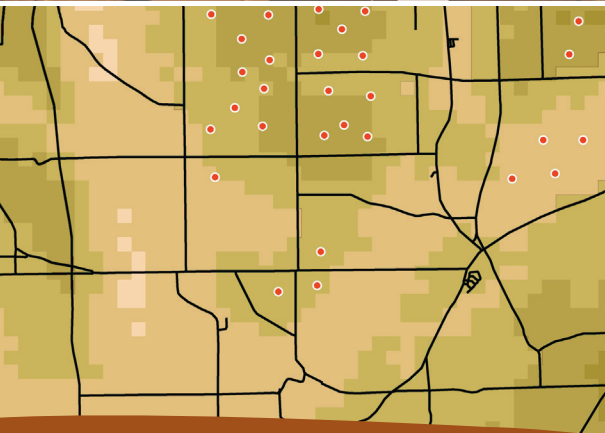
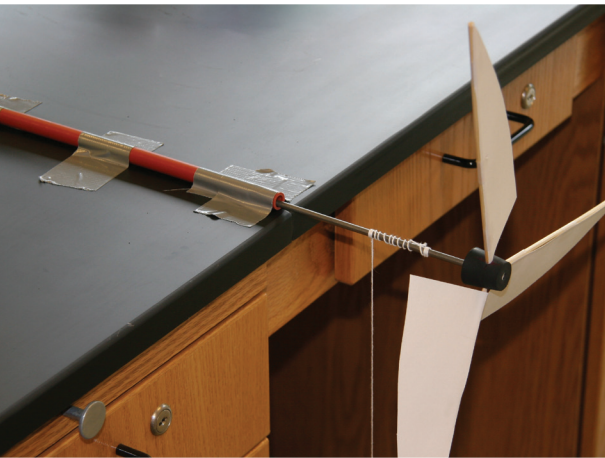


WindWise Education

Transforming the Energy of Wind into Powerful Minds



A Curriculum for Grades 6-12



www.WindWiseEducation.org

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WindWise Education was developed with funding from the New York State Energy Research & Development Authority.



WHERE DO YOU PUT A WIND FARM?

LESSON

14

KEY CONCEPT

Students will 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

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, where a wide range of 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. The groups write a proposal describing the assets of the site and present it to the class.

MATERIALS

- ☐ Information packets for two proposed wind farm locations in New York*
- ☐ Worksheet for each student*

*included with this activity

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 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, there are some factors that may be more important than others in determining location. Have students review the reading passage and 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 where the wind speeds are the highest?
- What things 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 potential 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 the site they have selected and why. If time permits, each group can present its proposal to the rest of the class.

Split 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. They have two locations in mind. Their investors would like to know which site they should select. The goal of your group is to analyze the information available for each site and make a recommendation to the investors.

After distributing 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 that she or he will evaluate for the group. Have students 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 with the reasons why the site is preferable. Students could also write this as homework.

Step 3: Wrap Up

Have each group 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. An example of a webquest can be found at www.web-and-flow.com/members/polson/webquest/webquest.htm

VOCABULARY

Endangered species – A species in danger of extinction throughout all or a significant portion of its range.

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 – A rule, order or law that is 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 but current information does not justify listing these species as either endangered or threatened.

Threatened – A species likely to become endangered in the foreseeable future.

ADDITIONAL RESOURCES

AWEA SITING HANDBOOK—www.awea.org/sitinghandbook —A comprehensive handbook to assist wind energy developers in addressing the regulatory and environmental issues associated with commercial-scale, land-based wind projects in the United States.

NATIONAL WIND COORDINATING COMMITTEE—www.nationalwind.org/publications/wes/wes03.htm – Publication, "Siting Issues for Wind Power Plants, Wind Energy Series, January 1997, No. 3" —This short paper outlines the issues with siting wind power plants.

Map Resources

GOOGLE MAPS—<http://maps.google.com> —This site provides terrain and satellite images.

TERRASERVER USA—<http://terraserver.microsoft.com/> —Provides aerial, topographic, and urban area maps for the United States.

TOPOZONE— <http://www.topozone.com> —A subscription service that provides topographic maps of all mapped areas of the United States.



NY STATE STANDARDS

Intermediate Level Science–Standard 1: Analysis, Inquiry, and Design

Scientific Inquiry

Key Idea 2:

Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

S2.1d Use appropriate tools and conventional techniques to solve problems about the natural world including: measuring, observing, describing, classifying, and sequencing.

Key Idea 3:

The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

S3.2 Interpret the organized data to answer the research question or hypothesis and to gain insight into the problem.

Intermediate Level Science–Standard 7: Interdisciplinary Problem Solving

Key Idea 1:

The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.

Key Idea 2:

Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.

Intermediate Level Science–Standard 4: Living Environment

Key Idea 7:

Human decisions and activities have had a profound impact on the physical and living environment.

Major Understandings:

7.2b The environment may be altered through the activities of organisms. Alterations are sometimes abrupt.

7.2c Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.

Intermediate Level Science–Standard 4: The Physical Setting

Key Idea 4:

Energy exists in many forms, and when these forms change energy is conserved.

Major Understandings:

4.1b Fossil fuels contain stored solar energy and are considered nonrenewable resources. They are a major source of energy in the United States. Solar energy, wind, moving water, and biomass are some examples of renewable energy resources.

The Living Environment: Standard 4 (High School)

Key Idea 7:

Human Decisions and activities have had a profound impact on the physical and living environment.

7.2c Industrialization brings an increased demand for and use of energy and other resources including fossil and nuclear fuels. This usage can have positive and negative effects on human ecosystems.

7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.



READING PASSAGE

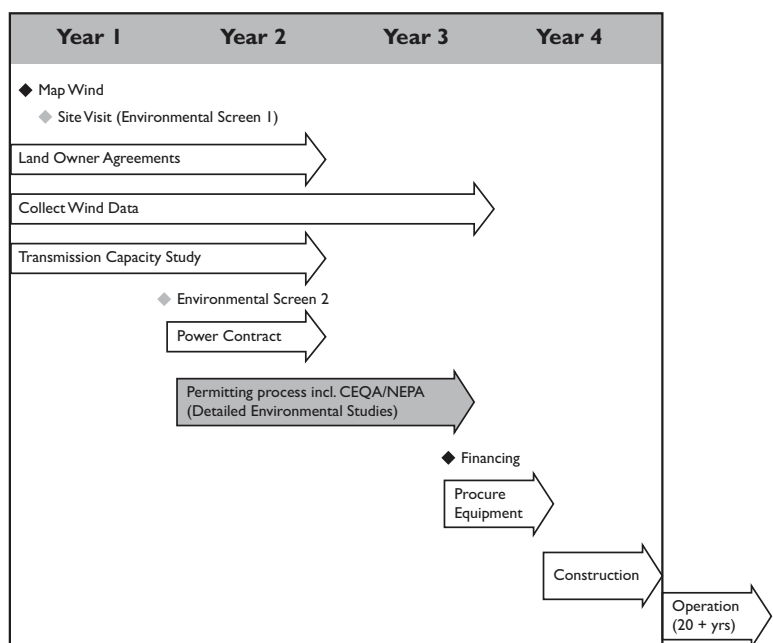
Before constructing a wind farm, developers spend years preparing. During this time, the developer collects wind speed data, talks to landowners about whether they are willing to have a turbine installed on their property, investigates the capacity of and distance to transmission (power) lines, and examines a number of environmental issues related to the potential wind farm. The wind energy developer must also navigate numerous local, state, and federal regulations. Each site has a different set of regulatory requirements and environmental constraints based on its unique location. When everything goes smoothly, a wind farm can be built within just a few years. However, if the developer encounters problems, the wind farm could take many years to become a reality. In some cases, the wind farm may never be built.

All developers are required to identify the environmental features on the site and conduct an environmental screening analysis. Some of the elements in this analysis include the following

- Identifying required permits, licenses, and regulatory approvals
- Determining the presence of threatened or endangered species or habitat
- Identifying the presence of bird and bat species and migration pathways near the project area
- Locating wetlands and protected areas
- Mapping community facilities and services such as churches, parks, and police and fire departments
- Verifying development constraints: noise limits, setback and height requirements, zoning constraints
- Investigating telecommunication and microwave paths that could be impeded by new wind turbines
- Identifying military radar/airspace
- Identifying airports and landing strips
- Evaluating soil and road evaluation for constructability
- Investigation of taxation of project infrastructure/production
- Assessing potential visual and aesthetic issues such as scenic vistas, parks, and residences

The initial stage of the environmental screening analysis is primarily conducted using desktop resources—that is, information that can be gathered in an office with a computer. In some cases, the developer may also hire scientists to collect some information on site. For instance, scientists may visit the site a number of times to determine what bird or bat species are present.

From this information, the developer will have a better idea of the existing environmental constraints. The developer may choose to add or remove some parts of the site if there are important areas that require protection, such as habitat for a protected species. Each site has its own set of challenges. The wind developer's job is to select a site that has the best chance of approval.



Typical Process and timeline for the development of a wind farm.

Source: www.awea.org/sitinghandbook

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% 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 permit the wind farm. Delays in the federal permitting process occurred when the regulatory authority for offshore renewable energy projects was transferred from the U.S. Army Corps of Engineers to the U.S. 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, fishing, economic impacts from less tourism and 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
- Clean Power Now, www.cleanpowernow.org
- Cape Wind: America's First Offshore Wind Farm on Nantucket Sound, www.capewind.org
- Boston Globe, 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

- **WIND OVER WATER**, www.windoverwater.org —A 2003 documentary film about the controversy of the Cape Wind Project.
- *Cape Wind: Money, Celebrity, Class, Politics and the Battle for Our Energy Future on Nantucket Sound*—by Wendy Williams and Robert Whitcomb—A book about the history of the Cape Wind project.
- **CAPE WIND**—www.capewindmovie.com/get-involved —The Fight for the Future of Power in America, a feature-length documentary on the controversy of the Cape Wind Project.



Name _____

Date _____

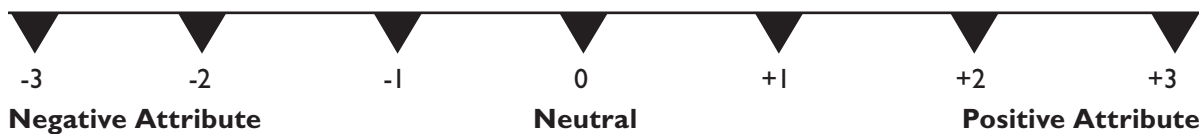
Class _____

WHERE DO YOU PUT A WIND FARM?

A large wind developer is interested in building a wind farm in New York. They have two locations in mind. Their investors would like to know which site can be implemented the fastest. The goal of your group 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 to help you decide how positive or negative the feature is. After evaluating each site, total the score for each site.



MAP OR RESEARCH INFORMATION	SITE 1	SITE 2	POTENTIAL PROBLEMS OR ADVANTAGES
Read the packet of information to answer the questions and determine a score.	Score	Score	Use this space to note important factors, such as average wind speed data, endangered species, or strong public opinion.
PROJECT DESCRIPTION ■ 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?			
ELEVATION MAP, LAND USE MAP ■ What are the 2-3 primary land uses near the site? ■ Will the elevation cause problems for construction? ■ Are there nearby towns?			
WIND SPEED MAP What is the average wind speed near the wind farm?			
BIRD SPECIES Are there any threatened or endangered bird species on or near the site?			
BAT SPECIES Are there any threatened or endangered bat species on or near the site?			



Name _____

Date _____

Class _____

MAP OR RESEARCH INFORMATION Read the packet of information to answer the questions and determine a score.	SITE 1 Score	SITE 2 Score	POTENTIAL PROBLEMS OR ADVANTAGES Use this space to note important factors, such as average wind speed data, endangered species, or strong public opinion.
WETLANDS AND PROTECTED AREAS Are there any wetlands near the turbine locations? If so, how close?			
TRANSMISSION CONSIDERATIONS ■ How much will the transmission connection cost? ■ How difficult will it be to get the transmission line approved? ■ Are there other issues that will make the transmission connection either easier or harder?			
VISUAL / AESTHETIC CONSIDERATIONS ■ When looking at the existing and simulated photos, do you think residents will be for or against the turbines? ■ Are there attractive views that will be altered (positively or negatively) by the wind turbines?			
LOCAL TOWN LAWS ■ Are there any town codes that may make the wind facility easier or more difficult to build?			
COMMUNITY OPINION ■ What is the public opinion of the wind facility?			
PROPERTY VALUES ■ Based on the projected property values, do you think residents will support or oppose the wind facility?			
TOTAL SCORE			

Step 2: Small Group Discussion

Take a few minutes as a group 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 what 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. 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.


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Take a few minutes as a group to discuss the two sites.

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Based on the scores for each site and your analysis of what 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. Write a paragraph describing why you have selected this site.



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 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 occurring along the road frontage.

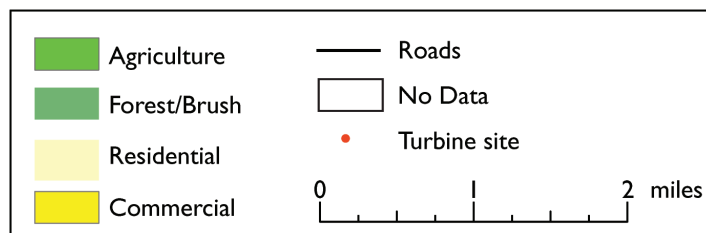
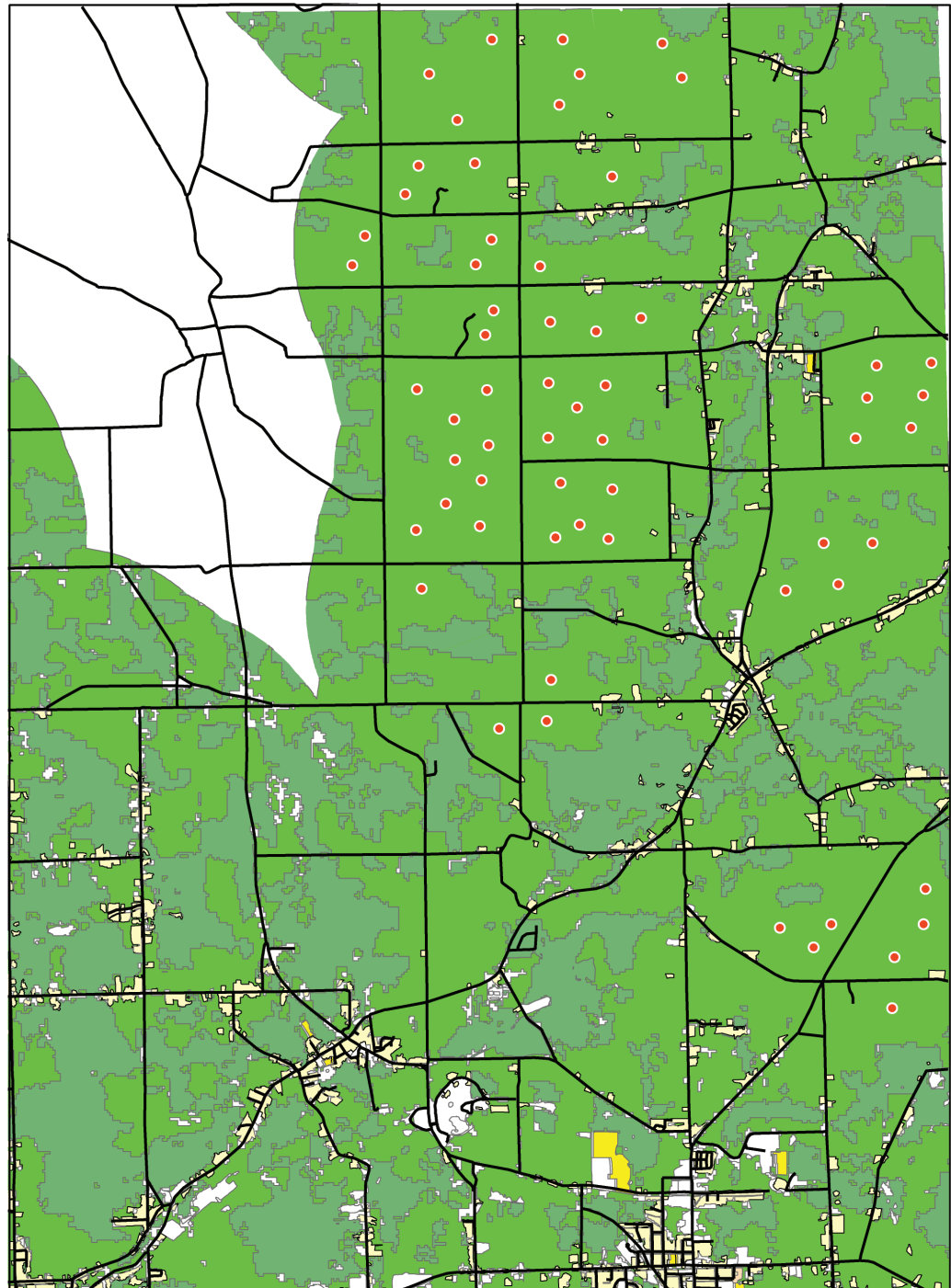
The closest town is two miles away. The wind farm is not located within town boundaries and would, therefore, not be subject to any town laws. Most nearby residences are at least 2,500 feet from the proposed 62 turbines in order to minimize visual and sound effects.

This area has a hilly topography with valleys and ridges where elevations and slope increase. The majority of 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 be easier or harder to put turbines in?
- In agricultural areas, how do you think the turbines will impact farming operations?
- How do you think the turbines will impact residences in the area?



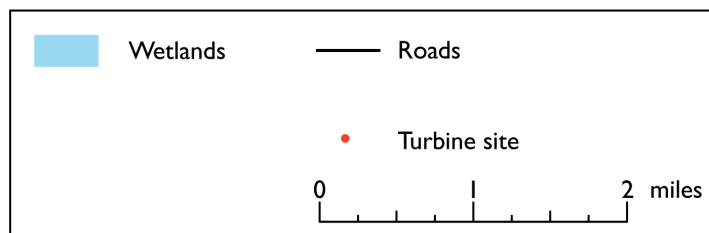
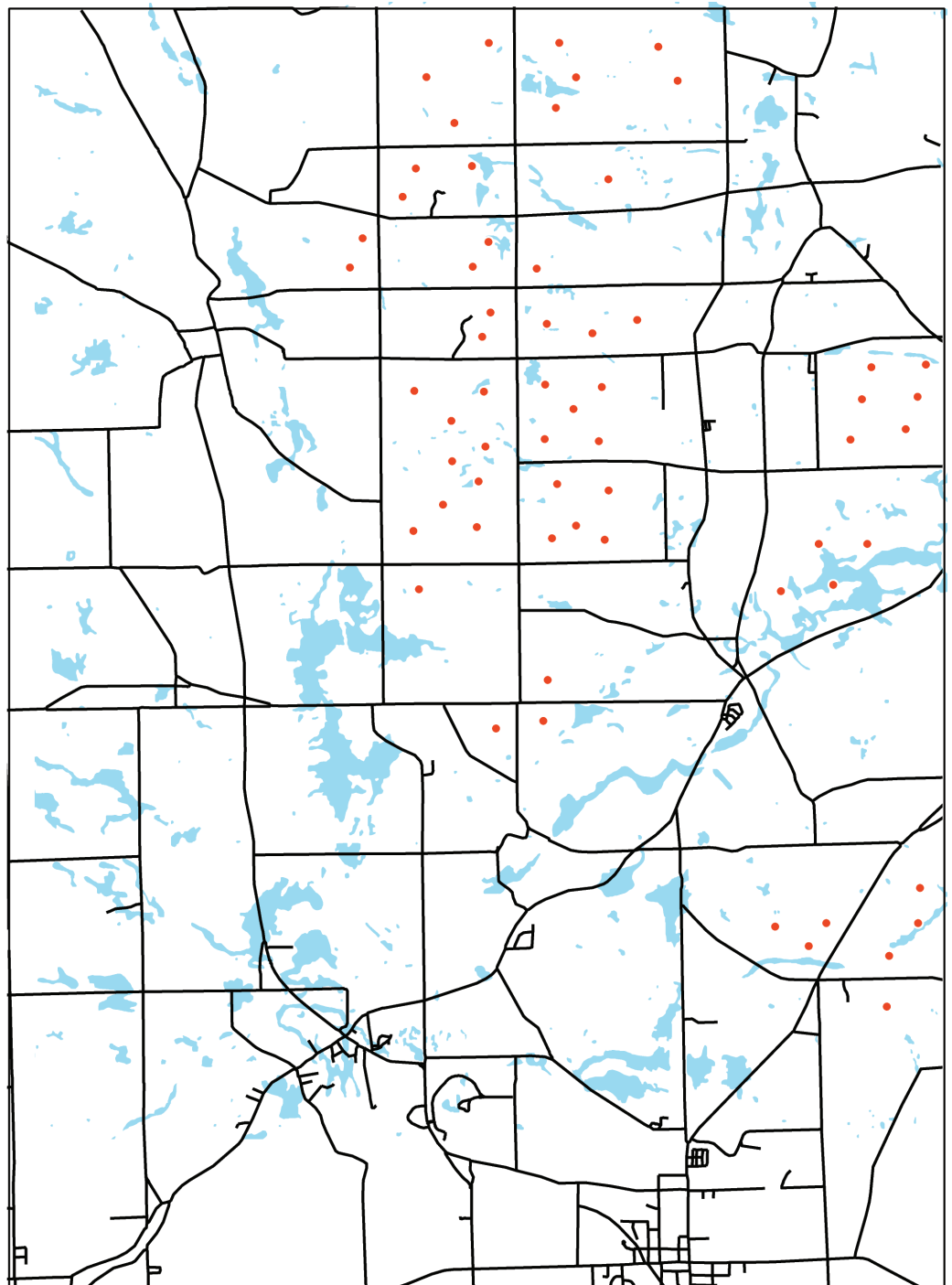
Map made by fictionalizing data from US Census Bureau, NYSDOP and USDA NASS Research & Development Division.

WETLANDS

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

Questions to consider

- Based on the map, how many wetlands 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 of threatened or endangered species been sited at the project site during survey nights? 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 to 2007.

SPECIES	SPRING	FALL	TOTAL
Water birds			
Great blue heron	4	0	4
Herring gull	0	0	0
Ringbilled gull	4	1	5
Waterfowl			
Canada goose	16	145	161
Mallard	3	12	15
Raptors			
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
Passerines			
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 likely a breeding resident in or near the wind farm site.

Three species of concern, sharp-shinned hawk, Cooper's hawk, and red-shouldered hawk, were recorded during migratory raptor surveys in 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/year, but not another season/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 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		DATE SAMPLED								
COMMON NAME	THREATENED OR ENDANGERED STATUS	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 <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.	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, a federally endangered bat, is a small gray bat that roosts in crevices or under the loose bark of trees during the summer. They hibernate in caves during the winter, with 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 may be some risk 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. The majority of the distance can follow a major state road and 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 the 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, business owners?
- Are there any significant issues that would delay or prevent the installation of the wind farm?

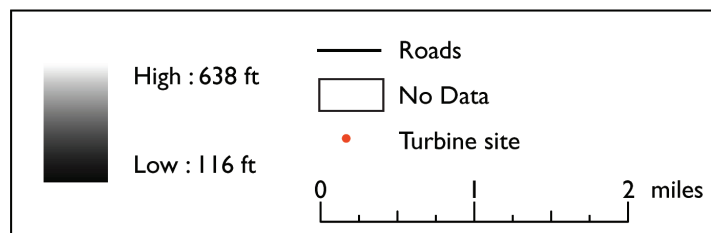
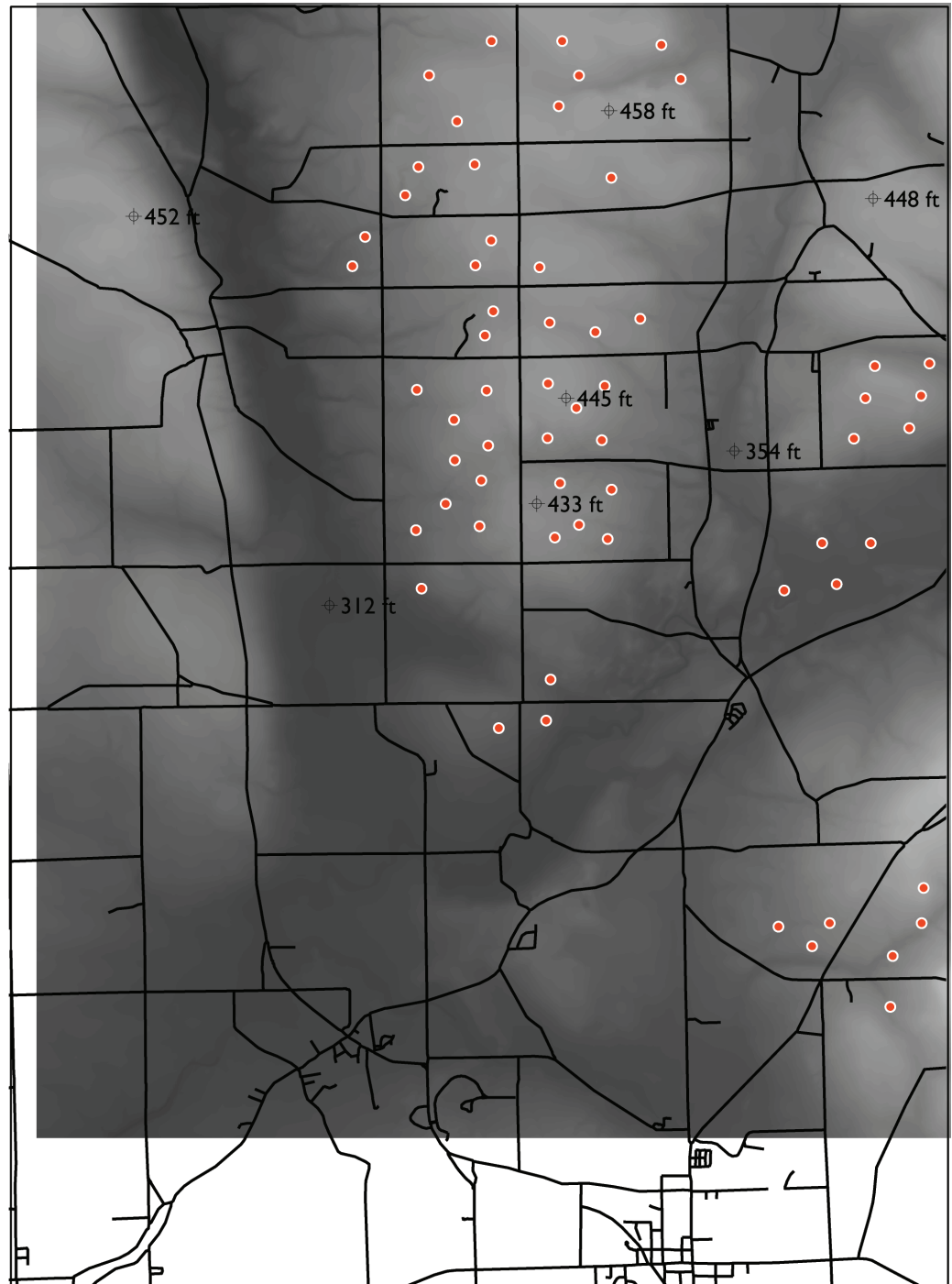
Impacts the Windy Hills Wind Farm will have on Local Property Values

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.

At the household level, 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.

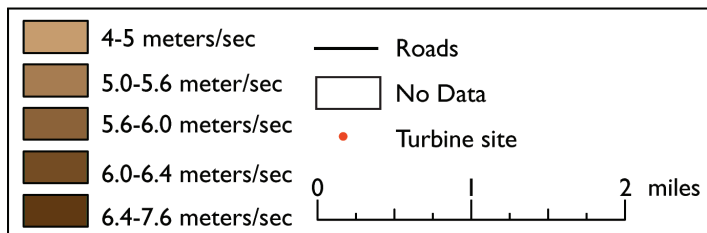
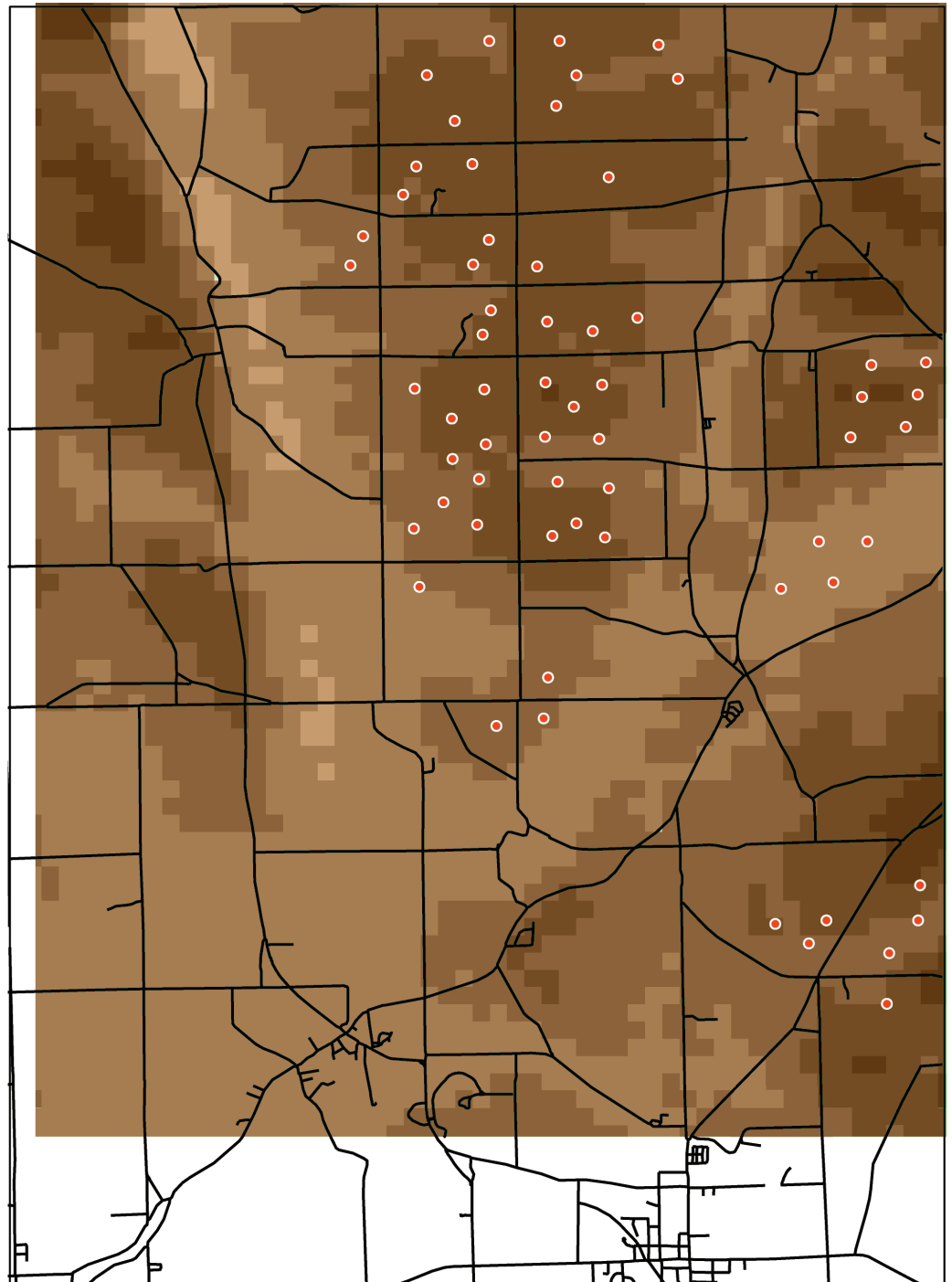
The main area of concern regarding turbine placement is the viewshed for residential properties in the vicinity. In assessing other communities where wind farms have been built, surveys found that wind farms have no demonstrable impact on property values, even near high end or executive home development.

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 Truewind.

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 or not supportive of 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 not support 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 this wind farm very difficult to gain approval?

Letters to the Editor:

Windy Hills Project has Great Potential

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

Windy Hills Project is Full of Hot Air


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?

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 issues that may make the wind farm easier or more difficult 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 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 personnel.

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

This area has a hilly topography 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 where visitors can look out onto the surrounding area where the wind farm will be visible.

The 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 wind farms. There are many single-family residences and commercial areas nearby. All turbines are located with a distance of 1,200 feet between the center of any tower foundation and the nearest off-site residence. When possible, trees will be planted to minimize the visual and sound 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.

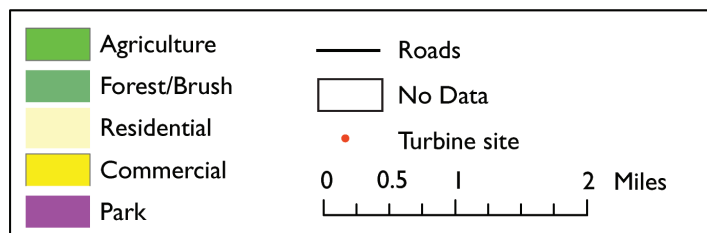
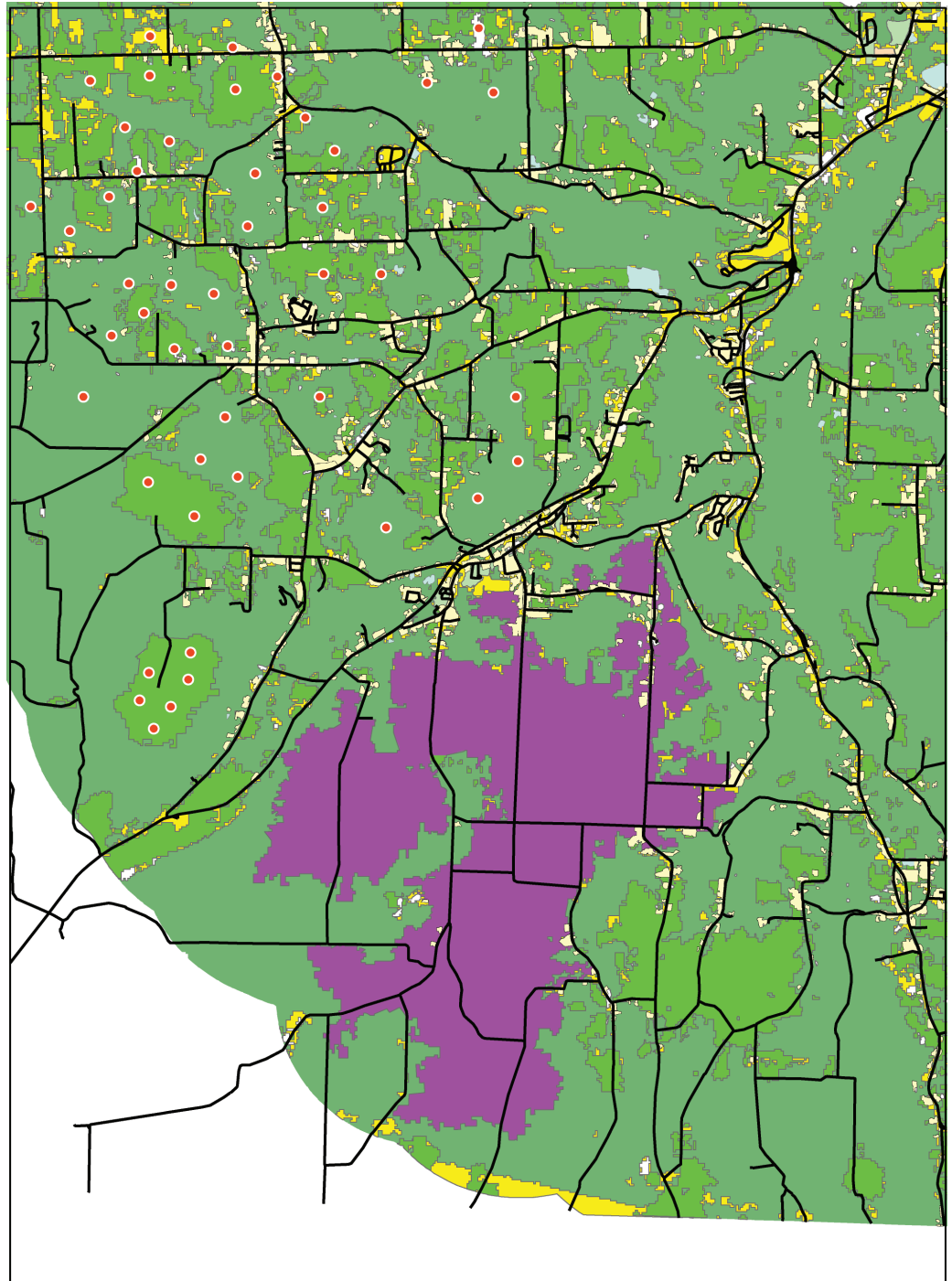
- a. Wind turbines shall be designed to minimize the impacts of land clearing and the loss of open space areas. Land protected by conservation easements shall be avoided when feasible. The use of previously developed areas will be given priority wherever possible.
- b. Wind turbines shall be located 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 be easier or harder to put turbines in?
- 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 of 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 showing which birds are present at the site. Are there any threatened or endangered birds that are 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 to the development of the wind farm?

Table 1

SPECIES	TYPE OF SPECIES	DISTANCE FROM SITE	NY LEGAL STATUS	FEDERAL LISTING
<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 they 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
Water birds			
Great blue heron	0	0	0
Herring gull	0	2	2
Ringbilled gull	8	3	11
Waterfowl			
Canada goose	24	0	24
Mallard	5	0	5
Raptors			
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
Passerines			
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
Other birds			
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.

There is one area near a nearby lake that is considered a potential breeding habitat. It is likely that many of the harriers observed were migrants or transients through the area. However, it is also possible 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 plants primarily in the western US (Erickson et al. 2001). While on the breeding grounds, northern harrier behavior, which generally includes low level flights and very little soaring, is not likely to put them at great risk from 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 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 OR 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 Bat)**

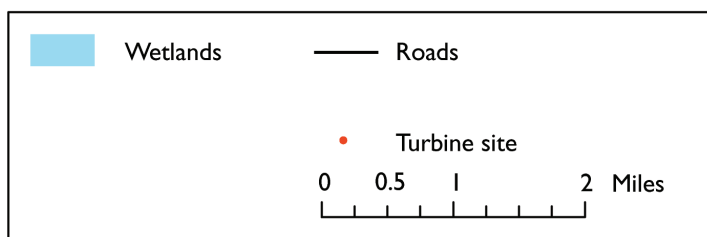
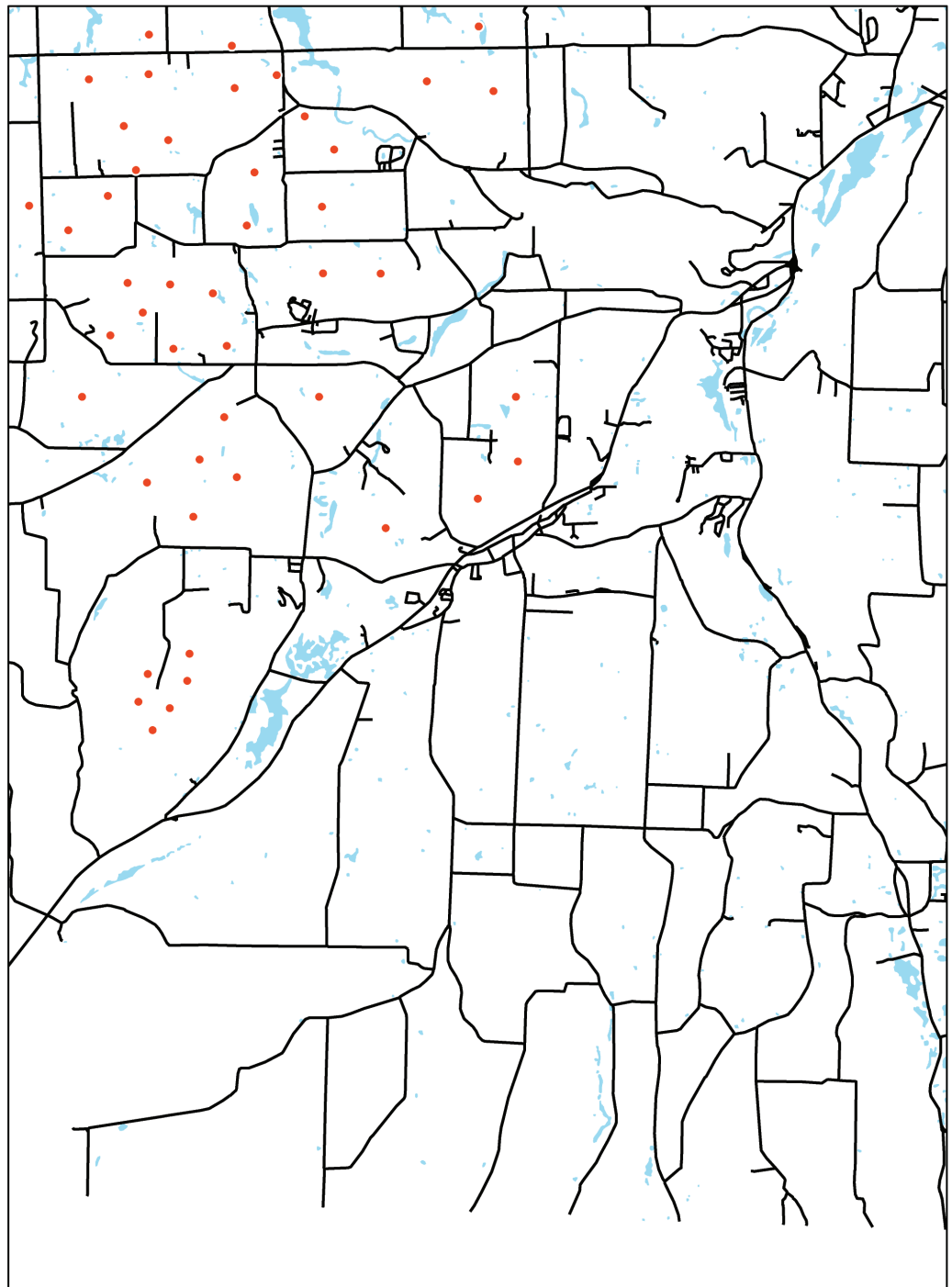
The Indiana myotis, a federally endangered bat, is a small gray bat that roosts in crevices or under the loose bark of trees during the summer. They hibernate in caves during the winter, with the majority of them found in Indiana, Kentucky, and Missouri. While no Indiana bat fatalities have been confirmed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

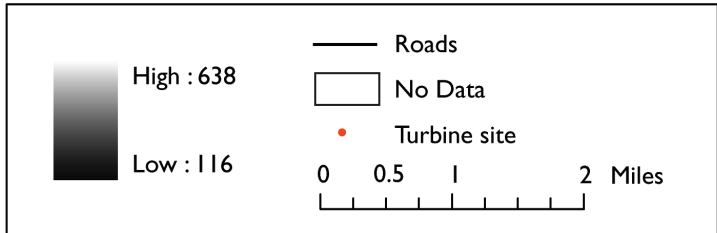
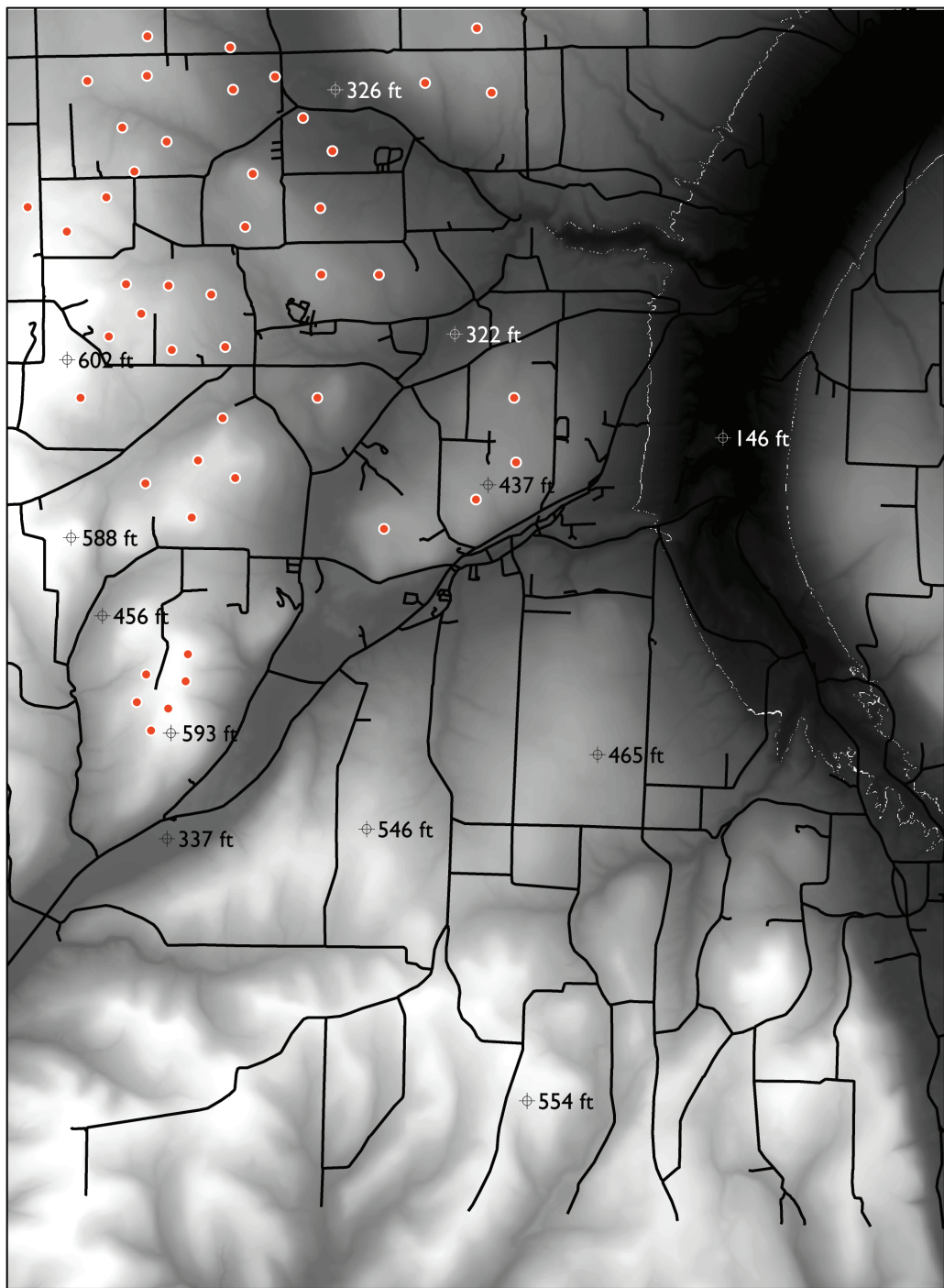
Questions to consider

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



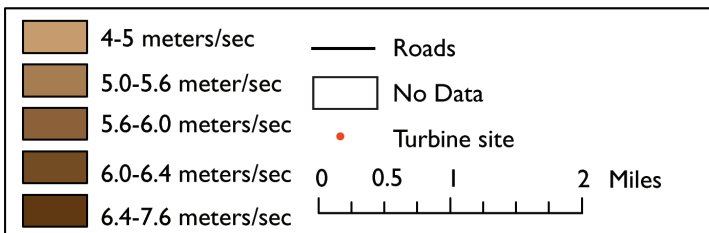
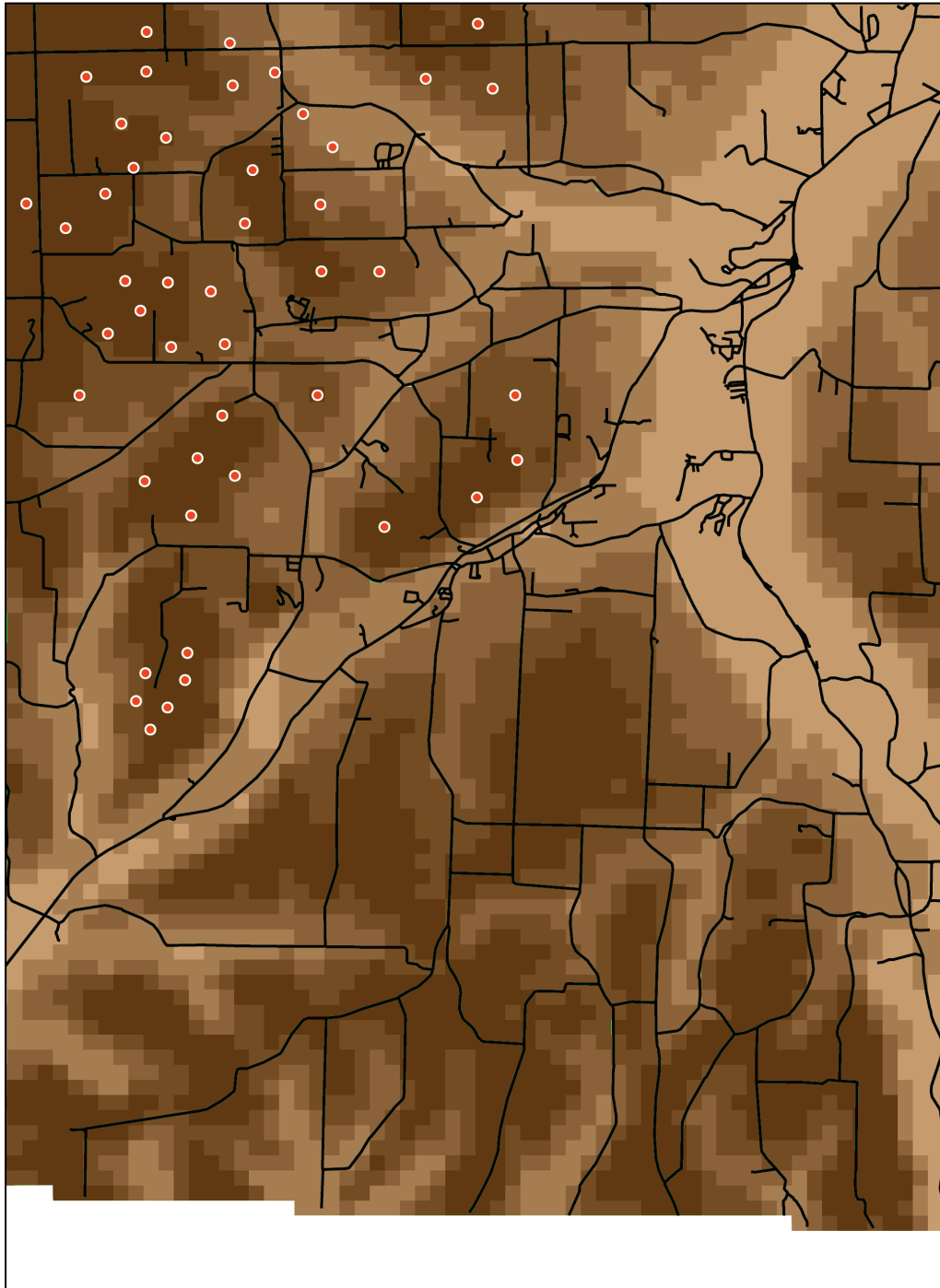
Map made by fictionalizing data from US Census Bureau and New York State Department of Environmental Conservation.

ELEVATION MAP



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 1 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 go be adjacent to residential areas.

PROPERTY VALUES

Questions to consider

- Are the 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, 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. Since 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 sound 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 as 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 or not supportive of 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 not support 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 this wind farm very difficult 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

Scaled-down Clean 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,

Siting Lesson Pack 2

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

