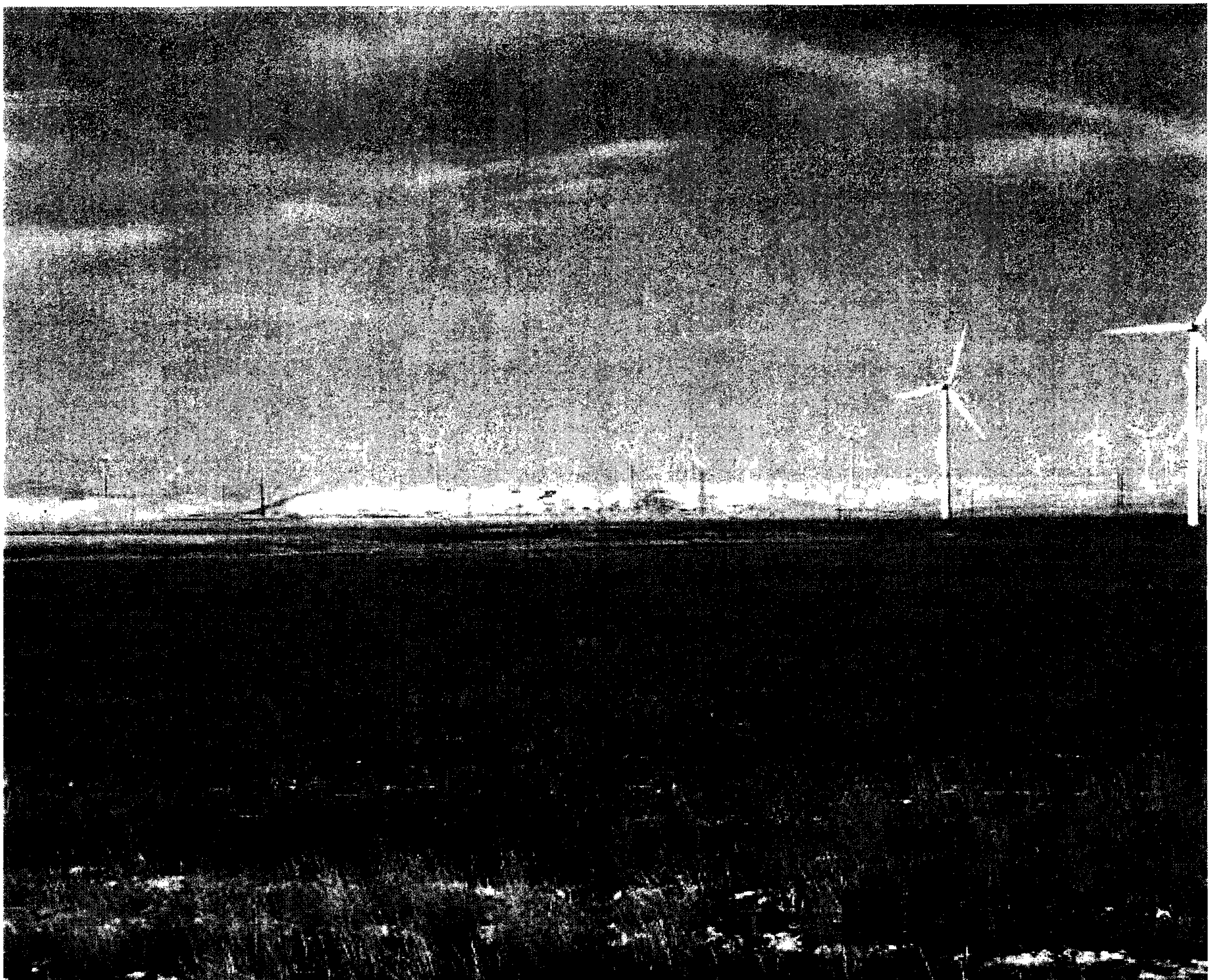

Environmental Assessment for the Judith Gap Wind Farm Project

Finding of No Significant Impact
Judith Gap Wind Farm

Montana Department of Natural Resources and Conservation
Farm Service Agency, United States Department of Agriculture

Introduction:

The Montana Department of Natural Resources and Conservation (DNRC) and the Farm Service Agency (FSA) have jointly prepared an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with a proposed wind energy park to be located six miles south of the Town of Judith Gap, Montana. A portion of the wind farm would be located on State of Montana school trust land and on private lands enrolled in the FSA, Conservation Reserve Program (CRP).

The purpose and the need for the EA are outlined in detail in Section 1.0 of the EA.

Selected Alternative

The selected alternative is Alternative B, construction and operation of the wind energy park on both State of Montana, school trust land and on private land enrolled in the CRP. Selection of Alternative B will result in the accomplishment of the project objectives.

Objective 1 Lease the right to utilize state land for the production of wind energy and generate the maximum legitimate monetary return to the common school trust. Alternative B will allow DNRC to lease to Windpark Solutions America LLC the right to place up to fifteen wind turbines on school trust land. The common school trust is projected to earn between \$37,500 and \$50,769 from wind energy.

Objective 2 Manage the state rangeland for the desired future condition characterized by a healthy native plant and animal community. Selection of Alternative B will maintain 99% of the native rangeland in an unchanged condition characterized by healthy native plant and animal communities. Avian and bat populations are not expected to be significantly affected.

Objective 3 Allow a producer enrolled under FSA's CRP to remove part of the enrolled acres for the construction of wind turbines for the production of wind energy. Selection of Alternative B will allow for the removal of 38.22 acres from CRP contracts while maintaining program benefits from remaining CRP acreage.

Reasons for Finding of No Significant Impact (FONSI)

In consideration of the analysis documented in the EA and the reasons outlined in this FONSI, the preferred alternative would not constitute a major State or Federal action that would significantly affect the human environment. Therefore, an EIS will not be prepared.

The following are separate finding specific to state and federal environmental rules:

The Montana Department of Natural Resources and Conservation makes the following findings pursuant to 36.2.524 ARM; Determining The Significance of Impacts.

1. The severity, duration, geographic extent and frequency of impacts from the construction and operation of the wind energy park are minimal.

   Of primary concern is the impact from collision or displacement to bird and bats. It is estimated that less than 3.5 birds and 2.5 bats deaths per megawatt will result from construction. At full build out of 180 megawatts this would result in the annual death of 540 birds and 450 bats. Eight raptor deaths are predicted annually. Some small-scale displacement of breeding songbirds is expected. There is the potential for displacement of one or two ferruginous hawk nests. These impacts are expected to occur over the twenty-year life of the project. Avian and bat impacts are not expected to be biologically significant.

   All other resource impacts are expected to be minimal and not significant. A minor amount of soil compaction during construction is expected. The conversion of 35 acres of native prairie, 38 acres of crested wheatgrass enrolled in the CRP, and 11 acres of dryland cropland to industrial purposes will occur. Construction of the wind park will result in a change in the visual character of the area. However, due to the lack of unique landscape characteristics and remote location this change is not deemed significant. The wind park will generate 45-50 A-weighted decibels of noise at 1,000 feet. There are no noise receptors within 0.50 miles of the project area. Noise modeling indicates that no significant impact to nearby residences will occur. No archeological sites will be disturbed as a result of project construction. The surrounding land uses of grazing and agricultural production will remain largely unchanged.

2. There is a reasonable level of assurance that the severities of potential impacts are known and are not significant.

   A detailed comparison has been made of potential avian / bat impacts of the proposed wind energy park and similar facilities and the DNRC is reasonably sure that avian impacts will be similar and not significant. Mortality and displacement estimates are based on these similar facilities. Moreover, an avian and bat monitoring plan has been established to measure actual mortality.

   All other resource impacts are known and can be reasonably predicted in terms of scope, duration, geographic extent and frequency of occurrence.

3. The growth inducing and growth inhibiting aspects of project development including the relationship or contribution of the impact to cumulative impacts are minimal. The project is located in Wheatland County, an area of declining population and economic activity. Assuming full build out, the project is expected to employee 175-275 people during the construction of the project and 6 –10 people during operation. The project will result in a minimal level of additional housing and demand for government services and these impacts are not expected to be significant

4. The impact to the quality and quantity of each environmental resource, including unique or fragile resources, is not expected to be significant.

The expected level of avian and bat mortality and displacement is not expected to have a significant impact to the quality or quantity of these resources. Changes to all other resources are minimal and do not have a significant effect on the quality or quantity of these resources.

5. The DNRC has considered the importance to the state and to society of each environmental resource or value that would be affected and has determined that no significant impact to these resources or values will occur from project implementation.
6. Implementation of the proposed action will not result in committal of the DNRC to future actions with significant impacts or decisions in principal about such future actions.
7. Implementation of the proposed action is not in conflict with any local, state, or federal law, requirements or formal plan.

The United State Department of Agriculture, Farm Services Administration makes the following findings pursuant to

Context (40 CFR 1508.27(a)

The preferred alternative (B), as outlined in the EA would allow greater revenue for the Montana School fund. In addition the property removed from CRP would be minimal and would not affect the remaining CRP contract acres. The potential effects of implementation of the preferred alternative will be providing a renewable wind energy source that is considered to be a more environmentally friendly and attractive compared to dams and current reliance on fossil fuels.

Intensity (40 CFR 1508.27(b)

1. Both beneficial and adverse impacts (40 CFR 1508.27(b)(1)) of implementing the preferred alternative have been fully considered within the EA. Cumulative impacts are expected to be minor as implementation of the preferred alternative will cause very little if any impact on the area and the human environment.

2. The preferred alternative would not significantly affect public health or safety (40 CFR 1508.27(b)(2)). Implementation of the preferred alternative would provide positive benefits by providing an alternative renewable energy source and increased revenue to the State School trust fund.

3. The preferred alternative would not significantly affect any unique characteristics (40 CFR 1508.27(b)(3)), which includes historic and cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. There is a visual impact to the immediate area and surroundings but reactions to this are more of a personal nature and will vary from individual to individual. Some individuals will prefer the current landscape as is with other individuals feeling the wind turbines add to the existing landscape.

4. The preferred alternative does not involve effects to the quality of the human environment that are likely to be highly controversial (40 CFR 1508.27(b)(4)).

5. The preferred alternative would not impose highly uncertain or involve unique or unknown risks (40 CFR 1508.27(b)(5)). Some avian and bat mortality would occur however impact is expected to be minor.

6. The preferred alternative would not establish a precedent for future actions with significant effects and does not represent a decision in principle about a future consideration (40 CFR 1508.27(b)(6)). The intended outcome of the preferred alternative is to provide increased revenue to the State School fund along with providing a renewable energy source. Any future projects that are similar in nature will need to be reviewed on a case-by-case basis to determine their individual potential for impacts on the human environment.

7. The preferred alternative is not related to other actions with individually insignificant but cumulative significant impacts (40 CFR 1508.27(b)(7)). The Environmental Consequences section of the EA discusses potential cumulative impacts of implementing the preferred alternative. Cumulative impacts of implementing the preferred alternative were determined to not be significant.

8. The preferred alternative would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural, or historical resources (40 CFR 1508.27(b)(8)).

9. The preferred alternative would not have adverse effects on threatened or endangered species or designated critical habitat (40 CFR 1508.27(b)(9)). In accordance with section 7 of the Endangered Species Act, the effects of implementing the preferred alternative on threatened and endangered species and designated critical habitat were addressed in the EA and a biological assessment completed by FSA. Consultation with the U.S. Fish Wildlife Service was completed.

10. The preferred alternative does not threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10)).

Determination

On the basis of the analysis and information contained in the EA and this document, it is our determination that adoption of the preferred alternative, Alternative B, does not constitute a major action significantly affecting the quality of the human environment. Therefore, an EIS is not necessary. This decision is effective upon signature.

Jeanne Holmgren

Jeanne Holmgren, State of Montana, Real Estate Management Bureau Chief

Mel Yost

Mel Yost, Farm Service Agency

This determination is not subject to appeal rights. A copy of the EA is available at Montana Department of Natural Resources and Conservation, 613, NE Main, Lewistown, Montana or the USDA, Farm Service Agency, 809 Second Ave NW, Harlowton, Montana

Judith Gap Windfarm – Response to Public Comment

1. Technical Advisory Committee (TAC)
   - Expand the role of the TAC to include ability to recommend mitigation measures in the event of unacceptable bird / bat mortality.
   - Include Montana Audubon in the TAC.
   - Establish a protocol for response to unforeseen bird / bat impacts.

The parameters of the Technical Advisory Committee were agreed upon between the project developer and the United States Fish and Wildlife Service and will not be renegotiated at this time.

An offer will be extended to Montana Audubon to participate on the TAC.

Protocol for Response to Unforeseen Bird/Bat Impacts

Step one: Investigate cause and gather incident information (e.g., weather conditions, turbines involved, types of lighting)

Step two: Thoroughly search turbines involved in incident as well as adjacent turbines. Walk through other parts of wind farm to determine if incident was restricted to a small set of turbines.

Step three: Report to local authorities and USFWS within a 48 hours

Step four: Work with agencies and TAC members and continue evaluating information.

Step five: Evaluate cause, make recommendations to avoid or mitigate future incidents

2. Describe the vegetative characteristics of the private grazing lands.

Private gazing lands are similar in character and quality to the native short grass prairie described in detail on state land. The typical plant species composition of private grazing lands include the following grasses and sedge; prairie junegrass, Sandberg bluegrass, western wheatgrass, needle and thread, blue grama, threadleaf sedge and forbs including; Hood's palox, common yarrow, cudweed sagewort, fringed sagewort, carrotleaf lomafium, milk vetch, pussytoes, death camas, dandelion, broom snakeweed, and penstemon. Livestock stocking rates on private land are determined by the landowner and can be expected to be slightly higher than those established for state land.

3. Include the results of the winter migration studies in the final EA.

Preliminary results from a winter avian survey in the Project and surrounding area include four sightings of bald eagles based on surveys conducted on January 16, 17, 26 and 27, 2004 (WEST 2004). Two sightings occurred on two consecutive days approximately three miles northeast of the Project area (Figure 5). One of these sightings included two adults and one juvenile perched on a fence; the second sighting was one eagle perched on a fence along a county road. A third sighting was made approximately two miles west of the Project area (Figure 5), and the eagle was flying overhead near a deer carcass. A golden eagle was also perched near this carcass. The fourth bald eagle sighting was made along U.S. Highway 191 within the Project area. This sighting was of a bald eagle in flight at an estimated altitude of 100 meter above the ground surface.

4. Explain why a NEPA review is required for private CRP lands.

In order for the USDA, Farm Services Administration to make a decision regarding whether to allow lands to be withdrawn from the CRP without penalty it must review the proposed action under the National Environmental Policy Act. The decision to make a NEPA review of this withdrawal request was made after consultation with the James P. Fortner, Environmental Compliance Manager, Conservation and Environmental Programs Division, Farm Services Administration, USDA - Washington, D.C.

5. Identify state land property boundaries to prevent trespass.

State land property boundaries will be prominently flagged prior to construction activities in order to prevent trespass. Construction crews will be briefed that no activity of any kind is to take place on adjoining private lands.

6. Assure that a map with the final tower placement is made available when finished.

Upon final determination of tower placement a map will be placed on the DNRC website, dnrc.state.mt.us. A copy of this map will be mailed to the requesting party.

7. Establish the setback distance from property lines for towers on state land. Suggested setbacks of 500' from a property line and 1,500 – 2,640 from a residence.

Setback distances for wind turbines are usually determined by local zoning ordinance. In the case of Wheatland County no setbacks established through local planning regulation. For state land a setback of 300 feet will be required unless the imposition of the setback will result in the removal of a wind turbine from state land. In no case will a wind turbine be placed in such a manner that a rotor blade will overhang adjoining property ownership. Setback between other wind turbines located on private land and other deeded ownership will be negotiated on an individual basis between the project developer and individual landowners. The project area is free of residential structures within one half mile (2,640).

8. Require insulators on all power poles.

All power poles will include insulators to prevent avian electrocution.

9. Describe lighting of power substation.

Lighting of the power substation is of concern due to a recent event where thirty birds collided with three wind turbines and an electrical substation. This event occurred during foggy conditions and may be caused by the attraction of four sodium vapor lamps mounted on the substation. The substation was located in close proximity (120') of three wind turbines. In the case of the Judith Gap project the substation is located over one half mile from the nearest wind turbine. Substation lights will be shrouded to minimize aerial visibility and attraction.

10. Sections 1.11.1.6.1 Environmental Justice and 1.11.1.6.2 were omitted from the draft EA.

Section 1.11.1.6.1 "Environmental Justice": Executive Order 12898, Federal Actions to address Environmental Justice in Minority Populations and Low Income Populations, requires FSA to review any disproportional adverse human health or environmental affects of its programs, policy and activities on minority and low income populations.

Section 1.11.1.6.2 Rational for Elimination of Environmental Justice from Further Study. In accordance with the 2002 Census, of Wheatland County population of approximately 2250 residence only 3 percent are minorities. Of the 835 listed households in Wheatland County (2000 Census) only 2.3 are minorities. The majority of residences currently reside in either the communities of Judith Gap or Harlowton, and minority population makes up a very small part of the project area. Of the 2250 residence of Wheatland County 440 or 19.5% are below the poverty level (2000 Census). There are no potential adverse health effects of this proposed project and as stated in Section 4.9 of the EA, the economic affect is a benefit to the area and area population. Therefore no direct, indirect, or cumulative effects are likely from selection of either alternative and this resource has been eliminated from further analysis.

11. Comments regarding haying and grazing CRP.

Comment regarding Section 2.2.1.1, regarding those acres under contract in the Conservation Reserve Program (CRP) cannot be hayed or grazed. The commenter is correct in that the acres can be hayed/grazed but this is limited on a year-by-year basis depending on drought or other disasters as designated by the agency. Also the entire CRP acreage can be hayed or grazed once out of every five years for forage management purposes but this practice must also be authorized by FSA as a needed management practice.

12. Comments regarding minor grammatical errors within the draft EA.

We acknowledge that minor grammatical errors exist within the draft EA. However, correction of these errors does not warrant the expense of republication of the entire document.

13. List all mitigation measures in one location.

Judith Gap Windpark Mitigation Measures:

Water Quality – Non Point Discharge Elimination System, General Permit for Stormwater Discharge

Public Safety - Montana Department of Transportation, Highway Approach Permit

Noxious Weeds – Wheatland County Weed District, Montana Noxious Weed Management Act, Weed control and management plan

Noxious Weeds – Power washing of all construction vehicles

Archeological – Preconstruction survey of all lands proposed for disturbance on state land.

Aviation – Red and white alternating lights will be placed on 10 – 15 wind turbines.

Avian Mortality and Displacement Monitoring – An Avian and Bat Monitoring Plan for the Judith Gap Windfarm will be implemented. A Technical Advisory Committee will advice the project developer regarding avian / bat impacts. A minimum amount of overhead power lines would be constructed. All power poles will have insulators to minimize bird electrocution. The power substation will be located one half mile from wind turbines and substation lighting will be shrouded.

Windpark Solutions Arcadia General Bidding Instructions

Included in WPSA Arcadia's instructions to prospective contractors bidding on construction of the proposed Judith Gap Wind Farm would be environmental protection requirements. Several noteworthy requirements identify the contractor as responsible for the following:

- *Solid and Sanitary Waste Disposal* -- Contractor shall pick up solid wastes and place in containers that are regularly emptied, dispose of garbage in approved containers that are regularly emptied, and prevent contamination of the proposed project site and other areas when handling and disposing of wastes. Upon completion of the work, Contractor shall leave the work areas clean, and control and dispose of wastes.
- *Petroleum Products* -- Contractor shall conduct fueling and lubrication of equipment and motor vehicles in a manner to protect against spills and evaporation, and shall dispose of unused lubricants and oils.

- *Dust* -- Contractor shall implement dust control at all times in accordance with applicable local and state requirements. Contractor shall keep dust down at all times during construction. Air blowing would be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Contractor shall not permit the shaking of bags of cement, concrete mortar, or plaster.
- *Temporary Construction* – Contractor shall remove temporary construction facilities (erected by and within Contractor's scope), including access road-entrance-way build ups, access road corner widening, crane pads, work areas, structures, foundations of temporary structures, and stockpiles of excess or waste materials.
- *Protection of Roads* -- Contractor shall plan and practice measures to minimize the impact to the existing landowner, township, county and state roads. Measures shall include demanding low speed limits for heavy vehicles and equipment traveling on the roads. Any road damage caused by construction activities shall be repaired by Contractor.

Windpark Solutions Arcadia Best Management Practices During Wind Farm Construction

WPSA has developed BMPs for wind farm projects. These include:

- *Disturbance Minimization* – The proposed wind farm project would be constructed to fit the existing terrain, thereby eliminating land-disturbing cut and fill activities, minimizing disturbance to existing drainage, and reducing soil erosion potential.
- *Sediment Control* -- Potential sediment movement to nearby drainages and wetlands resulting from construction disturbance would be controlled by installing silt fencing on the downhill side of access roads along low areas, and installing gravel entrances at county roads prior to grading activities to prevent vehicle tracking.
- *Fueling and Equipment Maintenance* -- Construction equipment would be fueled and maintained at an equipment maintenance staging area that would be designed to contain spills. Accidental spills would be cleaned up immediately following state regulations.
- *Reclamation/Revegetation* – Areas disturbed during construction would be graded to blend with the natural terrain, scarified, and seeded with species at landowner request or with regionally native species.
- *Inspection/Maintenance* -- Silt fencing would be inspected within 24 hours of each rain event of 1/2 inch or greater, maintained by removing sediment after a 50 percent loss of capacity, and replaced as necessary.

Windpark Solutions Arcadia Best Management Practices During Wind Farm Operation

WPSA would continue to follow WPSA BMPs during operation of the proposed wind farm. These specifically include:

- *Access Road Maintenance* – Permanent access road gravel surfaces within the proposed wind farm would be maintained to ensure positive drainage and minimize sediment runoff.
- *Noxious Weed Control* – Areas disturbed during construction would be monitored for infestation by noxious weeds at regular intervals coinciding with routine wind farm maintenance and monitoring activities.
- *Revegetation Monitoring* -- Re-seeding efforts using native grass seed mixes on areas disturbed during construction that are not being used for crop production would be monitored for success annually (in the spring) for two years following construction. If

revegetation efforts are not or only partially successful, appropriate reseeding measures would be taken.

Judith Gap Windfarm

Cover Sheet

The Montana Department of Natural Resources and Conservation and the United States Department of Agriculture, Farm Services Administration have prepared this joint environmental analysis to examine the effects on the human environment of the construction and operation of a wind farm in Wheatland County, Montana.

Proposed Action: The Montana Department of Natural Resources and Conservation (DNRC), proposes to lease 640 acres of school trust land for the placement of wind turbines for the production of electrical energy. Fifteen wind turbines are proposed to be constructed on school trust land located at Township 10N, Range 15E, Section 36 as part of a larger wind energy development occurring on adjacent private lands. The project is located six miles south of the town of Judith Gap along state highway 191. The proposed action would be implemented as early as April 1, 2004.

The United States Department of Agriculture (USDA), Farm Service Agency (FSA), is reviewing requests from various producers to allow the producers to place wind turbines for the production of electrical energy on property enrolled in the agency's Conservation Reserve Program (CRP). A maximum of 44 wind turbines are being proposed for CRP acreage. The acreage is located in Sections 29, 30, 31, 32, 33 of T10N, Range 16E and Sections 4, 5, 18 of T9N, Range 16E.

Type of document: Environmental Analysis

Co-lead agencies: Montana Department of Natural Resources and Conservation
United States Department of Agriculture, Farm Services Administration

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1.0 Chapter 1: Purpose of and Need for Action

1.1 Proposed Action: Construction

The Montana Department of Natural Resources and Conservation (DNRC) proposes to lease the right to construct fifteen wind turbines and associated facilities to Windpark Solutions America LLC (WPSA) or its assignee. The proposed project would be implemented as early as April 1, 2004.

In accordance with 2-CRP Handbook Par. 282, Farm Service Agency proposes to consent to producer's requests to install wind turbines for the production of electrical energy on acreage enrolled in the Conservation Reserve Program (CRP) on a case-by-case basis. FSA has received written requests from various producers for this purpose.

1.2 Location

The location of the state land within the proposed project is: Section 36, Township 10N, Range 15E, Wheatland County, Montana. The project is located six miles south of the town of Judith Gap along state highway 191.

The location of CRP acreage within the proposed project is: Sections 29, 30, 31, 32, 33 of T10N, Range 16E and Sections 4, 5, 18 of T9N, Range 16E.

1.3 Need for the Action

The state lands involved in the proposed project are held by the State of Montana in trust for the support of the Common School Trust (K-12 public education). The Board of Land Commissioners and the DNRC are required by the Montana Constitution to manage trust land to produce the largest measure of reasonable and legitimate monetary advantage for Montana's public school system. This guiding philosophy was codified by the Montana Legislature in 77-1-601, MCA.

7CFR Chapter VII, Subchapter G-Part 799 requires FSA to consider and address the effect on the environment in regard to all decision making processes. Therefore, before FSA can make a determination on a producer's request to remove acres from a CRP contract, the provisions of the National Environmental Policy Act (NEPA) must be considered and addressed.

1.4 Objectives of the Action (desired outcomes and conditions)

In order to meet it's Constitutional and statutory obligations, the DNRC has set the following project objectives:

Objective #1: Lease the right to utilize state land for the production of wind energy and generate the maximum legitimate monetary return to the common school trust.

Objective #2: Manage the rangeland for the desired future condition characterized by a healthy native plant and wildlife communities.

1 Purpose of and Need for Action

In order to meet its obligations under the CRP the FSA has set the following project objective

Objective #1: In regard to the CRP acres, approve producer's requests to remove property from the CRP contract for the production of wind energy. The remaining CRP property would continue to be managed by the owner under the terms of the CRP contract.

1.5 Decisions to be Made

- Determine if alternatives meet the project objectives
- Determine which alternative should be selected
- Determine if the selected alternative would cause significant effect(s) to the human environment, requiring the preparation of an environmental impact statement (EIS).

1.6 Relationship to other plans

The DNRC is in the process of completing a programmatic environmental impact statement for real estate management activities. The Department's administrative rule xxxx allows program activities to continue while this plan is under preparation.

The final Programmatic Environmental Impact Statement (PEIS) for the Conservation Reserve Program was published in the Federal Register on February 17, 2003. A Record of Decision for the PEIS was published in the Federal Register on May 8, 2003. Withdrawal of a portion of land from a CRP contract for the production of wind energy is consistent with decision reached in the PEIS. Individual projects require the appropriate level of analysis under the NEPA.

1.7 History of planning and scoping process

Comments were solicited in the spring of 2003. Advertisements were placed in the Harlowton Times Clarion and Lewistown News Argus soliciting comment. Newspaper articles appeared in both newspapers. Letters were sent to interested parties. The project proponent held public meetings in Judith Gap and Harlowton the week of January 27, 2003. A petition supporting the project containing 75 signatures was received. The Wheatland County Commission, City of Harlowton, and Town of Judith Gap submitted letters supporting the project. DNRC officials met with groups interested in the project.

The following agencies and organizations were contacted for input into the review of this project:

Montana Department of Fish, Wildlife and Parks
Montana Department of Environmental Quality
Montana Department of Transportation
Montana Department of Revenue
Montana Historical Society
Montana Department of Labor
Wheatland County Commission
United States Fish and Wildlife Service
United States Army Corp of Engineers
United States Bureau of Land Management
United States Federal Communication Commission
United States Forest Service
United States Federal Aviation Administration

United States Natural Resource Conservation Service
United States Air Force
United States Federal Communication Commission
Lewistown Airport
Harlowton Airport
Town of Judith Gap
City of Harlowton
Montana Audubon
Montana Environmental Information Center
Eloise Warner
Springdale Colony

1.8 Other environmental assessments related to this project

DNRC EA 10/22/02: Placement of an anemometer to measure wind and weather conditions and authorize avian and geotechnical studies.

DNRC Field Evaluations of grazing management practices dated 4-27-01 and 5-12-03.

Cultural Resource Inventory project # 95-8-3; Cennex Front Range Pipeline class 3 level inventory of pipeline disturbance

Cultural Resource Inventory project # 99-6-9; Montana Department of Highways class 3 level inventory of highway disturbance

1.9 Permits, Licenses, and other Authorizations Required

DEQ – Authorization under the General Permit for Stormwater Discharges from Construction Activity
MDT – Right of Way for underground highway crossing
MDT – Highway Approach Permit
Wheatland County Weed Board – Submission of a weed management plan

1.10 Issues Studied in Detail

1.10.1 Soil Resources

Potential adverse impacts to soil include increased runoff due to compaction and loss of vegetation for wildlife and livestock.

1.10.2 Vegetation

Potential adverse impacts to vegetation include conversion of native range for industrial purposes.

1.10.3 Wildlife

Potential adverse impacts to birds and bats includes the displacement of local birds from construction and operation of the wind farm, and resident and migratory bird and bat deaths due to collision with wind turbines and associated facilities. Some mortality of small mammals may occur from construction and operation due to excavation and vehicle collisions.

1.10.4 Visual Resources

Wind turbines and associated facilities change the visual character of the area.

1.10.5 Noise

Wind turbines create noise and there is potential adverse impact to area residents.

1.10.6 Aviation

Wind turbines may pose a risk to aircraft.

1.10.7 Economic Benefits and Expected Revenues

Construction and operation of a windfarm will create employment and tax revenue.

1.10.8 Historical and archeological sites

Construction and operation of the windfarm may disturb historical or cultural resources.

1.10.9 Land Use

Construction and operation of the windfarm may change land use in the area. Reclassification by DNRC of the subject state land from classification of a primary land use of grazing to a primary land use of wind energy production may affect the existing state grazing lessee.

1.11 Issues eliminated from further study

1.11.1 Water quantity, quality and distribution

The United States Army, Corp of Engineers (USCOE) has authority to regulate projects that place fill material into waters of the United States under Section 404 of the Clean Water Act. Waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters.

Under the Clean Water Act, The Montana Department of Environmental Quality (DEQ) administers the National Pollutant Discharge Elimination Program (NPDES) through the Montana Pollutant Discharge Elimination System program. The NPDES storm water program regulates water discharge associated with construction projects. Construction projects that disturb one acre or more of earth are required to obtain authorization under the General Permit for Storm Water Discharges Associated with Construction Activity.

An inventory of all water features within the windpark area has been completed. The project area contains no fish bearing streams or lakes. The water features in the project area are characterized by stock water ponds and ephemeral streams. Because of the gravelly nature of the soil few wetland areas exist.

1.11.1.2 Rationale for elimination of water quantity, quality and distribution from further analysis

The USCOE after examining the water resource inventory and conducting an on site inspection, determined in a letter dated April 24, 2003 that the project area did not contain any waters of the United States and that a permit under Section 404 of the Clean Water Act is not required.

The DEQ will require a General Storm Water Discharge permit that includes preparation of a Storm Water Pollution Prevention Plan (SWPP). The SWPP is completed shortly before project construction after completion of the final engineering design of the wind farm. It will contain an analysis of the characteristics of the site such as nearby surface water, topography, and storm water runoff patterns; identification of potential pollutants such as sediment from disturbed areas, and stored wastes or fuels; identify Best Management Practices (BMPs) which will be used to minimize or eliminate the potential for these pollutants to reach surface waters through storm water runoff.

The project proponent has developed BMPs for Windfarm Construction that establish erosion and sediment control measures that mitigate potential effects to water quality, quantity and distribution.

Because of the absence of valuable surface water features, the requirements of the DEQ storm water permitting process, and compliance with BMPs, project construction or operation is unlikely to have a negative effect on water quantity, quality or distribution. Therefore, no direct, indirect or cumulative effects are likely from the selection of either alternative and this resource has been eliminated from further analysis.

1.11.1.2.1 Air Quality

A planning and management process, "Prevention of Significant Deterioration" (PSD), was introduced as part of 1977 Amendments to The Clean Air Act. These PSD requirements set limits for increases in ambient pollution levels and establishes a system for preconstruction review of major projects. Three PSD classes have been established. Class I allows very small increases in pollution; Class II allows somewhat larger increases; and Class III allows air quality to deteriorate considerably more. The project area is located within a Class II airshed. A Class II airshed allows for moderate, well controlled growth in air pollution. However, the proposed wind turbines produce no air pollution emissions of any kind. A minor amount of fugitive dust generation is expected during construction but will be mitigated by implementation of best management practices to levels below federal or state standards.

1.11.1.2.2 Rationale for Elimination of Air Quality from Further Analysis

Wind turbines do not produce polluting emissions. Best Management Practices will mitigate any expected effect from fugitive dust below federal or state standards. Therefore, no direct, indirect or cumulative effects are likely from the selection of either alternative and this resource has been eliminated from further analysis.

1.11.1.3.1 Recreational Use

The state land within the windpark area is open for recreational use and receives a low level of antelope and deer hunting activity. Hunting on private land within the windfarm area is subject to landowner discretion.

1.11.1.3.2 Rationale for Elimination of Recreational Use from Further Analysis

Recreational use would continue without change post construction of the windfarm. Therefore, no direct, indirect or cumulative effects are likely from the selection of either alternative and this resource has been eliminated from further analysis.

1.11.1.4.1 Public safety

Public safety during the project construction phase is an issue associated with the movement of construction equipment along and onto Highway 191. An approach permit is required from the Montana Department of Transportation for any entry onto the highway. This approach permit will mitigate any safety concerns associated with the highway approach. Best Management Practices for Windpark Construction will be employed regarding the movement of construction vehicles along the highway.

1.11.1.4.2 Rationale For Elimination of Public Safety from Further Study

The Montana Department of Transportation highway approach permitting process and Best Management Practices for Windpark Construction mitigate any potential danger to public safety. Therefore, no direct, indirect or cumulative effects are likely from selection of either alternative and this resource has been eliminated from further analysis.

1.11.1.5.1 Noxious weeds

The project area is relatively free of noxious weeds. A low level of spotted knapweed is present along the Highway 191 corridor. The Montana County Noxious Weed Management Act requires the submission of a weed control plan to the county weed board specifying weed control mitigation measures and revegetation plans prior to ground disturbing activities. The plan must describe the time and method of seeding, fertilization, recommended plant species, use of weed-free seed and the weed management procedures to be used. This plan is subject to approval by the local weed board. Prior to entry of construction equipment on state land all construction equipment will be power washed to avoid transporting noxious weed seed onto state lands. According to the project proponent's BMPs, areas disturbed during construction would be monitored for infestation by noxious weeds at regular intervals coinciding with routine wind farm maintenance and monitoring activities.

1.11.1.5.2 Rationale For Elimination of Noxious Weeds from Further Study

Compliance with the Montana County Noxious Weed Management Act through submission of a weed control plan to the Wheatland County Weed Board and adherence to BMPs mitigate potential for the introduction or spread of noxious weeds to the project area. Therefore no direct, indirect or cumulative effects are likely from selection of either alternative and this resource has been eliminated from further analysis.

2 Alternatives

2.0 Alternatives Including the Proposed Action

2.1 Introduction

The purpose of Chapter 2 is to describe the alternatives and compare the alternatives by summarizing the environmental consequences. Alternatives were planned through scoping and development of issues and input from specialists. In addition, compliance with state school trust mandates and FSA CRP program rules helped shape alternatives. This chapter describes the activities (or lack of) of the No Action alternative and all action alternatives. Then based on the descriptions of the relevant resources in Chapter 3: Affected Environment and the predicted effects of all alternatives in Chapter 4: Environmental Consequences, this chapter presents the predicted effects of all alternatives on the quality of the human environment in comparative form, providing clear basis for choice among the options for the decision maker and the public.

2.1.1 Process Used to Develop the Alternatives

The major environmental issues were identified during the scoping process and were defined and summarized in Chapter 1. In order to understand how the proposed Construction alternative would effect the environment, its effects are contrasted to those of the No Action alternative. An important element to remember when making the contrast between the No Action and Construction alternatives is that the No Action alternative contains the expected effects of the construction and operation of a wind farm on private lands not enrolled in the CRP program. The Construction alternative discloses the additional impacts that are expected through the inclusion of private CRP lands and state lands within the project area.

2.1.2 Alternatives Eliminated From Detailed Study

No other alternatives were developed. The subject state land was opened to a lease for wind energy development through the issuance of a Request For Proposals. WPSA was the successful bidder in this process and has exclusive rights for wind energy development on the state land and has entered into exclusive contractual arrangements with the private property owners whose lands are enrolled in CRP. The WPSA project proposal met all project objectives and is the only action alternative proposed for state land and the adjacent CRP acres.

Alternatives were considered that included fewer wind turbines but not selected for further analysis as an analysis of the larger number of turbines would contain the effects expected if fewer turbines were constructed.

2 Alternatives

2.2 Description of Alternatives

2.2.1 Alternative A: No Action

The DNRC would not issue a lease for the development of wind energy production. No wind turbines would be placed on state land. However, windfarm development would continue on adjacent private lands. Existing uses of state land would continue.

The producer's request for placement of wind turbines on CRP contract acres would be denied. No wind turbines would be placed on property enrolled in the CRP program. Wind farm development could occur on the producer's private property not enrolled in the CRP program. Or the producer could remove the property from the CRP contract (the U.S. government would impose a monetary penalty to the producer if this occurred) and place the turbines on their private property.

2.2.1.1 Past Relevant Actions

Livestock grazing: The state land is currently leased for the grazing of livestock and that activity would continue unchanged.

Fire suppression: Human and natural caused fires have been and would continue to be suppressed.

Hunting and other recreational uses: limited deer and antelope and upland bird hunting would continue under the regulation of the Montana Department of Fish, Wildlife and Parks.

State Land Road Use: all existing roads would remain closed to public vehicle traffic. Roads remain open for emergency services, administrative use and use by the grazing lessee.

CRP Land Use: The CRP acres was native range which was broken out and cultivated for crop, primary in this area the farming practice was dryland grain farming. Under the CRP program enrolled acres are removed from crop production and re-planted back to native grass varieties by the owner of the property. CRP contracts are for 10 or 15 years. This a voluntary program for the owner/operator of property. It is the intent of the program that CRP acres are managed for soil and water conservation and for wildlife purpose. Acres under contract cannot be farmed, hayed or grazed during the term of the contract. The producer is provide annual cash payment from FSA in return from removing the property from production. Since this is private property and upon the expiration of a CRP contract the producer may use property again as they determine. In other words after the expiration or termination of CRP contract the property can be grazed or re-broke and placed back into crop production.

2.2.1.2 Present Relevant Actions Not Part of the Proposed Action.

Same as Past Relevant Actions

2.2.1.3 Reasonable Foreseeable Relevant Actions Not Part of the Proposed Action.

Construction and operation of a wind energy farm would continue on neighboring private land. The effects of private land construction are disclosed under Alt A.

2.2.2 Alternative B: Permit the construction and operation of wind energy turbines on state school trust land and on property enrolled in the CRP program.

Overall Project Description:

WPSA proposes to design and build a wind farm between Judith Gap and Harlowton, Montana ("Judith Gap Wind Farm", or the "Project"), which shall sell the electric output and all of the environmental attributes generated by the facility to one or more utilities (output of the first phase will be sold to NorthWestern Energy) under power purchase agreements. Power generated by the proposed Judith Gap Wind Farm would connect to NorthWestern Energy's electrical transmission system on a 230,000 volt power line running between Billings and Great Falls, which runs through Project-controlled land.

The Judith Gap Wind Farm is designed to provide economical, reliable, environmentally friendly, wind-generated electricity for the use of the customers of NorthWestern Energy and, potentially, other utilities. This Project, which can be built in phases from 50 megawatts ("MW") to 180 MW, is currently in an advanced state of development by WPSA, a Montana company located in Big Sandy in Chouteau County. The first phase of the facility is scheduled to be operational by the end of 2005.

Average output (578,160 megawatt hours) expected from the proposed Judith Gap Wind Farm is approximately 66 MW. Electricity produced from the facility is estimated to meet the energy demands of approximately 66,000 Montana households.

Site Location

The proposed project is located in Wheatland County, central Montana, between the communities of Judith Gap and Harlowton. The Project development site is approximately four miles by five miles, and covers an area of over 8,000 acres. Five landowners are involved with the Project. See maps for more detail.

Description of the project proponent

The project proponent is Windpark Solutions Arcadia LLC, a Montana limited liability company jointly owned by Windpark Solutions America LLC (WPSA) and an affiliate of Arcadia Windpower, Ltd.

Description of the wind resource

The Project has been taking readings from the first on-site 40-meter meteorological tower since April, 2001, showing a mean wind speed at 40 meters of 7.6 m/s. A second on-site 40-meter tower has been providing data since October, 2002. It shows a mean wind speed at 40 meters of 8.1 m/s. At hub height of 80 meters, the proponent's meteorologist, CUBE Engineering GmbH, predicts annual mean wind speeds of 8.6 to 9.0 m/s for the individual wind turbines in a 180 MW array.

2 Alternatives

Description of wind energy farm including possible phasing of construction, location of ancillary facilities (substation etc).

The proposed WPSA wind energy project ("Judith Gap Wind Farm") would be constructed, owned, and operated by WPSA or an unaffiliated entity. The proposed project is scheduled to be operational by the end of 2005. The proposed 180 MW (based on rated or maximum capacity) Judith Gap Wind Farm is located near the communities of Judith Gap and Harlowton in central Montana. The legal description of the proposed windfarm is all or part of the following: Township 9 North, Range 15 East, Section 1; Township 9 North, Range 16 East, Sections 4, 5, 6, 7, 8, 9, 17, and 18; Township 10 North, Range 15 East, Section 36; and Township 10 North, Range 16 East, Sections 29, 30, 31, and 32. The proposed project would consist of building, constructing, operating, and maintaining electrical gathering lines and a new substation underneath an existing NorthWestern Energy transmission line; and constructing, operating, and maintaining the wind farm. The following sections describe these two project components.

COLLECTOR LINE AND SUBSTATION CONSTRUCTION

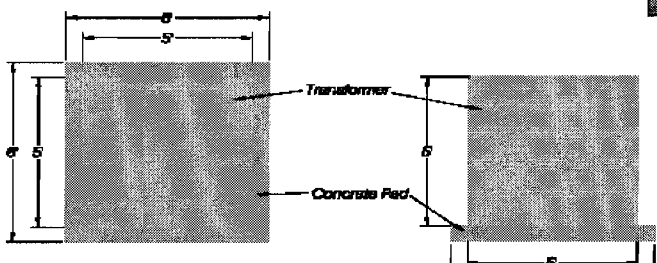
The proposed Judith Gap Wind Farm collection and transmission system would collect energy generated by the proposed wind farm and transmit it to a new substation to be built underneath NorthWestern Energy's 230 kilovolt transmission line. The location of the project substation relative to the other project components is shown on **Exhibit 1.**

Collection and Transmission System

The proponents would construct a radial feed collection system from up to 120 individual wind turbines. Individual collection lines from pad-mounted transformers at the base of the towers would mostly be buried in trenches along wind turbine access roads that are shown **Exhibit 1**. It is possible that portions of the collections lines would use overhead transmission lines to connect to the substation. The project proponents would purchase approximately 2 to 3 acres required for the collection substation from the respective landowner at fair market value. A portion of the substation would be owned by NorthWestern Energy. Trenches (both individual and common) are anticipated to be approximately 2 feet wide and 4 feet deep. Disturbance associated with all buried collection lines would be limited to a 100-foot construction ROW. All disturbances would be restored following burial of the electrical cables, and above ground utility warning markers would be installed at appropriate intervals. The pad-mounted transformers would be located within 20 feet of the base of each turbine tower. The approximate 5-foot square steel transformer box housing the transformer circuitry would be mounted on an approximate 6-foot square concrete slab. The picture insert on **Exhibit 2 below** shows a typical pad mounted transformer and its location near the base of the turbine tower. The proposed collection substation would be located within a fenced area.

Pad Mount Transformer:

Pad Mounted Transformer at Base of Wind Turbine



Pad Mounted Transformer - Plan

Pad Mounted Transformer - Profile

WIND FARM

The proposed windfarm would be located in portions of Townships 9 and 10 North, Ranges 15 and 16 East in Wheatland County, Montana as depicted in **Exhibit 3A & 3B**. A possible array of the 120 proposed wind turbines is shown. Siting considerations include:

- Anticipated 500-foot radius zone of influence of individual turbines based on turbulence; and
- Proposed 1,000-foot radius for safety, noise, vibration, and shadow flicker buffer zones for residences.

Exhibit 4 provides a diagram and photograph of the General Electric (GE) horizontal axis, 3-blade propeller turbines. The approximate height of the turbines would be 380 feet from the top of the swept area to the ground surface. The bottom of the swept area above the ground surface would be approximately 150 feet. These heights would allow the turbines to take advantage of more consistent, less turbulent winds aloft. The operational footprint of each wind tower approximates 50 feet by 50 feet, equating to approximately 1.5 acres for the proposed wind farm. The wind area under lease for a particular turbine may be up to 30 to 50 acres of land. Computer systems inside each turbine would perform self-diagnostic tests, and allow a remote operator to set new operating parameters, perform system checks, and ensure turbines are operating at peak performance. Turbines would automatically shut down in sustained winds of 56 miles per hour (mph) or gusts of about 100 mph.

2 Alternatives

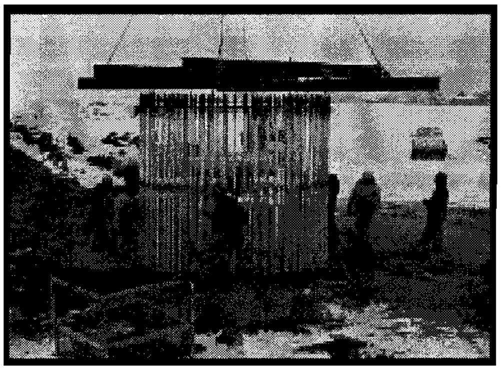
Construction of the wind turbines would be relatively quick in comparison to other types of power plants. WPSA expects to bring the proposed Judith Gap Wind Farm on-line in a matter of months once power purchase agreements and construction permits are in place. Although construction impacts would be temporary and short-lived, heavy equipment, including bulldozers, graders, trenching machines, concrete trucks, flatbed trucks, and large cranes, would be required. Wind farm construction typically occurs in the following sequence:

- *Civil Construction* -- Usually performed about three to six weeks before any other phase of construction begins. Entails surveying, cleaning, grubbing, grading, excavation, and foundation construction. In connection, it would also include civil work on support facilities such as laydown areas (approximately 3 acres), portable ready mix facilities, if applicable, construction office, and employee parking areas (approximately 2-3 acres).
- *Delivery and Access* -- Major wind turbine components including rotor assemblies, towers, power cable, and transformers would be delivered to the wind farm site by flatbed, semi-tractor trailers. A 350-foot wide construction area would be required alongside the turbine sites for rotor assembly, installation, and underground electrical, road, and access way construction. Access roads constructed from nearby US Highway 191 and Oxford Road would be graded and compacted to a total width of 35 feet for large crane travel. Permanent access road travel width of approximately 15 feet would remain after construction.
- *Electrical* -- Includes the underground collection system that interconnects into NorthWestern's transmission system via the underground and overhead medium voltage (34.5 kilovolt) collection lines and substation that were previously discussed. This phase typically starts three to four weeks after the civil construction phase.
- *Structural* -- Encompasses wind turbine and tower assembly, and erection onto turbine foundations. This phase would also include installation of all mechanical and electrical systems associated with the turbines. Typically, this phase would occur six to eight weeks following the beginning of civil construction.
- *Testing* -- This phase would start well into the proposed project, usually three to six months after the start of construction, and would typically last two to three months. This phase would include all the testing required to make the wind farm commercially operational. This incremental process would include energizing the interconnect substation, and bringing each turbine on line until commercial operation date would be declared.
- *Restoration and Final Project Completion* -- This final phase in wind farm construction would entail restoration and clean-up of all project disturbances. Erecting necessary signs, and gates, identifying permanent operations and maintenance facilities on the final walk down, and acceptance of the wind farm would be included in this final task. A photo series depicting the typical process of erecting a turbine is **as follows** and also located in **Exhibit 4.**

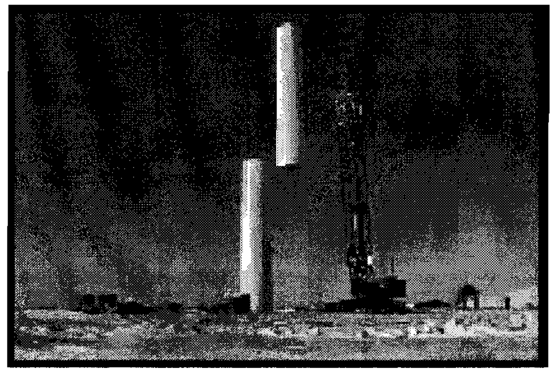
2 Alternatives

PREPARING THE ROADS

RUNNING CABLE UNDER ROAD



LOWERING THE BOLT CAGE



SETTING THE MID SECTION

SETTING THE NACELLE

FLYING THE ROTOR

Description of Overhead Power Distribution Lines
WindPark Solutions Judith Gap Project

The power distribution system for the WPSA Wind Project south of Judith Gap, Montana will be a nominal 34,500 volts and consist of mostly overhead line with segments of underground near the wind turbine locations. Overhead line construction will be either single circuit (4 wires) or double circuit (8 wires), supported on wood poles approximately 45 feet average height. The line will be designed to meet all applicable national, state and local standards and clearances, as well as to provide extra clearance over roadways where large vehicles may traverse.

Layout and placement of poles must consider numerous factors, including access for maintenance and practicality of design, as well as to obtain a pleasing aesthetic profile and appearance. Environmental considerations include pole placement to avoid drainages and other areas where soil disturbance may be objectionable, as well as addressing requirements to prevent potential electrocution of large raptors. The standards for this type of construction are well established by the U.S. Department of Agriculture Rural Utility Service; these lines will be very similar to hundreds of thousands of miles of other such lines operated by rural cooperatives throughout the west.

Distribution will be required to interconnect all turbines in a manner that allows for practical design and electrical loading; the approximate total length of line required can be determined by inspecting the distance between each turbine site, with allowance for routing to consider loop feed, as well as coordination with land owners that will continue to utilize the property for agricultural purposes

DNRC Actions:

The DNRC would reclassify the subject state land from its primary purpose of livestock grazing to the land classification “other” that allows for a primary purpose of wind farm development.

The DNRC would withdrawal the subject lands from the existing grazing leases.

The DNRC would issue the existing grazing lessee a grazing license that would allow existing grazing practices to continue subordinate to the dominate interest of the windpark.

The DNRC would enter into a lease agreement with Montana Wind Solutions America that would allow the construction and operation of wind energy turbines and associated facilities on state school trust land.

Up to 15 wind energy turbines would be placed on state land. These wind turbines would produce between 1.5 and 3.0 megawatts of electricity per turbine. The final wind turbine size has not been determined.

The common school trust would receive a one-time installation payment of $1,000 per installed megawatt ($22,500 assuming the construction of 15 wind 1.5 megawatt turbines) and an estimated annual rental between $37,500 and $50,769.

2 Alternatives

FSA Actions

Farm Service Agency would grant permission to the producer to allow the construction of wind-turbines on CRP acres. The remaining CRP acres not affected by a turbine and roads would remain in CRP and managed in accordance with the producers existing CRP contract. The individual producer/land owner would enter into a lease agreement with Montana Wind Solutions America that would allow the construction and operation of wind energy turbines and associated facilities on their private property.

The FSA would remove 38.22 acres from five individual CRP contracts in order to allow the placement of up to 44 wind energy turbines on private land enrolled in CRP.

A system of roads will be necessary for wind turbine construction and operation. Gravelly soils generally allow for use with little road construction. Where necessary, native materials will be barrowed for graveling. Roads will be allowed to re-vegetate post construction. A service road system of two tract trails between the wind turbines would remain during windfarm operation.

A system of underground power transmission lines would connect wind turbines with the Northwestern Energy 230kv electrical transmission line.

2.3 Mitigation Measures

ENVIRONMENTAL PROTECTION MEASURES

Several documents would provide environmental protection guidance to project construction contractors. These documents would include WPSA Energy General Bidding Instructions, WPSA Best Management Practices (BMPs), and USFWS agreements. Summaries and/or applicable parts of each of these documents follow.

Windpark Solutions Arcadia General Bidding Instructions

Included in WPSA Arcadia's instructions to prospective contractors bidding on construction of the proposed Judith Gap Wind Farm would be environmental protection requirements. Several noteworthy requirements identify the contractor as responsible for the following:

- *Solid and Sanitary Waste Disposal* -- Contractor shall pick up solid wastes and place in containers that are regularly emptied, dispose of garbage in approved containers that are regularly emptied, and prevent contamination of the proposed project site and other areas when handling and disposing of wastes. Upon completion of the work, Contractor shall leave the work areas clean, and control and dispose of wastes.
- *Petroleum Products* -- Contractor shall conduct fueling and lubrication of equipment and motor vehicles in a manner to protect against spills and evaporation, and shall dispose of unused lubricants and oils.
- *Dust* -- Contractor shall implement dust control at all times in accordance with applicable local and state requirements. Contractor shall keep dust down at all times during construction. Air blowing would be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Contractor shall not permit the shaking of bags of cement, concrete mortar, or plaster.
- *Temporary Construction* – Contractor shall remove temporary construction facilities (erected by and within Contractor's scope), including access road-entrance-way build ups, access road corner widening, crane pads, work areas, structures, foundations of temporary structures, and stockpiles of excess or waste materials.
- *Protection of Roads* -- Contractor shall plan and practice measures to minimize the impact to the existing landowner, township, county and state roads. Measures shall include demanding low speed limits for heavy vehicles and equipment traveling on the roads. Any road damage caused by construction activities shall be repaired by Contractor.

2 Alternatives

Windpark Solutions Arcadia Best Management Practices During Wind Farm Construction
WPSA has developed BMPs for wind farm projects. These include:

- *Disturbance Minimization* – The proposed wind farm project would be constructed to fit the existing terrain, thereby eliminating land-disturbing cut and fill activities, minimizing disturbance to existing drainage, and reducing soil erosion potential.
- *Sediment Control* -- Potential sediment movement to nearby drainages and wetlands resulting from construction disturbance would be controlled by installing silt fencing on the downhill side of access roads along low areas, and installing gravel entrances at county roads prior to grading activities to prevent vehicle tracking.
- *Fueling and Equipment Maintenance* -- Construction equipment would be fueled and maintained at an equipment maintenance staging area that would be designed to contain spills. Accidental spills would be cleaned up immediately following state regulations.
- *Reclamation/Revegetation* – Areas disturbed during construction would be graded to blend with the natural terrain, scarified, and seeded with species at landowner request or with regionally native species.
- *Inspection/Maintenance* -- Silt fencing would be inspected within 24 hours of each rain event of 1/2 inch or greater, maintained by removing sediment after a 50 percent loss of capacity, and replaced as necessary.

Windpark Solutions Arcadia Best Management Practices During Wind Farm Operation
WPSA would continue to follow WPSA BMPs during operation of the proposed wind farm. These specifically include:

- *Access Road Maintenance* – Permanent access road gravel surfaces within the proposed wind farm would be maintained to ensure positive drainage and minimize sediment runoff.
- *Noxious Weed Control* – Areas disturbed during construction would be monitored for infestation by noxious weeds at regular intervals coinciding with routine wind farm maintenance and monitoring activities.
- *Revegetation Monitoring* -- Re-seeding efforts using native grass seed mixes on areas disturbed during construction that are not being used for crop production would be monitored for success annually (in the spring) for two years following construction. If revegetation efforts are not or only partially successful, appropriate reseeding measures would be taken.

Future Avian Studies

Surveys of winter and migrant bald eagle and other raptor use are being conducted and will continue through the end of February, 2004. The objectives of the survey includes estimating the number of eagles regularly using the project area, identifying potential perching and/or roosting areas; Recording the behavior of eagles observed; Determining the type of forage that may be attracting eagles to the area, and documenting presence and amount of use of other raptors.

The Project developer will fund an operational monitoring program to directly estimate the impacts of the wind farm on birds and bats. A draft protocol is found in **Exhibit 10**. The operational monitoring plan for the Project will consist of the following components:

1) A minimum of one year of intensive fatality monitoring involving standardized carcass searches and carcass removal and searcher efficiency trials and a protocol for handling and reporting of fatalities and injured wildlife for the life of the project;

2) Three years of post-construction surveys to assess potential displacement of breeding grassland songbirds;
3) Golden eagle and ferruginous hawk nest surveys conducted during a minimum of one nesting period within 2 miles of the wind turbines;
4) Formation of a Technical Advisory Committee of the various stakeholders to review methodologies and results and make recommendations regarding the need for changes to the existing methods and the need for additional monitoring beyond the effort described in this plan.

2.4 Summary Comparison of Activities, the Predicted Achievement of the Project Objectives, and the Predicted Environmental Effects of All Alternatives

2.4.1 Summary Comparison of Project Activities

Table 2-1 Summary Comparison of Project Activities of Alternatives A and B.
The following table provides a comparison of the on the ground activities that would occur if either Alternative A or B were implemented.

Activity	Alt A	Alt B
Turbines placed on state land	0	15
Turbines placed on private CRP land	0	44
Turbines placed in the windpark area (private and state)	61	120
Miles of road placed on state land	0	4
Miles of road placed on CRP land	0	15
Miles of road placed in the windpark area	12	31
Miles of overhead transmission cable placed on state land	0	0
Acres of disturbed ground on state land	0	11.07
Acres of disturbed ground on private CRP land	0	38.22
Acres of disturbed ground in the windpark area	34.29	83.58

2.4.2 Summary Comparison of Predicted Achievement of Project Objectives

	Indicators	Alt A	Alt B
Objective #1 Lease the right to utilize state land for the production of wind energy and generate the maximum legitimate monetary return to the common school trust.	Annual income to the common school trust	No income from wind energy. Continued annual income from grazing rental of approximately $775.	Continued grazing rental income of approximately $750. The rental of state land for wind energy will produce the greater of: $2,500 per megawatt generated on state land or 2.7% of the gross revenue generated by wind turbines located on state land.

2 Alternatives

	Indicators	Alt A	Alt B
			School trust revenue is projected to be between \$37,500 and \$50,769 annually. The exact revenue is not known at this time. Completion of a power purchase agreement between WSA and Northwest Energy will determine the exact number of turbines that will be constructed on state land and the market price per megawatt.
Objective 2: Manage the state rangeland for the desired future condition characterized by a healthy native plant and animal community	Plant species composition and vigor Livestock carrying capacity Healthy wildlife populations	Plant species composition would be unchanged State Land Animal Unit Month Carrying Capacity 122 AUM would remain unchanged. Wildlife includes pronghorn, mule deer, small mammal populations, grassland songbirds, raptors such as red-tailed hawks, golden eagles and northern harriers..	11.07 acres of native partier would be disturbed. Plant species and vigor on over 99% of the property would be remain unchanged A reduction in livestock carrying capacity of 3 AUM. A minor impact to mammal populations will occur during project construction. Some mortality of birds and bats is expected from the project and this will be monitored
Objective #3: FSA Allow a producer enrolled under FSA's conservation reserve program to remove part of the acres for the construction of wind turbines for the production of wind energy	The producer would receive annual income from the lease of turbines to Wind Park Solutions. Wind energy is considered a non-pollutant alternative source of energy and therefore in compliance with the objectives of the CRP.	No benefit would be received from the alternative energy source.	A benefit to the public would realized in regard to creating an alternative energy source that is less harmful on the environment than existing fossil fuel sources and dams.

2.4.3 Summary Comparison of Predicted Environmental Effects

Issue	Alternative A – No Action	Alternative B - Construction
Avian and bat mortality due to collision with wind turbines	Approximately 3 or less bird and 2.5 or less bat deaths per MW per year. Up to 61 turbines (~90 MW) may be constructed in the windpark area resulting in an expected 270 bird deaths and 225 bat deaths windfarm. Most resident fatalities would be of common species such as horned lark and McCown's longspur. Approximately 4 raptor deaths per year. Monitoring will be conducted to estimate actual levels.	Assuming that the turbines placed on state land and private CRP lands would be additive to those placed on other adjoining private land the inclusion of 59 additional turbines (~89 MW) on state land would result in a total of 540 bird deaths and 450 bat deaths. An additional 8 raptor deaths per year. Monitoring will be conducted to estimate actual levels.
Avian displacement due to turbine proximity	Some small scale displacement of breeding songbirds is expected from project facilities. Potential displacement impacts to one or two ferruginous hawk nests.	Same impacts to breeding songbirds. Approximately one additional ferruginous hawk nest may be displaced.
Soil Resources	A minor amount of soil compaction and erosion will occur.	Same as A with slightly more area effected.
Vegetation	Construction of the windfarm on private land will permanently alter 23.71 acres of native short-grass prairie and 10.58 acres of dryland cropland. Within the 4,350 acre wind park area over 99% of existing vegetative cover will remain undisturbed by wind farm construction.	Construction of the wind farm on all ownerships will result in the permanent conversion of 34.78 acres of native prairie, 38.22 acres of CRP land, and 10.58 acres of dryland cropland. Within the 8,700 acre windpark area over 99% of existing vegetative cover will remain undisturbed by windfarm construction.
Visual Impacts	Construction of the windfarm will change the visual character of the area. However, this change is not deemed significant due to the remote location of the windfarm and lack of unique landscape characteristics	Same as A

2 Alternatives

Issue	Alternative A – No Action	Alternative B - Construction
Noise	The proposed project is located in a rural agricultural area. It is predicted that the wind turbines will produce between 45 – 50 A-weighted decibels at 1,000 feet. The baseline noise level in the area is approximately 38-48 dBA. It is expected that wind speeds will mask the noise generated by the wind turbines at distances greater than 1,000 feet. There are no noise receptors closer than 0.5 miles in the project area. Noise modeling indicates no significant impact to nearby residences associated with facility operation.	Same as A
Economic benefits and expected revenue	Estimated state taxes $658,456 Estimated local taxes $1,072,437 increasing after Year 5. Estimated construction employment 100-150 people Estimated permanent operation employment 3-5	Estimated state taxes $1,295,325 Estimated local taxes $2,109,712 increasing after Year 5. Estimated construction employment 175 – 275 people Estimated permanent operation employment 6-10
Historical and archeological sites	There is no legal obligation to conduct historical or cultural resource inventories on private land.	Archeological site 24WL0138 consisting of two tipi rings exists on state land. No disturbance of this site will be allowed. Upon determination of the exact location of wind turbines and other associated disturbance the DNRC would conduct a class 3 cultural resource inventory on state land. Contact with the SHPO indicates no previous recorded archaeological or historic sites within the CRP area. Based on previous disturbance in this area by roads, farming, pipelines, and missle sites, the likelihood of the presence or finding of cultural sites is extremely low. The CRP land has been previously disturbed through cultivation. If any historical or archeological sites are encountered below plow depth,

2 Alternatives

Issue	Alternative A – No Action	Alternative B - Construction
		construction would be halted until consultation with the State Historic Preservation Office is completed.
Land Use	23.71 acres of grazing land would be converted for the placement of wind turbines and associated facilities. A nominal amount of grazing forage would be lost. 10.58 acres of cropland will be removed from production. No change is overall land use is expected. Some displacement of the grazing activity may occur during the construction phase of windfarm development. Post construction, grazing and wind energy production are expected to co-exist without conflict	Same as A with incremental increase in land conversion. A total of 34.78 native prairie, 38.22 crp, and 10.58 cropland will be permanently disturbed. DNRC would cancel the existing grazing leases and issue a grazing license to the existing grazing lessee. The predominant classification of the land would be for wind energy production. A reduction of 3 AUM is expected as a result of this reclassification. Some displacement of the grazing activity may occur during the construction phase of windfarm development. Post construction, grazing and wind energy production are expected to co-exist without conflict.
Aviation	The wind farm will be located 7 miles from the nearest airport at Harlowton and 34 miles from the nearest commercial airport in Lewistown. It will not impact any airport operations. Judith Gap is within a defined aircraft flight path between Great Falls and Billings, but lighting on the turbines will mitigate any impacts to aviation.	Same as A.

3.0 Affected Environment

3.0 Introduction

Affected Environment succinctly describes the relevant resources that would affect or that would be affected by the alternative, if they were implemented. This Chapter also describes relevant factors of the existing environment and includes effects of past and ongoing management activities within the analysis area that might affect project implementation and operation.

In conjunction with the description of the No Action Alternative in Chapter 2 and with the predicted effects, the public can compare the effects of all action alternatives.

3.1 Description of Relevant Affected Resources

3.1.1 Soil Resources

Soils in the project area are classified as Aridisols-Mollisols on nearly level to moderately steep soils on fans, benches, and terraces. Soils with the aridic soil moisture regime are dry more than half of the time when they are warm enough for plant growth and never moist in any part for 90 consecutive days when they are warmer than 8 degrees C. They generally have annual precipitation of less than 14 inches. These soils are further classified as Calciorthids: Light-colored soils of cool, arid and semiarid grasslands. These soils are calcareous and have subsoil horizons of strong calcium carbonate accumulation. Most have loamy textures and are on gravelly piedmont terraces. Parent material consists of calcareous loamy alluvium.

A detailed soil survey has not been completed by the Natural Resources Conservation Service for the soils on state land. A soil survey has been completed for adjacent lands to the east which include the Crago and Musselshell soil series and are referenced as part of the Calciorthid unit. The Crago-Musselshell complex are well drained gravelly loams, with no restrictive features, seasonal high water table greater than 60 inches and a mean annual precipitation of 10 to 14 inches. It is not a hydric soil and exhibits moderate potential frost action with no flooding hazard.

Preliminary geotechnical subsurface stratigraphy consisted of 8 to 10.5 feet of very dense gravel containing varying percentages of sand and fine-grained silt or clay. The gravel is underlain by very hard sedimentary bedrock. The sedimentary bedrock consists of claystone bedrock interbedded with thin seams of siltstone

3.1.2 Vegetation

The project area contains three major vegetative types: native shortgrass prairie generally west of Highway 191; cultivated dryland agricultural land generally east of the Highway and Conservation Reserve Program grassland, which is primarily north of Oxford Road and also east of Highway 191. These vegetative cover types are depicted in **Exhibit 6**.

The native short-grass prairie west of the Highway, including the subject state land, is composed of flat benches dissected by broad valleys. The DNRC has conducted a field evaluation of the subject state land including an examination of plant species composition. The typical plant species composition of lands west of the highway include the following grasses and sedge; prairie junegrass, Sandberg bluegrass, western wheatgrass, needle and thread, blue grama, threadleaf sedge and forbs including; Hood's palox, common yarrow, cudweed sagewort, fringed sagewort, carrotleaf lomafium, milk vetch, pussytoes, death camas, dandelion, broom snakeweed, and penstemon.

The state land is comprised of two silty and one thin hilly range sites. Silty range site 1 comprises the entire west half of the section and is rated at .232 AUM / acre for a total of 74 AUM. The east half of the section contains two range sites, silty range site 2 contains 216.7 acres and is rated at .172 AUM / acre for a total of 37 AUM and thin hilly range site 3 is rated at .108 AUM / acre for a total of 11 AUM. The entire state section contains 122 AUM of forage.

Private cropland has been placed in the Conservation Reserve Program north of Oxford road and east of Highway 191. The southernmost CRP acreage located in sections 17, and 18, township 10N, range 15E is planted to a mixture of western wheatgrass, pubescent wheatgrass, alfalfa, and sweet clover. All other CRP acreage is planted to crested wheatgrass.

East of the Highway dryland agricultural land is used for the production of small grains, predominately wheat and barley.

3.1.3 Wildlife

3.1.3.1 Birds

Extensive baseline studies have been conducted to describe the spatial and temporal avian resources of the proposed project (Table 1). These studies and existing information on known direct and indirect impacts are used to predict impacts to these resources. This section contains a review and synthesis of those studies and other existing information.

Table 1. List of surveys and methods used to describe the affected bird and bat environment.

Description	Time Period	Methods
Site Evaluation Procedure	4 seasons	reconnaissance level survey, USFWS PII procedure
Point Count Transect Surveys for Avian Use	April 23 – June 25, 2003	80 stations, 10 minute duration, 3 visits per station
Walking Strip Transects for Avian Use	May 1 – July 2, 2003	6 transects parallel to turbine strings, 6 transects orientated perpendicular to turbine strings, 3 visits per transect
Point Counts for Raptors and Other Large Birds	May 14 – July 2, 2003	8 stations, 2 hour duration, 4-5 visits per station
Driving Survey for Raptors and Other Large Birds	July 22 – August 24, 2003 January 10 – February 28, 2004	~60 mile route, 6 surveys in summer, 8 surveys in winter (4 surveys have been completed)
Diurnal Migration Survey	May, 2003	2 stations, 8 hour surveys
Raptor Nest Survey	April and May, 2003	fixed wing aerial and ground surveys within 8 km of WRA
Prairie Dog and Ground Squirrel Surveys	April 22	fixed wing aerial survey within 8 km of WRA
Bat Activity	May, 2003	Ultrasound bat detector in conjunction with radar
Bird Migration	April and May 2002 April and May 2003	radar, project site and reference area

3 Affected Environment

Due to differences in habitat and vegetation, the proposed wind plant site was divided into two separate areas or units for some of the studies and forthcoming discussions. The North Unit includes sections 29 and 30, T10N, R16E, and consists primarily of CRP lands. The Southwest Unit includes section 36, T10N, R15E, Sections 1 and 12, T9N, R15E, and sections 6 and 7, T9N, R16E and consists primarily of grazed pasture land and cultivated agriculture.

The Potential Impact Index (PII) process outlined in the USFWS voluntary guidelines for wind plants (USFWS 2003) was applied to the proposed site for an initial site assessment (Harmata and Flath 2003). This subjective site assessment procedure compares physical (e.g., topography), ecological (e.g., migration) and biotic (e.g., presence of Threatened and Endangered species) characteristics of the proposed wind plant site to other reference sites. The ranking of the wind plant site relative to the reference sites is used to assess potential impacts and to guide the focus of baseline studies.

This initial site assessment ranked the North Unit very low[1] compared to other sites evaluated in Montana. The Southwest Unit was ranked higher than the North Unit, but was still ranked relatively low (10th lowest out of 31). The higher ranking of the Southwest Unit was primarily due to the presence of sensitive species such as Baird's sparrow (Federal Candidate), mountain plover (Federal Candidate), higher nesting activity for raptors, and possible presence of raptor prey (black-tailed prairie dog). Other priority issues identified for both units included winter and migratory use of the site by bald eagles and golden eagles, and migratory use by passerines, raptors and waterfowl (Table 2, Harmata and Flath 2003). Although the site in general ranked relatively low compared to the other sites evaluated, several baseline studies were conducted to address priority issues, and to further aid in predicting impacts.

Table 2. Comparison of fatality rates standardized to nameplate power output (1 MW) for wind projects studied in the Western U.S. Note that the Ponnequin, Colorado studies were not included because standardized estimates have not been provided, although results from that site are expected to be in the range of these projects. The fatality data that have been reported suggest standardized estimates in the range reported in this table.

	Project Size		Turbine Characteristics		Annual Fatality Rates		
					Birds	Raptors	Bats
Wind Power Project	# turbines	Nameplate Output (MW)	RD[a] (m)	Nameplate Output (MW)	#/ MW	#/ MW	#/ MW
Stateline, OR/WA[1]	454	300	47	0.66	2.6	0.07	1.4
Vansycle, OR[2]	38	25	47	0.66	1.0	0.00	1.1
Klondike, OR[3]	16	24	65	1.5	0.9	0.00	0.8
Nine Canyon, WA[4]	37	48	62	1.3	2.8	0.05	2.5
Foote Creek Rim, WY[5]	133	~90	43-45	0.7[a]	2.4	0.04	1.4

[1] the lower the score relative to the other sites, the lower the expected impacts

[1] Erickson et al. 2003a

[2] Erickson et al. 2000

[3] Johnson et al. 2002

[4] Erickson et al. 2003b

[5] Young et al. 2003

Resident Birds

Several studies were conducted to address potential impacts of the project on resident birds. Thirteen point count transects were established and monitored to estimate use of the project area by resident birds during the spring and early summer 2003 (Flath 2003). Approximately 80 stations were established, and represented the three major habitat types of the project areas: grazed grassland, wheat stubble, and Conservation Reserve Program land (CRP). A total of 1,487 individuals of 15 species and 4 unidentified individuals were observed during these surveys. Horned lark and McCown's longspur were the two most commonly observed species in all three habitat types, comprising over 90% of the use in pasture and wheat stubble transects, and over 60% in CRP habitats. Savannah sparrow, western meadowlark, and Sprague's pipit were also commonly observed in CRP habitats.

In addition to the point count surveys, walking transects were established and surveyed between May 1 and July 2, 2003 to further quantify pre-project resident bird use. Six walking transects orientated perpendicular to selected turbine strings were each surveyed three times between May 1 and July 2, 2003 (Curry and Kerlinger 2003). In addition, 6 "long transects" were established along select turbine strings. Birds and other wildlife (e.g., ground squirrels) were recorded. Results of these surveys were consistent with results of the surveys conducted by Flath (2003). Horned lark and McCown's longspur comprised the majority of the bird use, with Savannah sparrow, western meadowlark, and vesper sparrow observed occasionally, especially in the CRP habitats. Richardson's ground squirrel burrows were recorded in highest numbers in grazed pasture lands; this species is prey for raptors.

Additional focused surveys for quantifying raptor and other large bird use of the project site were conducted between May 14 and July 2, 2003. Eight point count stations were each surveyed for 2 hours during a survey day. A total of 409 raptors and large birds of 23 identified species were observed from the fixed points during 70 hours and 20 minutes of observation time. All are believed to nest in or near the project site except for American white pelicans and Franklin's gulls. Raptors comprised 37.4% of all birds observed, followed by waterfowl (29%). The most common raptors observed were ferruginous hawk and northern harrier, comprising over 65% of the observations made within 800 m of the station center. Golden eagles were the third most abundant raptor (17.6% of observations within 800 m of station center). Other notable species observed included long-billed curlew (27 observations), mountain plover (16), sandhill crane (9), and short-eared owl (1).

A raptor survey route established along roads within and outside the WRA boundary was driven 6 times between July 22nd and August 24th, 2003. A total of 101 raptor observations of 6 species were recorded. Ferruginous hawks and golden eagles were the most abundant raptor observed, comprising approximately 50% of the observations, followed by northern harrier (16 observations), prairie falcon (15), Swainson's hawk (10) and red-tailed hawk (9). The highest number of observations occurred in the northeast quadrant, with the lowest number recorded in the areas to the west of Highway 191.

Spring diurnal raptor and other large bird use was also quantified based on surveys at two point count stations. Few surveys could be conducted in late April due to snowstorms, thundershowers, and continuous cloud cover and rain. Approximately 54 hours of survey were conducted. Most of the use documented in May was likely from local resident birds. However, the late date of migration count initiation likely resulted in missing the majority of eagle and buteo migration. Ferruginous hawk and golden eagle comprised most of the raptor use, and 44% of the total use (Table 13, Curry and Kerlinger 2003).

Aerial and ground based surveys for raptor nests were conducted (Flath 2003). No active golden eagle nests were observed within 8 km of the project boundary. Thirteen active ferruginous hawk nests were identified within 8 km of the WRA. One nest was located within the WRA and one was located within 100 m of the WRA boundary. The other nests were located more than 2 km from the WRA boundary. Forty three percent of the nests with known outcome successfully fledged young.

Aerial surveys were also used to document raptor prey such as prairie dog and ground squirrels within 8 km of the wind project. No prairie dog towns were found during the survey. Ground squirrels occurred at low densities over most of the survey area, although apparently higher aggregations were found in two draws in the northeastern part of the area surveyed, just southeast of the town of Judith Gap.

Migrating Birds

Some migrating birds have been reported as fatalities at wind projects although in relatively low numbers (Erickson et al. 2003). Most studies of North American bird migration using techniques such as radar have suggested that nocturnal migrants follow a broadfront migration pattern, typically flying at high altitudes where they are not affected by variation in surface topography (e.g., Lowery and Newman 1966, Able 1972, Richardson 1972, Williams *et al.* 1977 *in* Williams *et al.* 2001). More recent radar studies have shown that nocturnal migrants fly at a variety of altitudes and that often millions of birds may pass over a site during a migration season (Kerlinger *et al.* 1984, Gauthreaux 1991, Cooper and Mabee 2000, Johnson *et al.* 2002). However, there is some evidence that significant topographic features may be followed during migration by a variety of diurnal and nocturnal migrant birds (Goodrich 1997). The project site is several miles south of a 10 to 15 mile gap between the Snowy Mountains and the Little Belt Mountains. The location of the project relative to the gap would suggest potentially higher migration rates from birds concentrating through the gap between the two ranges. This concern led to studies of nighttime and daytime bird migration.

As the majority of avian species in North America migrate at night, properly designed nocturnal studies using radar may provide information on the number of migrants moving over a potential wind plant site. Radar data provide an indirect measure of the potential number of birds at risk of collision with turbines. Daytime and nighttime migration rates were estimated using radar technologies (Harmata 2002, Harmata 2003). These technologies provide some information on radar signature passage rates and altitudes, but are often unable to distinguish birds from bats, and insects often interfere with data collection. Surveys were conducted during the 2002 spring migration for another developer in the vicinity of the WRA, and during spring migration of 2003 for this project.

The spring 2003 survey conducted just to the south of the 2002 survey suggested target passage rates 4 times higher than the previous year (Harmata 2002, Harmata 2003, Erickson et al. 2003). The passage rates estimated for this site are difficult to compare to rates from other sites due to differences in sampling periods and radar equipment, and field and analysis methods. Based on some conservative assumptions relative to these factors, evidence suggests passage rates at this site range from similar to four times higher than three other wind projects where both fatality monitoring and passage rates were estimated.

3.1.3.2 Bats

Bat surveys were conducted in late May 2003 using Peterson ultrasound detectors. These surveys were conducted in conjunction with the radar studies, at a time when radar signatures were abundant. No bat calls were detected during the surveys, but spring bat migration is believed to occur in April and early May (Flath 2003). There is little suitable roosting habitat within the project area, which likely limits use of the WRA by resident breeding populations of bats. It also appears that most bat mortality at wind projects occur during fall migration. In the West, tree-roosting migratory species such as hoary bats and silver-haired bats have been reported colliding with wind turbines, especially during the apparent fall migratory period.

3.1.3.3 Big Game

Some pronghorn and mule deer use occurs on the site throughout the year. The project area is not considered big game winter range, so large concentrations are not expected during the winter period.

3.2.1 Threatened and Endangered Species

According to the U.S. Fish and Wildlife Service (USFWS), there are three federally-listed endangered, threatened, proposed, and/or candidate species that occur in Wheatland County, Montana, and could potentially occur in the project area. These are:

• Bald eagle (*Haliaeetus leucocephalus*)	Listed Threatened
• Black-footed ferret (*Mustela nigripes*)	Listed Endangered
• Black-tailed prairie dog (*Cynomys ludovicianus*)	Candidate

3.2.1.1 Bald Eagle

In 1978, the USFWS listed the bald eagle throughout the lower 48 states as endangered except in Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was designated as threatened (43 FR 6233, February 14, 1978). In 1995, the bald eagle was reclassified from endangered to threatened in all of the lower 48 states (60 FR 133 July 12, 1995). During the 17-year period between 1978 and 1995, the bald eagle population increased in number and expanded in range. The improvement was a direct result of the banning of DDT and other persistent organochlorines, habitat protection, and other recovery efforts. In Montana, the number of known breeding pairs increased from 12 to 166 between 1978 and 1995 (MDFWP 1999). Bald eagles occur year-round in Montana, but their numbers fluctuate dramatically between seasons. The greatest numbers occur during the spring and fall migration periods. Migration peaks during March and November when large numbers of bald eagles move through the state to and from more southerly wintering areas (USFWS 1992).

Wintering bald eagles in Montana are primarily found along major waterways, with some found on upland wintering areas. Roost sites form critical habitat for wintering birds. Some roosts are used regularly by large or small numbers of eagles, while other receive only occasional use. During migration and at wintering sites, eagles that concentrate on locally abundant food tend to roost communally. Eagles wintering in Montana usually arrive about November and leave in March (MBEWG 1986). Open water and food availability dictate areas of use throughout the winter months. Upland areas may receive considerable use when carrion is available. Important prey includes waterfowl, salmonids, suckers, whitefish, carrion, and small mammals.

Bald eagles wintering in Montana tend to congregate near bodies of water. Major river drainages and large lakes constitute the majority of winter habitat use. Roosts consist of large trees or snags and have sturdy lateral limbs near the crown to provide easy entry and exit (USDA FS 1977). Communal roosts usually are located in stands of mature old growth conifer or cottonwoods, and roosts may be several miles from feeding sites.

Important bald eagle habitat includes wetlands, major water bodies, spring spawning streams, ungulate winter ranges, and areas where open water occurs. Bald eagles have varying tolerances to human disturbance. Disturbance near winter roosts or during egg-laying and incubation at the nest site may result in abandonment of the roost or nest.

3.2.1.2 Black-footed Ferret

The USFWS recognized that the black-footed ferret was in danger of extinction in 1964 under a precursor to the ESA of 1973; they were officially listed as endangered under the ESA in 1973.

Historically, the black-footed ferret ranged throughout the North American Great Plains. Black-footed ferrets are habitat specific and dependent on prairie dog colonies for survival (Biggins et al. 1985). Prairie dogs comprise more than 90% of black-footed ferret diets (Campbell et al. 1987) and prairie dog burrows provide ferrets with their source of shelter. Black-footed ferrets began disappearing following government-sponsored prairie dog (*Cynomys spp.*) control programs initiated soon after the turn of the 20th century. This program, presently continued at a smaller scale, was successful in eliminating prairie dogs from an estimated 98 percent of their former range. As their prey base was destroyed, ferret populations became fragmented and began dying from various factors, including canine distemper, which is fatal to black-footed ferrets. (FWS 1995, Clark et al. 1994).

3.2.1.3 Black-tailed Prairie Dog

Black-tailed prairie dog was listed as a candidate species in 2000 (Federal Register Vol. 65, No. 24). Candidate species are those for which the USFWS has sufficient information on their status and threats to propose them as endangered or threatened, but for which proposed listing is precluded by other higher priority species or actions (USFWS 2000a). Reviews of its status in 2001 and 2002 have determined that the overall magnitude and immediacy of threats remain unchanged since 2000, therefore the black-tailed prairie dog has remained a candidate.

Historically, black-tailed prairie dogs occurred on suitable habitat in the eastern two-thirds of Montana (Flath and Clark 1986), with the exception of the northeastern corner of the state (Hall and Kelson 1959). Known concentrations currently exist in southern Phillips County, Fort Belknap Reservation, Custer County, Charles M. Russell National Wildlife Refuge, and the Crow Reservation. The USFWS believes that there have been significant declines from historic estimates of black-tailed prairie dog occupied habitat in Montana. Recently, black-tailed prairie dog complexes in Montana have been significantly impacted by sylvatic plague and may continue to decline, although some site-specific increases have occurred.

3.2.2 Habitat for and Occurrence of Listed Species in the Project Area

Several studies have been conducted that document the existing habitat conditions in the Project area and the presence or absence of listed species.

Based on point count transects conducted in April, May, and June, 2003, no bald eagles were observed in the Project area (Flath 2003). During aerial surveys of the Project area and a five-mile radius in late April 2003, no bald eagle nests were observed (Flath 2003). No bald eagle sighting records were found in a search of the Montana Natural Heritage Program database for the township in which the Project occurs and a one-township buffer. Bald eagles are reported to winter (December 15 to February 15) throughout most of Montana, including the Project vicinity, and are reported as transients in the latilong in which the Project occurs during the remainder of the year (Skaar 1996). Preliminary results from a winter avian survey in the Project and surrounding area include four sightings of bald eagles (WEST 2004). Two sightings occurred on two consecutive days approximately three miles northeast of the Project area. One of these sightings included two adults and one juvenile perched on a fence; the second sighting was one eagle perched on a fence along a county road. A third sighting was made approximately two miles west of the Project area, and the eagle was flying overhead near a deer carcass. A golden eagle was also perched near this carcass. The fourth bald eagle sighting was made along U.S. Highway 191 within the Project area. This sighting was of a bald eagle in flight at an estimated altitude of 100 meter above the ground surface.

Road kill on U.S. Highway 191, which runs through the project area, may attract scavenging bald eagles. No prairie dogs towns or water bodies are present to attract eagles. Some pronghorn and mule deer use occurs on the site throughout the year. The project area, however, is not considered big game winter range, so large concentrations are not expected during the winter period when eagles are present (Flath, pers. comm). The project area consists of upland habitat used as rangeland, cultivation, and CRP. Rangeland consists of native grasslands and is used for cattle and sheep grazing. Some rangeland in the Project area is limited to summer grazing, other is used year-round on a 20-day rotation. Cattle also graze in the fall (Aug. – Oct.) on stubble. No calving operations occur in or near (within four miles) the Project area. Lands enrolled in CRP were formerly cultivated. The primary farming practice in this area was dryland grain farming.

To determine if prairie dog towns are present in the project area, an aerial survey was conducted in April 2003. Fifteen transects were flown at approximately one-mile intervals. No prairie dogs were observed in the project area or a 5-mile radius; however, they are reported to have occurred there historically (Flath 2003). Ground squirrels were observed at a low density over most of the survey area, with the higher aggregations found just southeast of the town of Judith Gap. Since no prairie dog towns are present, there is no habitat for black-footed ferrets or black-tailed prairie dogs in the project area.

3.2.3 Visual Resources

The wind farm is situated in a remote rural portion of Wheatland County. Photos depicting the current view of the wind turbine project area are shown in **Exhibit 5**. The visual setting for the wind farm consists of several flat areas on benches that rise above the surrounding area. The area is characterized by native short-grass prairie that occurs west of Highway 191 and created wheatgrass east of Highway 191. The visual setting within a mile of the wind farm consists of rolling hills, ridges, and flat benches containing dryland crops, CRP fields, and native grasslands; the riparian area associated with Roberts Creek; several small reservoirs; Highway 191; overhead powerlines and scattered rural residences. The larger viewshed includes the towns of Judith Gap located approximately 6 miles north of the site and Harlowton located approximately 7.5 miles south of the site. There are no unique landscape characteristics within the view shed of the wind farm.

3.2.4 Noise

There are no known studies of ambient noise levels in the project area. Currently, noise in the project area is typical of a rural setting. Sources of ambient noise include vehicular traffic, weather disturbances, occasional aircraft, and natural sources (e.g., wildlife, wind). Because the project site and surrounding areas are rural, sources of loud noises are few most of the time, and ambient noise levels are likely between 38 and 48 decibel A-weighted sound level (dBA) under calm wind conditions. These noise levels are similar to those experienced in libraries or residential living rooms and are characterized as being very quiet.

There are no sensitive human noise receptors such as schools, hospitals, or daycare centers in the vicinity of the project area. Noise-sensitive receptors in the project area are limited to rural residences located approximately 0.5 and 1.5 miles east of the nearest turbines at full build out (**Exhibit 7**).

3.2.5 Aviation

The only airport in the vicinity of the wind plant is the Wheatland County Airport located approximately 1 mile northwest of Harlowton and 7 miles south-southwest of the wind farm. The primary runway at this facility is a 4200-foot-long paved runway oriented east to west, although there is a secondary gravel runway oriented north to south. This airport is used primarily by small single and twin engine private aircraft, although it is occasionally used by life flight helicopters and fixed wing aircraft. There are approximately 500 to 600 takeoffs and landings per year at the airport (Ron Sherman, Wheatland County Airport, pers. commun.).

The nearest commercial airport is located in Lewistown, Montana, approximately 34 miles north-northeast of the wind farm. The Lewistown/Fergus Municipal Airport has three runways. The main runway (725) is 7500 feet long. The secondary runway (1230) is 4100 feet long, and the third runway (220) is 5400 feet long. The Lewistown Airport is used by commercial aircraft, of which Big Sky Airlines is the primary carrier. Big Sky operates four flights a day at the airport. The United Parcel Service (UPS) also flies one plane out of the airport twice a day, six days a week. During the summer months, the U.S. Bureau of Land Management (BLM) operates a fire dispatch center at the airport and maintains three fixed wing aircraft and one helicopter at the airport. There are currently 46 private aircraft maintained at the airport, including 45 fixed-wing aircraft and one helicopter. The airport also receives some helicopter use from the U.S. Air Force Malmstrom Air Force Base in Great Falls, Montana. On average, there are 4,000 to 5,000 takeoffs and landings per year for all commercial, military and private aircraft combined at the Lewistown Airport (Gary Moline, Lewistown Airport Manager, pers. commun.).

The Judith Gap area is also within a Federal Aviation Administration (FAA)-designated route between Great Falls and Billings. As a result, the project area receives more aircraft traffic than areas away from the gap (Mike Quinn, Aviation Support Officer, Montana State Department of Aeronautics, pers. commun.). Malstrom AFB may also occasionally fly helicopters to the missile site near the project area.

3.2.6 Economic Benefits and Expected Revenues

The project area is located in Wheatland County six miles south of the town of Judith Gap and 10 miles north of the county seat, Harlowton. The primary industries within Wheatland County are agriculture and professional / services. Population decreased in Wheatland County from 1970 to 2000 from 2,503 to 2,247. Average earnings per job, adjusted for inflation, decreased from $26,318 to $14,216 and total employment from 1,235 to 1,119 during this same period of time. In tax year 2002 the total taxable value of Wheatland County was $9,207,715. Please see **Exhibit 8** for a graphical depiction.

3.2.7 Historical and archeological sites

The windpark area is within the Northwestern Plains culture area and the traditional territory of the Blackfoot, Gros Ventre, Araphaho, the protohistoric Shoshone and historic Chippewa-Cree and Metis (Deaver, 1995). The open grasslands surrounding the mountains are characterized by use in typical Northwestern Plains fashion based on the occurrence of bison kills, drive lines, tipi sites, stone ring sites and rock shelters.

Two cultural investigations have taken place within the project area :

> Cultural Resource Inventory project # 95-8-3; Cennex Front Range Pipeline class 3 level inventory of pipeline disturbance
>
> Cultural Resource Inventory project # 99-6-9; Montana Department of Highways class 3 level inventory of highway disturbance

Cultural and paleontology resources are identified within a proposed project's area of potential effect (APE) and then evaluated as to their significance. Specific to cultural and paleontology resources, the affected environment could consist of:

1) all tangible products of human behavior that are more than 50 years old and determined to be eligible for listing in the National Register of Historic Places (Heritage Properties); and

2) all fossilized plant or animal remains that are rare and critical to scientific research.

No evidence of paleontology materials, or cultural resources less than 150 years old, have been identified within the project area. However, it is possible that less obvious evidences of proto-historic or prehistoric Native American activities are present within the proposed APE. Prior to commencement of project related ground disturbances, a Class III level intensity inventory of cultural resources will be conducted of the proposed APE. Any Heritage Property identified within the effected environment will be given due consideration per the mandates of MEPA and the Montana State Antiquities Act.

3.2.8 Land Use

The state land involved is used for the seasonal grazing of livestock. Grazing generally occurs in the late summer and early fall. The state land section is split east and west into two lease agreements.

The private lands subject to FSA review are enrolled in the Conservation Reserve Program. The subject lands previously were used for dryland crop production.

The other lands included within the project area are used for the dryland crop production and the grazing of livestock.

4.0 Environmental Consequences

4.1 Introduction

Environmental Consequences form the scientific and analytic basis for the summary comparison of effects presented in Chapter 2 pgs 16-20. This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of concurrent and future activities within the analysis area. This chapter focuses on the following effects:

- Direct, indirect and cumulative effects
- Adverse effects that cannot be avoided

Cumulative effects are effects of future activities near the project that are reasonably certain to occur in the foreseeable future. These types of actions may include, but are not limited to:

- ☐ population growth,
- ☐ new housing developments and subdivisions,
- ☐ infrastructure such as utilities/pipelines,
- ☐ mining operations,
- ☐ other energy developments, including other wind plants,
- ☐ logging of state and private forests,
- ☐ future agriculture practices on private land including livestock grazing.

This chapter has the following major sections:

- Predicted Attainment of the Project Objectives of All Alternatives
- Predicted Effects on Relevant Affected Resources of All Alternatives

4.2 Predicted Attainment of Project Objectives

4.2.1 Predicted Attainment of Project Objective #1.

Objective #1: Lease the right to utilize state land for the production of wind energy and generate the maximum legitimate monetary return to the common school trust.

4.2.1.1 Alternative A: No Action

Under this alternative the DNRC would not issue a lease for the construction and operation of a wind energy farm. No additional revenue would be generated for the common school trust and this objective would not be achieved. Also FSA would not grant the producer's request to place turbines on the affected CRP acres. No public benefit would be obtained from an alternative non-polluting energy source.

4.2.1.2 Alternative B: Construction

Under this alternative the DNRC would determine through completion of this environmental assessment that the expected environmental effects are not significant and that the DNRC may enter a lease agreement with WPSA for the construction and operation of a wind energy park. Completion of this lease agreement would result in the annual receipt of between $37,500 and $50,769 for the common school trust and objective 1 would be achieved.

Also under this alternative FSA would determine through completion of this environmental assessment that the expected environmental effects are not significant and would grant permission for the producer to enter into a lease agreement with WPSA for the construction and operation of a wind energy park, on their CRP acres.

4.2.2 Predicted Attainment of Project Objective #2

Objective #2: Manage the rangeland for the desired future condition characterized by a healthy native plant and wildlife community.

4.2.2.1 Alternative A: No Action

Under this alternative no wind energy development would occur on state land. The state land would remain characterized by healthy native plant communities and healthy wildlife populations. Objective 2 would be achieved through selection of the No Action alternative. Also, under this alternative no wind energy development would occur on CRP acres. The CRP acres would remain characterized by healthy native plant communities and healthy wildlife populations. Objective 2 would be achieved through selection of the No Action alternative.

4.2.2.2 Alternative B: Construction

Under this alternative state land would be developed for the production of wind energy. Placement of up to fifteen wind turbines and associated roads and transmission lines would eliminate approximately eleven acres of native short grass prairie within a 640 acre parcel. 98% of the range would be undisturbed. Existing surface use of livestock grazing and recreational use would continue. A nominal amount of displacement of local plant and wildlife is expected due to the construction and operation of the wind farm. Wind turbines are expected to kill on average less than three birds/ bats per towel and less than 45 birds / bats per year and have no effect on migratory populations.
Objective #2 would be achieved through selection of the Construction alternative.

Also, under this alternative CRP acres would be developed for the production of wind energy. Placement of up to 44 wind turbines and associated roads and transmission lines would eliminate approximately 36.56 acres of CRP from over 3779 acres under CRP contract. 99% of the CRP acres would be undisturbed. Existing management of the CRP would continue in accordance with CRP contract. A nominal amount of displacement of local plant and wildlife is expected due to the construction and operation of the wind farm. Wind turbines are expected to kill on average less than three birds / bats per town and less than 45 birds / bats per year and have no effect on migratory populations. Objective #2 would be achieved through selection of the Construction alternative.

4.3 Predicted Effects on Relevant Resources of all Alternatives

4.3.1 Soil Resources

4.3.1.1 Alt A

Potential adverse impacts to soil include increased erosion from runoff due to compaction and loss of vegetation, and possible impacts caused by fuel spill from construction equipment. Because of the gravelly soils and predominately gentle relief in the project area the potential for soil loss is low. Standard BMPs such as silt fencing, straw bales, and ditch blocks would be used during construction. Soil compaction would be limited to the crane pads at each wind turbine site. These pads are anticipated to be 50 feet by 50 feet and located on relatively flat ground. Best management practices for wind farm operations includes restoration of disturbed areas to preconstruction conditions. Erosion losses to soil resulting from compaction and disturbance would be short-term.

Construction BMPs require designed staging areas and fuel spill cleanup kits and the potential effects of fuel spills are low.

The Montana Department of Environmental Quality will require the submission of a Storm Water Pollution Prevention Plan to minimize impact to soil resources.

4.3.1.2 Cumulative Effects Alt A

The proposed Project is not expected to contribute to population growth and associated development activities. The general setting of the Project is rural agriculture, and this land use is expected to continue into the foreseeable future. Livestock grazing is likely to continue in the general area as the dominant land use. Future activities listed in 4.1 above, if they were to occur in the vicinity of the Project, could be expected to affect wildlife. Population trends for Wheatland County, however, show a ten percent decline in population between 1970 and 2000 (Sonoran Institute 2003). The Project itself is not expected to substantially contribute to the cumulative effects because of the temporary nature of the construction and the levels of mortality expected from the operational wind farm. Cumulative effects considered in this analysis are effects of future actions that are reasonably certain to occur in the foreseeable future. Because there are no foreseeable future actions that would result in increased development in the area, no additional changes further impacting soils are anticipated at this time. Because of the lack of foreseeable future actions only a brief statement will be made through the remainder of this analysis regarding specific resources.

4.3.1.3 Alt B

Impacts to soil resources associated with Alternative B would be very similar to those associated with Alternative A; however, they would be slightly greater due to the presence of more wind turbines over a larger area.

4.3.1.4 Cumulative Effects Alt B

The cumulative effects of Alt B are the same as Alt A.

4.4.1 Vegetation

4.4.1.1 Alt A

Temporary and permanent impacts to existing vegetation would result from construction activities. Temporary impacts associated with construction activities include localized reduction in the cultivation of crops and grazing capacity and possibly from the introduction of noxious weeds. Permanent disturbance would result from the construction of turbine pad sites and access roads. Approximately 34.29 acres would be permanently disturbed including 23.71 acres of native prairie and 10.58 of cropland. Over 99% of the wind farm area would remain undisturbed and impacts are expected to be low.

4.4.1.2 Cumulative Effects Alt A

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes further impacting vegetation are anticipated at this time.

4.4.1.3 Alt B

Impacts to vegetative resources associated with Alternative B would be very similar to those associated with Alternative A; however, they would be slightly greater due to the presence of more wind turbines over a larger area. Under Alt B 83.58 acres would be permanently disturbed including 34.78 acres of native prairie, 38.22 acres of CRP and 10.58 acres of cropland.

4.4.1.4 Cumulative Effects Alt B

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes further impacting vegetation are anticipated at this time.

4.5.1 Wildlife

4.5.1.1 Alt A

Some impacts to wildlife species and in particular avian and bat species are expected to occur from the Project. Measured use of the site by avian species in addition to mortality estimates from other existing wind plants was used to predict mortality of birds and bats from the Project. For example, use of the site by raptors is low to moderate compared to other wind farms and mortality estimates of raptors from other "newer generation" wind plants are relatively low (e.g. 0.07 raptors/turbine/year for Nine Canyon Wind Project, <0.04 raptors/turbine/year for Foote Creek Rim wind plant, Wyoming; <0.01 raptors/turbine/ year for the Buffalo Ridge wind plant, Minnesota). Therefore mortality estimates for raptors from the Project are expected to be low. Post construction monitoring is proposed to validate mortality predictions and monitor the actual level of mortality from the Project.

Other impacts include direct loss of habitat due to the Project facilities, and indirect impacts such as disturbance and displacement from the wind turbines, roads and human activities during construction and operations. Potential impacts are discussed for bats, birds and big game. Discussion of potential impacts to unique species including Federal listed species is also included.

Birds

Collision

Although generally considered environmentally friendly, wind power has been associated with the deaths of birds colliding with turbines and other wind plant structures, especially at Altamont Pass, California, the first large-scale commercial wind energy facility built in the U.S. (Erickson *et al.* 2001). Raptor fatalities at the Altamont Pass have been reported for more than a decade, and several studies have attempted to quantify and understand the mortality levels (Orloff and Flannery 1992, Orloff and Flannery 1996, Howell 1997, Thelander and Rugge 2000, Thelander et al. 2003). Reported raptor mortality at Altamont Pass has ranged from 0.05 to 0.10 fatalities per turbine per year (Erickson *et al.* 2001), where there are currently 5,400 operating turbines in a 60 mile^2 area. Several hundred red-tailed hawks, American kestrels and burrowing owls, and 30-60 golden eagles are estimated to be killed each year at the Altamont. Nearly all of the turbines are small (100 – 200 kW output) older generation machines. Fatality rates when standardized to name plate MW output is approximately 1 raptor fatality per MW per year (Thelander *et al.* 2003). Approximately 50% of the turbines currently in operation at Altamont Pass (approximately 3,000 out of 5,400) are Kenetech 56-100 turbines equipped on 18 m lattice towers, with rotor diameters of 18 m, down-wind blades spinning at approximately 60 revolutions per minute (rpm), with tips within 9 meters of the ground. These turbines are located in a high density and clustered arrangement within the 60 mi^2 WRA. Recent studies suggest the 56-100 turbines may cause higher golden eagle mortality than other turbine types (Hunt 2002).

The factors contributing to the higher raptor mortality at Altamont is likely a combination of several including those listed above (turbine types and configurations), as well as raptor use of the area. Raptor use and prey availability are very high at Altamont Pass relative to the surrounding area. These fatality rates (an estimated 30 to 60 golden eagle fatalities per year), coupled with the large number of turbines in a relatively small area, have contributed to the concerns over possible population level effects on golden eagles (Orloff and Flannery 1992, Hunt 2002). Hunt (2002) models show an increasing population size, even with the wind project and other mortality, but the long-term impact on the population is not well understood.

Wind plant design has changed significantly since the first large wind plants were developed in California; many of these changes have appeared to reduce risk to birds. Turbines are now typically installed on tubular steel towers instead of lattice towers and without open platforms at the top of the tower, eliminating perching and nesting opportunities for raptors and other birds. Electrical lines between turbines and from the turbine strings to substations in new-generation wind plants (including this project) are buried underground to eliminate perching opportunities, collisions with wires, and electrocutions. Collisions with wires and electrocutions have been a common source of mortality at Altamont Pass (Orloff and Flannery 1992) and other older wind projects.

Turbines at new wind projects are much larger than most turbines at the Altmont Pass, with blades moving at slower revolutions per minute (rpm). For example, the blades of turbines proposed for the project turn at 14 to 17 rpm's, contrasted to greater than 60 rpm's for the most abundant turbine at the Altamont Pass. Blade tip speeds of both large and small turbines are still fast. The maximum blade tip speed proposed for this project is approximately 140 mph.

Due to the avian collision concerns, baseline avian use, raptor nesting and operational fatality monitoring data (Erickson *et al.* 2001, 2002) have been collected at many of the new wind plants.

Outside of California, diurnal raptor fatalities comprised only 2% of the wind plant-related fatalities. Passerines (excluding house sparrows and European starlings) were the most common collision victims, comprising 82% of the 225 fatalities documented. No other group (e.g., waterbirds, waterfowl) comprised more than 5% of the fatalities. Throughout the entire U.S., but with studies primarily focused in the west and midwest, the average number of avian collision fatalities per turbine is estimated to be 2.19 per year (Erickson *et al.* 2001). Updated data for projects in the West and standardized to a per MW nameplate output are provided in Table 2 and have ranged from 1 to 3 bird fatalities per MW per year, or 90 to 270 bird fatalities for alternative A, actual levels of mortality could vary significantly from these predictions. Fatality monitoring will be conducted to estimate mortality.

Raptors

Raptor mortality has been absent to low at all newer generation wind plants studied in the U.S. Raptor mortality at new generation wind projects has ranged from 0 to 0.07 fatalities per MW per year (Table 2), in contrast to the 1 raptor per MW per year at the Altamont (Smallwood 2003). This and other information regarding wind turbine design and wind plant/wind turbine siting strongly suggests that the level of raptor mortality observed at Altamont Pass is quite unique (e.g., unique in the number and arrangement of turbines in a small area, turbine types, prey availability, raptor use), and can be avoided at other locations. Studies in California have found that large prey bases (e.g., ground squirrels) within the wind plants play a significant role in the mortality (Hoover *et al.* 2001, Thelander and Rugge 2000). At this project, no prairie dog towns were recorded with 8 km of the wind project during surveys, and relatively low numbers of Richardson ground squirrel activity were documented (Curry and Kerlinger 2003).

The fatalities observed at other wind projects include both resident and migrant fatalities of raptors and other birds. Raptor use at this project during the spring and summer seasons is considered low to moderate when compared to other existing wind projects in the west (Table 2). The size of the wind project, location, habitat, and species composition for raptors is most similar to the Foote Creek Rim, Wyoming and Ponnequin, Colorado projects (Kerlinger and Curry 2003). Using Foote Creek Rim and the upper range of raptor mortality estimates from new generation projects in the west, we estimate approximately 5-7 raptor deaths per year for Alternative A, although actual levels of mortality could vary significantly. Fatality monitoring will be conducted to estimate mortality. Risk of collision is likely highest for the most common raptor species observed during the studies including red-tailed hawk, northern harrier and ferruginous hawk. Owl species not typically observed during the diurnal surveys such as short-eared owl and great horned owl are also at some risk. Low risk is expected for golden eagles. At Foote Creek Rim, where golden eagles are observed frequently (Table 2), estimates are 1 fatality per 150 MW nameplate output per year (Young et al. 2003). American kestrels, Swainson's hawk and prairie falcons were observed in much lower numbers at this site, and are expected to have a lower risk of collision.

Migrating Songbirds

Passerines comprise a large proportion of the fatalities at new wind plants, and involve both resident and migrant species. Studies of nocturnal migration at several wind plants suggest that the mortality compared to the number of birds passing through the area is very low (Johnson *et al.* 2002, Mabee and Cooper 2002, McCrary *et al.* 1984, Erickson and Strickland 2003). Many species of songbirds migrate at night and have collided with other tall man-made structures. Large numbers of songbirds have collided with lighted communication towers and buildings when foggy conditions occur during spring or fall migration. To date, no large mortality events have been documented at wind plants in North

America (Erickson *et al.* 2001). Only two small events have been reported. At Buffalo Ridge Minnesota, fourteen migrating passerine fatalities (vireos, warblers, flycatchers) were found at two turbines during a single night in May 2002 (Johnson *et al.* 2002). Approximately 25 to 30 migrating passerine fatalities (mostly warblers) were observed near three turbines and a well-lit substation at the Mountaineer West Virginia wind project. Erickson and Strickland (2003) estimated 0.2 to 1 spring migrant songbird fatalities per turbine per year for this project. If we assume a similar estimate during the fall, we estimate approximately 0.4 to 2 migrant songbird fatalities per turbine per year for Alternative A, for a total of 25 to 120 migrant songbird fatalities per year. These mortality levels in comparison to the passage rates estimated from the radar studies would appear to be very low. Actual levels of mortality could vary significantly. Fatality monitoring will be conducted to estimate mortality.

Resident Songbirds

Two existing wind projects that have been studied for direct and indirect impacts and are similar in habitat and resident songbird species composition to this Project are the Ponnequin wind farm in northeast Colorado and the Foote Creek Rim win farm near Arlington, Wyoming. Both projects are also situated in grassland habitats and are grazed. Monitoring of mortality at the Ponnequin site has been ongoing for 7 years, and very few birds (20-30 total) have been found during this time period. Only one raptor fatality (an American kestrel) has been found. Most of the mortality has involved common resident songbirds such as horned lark, McCown's longspur, lark bunting and blackbirds, and migrating warblers (Ron Ryder, Colorado State University, pers. commun.). At the Phase 1 Foote Creek Rim wind plant, overall avian mortality averaged 1.5 per turbine per year (Young *et al.* 2003). Most (92%) of the carcasses found were songbirds. Only five raptors (3 American kestrels, 1 northern harrier, 1 short-eared owl) were found during the 3.5-year study. The remaining casualties included a western grebe, lesser scaup, mourning dove, common poorwill, and common nighthawk. Based on other studies in similar environments, we estimate approximately 1 resident songbird per turbine per year. Most of the resident birds killed would likely be songbirds such as horned larks and McCown's longspurs.

Shorebirds

A few mountain plovers were documented within the Judith Gap WRA. Like many other prairie species, mountain plovers forage and nest on the ground and typically fly close to the ground (Flath 2003), suggesting that they would not be susceptible to collision. Monitoring data at the Foote Creek Rim wind project also supports the very low collision risk for mountain plovers. A relatively large breeding population of mountain plovers exists at the Foote Creek Rim wind project and no fatalities have been observed during 4+ years of standardized fatality monitoring (Young et al. 2003). Foote Creek Rim also appears to be a pre-migratory concentration area, while no such aggregation was found in the Judith Gap WRA. A few other resident but uncommonly observed species may be at some risk of collision, including Sprague's pipits and long-billed curlews. These species both routinely fly at rotor swept area heights (Flath 2003).

Waterfowl

Wind plants with year-round waterfowl use have shown the highest waterfowl mortality, although the levels of waterfowl/waterbird mortality appear insignificant compared to the use of the sites by these groups. For example, only two Canada goose fatalities were documented at the Klondike, Oregon wind plant, although several thousand Canada goose were observed flying over the area during preconstruction surveys (Johnson *et al.* 2003c). Other U.S. wind farm sites within native landscapes have shown very low waterfowl use, except when significant water sources are in close proximity to the wind farm. The proposed site is proximate to a few small reservoirs and is used by a variety of local waterfowl (Curry and Kerlinger 2003), but apparently in low numbers. Some, although likely very few, waterfowl fatalities may occur.

Indirect Effects

In Europe, wind plant-related displacement effects are considered to have a greater impact on birds than collision mortality (Gill *et al.* 1996). Avian displacement associated with windpower development has not received as much attention in the U.S. At a large wind plant on Buffalo Ridge, Minnesota, abundance of several groups of birds was lowered primarily within 100 m of the turbines (Johnson *et al.* 2000a). Other studies have reported that birds may avoid flying in areas with turbines (Osborne *et al.* 1988). Also at Buffalo Ridge, Leddy *et al.* (1999) found that densities of male songbirds were four times higher in Conservation Reserve Program (CRP) grasslands without turbines than in CRP grasslands with turbines. Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness due to the presence of access roads and large gravel pads surrounding turbines (Leddy 1996, Johnson *et al.* 2000a).

The only report of avoidance of wind plants by raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density was lower than expected near a small wind plant (Usgaard *et al.* 1997), although the difference was not statistically significant. Two nests were expected based on the size of the area, and none were found. Similar numbers of raptor nests were found before and after construction of Phase 1 of the Montezuma Hills, California windplant (Howell and Noone 1992). At the Foote Creek Rim wind plant in southern Wyoming, one pair of red-tailed hawks successfully nested within 0.3 miles of the turbine strings, and seven red-tailed hawk, one great horned owl, and one golden eagle nests located within 1 mile of the wind plant were successful (Johnson *et al.* 2000b). A Swainson's hawk nested within 0.5 miles of a small wind plant in Oregon (Johnson *et al.* 2003c). Anecdotal evidence indicates that raptor use of the Altamont Pass, California wind resource area (WRA) may have increased since installation of wind turbines (Orloff and Flannery 1992, American Wind Energy Association 1995). Some birds apparently do become accustomed to turbines, as Osborn *et al.* (1998) reported a mallard nest within 31 m of a turbine in Minnesota. There is one ferruginous hawk nest within ½ mile of the project boundary (Flath 2003), that could be potentially displaced from construction and operation of the wind project.

The wind project will likely displace some birds. Although displacement of birds by wind plants is not desirable where important habitats may be limited, if other suitable habitats are available, one potential benefit of avian avoidance of turbines is the reduced potential for collision mortality to occur (Crockford 1992). Operational monitoring will address and estimate this displacement impact.

Bats

Collisions

An unexpected outcome of several avian monitoring studies at wind plants has been the discovery of bat collision fatalities. In the United States, bat fatalities have been found at several wind plants. In many cases the number of bat fatalities at wind plants has exceeded the number of avian fatalities (Johnson 2003). The estimated number of annual fatalities per turbine where bat mortality occurs has ranged from 0.1 at the Buffalo Ridge, Minnesota Phase 1 wind plant to 28.5 at the Buffalo Mountain, Tennessee wind plant (Johnson *et al.* 2003a). Although estimates have not been provided, results of studies at the Mountaineer wind project in West Virginia suggest a similar to possibly higher estimate than the Buffalo Mountain estimate.

Available evidence indicates that bat mortality would be confined primarily to the migratory species. Of 45 species of bats in North America (Wilson and Ruff 1999), only nine species comprise all known wind plant fatalities, despite the fact that wind plants have been constructed in several regions in a variety of habitats. Most (87.5%) of the identified bat fatalities documented at wind plants have been migratory tree bats. Of 1044 bat wind plant collision victims identified to species, hoary bats comprised 53.9%, eastern red bats comprised 24.5%, and silver-haired bats comprised 9.1%. The remaining identified fatalities were comprised primarily of eastern pipistrelle (5.4%), little brown bat (4.7%), and big brown bat (2.1%) (Johnson and Strickland 2003). Most bat mortality documented at U.S. wind plants occurred in late summer and early fall. Data are available for 1021 bat collision fatalities in the U.S. where the approximate date of the collision was reported, and nearly 90% of the fatalities occurred from mid-July through mid-September, with over 50% occurring in August (Johnson and Strickland 2003). At several wind plants evaluated to date in the U.S., bat collision mortality during the breeding season was virtually non-existent, despite the fact that relatively large populations of resident bats of several species were documented breeding in close proximity to the wind plant (see Johnson 2003). Furthermore, there is very little resident bat habitat within the project area, and no bats were detected during the limited May bat call surveys. Based on these studies and the lack of bat habitat at the project, it appears the project would pose little risk to non-migratory bat populations in the study area.

Some mortality of mostly migratory bats, especially hoary bat, and to a lesser extent silver-haired bat, is anticipated during operation of the Project. Thirty-nine bat fatalities have been found at the Ponnequin, Colorado wind farm over the last 7 years, including 36 hoary bats, 2 silver-haired bats, and 1 unidentified bat (Ron Ryder, Colorado State University, pers. commun.). Bat mortality at the Foote Creek Rim, Wyoming wind farm has averaged 1.3 per turbine per year (Johnson *et al.* 2000b, Young *et al.* 2002, 2003, Gruver 2002), and has been comprised of hoary bat (90%), little brown bat (4%), silver-haired bat (4%), and big brown bat (1.5%).

A similar range of mortality has been estimated from wind projects in more agricultural settings in the Pacific Northwest and Midwest. At the Buffalo Ridge Wind Plant, Minnesota, based on a 2-year study, bat mortality was estimated to be 2.05 bats per turbine per year (Johnson *et al.* 2003b). At the Vansycle Ridge Wind Plant in Oregon, bat mortality was estimated at 0.74 bats per turbine for the first year of operation (Erickson *et al.* 2000). At the Klondike, Oregon Wind Project, bat mortality was estimated at 1.16 bat fatalities per turbine per year (Johnson *et al.* 2003a). At the Stateline Wind Project on the Oregon/Washington border, bat mortality was estimated at approximately 1.5 bat fatalities per turbine per year (Erickson pers. comm.) from July 2001 through December 31, 2003. At the Nine Canyon, Washington Wind Project, bat mortality was estimated at approximately 3 bat fatalities per turbine per year (Erickson *et al.* 2003b).

Although potential future mortality of migratory bats is difficult to predict, we provide an estimate based on levels of mortality documented at other wind projects in the West. Using the estimates from these other wind projects, a reasonable range of expected mortality for the proposed wind farm is 1 to 2.5 bats per MW per year (Table 2). Under Alternative A, operation of the Project could result in approximately 90 to 225 bat fatalities per year. Actual levels of mortality are unknown and could be higher or lower depending on regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively. Mortality will likely involve mostly hoary bats and to a lesser extent silver-haired bats, two widely distributed species. A collaborative research project among Bat Conservation International, Department of Energy, USFWS and the wind industry is underway to study the wind turbine/bat interactions and develop effective deterrent methods and mitigation measures.

Indirect Impacts

As with birds, wind plant development may also impact bats indirectly through loss of habitat. The grassland and cultivated agricultural habitats where the turbines would be built are not preferred bat habitats, and construction of the wind plant will not reduce bat habitats on the project.

Big Game

There is little information on wind plant effects on big game. The only study to address effects of a wind plant development on pronghorn was at the Foote Creek Rim Wind Plant near Arlington, Wyoming. Pronghorn observed within 800 m of 6 observation points in and near the wind plant were recorded the year prior to construction, the year of construction, and one year post construction. The mean number of pronghorn observed per survey at the six points averaged 1.07 prior to, 1.59 during, and 1.14 the year following construction. There was no significant difference in pronghorn abundance between years, indicating that the wind plant did not displace pronghorn (Johnson *et al.* 2000b). Development of the turbine pads and access roads will slightly reduce the amount of available habitat for mule deer and pronghorn, but due to the small area disturbed this impact would be insignificant.

Studies have been conducted at the Starkey Research Unit, a large fenced experimental study area near La Grande using radio-collared elk and deer. Results of spring studies (April – early June) suggest that elk habitat selection may be negatively related to traffic and other human disturbance (Johnson et al. 2000c). Elk also tended to increase movement distances as a function of increased use by humans, including ATV use, hiking, and horse back riding (Wisdom et al. 2002). Mule deer habitat selection, on the other hand, appears to primarily be related to elk distribution, with mule deer avoiding areas used by elk. Traffic and roads did not appear to be an important factor in spring distribution of mule deer. In fact, there was some selection for areas close to roads with medium levels of traffic, but the cause of this relationship is unknown. Mule deer showed some increase in movement distances as a function of increased use by humans, including ATV use, hiking and horseback riding (Wisdom et al. 2002), but much less response than elk showed.

Federal Threatened and Endangered Species

Under the Endangered Species Act, effects are classified as those "not likely to adversely affect" or those "likely to adversely affect" a listed species. Not likely to adversely affect is the appropriate conclusion when effects are expected to be discountable, insignificant, or beneficial. Discountable effects are those that are extremely unlikely to occur and are essentially not expected to occur. Insignificant effects refer to the size and/or magnitude of the effect, and are those effects that should never reach a scale where take occurs. Insignificant effects are effects that cannot be detected, measured, or evaluated to any meaningful degree. Beneficial effects are positive effects to a species that occur without any associated adverse effects. Project effects have been evaluated in detail in a Biological Assessment prepared for the project (WEST Inc. 2004); they are summarized below.

Bald Eagle

Direct Impacts

Construction of the wind farm is unlikely to result in the death of a bald eagle; however, operation of the wind farm may put wintering and migrating eagles at risk of collision with turbines. The risk of collision is expected to be very low based on the fact that there are no known bald eagle fatalities associated with wind plants (Erickson et al. 2001) and on a site-specific risk assessment that concluded that the overall risk of avian collision fatalities at the Judith Gap Wind Farm is not likely to be biologically significant (Curry & Kerlinger 2003). While use of the Project area by bald eagles may occur, it is low use, seasonal, and probably directly correlated to occasional carcasses (carrion), on which they may forage. No nesting or roosting occurs in the Project area, and there is little to attract bald eagles to the site other than carrion. No major water bodies, big game winter range, or calving operations occur in the Project area. Bald eagle use of the Project area is probably limited to eagles moving across the site to forage and migrating across the area in the spring and fall. Migrating eagles are not expected to be at risk. In general, bald eagles migrate well above the area affected by the wind turbines, and since they migrate during the day, they are expected to avoid the project. Mitigation measures for the Project are intended to minimize foraging opportunities for bald eagles within the wind farm. Provided these measures are in place and given the low level of use of the area by bald eagles, the potential for take is considered immeasurable and therefore insignificant. The Judith Gap Wind Farm is not likely to adversely affect bald eagles.

Indirect Impacts

The Project may conceivably result in short-term and long-term disturbance and/or displacement effects to bald eagles from construction and operation of the wind farm. However, based on the on-site surveys and available information about bald eagle use of the area, the seasonal and spatial use of the site by bald eagles is low and likely directly correlated with the presence of foraging opportunities. With implementation of the mitigation measures, foraging opportunities will be minimized. The potential for disturbance and displacement to occur which result in adverse effects is considered discountable (i.e., extremely unlikely to occur and essentially not expected to occur) and insignificant (i.e., will not reach a scale where take occurs). That is, the Project is not expected disturb or displace bald eagles to the point where harm or harassment (as defined by the USFWS for listed species) occurs. Additionally, limiting construction to the summer further reduces the possibility of disturbing a wintering bald eagle.

Mitigation Measures:

The following measures will be incorporated into the Project to minimize potential risk to bald eagles from the Project:

- minimize construction activity that will occur during the winter;
- maintain best management practices within the construction zones to minimize adjacent habitat disturbance;
- establish and enforce reasonable driving speed in the Project to minimize wildlife or livestock road kills;
- provide adequate on-site waste disposal;
- adhere to the NPDES permit stipulations, including erosion control measures;
- reclaim disturbed areas as soon as practical following construction;
- establish and adhere to a fire prevention plan;

- remove and disposed of all carcasses of livestock, big game, and other wildlife from within the wind farm that may attract foraging bald eagles;
- notify state or local highway maintenance crews of road kill in or near the Project area and request removal to avoid attracting bald eagles;
- install raptor perch guards on all new power poles within the wind farm
- comply with APLIC guidelines for minimizing electrocutions on new power lines and poles.

Black-footed Ferret

Based on an aerial survey of the project area, including a 5-mile radius, no prairie dog towns are present. In the absence of prairie dog towns, no habitat occurs for the black-footed ferret; therefore this species would not occur in the project or surrounding area. Since black-footed ferrets do not occur there, the Judith Gap Wind Farm Project would have no effect on this species.

Black-tailed Prairie Dog

Based on an aerial survey of the project area, including a 5-mile radius, no prairie dog towns were observed (Flath 2003). Since black-tailed prairie dogs do not occur there, the Judith Gap Wind Farm Project would have no effect on this species.

4.5.1.2 Cumulative Effects Alt A

Because there are no foreseeable future actions that would result in increased development in the area, no additional significant changes further impacting wildlife are anticipated at this time.

4.5.1.3 Alternative B

Raptor mortality under this alternative is expected to be approximately twice as high as Alternative A due to the greater number of turbines. This would lead to a predicted mortality of 10-14 raptors per year. The expected number of bird fatalities (e.g., song birds, waterfowl) would also be approximately twice that estimated for Alternative A, or up to 540 fatalities per year. Alternative B would have greater displacement effects to birds, big game and other wildlife due to its larger size. Alternative B would also result in additional lost habitat for wildlife due to the larger area impacted. There is an additional ferruginous hawk nest that could be potentially displaced from construction and operation of the wind project (Flath 2003). Under alternative B, operation of the wind project could result in approximately twice as many bat fatalities as predicted for Alternative A. The estimate for Alternative B would range from 180 to 450 per year.

4.5.1.4 Cumulative Effects Alt B

Because there are no foreseeable future actions that would result in increased development in the area, no additional significant changes further impacting wildlife are anticipated at this time.

4.6 Visual Impacts

4.6.1 Alt A

Short-term visual impacts will result from ground disturbance associated with construction of the turbine pads, access roads, and transmission lines. However, successful reclamation of disturbed areas will remove these visual impacts.

The wind turbines will be placed on low benches in open, flat areas where there is little interference to wind flow and wind speeds are greatest. The turbines will be 387 feet tall at the tip of the blades. As a result, the turbines will be visible for up to several miles from some locations and their presence will change the visual character of the area. Photographs with the turbines superimposed were developed to depict the wind farm development area from the town of Judith Gap, from east of the wind farm, and from Highway 191 looking north (**Exhibit 9**).

Relative to other types of utility projects and facilities, the wind towers would present clean, graceful lines that would not overpower the landscape or obstruct views as do large industrial buildings. Because they would be spaced several hundred feet apart, they would be much less of a focal point on the landscape than many other large structures (Walla Walla County Regional Planning Department 2000). However, because the landscape within the project area is predominantly flat, the turbines would introduce a strong vertical element into the landscape and create strong contrasts (BLM 1995).

The perceived dominance of the turbines on the landscape depends on the angle of the sunlight striking the turbines, and would vary during the time of day, time of year, and weather conditions. During times of the day and year when the angle of the sun is lower, sunlight striking at a lower angle on the side of the turbines would tend to make them more visible and more prominent than when the sun is more directly overhead.

Due to the proximity of the Wheatland County Airport, the turbines will have lights on top of the nacelle for aircraft safety. These lights are typically white flashing lights in the daytime and red flashing lights at night. Although aircraft warning lights are designed to be more visible to aircraft than from the ground, the presence of the lights would cause a change in views from nearby residential areas and roadways.

Visual impacts would be greatest for those residences located nearest the project area, including the two residences located 0.5 and 1.5 miles from the nearest turbines. Visual impacts are greatly reduced with distance from the wind farm. Although the turbines will likely be visible from both Judith Gap and Harlowtown, they will not be a dominant feature on the landscape at those distances.

Reactions to the turbines would likely vary. Some people would prefer the setting as it now exists without the turbines. Other people, however, may find them to be an interesting and even aesthetic point of visual interest upon the landscape. A survey of people living within 12 miles of wind farms in Scotland found that three times as many residents reported the local wind farm has had a positive impact on the area (20%) than say it had a negative impact (7%). Most (73%) felt that it has had neither a positive or negative impact or expressed no opinion. People living closest to the wind farms (i.e., <3.1 miles) tended to be most positive about them, and those who most frequently see the wind farms in their day-to-day lives were most favorable towards them (Braunholz 2003).

The turbines will be painted with a flat gray or white, non-reflective paint. This color scheme would cause the wind turbines to recede more quickly as viewing distance increases. To mitigate short-term visual resource impacts, vegetation disturbance and the number of cuts and fills for access roads would be minimized. The landscape would be reshaped to its original contour and disturbed areas would be re-vegetated promptly.

4.6.2 Cumulative Effects Alt A

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes further impacting visual resources are anticipated.

4.6.3 Alt B

Impacts to visual resources associated with Alternative B would be very similar to those associated with Alternative A; however, they would be slightly greater due to the presence of more wind turbines over a larger area.

4.6.4 Cumulative Effects Alt B

Cumulative impacts associated with this alternative would be similar to those associated with Alternative A.

4.7 Noise

4.7.1 Alt A

The proposed project is located in a rural agricultural area with very few sensitive noise receptors. Noise impacts in the project area during construction will be temporary and will consist of increased noise levels associated with construction activities. Construction activities associated with development of the wind farm would generate maximum noise levels of 85 to 88 dBA at a distance of 50 feet (BLM 1995). Noise would also be generated by increased traffic on area roadways. Rural residences are located 0.5 and 1.5 miles east of the closest turbine. Although the closest residence may experience some increased noise levels during construction, construction noise should be virtually inaudible at the other residence. Regular maintenance and upkeep of construction equipment will reduce noise impacts to some extent. Construction noise may result in a temporary, minor impact to the residence located 0.5 miles away from the nearest turbine. To minimize impacts, construction will occur during regular business hours to the extent possible.

The two sources of noise from operational wind turbines are mechanical noise from the gearbox and aerodynamic noise from the rotor blades. Mechanical noise has virtually disappeared from modern wind turbines due to engineering designs that minimize vibrations. Aerodynamic noise results from turbine blades moving through the air. Blade tips and back edges are currently designed to minimize aerodynamic noise. Noise from moving blades is low frequency, and is therefore less obvious to the human ear.

Noise caused by the Vestas 1.8 MW turbine or other size machines, varies with wind speeds. Noise levels range from 101.4 dBA at wind speeds of 9 mph to 104.4 dBA at wind speeds of 22 mph. Noise levels decrease significantly with increasing distance from the turbines. It is predicted that the wind turbines will produce between 45 – 50 dBA at 1,000 feet, and that wind speeds will mask the noise generated by the wind turbines at distances greater than 1,000 feet. Noise modeling conducted for this project indicates that the nearest residence located 0.5 miles from the nearest turbine would experience turbine noise levels of up to 40 dBA, and that the residence located 1.5 miles from the nearest turbine would experience noise levels of up to 35 dbA. To put these noise levels into perspective, noise levels of 30 dBA are comparable to a soft whisper, while noise levels of 40 dBA are typical of those in a library (Tipler 1991). Results of the modeling indicated that there would be no noise impacts to those residences located nearest the project.

4.7.2 Cumulative Effects Alt A

Since there are no other developments in the project area in the foreseeable future that would result in increased noise levels, no cumulative impacts are anticipated regarding noise levels.

4.7.3 Alt B

Noise impacts associated with this alternative would be similar to those for Alternative A, although noise levels would be somewhat higher due to the greater number of turbines. The turbines closest to the two residences near the wind farm would be constructed under both alternatives.

4.7.4 Cumulative Effects Alt B

4.8 Aviation Safety

4.8.1 Alt A

As with other tall structures, wind turbines of the height proposed for use on the Judith Gap Project present a potential hazard to aircraft taking off and landing. This hazard extends well beyond the boundaries of an airport. The FAA sets guidelines for how tall structures can be in the vicinity of public use airports without jeopardizing safe use of the airport. These guidelines are based on keeping objects out of airspace used for arriving, departing, and maneuvering aircraft, and are based on a set of complex slopes from various points on the airport.

Due to the proximity of the wind turbines to the Wheatland County Airport and the Lewistown Airport, and because the wind farm is within an FAA-designated route, the Federal Aviation Administration (FAA) has made a preliminary determination that 10 to 15 turbines be equipped with airplane warning lights consisting of dual system red/medium intensity flashing white lights on top of the generator housing. This is a preliminary determination and further restrictions may be applied once the application has been reviewed more thoroughly. There are no new overhead powerlines associated with the project that could pose additional hazards to aircraft.

Generally speaking, no structures are allowed which might interfere with aircraft climbing at the rate of 200 feet per nautical mile from a runway. The wind farm is located approximately 6.1 nautical miles from the Wheatland County Airport runway, so the prohibition on obstacle height at this distance is 1220 feet, well above the 387-foot height of the turbines. In addition, aircraft using the main runway at the Wheatland County Airport would have to take off either to the east or west, whereas the turbines are located north of the runway. Because the turbines are not located in an aircraft approach or takeoff zone, operators of this airport did not have any objections to the wind farm. Due to the relatively small area affected by the wind farm and distance from the nearest airport, no impacts to aviation would likely be associated with construction of the wind farm provided that lighting measures required by the FAA are implemented.

4.8.2 Cumulative Effects Alt A

Construction of the wind farm would result in the presence of additional structures for aircraft to avoid in the area. No additional tall structures are proposed for the project vicinity, although other tall structures such as communication towers may be constructed in the future. Cumulative impacts to aviation are likely to be minimal.

4.8.3 Alt B

Impacts to aviation associated with Alternative B would be very similar to those associated with Alternative A, although the impacts would be slightly higher due to the greater number of turbines.

4.8.4 Cumulative Effects Alt B

Cumulative impacts would be similar for both alternatives.

4.9 Economic Benefits and Expected Revenues

The primary economic benefit associated with windfarm development is a dramatic increase in the tax base of Wheatland County. Additional benefit will result from increased employment during construction and to a lesser extend during operation of the facility.

The Montana Department of Revenue estimates a market value of 1.25 million dollars per megawatt of productive capacity. Industrial size windfarms are considered Class 13 property and are taxed at 6% of assessed value. Depreciation of assessed value starts immediately, with the first year assessed value being .95 of initial value.

Industrial windfarms are eligible for a tax break as a New or Expanding Industry as defined in 15-24-1401, MCA. This statute allows for a reduction of 50% in local government taxes for the first five years of operation contingent upon approval by the county commission. After year five property taxes increase in equal increments until the full tax is assessed in the tenth year. WPSA has indicated that they intend to apply for this tax break and the Wheatland County Commission indicated that they will approve this request. Taxes to state government are not eligible for reduction under this statute. The information presented below is predicated on the assumption that the County would not change the amount of mils assessed in response to the increase to the County's taxable value. It is likely that a reduction in mils would occur and that the actual taxes paid by WPSA would be less than presented. Until the actual size of the project is determined it is impossible to estimate what reduction (if any) in the amount of mils assessed would be made.

4.9.1 Alt A

Projected tax revenue

Assumption – 61, 1.5 megawatt turbines would be constructed on private land.

Estimated local tax revenue of Alt A after complete construction:

61 wind turbines * 1.5 megawatt per turbine = $114,375,000 total capitalized cost

$114,375,000 *.95 = $108,656,250 depreciated value in year one

$108,656,250 * .03 = $3,259,687 taxable value

$3,259,687 * .329 mils = $1,072,437 estimated tax

Estimated state tax revenue of Alt A after complete construction

$108,656,250 depreciated value * .06 = $6,519,375

$6,519,375 * .101 mils = $658,456 estimated tax

Employment Alt A

1 Construction workforce to build and test (assumes 4 to 6 month construction duration) - 100 to 150 people
2 Permanent operations personnel to run 3 to 5 depending on physical layout

Note: They will also be several local contracts for various services to support maintenance outages, emergencies, overhauls, collection and substation maintenance. Usually these contracts are executed and in place at start of operation.

No adverse economic effects are anticipated.

4.9.2 Cumulative Effects Alt A

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes further economic impacts are anticipated at this time.

4.9.3 Alt B

Assumption – 120, 1.5 megawatt wind turbines would be constructed on private, crp and state land.

Estimated local tax revenue after complete construction:

180 megawatts * $1.25 million per megawatt = $225,000,000 total capitalized cost

$225,000,000 * .95 = $213,750,000 depreciated value

$213,750,000 * .03 = $6,412,500 taxable value
$6,412,500 * .329 = $2,109,712 estimated local tax in year one

Estimated state tax revenue after complete construction:

$213,750,000 * .06 = $12,825,000 taxable value

$12,825,000 * .101 = $1,295,325 estimated state tax in year one

Employment Alt B

1 Construction workforce to build and test (assumes 4 to 6 month construction duration) - 175 to 275 people
2 Permanent operations personnel to run 6 to 10 depending on physical layout.

No adverse economic impacts are expected.

4.9.4 Cumulative Effects Alt B

Because there are no foreseeable future actions that would result in increased development in the area, no additional economic impacts are anticipated at this time.

4.10 Land Use

4.10.1 Alt A

The existing land uses of livestock grazing, dryland crop production and cropland enrollment within the CRP program would continue with minor modification to accommodate the placement of wind turbines. A small reduction in the number of animal unit months associated with livestock grazing would occur due to the removal of 23.71 acres of pasture. A reduction of 10.58 acres of cropland would result in slightly less production of small grain crops.

4.10.2 Cumulative Effects Alt A

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes in land use are anticipated at this time.

4.10.3 Alt B

The existing land uses of livestock grazing, dryland crop production and cropland enrollment within the CRP program would continue with minor modification to accommodate the placement of wind turbines. A small reduction in the number of animal unit months associated with livestock grazing would occur due to the removal of 34.78 acres of pasture. A reduction of 10.58 acres of cropland would result in slightly less production of small grain crops. CRP acreage would be reduced by 38.22 acres resulting in a small reduction in wildlife and soil conservation benefits.

State land would be reclassified from the current designation of as grazing lands to the land classification "other" that allows for a predominant use as a wind energy park. The existing grazing use of the parcel would continue but would be subordinate to use as a wind energy site. A reduction of four AUM months is anticipated. Some disruption of seasonal grazing activities may occur during construction. Post construction wind energy production and livestock grazing are expected to be compatible.

4.10.4 Cumulative Effects Alt B

Because there are no foreseeable future actions that would result in increased development in the area, no additional changes in land use are anticipated at this time.

5.0 List of Individuals Associated with the Project

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Mel Yost, Farm Services Administration
Wallace Erickson, West Inc.

6.0 List of Agencies and Persons Consulted and/or Provided Copies of this EA

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Montana Department of Labor
United States Army Corp of Engineers
United States Bureau of Land Management
United States Federal Communication Commission
United States Forest Service
United States Federal Aviation Administration
United States Natural Resource Conservation Service
United States Air Force
Springdale Colony
Town of Judith Gap
City of Harlowton

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Exhibits

Exhibit 1

Exhibit 1

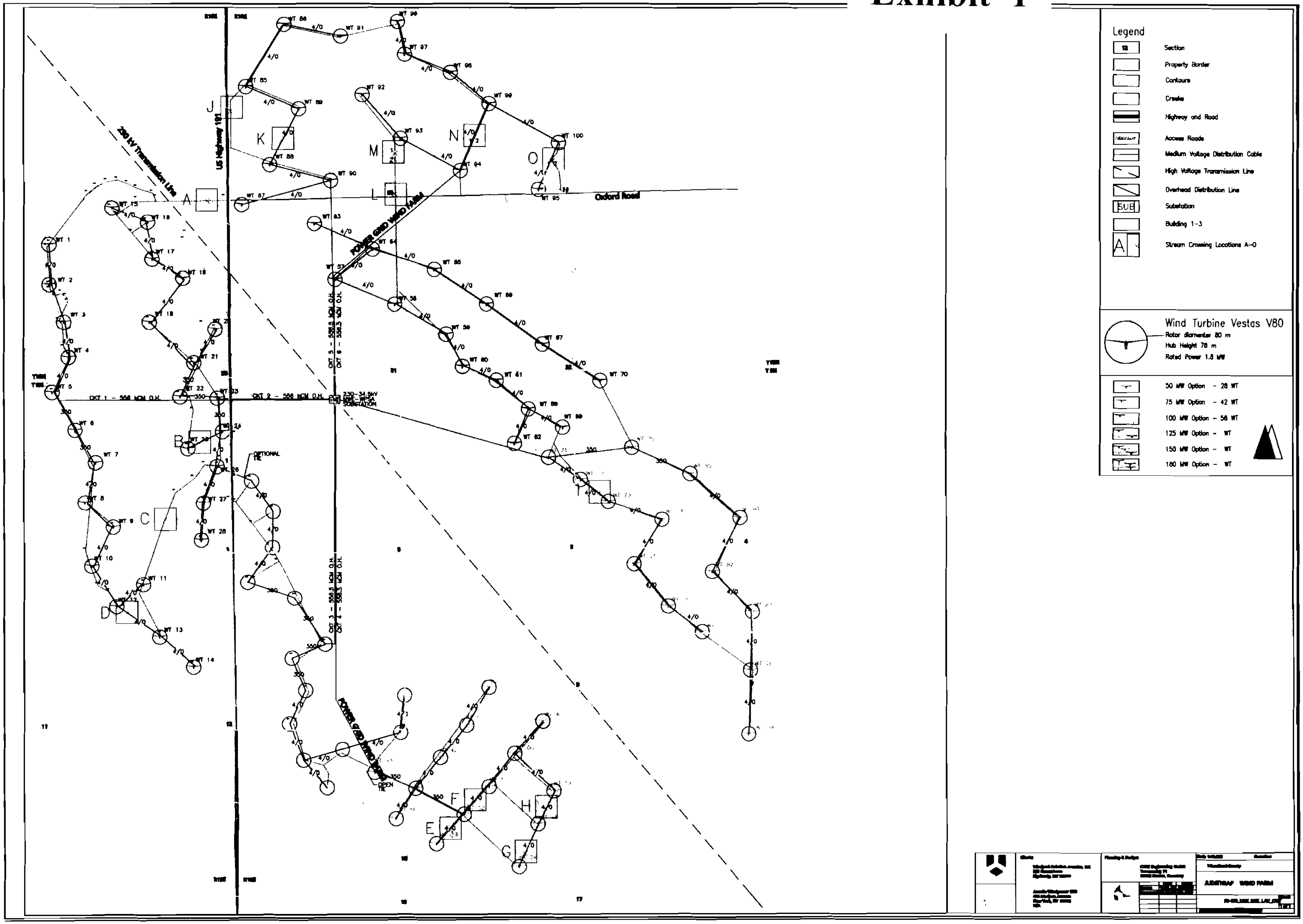
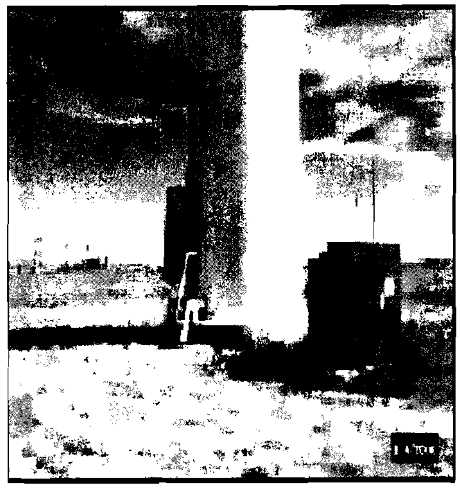
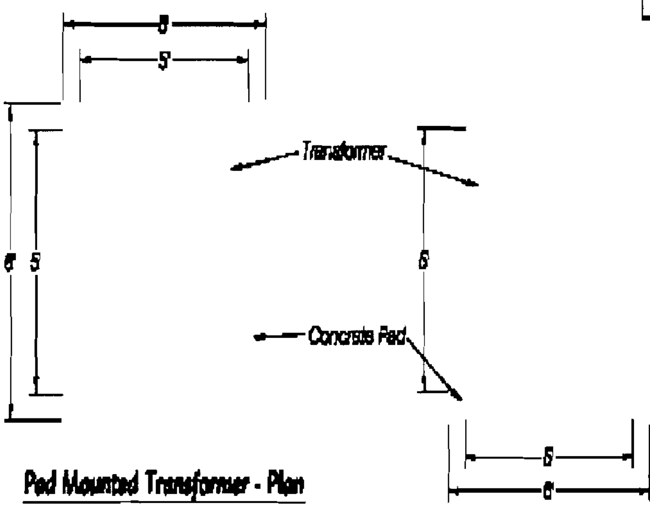


Exhibit 2



Pad Mounted Transformer at Base of Wind Turbine



Pad Mounted Transformer - Plan

Pad Mounted Transformer - Profile

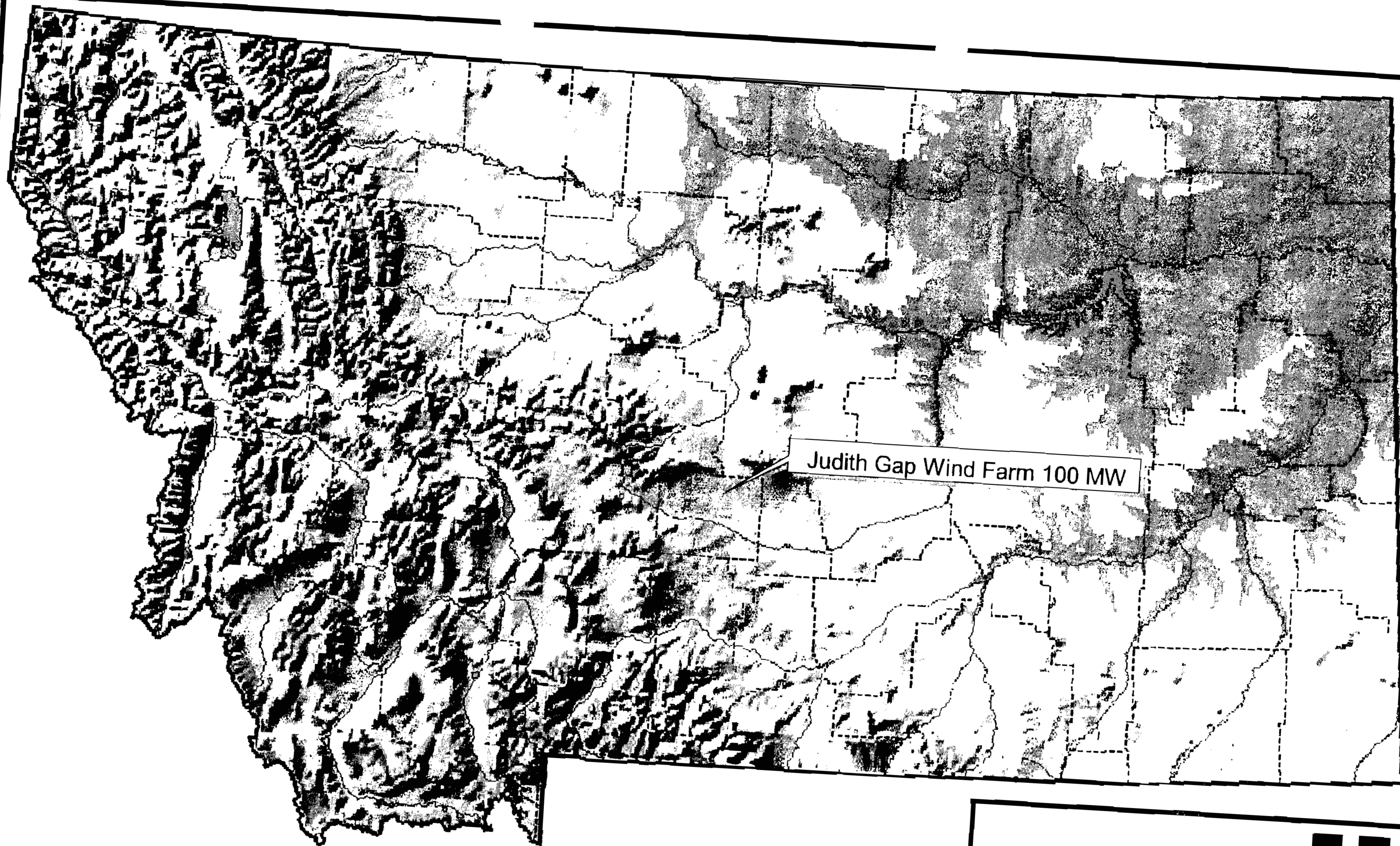
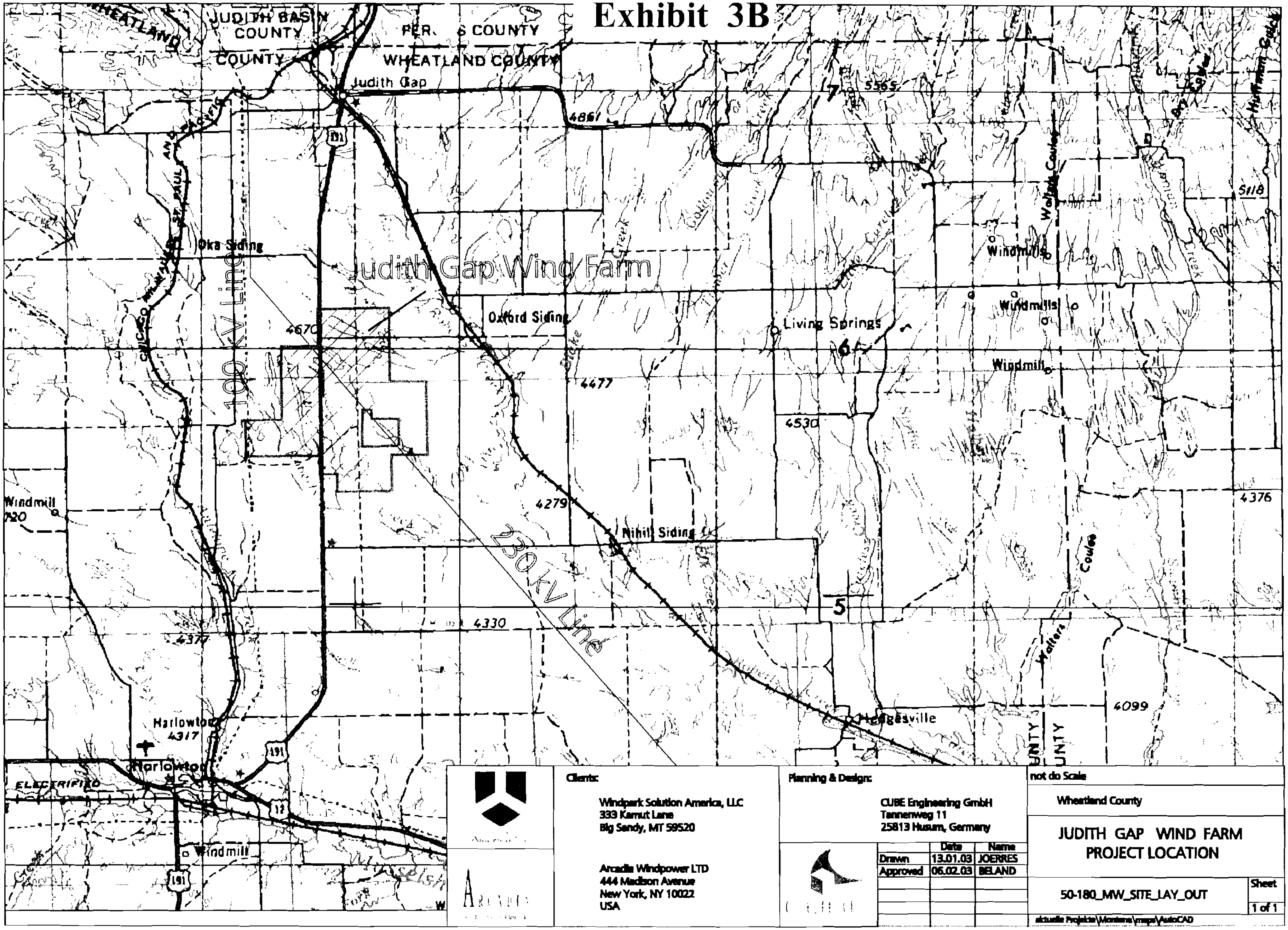


Exhibit 3A

Judith Gap Wind Farm 100 MW	
Client/ Builder: Windpark Solutions America LLC	Design & Planning: CUBE Engineering GmbH
Drawer	Nadine Jörres (B.Sc.)
Date	2003 - 01 - 15

Exhibit 3B


WHEATLAND
JUDITH BASIN COUNTY
COUNTY
WHEATLAND COUNTY
Judith Gap
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4861
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7
5118
Oka Siding
Judith Gap Wind Farm
100 kV Line
4670
Oxford Siding
Living Springs
6
Windmills
Windmills
Windmill
4477
4530
Windmill
4279
Nihill Siding
230 kV Line
4376
Coulee
5
4330
4377
Walters
4099
Harlowton
4317
Harlowton
Hedgesville
ELECTRIFIED
191
12
Windmill
191
Clients:
Windpark Solution America, LLC
333 Kamut Lane
Big Sandy, MT 59520
Arcadia Windpower LTD
444 Madison Avenue
New York, NY 10022
USA
Planning & Design:
CUBE Engineering GmbH
Tannenweg 11
25813 Husum, Germany
	Date	Name
Drawn	13.01.03	JOERRES
Approved	06.02.03	BELAND
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Wheatland County
JUDITH GAP WIND FARM
PROJECT LOCATION
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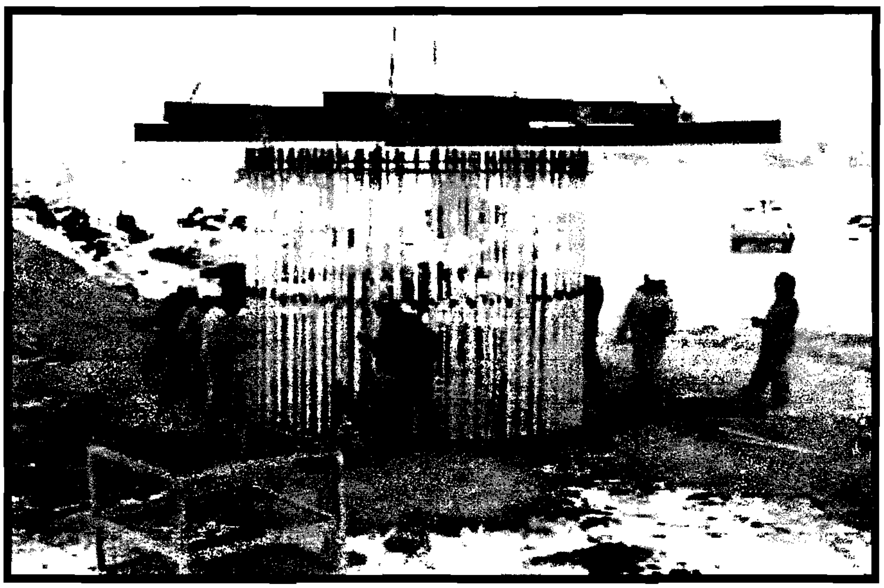
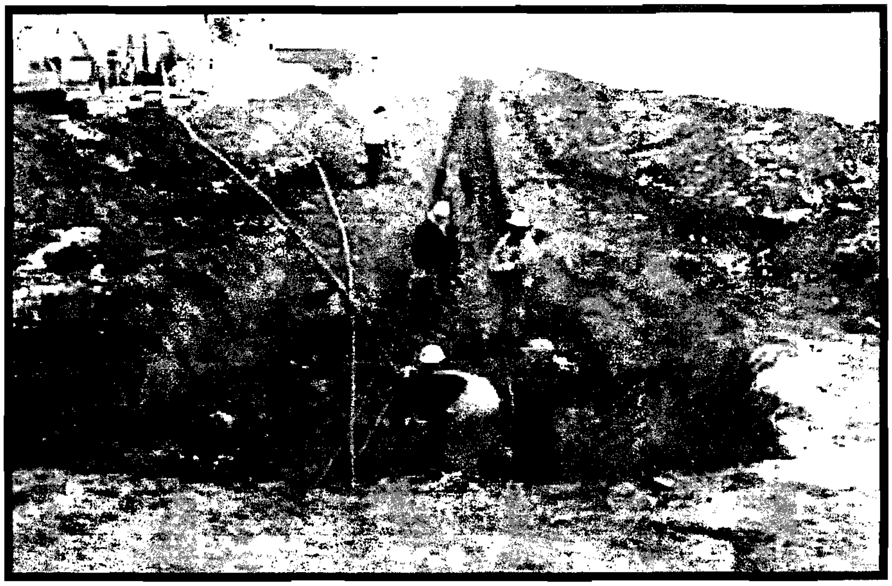
1 of 1
aktuelle Projekte\Montana\maps\AutoCAD

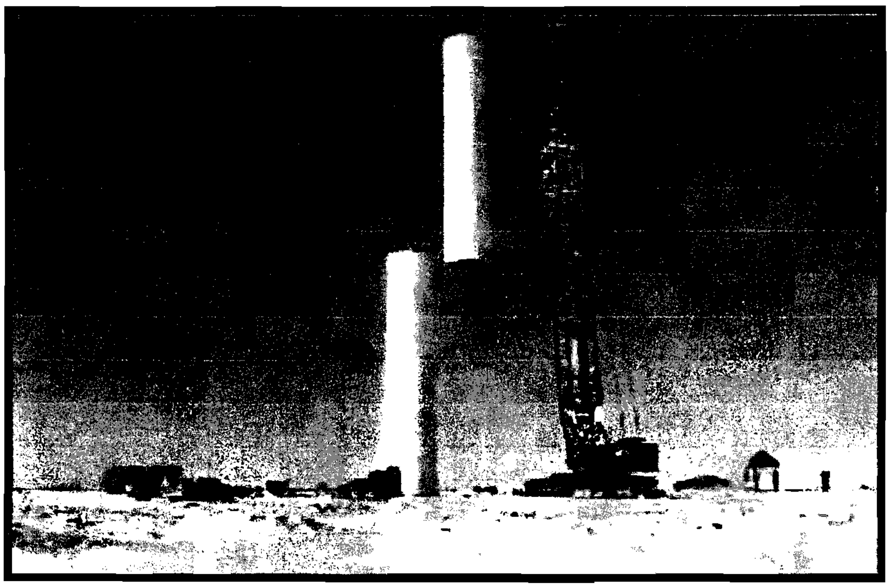
PREPAR NG THE ROADS



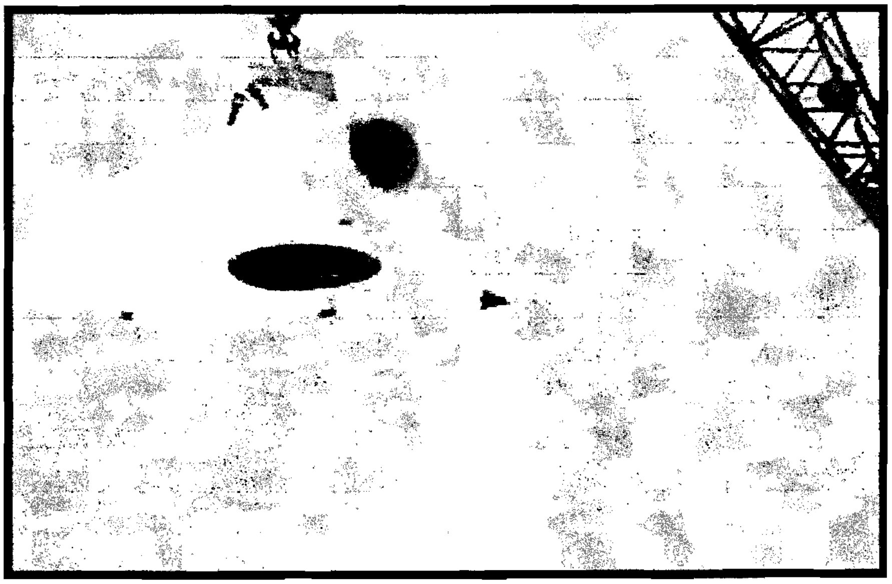
LOWERING THE 3OLT CAGE



RUNNING CABLE UNDER ROAD



SETTING THE MID SECTION



SETTING THE NACELLE

FLYING THE ROTOR

Typical Turbine Construction Sequence
Wind Energy Center (Edgeley/Kulm Project)
FPL Energy North Dakota Wind, LLC
La Moure County, North Dakota
APPENDIX A

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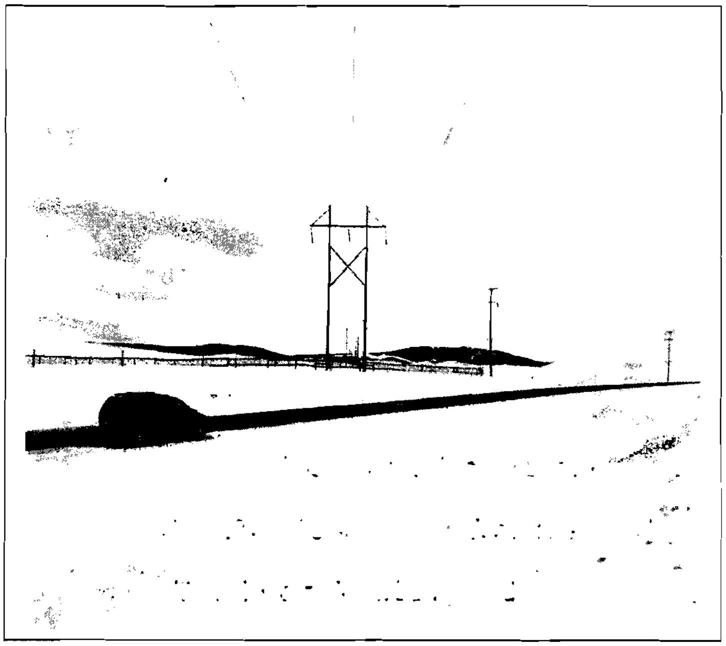

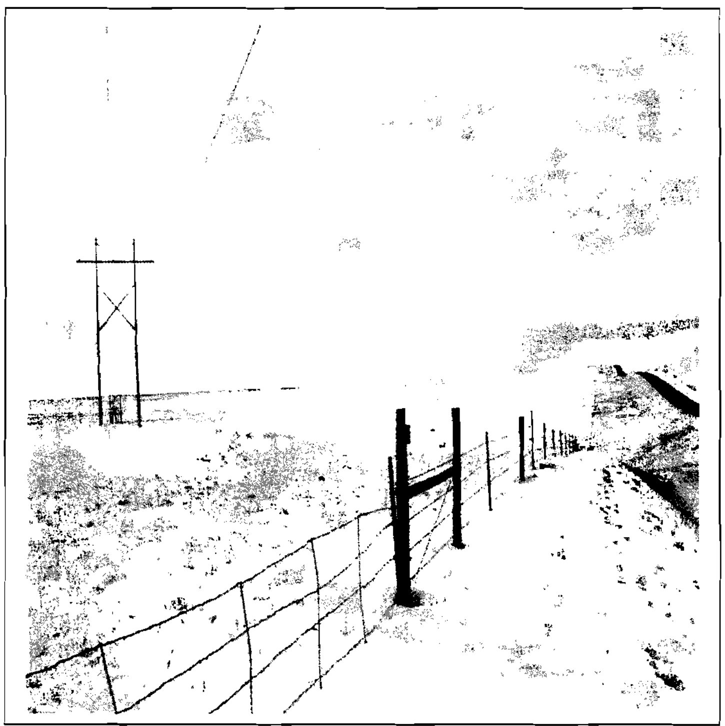

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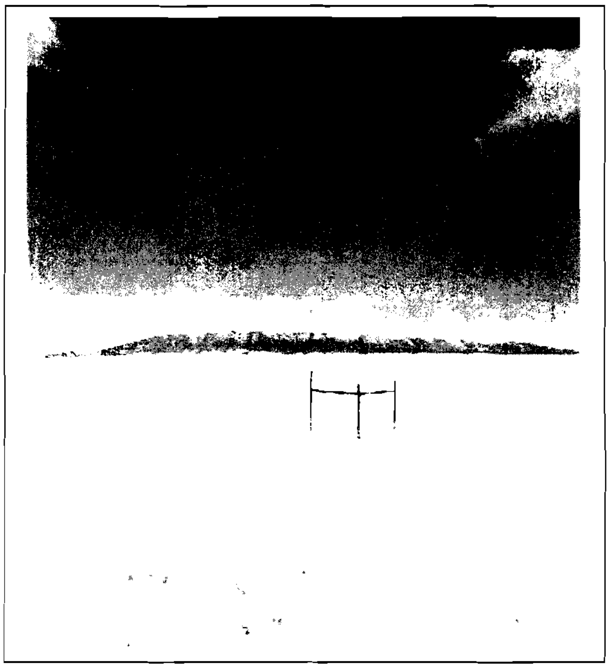
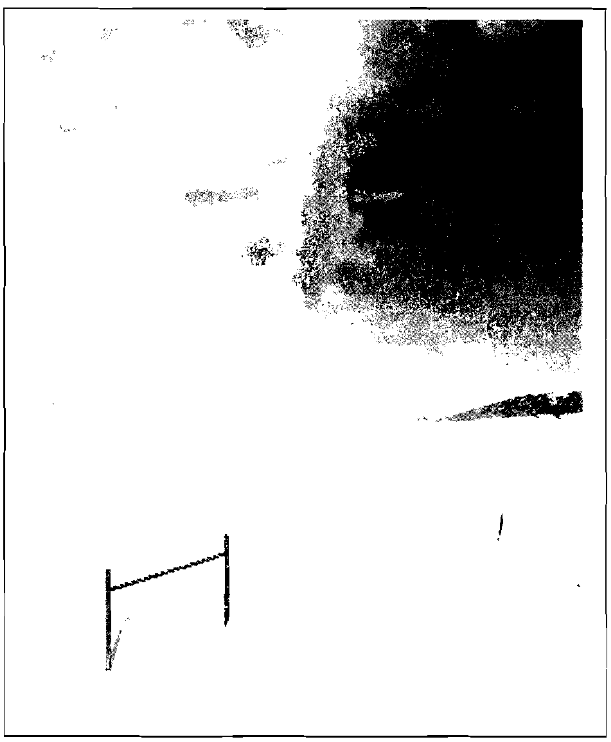




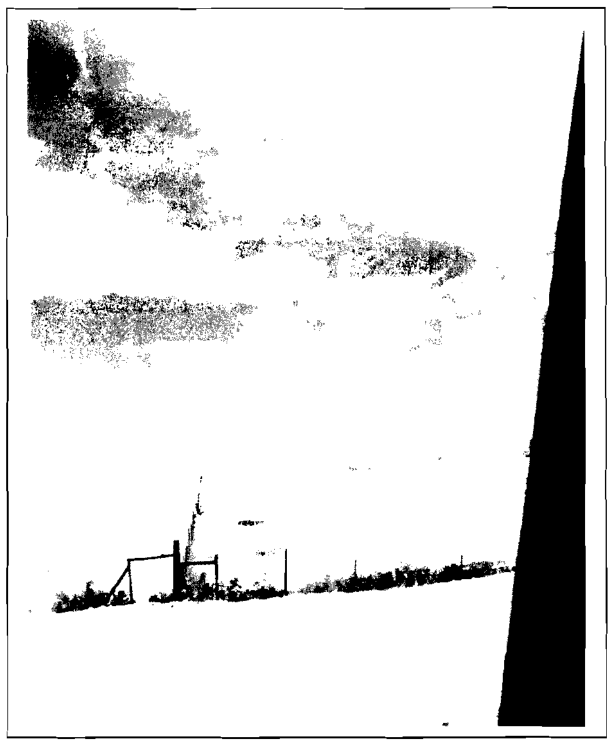
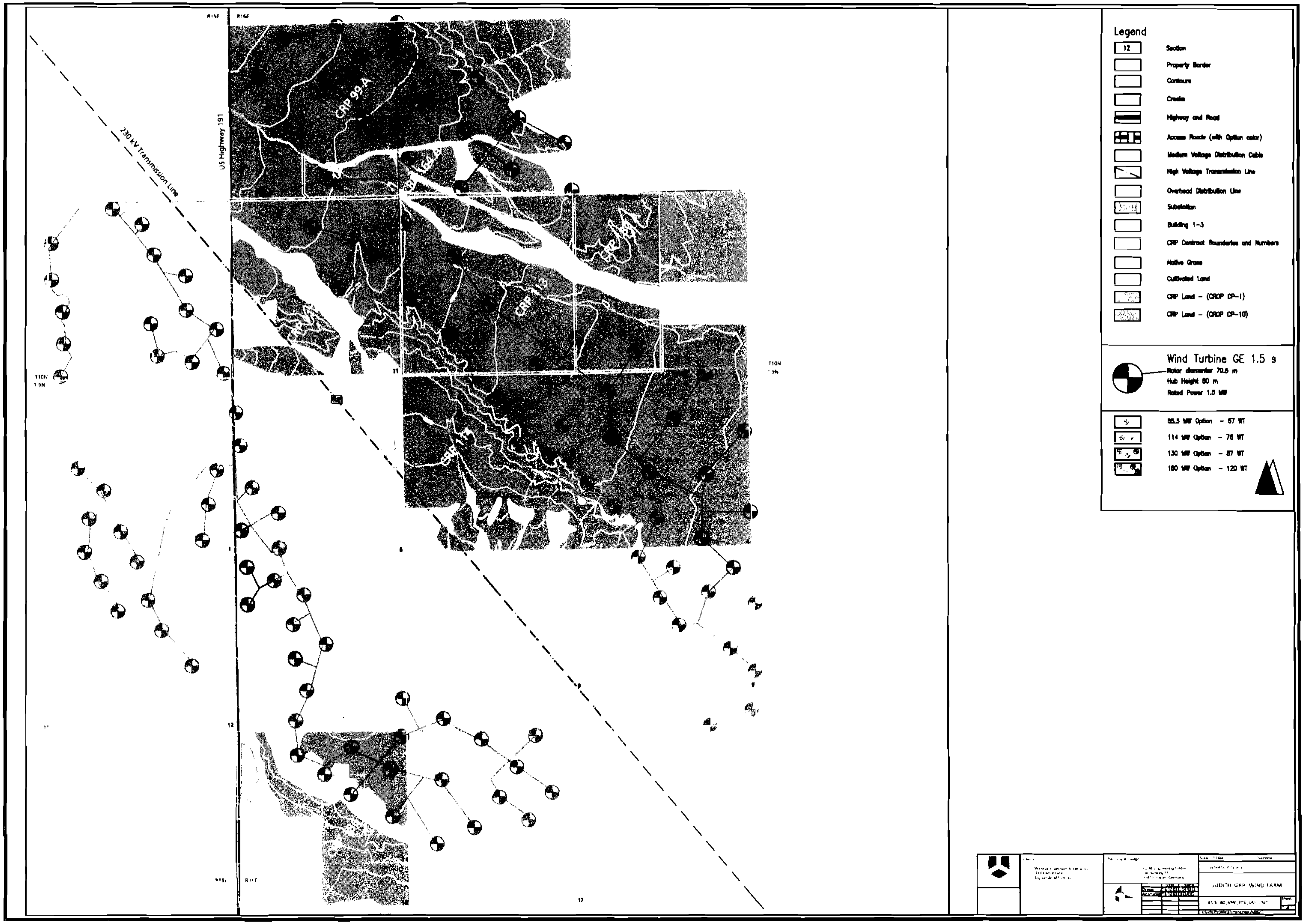


Exhibit 6



230 kV Transmission Line
US Highway 191
CRP 99 A
R15E
R16E
T10N
T9N
Legend
Section
Property Border
Contours
Creeks
Highway and Road
Access Roads (with Option color)
Medium Voltage Distribution Cable
High Voltage Transmission Line
Overhead Distribution Line
Substation
Building 1-3
CRP Contract Boundaries and Numbers
Native Grass
Cultivated Land
CRP Land - (CROP CP-1)
CRP Land - (CROP CP-10)
Wind Turbine GE 1.5 s
Rotor diameter 70.5 m
Hub Height 80 m
Rated Power 1.5 MW
85.5 MW Option - 57 WT
114 MW Option - 76 WT
130 MW Option - 87 WT
180 MW Option - 120 WT
JUDITH GAP WIND FARM

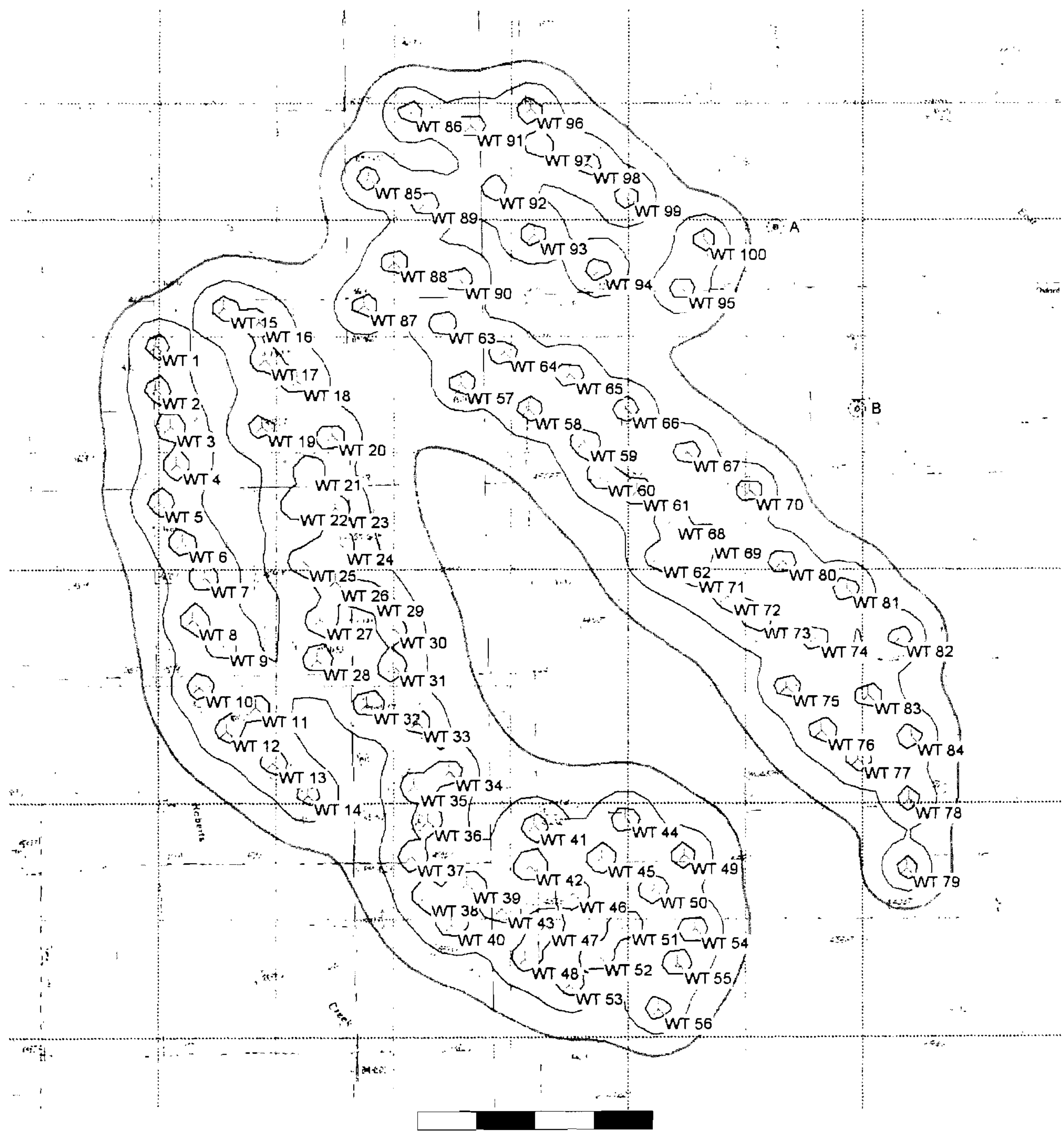
Exhibit 7

WindPRO version 2.3.1.127 Dec 2002

Project:	Description:	Printed/Page
Judith Gap	Wind farm project appr. 6 miles south of Judith Gap Wheatland County, Montana, USA.	15.02.2003 17:45 / 1
Windpark Solutions America LLC Kamut Lane 333 MT 59520 Big Sandy / USA	Coordinates: East -109°46' / North 46°35'	Licensed user: **CUBE Engineering GmbH** Ludwig-Erhard-Str. 10 DE-34131 Kassel +49 561 34338 St. Chun Calculated: 13.02.2003 15:51/2.3.1.127

DECIBEL - Topographical Map

Calculation: calculation of ISO lines for 180 MW V-80 **File:** Judith Gap_24000.bmi



Map: Judith Gap_24000 , Print scale 1:50.000, Map center UTM NAD27 Zone: 12 East: 596.197 North: 5.158.098

New WTG   Noise sensitive area

Height above sea level from active line object

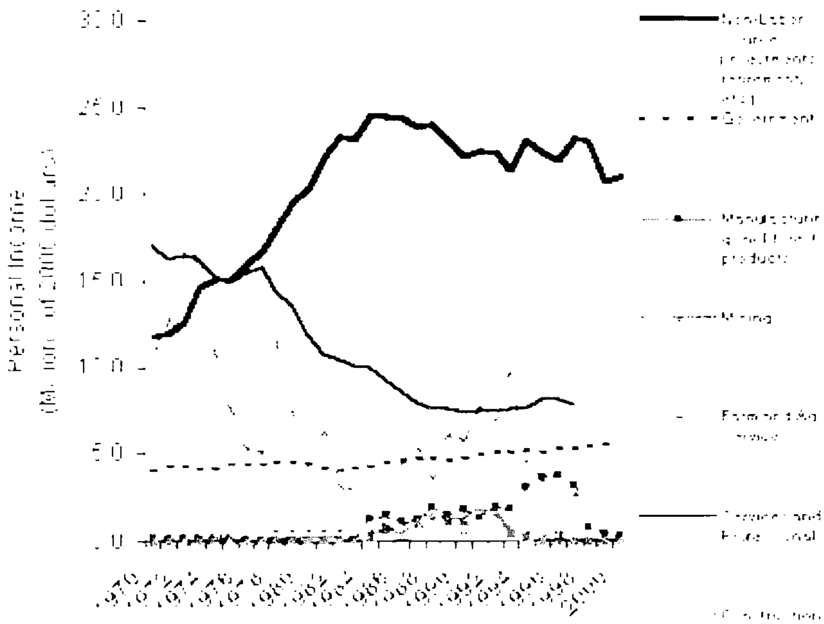
35 dB(A)   40 dB(A)   45 dB(A)   50 dB(A)   55 dB(A)

Exhibit 8

Population

- From 1970 to 2000 Wheatland County, MT fell by 256 people, a 10% decline in population.

Income Growth or Decline by Major Category



Average Earnings

- Average earnings per job, in real terms, dropped from $26,318 in 1970 to $14,216 in 2000.

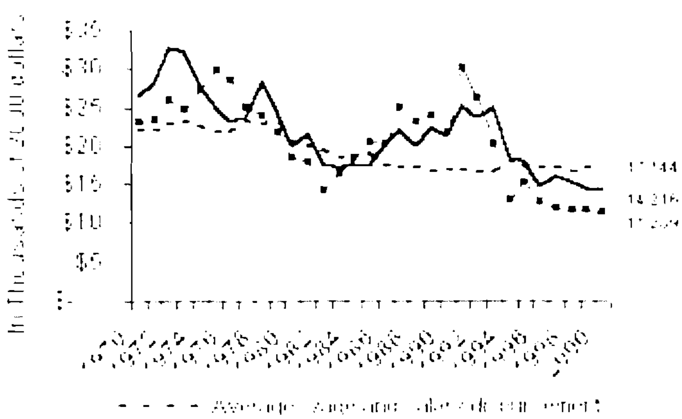
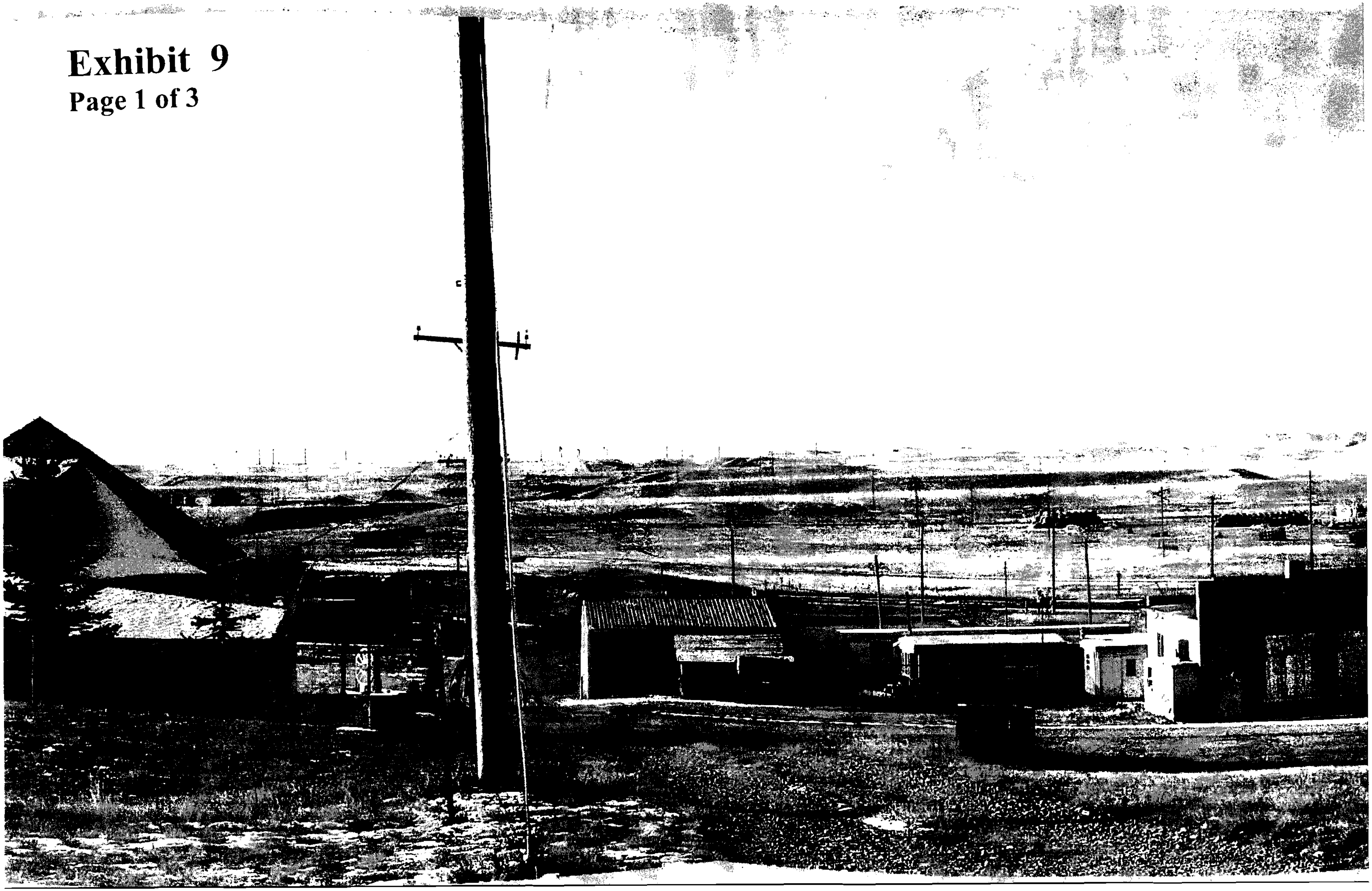


Exhibit 9



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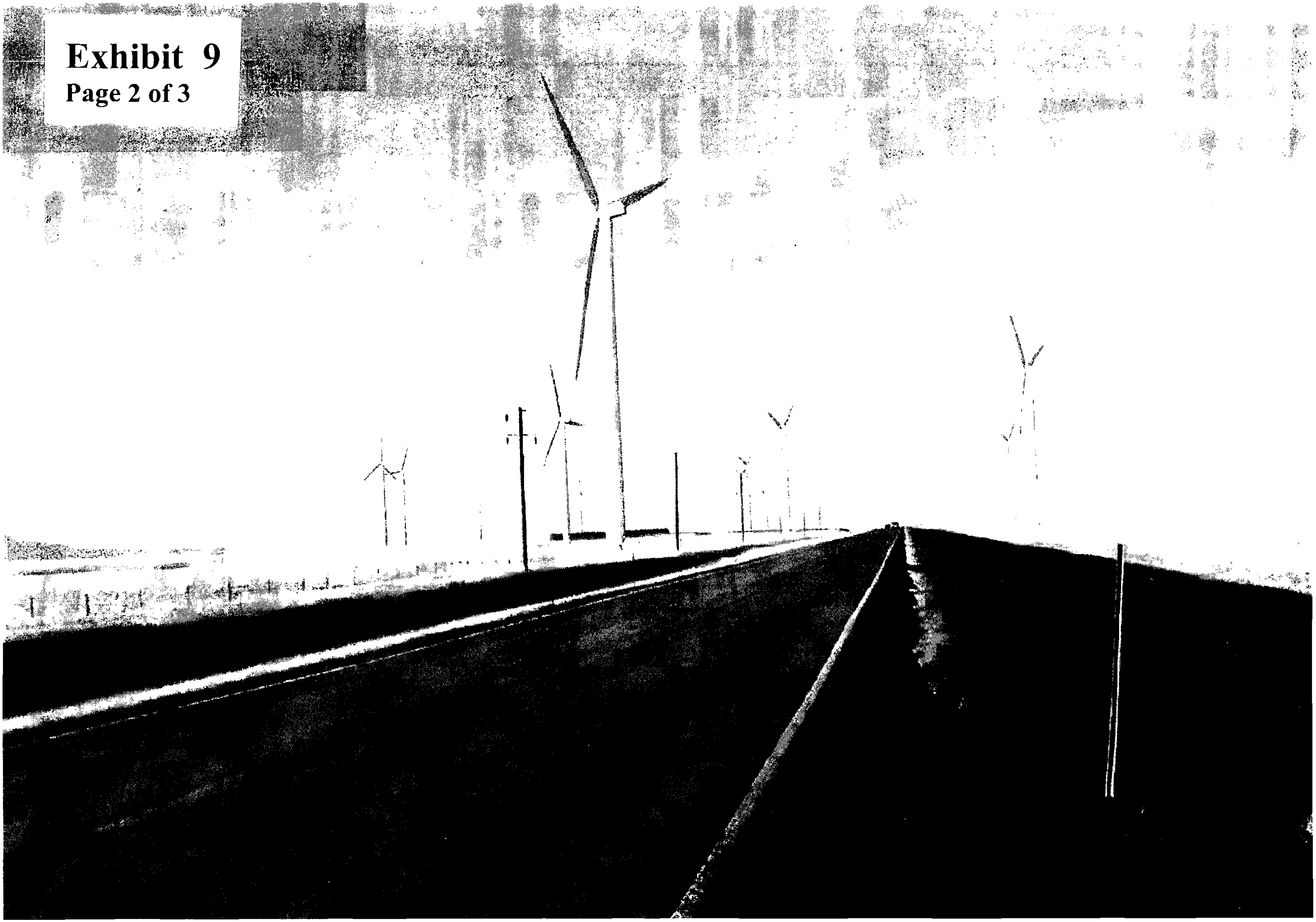

Exhibit 9
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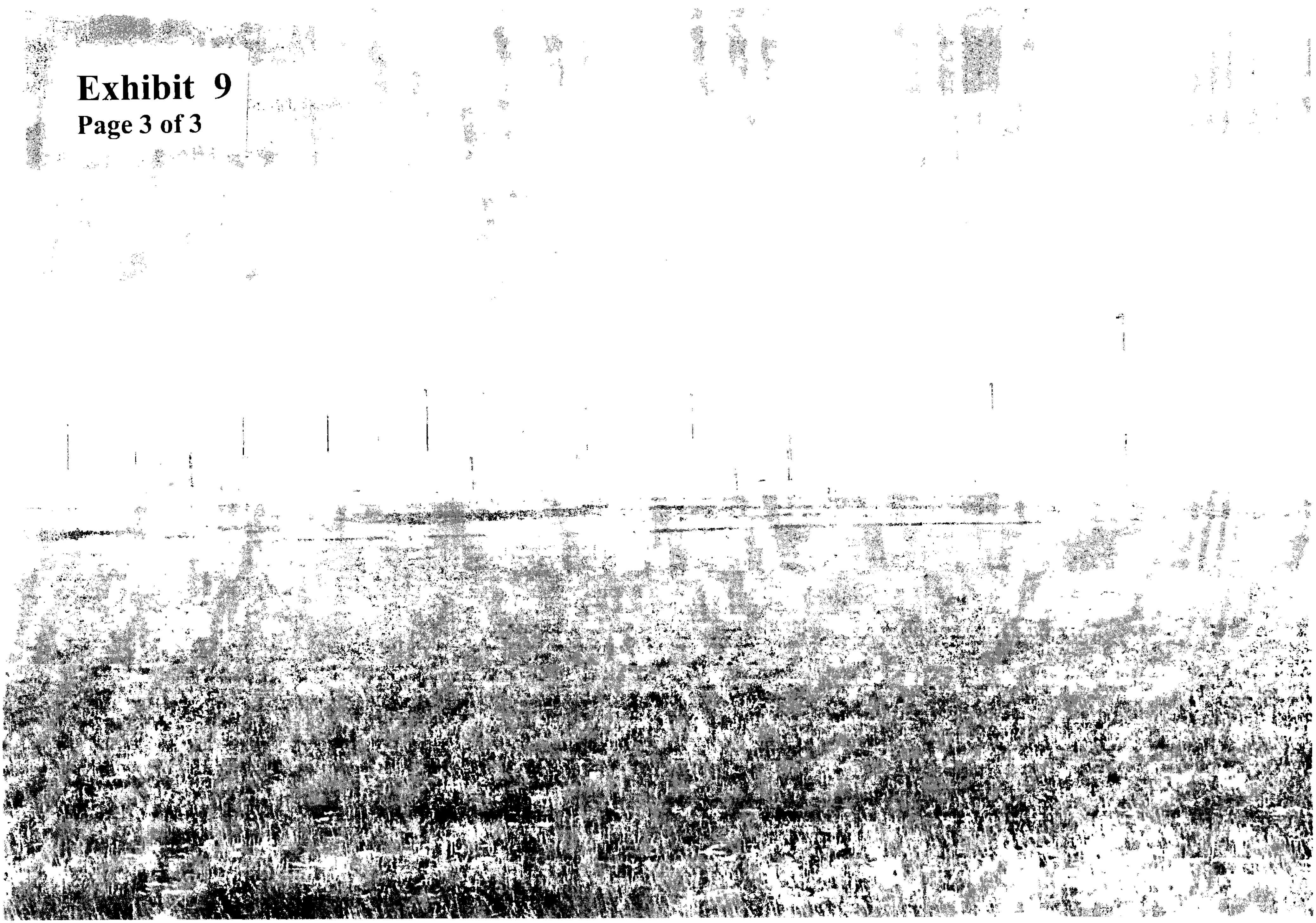
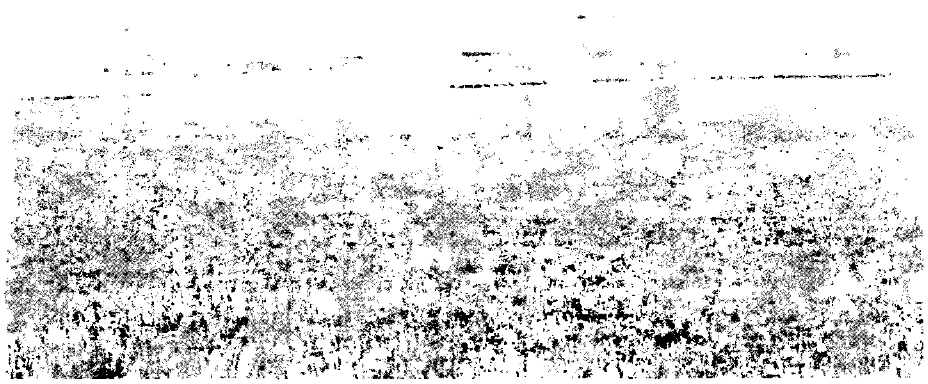


Exhibit 10



Avian and Bat Monitoring Plan for the Judith Gap Wind Farm

Wheatland County, Montana

Prepared by:

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Draft
February 2004

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INTRODUCTION AND BACKGROUND

The Judith Gap Wind Farm (the "Project") is being proposed for development in Wheatland County, Montana south of the town of Judith Gap. Extensive baseline studies (Harmata and Flath 2003, Harmata 2003, Flath 2003, Curry and Kerlinger 2003) and review of existing information from other wind projects were used to estimate the impacts of the project on wildlife, including birds and bats. The proposed development will be a maximum of 180 MW, and 120 turbines, but final project characteristics will depend on factors such as turbine model, electricity markets, and transmission constraints. The Project developer will fund an operational monitoring program to directly estimate the impacts of the windfarm on birds and bats. The operational monitoring plan for the Project will consist of the following components:

1) A minimum of one year of intensive fatality monitoring involving standardized carcass searches and carcass removal and searcher efficiency trials and a protocol for handling and reporting of fatalities and injured wildlife for the life of the project;
2) Three years of post-construction surveys to assess potential displacement of breeding grassland songbirds;
3) Golden eagle and ferruginous hawk nest surveys conducted during a minimum of one nesting period during operation and within 2 miles of the wind turbines;
4) Formation of a Technical Advisory Committee of the various stakeholders to review methodologies and results and make recommendations regarding the need for changes to the existing methods and the need for additional monitoring beyond the effort described in this plan.

The protocol for the fatality monitoring study is similar to protocols used at the Vansycle Project in northeastern Oregon (Erickson *et al.* 2000), the Stateline project in Oregon and Washington (FPL *et al.* 2001, Erickson *et al.* 2003a), the Buffalo Ridge project in southwestern Minnesota (Johnson *et al.* 2000), the Nine Canyon Wind Project in Washington (Erickson *et al.* 2003b), and the Foote Creek Rim project in Wyoming (Young *et al.* 2003). The methods for the songbird and raptor nest surveys will be similar to the methods used in pre-project baseline studies at the Judith Gap Wind Project (Harmata and Flath 2003, Flath 2003). A Technical Advisory Committee (TAC) will be established to evaluate the methods and results of the monitoring program, and make recommendations regarding the need for changes to the existing plan, including the need for additional monitoring. Representatives on the TAC will likely include the developer, Northwestern Energy, the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife and Parks (MFWP), Montana Department of Natural Resources and Conservation (DNRC), consultants conducting the monitoring studies and private landowners associated with the Project.

AVIAN AND BAT FATALITY STUDY

Introduction

The primary objective of the fatality studies is to estimate the annual number of avian and bat fatalities attributable to the Project. The standardized fatality monitoring phase of the study will begin once all the turbines are constructed and operational. The study will be conducted for a minimum of one year, with a less intensive monitoring program (incidental monitoring) in place for the life of the project, including during the construction phase. The methods are broken into four primary components: 1) standardized carcass searches, 2) an incidental casualty and injured bird reporting system, 3) searcher efficiency trials, and 4) carcass removal trials.

The number of avian and bat fatalities attributable to collision with the wind turbines will be estimated based on the number of avian and bat fatalities found in the casualty search plots whose death appears related to collision with these structures. All carcasses located within areas surveyed, regardless of species, will be recorded and a cause of death determined, if possible, based on inspection of the carcass. Some carcasses may be necropsied to aid in determining cause of death. Total number of avian and bat carcasses will be estimated by adjusting for "removal bias" (e.g., scavenging), searcher efficiency bias, and sampling effort. Carcasses where the cause of death is not apparent will be included in the fatality estimate. Including fatalities when cause of death is unknown will lead to an overestimate of the true number of wind project fatalities. Most projects have used this conservative approach (e.g., Foote Creek Rim, Wyoming; Vansycle, Oregon; and Stateline, Oregon and Washington) because of the relative high costs associated with obtaining accurate estimates of natural or reference mortality.

Definitions and Field Methods

Selection and Delineation of Carcass Search Plots

A sample of 50 turbines will be selected using a systematic sampling procedure with a random starting point for selection of the first turbine. If fewer than 50 turbines are built, then all turbines that are built will be searched. Square plots a minimum distance of 100 m from the turbines and centered on the turbine will be searched by walking parallel transects. Plots will be orientated so that the maximum distance searched (141 m) will coincide with the general direction of the prevailing winds (Figure 1). Adjustments to the plot size may be made prior to searches once the dimensions of the turbine (i.e., height and rotor diameter) are known. Studies at the Vansycle wind plant (Erickson *et al.* 2000), the Buffalo Ridge wind plant (Johnson *et al.* 2002, Higgins *et al.* 1996), the Foote Creek Rim wind plant (Young *et al.* 2003), and the Nine Canyon Wind Project (Erickson *et al.* 2003b) indicate nearly all fatalities are found within the tip height distance measured along the ground from the base of the turbines, with a large majority of carcasses found within a distance equal to 50% of the tip height.

Scheduling/Timing

Carcass searches will be conducted approximately once every two weeks[1] at the sampled turbines during most of the monitoring year. The first search will be conducted within 30 days after the date all turbines become operational (commercially producing electricity) to clear the plots of evidence of old carcasses and document fatalities that may have occurred during the testing and early operational phase. Approximately half of the sampled turbines will be surveyed during one week, and the other half will be sampled the next week, so that carcass search technicians will have a presence in the wind project on most days during the one year study period. A systematic sample of 10 of the 50 turbines will be sampled more intensive during spring and fall migration. Daily searches will be conducted during two five day periods during peak spring bird migration

[1] this schedule may be modified depending on the results of the carcass removal trial. The first trial will be conducted during the construction period.

and during two five day periods during peak fall migration. The first 5 day period during the spring will be in late April/early May and the second will be in late May. The first 5 day period during fall migration will be in late August and the second will be in late October. The peak periods were selected based on the results of radar studies in Montana (Harmata 2002, Harmata 2003, Harmata et al. 1998), and results of bat studies at wind projects in the west (Johnson 2004). Approximately 26 searches will be conducted at 40 turbines during the year, with approximately 42 searches conducted at the 10 intensively sampled turbines.

Standardized Carcass Searches

Objective: to systematically search the Project for avian and bat fatalities that are attributable to collision with project facilities.

Personnel trained in proper search techniques will conduct the carcass searches. Initially, transects will be set approximately 6-10 meters apart in the area to be searched. A searcher will walk at a rate of approximately 45-60 meters a minute along each transect searching both sides out to three meters for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial. We anticipate that it should take approximately 2 hours to survey the search area around each turbine depending on habitat type..

The condition of each carcass found will be recorded using the following condition categories:

- Intact – a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass, which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.).
- Feather Spot - 10 or more feathers or 2 or more primaries at one location indicating predation or scavenging.

Appendix A contains examples of various field and laboratory forms for the carcass searches and fatalities discovered. All carcasses found will be labeled with a unique number, bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be maintained, bagged and frozen with the carcass at all times. For all casualties found, data recorded will include species, sex and age when possible, date and time collected, GPS location, condition (e.g., intact, scavenged, feather spot), and any comments that may indicate cause of death. All casualties located will be photographed as found and mapped on a detailed map of the study area showing the location of the wind turbines and associated facilities such as access roads and meteorological towers.

Casualties or fatalities found by maintenance personnel and others not conducting the formal searches within 150 m of a wind turbine, meteorological tower, substation or road will be documented using a wildlife incident reporting system (see WRRS section below). Collection of state or federal endangered, threatened, or protected species will be coordinated with the USFWS and MFWP. When non-study personnel discover carcasses or injured animals, a digital photograph will be taken, and a Project Respondent[2] will be notified to identify the casualty. Personnel potentially involved in searches will receive training prior to working in the Project. Casualties or fatalities found in non-search areas will be treated as incidental discoveries. Fatalities found within search areas, but not during scheduled searches, will be included in the fatality estimation.

Any injured native birds found will be carefully captured by a trained technician and transported to the designated wildlife rehabilitation center or veterinary clinic in a timely fashion. An example protocol for handling injured birds is found in Appendix B and will be used for this project. Appropriate collection permits will be obtained from the MFWP and the USFWS. Dissemination of data (e.g., to the USFWS law enforcement and other agency representatives) is discussed in the "Disposition of Data" section below.

Searcher Efficiency Trials

Objective: to estimate the percentage of avian/bat fatalities which are found by searchers.

Searcher efficiency studies will be conducted in the same areas carcass searches occur. Searcher

---

[2] a person trained in the monitoring program and who is listed on the state and federal scientific collection permits

efficiency will be estimated by size of carcass, general habitat type, and season. Estimates of searcher efficiency will be used to adjust the number of carcasses found, correcting for detection bias.

Searcher efficiency trials will begin when turbines are placed into operation. Personnel conducting the searches will not know when trials are conducted or the location of the detection carcasses. During each season approximately 20 carcasses of birds of two different size classes will be placed in the search area throughout the search period, for a total of approximately 160 searcher efficiency trial carcasses for the entire year. Species such as house sparrows and European starlings will be used to represent small-sized birds. Species such as rock pigeons, hen mallards and hen pheasants will be used to represent medium to large-sized birds. A minimum of two dates will be used each season for a minimum total of 8 trial dates. An attempt will be made to use several small brown birds (house sparrows) during the summer and fall seasons to simulate bat carcasses. Bat carcasses will be used if available.

All carcasses will be placed at random locations within areas being searched prior to the carcass search on the same day. If avian scavengers appear attracted by placement of carcasses, the carcasses will be distributed before dawn. Carcasses will be dropped from waist height.

Each trial carcass will be discreetly marked so that it can be identified as a study carcass after it is found. The number and location of the detection carcasses found during the carcass search will be recorded. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

Wildlife Response and Reporting System and Incidental Fatality Discoveries

The Wildlife Response and Reporting System (WRRS) is a monitoring program set up for searching for and handling avian casualties found by maintenance personnel. This system is modeled after FPL Energy's protocol used at projects in the Pacific Northwest (FPL Energy 2003). Construction and maintenance personnel will be trained in the methods. This monitoring program includes reporting of carcasses discovered incidental to construction and maintenance operations.

Any carcasses discovered by maintenance personnel will be recorded, photographed and reported to a Project Respondent. The Respondent will identify the fatality and fill outthe Casualty Information Form (see Appendix A). The fatality will be collected unless it is a federal endangered or threatened species. If the fatality is a federally listed species, the USFWS will be contacted for handling instructions. Fatalities discovered on standardized carcass search plots but not during scheduled searches will be included in the fatality estimates.

Carcass Removal Trials

Objective: to estimate the length of time avian/bat fatalities remain in the search area.

Carcass removal studies will be conducted during the construction period and throughout the monitoring year. Estimates of carcass removal will be used to adjust carcass counts for removal bias. Carcass removal includes removal by predation or scavenging, or removal by other means such as being plowed into a field.

It is expected that carcass removal trials will occur within each of the following seasons, but times for these trials may vary: (1) spring migration (March 16 - May 31); (2) breeding season (May 31-August 15); (3) fall migration (August 16-October 31) and (4) winter (November 1-March 15). Planted carcasses are not placed in or near the carcass search plot because they might be confused with wind turbine related fatalities. The planted carcasses will be located randomly within the carcass removal trial plots. If only a percentage of the turbines are searched, turbine locations not selected for searching will be used for the trials. If all turbines are searched, trials will be conducted in areas near the turbines with similar habitats.

Each season, approximately 20 carcasses of birds of two size classes will be distributed resulting in a total of approximately 160 trial carcasses used in carcass removal studies for the entire year for the entire wind project. Species such as house sparrows and European starlings will be used to represent small-sized birds. Species such as rock pigeons, hen mallards and hen pheasants will be used to represent medium to large-sized birds. Approximately 10 carcasses from each size class

(20 total carcasses) will be placed in the field during each of at least two trials each season. Thus, the trial will be spread throughout the year to incorporate the effects of varying weather, climatic conditions, farming practices, and scavenger densities. If fresh bat carcasses are available, they may also be used. Carcasses will be dropped from waist height.

It is expected that carcasses will be checked as follows, although actual intervals may vary. Carcasses will be checked for a period of 20 days to determine removal rates. They will be checked every day for the first 4 days, and then on day 7, day 10, day 14, and day 20. This schedule may vary depending on weather and coordination with the other survey work. Experimental carcasses will be marked discreetly using a piece of tape on one leg for recognition by searchers and other personnel. Experimental carcasses will be left at the location until the end of the carcass removal trial. Any remaining trial carcasses will be removed at the end of the 20-day period.

Data Handling and Statistical Analysis Methods For Fatality Data

The estimate of the total number of wind turbine-related fatalities will be based on three components: 1) observed number of carcasses, 2) searcher efficiency expressed as the proportion of planted carcasses found by searchers, and 3) removal rates expressed as the length of time a carcass is expected to remain in the study area and be available for detection by the searchers.

Observed Number of Carcasses

The average number of carcasses detected per turbine is:

$$\bar{c} = \frac{\sum_{i=1}^{k} c_i}{k}$$

where c_i is the number of carcasses detected at turbine i for the period of study, and k is the number of turbines searched.

Estimation of Searcher Efficiency

Searcher efficiency is expressed as p, the estimated proportion of trial carcasses found by searchers. The variance of the estimate, v(p), is calculated by the formula:

$$v(p)=\frac{p(1-p)}{d}$$

where d is the total number of carcasses placed. Carcass detection rates will be estimated by major habitat type, carcass size, and season. Data will be pooled across seasons if detection rates are not significantly different between seasons.

Estimation of Carcass Removal

Estimates of carcass removal are used to adjust carcass counts for removal bias. Carcass removal includes removal by predation or scavenging, or removal by other means such as being plowed into a field. The length of time a carcass remains in the study area before it is removed is denoted as t_i. Mean carcass removal time is expressed as $\bar{t}$, the average length of time a carcass remains at the site before it is removed:

$$\bar{t}=\frac{\sum_{i=1}^{s} t_i}{s}$$

where s is the number of carcasses used in the scavenging trials. Modifications to the estimator will be made if there are trial carcasses that remain at the end of the 20-day trial period (Barnard 2000, Erickson *et al.* 2003a, Shumway *et al.* 1989).

Estimation of the Total Number of Facility-Related Fatalities

To calculate the total number of facility-related fatalities (M), the observed fatality rate is divided by $\hat{\pi}$, an estimate of the probability a casualty is not removed by a scavenger (or other means), and is detected:

$$M=\frac{N*\bar{c}}{\hat{\pi}}$$

where N is the total number of turbines in the windfarm, and $\hat{\pi}$ is calculated by:

$$\hat{\pi}=\frac{1}{14*26}\sum_{k=1}^{26}\sum_{i=1}^{14}\sum_{j=1}^{26-k+1}\left[P(T>j*14-(i+0.5))*p(1-p)^{j-1}\right].$$

The probability P(T > t) on the right side of the equation is calculated assuming the carcass removal times are distributed either exponential, log-normal or normal with mean $\bar{t}$. A goodness of fit test will be conducted to determine which distribution is most appropriate. We denote m as the estimated mortality per turbine per year (M/N). Modifications to this estimator will be made to account for the differences in sampling intensity for the 10 turbines sampled on a daily basis during peak spring and fall migration. Other modifications may be made with approval from the TAC.

We will calculate annual fatality estimates for raptors, small birds, large birds, all birds combined and bats. The final reported estimates of *m* and associated standard errors and 90% confidence intervals will be calculated using bootstrapping (Manly 1997) based on a computer program written in SAS. For each iteration of the bootstrap, the turbines and associated mortality data, searcher efficiency trial birds and associated data, and the scavenging removal trial birds and associated data are sampled with replacement. Estimates of $\bar{c}$, $\bar{t}$, p, and m are calculated for each of 5,000 bootstrap samples. The final estimates of $\bar{c}$, $\bar{t}$, p, and m, and associated bootstrap percentile confidence intervals, are calculated from the 5,000 bootstrap estimates.

GRASSLAND BIRD DISPLACEMENT STUDY

A before/after impact gradient study design and analysis (Anderson *et al.* 1999, Morrison *et al.* 2001) will be used to estimate the potential displacement effect of the wind turbines, roads and human disturbance on breeding songbirds within the Judith Gap Wind Project. Similar studies have been conducted at the Ponnequin Wind Project in Colorado (Ryder pers. comm.), the Stateline Wind Project in Oregon and Washington (Erickson *et al.* 2003a) and the Buffalo Ridge Wind Project in Minnesota (Leddy et al. 1999).

During the summer 2003, transects perpendicular to the turbine strings were established and surveyed. The methods used during those surveys are described in Curry and Kerlinger (2003), are repeated below, and will be followed during the operational phase. Surveys will be conducted during the first, third and fifth breeding season after construction of the windfarm to study changes in bird densities as vegetation of temporarily impacted areas (e.g., road shoulders and along underground collector lines) recovers.

A perpendicular transect survey begins along a point where a turbine tower will be, or has been erected (Figure 2). The observer proceeds 25 m from the turbine location along the long transect. At that point the observer moves perpendicular to the main transect on perpendicular Transect A. Transect A (50 x 50 meter blocks 7A-12A) is walked using a predetermined compass bearing from the centerline. The observer records all activity within each of the 50 x 50 m blocks as he/she proceeds along the transect. In this study there are two strings of six (6) 50 x 50 meter blocks on each side of the turbine string.

All birds, small mammals, recently used ground squirrel and badger burrows, and fresh badger diggings are recorded by each 50 m x 50 m block. Bird height is recorded to the nearest m.

Data Handling and Statistical Analysis Methods For Displacement Surveys

The mean changes in avian use from the pre-construction period to the post construction period will be compared by distance from turbine string. T-tests, regression analyses and confidence intervals will be used to evaluate the significance of any potential displacement effects.

RAPTOR NEST STUDY

The primary objective of raptor nest surveys is to document and monitor active ferruginous hawk and golden eagle nests located within 2 miles of the wind turbines. This information will aid in understanding whether operation of the facility results in a reduction of nesting activity or nesting success. No active golden eagle nests and five active ferruginous hawk nests were documented during 2003 surveys.

One aerial and one ground survey will be used to gather nest success statistics on active nests, nests with young, and number of young fledged. The developer will share the data with state and federal biologists. Raptor nests will be monitored for a minimum of one breeding season during operation of the windfarm in the same year standardized fatality monitoring is conducted. During the monitoring, a minimum of one aerial survey will be conducted in April or May and additional ground surveys as described in this section will be made. All nests will be given identification numbers, and nest locations will be recorded on U.S. Geological Survey 7.5 minute quadrangle maps. Global positioning system (GPS) coordinates will be recorded for any new nests not previously recorded. Locations of inactive nests will be recorded. All new nests not previously mapped, whether active or inactive, will be given an identification number and their locations (coordinates) recorded. For occupied golden eagle and ferruginous hawk nests within 2 miles of the wind turbines, nesting success will be determined by a minimum of one ground visit (if land access is granted) to verify species, number of young and nesting success. A successful nest means that the young have successfully fledged (flown from the nest).

DISPOSITION OF DATA AND DECISION STANDARDS

This monitoring program will provide data for evaluating the direct impacts of the Project on birds and bats from mortality studies, and the indirect impacts of the Project on breeding grassland birds and nesting raptors. A Technical Advisory Committee (TAC) will be established to evaluate the results of the monitoring program and make recommendations regarding additional monitoring. Representatives on the TAC will likely include the developer, Northwestern Energy, USFWS, MFWP, DNRC, consultants conducting the monitoring studies and private landowners associated with the Project. At a minimum, The TAC will meet after completion of one year of the monitoring program to discuss the results of the monitoring studies, evaluate the methods used, and address the need for further study. Additional meetings may be held during the monitoring years to address problems or issues identified during the study. The wind project developer will provide progress reports in the form of a technical memorandum to the TAC every three months that will include data pertaining to any avian and bat fatalities discovered to date, as well as data from other study components. The USFWS Resident-Agent-In-Charge (RAC, Roger Parker, 406.247.7355) will also be notified within 24 hours of positive identification of any endangered or threatened species fatality. An annual report will be prepared at the end of the first year of monitoring and will be distributed to the members of the TAC at least one week prior to the annual meeting. The need for further study or changes to the current protocol will be based on reasonable criteria proposed by the TAC. The TAC should consider the following information in their recommendations regarding the need for further study.

The criteria for recommending further study should use a common sense "weight-of-evidence" approach to determine the effects of the Project on species of concern. The weight-of-evidence approach will consider the number of carcasses actually found, the magnitude of mortality events, the estimate of the total number of carcasses, the precision of the estimates, the relative abundance of the species based on the baseline and monitoring studies, results of similar studies in the region, and legal and social issues.

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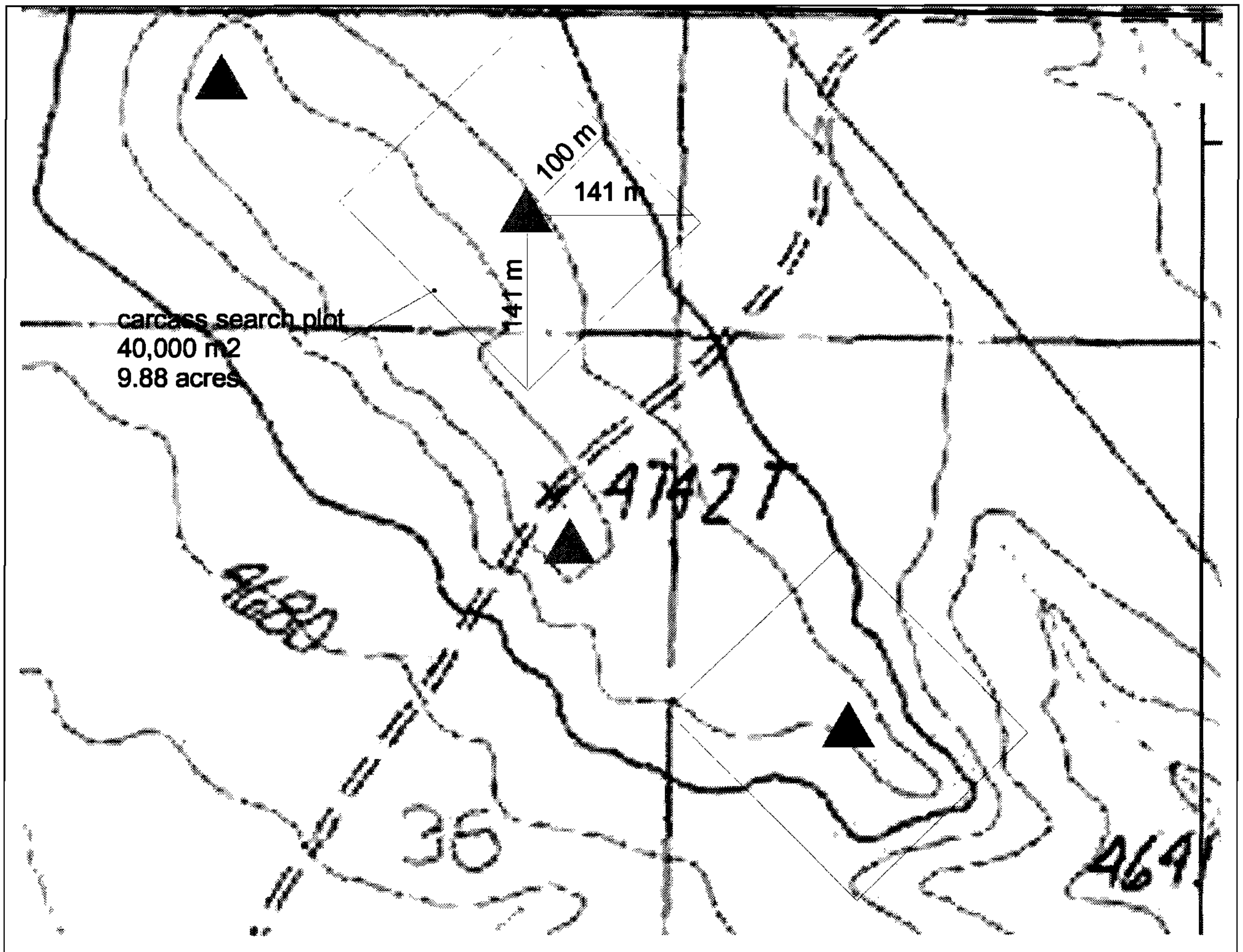

Figure 1. Approximate size and orientation of the carcass search plots.

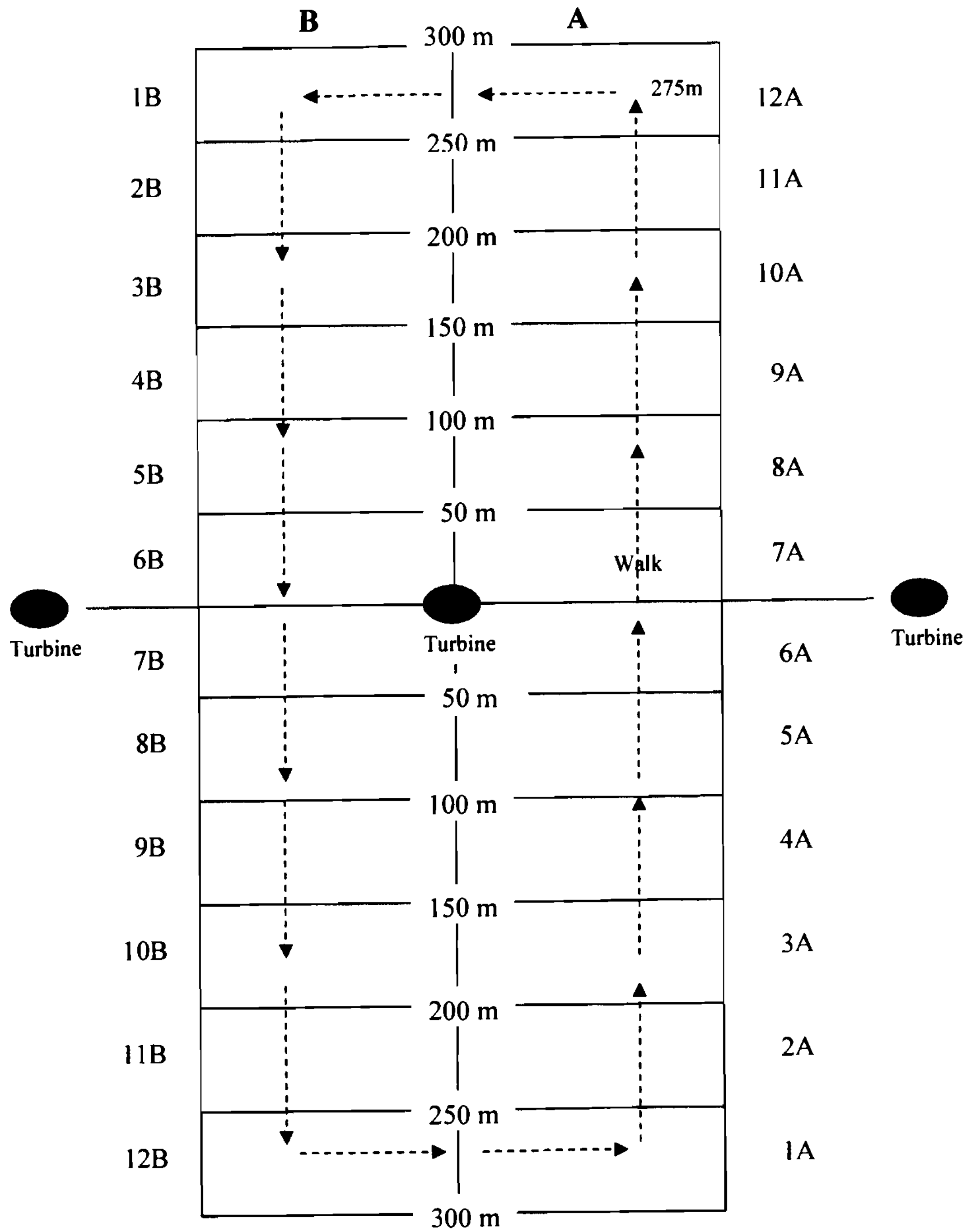

Figure 2. Grassland bird displacement survey layouts (from Curry and Kerlinger 2003).

APPENDIX A CARCASS SEARCH AND SEARCHER EFFICIENCY TRIAL DATA FORMS

CASUALTY SEARCH FORM-keep with carcass **Judith Gap Wind Farm**

DATE:____________ OBSERVER:____________

PLOT TYPE (circle one): turbine met tower powerline other PLOT NO.: ____________

TIME BEGIN: ____________ TIME END: ____________

CASUALTIES FOUND:

SPECIES	SAMPLE NO.	HABITAT

SEARCHER EFFICIENCY CARCASSES FOUND:

SPECIES	ID TAG	HABITAT

CASUALTY INFORMATION FORM - FIELD FORM ***Judith Gap Wind Farm***

DATE: ____ TIME: ____ OBSERVER: ____

FOUND DURING (check one): SCHEDULED CARCASS SEARCH_____ INCIDENTAL FIND_____

COLLECTED? Yes No SAMPLE NO.: ____ FILM ROLL/PHOTO NO: ____

PLOT TYPE (circle one): turbine met tower powerline other PLOT NO.: ____

LOCATION IF NOT ON PLOT ____

HABITAT: ____

SPECIES: ____ SEX(circle): M F U AGE(circle): A J U

CONDITION (circle one): injured intact scavenged dismembered feather spot other

DISTANCE & BEARING FROM NEAREST TOWER/POLE:

DESCRIPTION	DISTANCE (m)	BEARING (degrees)
Part 1 ____	____	____
Part 2 ____	____	____
Part 3 ____	____	____
Other ____		

Comments:

ESTIMATED TIME SINCE DEATH/INJURY: ____

WEATHER HISTORY [If carcass is estimated to be less than one week old, circle any of the following weather conditions that occurred at or before the estimated time of death/incident]:

clear calm fog cloudy rain snow storm gusty wind violent storm blizzard

WEATHER NOTES:

GENERAL COMMENTS: (e.g. behavior observed if bird is injured; details of carcass - body parts missing, injuries, number of feathers in feather spot; indications of cause of death, field marks for identification, USFWS band no., etc.)

Agency Contact

USFWS Contact: Date: ____ Time: ____ Recovery Approval: yes no

Contact Person(s):

Comments:

Disposition of Find ____

Transported to freezer ____ Date: ____ Time: ____

Release to USFWS: Person: ____ Date: ____ Time: ____

Comments:

Searcher Efficiency Trials: Carcass Placement Log *Judith Gap Wind Project*

General Information: Season____________ Month____________ Other____

No.	Species/Age	Placed By	Date	Time	Plot: Location	Found? (yes/no)	Retrieved? (yes/no)	Notes
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Weather notes for days that carcasses are placed:

Date_________ Time__________ Temp__________ Wind Dir.__________ Wind Speed__________ Precip___________

Date_________ Time__________ Temp__________ Wind Dir.__________ Wind Speed__________ Precip___________

Date_________ Time__________ Temp__________ Wind Dir.__________ Wind Speed__________ Precip___________

Date_________ Time__________ Temp__________ Wind Dir.__________ Wind Speed__________ Precip___________

APPENDIX B - INJURED WILDLIFE – PROCEDURES FOR REPORTING AND CARE

INJURED WILDLIFE – PROCEDURES FOR REPORTING AND CARE

The following procedures apply to injured birds or other wildlife:

Record data on the Casualty Information Form but first, the primary objective is to provide immediate care for the injured animal. Capture animal by placing a dark cloth or blanket over the animal. By removing its ability to see, generally it will calm down and be more easily handled. Place the animal in a box that has a towel or other material for the animal to hide under or grasp on to.

Quickly look around the immediate area for other injured animals as there may have been a flock, or a pair.

While capturing the animal, assess the injury so you'll know what to report to the wildlife rehabilitator or veterinarian.

Do not provide additional stress. Keep cool if it is a hot day and keep it slightly warm if it is a cool day by placing the box in the office. Darken room if possible.

If it is a federally listed (Threatened, Endangered) or Montana State listed (Threatened, Endangered) species, a Project Respondent will contact Montana Fish Wildlife and Parks (Alison Puckniak, 406.247.2966). In addition, for federally listed species, they will contact U.S. Fish and Wildlife Service Law Enforcement Resident-Agent-in-Charge (RAC, Roger Parker, 406.247.7355). These calls should be made within 24 hours of discovery. Phone the designated rehabilitation center for additional instructions. Describe the injury to the rehabilitation center and they will determine if it should go directly to a veterinary clinic.

Deliver the animal to the specified location. The doctor will need to fill out the "Casualty Examination Form." The clinic will make arrangements to deliver the animal to the designated rehabilitation center. The owner of the wind project will pay for all veterinary bills.