

# Airing Our Views: Public Input to Wind Project Planning

- A Role-Playing Activity -



# **Airing Our Views: Public Input to Wind Project Planning**

## **A Role-Playing Activity**

Students learn about a range of issues associated with the development of a proposed wind farm on the public lands, and try their hands at making land-use decisions that address the needs and concerns of various groups impacted by such development.

**Grade Level:**                      **Intermediate**

**Subject Areas:**                      **Science**  
   **Social Studies**  
   **Language Arts**

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20 M Street, SE  
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April, 2012

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## Teacher Guide

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Use background information, graphic data, and role-playing activities to: 1) teach students about a range of issues associated with the development of a proposed wind farm on the public lands; 2) introduce students to the land-use decision-making process; and 3) expose students to the challenges associated with addressing the needs and concerns of various groups impacted by proposed land uses.

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### Background

The Bureau of Land Management (BLM) manages 245 million acres of federal lands. These BLM-managed lands are referred to as the public lands, and the BLM’s mission is to sustain the health, productivity, and diversity of the public lands for the use and enjoyment of present and future generations. The uses of the public lands are varied and diverse, and the BLM must balance multiple uses of the land by considering social, economic, and environmental factors.

### Recommended Pre-activities

The publication *Renewable Energy on the Public Lands: POWERing the future* introduces students to the Bureau of Land Management and demonstrates the current potential for solar, wind, and geothermal energy development on BLM-managed lands. The publication also introduces students to the land-use planning process that the BLM uses in order to evaluate the social, economic, and environmental impacts associated with land-use decisions.

The online slideshow “No Ordinary Windmills” offers students a photographic journey through the process of installing wind turbines, demonstrating the size and scale of the structures.

Both of these resources are available at [www.blm.gov/education](http://www.blm.gov/education).

### Time

Seven to nine 45-minute class periods, depending on the length of group discussions; the optional extension activities would require additional time.

## Preparation

- Familiarize yourself with the introduction, the background information, and the activities in the booklet.
- Make copies of “Background Information: Part One” (pages 9-15 of PDF) for each student. **Note:** the map should be printed in color.
- Make copies of “Background Information: Part Two” (pages 16-23 of PDF) for each student. **Note:** the map should be printed in color.
- Make 1 copy of each “Group Description and Interests” page.

## Procedure

### Step One - Introduction

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Use the information provided in the section, “Introducing the Project to Students,” to provide students with an overall understanding of the goals and objectives of the project.

### Step Two – Background Information: Part One

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Distribute a copy of “Background Information: Part One” to each student. Explain to the students that part one of the background information introduces the proposal for a new wind farm, and describes the current conditions of the area in which the proposed wind farm would be built. Have the students read part one. Discuss the wind farm proposal as well as the major features of the land, its wildlife, and its existing uses. Review the map and diagram. Ask the students what they think would be some potential impacts of the proposed wind farm on the land, its wildlife, and its existing uses.

### Step Three – Background Information: Part Two

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Review “Background Information: Part One” with the students. Distribute a copy of “Background Information: Part Two” to each student. Explain to the students that part two of the background information covers the anticipated impacts of the proposed wind farm, as well as the mitigation steps that the company would implement in order to reduce the negative impacts of the project. Review the map.

### Step Four – Group Considerations

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Split the students up into five or six groups, and hand out a different “Group Description and Interests” page to each group. Explain to the students that they will be considering the proposed wind farm from the point of view of the group they represent. Each group will read its group description and interests, and address the following:

1. What other factors might be of interest to your group regarding the proposed wind farm?
2. Decide whether you support or oppose the wind farm project.

3. List the reasons for your position.
4. Be prepared to respond to arguments opposing your group's position.
5. What are you willing to give up or change about your position?
6. Identify the mitigation steps (steps that may reduce the negative impacts) that you want to see implemented in the event that the project is approved.

#### Step Five – Group Presentation Preparation

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In this step, each group prepares a five-minute presentation that it will give in front of BLM representatives at a “public meeting” in the subsequent step.

The presentation must include the following:

1. Brief description of the group and its interests
2. A statement of whether the group supports or opposes the project
3. An explanation of the reasoning behind the group's decision.

One person in each group is selected to be the group spokesperson. The spokesperson practices giving the five-minute presentation to the rest of his/her group, and at the end of the presentation the other group members further prepare the spokesperson by asking him/her questions about the group's position and line of reasoning.

#### Step Six – “Public Meeting” Role Play

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In this “public meeting” role-playing activity, the group spokespersons present their positions to representatives of the BLM. Select one student from each group, other than the group spokesperson, to sit in front of the classroom. Explain to these selected students that their roles will change from this point forward, and they will now be representatives of the BLM. Their job will be to listen to each group's presentation, take notes on each presentation, and ask each spokesperson any questions they may have. Once all presentations have been delivered, the BLM representatives must decide whether to allow or reject the development of the proposed wind farm on the BLM-managed lands.

Remind the BLM representatives to take notes during each presentation, and invite each group spokesperson one by one to make his/her group's case to the BLM representatives. At the end of each presentation, have the BLM representatives ask the group spokesperson any questions they may have.

Once all groups have presented their positions, briefly lead students in a general discussion. Make sure students see that all groups have valid concerns and that trade-offs will be necessary regardless of the final path chosen. Explain to students the importance of balancing the short-term social, economic, and environmental needs with the long-term ones.

Next, the students will continue the discussion in small groups in the following manner:

1. Have the BLM representatives do the following:

- a. Decide as a group whether the BLM will allow or reject the development of the wind farm on the BLM-managed lands, and list the reasons for the decision.
  - b. If the decision is to allow the development of the wind farm on the BLM-managed lands, identify modifications to the proposal and/or actions that the wind farm company must take to address potential negative impacts of the wind farm, such as those raised by the groups opposing the wind farm project.
  - c. If the decision is to reject the development of the wind farm on the BLM-managed lands, address the concerns of the interest groups that supported the proposed wind farm.
  - d. Pick one person to present the information to the class during the next session.
2. Have the rest of the class do the following:
    - a. Form groups made up of one person from each interest group.
    - b. Each group must decide whether it thinks the BLM should allow or reject the development of the wind farm on the BLM-managed lands and list the reasons for the decision.
    - c. Groups that support the project must identify modifications to the proposal and/or actions that the wind farm company should take to address potential negative impacts of the wind farm, such as those raised by the groups opposing the project.
    - d. Groups that oppose the project must address the concerns of the groups that supported the proposed wind farm.
    - e. Pick one person to present the information to the class during the next session (make sure this person has not already presented during the “public meeting”).

### Step Seven – Final Decisions

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The chosen BLM representative offers the BLM’s decision to the class, including the reasoning behind the decision as well as any mitigation measures that will be required of the company. Next, the spokesperson from each of the other groups offers his/her group’s proposal to the class, including the reasoning behind the group’s decision and mitigation measures. Finally, lead all students in an overall classroom discussion of the different proposals and how each one addressed the various issues and interests. Discuss how each proposal balances the short-term social, economic, and environmental needs with the long-term ones.

### Extension Activities

1. Students identify the steps that each community sector can take to promote energy conservation and ecosystem health.
2. Students identify the steps that they themselves are taking and can take to promote energy conservation.
3. Students research alternative designs for wind turbines that aim to reduce negative impacts on wildlife.

4. Students identify areas in their own community where a wind turbine could potentially be built. What issues would they need to address before the wind turbine could be installed? What impacts would the wind turbine have on their community?
5. Students conduct research on wind farms that have already been developed or are currently proposed on BLM-managed lands, and study the issues raised by different groups during the proposal process. Students identify similarities and differences between the issues raised in their own role-playing activity and those raised for actual wind farm proposals on BLM-managed lands. Research materials for wind farm projects on BLM-managed lands can be obtained at the following BLM websites:
  - a. Wind projects in Arizona: <http://www.blm.gov/az/st/en/prog/energy/wind.html>
  - b. Wind projects in California: <http://www.blm.gov/ca/st/en/prog/energy/wind.html>
  - c. Wind projects in Nevada: [http://www.blm.gov/nv/st/en/prog/energy/fast-track\\_renewable.html](http://www.blm.gov/nv/st/en/prog/energy/fast-track_renewable.html)
  - d. Wind projects in Wyoming: <http://www.blm.gov/wy/st/en/programs/energy/renewable/wind.html>

## **Introducing the Project to Students**

### **Introducing the Bureau of Land Management**

Explain to students that in this series of activities, they will become acquainted with some of the steps taken by resource agencies in making land-use decisions. The Bureau of Land Management (BLM) is one such resource agency. The BLM is an agency of the United States government in charge of managing 245 million acres of federal land for multiple uses, in ways that sustain the health of the land and comply with federal laws. Some of the multiple uses include cattle grazing, recreation, mineral extraction, energy production, and wildlife habitat and open space preservation. The BLM's challenge is to resolve potential conflicts among different uses as part of its land-use planning and implementation processes. The exercise of resolving such potential conflicts utilizes the skills of analysis, reasoning, and effective listening and speaking. Through venues such as public meetings, the BLM gathers the view and concerns of different groups impacted by land-use decisions.

### **Land-Use Decision Making**

In this series of activities, students will apply and strengthen their own skills of analysis, reasoning, and effective listening and speaking as they work to resolve potential conflicts associated with land-use decisions. Students will consider whether an area of the public lands managed by the Bureau of Land Management (BLM) should be made available to a company for the development of a wind farm. Their challenge will be to accommodate competing demands on the land while maintaining the area's environmental health.

### **Role-Playing Scenario**

Explain to students that while data from actual environmental analyses for projects on BLM-managed lands was incorporated into this activity's background information, the data is meant for use in a fictitious, role-playing scenario. The state in which the proposed project area is located could be any state in the country where desert ecosystems are found. Furthermore, the number and variety of potential impacts presented in this activity have been limited in order to make the activity grade-level appropriate. The number and variety of impacts addressed in actual environmental analyses for proposed projects can be much more extensive.

### **Activity Steps**

Students will first read the background information provided and will then be separated into small groups. Each group will consider the proposed wind farm from a particular point of view, and decide whether they support or oppose the project. Each group will present its point of view to BLM representatives during a "public meeting" role-playing activity. The class will then work on developing various alternatives for resolving the land-use conflicts.

### **Reviewing Measurement Units**

Since the background information refers to acres and miles, review with students that: 1 mile equals 5,280 feet; 1 square mile equals 640 acres; and 1 acre equals 43,560 square feet. Put these units into perspective for students by estimating the acreage of your school, a nearby park, a football field, etc.

## **Background Information – Part One**

### **The Proposal**

A company is interested in building a wind farm in a rural area of the state. There are two small towns nearby. One town is 6 miles away, and the other town is 12 miles away. The area that the company would like to use for the wind farm is made up of lands with different types of ownership. Some of the land is owned by private individuals. Some of the land is owned by the state. Some of the land is owned by the government of the United States and is managed by the Bureau of Land Management (BLM). These BLM-managed lands are called the public lands. The company has already made agreements to lease the lands that are owned by private individuals and the state. Now the company has submitted an application to the Bureau of Land Management for a Right of Way to use the public lands.

### **BLM Land-Use Decisions**

Before the company can be given the Right of Way, the BLM must check to make sure a wind farm fits well with the existing plans for this specific section of the public lands. The BLM must also do some research to see if the wind farm project can be completed in an environmentally sound manner. As part of its research, the BLM will listen to the ideas and opinions of nearby communities, government agencies, and other people who use the lands in the area or might be affected by the wind farm project. Currently, lands in the area are used for mining, cattle grazing, and recreational hunting.



**Figure 1: Members of the public share their views with BLM representatives regarding a proposed project on BLM-managed lands.**  
Credit: BLM California

### **Proposed Phases of Development**

The company would build the wind farm in several phases. In phase one of the project, 30 wind turbines would be installed. Lines of cable would be laid to connect the wind turbines together and to carry the electricity created by each turbine. Most of these cable lines would be buried three feet below the ground. An electric substation would also be built. This electric substation would be connected at one end to the cable lines in order to collect all the electricity that is generated from the wind turbines. The electric substation would be connected at the other end to the existing transmission lines that pass electricity over hundreds of miles to where it is needed, such as people's homes. In phase one, a large building would also be built to serve as the operations and maintenance center for the wind farm. The 30 wind turbines installed in phase one would be able to produce a total of 64 megawatts of energy, enough electricity for about 19,200 homes. Once completed, phase one would have turbines and

buildings spread over a 25-square-mile area. Additional miles of land would also be needed to build the roads necessary to get to the wind farm. These roads would be used by the construction crews while they build the wind farm. Once construction is complete, the roads would continue to be used by the people who manage and maintain the wind farm. It is estimated that 12 miles of access roads would be built in phase one. Figure 3 shows the preliminary plan layout for phase one of the proposed wind farm.

Once phase one is in operation, construction would start on additional sections of the wind farm. It is estimated that 209 more turbines would be installed in the additional phases. The total amount of energy produced by the additional phases would be 314 megawatts, enough electricity for about 94,200 homes. These additional phases would be spread across another 75 square miles of land located east of the phase one area. About 90 to 99 miles of additional access roads would also need to be built for the additional phases.

### Wind Turbine Characteristics

Each wind turbine would be between 262 and 344 feet tall, not counting the rotor. Each wind turbine rotor would be between 256 and 328 feet in diameter. Figure 4 shows a diagram of the typical wind turbines that would be used on the proposed wind farm. With their massive size, the wind turbines would require careful installation to ensure stability. This stability would be achieved by burying the base of each wind turbine inside a concrete foundation about 60 feet wide and 10 feet deep. In order to prevent collision with small planes flying in the area and to comply with regulations of the Federal Aviation Administration, the top half of each turbine would be lit with red or white flashing lights at night.

The company estimates that about 20,000 gallons of water would be needed for the construction of each wind turbine. This includes about 9,000 gallons of water for making the concrete for the foundation, and another 11,000 gallons of water for controlling dust during construction.



Figure 2: A crane lifts the massive turbine rotor into position.  
Credit: National Renewable Energy Laboratory

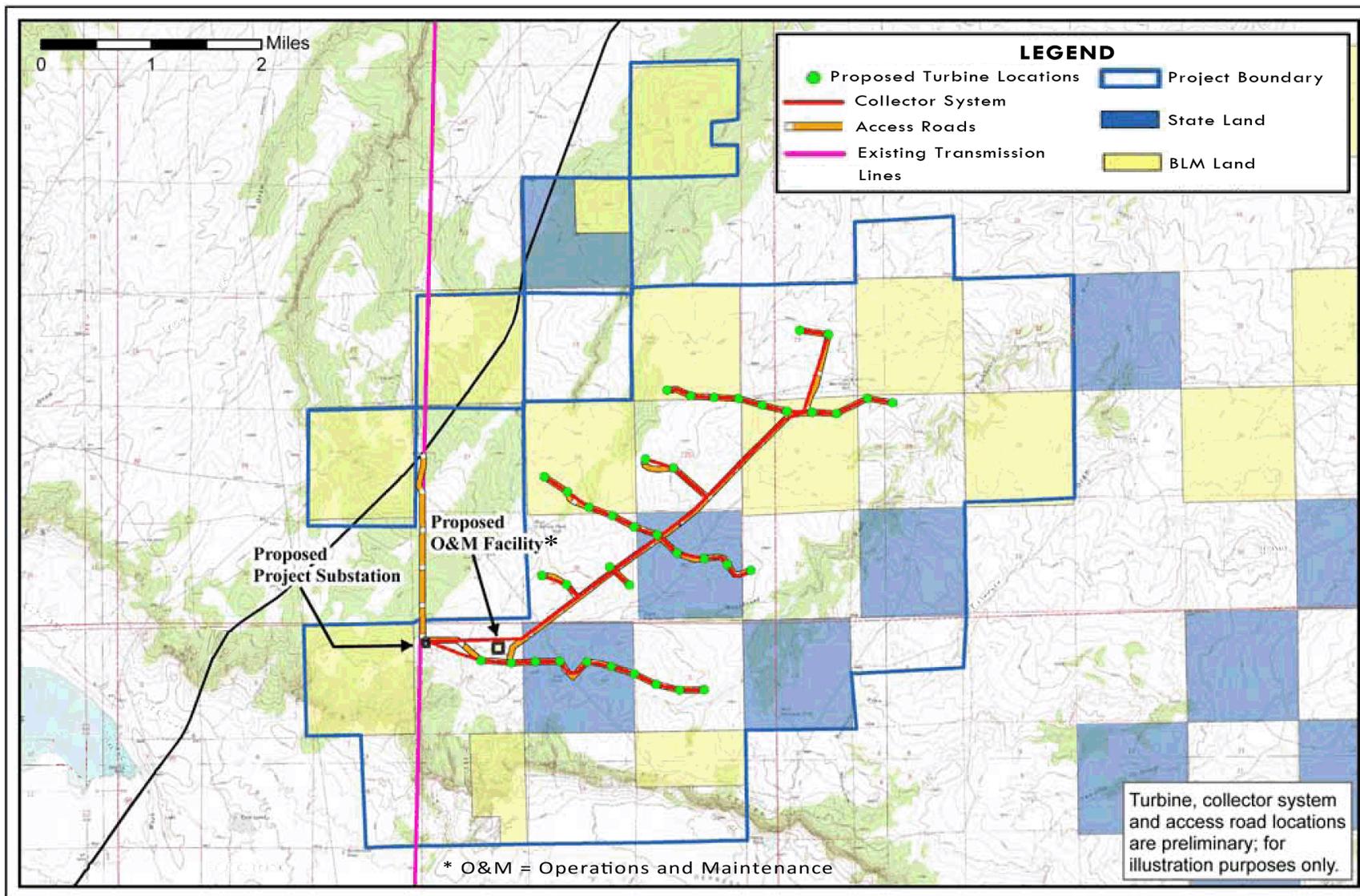


Figure 3: Phase One Preliminary Layout for Proposed Wind Farm.

Credit: BLM

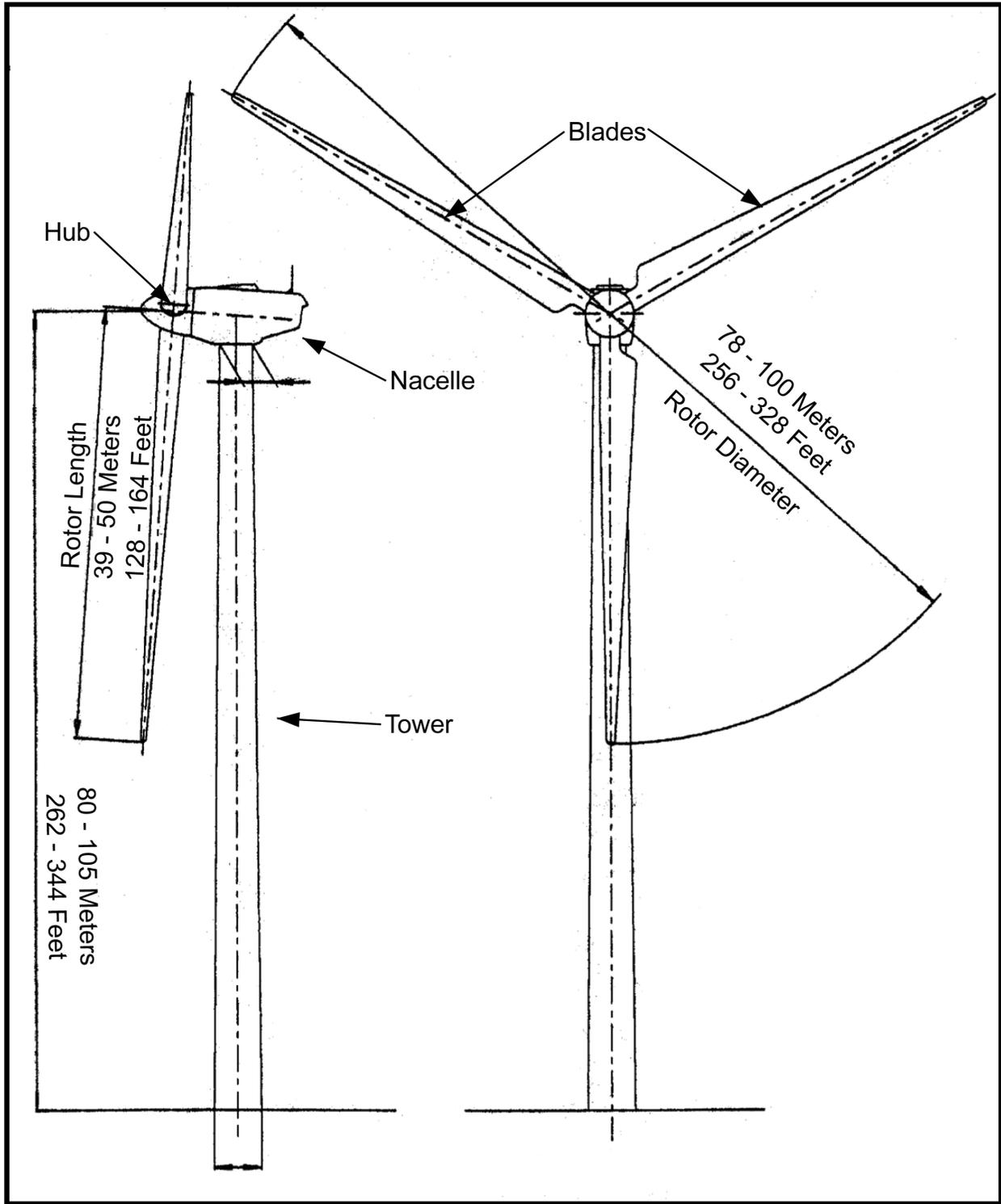


Figure 4: Diagram of typical wind turbines that would be used on the proposed wind farm.  
Credit: BLM

## Current Condition of the Land

### Vegetation and Precipitation



Figure 5: Vegetation commonly found in the project area.  
Credit: BLM Utah

The project area is mostly made up of desert scrub and desert grasslands. Smaller areas of woodlands also exist in the project area. The most common trees in these woodlands are pinyon and juniper trees. Only about half of the project area is actually covered with vegetation. The other half of the area is bare ground. Water is scarce in the area where the wind farm would be built. It only rains about 9 inches each year, and half of the rain falls during heavy rainstorms between July and September.

The paper-spined cactus grows in some parts of the project area. This type of cactus is a species of concern for the U.S. government, because its numbers have decreased greatly over the years in the areas where the cactus has existed historically.



Figure 6: Paper-spined cactus  
©Robert Sivinski

### Soil

Because the project area is very dry and there are not enough plants to protect the soil, soil erosion is a big problem in the project area. Soil erosion occurs when soil is removed by wind or water. The windy conditions in the project area erode the soil. The limited rainfall in the area occurs during heavy rainstorms, which also leads to soil erosion. Because of soil erosion, the soil is on average only 10 inches thick in the project area. Soil erosion leads to many problems. For example, it is difficult for plants to survive in the area without this layer of soil. Another problem is that the eroded soil may end up in nearby streams and create problems for the wildlife in and around the streams.

### Wildlife

A large variety of wildlife depends on the project area. Some of the animals live in the project area all year long. Other animals only use the area during certain times of the year, such as for resting during their migration to other locations, or during the breeding and nesting seasons. A lot of birds can be found in the project area, including a small number of hawks and eagles. Many types of mammals also live in the area, including pronghorn antelope, mule deer, coyote, elk, rabbits, gray foxes, and Gunnison's prairie dogs.

### ***Pronghorn Antelope***

The number of pronghorn antelope has been decreasing greatly in the state. There are many reasons for this. One reason is that the construction of homes and other buildings has reduced the size of the pronghorn's habitat. Another reason is the construction of new roads. Cars and trucks driving on the roads can hit pronghorn trying to cross the road.

### ***Gunnison's Prairie Dog***

The Gunnison's prairie dog is an important species in the project area. Colonies of prairie dogs live together in 'towns' that they build by burrowing a connection of tunnels in the ground. Burrowing owls, snakes, and foxes then use some of the empty tunnels for their own homes. The work of the prairie dog also helps to add nutrients to the soil and allow more water to be absorbed into the soil during rainstorms. The prairie dog is also an important food for coyote, foxes, hawks, and eagles.

The Gunnison's prairie dog is disappearing in other states around the country and is identified as a species of greatest conservation need. In this state, its populations are doing better but still need extra care and observation. Factors that negatively impact the Gunnison's prairie dog populations are: loss of the natural environment in which they live; fragmentation of the natural environment caused by the construction of roads, buildings, etc.; poisoning; and recreational hunting.



Figure 7: Pronghorn antelope  
Credit: US Fish & Wildlife Service



Figure 8: Gunnison's prairie dog colony  
Credit: R.L. Forbes, American Society of Mammalogists

### Geology

Some portions of the project area have a rocky surface. This poses a challenge in laying down the lines of cable for the proposed wind farm.

There is currently no active mining in the project area. The area has already been inspected by geologists for the presence of gold, silver, and copper; at present, no such minerals have been found. However, BLM geologists have identified the potential existence of oil, gas, sodium, and potassium deposits in the area.

### Cultural, Historical, and Paleontological Resources

The state in which the wind farm project is proposed has laws requiring that important cultural and historical resources found on state-owned lands be identified and protected. The federal government has similar laws as well for important cultural and historical resources found on BLM-managed lands.

No fossils have been found yet in the area of land within the proposed wind farm. However, fossils have been found on lands near the project area. Clay pottery, stone tools, and other items have also been found in the area of the proposed wind farm. Some of these items were made by people who lived in the area as far back as 1,500 years ago, and represent an important part of America's history.

## **Background Information – Part Two**

### **Anticipated Impacts of the Wind Farm**

#### Vegetation Impacts

The steps of clearing the land, flattening the land, and other wind farm construction activities would result in the permanent loss of vegetation in some areas, and the temporary loss of vegetation in others. The permanent removal of vegetation would occur at the following locations on the proposed wind farm: wind turbines, support buildings, and access roads. About 250 acres of vegetation would have to be permanently removed at these sites. Temporary removal of 1,000 acres of vegetation would occur in construction work zones. Most of the temporary and permanent impacts to vegetation would occur in areas covered by grasslands. Only a small area of woodlands would be impacted.



**Figure 1: The construction phase needs additional space, further impacting the land.**  
Credit: National Renewable Energy Laboratory

The paper-spined cactus, which grows in some parts of the project area, is a species of concern for the United States government. The development plans for the wind farm would be designed to avoid the areas where the cactus grows. The construction crews would also be trained to avoid any activity in the areas where the cactus grows. Therefore, the proposed wind farm project would likely have no negative impacts on the paper-spined cactus growing in the project area.

#### Soil Impacts

The proposed wind farm may increase the amount of soil erosion in the area. Project activities that would contribute to increased soil erosion include: 1) the removal of vegetation to install the wind turbines and to construct buildings and access roads, and 2) the compacting of the land by the passage of heavy machinery. Tables 1 and 2 present the amount of land that would be disturbed during construction and operation of the wind farm. In all, it is estimated that about 1,627 acres of land would be disturbed during the construction of wind farm. Of these total acres disturbed, only 353 acres would be on lands owned by the U.S. government and managed by the BLM.

Table 1: Areas of Private, State, and U.S. Government Lands **Temporarily Disturbed during Construction**

Facility	Phase One	Additional Phases	Total Area Disturbed
Wind Turbines	100 acres (41 acres private, 25 acres state, 34 acres U.S. government)	722 acres (434 acres private, 144 acres state, 144 acres U.S. government)	822 acres (475 acres private, 169 acres state, 178 acres U.S. government)
Cable Lines connecting turbines	33 acres (12 acres private, 9 acres state, 12 acres U.S. government)	300 acres (180 acres private, 60 acres state, 60 acres U.S. government)	333 acres (192 acres private, 69 acres state, 72 acres U.S. government)
Roads	52 acres (19 acres private, 14 acres state, 19 acres U.S. government)	420 acres (252 acres private, 84 acres state, 84 acres U.S. government)	472 acres (271 acres private, 98 acres state, 103 acres U.S. government)
Total Construction Area	185 acres (72 acres private, 48 acres state, 65 acres U.S. government)	1442 acres (866 acres private, 288 acres state, 288 acres U.S. government)	1627 acres (938 acres private, 336 acres state, 353 acres U.S. government)

Table 2: Areas of Private, State, and U.S. Government Lands **Permanently Disturbed for Operation**

Facility	Phase One	Additional Phases	Total Area Disturbed
Wind Turbines	3 acres (1 acre private, 1 acre state, 1 acre U.S. government)	17 acres (10 acres private, 3 acres state, 4 acres U.S. government)	20 acres (12 acres private, 4 acres state, 4 acres U.S. government)
Electric Substation	2 acres (2 acres private, 0 acres state, 0 acres U.S. government)	4 acres (4 acres private, 0 acres state, 0 acres U.S. government)	6 acres (6 acres private, 0 acres state, 0 acres U.S. government)
Operations and Maintenance Facility	4 acres (4 acres private, 0 acres state, 0 acres U.S. government)	4 acres (4 acres private, 0 acres state, 0 acres U.S. government)	8 acres (8 acres private, 0 acres state, 0 acres U.S. government)
Roads	24 acres (9 acres private, 6 acres state, 9 acres U.S. government)	192 acres (110 acres private, 40 acres state, 42 acres U.S. government)	216 acres (119 acres private, 46 acres state, 51 acres U.S. government)
Total Construction Area	33 acres (16 acres private, 7 acres state, 10 acres U.S. government)	217 acres (128 acres private, 43 acres state, 46 acres U.S. government)	250 acres (145 acres private, 50 acres state, 55 acres U.S. government)

## Wildlife Impacts

### ***Collision with Turbine Rotors***

Wildlife biologists have been conducting research on the impacts of wind farms on wildlife. Research shows that one common problem on wind farms is the death of birds and bats as they fly into the moving rotors of wind turbines. State wildlife biologists predict that about 3 birds would die each day as



**Figure 2: Horned lark**  
Credit: Idaho Fish & Game

a result of the proposed wind farm being built in the project area. This would result in about 1,172 bird deaths each year as a result of the wind farm. Of all the bird species in the project area, the horned lark would probably suffer the most deaths. While these numbers are high, it is worth noting that of all birds that die in the U.S. each year, only about 1 in every 1,000 deaths is caused by a collision with a wind farm. Many more birds die from flying into buildings or being hunted by cats.

The proposed wind farm would create similar problems for bats. State wildlife biologists predict that about 2 bats would die each day from flying into wind turbines in the proposed project area. This would result in about 718 bat deaths each year from the wind turbines.

### ***Stress to Pronghorn Antelope***

The proposed wind farm could add further stress to the pronghorn antelope populations, which are already in decline. The construction of new access roads needed by the wind farm would potentially increase collisions between vehicles travelling on the roads and pronghorn trying to cross the roads. New gates built around the wind farm facilities would also block the movement of pronghorn, because pronghorn cannot jump over gates. Increased noise levels during the construction phase of the wind farm could also impact the pronghorn. For example, if construction were occurring near the pronghorn's sources of water, the noise from the construction could scare the pronghorn from drinking water. This would be especially dangerous during the fawning season, when the pronghorn babies would be in need of water but unable to travel long distances in search of a water source.



**Figure 3: Pronghorn antelope herd**  
Credit: US Fish & Wildlife Service

### ***Impact of Explosives***

In the rocky portions of the project area, construction crews would need to use small explosives to blast rocks and open up space to bury the cable lines. This use of explosives could negatively impact wildlife in the area. The explosives could scare wildlife away from nearby water sources, as explained in the

previous paragraph in the case of pronghorn antelope. The explosives could also scare Gunnison's prairie dogs out of their underground homes in the area, and scare birds out of their nests.

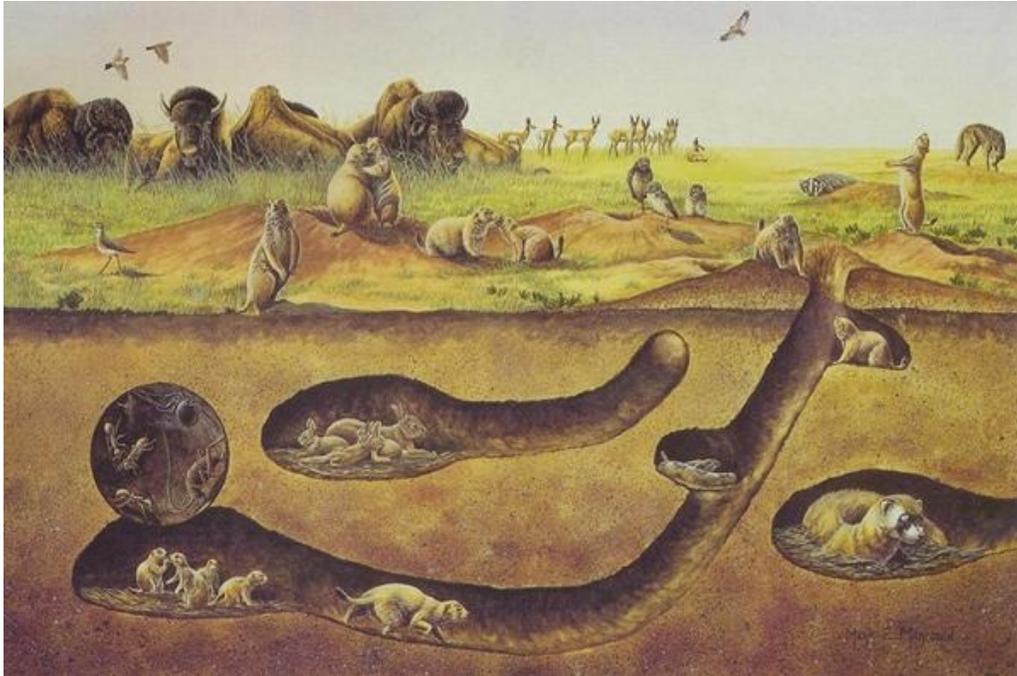


Figure 4: Cross section of prairie dog burrows

Credit: Mark E. Marcuson, University of Nebraska-Lincoln, Dept. of Forestry, Fisheries, & Wildlife

### ***Impacts on Gunnison's Prairie Dog Tunnels***

Factors other than noise from explosives could also impact the Gunnison's prairie dog populations in the project area. The construction of wind farm facilities and access roads near prairie dog tunnels could destroy the tunnels. The tunnels could also be crushed by heavy machinery passing over them during the construction phase. As mentioned earlier, the Gunnison's prairie dog is disappearing in other states around the country and is identified as a species of greatest conservation need. While in this state its populations are doing better, it still needs extra care and observation.

### **Cultural, Historical, and Paleontological Impacts**

Since no fossils have been found in the project area, the proposed wind farm would likely have no negative paleontological impacts in the project area. An archaeological survey has already been completed on lands that would be impacted in phase one of the project. As a result of this survey, the design plans for the wind farm were modified in order to avoid any impact to important archaeological sites found in the phase one area. Similar surveys would be conducted before starting the additional construction phases of the wind farm project, and the design plans for the additional phases would be modified as necessary. Therefore, the proposed wind farm would likely have no negative impacts on important cultural or historical resources in the project area.

### Noise Impacts

The impacts of noise on wildlife during the construction of the wind farm were discussed previously in the section on wildlife impacts.

During the ongoing operation of the wind farm, there would also be impacts from noise. Once in operation, each wind turbine would create noise. Faster winds would cause the wind turbine rotors to spin faster and create more noise. Studies indicate that wildlife tend to avoid areas near operating wind turbines. This may be due partly to the noise created by the wind turbines.



**Figure 5: Operating wind turbines**  
Credit: National Renewable Energy Laboratory

The U.S. government currently does not have requirements for noise control. The county in which the proposed wind farm would be located does not have any laws concerning noise control either. However, the U.S. government has established recommendations for noise levels in order to protect public health. Based on noise level data provided by

the manufacturers of the wind turbines, the noise from the wind turbines would meet the U.S. government's recommended noise levels for humans at a distance of about 500 feet from each wind turbine. Since the wind turbines in this proposed wind farm would be much farther than 500 feet from any homes, there would likely be no noise issues for people living in nearby communities.

### Impacts on Other Uses

The impact of the proposed wind farm on other uses of the lands in the project area must also be considered. Other uses of the lands include mining, grazing, recreation, and development.

Many lands managed by the BLM around the country are used by people and companies to extract oil, gas, coal, gravel, sand, and other minerals. In this proposed project area, the BLM-managed lands are currently not being used for any mining activities. However, some mining of the BLM-managed lands may occur in the future. Some of the private lands in the project area are currently being leased by companies for mineral extraction. These companies have not actually started mining the lands yet, and it is not known when they will start mining operations.

Cattle have grazed in the project area for over 100 years. Since a very large area of land in the project area would remain available for cattle to graze, the proposed wind farm would likely have no major impacts on cattle grazing in the area.



**Figure 6: Cattle grazing on the public lands.**  
Credit: BLM Utah

Recreation activities, especially hunting, also occur in the project area. The public lands in the area are very popular for hunters. The pronghorn antelope and the Gunnison's prairie dog are the main wildlife species being hunted. The proposed wind farm project would require the construction of some new gates in order to protect the wind farm facilities. These new gates would prevent access by hunters to some of the public lands in the project area.

In the coming years, two landowners plan to build communities of new homes on lands near the proposed wind farm. They plan to sell the homes to people interested in retiring in the area. One of these planned residential communities would lie to the north of phase one of the proposed wind farm. The other planned residential community would lie to the east of the additional phases of the proposed wind farm. While wind turbines would be installed farther than 500 feet from any property line not leased by the wind farm, the wind turbines would still be visible from these planned communities.

Figure 7 shows the portions of the project area that have potential use for mining and those areas where residential communities are planned.

### **The Company's Proposed Mitigation Efforts**

#### Mitigation Measures for Vegetation

On areas of land that would be disturbed during construction, the top nutrient-rich layer of soil would be removed and saved as much as possible before construction were to begin. This top layer of soil would be returned to the area once construction were completed, and seeds for native plants would be spread in order to encourage plants to regrow over the disturbed lands. Native plants are the plants that naturally grow in the area and that the wildlife in the area uses for food and shelter. Of the 1,627 acres of land that would be disturbed during construction, about 1,377 would be restored to a natural state. This would leave 250 acres of land permanently disturbed.

#### Mitigation Measures for Soil Erosion

When building the wind farm, the company would take several steps in order to reduce the amount of soil erosion. For example, in some areas the soil would be covered with mulch to prevent erosion. In other areas, the soil would be covered with sheets of plastic to protect it from erosion during heavy rainfall.

#### Mitigation Measures for Wildlife

The construction of new access roads, the installation of new gates, and the increased noise level associated with the proposed wind farm would all negatively impact the pronghorn antelope population living in the project area. The company would make sure the wind farm would be designed to include:

- 1) adequate pathways through the project area for the pronghorn antelope to move through, and

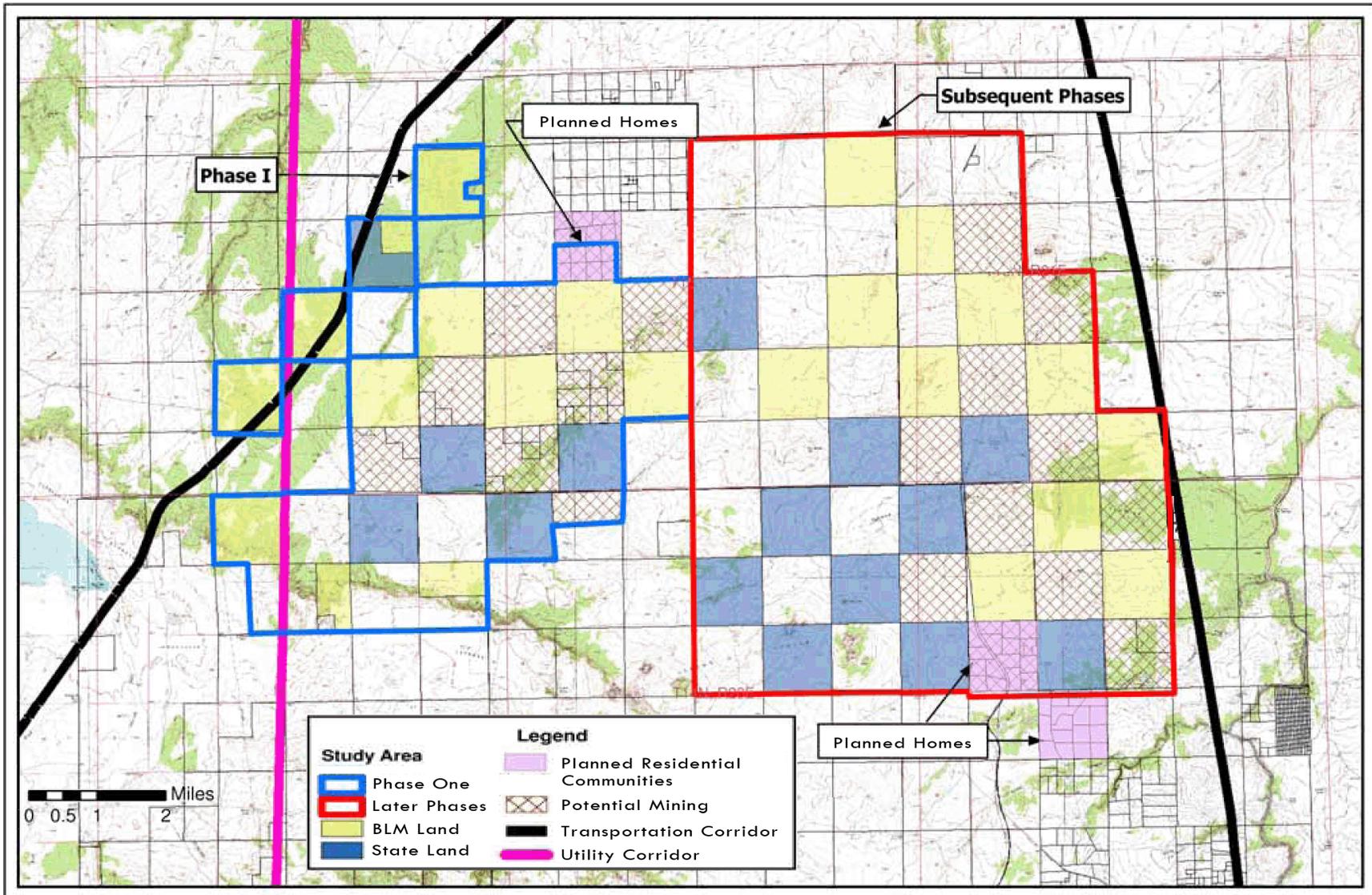


Figure 7: Planned Land Use in the Project Area. Credit: BLM

2) adequate open spaces in the project area - away from noise, gates, and vehicles – in which the pronghorn antelope could graze, drink, and rest.

During the process of laying down cables in rocky areas, the use of explosives would be limited to specific times of the year (such as non-breeding season) and to specific times of the day to reduce impacts on wildlife. Also, the use of explosives would be limited to areas that would be at an adequate distance from sensitive wildlife habitats, such as eagles' nests. In areas that are too rocky, the cable lines would be installed using above-ground poles.

To avoid negative impacts to Gunnison's prairie dog populations in the project area, surveys would be conducted of the project area before construction were to begin, in order to identify prairie dog colonies. These surveys would then be used to make necessary modifications to the final design of the wind farm in order to minimize direct impacts on the prairie dog towns identified. Construction crews would also be trained to identify and minimize damage to prairie dog burrows.

The proposed wind farm might actually benefit the Gunnison's prairie dog populations in one way: by reducing fragmentation of the natural environment in which the prairie dog colonies live. The wind farm would lease lands within the project area land from various private landowners. This means that these private lands would not be broken into smaller sections and sold off, and the prairie dog's natural environment would remain more intact.

#### Mitigation Measure for Cultural, Historical, and Paleontological Resources

Although no fossils have been found in the project area, the wind farm company would still educate all construction workers in the identification of rocks potentially containing fossils. If significant fossils are uncovered during construction activities, construction workers would be instructed to stop their activities, and the company would consult with the BLM on how to avoid damage to the fossils, how to remove the fossils, and how to monitor ongoing construction activities. The company would also take steps to prevent potential fossil looting or vandalism.

In regards to cultural and historical resources, it was mentioned earlier that surveys would be conducted before construction were to begin, in order to identify and avoid areas with important archaeological finds. However, should construction activities reveal archaeological finds that were missed during the surveying process, the construction workers would be instructed to stop their activities. A project archeologist would examine the discovery and provide recommendations to BLM representatives. Construction activities would not resume in the area until permission were obtained from the BLM representatives.

## Group – State Government

This group includes representatives from various agencies of the state government, including the state budget office, economic development office, and environmental protection office. This group must balance all of the different interests of the state government, such as: promoting jobs and businesses; funding public services; promoting the health of citizens; and promoting the health of the environment, including the native plants and animals.

## Factors of Interest

- The state has set a requirement that by the year 2025, 15% of the energy used in the state needs to come from renewable resources. The wind farm project would be a step towards reaching this goal.
- The number of birds that would die each year from flying into wind turbines would be much smaller than the number of birds that die in the country from flying into buildings or from being hunted by cats.
- Because the project would be built in phases, only small areas of land would be disturbed at any one time. This would minimize the impact on wildlife living in the area.
- The company's proposed construction plans should substantially prevent soil erosion.
- The company's operations would bring in new revenue for the state government in the form of state corporate income taxes.
- The company would pay rent to local landowners for using their land. These local landowners would then pay state taxes on their rental income. This would result in more revenue for the state government.
- The wind farm would create new jobs in nearby communities. The people hired for these jobs would then buy items at stores in those communities, and many of the items purchased would have a state sales tax. This would result in more revenues for the state government.

## Discussion Steps

1. What other factors might be of interest to your group regarding the proposed wind farm?
2. In your group, decide whether you support or oppose the wind farm project.
3. List the reasons for your position.
4. Be prepared to respond to arguments opposing your group's position or reasoning.
5. What are you willing to give up or change about your position?
6. Identify the mitigation steps (steps that may reduce the negative impacts) that you want to see implemented in the event that the project is approved.

## Group – County Government

This group includes representatives from various agencies of the county government, including the county finance office, economic development office, and environmental protection office. This group must balance all of the different interests of the county government, such as: promoting jobs and businesses; funding schools, law enforcement, fire and rescue, and other public services; promoting the health of citizens; and promoting the health of the environment, including the native plants and animals.

## Factors of Interest

- Some landowners support the project because they would benefit from leasing their land for the wind farm project.
- Two landowners own large plots of land very close to the wind farm. They plan to build communities of new homes on their land. These two landowners oppose the project. They are concerned that people would not want to buy homes in the new communities they plan to build, because the new homes would be too close to the wind farm.
- During the 12-month construction phase, the project would bring about 200 new construction jobs to the county. During the operations phase, the project would bring 5-10 new full-time or part-time jobs to the county.
- Recreational hunting is important to local businesses such as hotels, restaurants, and sporting goods stores. The wind farm might decrease the amount of recreational hunting in the area.
- The wind farm company would spend money in the county during construction of the wind farm. Spending would be on construction materials, food, hotels, etc. Local spending during construction could reach about \$10 million.
- Once operational, the wind farm would continue to generate business in the county for services such as food, lodging, etc. Local spending during operations could reach \$900,000 each year.
- The company would pay property taxes to the county government for the project. This would mean more revenue for the county government. The company would pay about \$18 million in property taxes over the life of the project. This money would support schools, public health clinics, fire stations, libraries, and other services in the county.

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## Group – Ranching and Mining Coalition

The ranchers who graze their cattle in the project area have formed an alliance with the companies that have leased private lands in the project area and plan to mine the lands in the future. A non-profit organization that represents mining interests in the state has also joined the coalition, in order to support other individuals and companies that may be interested in starting mining operations in the project area in the future.

## Factors of Interest

- Cattle have been grazing in the area for over 100 years.
- Cattle are an important source of income for several families in the area.
- The wind farm facilities and operations may prevent access to areas that have potential for future mining activity.
- The wind farm would require the construction of gates in some parts of the project area, and these gates may block access for future mining activities.
- Some of the species in the area, such as the paper-spined cactus, the pronghorn antelope, and the Gunnison's prairie dog, are currently struggling with pressures created from humans. If the wind farm negatively impacts these species, then the public lands in the project area could be closed to ranchers and miners as well, to protect the species.

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### Group – Recreational Hunting Association

This is a non-profit organization that represents the interests of people who hunt for recreation in the proposed project area.

### Factors of Interest

- The use of explosives could hurt the Gunnison's prairie dog colonies living in the project area.
- Many people enjoy hunting the Gunnison's prairie dog in the project area.
- The new access roads may scare pronghorn antelope from the area.
- The new access roads would increase the possibility of antelope getting killed by cars and trucks.
- Many people enjoy hunting the pronghorn antelope in the area.
- New gates built for the wind farm would block recreational hunters' access to some areas of the public lands.
- If, as a result of the wind farm project, populations of the Gunnison's prairie dog and pronghorn antelope decline in the area below a certain level, recreational hunting may end up being banned altogether.

### Discussion Steps

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## Group – Friends of Biodiversity

This group includes wildlife biologists, ecologists, conservationists, and individuals interested in protecting and preserving the area's natural environment.

## Factors of Interest

- About 1,627 acres of land would be temporarily disturbed by the proposed project, and about 250 acres could be permanently impacted. Desert environments are very fragile, and do not recover from damage easily.
- The total damage to the environment - from the wind farm, mining, cattle grazing, hunting, and unpredictable events such as wildfires and diseases spreading through wildlife populations - add considerable stress to the desert environment.
- The populations of paper-spined cactus, the pronghorn antelope, and Gunnison's prairie dog have already been decreasing, and this wind farm would compound the problems for these species.
- Soil erosion is already a big problem in the area. A recent wildfire was followed by a great deal of soil erosion. This is because the wildfire burned the plants that would usually absorb water into their roots and reduce soil erosion from the movement of water. The burning of the plants also left the area more open to the erosive effects of wind. The disturbance to the lands by the proposed wind farm project would increase the amount of soil erosion.
- The use of explosives would scare some wildlife away and injure others.
- The new access roads would increase the possibility of wildlife getting hit by trucks, and would make it harder for smaller species, such as mice and gophers, to move freely through the areas where they have always lived.
- While the number of birds and bats getting killed by wind turbines may not be large currently, as more wind farms are built, more birds and bats will be killed.

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## Group – Coalition of Archaeologists

This group of archaeologists includes researchers who are already investigating archaeological sites near the project area, as well as archaeologists from universities within and outside the state.

## Factors of Interest

- The survey of phase one of the proposed wind farm has already uncovered important archaeological sites, including some that are 1,500 years old.
- Potential archaeological resources in the project area would help the research projects of archaeologists already conducting investigations nearby.
- Since it takes years of study to be able to recognize important archaeological resources, archaeologists are concerned that construction crews could not be trained sufficiently in a short time period to recognize archaeological resources uncovered while digging up the ground during construction activities.
- If important archaeological resources are uncovered once construction has already started, it would be harder and more costly for the wind farm company to modify its design plans. Would they be able to afford making those design modifications?
- Archaeological resources uncovered during construction would be vulnerable to looting, vandalism, and damage.

## Discussion Steps

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