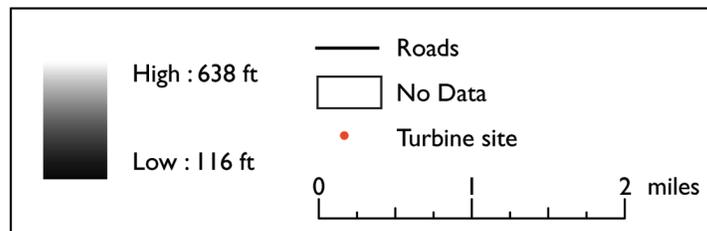
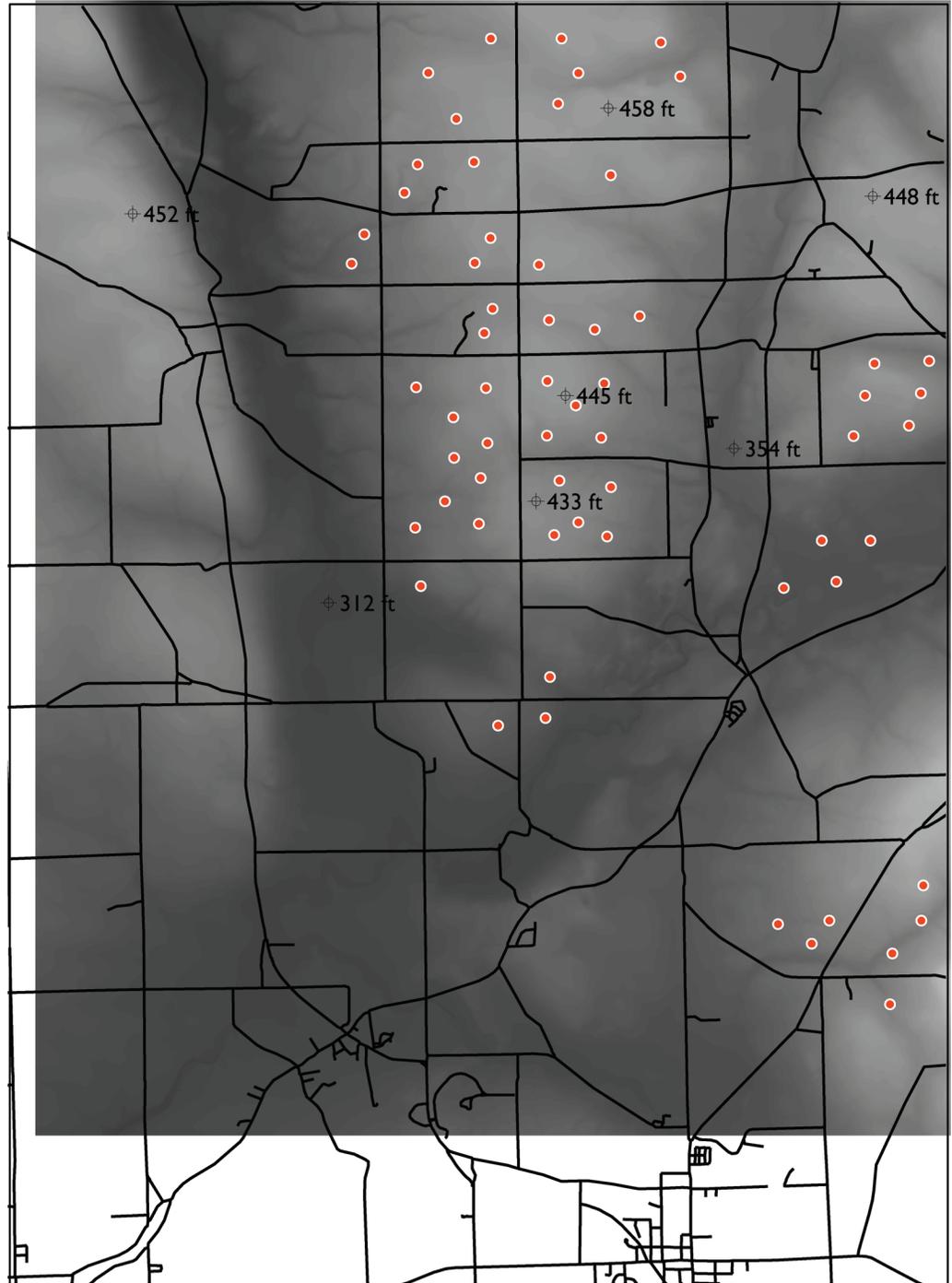
### **Impacts of the Windy Hills Wind Farm on local property values**

An evaluation of area properties and existing conditions suggests that the economic impact of the wind farm will be positive. The construction and ongoing maintenance and operation of the Windy Hills Wind Farm will generate revenue for local contractors and good paying, permanent jobs. Licensing fees and other payments to the host communities will possibly facilitate investment in local infrastructure needed to attract new business to the area.

Most of the project will be situated on large tracts of agricultural acreage where turbine placement will be designed to minimize interference with ongoing farming activities, whether it be row crops or dairy stock. The rental income from the land leases will provide farmers with additional revenue streams.

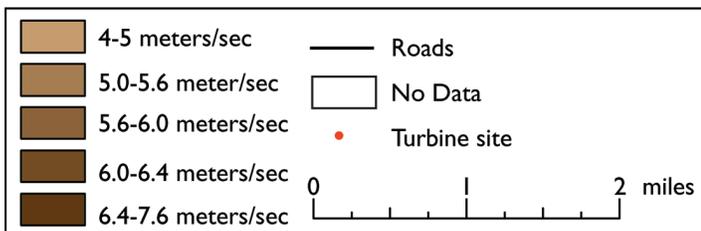
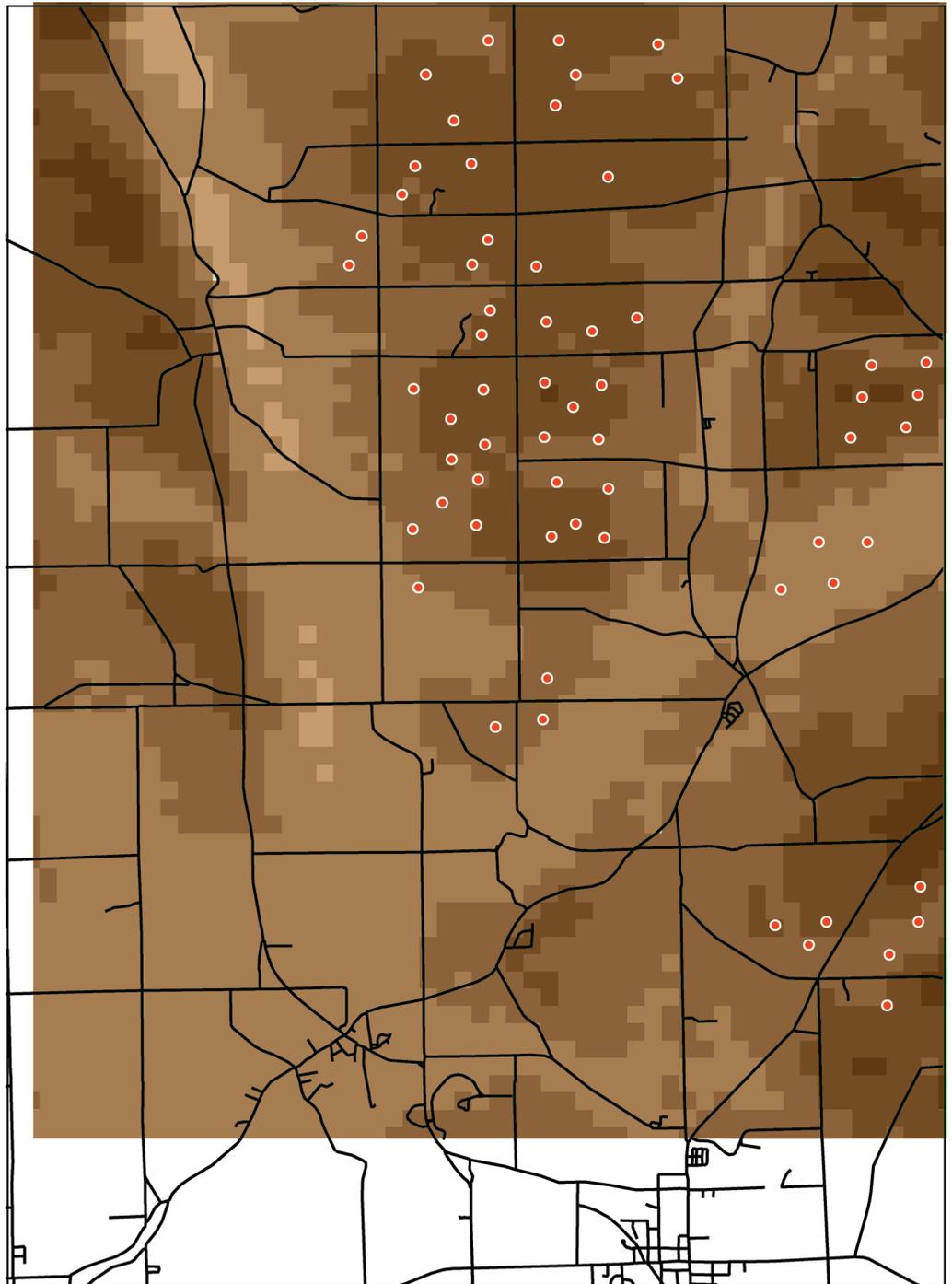
The main area of concern regarding turbine placement is the viewshed for residential properties in the vicinity. In assessing other communities where wind farms have been built, surveys found that wind farms have no demonstrable impact on property values, even near high-end or executive home development.

### ELEVATION MAP



Map made by fictionalizing data from US Census Bureau, NYS DEC and USGS.

### WIND SPEED MAP



Map made by fictionalizing data from US Census Bureau and AWS Truwind.

## **VISUAL IMPACT**

Questions to consider:

- How would you describe the before and simulated after pictures?
- Do the turbines look attractive or unattractive? Do they significantly impact any “views?”
- Do you think people living in this area would be supportive of, or opposed to the turbines?

### **Photo of existing conditions**



### **Photosimulation showing new wind turbines**



**Photo of existing conditions**



**Photosimulation showing new wind turbines**



## *Siting Lesson Pack 1*

### **Photo of existing conditions**



### **Photosimulation showing new wind turbines**



## **COMMUNITY OPINION**

Questions to consider:

- Do community members tend to support or oppose the wind farm?
- What are the pros and cons of the wind farm as identified by the community?
- Are there any issues that you think would make it very difficult for this wind farm to gain approval?

## **LETTERS TO THE EDITOR**

Dear Editor:

I am writing in support of the proposed Windy Hills Wind Farm.

Over the past few months, a group of citizens have collected over 300 signatures in support of the wind farm. As one of those supporters, I believe that a new wind farm is the beginning of a wonderful opportunity for residents and will benefit our grandchildren.

In addition to providing a clean energy source to our state, the Windy Hills Wind Farm would provide over \$700,000 annually to our town, county, school districts, and fire departments. Those farmers who lease the use of their land will also benefit, enabling them to increase the viability of their farms. The wind farm would also bring 13 full-time jobs and over 100 construction jobs. Windy Hills would be a great asset to our community.

I hope that the Board will approve this project.

Ronald Davies

Dear Editor,

I hope the Town Board will realize what a boondoggle Windy Hills is before it's too late.

The proposed panacea of green energy and jobs will forever change the face of our community. Our rolling green hills and expansive skies will be marred by enormous rotating metal blades that equal the span of a 747. As for jobs, what happens after the turbines are constructed? And where are the guarantees that local people will be hired over outside contractors? If you take a good look at Windy Hills' proposal, it just doesn't add up.

I urge the board to vote no on Windy Hills.

Debbie McGriff





# WHERE DO YOU PUT A WIND FARM?

Questions to consider:

- How many turbines will the site have? How many megawatts? How many homes would the wind farm theoretically provide power to?
- How many individuals does the wind farm need to obtain leases from?
- Are there any issues that may make it easier or more difficult for the wind farm to gain approval?
- Are there local laws that will impact the wind farm?
- Will the topography make it potentially easier or more difficult to develop the wind farm? Why?

The Clean Horizons Wind Farm LLC proposes to construct a wind-powered generating facility with 46 turbines with a total capacity of 75 megawatts (MW). Each turbine has a maximum height of 375 feet. The proposed project would meet the electrical needs of over 30,000 homes. The project will employ 7–12 administrative and other personnel.

Eighty landowners own the 110 land parcels that make up the project site. The land used in the project site is predominately forested and would require clearings for the turbines and access roads.

The topography of this area is hilly, with valleys and ridges where elevations and slope increase. Located to the southeast of the windfarm is a large park that is protected from future development. The park has a number of points from which visitors can look out onto the surrounding area where the wind farm will be visible.

The proposed turbines would be adjacent to two nearby towns and would be located partially within the boundaries of one of these towns, where there is a town law related to wind farms. There are many single-family residences and commercial areas nearby. All turbines are located so that there is a distance of 1,200 feet between the center of any tower foundation and the nearest off-site residence. When it is possible, trees will be planted to minimize the visual and auditory effects of the turbines.

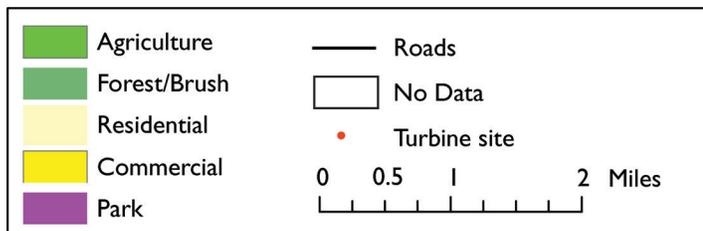
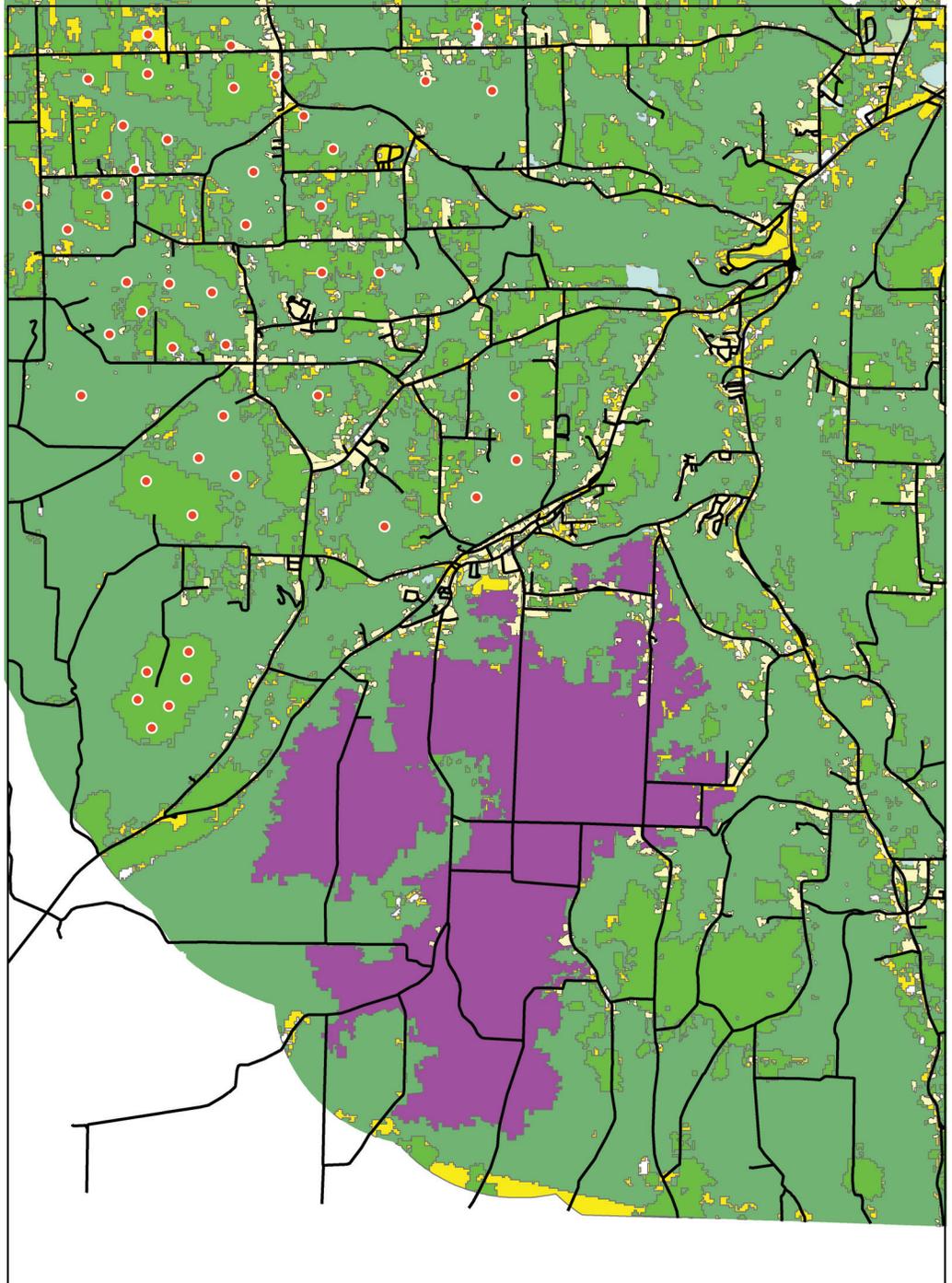
## **TOWN LAW**

- (9) Location of the residential structures within 1,200 feet of each proposed tower to any off-site residence within one-hundred feet shall be noted.
- a. Wind turbines shall be designed to minimize the impacts of land clearing and the loss of open space areas. Land protected by conservation easements shall be avoided when feasible. The use of previously developed areas will be given priority wherever possible.
  - b. Wind turbines shall be located in a manner that minimizes significant negative impacts on rare animal species in the vicinity, particularly bird and bat species.
  - c. Wind energy conversion facilities shall be located in a manner consistent with all applicable state and Federal wetlands laws and regulations
  - d. Storm-water run-off and erosion control shall be managed in a manner consistent with all applicable state and Federal laws and regulations
  - e. The maximum Total Height of any wind turbines shall be 420 feet.
- (10) Turbines shall be 100 feet from state-identified wetlands. This distance may be adjusted to be greater or lesser at the discretion of the reviewing body, based on topography, land cover, land uses and other factors that influence the flight patterns of resident birds.

### LAND USE MAP

Questions to consider:

- What are the 2–3 primary land uses in the wind farm site?
- Do you think these land uses will make it easier or harder to introduce turbines?
- How do you think the turbines will impact farming operations in agricultural areas?
- How do you think the turbines will impact residences in the area?



Map made by fictionalizing data from US Census Bureau, NYSDOP and USDA NASS Research & Development Division.

**THREATENED OR ENDANGERED SPECIES OR HABITAT**

The following is a table of species about special concern that have been sited either on or near the wind farm project site.

Questions to consider:

- Compare the table below with the table on the next page that shows which birds are present at the site. Are there any threatened or endangered birds found on or near this site?
- How many of these birds are found on the site? Should the presence of these birds be of concern in the development of the wind farm?

**Table 1**

<b>SPECIES</b>	<b>TYPE OF SPECIES</b>	<b>DISTANCE FROM SITE</b>	<b>NY LEGAL STATUS</b>
<i>Ammodramus heslowii</i> Henslow's sparrow	Bird	Within 10 miles of site	Threatened
<i>Bartramia longicauda</i> Upland sandpiper	Bird	Within 10 miles of site	Threatened
<i>Podilymbus podiceps</i> Pied-billed grebe	Bird	Within 10 miles of site	Threatened
<i>Asio flammeus</i> Short-eared owl	Bird	Within site boundary	Endangered
<i>Circus cyaneus</i> Northern harrier	Bird	Within 10 miles of site	Threatened

## BIRD SPECIES OBSERVED

Questions to consider:

- Are there any threatened or endangered bird species within the project site or nearby?
- Have any of threatened or endangered species been observed at the project site during survey nights?  
Are these thought to live on the site, breed at the site, or migrate through the site?

**Table 2: Raptors and other large birds observed in surveys at the Clean Horizons Site.**

SPECIES	SPRING	FALL	TOTAL
<b>Water birds</b>			
Great blue heron	0	0	0
Herring gull	0	2	2
Ring-billed gull	8	3	11
Waterfowl			
Canada goose	24	0	24
Mallard	5	0	5
<b>Raptors</b>			
Cooper's hawk*	3	2	5
Sharp shinned hawk*	6	4	10
Red-tailed hawk	23	32	55
Red-shouldered hawk*	2	2	4
Northern harrier**	8	9	17
American kestrel	0	6	6
Turkey vulture	50	157	207
Osprey*	0	0	0
<b>Passerines</b>			
American crow	22	60	82
European starling	45	55	100
Red-winged blackbird	0	82	82
Blue jay	0	10	10
American goldfinch	0	11	11
American redstart	0	2	2
Tree swallow	0	5	5
<b>Other birds</b>			
Pileated woodpecker	1	0	1

\*New York State Species of Special Concern

\*\*New York State Threatened Status

## NORTHERN HARRIERS

Northern harriers, which are considered threatened in New York, were documented in the Clean Horizons study area during both seasons of study.

One area close to a nearby lake is considered a potential breeding habitat. It is likely that many of the harriers observed were migrants or transients through the area. It is also possible, however, that harriers were breeding residents in the Clean Horizons area.

Based on the current project layout, no turbines are proposed for the potential northern harrier breeding habitat in the Clean Horizons project. No direct habitat loss impacts are expected. Northern harriers could be at risk of collision with turbines and they have been recorded as fatalities at other wind farms, primarily in the western US. Northern harrier behavior, which generally includes low level flights and very little soaring, is not likely to put them at great risk from turbines while they are on the breeding grounds.

## BAT SPECIES OBSERVED

Questions to consider:

- Are any threatened or endangered bat species within the project site or nearby? Have any of these observed at the project site during survey nights?
- Of the species detected at the site, are there any that may be of special concern?

**Table 3: Summary of detected bat species during summer night surveys.**

COMMON NAME (Scientific Name)	THREATENED/ ENDANGERED?	NUMBER
Big brown bat ( <i>Eptesicus fuscus</i> )	No	100
Eastern red bat ( <i>Lasiurus borealis</i> )	No	90
Hoary bat ( <i>Lasiurus cinureus</i> )	No	65
<i>Myotis</i> spp. (This category includes any bat in the genus <i>myotis</i> whose species is not identified.)	One species, the <i>Myotis sodalis</i> (Indiana bat), is endangered.	72
No identification		325

### ***Myotis sodalis* (Indiana myotis)**

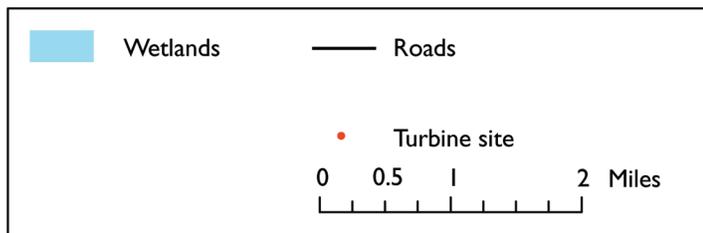
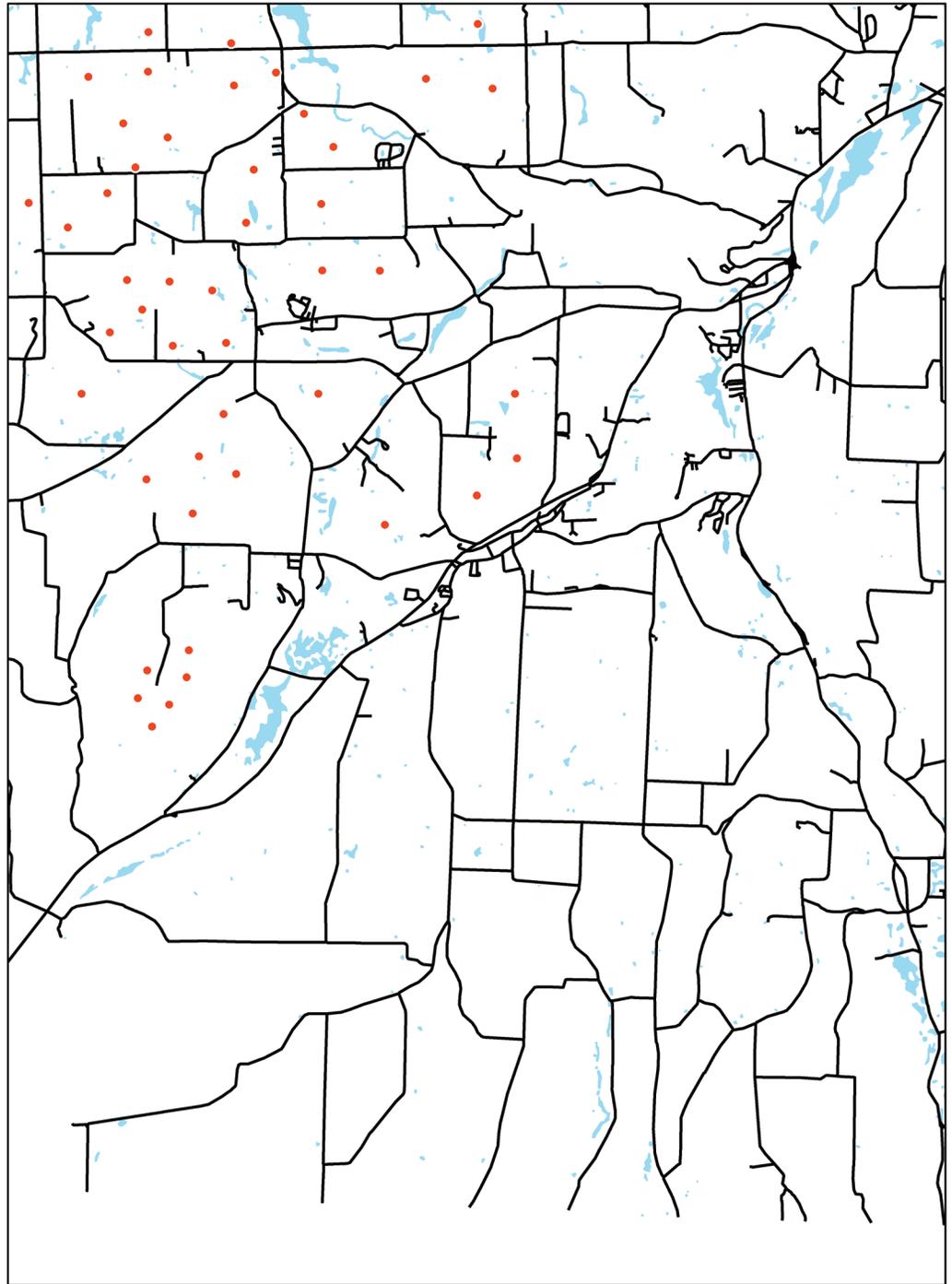
The Indiana myotis, federally identified as endangered, is a small gray bat that roosts in crevices or under the loose bark of trees during the summer. Indiana myotis hibernate in caves during the winter, the majority of them found in Indiana, Kentucky, and Missouri. While no Indiana bat fatalities have been confirmed at active wind energy facilities, other *Myotis* species (*Myotis* spp.) that exhibit similar life history characteristics and behaviors have been killed; therefore, there some risk may be associated with this species.

## WETLANDS AND PROTECTED AREAS

Town law recommends that turbines be placed at least 100 feet from state protected wetlands. While all proposed turbines are at least 100 feet from wetlands on the site, a few turbines are within 200 feet of the wetlands and will have access roads also near the wetlands. The wetlands in this area serve as valuable habitat.

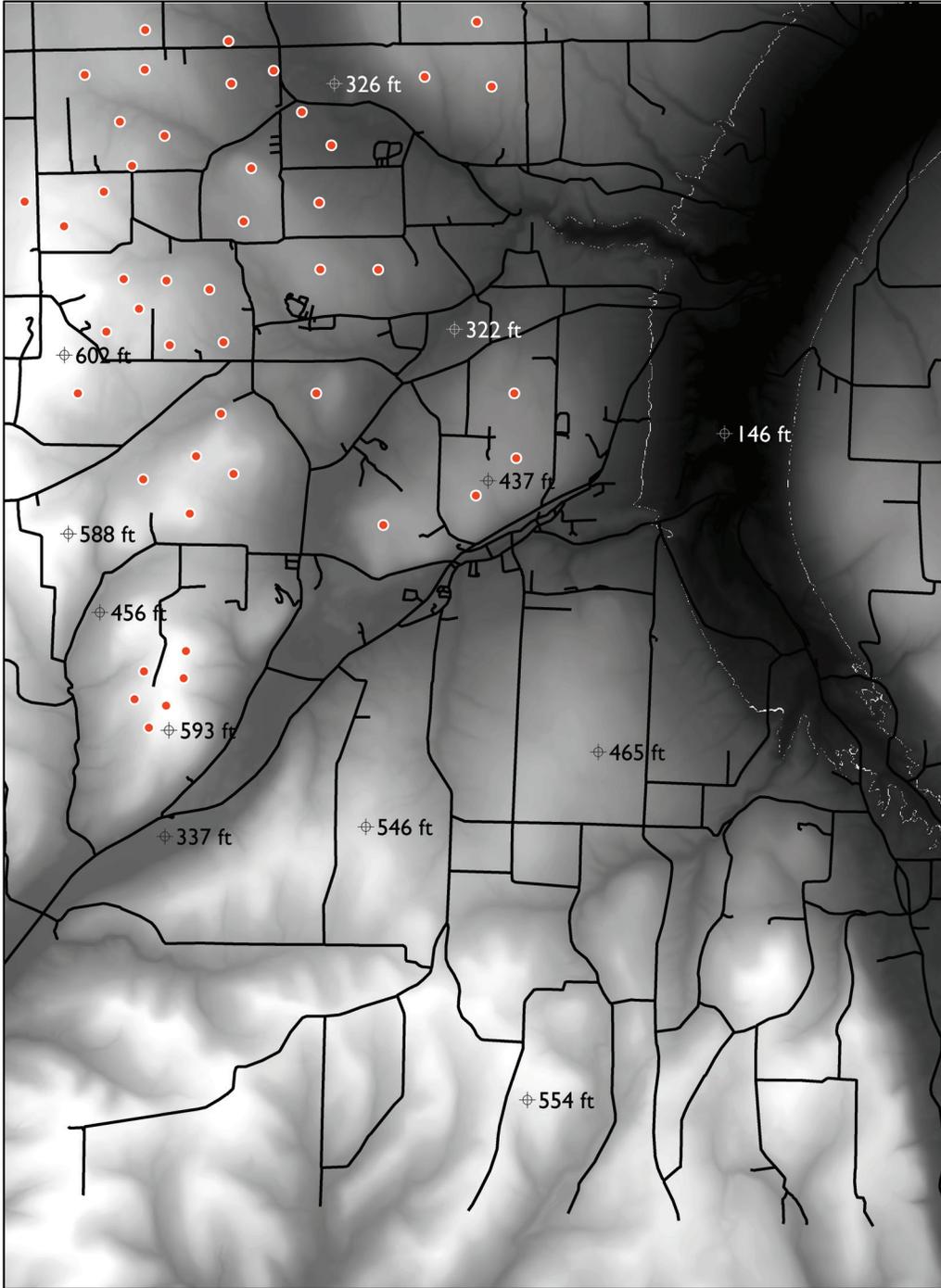
Questions to consider:

- Based on the map, how much wetland area do you believe will be impacted?
- Can you think of any way the wind farm can ensure protection of these wetlands?



Map made by fictionalizing data from US Census Bureau and New York State Department of Environmental Conservation.

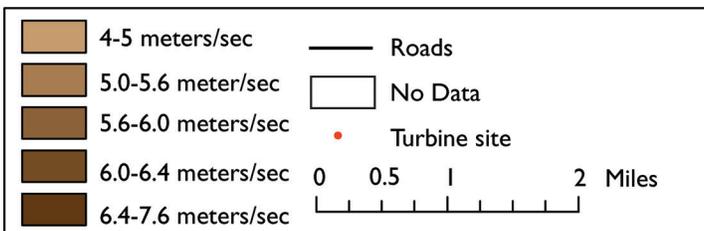
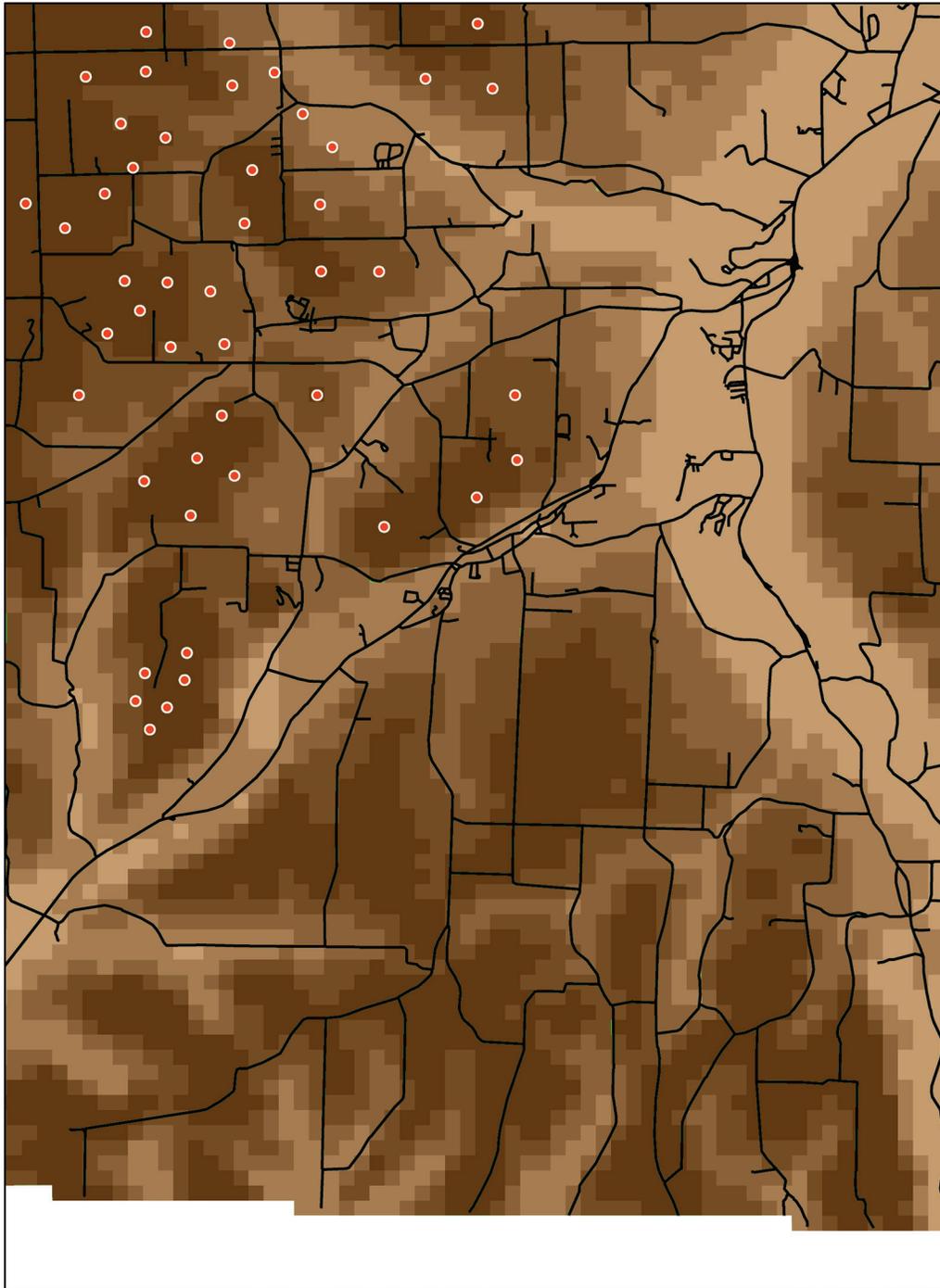
### ELEVATION MAP



	High : 638		Roads
	Low : 116		No Data
			Turbine site
			0 0.5 1 2 Miles

Map made by fictionalizing data from US Census Bureau, NYS DEC and USGS.

## WIND SPEED MAP



Map made by fictionalizing data from US Census Bureau and AWS Truewind.

## **TRANSMISSION CONSIDERATIONS**

Questions to consider:

- How difficult will it be to create a transmission connection? How much will it cost?
- Are there any issues that make the transmission connection easier or more difficult?

The closest transmission connection is 1 mile away and would cost \$2 million per mile. Along the one-mile stretch is a wetland that has been identified as an important habitat. To go through the wetland would cost an additional \$5 million in mitigation. To avoid the wetland would take an additional 2 miles of transmission that would be adjacent to residential areas.

## **PROPERTY VALUES**

Questions to consider:

- Are property values predicted to go up or down with the installation of the wind farm?
- What are the pros and cons of the wind farm for specific groups of people such as farmers, non-farming residents, and business owners?
- Are there any significant issues that would delay or prevent the installation of the wind farm?

Properties that are near the Clean Horizons Wind Farm include a mix of forested land, residential and commercial areas and some small farms.

The existing homes are of lower value and do not rely on the viewshed as the more expensive, executive homes would. Because there are no executive-type homes in the area, the impact to the viewshed would have little to no impact on the property values. However, some of the wind turbines are relatively close to residential structures (1,200 feet), which may create some visual or auditory effects from the turbines and could negatively impact the values of these homes.

A large park is located less than a mile southeast of the southern edge of the wind farm. This park is seen as an important amenity because it draws visitors from a wide area. Visitors often frequent local businesses in the town while in the area. The viewshed from this park will include the wind farm. It is unknown if the wind farm will change the number of visitors to the park.

## **VISUAL IMPACT**

Questions to consider:

- How would you describe the before and simulated after pictures?
- Do the turbines look attractive or unattractive? Do they significantly impact any “views.”
- Do you think people living in this area would be supportive of, or opposed to the turbines?

**Photo of existing conditions**



**Photosimulation showing new wind turbines**



**Photo of existing conditions**



**Photosimulation showing new wind turbines**



*Siting Lesson Pack 2*

**Photo of existing conditions**



**Photosimulation showing new wind turbines**



## **COMMUNITY OPINION**

Questions to consider:

- Do community members tend to support or oppose the wind farm?
- What are the pros and cons of the wind farm as identified by the community?
- Are there any issues that you think would make it very difficult for this wind farm to gain approval?

## **LETTERS TO THE EDITOR**

*Wind Power May Forever Change Our Rural Community*

Dear Editor:

The beauty of our rural community is rapidly being threatened by the proposed Clean Horizons Wind Farm. The heart of our community is being wrenched before our very eyes as 400 foot turbines are ready to march across our countryside.

Clean Horizons has promised our community jobs and economic incentives, but at what cost? I am gravely concerned about the impacts these turbines will have to our health, our views, and property values.

Clean Horizons recommends the turbines be set back 1,000 to 1,500 feet from residences. Will this be enough to protect residents from flickering blade shadows that can travel up to a mile? Imagine your kids playing in the backyard with giant shadows flying past. Residents in other wind communities are claiming the shadows cause dizziness and nausea. In Europe some communities are recommending setbacks of over 4,000 feet. Will we wait until our children are sick to protest?

How about the impact these towers will have on our property values? For many of us, our home and land is our main financial asset. Destroy our property values and what have we? Already, one owner lost a sale because of the proposed turbines. The town board has shown no concern for the impacts that all of us will feel as our town is transformed from rolling hills and bucolic farms to stark, whirling towers of doom.

Should we be forced to bear the health and safety impacts of these turbines for the sake of corporate profits? I think not. Join me in fighting Clean Horizons' proposal at the next town meeting.

Bertrand Phillips

## *Siting Lesson Pack 2*

### *Scaled-down Clear Horizons Project Addresses Resident's Concerns*

Dear Editor:

The latest proposal from Clear Horizons, LLC would include significant reductions in noise, land conversion, and other issues. The project would include 46 turbines instead of the originally proposed 75, therefore, reducing the overall impact to surrounding townships.

The new proposal also significantly reduces the amount of forested areas that will need to be cleared for turbines and access roads.

Shadow flicker would also be reduced, and Clear Horizons indicates no projected situations with more than 30 hours per year at any residence. Significant reductions would also include noise, which likewise wouldn't exceed 50 decibels, meeting town requirements.

A total of 10 miles of access roads would be required, compared to the original 17 miles meaning less forested area will be disturbed. Perhaps even more important to our town is that it will bring an estimated \$600,000 annually to our local economy.

I think Clear Horizons has met the residents' concerns and deserves a place in our community.

Brenda Scout

