Wyoming Industrial Development Information and Siting Act

Section 109 Permit Application
Reno Junction Wind Energy Project

Prepared for

TPW Reno Junction LLC
a subsidiary of

Third Planet Windpower

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April 2010

Final Report

Wyoming Industrial Development Information and Siting Act

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April 22, 2010

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Acronyms and Abbreviations

3-D	three dimensional
AASHTO	American Association of State Highways and Transportation Officials
AC/DC	alternating current and direct current
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
amsl	above mean sea level
AQD	Air Quality Division
ARRA	American Recovery and Reinvestment Act
AWEA	American Wind Energy Association
BEA	U.S. Bureau of Economic Analysis
BEPC	Basin Electric Power Cooperative
bgs	below ground surface
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	best management practice
CAA	certified ambulance attendant
CCCD	Converse County Conservation District
CCEMA	Campbell County Emergency Management Agency
CCMH	Campbell County Memorial Hospital
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
cm	centimeter
CRAI	Cultural Resource Analysts, Inc.
CWA	Clean Water Act
CWIP	Construction Work in Progress

dB	decibel
dBA	A-weighted decibel
DNL	day-night sound level
DNV	Det Norske Veritas
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DTA	Down Town Assembly
EAD	Economic Analysis Division
EIA	Energy Information Administration
EISA	Energy Independence and Security Act of 2007
EMF	electromagnetic field
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
ENT	ear, nose, and throat
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
EPC	engineering, procurement, and construction
E-stop	Emergency stop
ESA	Endangered Species Act
ESS	electrical simplification system
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Federal Insurance Rate Map
FPLE	Florida Power Light and Electric
ft	foot/feet
ft^2	square foot/feet
FMV	fair market value
FTE	full-time equivalent

FY	fiscal year
GDP	gross domestic product
GE	General Electric Company
GIS	geographic information system
GL	Germanischer Lloyd
gpd	gallons per day
gpm	gallons per minute
GSU	generator step-up
hp	horsepower
HUC	Hydrologic Unit Code
HVB	Hypo-und Vereinsbank
I-25	Interstate 25
1-90	Interstate 90
IBC	International Building Code
IEC	International Electrotechnical Commission
IMPLAN	Impact Analysis for Planning (model)
I-O	input-output
IOU	investor-owned utility
I&S	Improvement and Service (District)
ISA	Industrial Development Information and Siting Act
ISC	Industrial Siting Commission
ISD	Industrial Siting Division
ISO	International Organization for Standardization
ITC	Investment Tax Credit
K	Soil Erodibility Factor
kHz	kilohertz
KOP	key observation point
kV	kilovolt
lb	pound

L_{eq}	equivalent sound level
L_{dn}	day-night sound level
LF	linear feet
L_n	statistical noise level
LIBOR	London Inter-bank Offer Rate
LOS	level of service
m	meter
m^2	square meter
MCE	maximum considered earthquake
met	meteorological (tower)
mgd	million gallons per day
mm	millimeter
mph	miles per hour
MSW	municipal solid waste
MW	megawatt
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NEPDG	National Energy Policy Development Group
NFPA	National Fire Protection Agency
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
O&M	operations and maintenance
OES	Occupational Employment Statistics
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl

PCE	personal consumption expenditure
PFYC	Probable Fossil Yield Classification
PHRC	public health response coordinator
P.L.	Public Law
PMSA	Parts, Maintenance, and Service Agreement
PPA	power purchase agreement
PREC	Powder River Energy Corporation
Project	Reno Junction Windpower Project
PSAP	Public Safety Answering Points
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
REC	renewable energy credit
REIS	Regional Economic Information System
REMI	Regional Economic Models, Inc.
REPP	Renewable Energy Policy Project
RERT	Regional Emergency Response Team
RFP	Request for Proposals
RIMS	Regional Industrial Multiplier System II
rpm	revolutions per minute
RPS	Renewable Portfolio Standard
RUSLE	Revised Universal Soil Loss Equation
RV	recreational vehicle
SAM	social accounting matrix
SCADA	supervisory control and data acquisition
SH	State Highway
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control and Countermeasure Plans
STIP	State Transportation Improvement Program
SWPPP	Stormwater Pollution Prevention Plan

SWTSD	solid waste treatment, storage, and disposal
TAC	Technical Advisory Committee
TPW	Third Planet Windpower, LLC
TPWRJ	TPW Reno Junction
UI	unemployment insurance
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USLE	Universal Soil Loss Equation
VCI	vapor corrosion inhibitor
VDI	Verein Deutscher Ingenieure
WCDA	Wyoming Community Development Authority
WDEQ	Wyoming Department of Environmental Quality
WDOR	Wyoming Department of Revenue
WEST	Western Ecosystems Technology
WGFD	Wyoming Game and Fish Department
WHDP	Wyoming Housing Database Partnership
WQD	Water Quality Division
W.S.	Wyoming Statute
WSEO	Wyoming State Engineer's Office
WSGS	Wyoming State Geological Survey
WTG	wind turbine generator
WWDC	Wyoming Water Development Commission
WWDO	Wyoming Water Development Office
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database

WYPDES	Wyoming Pollutant Discharge Elimination System
WYR	Wyoming Register
WYSHPO	Wyoming State Historic Preservation Office
yd^2	square yard
Yd^3	cubic yard
ZVI	zone of visual influence

Executive Summary

TPW Reno Junction, LLC (TPWRJ), a wholly owned subsidiary of Third Planet Windpower, LLC (TPW), is submitting this Section 109 Permit Application pursuant to Wyoming Statute (W.S.) § 35-12-109 of the Wyoming Industrial Development Information and Siting Act (ISA). TPWRJ proposes to construct, own, and operate the Reno Junction Wind Energy Facility (the Project) to be located in southwestern Campbell County, Wyoming.

The permit application includes all the information required by W.S. 35-12-109, including all applicable ISA implementing rules and regulations. Pertinent data and analyses are included in Sections 1 through 7 and corresponding appendices. The signature letter was submitted under separate cover to the Wyoming Department of Environmental Quality (WDEQ) - Industrial Siting Division (ISD), along with the required application fee. TPWRJ requests issuance of a Section 109 ISA Permit pursuant to W.S. § 35-12-109 that allows for construction and operation of the proposed Project.

ISA Statute and Cost

An ISA Jurisdictional Meeting was held with the WDEQ-ISD on April 28, 2009. The WEDQ-ISD determined that the estimated capital costs of construction for the Project meet or exceed the (then current) statutory jurisdictional capital construction cost threshold of $173.2 million (W.S. § 35-12-102(vii)). As such, the proposed Project falls under the jurisdiction of the ISA and requires a permit issued from the Wyoming Industrial Siting Council (ISC) to construct and operate.

Project and Components

The Project will install up to 100 General Electric Company (GE) 1.5-megawatt (MW) xle model wind turbine generators (WTGs), for a total nameplate capacity of 150 MW.

Facilities and related infrastructure associated with the wind farm will include WTGs mounted on steel tubular towers, pad-mounted transformers, and buried electric power collection system and fiber optic communications cable. Access roads, meteorological (met) towers, a supervisory control and data acquisition (SCADA) system, and an operations and maintenance (O&M) building also will be constructed. A Project substation will be constructed on site, and approximately 5.3 miles of 230,000-volt transmission line will extend north to interconnect with Basin Electric Power Cooperative's existing Pumpkin Buttes Substation.

The Project will include engineering, purchase, and construction of all equipment and facilities necessary for a fully operational wind energy electrical generation project. The Project will be executed using an engineering, procurement, and construction (EPC) services process. Under the EPC contract, the selected contractor will design the installation, procure the necessary materials, and construct the Project using a combination of internal labor and subcontractors. TPWRJ will procure major equipment such as WTGs, main power transformers, cable, and breakers.

Location

The Project site is located in Campbell County, Wyoming; the northernmost extent of the Project boundary is approximately 3.5 miles south of Savageton, as depicted in a Preliminary Site Layout map included in **Appendix A**. The Project site occurs on gently undulating to rolling lands that include varied landforms of hill sides, alluvial fans, ridges, and stream terraces. The Project area is bisected by a north–south stretch of Wyoming State Highway (SH) 50 and is crossed by portions of two graveled Campbell County roads (Moore Road and Van Buggenum Road). Elevations range from 5,000 to 5,514 feet (ft) above mean sea level (amsl). The Project consists of approximately 14,078 acres of leased land, including 12,798 acres of private fee and 1,280 acres of State of Wyoming lands.

Land Use

The Project site is extensively disturbed by past and current oil and gas activities. Currently, five companies have active oil and coalbed natural gas operations associated with the Hartzog Draw, Powder River Basin Coal Bed, and Willow Creek fields within the Project site. In addition, two other companies hold leases for uranium mining within the Project area, and test wells have been installed onsite. Livestock grazing is also active within the Project area.

Project access roads and WTGs will occur on private fee lands and within the two sections of leased State of Wyoming lands. TPWRJ obtained a Wind Energy Lease Agreement from the Board of Land Commissioners in April 2009. The Project will not require the use of any federally managed lands.

Construction Schedule

TPWRJ anticipates an approximate 11-month construction schedule. The majority of Project construction activities will be concentrated in a 9-month period (August 2010 through April 2011), during which the site civil work will be completed and the WTGs will be delivered, installed, and commissioned. The WTGs are anticipated to be delivered starting as early as August 2010. Erection and commissioning of the WTGs is anticipated to be completed by April 2011. The commercial operation date of the Project is currently estimated and scheduled for April 2011, and construction and demobilization is expected to be complete by May 2011.

Construction and Operation Workforce Requirements

The on-site construction workforce (both local and non-local) will initiate at 28 workers in June 2010 and will rapidly escalate to 309 workers in the peak month of October 2010. The on-site construction workforce will then decline over the following 6 months.

During the operations phase, approximately 15 full-time permanent persons will be employed by the Project.

Transportation

The nacelle, hub assembly, blades, steel tubular towers, transformers, electrical collector line, transmission line poles, and substation components will be trucked directly to the Project site using semi-tractor trailers. Currently, the anticipated routing of workforce and delivery vehicles is expected to use Interstate 25 (I-25), I-90, SH 50, and SH 387 to access private roads in the Project area.

Based on initial input from the Wyoming Department of Transportation (WYDOT), over-sized load deliveries will avoid planned road and bridge improvement projects and may require road use agreements between TPWRJ and WYDOT for certain segments of Wyoming State Highways. However, access routes for all components requiring oversized trucks and loads, as well as higher clearances, will be coordinated with the WYDOT Casper and Sheridan District Offices.

Public Involvement Activities

TPWRJ conducted an extensive local and state government public involvement outreach program with elected local government officials representing Campbell, Weston, Crook, Natrona, Converse, and Johnson counties. TPWRJ scheduled and conducted meetings to discuss potential environmental, social, and economic issues and to identify mitigation recommendations and solutions that could be incorporated into the planning and design of the Project. TPWRJ also conducted a public open house on March 2, 2010 in Wright, Wyoming.

TPWRJ has notified all relevant State of Wyoming agencies of the Project and invited their input and involvement. In addition, TPWRJ has conducted specific meetings with the Wyoming Game and Fish Department (WGFD), Wyoming Department of State Parks - Cultural Resources State Historic Preservation Office (WYSHPO), and the WYDOT Casper and Sheridan District Offices to ensure that their concerns were identified and addressed. Lastly, TPWRJ met with the U.S. Fish and Wildlife Service (USFWS) to discuss and ensure that the Project was appropriately sited and impacts to resources under USFWS jurisdiction (i.e., federally listed species, raptors, and migratory birds) would be avoided or minimized to the maximum extent practicable.

Socioeconomic Analyses

The socioeconomic impact analysis evaluated the benefits and impacts to the social and economic resources in the Study Area and primary Area of Site Influence. To measure potential benefits and impacts, the socioeconomic analysis compared the expected future conditions in the Study Area with and without the Project. The recommended Study Area included Campbell County, where the proposed project would be sited; all of the surrounding counties (Crook, Weston, Johnson, Sheridan, and Converse); and the proximate Natrona County, which has strong economic ties with Campbell County. The counties included in the Study Area were determined through objective analysis and in consultation with WDEQ-ISD staff. Further analysis showed that the Area of Site Influence was much smaller than the broad study area. Specifically, the Area of Site Influence depends mostly on the location decisions of the local and non-local (i.e., in-migrating) construction workforce as

well as the counties supplying materials and equipment to construct the Project. Analysis of the observed location choices of the recent and current construction workforces of other projects sited in Campbell County and other economic data showed that the Project's influence would primarily be limited to Campbell, Natrona, and Crook counties.

Both local communities and the State of Wyoming will realize benefits from the Project. Wyoming will gain economic benefits, including permanent job creation, tax revenues, and expansion of clean and renewable energy generation within the region. Locally, the Project will result in local spending on goods and services, additional local economic activity, increased land lease revenues to private landowners and the State of Wyoming, and tax revenues.

Due to the small size of the construction workforce and limited length of the construction schedule, the Project will place minimal demands on water, sewer, roads, electrical lines, or other local infrastructure. Therefore, construction and operation of the Project will not significantly affect the various public and non-public facilities and municipal services as a result of in-migration of workers for non-basic employment opportunities.

Environmental Resources

TPWRJ actively sought a project location that would have minimal impacts to environmental resources. The Project site is extensively disturbed by past and current oil and gas activities and appurtenant infrastructure. These past and current industrial activities have resulted in significant alterations to the vegetation communities and habitats within the Project area. Additionally, the Project area is located outside the Greater Sage-grouse Core Area (identified in the Governor's Executive Order [E.O.] 2008-2) and designated crucial big game ranges. Therefore, potential environmental impacts associated with the Project have been substantially reduced through the concentration of impacts within a previously disturbed and active industrialized area.

TPWRJ has reviewed existing data and conducted cultural resource inventories, threatened and endangered species habitat evaluations, greater sage-grouse lek surveys, avian-use fixed-point surveys, bat detection surveys, raptor nest surveys, and noise and visual resource analyses to document and characterize baseline conditions of the Project area. All of the baseline resource data and information has been used by TPWRJ to further micro-site Project components to avoid or minimize potential environmental and natural resource impacts.

Avoidance and minimization activities included adjusting the Project boundary and relocating WTGs to avoid potential conflicts with nesting raptors, greater sage-grouse leks, cultural resource sites, and wetlands and waterbodies. Additional studies are ongoing and will be incorporated into micro-siting activities, where appropriate.

To avoid potential impacts to greater sage-grouse, TPWRJ has sited all Project infrastructure and planned its construction schedule in accordance with WGFD recommendations.

Class I and III Cultural Resource Inventories were completed for approximately 80 percent of the Project area. TPWRJ has sited Project infrastructure to avoid cultural resource sites eligible and unevaluated for listing on the National Register of Historic Places (NRHP) in accordance with WYSHPO recommendations. A supplemental Class III Inventory will be

completed prior to disturbance in uninventoried areas of the Project site and provided to WYSHPO for review.

TPWRJ has sited Project infrastructure to eliminate or minimize the risk of discharges of dredged or fill materials into jurisdictional wetlands or waters of the U.S (intermittent drainages). Specifically, TPWRJ has minimized the number of jurisdictional waters of the U.S. crossings to the maximum extent practicable. Micro-siting of appurtenant linear features during the final design phase will further reduce the potential for impacts to jurisdictional wetlands and waters and of the U.S. to the extent practicable. In addition, Clean Water Act (CWA) compliance will be implemented.

Construction practices and micro-siting of facilities are designed to minimize the risk of erosion or discharge into the intermittent waterbodies within the Project area. The nearest perennial waterbody is the Belle Fourche River, located approximately 5 miles east of the nearest WTG. Therefore, no direct or significant indirect impact to aquatic or fishery resources would occur during Project construction or operation.

Section
1

1.0 Purpose, Need, and Benefit

1.1 Purpose

Third Planet Windpower Reno Junction, LLC (TPWRJ) is a wholly owned development subsidiary of Third Planet Windpower, LLC (TPW). Formed in 2006, TPW is an independent power producer focused on the development of utility-scale wind energy facilities throughout the United States. TPW currently operates a 100.5-megawatt (MW) wind park in Loraine, Texas, and expects to complete construction on a 40.5-MW wind energy facility in Petersburg, Nebraska by early 2011.

TPWRJ's purpose is to construct, own, and operate a wind energy facility in Campbell County, Wyoming, and to generate revenue for TPW via the sale of clean, renewable wind energy produced by the proposed Reno Junction Wind Energy Facility (the Project).

The Energy Information Administration (EIA), a statistical agency of the U.S. Department of Energy (DOE), predicts in their 2010 Annual Energy Outlook (December 2009) that total electricity demand in the United States will grow by 1.0 percent per year from 2008 through 2035. While the majority of new generation during this period is predicted to consist of fossil fuel-burning facilities, recent federal and state legislation has the effect of increasing the demand of renewable energy generation facilities. The renewable fuel standard in the Energy Independence and Security Act of 2007 (EISA) (U.S. Congress, 2007), the federal production tax credit for renewable generation sources, the federal loan guarantee program in the America Recovery and Reinvestment Act (ARRA), and new and increases to state-mandated Renewable Portfolio Standards (RPS) (EIA, 2009) have all contributed to the increased demand for renewable energy generation sources in many areas of the United States. Other factors contributing to the increased renewable energy generation demand in the United States include:

- The National Energy Policy Development Group (NEPDG) (2001) recommended to the President, as part of the National Energy Policy, that the Departments of the Interior, Energy, Agriculture, and Defense work together to increase renewable energy production.
- In 2004, the Western Governors' Association set a goal of developing 30,000 MW of clean energy by 2015 from traditional and renewable energy sources (Policy Resolution 04-13, June 2004). This goal was reaffirmed in 2006 by Policy Resolution 06-10, Clean and Diversified Energy for the West (Western Governors' Association, 2006).
- The Energy Policy Act of 2005 (P.L. 109-58), Section 211, states "It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity." The Act encourages the development of renewable energy resources, including wind energy, as part of an overall strategy to develop a diverse portfolio of domestic energy supplies for the future. Although the proposed

TPWRJ Project does not contemplate the use of federal lands, its construction and operation would contribute to the accretion of domestic energy production.

- To address increased interest in wind energy development and to implement the National Energy Policy recommendation to increase renewable energy production, the Bureau of Land Management (BLM) established a wind energy development program. This program, which included the amendment of multiple land use plans, supported the Congressional direction provided in the Energy Policy Act of 2005 regarding renewable energy development on public lands, the directives of Executive Order (E.O.) 13212, and the recommendations of the NEPDG. Although the Project would not involve BLM-managed lands, this policy demonstrates the Administration's desire to support renewable energy projects such as wind facilities.
- On March 11, 2009, Secretary of the Interior Ken Salazar signed Order No. 3285 – Renewable Energy Development by the U.S. Department of the Interior (DOI) (U.S. Secretary of the Interior, 2009), which establishes the development of renewable energy as a priority for the DOI. Encouraging the production, development, and delivery of renewable energy is now one of the DOI's highest priorities. Although the Project would not involve any DOI lands, Order No. 3285 presents another facet of the federal government's energy policy supporting renewable energy.

1.2 Need

TPWRJ is engaged in late-stage power marketing with several investor-owned utilities (IOU) in the western United States. These utilities are subject to state-specific RPS that govern energy procurement requirements in the states in which said utilities serve load. Once TPWRJ is successful in negotiating a power purchase agreement (PPA) with one or more of these IOUs, TPWRJ will construct and operate the Project to meet the terms of its negotiated PPA. The Project would respond to the national call for more renewable energy and the mandate from many western states for increased production of renewable energy.

1.3 Benefits

Development of the TPWRJ Project carries significant local and regional economic benefits, including creation of new jobs and business for service-sector businesses, increased tax base in the form of *ad valorem* (property) and generation taxes, and new dollars supporting the local economy. The Project will generate distinct and positive economic impacts during both construction and operation phases. Construction activities will result in a short-term surge in commercial and consumer spending in the region, while operation of the facility will produce long-term economic benefits to the local communities. Both sources of economic stimuli will result in increased output, income, and employment in Campbell County.

The proposed Project presents a unique opportunity to diversify the regional electrical generation output while contributing to the local employment and tax base for the life of the Project, which is projected to be at least 25 years.

1.3.1 Estimated Capital Costs

Table 1-1 provides an estimate of the total Project costs and 2011 property taxes.

TABLE 1-1

Estimation of Assessed Value

County	Capital Investment[1]	Market to Book Ratio[2]	Estimated Fair Market Value (FMV)	Assessment Ratio[3]	Estimated Assessed Value	Tax District	2009 Tax Levy[4]	Estimated Property Tax
Campbell	$343,832,000	96%	$330,078	11.5%	$37,959	0100	58.799	$2,231,951

[1]Level of estimated capital investment for the Project.

[2]Ratio of fair market value to net book value, based on net book value.

[3]Statutory assessment ratio applicable to industrial operating property.

[4]2009 mill levy for the listed taxing district.

Source: TPWRJ, 2010.

1.3.2 Regional Benefits

A major facet of the socioeconomic impact of large capital infrastructure projects is the total impact on specific local economic sectors and various positive effects on the local economy. The increases in employment or output often occur locally as a result of new business locations and community events, and such changes have positive implications for other parts of the local economy.

The primary local economic benefits associated with the introduction of new business activity are increased employee compensation (wages and salaries exclusive of withholdings), purchases made by the new business, and taxes paid to local governments. The more local businesses are able to supply the needs of the employees and the new business, the greater the local economic impact of the new business.

Economic multipliers are often used to estimate the total economic impacts of a project or new business activity. The concept is that employee wages and business purchases have a "ripple effect" in an economy. The new business will purchase some of its required materials, supplies, and services in the local economy and those local businesses in turn may hire some new employees, creating indirect effects. Employees at the new business or project will likewise spend a portion of their wages at local stores and businesses, creating induced effects. In this way, the economic impact of the new business or project will spread throughout the local economy.

In addition to providing a stimulus to the local economy in the form of expenditures on materials and supplies (referred to as procurements), the Project would employ construction workers who are expected to spend much of their income (referred to as personal consumption expenditure [PCE]) in the study area, thus stimulating additional output in the various sectors that provide consumer goods and services. As a result of both Project procurements and PCE by local and non-local construction workers, the Project is expected to result in a temporary increase in employment and income during the construction period.

Direct and Secondary (Indirect and Induced) Benefits

Based on knowledge of the local economy and local sources, it is possible to identify the elements that have direct and secondary effects on the local economy:

- A direct effect arises from the first round of buying and selling. In general, this is the purchase of some inputs such as fuel, the spending of income earned by workers, annual landowner revenues, and the income effects of tax changes. These direct effects can be used to identify additional rounds of buying and selling for other sectors and to identify the effect on rounds of spending by local households.
- An indirect effect is the increase in sales of other industry sectors in the region, which includes further round-by-round sales.
- An induced effect is the increased household income expenditures generated by the direct and indirect output effects.

The total economic effect is the sum of the direct, indirect, and induced effects.

Direct Benefits

During the construction phase of the Project, it is anticipated that approximately 15 percent of the on-site workforce would be composed of persons already residing in the local area. The Project's peak construction workforce is estimated at up to 309 tradesmen and corporate personnel. The Project would generate up to 15 permanent full-time equivalent (FTE) jobs during the operations phase.

Secondary Benefits

Construction of the Project would also result in secondary economic impacts (indirect and induced impacts) within the area of potential effect; these impacts are temporary. Indirect and induced employment effects include the purchase of goods and services by firms involved with construction. Induced employment effects also include construction workers spending their income within Campbell, Natrona, and Crook Counties.

The Project is expected to result in annual indirect and induced employment within the study area of 23 and 23 FTE jobs, respectively, resulting in a short-term increase in total local Project-related employment of 130 jobs. Total employment associated with the Project, including jobs held by non-local workers, would number 309 jobs during the peak construction month and an average of 118 workers per month over the construction phase of the project. The additional secondary jobs result from Project-related procurements in the study area, as well as local and non-local construction worker PCE. PCE would consist mostly of accommodations, food services, recreation, entertainment, and transportation. **Table 1-2** provides a summary of expected employment effects as a result of the Project.

TABLE 1-2
Direct and Secondary Employment in the Local Economy

Employment Type (FTE)	Construction Phase 2010-2011	Operations Phase 2011 Onward
Direct (on-site)	84	15[1]
Indirect	23	7
Induced	23	14
TOTAL	**130**	**36**

[1]The project is likely to employ up to 15 full-time workers.

Source: CH2M HILL, 2010.

Much of the operations and maintenance activity would be performed by local personnel at an annual estimated cost of approximately $3.7 million.

1.3.3 Local Benefits

The Project's economic benefits to both local communities and the State of Wyoming include the following:

- Creation of jobs and stable employment
- Increased local spending
- Land lease revenue for local landowners and the State Land Trust
- Tax effects (increased *ad valorem* tax and energy generation tax revenue)

Job Creation

The construction of the facility will result in a peak of approximately 309 temporary construction jobs in the fall/winter of 2010. A permanent workforce of up to 15 FTE jobs will be required to operate the wind energy facility.

Increased Local Spending

Spending on construction and operation of the Project will positively affect the local economy directly through the purchase of local goods and services, and indirectly as those purchases generate purchases of intermediate goods and services from other related sectors of the economy. In addition, direct and indirect increases in employment and income will enhance overall local purchasing power, thereby inducing further spending on goods and services. This cycle is expected to continue until the dollars spent eventually leak out of the local economy as a result of taxes, savings, or purchases of non-locally produced goods and services.

The Project will be a source of new local professional job opportunities in the region. Specifically, permanent operations and maintenance (O&M) positions will provide new local wage jobs (i.e., jobs above entry level and providing industry-scale income), some of which will require specialized backgrounds in wind operations. These positions also may add to the local economy through the employee purchase of residential homes, thereby increasing the local tax base.

Land Lease Revenue

The surface landowners including both private fee and the State of Wyoming will benefit from increased and diversified income. Generally, landowners receive substantial land rent during the development of a wind facility, as well as royalties from the revenue generated by the Project during operations. This income is expected to induce additional employment in the local economy to the extent that landowners increase their expenditures on local goods and services. After the Project is operational, land within the Project site will continue to be used for current land uses, which include oil and gas extraction, conventional livestock grazing, and ranching activities.

Project access roads and wind turbine generators will be constructed on the two sections of State of Wyoming land for which TPWRJ has obtained a Wind Energy Lease Agreement from the Board of Land Commissioners. The Wind Energy Lease includes structured payments for the use of the State lands, which are reflective of the lease agreements in place with private landowners. Fees typically include an annual fee per acre during development, an installation fee based on capacity payable when commercial operation begins, and an operating fee based on energy generated by facilities on State lands. As proposed in the preliminary site plan (see **Appendix A)**, 20 turbines will be sited on State lands. Each of these turbines will generate approximately $7,500 to $11,000 annually in royalty payments in addition to development term rent and installation fees.

Tax Effects

Tax effects are an important consideration and a significant benefit of the Project. The biggest tax benefit and source of new tax revenue would be associated with the *ad valorem* taxes collected over the estimated 25-year life of the Project. In conjunction with associated ancillary activities, state and local tax revenues also would be generated during the construction and life of operation of the proposed facility. Although some of these tax revenues will be distributed on a local level, the State controls such distribution.

It is estimated that *ad valorem* taxes of approximately $2.232 million would be payable to Campbell County in the first year of operation of the Project, as shown in **Table 1-3**. The estimated total *ad valorem* tax revenue generated in the first 5 years of operation (2011 through 2015) would be approximately $10.328 million.

TABLE 1-3
Estimate of *Ad Valorem* Taxes Paid Per Year (in thousands)

2011	2012	2013	2014	2015	5-Year Total
$2,232	$2,150	$2,066	$1,982	$1,897	$10,328

[1]It is estimated that construction will be 89-percent complete by the 1/1/2011 lien date.
[2]Property Tax escalation factor of 0.5 percent reduced 4 percent annually.

Source: TPWRJ, 2010.

Lodging tax revenues could accrue to the counties in which Project-related construction workers temporarily reside, and estimates are included in the local tax revenues reported above. However, it should be noted that: (1) the actual distribution of construction workers is not known at this time, and (2) the durations of their stays are not known; lodging taxes are levied only on sleeping accommodations for guests staying less than 30 days.

Environmental Benefits

Wind power is fueled by the kinetic energy of the wind, which is continually regenerated through atmospheric processes. The generation of electricity from the wind relies on frequent and recurring winds to turn the blades of power-generating turbines. Unlike most other electrical generation sources, wind turbine generators (WTGs) do not consume water, require no additional fuel sources and do not generate pollutant discharges. The greatest local advantage of wind power over other electrical generation sources is its potential for large-scale electricity generation without localized air emissions or depletion of non-renewable resources. Additionally, the lack of emissions results in no contribution to environmental concerns such as acid precipitation, global climate change, smog, mercury contamination, water withdrawal or water quality impacts, and particulate-related health effects.

Section 2
Application and Facility Description

2.0 Applicant and Facility Description

In accordance with W.S. 35-12-109, the application shall contain the information required by the ISA with respect to both the construction period and the following information the Council determines necessary.

The following sections provide information relevant to Wyoming Statute (W.S.) 35-12-109 and implementing rules and regulations that detail Project-specific information relating to the intention of TPW Reno Junction, LLC (TPWRJ) to construct, own, and operate the proposed 100 wind turbine generator (WTG), 150-megawatt (MW) wind energy facility in Campbell County, Wyoming.

2.1 Applicant Information

Rule I Section 7(a) & W.S. § 35-12-109(a)(i) – Name and Address of Applicant. An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain the name and address of the applicant, and, if the applicant is a partnership, association or corporation, the names and addresses of the managers designated by the applicant responsible for permitting, construction or operation of the facility.

Applicant:

TPW Reno Junction LLC
A wholly owned subsidiary of Third Planet Windpower, LLC
2333 San Ramon Valley Blvd., Suite 285
San Ramon, CA 94583

The following manager has been designated by TPWRJ to be responsible for permitting of the proposed Reno Junction Wind Energy Facility (the Project):

Mr. Sam Littlefield
Project Developer, Western Region
Third Planet Windpower, LLC
One World Trade Center
121 SW Salmon St., 11th Floor
Portland, OR 97204

TPWRJ is a wholly owned development subsidiary of Third Planet Windpower (TPW), a Delaware Limited Liability Company founded in 2006. TPW's principal business is developing, constructing, owning, and operating commercial-scale wind energy facilities throughout the United States. The company is majority owned (approximately 99 percent) by Morgan Stanley Renewable Development Fund, LLC, a Delaware Limited Liability Company, a direct subsidiary of Morgan Stanley Renewables, Inc. and an indirect , wholly owned subsidiary of Morgan Stanley, formed in and subject to the laws of Delaware. The remaining approximately 1 percent of TPW is held by investors, including individual TPW employees.

2.1.1 Financial Assurance

W.S. § 35-12-109(a)(xxi) – Application for Permit. Information demonstrating the applicant's financial capability to construct, maintain, operate, decommission and reclaim the facility.

Company Overview

TPWRJ is a wholly owned subsidiary of TPW. TPW's executives and development team have been responsible for the development, permitting, design, engineering, interconnection, construction and operation of some of the largest and most complicated wind projects in the United States with companies including Florida Power Light and Electric (FPLE) (now NextEra Energy Resources), Noble Environmental Power, Gamesa, Iberdrola, and Tetra Tech EC. Since its founding in 2006, TPW has completed construction and entered operation of a 100.5-MW wind farm north of Loraine, Texas, which was built to also accommodate rapid expansion to 250.5 MW. Additionally, TPW has secured a power purchase agreement for a planned 40.5 MW wind farm near Petersburg, Nebraska, which is expected to be constructed and in operation by early 2011.

TPW's successful growth over its first 4 years has resulted from the efforts of an experienced team of wind industry professionals. The TPW team's experience in working with the largest developers, owners, operators, builders, and manufacturers in the wind industry will help to ensure the delivery of a safe, reliable, high-quality wind energy project in Campbell County, Wyoming.

Turbine Supply

TPW has a contract with General Electric (GE) for the provision of 100, 1.5-MW turbines for planned deployment at the Project.

Financing Plan

Construction of the Project is expected to be financed with a combination of debt and equity during the construction phase. Construction financing is currently priced at the London Inter-bank Offer Rate (LIBOR) plus 3.25 to 3.50 percent. Leading construction lenders in this area include Dexia Crédit Locale, Union Bank of California, Bayern LB, and Bayerishe Hypo-und Vereinsbank (HVB).

During the operations phase, TPWRJ expects to finance the Project using both the provisions of American Recovery and Reinvestment Act 2009 (ARRA, also known as the stimulus package) and traditional financings for wind investment, which may include tax equity, bank debt, and cash equity. The ARRA provisions include the U.S. Department of Energy (DOE) Cash Grant, or the Investment Tax Credit (ITC). The cash grant/ITC is available for up to 30 percent of the capital cost (including Interest During Construction and other 'soft costs'). TPW expects to finance the Project in one of two ways: (1) with ITC/tax equity, bank debt, and cash equity; or (2) with ITC/tax equity and cash equity. Should TPWRJ use bank debt, the pricing would be in the same range as for construction (3.25 to 3.50 percent) and is typically for a tenor of 10 to 15 years. Again, the lead lenders in this area are as above. Other lenders that have done recent transactions include Tokyo Mitsubishi-UFJ, BBVA, Société Générale, Banco Santander, and Commerzbank.

Construction Contractor

TPW contracted Blattner Energy as the engineer, procurement, and construction (EPC) contractor for its project in Loraine, Texas, based on the company's excellent industry reputation and TPW's belief that a single EPC contractor is best suited to advancing the TPWRJ Project schedule while maintaining safety and quality. TPWRJ would consider employment of D.H. Blattner or a similarly qualified firm for the construction of the Project, as well as a variety of other industry leading consultants and engineers to ensure that the wind farm is built to the highest industry standards.

Operations Plan

TPWRJ intends to employ experienced personnel to manage facility operations and will contract with GE for at least the first 2 years of operations during the major equipment warranty period. After this period, TPW will staff its technician pool with local hires or utilize the services of an experienced third party firm for operations and maintenance services.

Included in TPW's Turbine Supply Agreement with GE is a 2-year full warranty package that provides a "bumper-to-bumper" concept that ensures all equipment will be new and free from defects in material, workmanship, and title. The warranty is enacted on all equipment after turbine completion, and any work repaired during this 2-year period is then similarly warranted for a period of 12 months from the date of repair or until the end of the warranty period, whichever is later.

Warranty and Maintenance

A major component warranty and maintenance plan is a critical component contributing to long-term project viability. For its wind farm in Loraine, Texas, TPW and GE signed a Parts, Maintenance, and Service Agreement (PMSA) on December 21, 2007, which provides for GE technician support to provide maintenance and related services for the first 2 years of operation. Contract details will require that GE meet or exceed guaranteed performance requirements to include, but not limited to, 95-percent availability for the first 3 months after the facility Commercial Operation Date, and 97-percent availability for the next 21 months. TPWRJ expects to enter into a similar agreement with GE for the Project.

The PMSA would provide mechanisms for cost recovery if these guaranteed availability performance numbers are not achieved. Long-term availability is expected to be at least 97 percent, based on the TPW team's extensive experience operating this technology. Scheduled maintenance will occur every 6 months, and forced outage maintenance will be managed on an as-needed basis.

The GE 1.5-MW turbines have a design life of 25 years, which is consistent with the minimum projected operational life of the facility.

Decommissioning

Site reclamation and facility decommissioning is described in detail in Section 3.8. Specific reclamation and decommissioning requirements are based on a commercial agreement between TPWRJ and its lessees, including the State of Wyoming. The expected cost to decommission the facility is estimated at $3.6 million. TPWRJ's financial analysis considers these costs as a component in pro forma modeling and in the assessment of project viability.

For other major infrastructure projects, TPW has agreed to bonding, postponed until the fifteenth year of operations. For this Project, TPWRJ would execute a surety bond or similar mechanism that would provide financial assurance for decommissioning and site reclamation, as required by statute.

2.2 Commercial Wind Energy Facility

§35-12-102(E)(I) - Any commercial facility generating electricity from wind and associated collector systems that consists of thirty (30) or more wind turbines in all planned phases of the installation.

The Project will consist of up to 100 WTGs. Therefore, the proposed TPWRJ falls under Wyoming's Industrial Siting Act (ISA) statutory definition of a wind commercial generating facility.

2.3 Site Selection

W.S. § 35-12-109(a)(vii) – Site Selection. An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain a statement of why the proposed location was selected.

The Project site was selected for the following reasons:

1. The site offers a commercially viable wind resource based on collected meteorological data (over two years of data from two meteorological towers and eight months of data from a third tower);
2. TPWRJ has acquired complete site control of 14,078 acres, which is sufficient to construct and operate the 100-WTG (150-MW) Project;
3. The Project will interconnect with Basin Electric Power Cooperative's existing substation within the Project area;
4. TPWRJ has entered into a Large Generator Interconnection Agreement for 200 MW with Basin Electric and Black Hills Power, both members of the Common Use System;
5. The 5.3-mile, 230,000-volt radial transmission line will be fully contained within the Project site;
6. The Project site is located outside of the Executive Order 2008-02 Greater Sage-grouse Core Area and designated big game crucial winter ranges;
7. Extensive disturbances associated with oil and gas extraction activities will minimize overall impacts; and
8. The Project site is located in close proximity to major transportation corridors.

2.4 Nature and Location of the Facility

Rule I Section 7(b) & W.S. § 35-12-109(a)(iii) – Nature and Location of Facility. An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain a description of the nature and location of the facility; and – A description of the specific, geographic location of the proposed industrial facility.

The Project is located in Campbell County, Wyoming, within Townships 43N-74W, 43N-75W, 44N-74W, and 44N-75W (see **Appendix A**). The Project area is bisected by a north–south stretch of Wyoming State Highway (SH) 50 and crossed by portions of three gravel county roads (Moore Road, Todd Road, and Van Buggenum Road). The site topography varies from relatively level to rolling, with elevations ranging from 5,000 to 5,514 feet above mean sea level (AMSL).

2.5 Point of Delivery – Goods and Services

W.S. § 39-15-111(c) – Distribution. If any person commences after the effective date of this act to construct an industrial facility, as that term is defined in W.S. 35-12-102, under a permit issued pursuant to W.S. 35-12-106, or if the federal or state government commences to construct any project within this state with an estimated construction cost as specified in the definition of industrial facility in W.S. 35-12-102, the state treasurer shall thereafter pay to the county treasurer and the county treasurer will distribute to the county, cities and towns of that county in which the industrial facility or project is located, impact assistance payments from the monies available under paragraph (b)(i) of this section. For purposes of this subsection, the industrial facility or federal or state government project will be deemed to be located in the county in which a majority of the of construction costs will be expended.

The construction and operation of the Project will result in the purchase of goods and services, both for the Project itself and for the needs of the associated construction and operations workforce. Goods and services procured for construction activities will be obtained from various local, regional, and national vendors.

TPWRJ anticipates that the majority of the Project's components will be trucked to the Project site. Therefore, Campbell County will be the primary point of delivery for components associated with the Project.

2.6 Preliminary Site Plan

Rule I Section 7(b)(i) – Preliminary site plans at an appropriate scale indicating the anticipated location for all major structures, roads, parking areas, on-site temporary housing, staging areas, construction material sources, material storage piles and other dependent components.

TPWRJ has completed a preliminary site plan and layout detailing all appurtenant facilities required for the Project (see **Appendix A**).

2.7 Land Ownership

Rule I Section 7(b)(ii) – Land Ownership. The area of land required by the industrial facility and a land ownership map covering all the components of the proposed industrial facility.

The Project consists of approximately 14,078 acres: 12,798 acres of private fee lands and 1,280 acres of State of Wyoming lands. The 12,078 acres of private fee were leased in the summer of 2007. Two sections of State of Wyoming land totaling 1,280 acres will be used for the Project, including the placement of WTGs, collection lines, and access roads. TPWRJ secured a Wind Energy Lease Agreement with the State of Wyoming, Board of Land Commissioners in April 2009. No federal lands will be used for any Project infrastructure or transmission line. All leased land occurs in Campbell County. **Table 2-1** provides the legal description of the Project's location. A land ownership map is provided in **Appendix D**.

TABLE 2-1
Project Site Legal Description

Location	Section	Township	Range
S1/2	Section 1	Township 44 North	Range 75 West
S1/2	Section 2	Township 44 North	Range 75 West
All	Section 11	Township 44 North	Range 75 West
S1/2 and NW1/4	Section 12	Township 44 North	Range 75 West
N1/2, SE1/4 and E1/2 SW1/4	Section 13	Township 44 North	Range 75 West
N1/2, SW1/4 and W1/2 SE1/4	Section 14	Township 44 North	Range 75 West
All	Section 36	Township 44 North	Range 75 West
S1/2	Section 6	Township 44 North	Range 74 West
All	Section 7	Township 44 North	Range 74 West
SW1/4	Section 8	Township 44 North	Range 74 West
W1/2	Section 17	Township 44 North	Range 74 West
All	Section 18	Township 44 North	Range 74 West
All	Section 20	Township 44 North	Range 74 West
W1/2	Section 21	Township 44 North	Range 74 West
W1/2	Section 28	Township 44 North	Range 74 West
All	Section 29	Township 44 North	Range 74 West
All	Section 30	Township 44 North	Range 74 West
NW1/4, N1/2 SW1/4, SE1/4 SW1/4, SE1/4, S1/2 NE1/4 and NW1/4 NE1/4	Section 31	Township 44 North	Range 74 West
W1/2 and N1/2 NE1/4	Section 32	Township 44 North	Range 74 West
N1/2 NW1/4	Section 33	Township 44 North	Range 74 West
W1/2	Section 5	Township 43 North	Range 74 West
SE1/4, N1/2 NE1/4 and NE1/4 NW1/4	Section 6	Township 43 North	Range 74 West
E1/2 and SW1/4	Section 7	Township 43 North	Range 74 West
N1/2	Section 18	Township 43 North	Range 74 West
N1/2	Section 19	Township 43 North	Range 74 West
All	Section 30	Township 43 North	Range 74 West
N1/2	Section 31	Township 35 North	Range 74 West
E1/2	Section 1	Township 43 North	Range 75 West
E1/2	Section 12	Township 43 North	Range 75 West
E1/2, SW1/4, S1/2 NW1/4	Section 13	Township 43 North	Range 75 West
All	Section 36	Township 43 North	Range 75 West

Source: TPWRJ, 2010.

2.7.1 Subsurface Ownership

W.S. § 39-15-105(f) – Rules and Regulations. In addition to the rules and regulations adopted under subsection (b) of this section, the council shall promulgate rules and regulations requiring applicants for facilities described in W.S. 35-12-102(a)(vii)(E) and (F) to provide notice to record owners of mineral rights located on or under the lands where the proposed facility will be constructed.

Due to the extensive amount of oil and gas operations within the Project boundary, TPWRJ has conducted outreach to the uranium, oil, and gas leaseholders and the operators presently active within the Project site. Agreements which guide the interaction between TPWRJ's construction and operations activities and the extractive activities of the mineral leaseholders are currently being developed by TPWRJ in coordination with the mineral leaseholders. TPWRJ will execute these agreements prior to Project construction.

2.8 Project Phase Descriptions and Future Modifications

W.S. § 35-12-109(a)(vi) – Future Additions and Modifications. An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain future additions and modifications to the facility to which the applicant may wish to be approved in the permit.

The 100-WTG (150-MW) Project will be constructed in a single phase. No future phases or modifications to the Project are planned at this time.

2.9 Wind Energy Facility Components

Rule I Section 7(c) – A general description of the major components of the proposed industrial facility such as boilers, steam generators, turbine generators, cooling facilities, production equipment, and dependent components.

Facilities and related infrastructure associated with the wind farm will include WTGs mounted on steel tubular towers, pad-mounted transformers, and buried power collection electric system and fiber optic communications cable. Access roads, meteorological (met) towers, a supervisory control and data acquisition (SCADA) system, and an operations and maintenance (O&M) building also will be constructed. A Project substation will be constructed onsite, and approximately 5.3 miles of 230,000-volt transmission line will extend north to interconnect with Basin Electric Power Cooperative existing 230,000 volt Pumpkin Buttes substation.

2.9.1 GE 1.5-MW xle Wind Turbine Generators

The Project will install and erect 100 GE 1.5-MW xle WTGs. The GE 1.5-MW xle is a three-blade, active yaw-and-pitch regulated machine with power and torque control capabilities. The rotor diameter is 270.6 feet (ft), and the height at the hub is expected to be 262.4 ft (see **Figure 2-1**). The swept area of the rotor is 6,394 square yards (yd^2), and the rotor typically operates up to 20 revolutions per minute (rpm). The cut-in and cut-out (10-minute average) wind speeds for the GE 1.5 MW xle model are 7.8 miles per hour (mph) and 44.7 mph, respectively. **Table 2-2** details GE 1.5-MW xle turbine specifications.

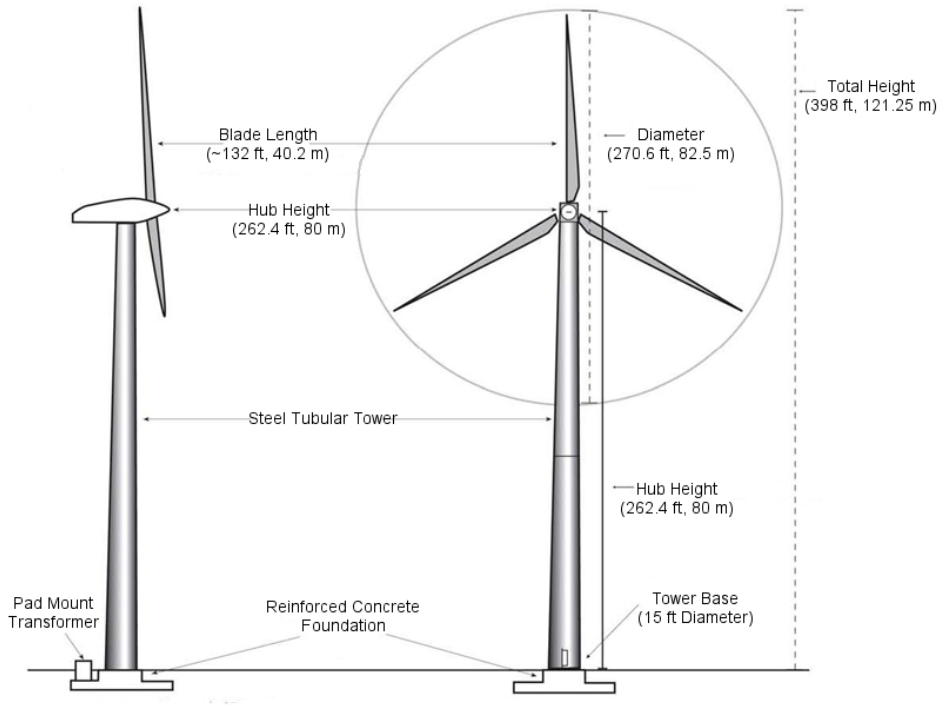


FIGURE 2-1
GE 1.5-MW xle Wind Turbine and Tower

The WTGs will be mounted on a poured-concrete pad and spaced at distances equal to approximately three to four rotor diameters between turbines, and at least eight rotor diameters between turbine rows, depending on site characteristics.

Rotor Blades

The rotor for a GE wind turbine is made of three high-tech blades, each approximately 132 ft in length. The rotor blades are made of laminated materials such as composites, balsa wood, carbon fiber, and fiberglass that have high strength-to-weight ratios. These materials are molded into airfoils to maximize the wind's lift.

The rotors are bolted onto the central hub, and a pitch mechanism allows the blade to rotate on its axis to take advantage of different wind speeds. Wind creates lift on the blades, causing the rotor hub to spin. This rotation is transferred to a gearbox where the speed of rotation is increased to the speed required for the attached electric generator that is housed in the nacelle. The blades are non-metallic, but are equipped with a sophisticated lightning protection system.

TABLE 2-2
General Electric 1.5-MW xle Turbine Specifications Weights and Lengths

Component	Description	Weight		Length		Diameter			
		Kilograms	Pounds	Meters	Feet	Meters (at base)	Feet (at base)	Meters (at top)	Meters (at top)
80-m hub	Base Section	57,500	126,766	22.3	73.2	4.6	15.0	4.3	14.1
(three Sections)	FMP Ring	9,084	20,027	1.7	5.5	4.6	15.1	4.3	14.1
	Middle Section	37,850	83,445	25.0	82.0	4.3	14.1	3.4	11.2
	Top Section	29,908	65,936	30.0	98.4	3.4	11.2	2.6	8.4
Subtotal		125,258	276,147	77.3	253.6	--	--	--	--
Hub Assembly	Hub Assembly w/ Fixture xle	21,500	47,399	--	--	3.2	10.5	3.8	12.6
Rotor	82-m 1.5-MW xle	39,650	87,413	--	--	82.0	269.0	--	--
Machine Head	Machine Head Assembly xle	55,300	121,916	8.8	28.9	--	--	3.8	12.5
Nacelle	Down Tower Controller	3,800	8,378	--	--	--	--	--	--
	Gearbox xle	15,100	33,290	--	--	--	--	--	--
	Generator	8,450	18,629	--	--	--	--	--	--
	Main Bearing	2,100	4,630	--	--	--	--	--	--
	Yaw Drive	515	1,135	--	--	--	--	--	--
	Pitch Drive	300	661	--	--	--	--	--	--
	Main-Shaft	6,600	14,551	--	--	--	--	--	--

Source: General Electric, 2009.

Nacelle

The heart of the wind turbine is its electricity generating system. The rotor drives a large shaft into a gearbox, which steps up the revolutions per minute to a speed suitable for the electrical generator. The gearbox and generator are mounted on a bedplate to increase durability and minimize noise. The shaft usually has two independent braking systems as a safety mechanism. The gearbox, generator, and various pieces of control equipment are enclosed within the nacelle, which houses the unit that protects the turbine mechanics and electronics from environmental exposure.

The turbine has a yaw drive system to keep the rotor facing into the wind and to unwind cables. The drive system consists of an electric or hydraulic motor, mounted on the nacelle, which drives a pinion mounted on a vertical shaft through a reducing gearbox. The drive

system also contains the brake system, which is able to stop the turbine from turning. To control the functioning of the WTG, the drive system is fitted with a number of sensors to read the speed and direction of the wind, the amount of electrical power generation, the rotor speed, the blades' pitch, the turbine's vibration, the temperature of the lubricants, and other variables. A computer processes the inputs to carry out the normal operation of the turbine, and a safety system can override the controller in an emergency. To condition and control the power output, the generator is equipped with a remote control and monitoring system.

Tower Structures

The nacelle and generator are mounted on top of a tubular steel tower to allow the blades to take advantage of winds aloft. Towers used for the WTGs consist of three tubular steel sections coated with paints and sealants. The towers supporting each WTG will be a tapered steel monopole, up to approximately 262 ft in height. The tower is supported by a reinforced-concrete foundation ranging from 48 to 80 ft in diameter, depending on final engineering design. The towers will be uniformly painted a neutral color that complies with Federal Aviation Administration (FAA) requirements for daylight marking. The towers feature a locked entry door at ground level and an internal access ladder with safety platforms for access to the nacelle. A controller cabinet will be located inside each tower at its base. Towers are pre-fabricated in three sections and delivered and assembled on site.

Transformer

A pad-mounted step-up transformer will be installed at the base of each WTG to increase the output voltage to the level of the power collection system (34,500 volts). A small concrete slab or fiberglass foundation, a concrete vault, or other suitable base will be used to support the step-up transformers.

Foundations

The tower for the WTG will be set on a poured-in-place concrete foundation. The actual foundation design for each WTG turbine will be determined based on site-specific geotechnical information and structural loading requirements of the turbine model.

Lighting Specifications

The WTGs will be grouped in arrays, and some of the WTGs will require FAA-mandated aviation warning lights. The number of WTGs with lights and the lighting pattern of the WTGs will be determined through consultation with the FAA prior to construction.

2.9.2 Power Collection System

A network of collection power cables will be installed along and between the turbine strings to collect power generated by the individual wind turbines, transform the power to 34,500 volts, and route it to the collector substation. Collection power cables will be buried a minimum of 4 ft below ground surface (bgs). The collector substation will convert the electricity to transmission voltage (230,000 volts) for delivery into the interconnection substation and then on to the electrical grid.

The Project electrical system will consist of three key elements:

1. A collector system that collects energy generated at 690 volts from each WTG, transforms it to 34,500 volts through a pad-mounted transformer, and delivers the power through a network of electrical conductors.
2. A collector substation that transforms energy delivered by the collector system from 34,500 volts to 230,000 volts.
3. A 230,000-volt transmission line, which delivers the electricity and interconnects to Basin Electric Power Cooperative's existing Pumpkin Buttes Substation.

2.9.3 SCADA System

A SCADA system will be installed to collect operating and performance data from each WTG and provide remote monitoring and operation of the WTGs when appropriate. The WTGs will be linked to one or more central computers via a fiber optic network. Fiber optic cables for the SCADA system will be installed in the collector cable trenches. The SCADA cables will be installed at least 4 ft bgs. The host computer(s) is expected to be located in the substation building control room at the Project site. SCADA software will consist of applications developed by the turbine vendor and/or a third-party SCADA vendor.

2.9.4 Meteorological Towers

Up to five permanent met towers will be constructed within the footprint of the Project site for the purpose of collecting meteorological data and forecasting conditions. The final location of the met towers will be determined in consultation with GE.

2.9.5 Operation and Maintenance Building

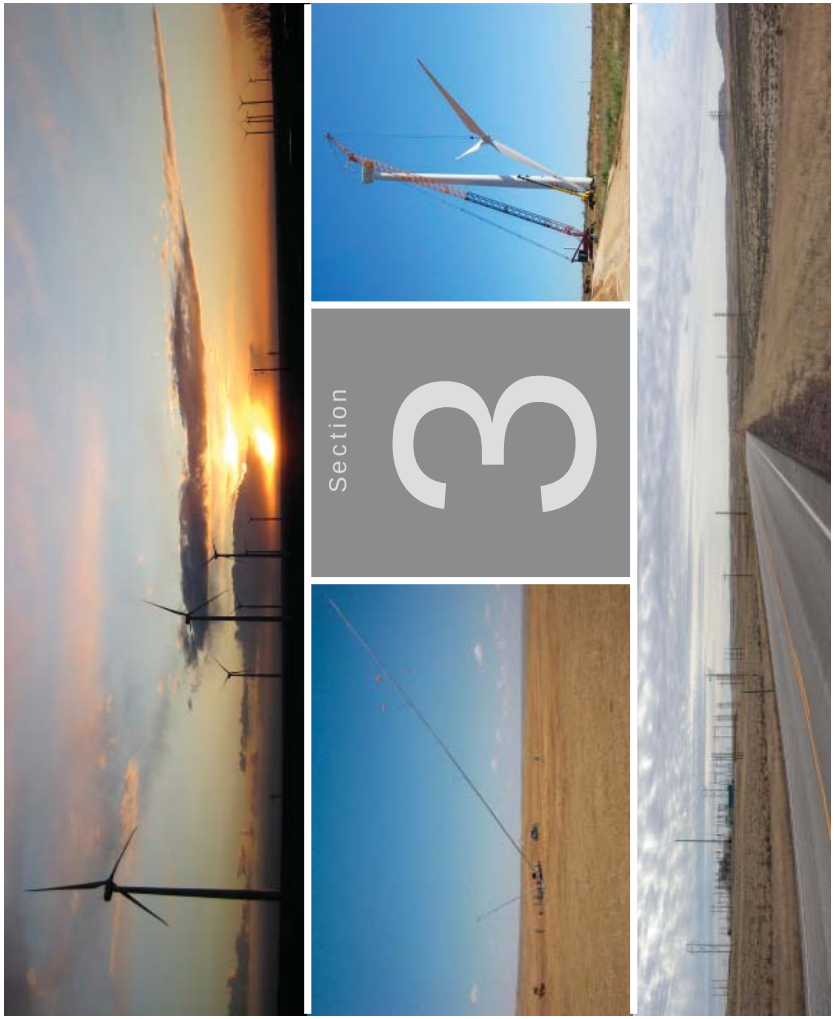
An O&M building will be constructed within the Project boundary. The O&M building will be approximately 6,000 ft^2 and will include space for offices, bathroom and kitchen facilities, a break room, a storage area, and a garage for vehicle, turbine, and equipment maintenance. A fenced, graveled area for parking and storage also will be provided. The O&M building will use a new groundwater well or will purchase water from an existing well to supply water for domestic use and will discharge to an on-site septic system.

2.9.6 Access Roads

New gravel access roads will be constructed for delivery of construction materials and turbine components, as well as general access to WTG pads and substation locations. A series of existing oil and gas access roads are present within the Project site.

Access roads will be engineered based on turbine vendor design standards and specifications and will be located to minimize disturbances, maximize transportation efficiency, and avoid sensitive resources and unsuitable topography to the extent practicable. Existing roads will be used where practicable, although some areas may need to be widened to accommodate delivery of WTG equipment and crane movement. Raw materials used for access road and crane pad preparation will include aggregate grade gravel, crushed rock, and water for dust control and road compaction.

Section 3
Construction, Operations, and Decommissioning



3.0 Construction and Operations Descriptions

This section provides information on the construction and operations of the proposed Reno Junction Wind Energy Facility (the Project).

3.1 Time of Commencement and Construction Time

Rule I Section 7(a)(iv) – An application for a permit shall be filed with the Division, in a form as prescribed by Council rules and regulations, and shall contain information on the estimated time of commencement of construction and construction time.

Contingent upon approval from the Wyoming Industrial Siting Council (ISC) and obtaining all other required permits, Third Planet Windpower Reno Junction, LLC (TPWRJ) anticipates commencement of construction activities in August 2010 (third quarter). It is anticipated that pre-commencement of construction activities, such as access road construction and the civil and geotechnical surveys, would be initiated in June 2010. Installation of the electrical systems (collection system, transmission line, and substation) and construction and erection of the turbines and may begin late in the third quarter of 2010 and continue to commercial operations, in the spring of 2011.

3.2 Construction Schedule

Rule I Section 7(e) - A statement that shall be a reasonable estimate of the calendar quarter in which construction of the industrial facility will commence, contingent upon the issuance of a permit by the Council.

Contingent upon approval from the ISC and obtaining all other required permits, construction activities associated with the Project would commence in the third quarter of 2010. The preliminary construction schedule is presented in **Figure 3-1**.

3.3 Construction Completion Schedule

Rule I Section 7(f) - A statement that shall be a reasonable estimate of the maximum time period required for construction of the industrial facility and an estimate of when the physical components of the industrial facility will be ninety (90) percent complete, and the basis for that estimate.

Erection and commissioning of the wind turbine generators (WTGs) is anticipated to be completed in March 2011, which will mark the estimated 90-percent complete point of the construction schedule. The Project commercial operation date is currently estimated and scheduled for April 2011. The maximum time period required for construction is expected to be 12 months, with construction completed in May 2011.

TPWRJ Reno Junction Wind Farm Project Construction Schedule

ID	Task Name	Start	Finish
1	**Preconstruction Activities**	**Tue 12/1/09**	**Fri 7/23/10**
2	Preliminary Geotech and Reporting	Tue 12/1/09	Thu 1/14/10
3	Boundary Survey and Mapping	Tue 12/1/09	Thu 1/14/10
4	Turbine Staking	Mon 7/19/10	Fri 7/23/10
5	EPC Contractor Full Notice to Proceed	Thu 7/15/10	Thu 7/15/10
6	**Industrial Siting Permitting**	**Mon 4/19/10**	**Fri 8/13/10**
7	ISA Submittal	Mon 4/19/10	Mon 4/19/10
8	ISA Hearing	Tue 7/13/10	Wed 7/14/10
9	Finding of Fact	Fri 8/13/10	Fri 8/13/10
10	**Civil Construction**	**Thu 7/1/10**	**Sun 5/1/11**
11	Road Construction	Thu 7/1/10	Wed 10/20/10
12	Grading of Temporary Use Areas	Thu 7/1/10	Wed 7/28/10
13	Ongoing Civil Maintenance	Thu 7/1/10	Sun 5/1/11
14	**Electrical Construction**	**Fri 8/13/10**	**Thu 2/24/11**
15	Collection System Construction	Fri 8/13/10	Thu 11/4/10
16	Collector Substation Construction	Fri 8/13/10	Thu 2/24/11
17	Transmission Line Construction	Fri 10/1/10	Thu 11/25/10
18	**Turbine Construction**	**Fri 8/13/10**	**Fri 3/18/11**
19	Foundation Construcion	Fri 8/13/10	Thu 12/2/10
20	Turbine Delivery	Fri 8/13/10	Thu 12/2/10
21	Turbine Erection	Fri 10/1/10	Thu 1/20/11
22	Commissioning	Mon 11/1/10	Fri 3/18/11
23	**Ancillary Facility Construction**	**Wed 9/1/10**	**Tue 1/18/11**
24	Operations and Maintenance Building Construction	Wed 9/1/10	Tue 1/18/11
25	Met Tower Installation	Fri 10/1/10	Thu 11/25/10
26	**Commercial Operation**	Fri 4/1/11	Fri 4/1/11

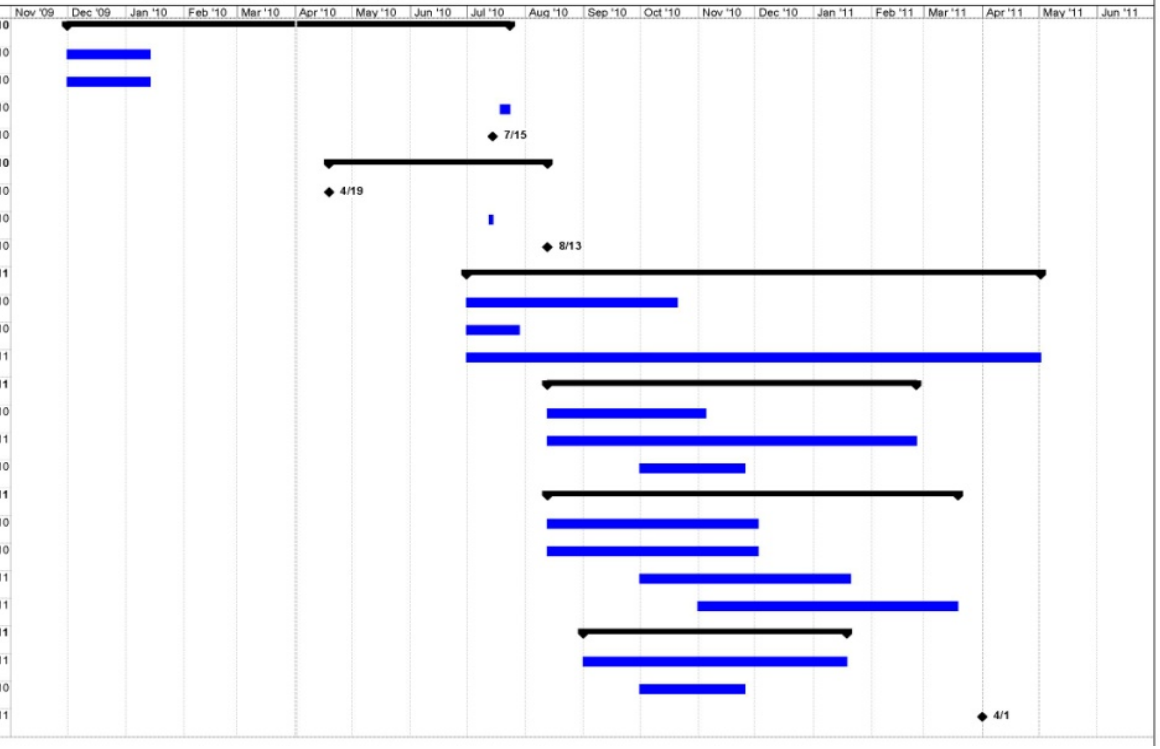


FIGURE 3-1
Project Preliminary Construction Schedule

3.4 Construction Workforce Estimate

Rule I Section 7(v) - Estimated number and job classifications, by calendar quarter, of employees of the applicant, or contractor or subcontractor of the applicant, during the construction phase and during the operating life of the facility.

3.4.1 Estimated Number and Job Classifications

The estimated number of on-site construction workers by month is shown in **Figure 3-2** and **Table 3-1**. It is anticipated that the on-site construction workforce (both local and non-local) will ramp up quickly from 28 workers in June 2010 to 309 workers in the peak month (October 2010), then decline rapidly over the following 6 months. Road construction would continue as needed, and installation of the electrical collection system and on-site turbine assembly would commence immediately following the 2-month preconstruction phase and would be concentrated in the following 6 months.

A review of Table 3-1 shows that, during the months of active construction, peak employment would occur in the 6 months from August 2010 through January 2011.

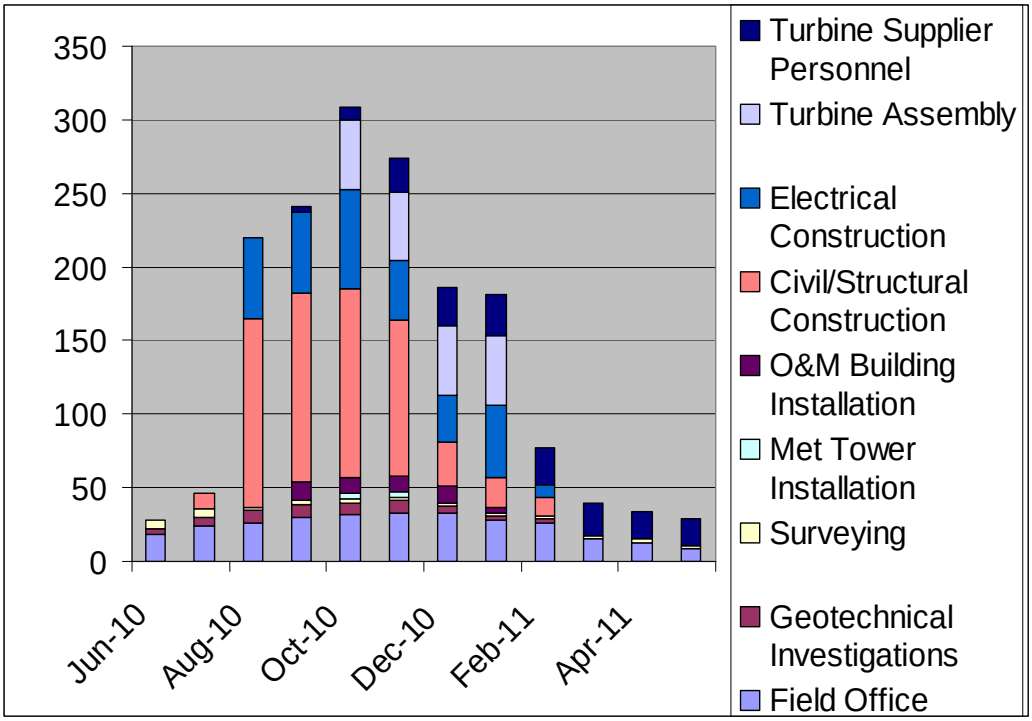


FIGURE 3-2
Construction Workforce Schedule by Month

TABLE 3-1
On-site Construction Workforce Schedule

	PRECON				CONSTRUCTION				OPS			
PERSONNEL	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11
TPWRJ Project												
Corporate Personnel	2	2	2	2	2	2	2	2	2	1	1	1
On Site: Construction Mgr, Admin, QA/QC	4	4	4	4	4	4	4	4	4	4	4	4
On Site: Oversight	3	6	6	6	6	6	6	6	5	4	4	
On Site: Receiving, Mech. Completion				4	6	6	6	2	2	2		
On Site: Operations						1	1	1	2	3	3	3
General Contractor												
Corporate Personnel	2	2	2	2	2	2	2	2	2			
Office and General Supervision	7	10	11	11	11	11	11	10	8			
Geotechnical: Drilling/Preliminary Site Work	4	4	5	5	4	4	3	3	3			
Geotechnical: Construction Materials Testing		2	4	4	4	4	2					
Road Construction		6	57	57	57	35	30	20	12			
Foundation: Excavation		2	12	12	12	12						
Foundation: Rodbusters		2	21	21	21	21						
Foundation: Placement			17	17	17	17						
Concrete: Batch Plant/Supply			6	6	6	6						
Concrete: Delivery/Trucking			15	15	15	15						
Electrical Collection System			18	18	18							
Electrical Collection System: Trenching			10	10	5							
Electrical Collection System: Fiber			5	5	5							
Substation: Construction			22	14	14	14	17	25	4			
Substation: Testing								5	5			
Transmission Line: Supervisor/Foreman					1	1						

TABLE 3-1
On-site Construction Workforce Schedule

	PRECON				CONSTRUCTION				OPS			
PERSONNEL	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11
Transmission Line: Equipment Operators					2	2						
Transmission Line: General Laborer					4	4						
Transmission Line: Lineman/Electricians					4	4						
Turbine Assembly					38	38	38	38				
Turbine Assembly: Mechanical					9	9	9	9				
Turbine Assembly: Electrical					15	15	15	15				
Met Tower Installation					4	4						
Operations and Maintenance (O&M) Building				13	11	11	11	4				
Turbine Supplier												
Receiving to Mechanical Completion Certificate				2	6	6	6	6	3	1	1	1
Pre-commissioning				2	3	5	5	5	5	5	1	
Operations and Parts/Maintenance/ Service Activities						12	15	17	17	17	17	17
Other												
Surveying Services	6	6	2	2	2	2	2	2	2	2	2	2
Third Party Engineering Oversight			1	1	1	1	1	1	1	1	1	1
Generator Step-up Transformer Installation & Dress Out				8				4				
Interconnection Facilities (By Others)												
TOTAL	**28**	**46**	**220**	**241**	**309**	**274**	**186**	**181**	**77**	**40**	**34**	**29**

Source: TPWRJ, 2010.

3.4.2 Local and Non-local Workforce

35-12-109(a)(xviii) - *A brief description of the methods and strategies the applicant will use to maximize employment and utilization of the existing local or in-state contractors and labor force during the construction.*

Per statute, TPWRJ will require its General Contractor to use local workers to the maximum extent practicable. The selected General Contractor will use the local Department of Workforce Services to post open job descriptions and screen job applicants for both skilled and unskilled labor positions. In addition, the General Contractor will seek the services of local vendors and services providers to maximize local business opportunities.

The proportion of non-local workers filling job openings will vary by construction activity and the month within the anticipated construction window. Overall, it is estimated that approximately 85 percent of the workforce would comprise non-local workers, peaking at 263 non-local workers in October 2010. This estimated distribution of local workers over the construction period is illustrated in **Figure 3-3**.

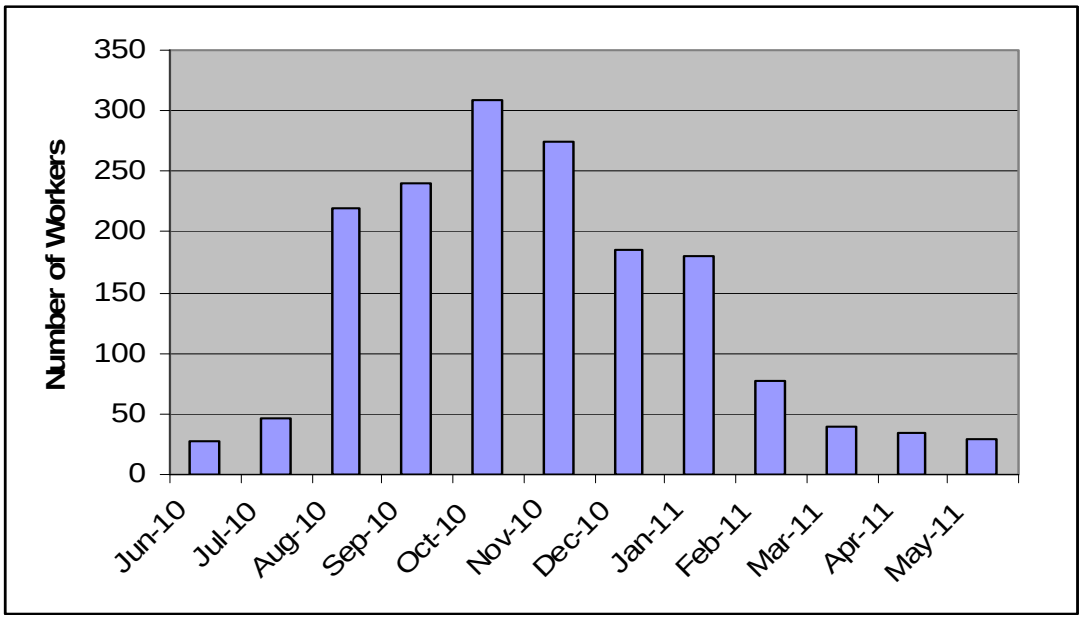


FIGURE 3-3
Estimated Number of Workers over the Project Construction Period

3.5 Operations Workforce Employment

Rule I Section 7(v) - Estimated number and job classifications, by calendar quarter, of employees of the applicant, or contractor or subcontractor of the applicant, during the construction phase and during the operating life of the facility.

A long-term benefit of the Project comes from permanent employees who will operate and maintain the wind energy facilities. Upon initiation of commercial operations, the operation of the Project will require approximately 15 full-time employees. These full-time job classifications and estimated number of personnel are displayed in **Table 3-2**.

It is anticipated that the operations workforce will be in place in the second quarter of 2011. Permanent full-time employees will be employed over the entire calendar year and over the anticipated 25-year life of the Project.

TABLE 3-2
Estimated Operations Workforce Summary by Job Classification

Job Classification	Number of Personnel
WTG Technicians	10
Lead Technician	1
High Voltage Technician	2
Administration	1
Plant Engineer/Manager	1

Source: TPWRJ, 2010.

3.6 Construction Procedures

TPWRJ will enter into a contract with a General Contractor to complete all phases of construction for the Project. The contract will be structured and issued as Engineer-Procure-Construct (EPC), with the exception of the purchase of the WTGs and transformers, which TPWRJ has already and will have procured, respectively.

The final engineering design will commence upon award of the EPC contract via a full or limited Notice to Proceed. The final engineering design will be completed using all relevant applicable engineering standards. Preliminary geotechnical and structural engineering investigations have been completed to inform the EPC bidding process. In addition, preliminary electrical engineering and review has been completed as required to interconnect the Project to the electrical power grid.

Following a full or limited Notice to Proceed, the General Contractor and subcontractors would perform a full geotechnical investigation of all turbine sites and at select locations of ancillary facilities. Thereafter, the General Contractor would prepare the construction site, complete site civil work (including access roads), install WTG pads, erect WTGs, install appurtenant linear facilities, oversee construction, and complete final cleanup and restoration of the turbine crane pads, widened access roads, and other temporary disturbance areas. A general overview of the construction activities associated with the Project is provided in the sections below.

Construction equipment used for the Project would include earth-moving equipment, cranes, and support staff light trucks. **Table 3-3** details the general equipment that is likely to be used for the Project.

TABLE 3-3
General Construction Equipment Needed for the Project

Equipment	Construction Use
Bulldozers	Road and Pad Construction
Motor Graders	Road and Pad Construction
Gravel Truck Haulers/Bottom Dump	Hauling and Placement of Road Aggregate
Water Trucks	Compaction, Erosion, and Dust Control
Roller/Compactors	Road and Pad Compaction
Backhoe/Trenching Machines	Excavating Foundations, Trenches for Underground Utilities
18-Wheel Semi-Tractors	Turbine Component Delivery
Truck-Mounted Drill Rigs	Drilling Soil Test Bore Holes
Concrete Trucks and Pumps	Pouring Tower and Other Structure Foundations
Conventional and Small Cranes	Off-Loading Equipment Onsite, Set Tower Components
Heavy and Intermediate Cranes	Off-Loading Equipment Onsite, Erecting Towers, Nacelles, and Rotors
Cement Trucks	Hauling Tower Base Cement Material
Pickup Trucks	General Use by Construction Personnel
Small Hydraulic Cranes/Forklifts	Loading and Unloading Minor Project Equipment
All-terrain Vehicles	Site Access
Rough-terrain Forklift	Lifting Equipment
Concrete Batch Plant	On-site Concrete Mixing for Turbine Foundations

Source: TPWRJ, 2010.

3.6.1 Site Civil Work/Preparation

All access roads and WTG locations will be designed to vendor specifications and will undergo final micro-siting prior to site civil work.

The construction work areas will be surveyed to the engineered and designed specifications and clearly marked with stakes and flagging. Access roads, WTG locations, and other site locations will be grubbed, cleared, and prepared for site activities. Access roads may be constructed in advance of other Project features, depending on timing, wildlife seasonal restrictions (if applicable), and agency consensus (if required). Grading will be minimized and all topsoil will be preserved, to the extent practicable. Excavated topsoil will be stockpiled alongside the excavated area for replacement after construction, as appropriate.

3.6.2 Access Road and Crane Pad Preparation

All access roads will consist of 6 to 15 inches of aggregate base. Road widths will be approximately 32 feet (ft) during the construction period, with a permanent width of 16 to 24 ft at the onset of commercial operations. A certain portion of the access roads will be used to move large cranes between turbine sites during mechanical assembly. In these circumstances, the access road shoulders will be used, either through compacted native

earth or by extending the road aggregate out to 34 ft. In either case, the road shoulders will be reclaimed to a permanent width not greater than 24 ft. Passing turnouts will be located approximately every 4 miles along access roads and where needed.

Existing private access roads will be improved by widening, grading, and aggregate placement to the maximum extent practical. The existing access roads are generally 8 to 12 ft wide; they will need to be widened to up to 32 ft during construction, and then reclaimed and narrowed for commercial operations. If necessary, wider cattle guards will be installed to accommodate any wider road widths.

In areas where existing roads do not provide access to wind turbine locations, and along the length of turbine strings, new gravel roads will be constructed. Generally, access roads will be up to 20 ft wide, with shoulders on either side providing flexibility to increase the total construction width to 32 ft. Both existing and new access roads will be designed under the direction of a licensed engineer and compacted to meet equipment loading and hauling requirements. The tower sections, rotor blades, and other WTG components are intended to be delivered directly to the WTG locations using the completed access roads.

In conjunction with access road construction, crane pads will be established at each WTG location. The purpose of the crane pad is to provide adequate work space to maneuver a large commercial crane to install the staged tower sections, nacelle, blades, and other turbine components. The typical disturbance area is circular with a radius equal to the blade length. In some cases, construction contractors prefer a larger area at each of the turbine locations to reduce construction costs.

A portion of the crane pad will remain in place to provide access to the area for operations and maintenance activities, if necessary. When construction is complete, an approximate 40-ft-by-50-ft (2,000 ft^2) area will be maintained.

3.6.3 Laydown Areas and Batch Plant

During construction, laydown areas will be used to stage construction components and store construction supplies and equipment. An approximate 10-acre laydown area will be located within the Project site. Additionally, a 2-acre area will be used for the Project batch plant and will be located near the laydown area. The laydown and batch plant areas will be cleared and grubbed, and the topsoil and subsoil will be stripped and stockpiled for use during reclamation of the disturbed areas.

3.6.4 Tower Foundations

After access road and pad construction is completed, crews will begin installation of the tower foundations immediately adjacent to the crane pads. Each turbine tower will be supported by a reinforced concrete foundation. Based on a preliminary geotechnical investigation and structural engineering, foundations are expected to be spread-foot type, approximately 50 ft wide; foundations could be up to 80 ft in width. The actual foundation design for each turbine will be determined based on site-specific geotechnical information, structural loading requirements, final engineering design, specifications of the selected turbine model, and vendor approval.

The foundation locations will be excavated, a mud mat poured and cured, forms set, rebar installed, and the concrete poured and cured to create the foundation. Depending on the

final foundation design, each tower foundation will require approximately 300 to 400 cubic yards (yd^3) of concrete, including the pedestal, which is the portion of the foundation that extends above grade. The pedestal will be up to 20 ft in diameter and will be approximately 3.5 ft in depth. The bottom of the pedestal will be 3 ft below grade, and the top of the pedestal will extend 0.5 ft above grade. The estimated amount of concrete used in the pedestal is expected to range between 26 and 41 yd^3. During construction, a licensed engineer will prepare a special inspection report for each foundation excavation and pour.

The majority of each turbine foundation is underground, and the majority of the foundation will be backfilled with subsoil and topsoil. A nonflammable groundcover will surround the towers on all sides, referred to as the gravel apron. The turbine pad and transformer will be located within the gravel apron. The area permanently disturbed during operations will average 40 by 50 ft, or 2,000 ft^2. These dimensions include the turbine tower, with a radius of up to 8 ft (16-ft diameter), and the surrounding gravel apron, an additional radius of up to 15 ft.

Tower Assembly

The WTG towers, nacelles, and blades will be delivered to each WTG pad location to support assembly. The tower that supports the wind turbine will be a 262-ft tapered monopole. Towers are pre-fabricated and delivered via truck to the tower pad in three sections. Large cranes will be brought on site to lift the multiple tower sections, nacelle, and blades from the trucks and place them near the tower foundation. Once all the components have been brought to the site, the first step will be to lift and secure the down-tower electrical assembly to the foundation. Next, the tower base section will be lifted and placed over the down-tower assembly and secured to the foundation. The mid tower section will be connected to the base, and the top tower section will be connected to the mid tower section. Once the nacelle is placed on the top tower section, the three blades will be bolted to the rotor hub, lifted to the central hub by a construction crane, and connected to the nacelle.

3.6.5 Power Collection System

§35-12-119(c)(i) – The construction, operation and maintenance of the following activities are exempt from this chapter electric transmission lines not exceeding five hundred thousand (500,000) with a maximum operating voltage of less than one hundred sixty thousand (160,000) volts; except:

> *(A) Any collector system, regardless of voltage, associated with a commercial facility generating electricity from wind and which meets the definition of an industrial facility pursuant to W.S. 35-12-102(a)(vii)(E) shall not be exempt;*

A network of collection power cables will be installed along and between the turbine strings to collect power generated by the individual wind turbines, transformed to 34,500 volts, and routed to the on-site collector substation. The collector substation will convert the electricity to transmission voltage (230,000 volts) for delivery into Basin Electric Power Cooperative's existing Pumpkin Buttes substation located in the northern extent of the Project, and then on to the electrical grid.

Collector System

The majority of the collector system will be underground; however, where site-specific considerations require, the collector system may be aboveground. Using aboveground

structures allows the collector cables to span site-specific constraints to reduce environmental impacts and/or control costs of the Project.

The collector cable and surrounding insulation jacket is expected to have a total diameter of less than 3 inches. The underground collection system power cable between turbines in a turbine string will be stranded metal. The cables from each string to the collection substation will use a larger gauge stranded metal conductor.

The underground electrical and communication cables will be buried adjacent to access roads, where possible. Backhoe or trenching machines will be used to excavate the collector cable ditches. Two burial methods may be used: trenching or plowing. Trenches are typically excavated 3 to 5 ft wide and a minimum of 4 ft deep, and the topsoil is segregated from subsurface soil into separate piles. Plowing involves a special attachment to a bulldozer, which effectively excavates the soil at the front while simultaneously laying the cable(s) at the back, disturbing only a several-inch strip of surface soil. Selection of the installation method is dependent on a number of site-specific factors, including soil type, contractor and equipment availability, manufacturer's installation specifications, and project economics. Trenches are backfilled with the remainder of the subsurface soil pile and covered with the topsoil. After final grading and restoration to the original contours, the area will be reseeded with the reclamation seed mixture.

A generator step-up (GSU) transformer will be installed immediately adjacent to the base of each wind turbine to increase the output voltage of the turbine to the voltage of the power collection system (typically 34.5 kilovolts [kV]). The transformer is encased in a rectangular steel box measuring approximately 7.5 ft wide by 8.5 ft tall. Transformers will be sealed and contain non-polychlorinated biphenyl (PCB) mineral oil. Support for the transformer is expected to be provided by a fiberglass vault, excavated below grade. The fiberglass vault serves as a containment system in the event of malfunction and any associated mineral oil leakage.

Collector Substation

Output from the Project will be delivered to a 34,500/230,000-volt collector substation that is centrally located on the Project site. The collector cable system will link each WTG to the next adjacent WTG in an electrical grid pattern and, finally, to the collector substation.

The collector substation will occupy an area of approximately 1.5 acres within a larger, cleared area of approximately 5 acres. The 5-acre site will be cleared, graded, and graveled. After site preparation, transformer pads, oil spill containment structures, and other foundations will be excavated, forms set, rebar installed, and the concrete poured and cured to create the foundation. Backfilled soil will be graded and compacted, and any excess soil will be distributed around the site. The 1.5-acre substation site will be enclosed within a chain-link fence to secure access only for authorized personnel. The transformers will be oil cooled and insulated. The substation equipment may include circuit breakers, power transformer(s), bus and insulators, disconnect switches, relaying equipment, battery and charger, surge arrestors, alternating current and direct current (AC/DC) supplies, control building, metering equipment, supervisory control and data acquisition (SCADA) provision, grounding, and associated control wiring.

Electrical and other equipment will be transported to the site by truck and installed with appropriate construction equipment. The collector substation facilities will conform to all applicable Wyoming electrical regulations and standards.

230,000-Volt Interconnection Transmission Line

§35-12-119(c) – The construction, operation and maintenance of the following activities are exempt from this chapter:

> *(i) Electric transmission lines not exceeding five hundred thousand (500,000) with a maximum operating voltage of less than one hundred sixty thousand (160,000) volts; except:*
>
> *(A) Any collector system, regardless of voltage, associated with a commercial facility generating electricity from wind and which meets the definition of an industrial facility pursuant to W.S. 35-12-102(a)(vii)(E) shall not be exempt;*

The WTGs for the Project will be grouped in array strings, interconnected with an underground power collection system, and directed to the centrally-located collector substation. To connect the Project to the local transmission grid, a new overhead 230,000-volt transmission line will be constructed to interconnect the Project's collector substation with Basin Electric Power Cooperative's existing Pumpkin Buttes substation. The proposed overhead transmission line route will traverse approximately 5.3 miles within the Project site (see Preliminary Site Layout in **Appendix A**), entirely contained within leased private lands. TPWRJ will own and operate the 230,000-volt interconnect transmission line.

3.6.6 Meteorological Towers

Up to five 262-ft permanent meteorological (met) towers will be placed within the Project site boundary. The permanent met towers will be lattice structures and marked per Federal Aviation Administration (FAA) regulations. The final locations will be determined in consultation with General Electric, the turbine vendor, approximately 3 to 5 months prior to the commencement of operations.

3.6.7 SCADA

A SCADA system will be installed to collect operating and performance data from each WTG and the wind energy facility as a whole, as well as to provide remote operation of the WTGs. The WTGs will be linked to the SCADA system via a fiber optic network. Fiber optic cables for the SCADA system will be collocated with the collector cables. The SCADA cables will be installed at least 4 ft below grade. The host computer is expected to be located in the O&M building at the Project site. The SCADA software will consist of applications developed by the turbine vendor or a third-party SCADA vendor.

3.6.8 Testing

As WTGs are erected and electrical collection systems are interconnected, all associated systems, controls, and safety equipment will be calibrated and tested. Qualified technicians, turbine vendor commissioning experts, and electricians will test and inspect all WTG components, transformers, communications systems, substation and switchyard, and transmission systems to ensure they comply with required design specifications and are working properly and safely. Each WTG and associated piece of equipment will be tested

and inspected upon individual completion before being placed into service. All required tests will be conducted and any malfunctions corrected prior to final interconnection of the WTGs.

3.7 Operation and Maintenance Activities

Rule I Section 7(d) - A description of the operating nature of the proposed industrial facility, the expected source and quantity of its raw materials, and energy requirements.

Once commercial operation has been achieved, the wind farm will be managed by the O&M staff. Typical routine maintenance time for a modern WTG is approximated at 40 hours per year, which includes standard, twice-annual maintenance and a monthly padmount transformer inspection. Non-routine maintenance may be of a similar order. TPWRJ's Turbine Supply Agreement includes a 2-year, full-warranty package that provides a "bumper-to-bumper" concept and ensures all equipment will be new and free from defects in material, workmanship and title. The warranty is enacted on all equipment after turbine completion, and any work repaired during this two-year period is then similarly warranted for a period of twelve months from the date of repair or until the end of the warranty period, whichever is later.

3.7.1 Proposed On-Line Life and Projected Operating Capacity

Section 7(d)(i) - The proposed on-line life of the industrial facility and its projected operating capacity during its on-line life and, for transmission lines exceeding one hundred fifteen thousand (115,000) volts included as part of the proposed industrial facility, a projection indicating when such lines will become insufficient to meet the future demand and at what time a need will exist to construct additional transmission lines to meet such demands.

The Project electrical generation capacity would be 150 MW, and the operational and economic life of the Project is anticipated to be 25 years. The operational life may be extended depending on market conditions and overall condition of the infrastructure. The 230,000-volt transmission line is being constructed to serve the electrical output of the 100 turbines, and the economic life of the transmission line is also anticipated to be 25 or more years. It is anticipated that the 230,000-volt line will allow for any future repowering of the Project.

3.7.2 Facility Operation and Maintenance

Section 7(d)(ii) Products needed by facility operations and their source.

WTGs are used to generate electricity from the kinetic power of the wind. Therefore, no additional raw fuel materials or energy requirements are required to operate the WTGs. Permanent on-site employees will operate and maintain the Project facilities.

Wind Turbine Generators

Routine maintenance of the WTGs will be necessary to maximize performance and detect potential malfunctions. O&M procedures will be established that will define specific routine WTG maintenance and inspection activities in accordance with the WTG manufacturer's recommendations. Scheduled maintenance will be conducted approximately every 6 months on each WTG. O&M personnel will perform routine maintenance, including replacing lubricating fluids periodically, checking parts for wear, and recording operating

parameters. All roads, pads, and trenched areas will be inspected regularly and maintained to minimize erosion. The O&M staff will perform most repairs, with the assistance of contracted personnel as needed.

Each WTG will be monitored continuously by a SCADA system that reports major aspects of operation through communication lines connecting the WTGs and the O&M building. Alarm systems will be triggered if operational characteristics fall outside set limits. Each WTG has an automatic braking system to shut down the WTG in the event of malfunctions or excessive wind speeds. Any problems will be reported promptly to on-site O&M personnel for correction.

Transformers and Substations

Substations, large step-up transformers, and pad-mounted transformers will be maintained as part of normal O&M activities and will be accessed from the access roads. In the event of transformer or other device failure, replacement of this equipment could be accomplished from the access roads.

Underground Collection Line

Periodic maintenance of underground collection lines will be required during the life of the Project. These maintenance activities will be conducted pursuant to prudent utility practices. Disturbance of buried collection lines for maintenance will typically be limited to an approximate 25- to 50-ft-wide linear construction corridor. All electrical terminations will occur above ground in appropriate weather-tight, secure electrical enclosures to facilitate ease of maintenance. Underground collection lines are relatively maintenance free, but maintenance will be performed as needed.

3.8 Reclamation and Site Decommissioning

§35-12-109(a)(xx) - An application for a permit shall be filed with the division, in a form as prescribed by council rules and regulations, and shall contain for facilities permitted pursuant to W.S. 35-12-102(a)(vii)(E), a site reclamation and decommissioning plan, which shall be updated every five (5) years, and a description of a financial assurance plan which will assure that all facilities will be properly reclaimed and decommissioned. All such plans, unless otherwise exempt, shall demonstrate compliance with any rules or regulations adopted by the council pursuant to W.S. 35-12-105(d) and (e).

3.8.1 Reclamation

After the life of the Project, most facilities will be removed and the disturbed areas reclaimed and returned to pre-Project land uses. Reclamation will typically include alleviating compact, replacing salvaged topsoil and subsoil, regrading (where necessary), reseeding disturbed areas to a native grassland seed mixture, and controlling noxious weeds.

Pursuant to the issued private and State of Wyoming land leases, TPWRJ will be required to implement agreed-upon reclamation and restoration practices. Pursuant to agreed lease terms, TPWRJ will implement the following reclamation measures:

- Restoration activities will be completed within 6 months of disturbance (weather permitting or extended by consent of the surface landowner).

- Topsoil will be removed, stored, and respread to its approximate pre-disturbance levels on all applicable surface areas (e.g., access roads, staging area). The soil will be tilled and treated to adequately establish a proper seedbed, and successful germination must be shown prior to the completion of reclamation activities.
- Disturbed and reclaimed areas will be inspected and all noxious weeds will be controlled during the operational period.
- Soil compaction will be alleviated, disturbed areas will be recontoured, and no permanent mounds, ridges, sink holes, or trenches will be left at the Project site. In addition, reasonable protection measures will be implemented to reduce or prevent soil erosion.
- The contour will be drill seeded to a depth of 0.5 inch, followed by compaction of the seedbed to prevent soil and seed losses. In lieu of a specific mixture desired by the landowner, a seed mixture similar to that detailed in **Table 3-4** may be implemented on all disturbed lands.
- Revegetation efforts will attempt to restore temporarily disturbed portions of the Project site to a condition and forage density reasonably similar to its original condition.

TABLE 3-4
Proposed Reclamation Seed Mixture

Species	Percent Mixture	Pounds per Acre (Live Seed)
Thickspike Wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*)	20	2.4
Prairie sandreed (*Calamovilfa longifolia*)	15	1.8
Indian ricegrass (*Achnatherum hymenoides*)	20	2.4
Bluebunch Wheatgrass (*Pseudoroegneria spicata* ssp. *Spicata*)	30	3.6
Prairie coneflower (*Ratibida columnifera*)	5	0.6
White or purple prairie clover (*Dalea candidum*, *purpureum*)	5	0.6
Scarlet Globemallow (*Sphaeralcea coccinea*) or Blue flax (*Linum lewisii*)	5	0.6
Totals	100	12

3.8.2 Site Decommissioning

Decommissioning is a step-by-step, methodical deconstruction process that involves removing and disposing of the infrastructure and appurtenant facilities associated with the Project. With some exceptions, site decommissioning will involve the reverse of site development. Generally, wind farm projects that are decommissioned contain a high "scrap value" due to the materials and equipment contained in the infrastructure (e.g., steel infrastructure, electric generators, and copper).

A typical decommissioning procedure is described as follows. All WTGs will be dismantled and either relocated to other wind energy projects or sold for scrap value. Electronic equipment will be recycled or disposed of (in some cases as hazardous waste because of the

heavy metals present) in landfills or properly licensed hazardous waste facilities. Transformers and electrical control devices will be reused in other applications or sold as scrap after fluid removal. Some portion of turbine foundations and underground collector cable may be left in place. The access roads, rock or gravel in the electrical substations, transformer pads, and building foundations will be removed and recycled if no longer needed.

Disturbed land areas covered in rock or gravel or building/tower footprints will be restored to original grade (which includes adjusting soil compaction that might have resulted from previous uses) and reseeded or replanted with native vegetation. As the electrical substations and storage buildings are dismantled, the site will be inspected for the presence of industrial contamination from minor spills or leaks and decontaminated as necessary. Demolition or removal of equipment and facilities will meet applicable environmental and health regulations, and economically recoverable materials will be salvaged to the extent practical. Lastly, all disturbed areas will be reclaimed and restored so that prior land uses can be resumed.

TPWRJ has estimated the decommissioning cost inclusive of salvage credit. At this time, the market value of the scrapped materials is expected to partially offset decommissioning costs, resulting in a total cost to decommission of approximately $3.65 million (see **Table 3-5**). Based on the estimated costs to decommission, TPWRJ proposes to obtain and transfer a surety bond or other reasonably satisfactory security to the appropriate agency at year 15 (i.e., after the original operational date).

TABLE 3-5
Project Estimated Decommissioning Costs

1.0 Turbines & Towers

For this estimate, decommissioning of turbines and towers includes dismantling the turbine components and transporting off site.

Turbines: General Electric

Towers: 262-ft Steel Tower

	Quantity	Unit Cost	Extended Cost	Assumptions
1.1 Dismantle Turbine and Towers	100	$33,000	$3,300,000	Includes removal of electrical tower wiring and hauling of turbines off site
1.2 Remove Transformers	100	$1,600	$160,000	
1.3 Salvage Turbines and Towers	100	$(17,500)	$(1,750,000)	Based on current price per ton of steel (average range is $15k to $20k)
1.4 Salvage Transformers	100	$(3,500)	$(350,000)	Average range in market is $3k to $4k
Total			**$1,360,000**	

2.0 Tower Foundations

Tower and transformer foundations, conduits, and cable connections will be removed to a depth below existing grade as specified in TPWRJ's private and Wyoming State land lease agreements. Foundation sites will be graded to match surrounding contours and restored to conditions that will support surrounding vegetation.

TABLE 3-5
Project Estimated Decommissioning Costs

Type: 17-ft diameter Spread Footer Foundation Pedestal

	Quantity	Unit Cost	Extended Cost	Assumptions
2.1 Foundation Removal, disposal, and grading (each)	100	$7,100	$710,000	Demolition and removal of foundation concrete and steel
2.2 Transformer Pad Removal & Disposal (each)	100	$560	$56,000	Complete removal
Total			**$766,000**	

3.0 Tower Access & Site Roads

Aggregate base roads will be scarified and graded into the adjacent soils to approximate existing topography, covered with topsoil from the site, and vegetation re-established.

Type: 24-ft wide roads with 9-inch compacted aggregate base

	Quantity	Unit Cost	Extended Cost	Assumptions
3.1 Remove access roads	255,542 lf	$5.66	$1,446,368	Aggregate base will be removed and hauled off site
Total			**$1,446,368**	

4.0 Collection System

Removal of termination sections near transformer to a depth specified in TPWRJ's private and Wyoming State land lease agreements.

Type: Termination section near base of each tower

	Quantity	Unit Cost	Extended Cost	Assumptions
4.1 Remove Collection System Terminations (each)	100	$810	$81,000	
Total			**$81,000**	
Site Decommissioning Total			**$3,653,368**	

Source: TPWRJ, 2010.

3.9 List of Permits Required for Construction

It is expected that all permits required for construction of the Project will be obtained prior to the initiation of the major construction activities in summer 2010. Regulatory agencies and anticipated required permits are listed in **Table 3-6**.

TABLE 3-6
Potential Federal, State, and Local Permit Requirements

Jurisdiction	Permit/Decision	Status	Anticipated Permit Receipt
Federal			
Federal Aviation Administration	Notice of Proposed Construction or Alteration	Pending final design; file before construction begins.	Spring 2010
Department of Commerce - National Telecommunication Information Agency	Impacts to Telecommunication Systems and radar	Pending final design; file before construction begins.	Spring 2010
U.S. Army Corps of Engineers	Clean Water Act Section 404 - Individual or Nationwide Permit	Pending final design; file before construction begins. May not be necessary depending on impacts.	Spring 2010
State			
Wyoming State Engineer's Office	Permits to appropriate groundwater (use, storage, wells, dewatering) or water stored in impoundments or reservoirs, Wyoming Statute (W.S.) 41 3-901 through 41-3-938, as amended (Form U.W. 5)	Pending final design; file before construction begins.	Spring 2010
Wyoming Department of Environmental Quality	Wyoming Industrial Development Information and Siting Act / Industrial Siting Commission Order	Submitted.	April 19, 2010
	Wyoming Pollutant Discharge Elimination System (WyPDES) - Large Construction General Permit (WYR10-0000)	Pending final design; file before construction begins.	Summer 2010
	Permit to Construct Small Wastewater Facilities (Septic Tanks and Leachfields)	Pending final design, depending on size of septic tank.	Summer 2010
	Air Quality Division - Temporary/Portable Source Air Permit	Pending final on-site location and delivery of portable concrete batch plant.	Summer 2010
Wyoming Department of Transportation	Right-of-Way Encroachment for transmission and collector line crossings of Wyoming State Highway (SH) 50	Pending final design.	Summer 2010
	Port of Entry	Prior to construction when turbine delivery schedule is finalized.	Summer 2010

TABLE 3-6
Potential Federal, State, and Local Permit Requirements

Jurisdiction	Permit/Decision	Status	Anticipated Permit Receipt
	Permit for Oversized/Overweight Loads	Prior to construction when turbine delivery schedule is finalized.	Summer 2010
Wyoming Office of State Lands and Investments	Special Use Lease	Obtained.	April 2009 (Wind Energy Lease Agreement issued for 1,280 acres of State of Wyoming lands.)
Local			
Campbell County			
Planning and Zoning Commission	Building permits are required for construction of new buildings, turbines and electrical infrastructure.	Pending final design; file before construction begins.	Summer 2010

Source: CH2M HILL, 2010.

Section

4

Section 4
Public Involvement

4.0 Public Involvement

Rule I Section 7(g) – The applicant shall identify what it deems to be the area of site influence and the local governments primarily affected by the proposed industrial facility as defined in Sections 2(b) and (c), respectively, of the regulations. The immediately adjoining area(s) and local governments shall also be identified with a statement of the reasons for their exclusion from the list of area(s) or local governments primarily affected by the proposed industrial facility.

4.1 Study Area and Area of Site Influence

As stated in the Wyoming Industrial Development and Information Siting Act (ISA) rules and statutes, a local government primarily affected by the proposed industrial facility means any defined geographical area or unit of local government or special district in which the construction and operation of the industrial facility may significantly affect the environment, population, level of economic well-being, or level of social services, or may threaten the health, safety, or welfare of present or expected inhabitants. Any such local government body or special district is considered to be within the Area of Site Influence. In addition, the socioeconomic impact analysis methodology involves a description of existing (i.e., baseline) conditions for a geographical area broader than the recommended Area of Site Influence. This area is referred to as the Study Area.

4.1.1 Study Area

The counties comprising the Study Area were identified early in the planning and analysis process, and in consultation with the Wyoming Department of Environmental Quality (WDEQ) - Industrial Siting Division (ISD):

- Campbell
- Converse
- Crook
- Johnson
- Natrona
- Sheridan
- Weston

4.1.2 Area of Site Influence

Based on the statute definition of the Area of Site Influence presented above, TPW Reno Junction, LLC (TPWRJ) recommends that local governments primarily affected by the proposed Reno Junction Wind Energy Facility (the Project) include the following:

- Campbell County and the incorporated cities and towns of Gillette, Wright, and Rozet;
- Natrona County and the incorporated cities and towns of Bar Nunn, Casper, Evansville, Mills, and Midwest/Edgerton; and
- The town of Moorcroft in Crook County.

Therefore, Converse, Johnson, Sheridan, and Weston counties and all incorporated towns and municipalities within have been recommended to be excluded from the Area of Site Influence. This recommendation for excluding these counties and communities is based on what are presumed to be excessive commuting times to the Project, the lack of appropriate accommodations, and/or the observed location behavior patterns of the non-local workforce from past industrial facility construction projects near the Project.

To the extent practicable, TPWRJ intends to maximize the benefits of the Project to the local communities in the Area of Site Influence while minimizing any potential adverse impacts. Therefore, TPWRJ conducted a series of meetings with State agencies and local officials and undertook additional outreach activities that met and exceeded the ISA requirements. These meetings and correspondence are summarized in the sections below.

4.2 Meeting Activities

TPWRJ scheduled formal meetings to present the Project and receive comments from State agency and local government officials, and to provide the opportunity for involvement by local community members. **Table 4-1** lists these formal agency and public involvement activities by organization and date.

TABLE 4-1
Local Government, State Agency, and Community Meetings

Organization	Date	General Discussion
Wyoming Department of Environmental Quality – Industrial Siting Division	April 10, 2009	Jurisdictional Meeting - Provided overview of Project and ISA process; Project workforce and operation requirements; construction schedule and costs; local agency consultation; and public involvement.
Wyoming Game and Fish Department (WGFD) – State Government	June 16, 2009	Discussed wildlife baseline survey protocols, data collected to date, site characterization, and WGFD concurrence with survey methodologies.
Wyoming Game and Fish Department – State Government	January 19, 2010	Reviewed baseline data collected to date and discussed additional survey and monitoring recommendations specific to the ISA permitting process.
Wyoming State Parks and Cultural Resources – State Government	January 19, 2010	Discussed likely agency concerns, TPWRJ impact avoidance strategy, and agency statutory and regulatory authority under the ISA as it relates to a private fee and State of Wyoming lands project that lacks a federal nexus.
Wyoming State Engineers Office (SEO), Cheyenne – State Government	January 19, 2010	Discussed Project water use and source issues relevant to the SEO.
Town of New Castle Council – Local Government	February 1, 2010	Presented Project details regarding workforce and operation requirements, construction schedule, local agency consultation, and public/agency involvement. TPWRJ and CH2M HILL representatives responded to questions and addressed issues and concerns.
City of Gillette Council – Local Government	February 2, 2010	See above.
Campbell County Board of	February 2, 2010	See above.

TABLE 4-1
Local Government, State Agency, and Community Meetings

Organization	Date	General Discussion
Commissioners – Local Government		
Town of Wright Council – Local Government	February 2, 2010	See above.
Weston County Commissioners – Local Government	February 2, 2010	See above.
Crook County Commissioners - Local Government	February 2, 2010	See above.
Campbell County Assessor (Troy D. Clements) – Local Government	February 3, 2010	See above.
Campbell County Chamber of Commerce – Gillette Community	February 3, 2010	See above.
Campbell County Office of the Sheriff (William H. (Bill) Pownall) – Local Government	February 3, 2010	See above.
Campbell County Economic Development Corporation – Gillette Community	February 3, 2010	See above.
Town of Midwest Council – Local Government	February 3, 2010	See above.
Town of Edgerton Council – Local Government	February 3, 2010	See above.
Town of Wright Council – Local Government	February 8, 2010	See above.
Natrona County Commissioners – Local Government	February 9, 2010	See above.
Town of Kaycee Council – Local Government	February 9, 2010	See above.
Converse County Commissioners – Local Government	February 16, 2010	See above.
Johnson County Commissioners – Local Government	February 16, 2010	See above.
Town of Buffalo Council – Local Government	February 16, 2010	See above.
Wyoming Department of Transportation – Casper and Sheridan Districts	March 2, 2010	See above.
Wright Area Public Open House	March 2, 2010	See above.
U.S. Fish and Wildlife Service – Cheyenne Ecological Services Field Office	February 24, 2010	Reviewed baseline data collected to date; discussed additional survey and monitoring recommendations specific to Federal regulatory processes; and discussed impact avoidance and minimization recommendations.

4.2.1 Meeting Format and Information Provided

The meeting format and the information provided at the meetings listed in Table 4-1 were generally the same and consisted of the following:

- A PowerPoint presentation detailing TPWRJ and the Project details was presented to each audience.
- Fact sheets describing TPWRJ and the Project were made available to meeting attendees.
- Each presentation was followed by a question-and-answer session in which TPWRJ discussed and/or resolved issues brought up by meeting attendees.

4.2.2 Notices to Governing Bodies

W.S. § 35-12-109(a)(xix) Certification that the governing bodies of all local governments which will be primarily affected by the proposed facility were provided notification, a description of the proposed project and an opportunity to ask the applicant questions at least thirty (30) days prior to submission of the application;

The governing bodies of all local governments that will be primarily affected by the proposed facility were provided notification, a description of the proposed Project, and an opportunity to ask TPWRJ questions at least 30 days prior to submittal of the Application. This was done via in-person meetings with those entities listed in Table 4-1 and via letter notification of governing bodies for those entities that TPWRJ did not meet with in person. This Application serves as certification of the notification requirement.

4.2.3 Newspaper and Radio Advertisements and Notices

Advertisements announcing the Wright Area Public Open House were placed in local newspapers and broadcasts as shown in **Table 4-2**. These are the main local newspapers and radio stations serving residents of the Project vicinity. Additionally, notices were posted in public places such as the Campbell County Commissioner's Office and County Building by County staff, and in the Savageton Bar and Grill. The advertisements invited the public to attend the open house to learn more about the Project and to ask questions of TPWRJ representatives. The Open House was well attended, with approximately 50 attendees.

TABLE 4-2
Local Newspapers and Dates of Notice for the Wright Area Open House Community Meeting

Media Outlet	Notice Date
Gillette News Record	February 26 – March 1, 2010
High Plains Sentinel	February 25, 2010
Basin Radio Network	March 1-2, 2010

4.3 Questions and Answers

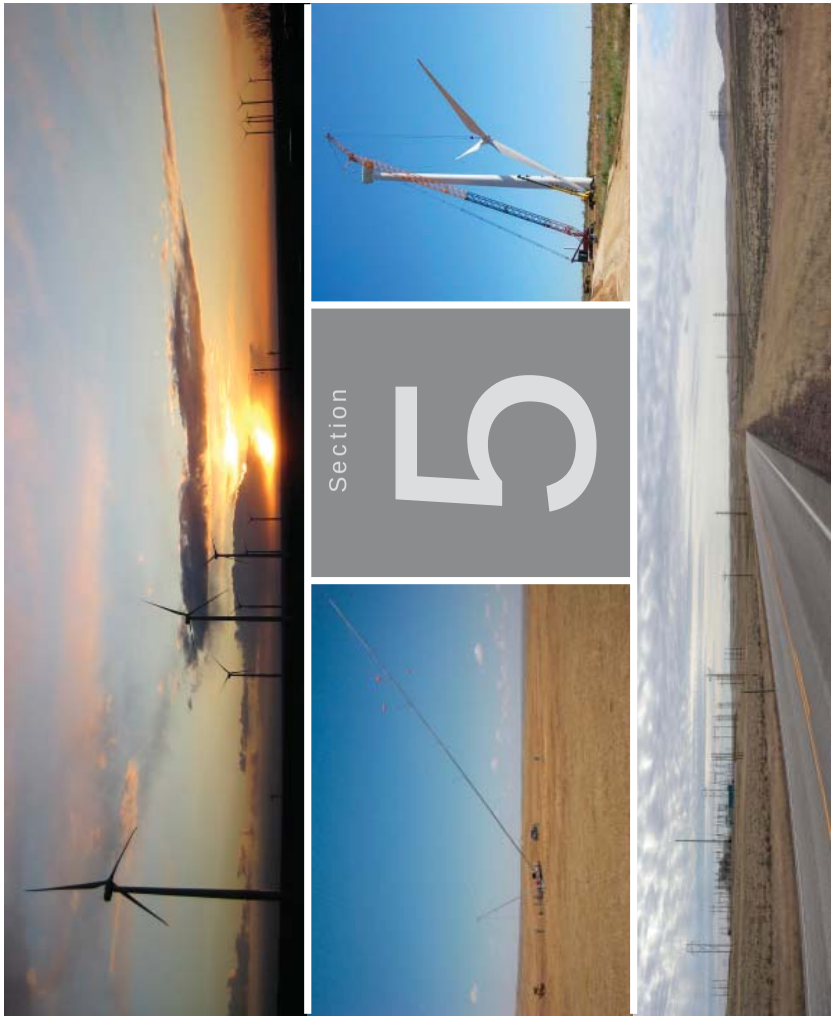
The types and nature of the questions posed at the local government and public meetings were similar across all the meetings. The primary topics included the following:

- Number of towers
- Socioeconomic issues, including employment, housing, tax revenue, and community partnerships
- Solid waste generation and disposal
- Land ownership
- Transmission line siting
- Federal and state tax exemptions and incentives for renewable energy
- Power destination – Wyoming or out of state
- Benefits to towns, cities, state, and region
- Desire to involve local contractors and hire locally
- Use of rail for WTG component delivery and offloading sites

TPWRJ representatives answered all questions to the best of their knowledge.

No major issues or potential impact concerns were identified by the communities or local governing bodies. TPWRJ also solicited input from state agencies and addressed issues to the extent practicable. However, identified issues were considered in the context of the appropriate agency authority and jurisdiction along with the ISA governing rules and adopted statues. TPWRJ made voluntary commitments to the governing bodies and agencies identified above, and as described in Sections 5, 6, and 7 of this Application. These commitments include wildlife monitoring and avoidance, cultural resources surveys and avoidance, road use agreements, transportation planning, and other measures to ensure that potential impacts of the Project are avoided or minimized to an acceptable level.

Section 5
Socioeconomic Baseline and Impacts



5.0 Socioeconomic Baseline and Impacts

5.1 Introduction

Section 5 is organized into six major subsections that address the following topics concerning the proposed Reno Junction Wind Energy Facility (the Project):

- Regulatory jurisdiction, which describes the statutory background germane to treatment of socioeconomic resources
- Methodology, which addresses the following topics:
  - Recommended Area of Site Influence, Study Area, and local governments primarily affected by the proposed industrial facility
  - Construction and operations workforce estimates
  - Impact analysis methodology
- Inventory and evaluation of social and economic conditions and impact assessment, which addresses existing conditions and Project-induced impacts occurring during both the construction and operations phases. This subsection is further divided on a resource-specific basis as follows:
  - Population
  - Economic and fiscal conditions
  - Housing
  - Public education
  - Public safety
    - Fire protection services
    - Law enforcement services
    - Crime
  - Health care
  - Municipal services
    - Wastewater treatment facilities
    - Water distribution and treatment facilities
    - Non-hazardous waste collection and disposal
    - Electricity service
    - Natural gas service
  - Transportation facilities
- Cumulative impacts
- Trade-off analysis
- Mitigation measures

5.2 Regulatory Jurisdiction

Title 35 Public Health and Safety, Chapter 12 Industrial Development and Siting of the Statutes of the State of Wyoming provides guidance relative to the socioeconomic topics of concern that will be addressed during the permit application process. A number of aspects of the socioeconomic environment could experience benefits or adverse impacts associated with construction and operation of the proposed facility. These aspects are addressed in this report and include economic base, housing, transportation, sewer and water facilities, solid waste facilities, police and fire facilities, educational facilities, and health and hospital facilities.

According to the statute, the Wyoming Industrial Siting Council (ISC) will grant a permit, either as proposed or as modified by the Council, if it finds and determines that the facility will not pose a threat of serious injury to the environment, the social and economic condition, or inhabitants or expected inhabitants in the affected areas and will not substantially impair the health, safety, or welfare of the inhabitants. For the purposes of the permit application, the definitions of "health," "safety," and "welfare" provided in the statutes are as follows:

- Health will mean the state of being sound in body or mind and includes psychological as well as physical well-being.
- Safety will mean freedom from fear of injury or threat of injury. Such injury or threat of injury may be premised on crime rates, traffic accident rates, dangers of industrial accidents or mishaps, or other similar considerations.
- Welfare will mean considerations of public convenience, public well-being, and general prosperity. The term also properly covers those subjects encompassed under health and safety.

Guidance is provided in the Wyoming statutes regarding information that should be included in the permit application and includes Area of Site Influence and local governments primarily affected by the proposed industrial facility, construction and operations workforce estimates, and inventory and evaluation of the social and economic conditions in the Area of Site Influence.

5.3 Methodology

5.3.1 Area of Site Influence, Local Governments Primarily Affected, and Study Area

Rule I Section 7(g) – The applicant shall identify what it deems to be the Area of Site Influence and the local governments primarily affected by the proposed industrial facility as defined in Sections 2(b) and (c), respectively, of these regulations. The immediately adjoining area(s) and local governments shall also be identified with a statement of the reasons for their exclusion from the areas(s) or local governments primarily affected by the proposed industrial facility.

5.3.1.1 Area of Site Influence

An Area of Site Influence contains locations that may be affected environmentally, socially, or economically, in any significant degree, by the proposed location of the industrial facility. A local government primarily affected by the proposed industrial facility means any defined geographical area or unit of local government or special district in which the construction and operation of the industrial facility may significantly affect the environment, population, level of economic well-being, or level of social services or may threaten the health, safety, or welfare of present or expected inhabitants. Any such local government body or special district is within the Area of Site Influence.

Pursuant to statute, TPW Reno Junction, LLC (TPWRJ) evaluated the potential Area of Site Influence and local governments primarily affected by the proposed Project. Primary criteria that factored into the Area of Site Influence recommendation are as follows:

1. Within a commuting distance of 100 miles or less from the work site
2. Within a daily one-way commute time of approximately 1 hour or less from the work site
3. Supply of temporary housing units
4. Size of population (i.e., as an indicator for labor supply and urban amenities)
5. Analysis of Industrial Development Information and Siting Act (ISA) housing data from the previously permitted Dry Fork and Wygen III coal-fired power plant projects in Campbell County

These five criteria were used in identifying communities likely to capture 1 percent or more of allocated workers.

1. Commuting Distance of 100 Miles or Less from the Project

The Project area is bisected by a north–south stretch of Wyoming State Highway (SH) 50, approximately 35 miles southwest of Gillette, Wyoming. Two gravel county roads—Moore Road and Van Buggenum Road—cross the Project area. **Table 5-1** illustrates the distance in miles (Column C) separating the Project site from a number of communities in counties adjacent to or very near Campbell County (Columns A and B). The following communities meet the commuting distance criterion of 100 miles or less from the Project: Gillette, Wright, Moorcroft, Pine Haven, Kaycee, Casper, Midwest/Edgerton, and Upton.

TABLE 5-1
Communities Identified as within Recommended Area of Site Influence and Relevant Housing Statistics[a]

County	Community	Distance (miles) from Work Site Used in Model	Distance (minutes) from Work Site Used in Model	Population (July 1, 2008)	Number of Rooms	Number of RV sites	Percent of Non-local Workers
A	B	C	D	E	F	G	
Campbell	Gillette	40	73	26,871	1,343	1815	90
	Wright	33	47	1,462	71	0	5
Converse	Douglas	108	140	5,971	438	0	
	Glenrock	109	125	2,423	54	44	
	Rolling Hills	114	132	505	56	0	
Crook	Hulett	113	154	471	31	0	
	Moorcroft	72	102	892	0	0	3
	Pinehaven	84	123	380	5	31	
	Sundance	105	129	1,253	77	118	
Johnson	Buffalo	110	135	4,832	296	72	
	Kaycee	68	92	290	66	44	
Natrona	Casper[b]	89	106	61,411	2,689	408	1
	Midwest/Edgerton	45	60	611	20	0	1
	Alcova	115	135	21	24	0	
Sheridan	Clearmont	108	152	114	0	0	
	Sheridan	148	160	17,187	1,186	182	
Weston	Newcastle	103	175	3,390	189	36	
	Upton	91	120	907	23	0	
Total					**6,417**	**766**	

[a] While the intent of TPWRJ is to ensure that adequate housing for the non-local workforce is available mainly within the Gillette area, Wright, Moorcroft, Midwest/Edgerton, and Casper and their environs, it is recognized that some members of the workforce may choose to temporarily reside outside these communities.

[b] Represents combined population of Casper, Bar Nunn, Evansville, and Mills.

100 miles or less one-way commute distance; 1 hour or less one-way commute time

Source: CH2M HILL, 2010.

2. Daily One-Way Commute of Approximately 1-Hour or Less

Especially when suitable accommodations can be found relatively close to the Project site, it is reasonable to assume that workers will not spend any more of their work-day commuting than is necessary. Column D shows the one-way commuting times for the communities in the Study Area. Only two communities, Wright and Midwest/Edgerton, have commuting times of 60 minutes or less and Gillette is the next closest at 73 minutes. Moorcroft, Pine Haven, Kaycee, Casper, and Upton all registered one-way commuting times of 90 minutes or more.

3. Supply of Temporary Housing Units

The supply of temporary housing units is another factor that can constrain worker location choices. Of the communities that met one or both of the distance and time constraints, both Gillette and Casper have over 3,100 hotel/motel rooms or recreational vehicle (RV) sites for rent. Wright offers 3 hotels with a combined total of 116 rooms. Upton shows 23 rooms, Midwest/Edgerton offers one motel with 20 rooms, and Moorcroft does not show any availability of this type of housing.

4. Size of Population

The size of the resident population of each of the communities (Column E) is also shown. Approximately 27,000 people live in Gillette and over 61,000 reside in Casper. This suggests that these cities have a relatively sizeable permanent workforce as well as urban amenities that could be attractive to the non-local workforce.

5. Dry Fork and Wygen III ISA Projects Housing Data

Two current ISA projects in Campbell County—Wygen III (Black Hills Power) and Dry Fork (Basin Electric Power Cooperative)—recently completed peak construction phases. Based on data reported to the Industrial Siting Division (ISD) during construction of these projects, an analysis of the actual commuting choices of local workers and the location choices of non-local workers (in-migrants) was conducted on the Dry Fork and Wygen III ISA projects sited in Campbell County.

Based on the housing data reported by the Black Hills Corporation, the Wygen III construction employment peaked at 341 workers in the third quarter of 2009. A review of the third quarter data shows that 328 of the construction workforce (96 percent) resided in Gillette and an additional five workers lived in Rozet. In addition, the housing data showed that about 98 percent of the construction workforce chose to reside in Campbell County. Of the remaining eight workers, five (about 1.5 percent) chose to live in Moorcroft, Crook County, and three employees commuted from Colorado.

Approximately 261 of the Wygen III construction workforce (76.5 percent) were non-local originating from residences from states across the U.S., as well as from provinces in Canada. Besides the Town of Moorcroft, no Wyoming community outside of Campbell County housed non-local workers in excess of 1 percent of the peak construction workforce.

The data reported by Basin Electric for the Dry Fork project provides similar findings. The construction workforce peaked with 1,289 employees in the fourth quarter 2009. The quarterly report was based on the survey responses from 1,135 employees. Analysis of the data showed that 96 percent of the employees resided in Campbell County. Specifically,

95 percent resided in Gillette, and the remainder resided in the communities of Rozet and Wright. Moorcroft (Crook County) housed eight workers or 0.7 percent of the peak workforce. The remainder of the construction workforce was dispersed in other communities in Wyoming, or another state. Approximately 999 (88 percent) were non-local with 74 relocating to the area from other cities in Wyoming, and 925 in-migrating from another state of residence.

Both of these projects will have completed their construction phases prior to this Project commencing. As the current non-local workers leave the area, the temporary housing units that they vacate will increase the supply available for housing the incoming workforce.

5.3.1.2 Recommended Area of Site Influence and Area Primarily Affected

The data from the choices made by the non-local construction workforce on the Dry Fork and Wygen III projects suggests recommending the area of primary influence to include the communities in Campbell County as well as the Town of Moorcroft in Crook County. Data presented in Table 5-1 also supports including the Natrona County communities of Midwest/Edgerton, as well as the broader Casper area, based on the distance and time criteria, availability of temporary housing, and for Casper, the urban amenities it offers due to its population size. Commuter behavior takes place under time and distance constraints and applying the criteria previously outlined would exclude many of the listed communities.

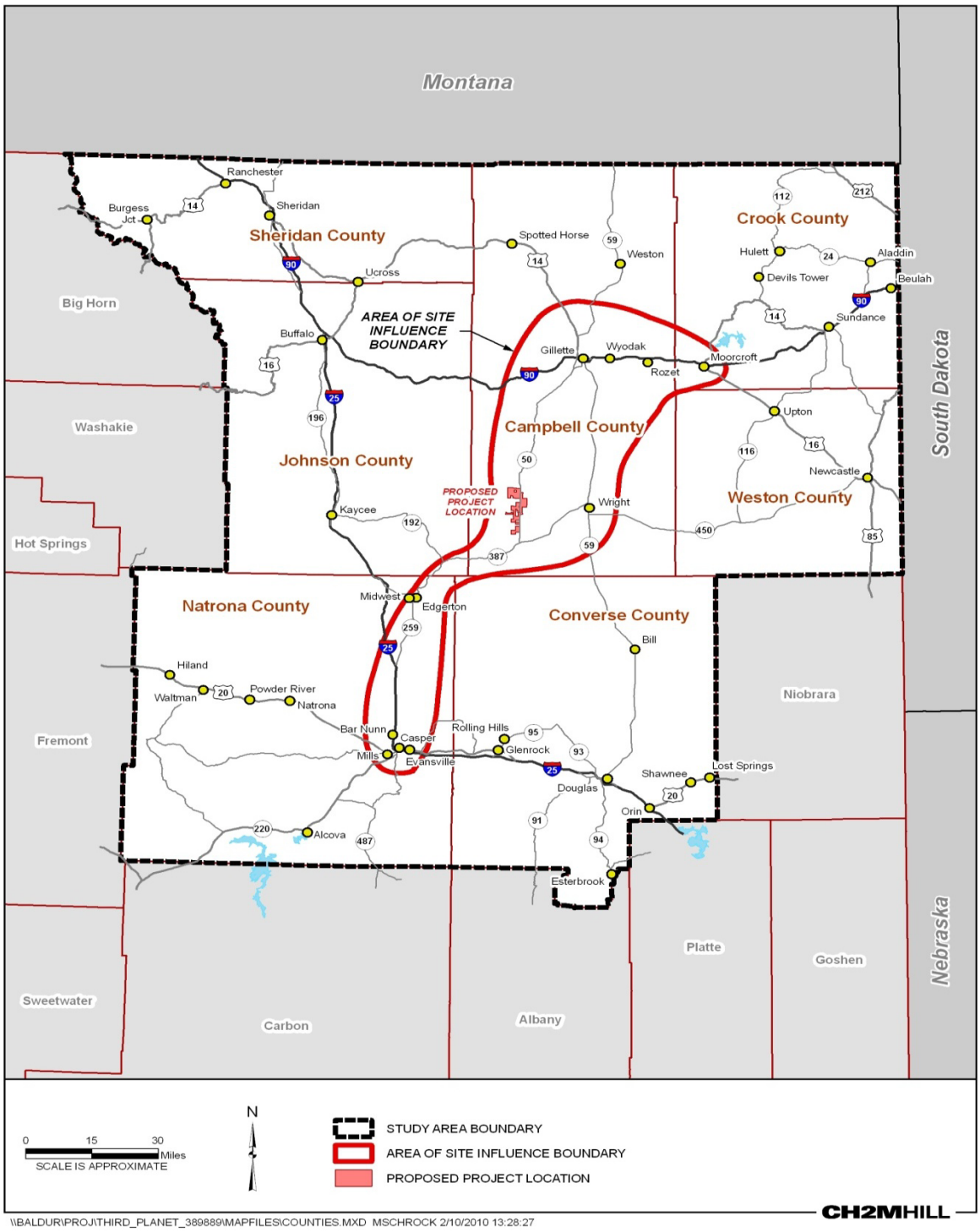
Factoring in all five criteria, it is estimated that the temporary residence choices made by the TPWRJ non-local workforce would be as follows:

- Gillette area – 90 percent
- Wright – 5 percent
- Moorcroft – 3 percent
- Midwest/Edgerton– 1 percent
- Casper – 1 percent

The Area of Site Influence, as recommended by the applicant, is detailed in Table 5-1 above.

The recommended Area of Site Influence is displayed in **Figure 5-1**.

FIGURE 5-1
Recommended Area of Site Influence and Counties Comprising Study Area



Given the observed location choices of workers in the Study Area and the availability of housing alternatives relatively close to the Project site, the more distant and smaller communities, such as Alcova and Clearmont, have been eliminated from the list of likely residence communities.

The majority of construction and operations workers are expected to reside within this recommended Area of Site Influence and its communities; therefore, TPWRJ has concentrated its efforts at securing housing commitments for non-local workers in this area.

5.3.1.3 Local Governments Primarily Affected by the Project

A local government primarily affected by the proposed industrial facility includes any defined geographical area, unit of local government, or special district in which the construction and operation of the industrial facility may significantly affect the environment, population, level of economic well-being, or level of social services or may threaten the health, safety, or welfare of present or expected inhabitants. Any such local government body or special district is within the Area of Site Influence.

Local Governments Primarily Affected by the Proposed Industrial Facility. Based on the delineation of the Area of Site Influence presented previously, the applicant recommends that local governments primarily affected by the proposed industrial facility would include the following:

- Campbell County and the incorporated cities and towns of Gillette, Wright, and Rozet
- Natrona County and the incorporated cities and towns of Bar Nunn, Casper, Evansville, Mills, and Midwest/Edgerton
- The town of Moorcroft in Crook County

Local Governments Primarily Unaffected by the Proposed Industrial Facility. It is recommended that counties (and communities contained within them) other than Campbell County; the communities and incorporated cities and towns of Bar Nunn, Casper, Evansville, Mills, and Midwest/Edgerton in Natrona County; and the town of Moorcroft in Crook County be excluded from the Area of Site Influence. This recommendation for excluding other communities is based on their relatively excessive commuting times to the Project, lack of appropriate accommodations, and the observed location behavior patterns of the non-local workforce from recent industrial projects constructed in Campbell County.

5.3.1.4 Study Area

The socioeconomic impact analysis methodology involves a description of existing (i.e., baseline) conditions for a geographical area broader than the recommended Area of Site Influence. This area is referred to as the Study Area. The counties comprising the Study Area were identified early in the analysis and in consultation with the ISD as those containing potential relocation sites for workers commuting to the construction site and include Campbell, Crook, Sheridan, Converse, Johnson, Weston and Natrona counties.

Delineation of the Study Area is also designed to capture the direct and secondary economic impacts associated with the construction and operation of the proposed Project. By examining the broader Study Area for potential relationships between the proposed Project and the various types of socioeconomic resources, the rationale for including and excluding

areas from the Area Primarily Affected is more readily apparent. For example, economic impacts are mainly associated with the purchase of equipment, materials, goods, and services required for construction and operation of the Project and expenditures made by workers for personal items. It is likely that economic impacts will be centered in the Gillette area in Campbell County and the Casper area in Natrona County due to the relative sizes of their economies and their offering of purveyors of goods and services likely to be purchased in support of construction activities as well as by individuals for personal items. All other urban areas that could contain industries potentially affected by the proposed Project are relatively distant and are located outside of the Study Area.

Another factor contributing to the inclusion of exclusion of areas from the Area Primarily Affected is commuting patterns. Typically, the large majority of persons working in any county reside in the same county. Commuter flows relate directly to the number of job opportunities at specific destinations and the driving time required to access said destinations from a place of residence. Based on information compiled by the State of Wyoming as shown in **Table 5-2**, within the seven-county Study Area, sizeable percentages of the workers commuting into Campbell County come from Converse (12.1 percent), Crook (17.2 percent), Natrona (9.6 percent), Sheridan (11.5 percent), and Weston (14.9 percent). Of the 16 percent of residents of Campbell County who commute to jobs in other Wyoming counties, 32 percent commute to Natrona County and 15 percent commute to Sheridan County.

TABLE 5-2
Inter-County Commuter Flows for Campbell County (4th Quarter, 2005)

County of Origin or Destination	Inflow to Campbell County	Outflow from Campbell County
Albany	1.3%	6%
Big Horn	1.3%	1%
Campbell	NA	NA
Carbon	2.4%	2%
Converse	12.1%	3%
Crook	17.2%	8%
Fremont	3.3%	2%
Goshen	1.6%	1%
Hot Springs	0.5%	0%
Johnson	4.7%	4%
Laramie	2.9%	6%
Lincoln	0.5%	1%
Natrona	9.6%	32%
Niobrara	0.3%	0%
Park	3.6%	1%
Platte	0.9%	1%
Sheridan	11.5%	15%

TABLE 5-2
Inter-County Commuter Flows for Campbell County (4th Quarter, 2005)

County of Origin or Destination	Inflow to Campbell County	Outflow from Campbell County
Sublette	0.7%	0%
Sweetwater	7.6%	7%
Teton	0.2%	1%
Uinta	1.6%	1%
Washakie	1.3%	1%
Weston	14.9%	5%

NA = Not Applicable

Source: Wyoming Department of Employment, Research and Planning, 2007a.

Information published by the U.S. Census regarding commuting patterns for residents of Campbell County and persons who work in Campbell County in 2008 is displayed in **Table 5-3**. Approximately 84 percent of the people who work in Campbell County also reside in Campbell County. There is evidence of a strong linkage to Natrona County, where 4.1 percent of Campbell County residents work. Also, of all the people working in Campbell County, 3.3 percent commute from Natrona County and another 4 percent reside in Converse County, 3.5 percent live in Sheridan County, 3 percent live in Weston County, 1.8 percent live in Crook County, and 1.3 percent live in Johnson County. These commuting patterns show that few residents of counties outside of the recommended Area of Site Influence (i.e., Sheridan, Johnson, Weston and Converse counties) choose to commute to Campbell County.

TABLE 5-3
Work Places of Campbell County Residents and Places of Residence of Persons Working in Campbell County

	Places of Work of Persons Residing in Campbell County		Places of Residence of Persons Working in Campbell County	
	Count	**Share**	**Count**	**Share**
Total Primary Jobs	**24,268**	**100**	**28,253**	**100%**
Campbell County	**20,397**	**84.0%**	**20,397**	**72.2%**
Gillette	13,791	56.8%	12,684	44.9%
Antelope Valley—Crestview	803	3.3%	1,103	3.9%
Wright	506	2.1%	652	2.3%
Sleepy Hollow	84	0.3%	740	2.6%
Natrona County	**990**	**4.1%**	**938**	**3.3%**
Casper City	511	2.1%	729	2.6%
Vista West	126	0.5%	ND	ND
Laramie County	**297**	**1.2%**	**391**	**1.4%**
Cheyenne City	267	1.1%	244	0.9%
Crook County	**214**	**0.9%**	**543**	**1.8%**
Sheridan County	**499**	**2.1%**	**985**	**3.5%**
Sheridan City	400	1.6%	692	2.4%
Converse County	**203**	**0.8%**	**1,123**	**4.0%**
Douglas	ND	ND	684	2.4%
Park County	**163**	**0.7%**	**ND**	**ND**
Cody City	90	0.4%	ND	ND
Fremont County	**144**	**0.6%**	**330**	**1.2%**
Riverton City	101	0.4%	ND	ND
Carbon County	**135**	**0.6%**	**174**	**0.6%**
Teton County	**106**	**0.4%**	**ND**	**ND**
Weston County	**ND**	**ND**	**846**	**3.0%**
Newcastle	ND	ND	520	1.8%
Johnson County	**ND**	**ND**	**366**	**1.3%**
Buffalo	ND	ND	203	0.7%
All Other Locations	**7,589**	**31.3%**	**2,177**	**7.7%**

ND = No data

Source: U.S. Census Bureau, 2008.

5.3.2 Construction and Operations Workforce Estimates

Rule I Section 7(h)(i, ii, and iii) – The estimated number of employees needed to complete the construction and operation of the facility by the applicant, its contractors, and subcontractors to include job classifications by calendar quarter. The estimate should also include:

(i) Seasonal fluctuations and the peak employment during both construction and operation;

(ii) Annual payroll; and

(iii) Expected benefits, if any, to be provided including housing allowances, transportation allowances, and per diem allowances.

It is required that estimates be provided by the applicant, its contractors, and its subcontractors of the number of employees needed to complete the construction and operation of the facility. These estimates must include job classifications by calendar quarter; seasonal fluctuations and the peak employment during both construction and operation; annual payroll; and expected benefits, if any, to be provided including housing allowance, transportation allowances, and per diem allowances.

5.3.2.1 Construction Workforce Estimate

Potential impacts to socioeconomic resources are directly and indirectly attributable to (1) the influx of non-local workers and (2) expenditures made in the local economy for equipment, materials, and services required to both construct and operate the Project.

The estimated number of on-site construction workers by month is shown in **Table 5-4** and **Figure 5-2**. TPWRJ anticipates that the onsite construction workforce (both local and non-local) will ramp up quickly from 28 workers in June 2010 to 309 workers in the peak month (October 2010). The onsite workforce will then decline rapidly during the following 6 months. Road construction, the installation of the electrical collection system, and the on-site turbine assembly would commence immediately following the 2-month preconstruction phase and be concentrated in the next 6 months. The workforce schedule, showing the number of workers categorized by type of activity is exhibited in **Figure 5-3**.

FIGURE 5-2
TPWRJ Reno Junction Construction Workforce Schedule

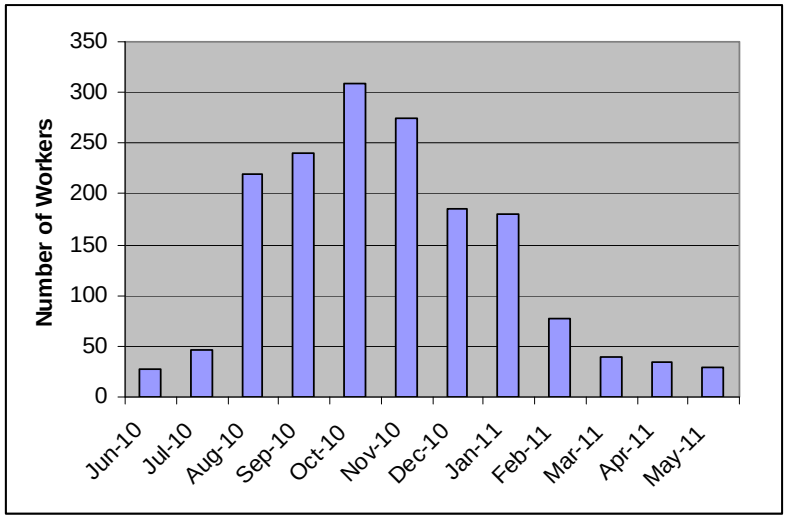


TABLE 5-4
On-site Construction Workforce Schedule

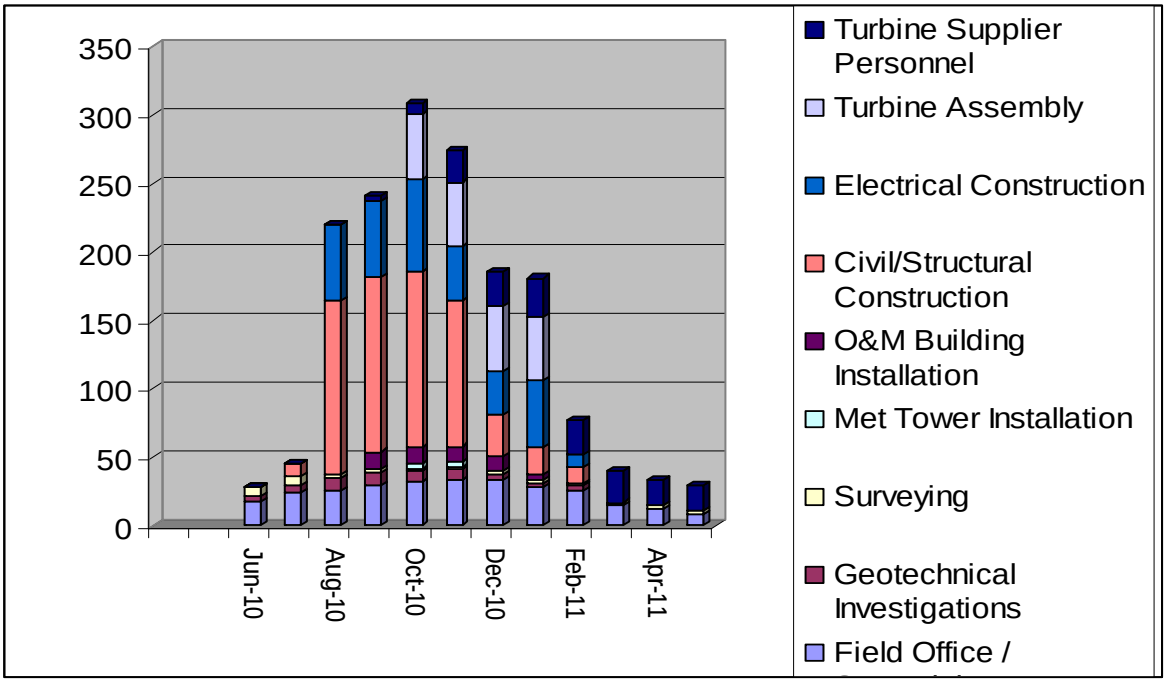
Personnel	Precon		Construction									OPS
	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11
TPW												
Corporate Personnel	2	2	2	2	2	2	2	2	2	1	1	1
Site Personnel: Constr. Mgr, Admin, Quality Assurance/Quality Control (QA/QC)	4	4	4	4	4	4	4	4	4	4	4	4
Site Personnel: Oversight	3	6	6	6	6	6	6	6	5	4	4	
Site Personnel: Receiving, mech. Comp.				4	6	6	6	2	2	2		
Operations Personnel						1	1	1	2	3	3	3
Balance of Plant												
Corporate Personnel	2	2	2	2	2	2	2	2	2			
Site Personnel: Office & General Supervision	7	10	11	11	11	11	11	10	8			
Geotech: Drilling/Prelim Site Work	4	4	5	5	4	4	3	3	3			
Geotech: Construction Materials Testing		2	4	4	4	4	2					
Road Construction		6	57	57	57	35	30	20	12			
Foundation: Excavation		2	12	12	12	12						
Foundation: Rodbusters		2	21	21	21	21						
Foundation: Placement			17	17	17	17						
Concrete: Batch Plant/Supply			6	6	6	6						
Concrete: Delivery/Trucking			15	15	15	15						
Electrical Collection System			18	18	18							
Electrical Collection System: Trenching			10	10	5							
Electrical Collection System: Fiber			5	5	5							
Substation: Construction			22	14	14	14	17	25	4			
Substation: Testing								5	5			
Transmission Line: Supervisor/Foreman					1	1						

TABLE 5-4
On-site Construction Workforce Schedule

Personnel	Precon		Construction									OPS
	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11
Transmission Line: Equipment Operators					2	2						
Transmission Line: General Laborer					4	4						
Transmission Line: Lineman/Electricians					4	4						
Turbine Assembly					38	38	38	38				
Turbine Assembly: Mechanical					9	9	9	9				
Turbine Assembly: Electrical					15	15	15	15				
Met Tower Installation					4	4						
O&M Building				13	11	11	11	4				
TURBINE SUPPLIER												
Turbine Supplier – Receiving/MCC				2	6	6	6	6	3	1	1	1
Turbine Supplier – Precomm				2	3	5	5	5	5	5	1	
Turbine Supplier – OPS/PMSA						12	15	17	17	17	17	17
OTHER												
Surveying Services	6	6	2	2	2	2	2	2	2	2	2	2
Third-Party Engineering Oversight			1	1	1	1	1	1	1	1	1	1
GSU Installation and Dress Out				8				4				
Interconnection Facilities (by Others)												
GRAND TOTAL	**28**	**46**	**220**	**241**	**309**	**274**	**186**	**181**	**77**	**40**	**34**	**29**

Source: TPWRJ, 2010.

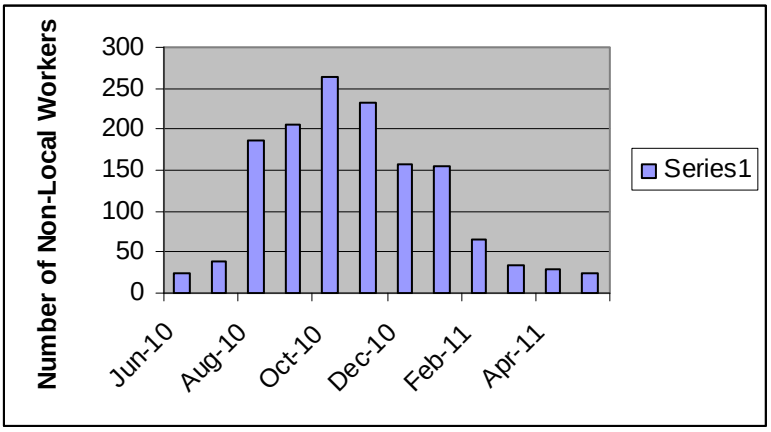
FIGURE 5-3
Workforce Schedule by Type of Activity



Source: TPWRJ, 2010.

Local to Non-local Workforce Ratio. The proportion of non-local workers filling job openings will vary by construction activity. On a month-to-month basis, the number of onsite jobs held by workers from outside the local area would vary. Overall, it is estimated that about 85 percent of the workforce would be composed of non-local workers, with the non-local workforce peaking at 263 workers in October 2010. This estimated distribution of non-local workers over the construction period is illustrated in **Figure 5-4**.

FIGURE 5-4
Number of Non-Local Workers over the Construction Period



Source: TPWTJ, 2010.

5.3.2.2 Operations Workforce Estimate

The total workforce associated with the Project during the operations phase would number about 15 workers. These workers would likely originate as non-local and would permanently relocate to the local area.

5.3.3 Impact Analysis Methodology

Potential impacts associated with the proposed facility are driven by a number of factors, including direct construction and operations workers currently residing in the area; direct workers newly entering the region for a limited time; additional service workers required to support these direct workers; and the local purchase of equipment, supplies, materials, and services necessary for construction and operation of the facility.

Where appropriate, level of service (LOS) ratios are calculated for resources and comparisons are made with statewide, national, and local ratios to provide a perspective for impact assessment. LOS ratios express the quantity of a service (e.g., the number of firefighters or law enforcement officers in a service area) in relation to the population in the respective service area (e.g., per 10,000 residents). These ratios provide a means of comparing service levels across service areas and over time or against target or standard levels. LOS ratios are used to estimate the number of additional service personnel required to meet the demands of new residents while maintaining existing service levels. If it appears that the resources are unlikely to be able to accommodate the new demands of the Project, then mitigation measures are proposed.

5.3.3.1 Regional Economic Analysis

The economic impacts occurring in a local economy associated with the introduction of new business activity is based primarily on employee compensation, purchases made by the new business, and taxes paid to local governments. Thus, the positive economic impact on local businesses is expected to be consistent with the degree to which local businesses are able to supply the needs of new businesses and their employees. Conversely, if local businesses cannot meet the needs of new businesses or their employees, or cannot do so in a cost-competitive manner, then purchases may occur outside of the local economy. Purchases made outside of the local area represent leakages of money out of the local economy. Profits of the new business also leak out of the local economy if the owners or stockholders reside outside the local area. To measure local economic impacts, this report focuses on projected wages and salaries, business purchases, and taxes collected by local municipal and county governments.

To estimate the total economic impacts of a project or new business activity, the analysis should take into account the concept is that employee wages and business purchases have a "ripple effect" in an economy. The new business will purchase some of its required materials, supplies, and services in the local economy and local businesses will hire some new employees to meet demand, creating what are known as indirect effects. Employees at the new business or project will likewise spend a portion of their wages at local stores and businesses, creating "induced effects." In this way, the economic impact of the new business or project spreads in the local economy. The portions of employee wages and business purchases that are made outside of the local economy result in leakages out of the local economy. Collectively, indirect and induced effects are referred to as "secondary impacts."

In their entirety, all of the previously discussed changes (direct and secondary) are referred to as "total economic impacts." By their nature, total impacts are greater than initial changes because of secondary effects. The magnitude of the increase is what is popularly termed a "multiplier effect." To estimate the total economic impacts due to this ripple effect, economic multipliers are used in conjunction with the direct employment, wages, business purchases, and taxes paid. The direct impacts are multiplied by the economic multiplier to yield an estimate of the overall economic impact of the new business or project. Multipliers are generated by economic input-output (I-O) models that account for linkages between sectors in an economy.

An I-O analysis estimates the dollar value of change in regional economic activity associated with economic linkages and leakages. The economic system, consisting of producers and consumers, is divided into various sectors that are defined in terms of the resources they require as inputs and what they produce as outputs. The quantities of inputs and outputs for a given period, usually expressed in monetary terms, are entered into an I-O matrix to enable the analysis of impacts within and across various sectors of an economy where growth and decline take place, as well as what effects various policies may have.

A number of regional economic analysis modeling systems (consisting of data and analytical software) are available for use in regional economic analysis. An I-O approach is used here for estimating the secondary effects of the Project. A number of I-O models exist, including Impact Analysis for Planning (IMPLAN); Regional Economic Models, Inc. (REMI); and Regional Industrial Multiplier System II (RIMS). These modeling systems all contain computer databases used to create I-O models for any combination of U.S. counties. For this Project, IMPLAN was used to estimate the indirect and induced impacts associated with implementation of the Project.

5.3.3.2 Impact Analysis for Planning Model

IMPLAN was originally developed by the U.S. Forest Service (USFS) in cooperation with the Federal Emergency Management Agency (FEMA) and the Bureau of Land Management (BLM) to assist in land and resource management planning. The IMPLAN package includes (1) estimates of final demands and final payments for counties developed from government data; (2) a national average matrix of technical coefficients; (3) mathematical tools that help the user build the I-O model; and (4) tools that allow the user to change data, conduct impact analysis, and generate reports.

5.4 Inventory, Evaluation, and Impact Assessment by Social and Economic Resource Areas

Rule I Section (7)(i) – An evaluation of the social and economic conditions in the Area of Site Influence. The social and economic conditions shall be inventoried and evaluated as they currently exist, projected as they would exist in the future without the proposed industrial facility and as they will exist with the facility.

Social and economic conditions in the geographical area likely to experience impacts associated with the construction and operation of the industrial facility are inventoried and evaluated as they currently exist, projected as they would exist in the future without the proposed facility, and as they would exist with the facility. Following this evaluation, an

assessment of potential Project-induced impacts, during both construction and operation phases, is presented.

The resources addressed are as follow:

- **Population –** historical trends, density and distribution, age, race and ethnicity, poverty status, migration, and projections
- **Economic and Fiscal Conditions –** employment and unemployment, employment by industrial sector, earnings and income, commuting and housing-jobs balance, construction industry, government revenues and finances (property values, sales taxes, use taxes, lodging taxes, impact assistance funds), finances (revenues and expenditures), and future conditions by sector
- **Housing –** permanent housing (housing stock characteristics, construction activity, home values and rental housing costs, rental housing vacancies, housing needs), and temporary housing (hotel, motels and RV spaces)
- **Public Education –** educational facilities, student enrollment, and student-teacher ratios
- **Public Safety –** fire protection services, law enforcement services, and crime;
- **Health Care –** location and characteristics of personnel and facilities and health needs of existing population
- **Municipal Services –** wastewater treatment, water treatment and distribution, non-hazardous waste collection and disposal, electricity service, and natural gas service

5.4.1 Population

Rule I Section 7(i)(iii) – A study of the area population including a description of methodology used. The study may include, but is not limited to, an evaluation of demographic characteristics for the current population and projections of the area population without the proposed industrial facility.

This subsection describes past, present, and future characteristics of the population in the Study Area. These characteristics include historical trends for the Study Area, counties, and incorporated places; age composition of the county populations; racial and ethnic composition; and migration patterns.

Population characteristics that are important in determining the location and availability of the local labor force include the location of population centers and the age distribution of the population (i.e., the identification of areas where persons of working age reside).

5.4.1.1 Existing Conditions

Historical Population Trends. County population data for the Study Area are reported in **Table 5-5**. Overall, the population of the seven-county Study Area has seen steady growth since 1920 except for during the 1980s when it experienced a decline. Between 1920 and 2008, the population of each county increased as follows: Campbell (692 percent); Converse

TABLE 5-5
Population Trends in the Study Area

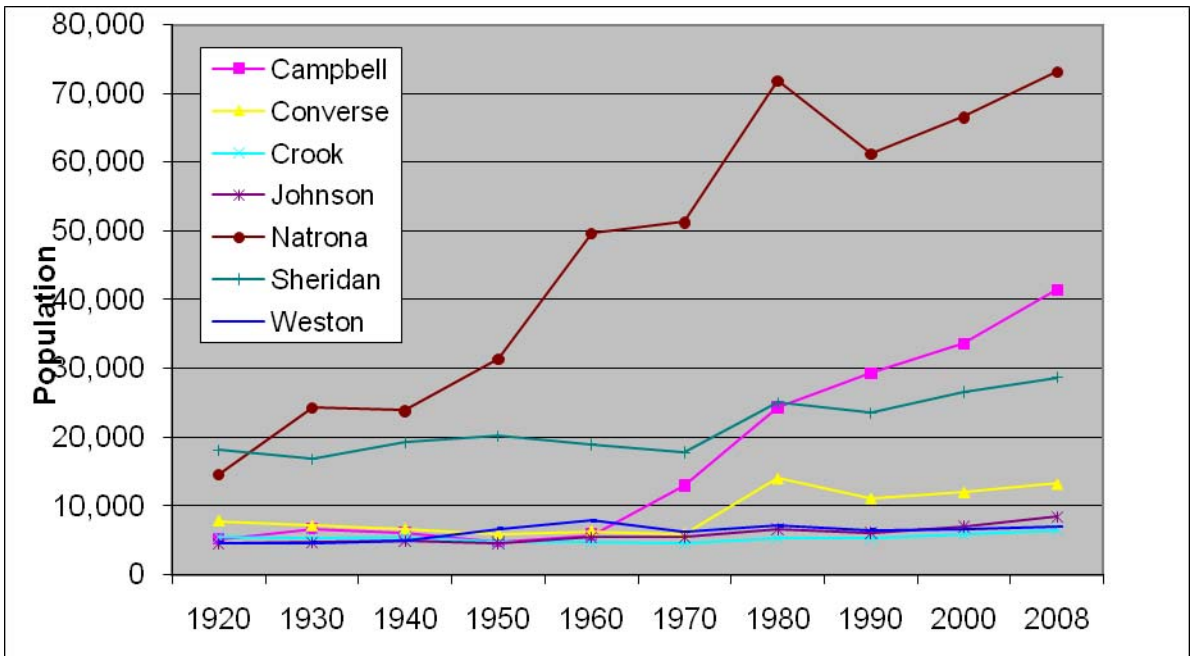
County	1920	1930	1940	1950	1960	1970	1980	1990	2000	2008
Campbell	5,233	6,720	6,048	4,839	5,861	12,957	24,367	29,370	33,698	41,473
Converse	7,871	7,145	6,631	5,933	6,366	5,938	14,069	11,128	12,052	13,267
Crook	5,524	5,333	5,463	4,738	4,691	4,535	5,308	5,294	5,887	6,457
Johnson	4,617	4,816	4,980	4,707	5,475	5,587	6,700	6,145	7,075	8,464
Natrona	14,635	24,272	23,858	31,437	49,623	51,264	71,856	61,226	66,533	73,129
Sheridan	18,182	16,875	19,255	20,185	18,989	17,852	25,048	23,562	26,560	28,662
Weston	4,631	4,673	4,958	6,733	7,929	6,307	7,106	6,518	6,644	7,022
Study Area	60,693	69,834	71,193	78,572	98,934	104,440	154,454	143,243	158,449	178,474
State of Wyoming	194,402	225,565	250,742	290,529	330,066	332,416	469,557	453,588	493,782	532,668

Source: State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2008.
http://eadiv.state.wy.us/demog_data/cntycity_hist.htm

(69 percent); Crook (17 percent); Johnson (83 percent); Natrona (400 percent); Sheridan (58 percent); and Weston (52 percent). By comparison, the population of the state grew by 194 percent over this period. Average annual rates ranged from a low of 0.2 percent for Crook County to at a high of 7.8 percent for Campbell County.

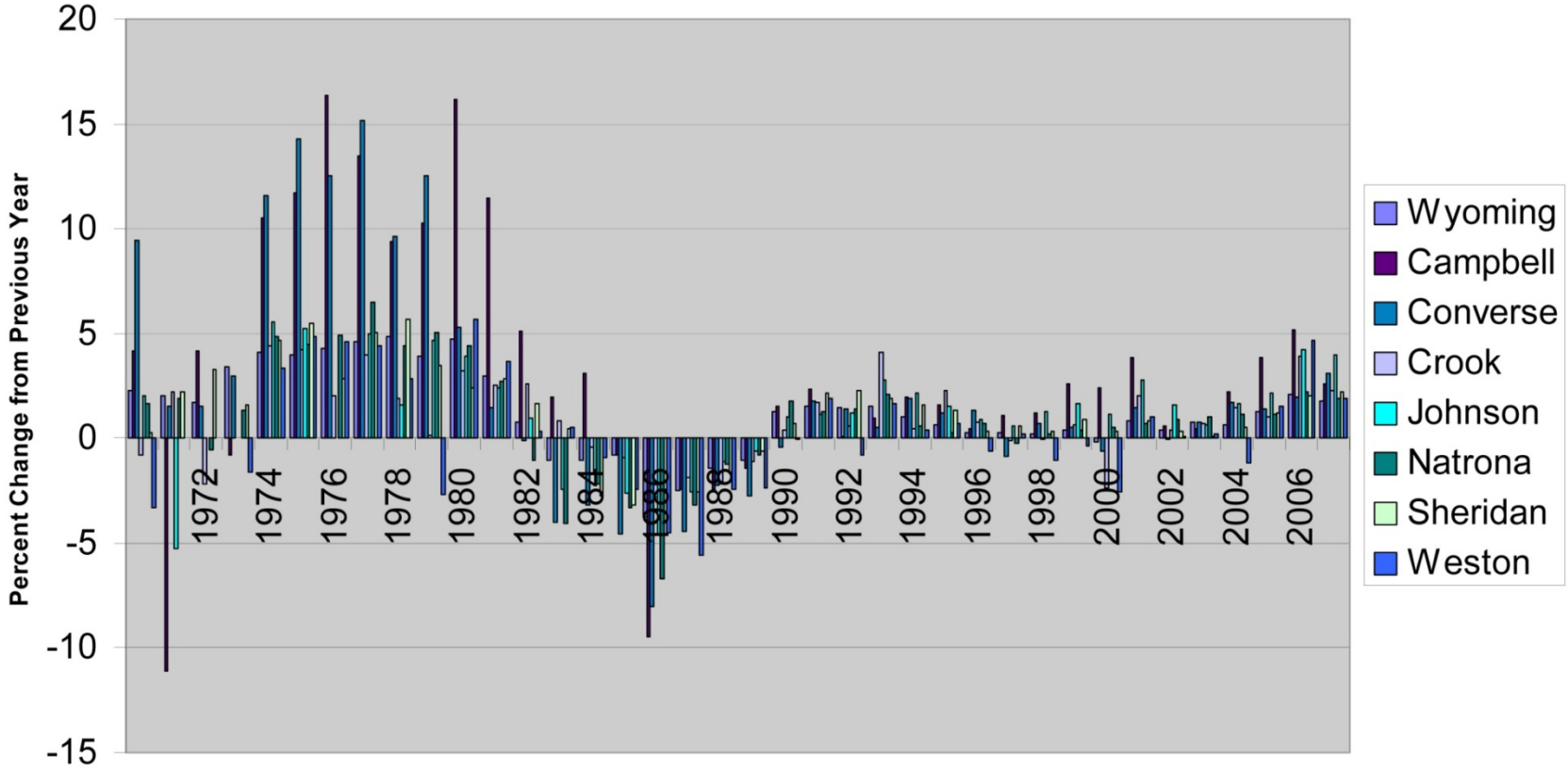
Figures 5-5 and **5-6** illustrate the population trend between 1970 and 2008. Figure 5-5 shows the patterns of population growth that are presented in tabular form in Table 5-5 for each county. The cyclical nature of the trend is evident in Figure 5-6 where the timing and magnitude of the trends are illustrated. Figure 5-6 presents the percentage changes in population from year to year. This figure illustrates the "boom-bust" cycle that saw rapid growth starting in the mid-1970s until 1980 and population losses during the "bust" period of 1982 through 1991. Overall, the period from 1991 to 2008 showed population growth in the majority of counties within the Study Area, including Campbell County. At the state level, the "boom-bust" cycle was less pronounced than for the individual counties.

FIGURE 5-5
Historic County Population (1920 to 2008)



Source: Wyoming Department of Administration and Information, Economic Analysis Division and CH2M HILL, 2009.

FIGURE 5-6
Population Growth Trends: Counties and State (1970 to 2008)



Source: Wyoming Department of Administration and Information, Economic Analysis Division and CH2M HILL, 2010.

At the beginning of the period 1920 through 2008, the population of the Study Area comprised about 31.2 percent of that of the state of Wyoming. This percentage reached its highest level in 2008 with 33.5 percent of the state population. Its share hit its low point of 27 percent in 1950. **Table 5-6** displays the share of the state of Wyoming population contributed by each county within the Study Area, separately, and for the Study Area as a whole. Campbell County's share of the state's population increased slightly from 1920 to 1930, fell from 1930 to 1950, and then rose steadily to 2008. Smaller Converse County showed a steadily decreasing share between 1920 and 1970 with a slight upturn since then. Crook County's share started small at 2.8 percent and steadily fell to 1.1 percent by 1980. It experiences a slight increase to 1.2 percent in 1990 where it has remained until 2008. The pattern for Johnson County was similar to Crook County, but its share of the state population never fell below 1.4 percent and it rebounded slightly to 1.6 percent in 2008. In contrast, Natrona County's share of state population increased from 7.5 to almost 14 percent over the time period while Sheridan County's share fell from 9.4 to 5.4 percent and Weston County's share fell from 2.4 to 1.3 percent.

TABLE 5-6
Share of State of Wyoming Population (1920 through 2008)

County	1920	1930	1940	1950	1960	1970	1980	1990	2000	2008
Campbell	2.7%	3.0%	2.4%	1.7%	1.8%	3.9%	5.2%	6.5%	6.8%	7.8%
Converse	4.0%	3.2%	2.6%	2.0%	1.9%	1.8%	3.0%	2.5%	2.4%	2.5%
Crook	2.8%	2.4%	2.2%	1.6%	1.4%	1.4%	1.1%	1.2%	1.2%	1.2%
Johnson	2.4%	2.1%	2.0%	1.6%	1.7%	1.7%	1.4%	1.4%	1.4%	1.6%
Natrona	7.5%	10.8%	9.5%	10.8%	15.0%	15.4%	15.3%	13.5%	13.5%	13.7%
Sheridan	9.4%	7.5%	7.7%	6.9%	5.8%	5.4%	5.3%	5.2%	5.4%	5.4%
Weston	2.4%	2.1%	2.0%	2.3%	2.4%	1.9%	1.5%	1.4%	1.3%	1.3%
Study Area	31.2%	31.0%	28.4%	27.0%	30.0%	31.4%	32.9%	31.6%	32.1%	33.5%

Source: State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2008. http://eadiv.state.wy.us/demog_data/cntycity_hist.htm

Population Density and Distribution. The majority of the population of each county resides in incorporated communities. As presented in **Table 5-7A**, in 2009, the two largest population centers are Gillette in Campbell County and Casper in Natrona County, accounting for about 14 percent and 30 percent of the Study Area population, respectively. According to the Census population forecasts for 2009, the two cities, Gillette and Wright account for almost 64 percent of the population of Campbell County. Similarly, the cities of Douglas and Glenrock together contained about 62 percent of the 2009 total population of Converse County (44 percent is contributed by Douglas). Sundance, at 19 percent, holds the largest population of all the cities in Crook County, and Buffalo accounts for about 56 percent of the population of Johnson County. The City of Casper was home to almost 73 percent of Natrona County residents, and the larger Casper urban area (Casper, Evansville, Mills, and Bar Nunn) contained 84 percent of the county population. Almost 60 percent of the Sheridan County population resides in Sheridan City and about 62 percent of Weston's population

live within the towns of New Castle and Upton. The population of all incorporated communities in the seven counties is shown in **Table 5-7B**.

Age of the Population. Besides population centers, the most important factor in determining the availability of the local labor force is the age distribution of the population. **Table 5-8** compares the existing population, by age, in the Study Area counties and the State of Wyoming. The age cohorts from 20 to 39 and from 40 to 64 offer the greatest possible contribution of the expected labor force. These two cohorts contain 59 percent of the population of the State of Wyoming as a whole. The distributions for the counties in the Study Area range from a low of 56 percent for Crook and Johnson counties to a high of 61 percent for Campbell County.

Population Migration. Population change in an area is attributable to births, deaths, and net migration. Cumulative estimates of the components of resident population change for Wyoming over the period from April 1, 2000 to July 1, 2009, were developed by the U.S. Census (2009). The estimate of the total population change for the state over this period was an increase of 50,487 residents. Births exceeded deaths by 27,356, which represents the "natural" increase in population. The remaining 25,660 is net migration to the state from both international (3,278) and domestic (22,382) regions.

Future Population. As shown in **Table 5-7C**, population projections prepared by the Wyoming Department of Administration and Information, Economic Analysis Division (EAD, 2006) forecast that the population of the Study Area will increase by about 10,230 residents between 2010 and 2015. This is a 5.6-percent increase occurring at an average annual rate of 1.1 percent as indicated in **Table 5-9**. Campbell County is expected to experience the highest average annual rate of growth (2.1 percent) and Weston County's population is projected to decline by 0.2 percent per year over this period. The forecast for the second half of the decade (i.e., 2015 to 2020) mirrors the first half so that by 2020 the Study Area is projected to grow by an additional 10,730 residents. The average annual rate of population growth for the Study Area at 1.1 percent is higher than for the state of Wyoming, which is forecast to grow at an average annual rate of 0.7 percent between 2010 and 2020.

TABLE 5-7A
Population for Wyoming, Counties, Cities, and Towns: 2000 to 2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Area	**Census**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Estimate**	**Forecast**	**Forecast**	**Forecast**	**Forecast**
Wyoming	**493,782**	**494,045**	**499,045**	**501,915**	**505,887**	**509,294**	**515,410**	**522,620**	**528,900**	**534,720**
Campbell County	**33,698**	**34,670**	**36,155**	**36,423**	**36,654**	**37,405**	**38,890**	**39,990**	**41,040**	**42,080**
Gillette	20,271	20,870	21,819	22,053	22,174	22,685	23,522	24,187	24,822	25,451
Wright	1,347	1,379	1,426	1,418	1,408	1,425	1,508	1,551	1,591	1,632
Converse County	**12,052**	**12,098**	**12,356**	**12,339**	**12,526**	**12,766**	**12,860**	**13,020**	**13,160**	**13,290**
Douglas	5,295	5,319	5,426	5,401	5,490	5,581	5,635	5,705	5,766	5,823
Glenrock	2,242	2,242	2,290	2,289	2,302	2,351	2,375	2,405	2,431	2,455
Lost Springs	1	1	1	1	1	1	1	1	1	1

TABLE 5-7A
Population for Wyoming, Counties, Cities, and Towns: 2000 to 2009

Area	2000 Census	2001 Estimate	2002 Estimate	2003 Estimate	2004 Estimate	2005 Estimate	2006 Forecast	2007 Forecast	2008 Forecast	2009 Forecast
Rolling Hills	449	450	460	461	461	467	475	481	486	491
Crook County	**5,887**	**5,775**	**5,898**	**5,974**	**6,032**	**6,182**	**6,210**	**6,300**	**6,380**	**6,460**
Hulett	408	400	406	410	412	429	428	434	440	445
Moorcroft	807	793	807	824	821	845	850	862	873	884
Pine Haven	222	225	240	267	298	317	287	291	295	299
Sundance	1,161	1,132	1,173	1,174	1,167	1,184	1,209	1,227	1,242	1,258
Johnson County	**7,075**	**7,171**	**7,413**	**7,537**	**7,606**	**7,721**	**7,990**	**8,200**	**8,400**	**8,590**
Buffalo	3,902	3,956	4,100	4,212	4,230	4,290	4,438	4,554	4,666	4,771
Kaycee	249	253	261	265	269	273	282	289	296	303
Natrona County	**66,533**	**66,909**	**67,519**	**68,238**	**68,988**	**69,799**	**70,650**	**71,780**	**72,770**	**73,700**
Bar Nunn	936	944	955	970	1,139	1,292	1,128	1,146	1,162	1,176
Casper	49,737	49,867	50,236	50,770	51,223	51,738	52,504	53,343	54,079	54,770
Edgerton	169	169	170	171	172	173	177	179	182	184
Evansville	2,255	2,269	2,285	2,297	2,304	2,328	2,372	2,410	2,443	2,474
Midwest	408	408	411	417	427	431	434	441	447	453
Mills	2,632	2,739	2,830	2,866	2,873	2,898	2,935	2,982	3,023	3,062
Sheridan County	**26,560**	**26,729**	**26,951**	**27,146**	**27,236**	**27,389**	**27,720**	**28,040**	**28,310**	**28,540**
Clearmont	115	115	116	117	117	117	119	120	122	123
Dayton	678	679	682	701	706	717	716	724	731	737
Ranchester	701	708	717	719	707	717	729	737	744	750
Sheridan	15,872	15,934	16,026	16,096	16,255	16,333	16,510	16,701	16,861	16,998
Weston County	**6,644**	**6,522**	**6,619**	**6,671**	**6,677**	**6,671**	**6,700**	**6,730**	**6,740**	**6,740**
Newcastle	3,248	3,196	3,233	3,247	3,220	3,221	3,251	3,265	3,270	3,270
Upton	872	851	866	872	863	857	869	873	874	874
Study Area	**158,449**	**159,874**	**162,911**	**164,328**	**165,719**	**167,933**	**171,020**	**174,060**	**176,800**	**179,400**

Notes:
2000 state, county, and municipality population are 2000 Census data with official revisions included.
2001 to 2005 state, county, and municipality population estimates were produced by the U.S. Census Bureau.
2006 to 2009 state and county population forecasts were developed based on trends of demographic and economic variables.
Municipality population forecasts were simply calculated by applying the place/county ratios to the appropriate county population forecasts.

Source: Wyoming Department of Administration and Information, Economic Analysis Division (http://eadiv.state.wy.us), December 2006; CH2M HILL 2010.

TABLE 5-7B
Percentage of Study Area Population Within Each County

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Campbell	21.27	21.68	22.19	22.00	21.98	21.83	21.87	22.34	22.62	22.88
Converse	7.61	7.57	7.58	7.52	7.44	7.46	7.46	7.39	7.36	7.34
Crook	3.72	3.61	3.62	3.59	3.60	3.59	3.61	3.57	3.56	3.56
Johnson	4.46	4.48	4.55	4.51	4.55	4.53	4.51	4.59	4.64	4.68
Natrona	41.99	41.85	41.44	41.09	41.18	41.08	40.81	40.59	40.60	40.56
Sheridan	16.76	16.72	16.54	16.40	16.38	16.22	16.02	15.92	15.86	15.78
Weston	4.19	4.08	4.06	4.03	4.02	3.98	3.90	3.85	3.81	3.76

TABLE 5-7C
Population forecast for Wyoming, Counties, Cities, and Towns: 2000 to 2020

	2000	2010	2011	2012	2013	2014	2015	2020
Area	Census	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
Wyoming	**493,782**	**540,040**	**544,400**	**548,190**	**551,480**	**555,310**	**559,210**	**579,090**
Campbell Co.	**33,698**	**43,090**	**44,010**	**44,910**	**45,780**	**46,700**	**47,650**	**52,630**
Gillette	20,271	26,062	26,618	27,163	27,689	28,245	28,820	31,832
Wright	1,347	1,671	1,706	1,741	1,775	1,811	1,847	2,041
Converse Co.	**12,052**	**13,400**	**13,500**	**13,580**	**13,650**	**13,740**	**13,820**	**14,240**
Douglas	5,295	5,871	5,915	5,950	5,981	6,020	6,055	6,239
Glenrock	2,242	2,475	2,493	2,508	2,521	2,538	2,552	2,630
Lost Springs	1	1	1	1	1	1	1	1
Rolling Hills	449	495	499	502	505	508	511	526
Crook Co.	**5,887**	**6,520**	**6,570**	**6,620**	**6,650**	**6,700**	**6,740**	**6,950**
Hulett	408	449	453	456	458	462	464	479
Moorcroft	807	892	899	906	910	917	923	951
Pine Haven	222	302	304	306	308	310	312	321
Sundance	1,161	1,269	1,279	1,289	1,295	1,304	1,312	1,353
Johnson Co.	**7,075**	**8,780**	**8,940**	**9,090**	**9,230**	**9,380**	**9,540**	**10,350**
Buffalo	3,902	4,877	4,966	5,049	5,127	5,210	5,299	5,749
Kaycee	249	310	315	321	326	331	337	365
Natrona Co.	**66,533**	**74,560**	**75,300**	**75,970**	**76,570**	**77,240**	**77,920**	**81,320**
Bar Nunn	936	1,190	1,202	1,213	1,222	1,233	1,244	1,298
Casper	49,737	55,409	55,959	56,457	56,903	57,401	57,906	60,433
Edgerton	169	186	188	190	191	193	195	203
Evansville	2,255	2,503	2,528	2,550	2,571	2,593	2,616	2,730
Midwest	408	458	463	467	470	475	479	500
Mills	2,632	3,098	3,129	3,156	3,181	3,209	3,237	3,379
Sheridan Co.	**26,560**	**28,750**	**28,980**	**29,180**	**29,350**	**29,540**	**29,740**	**30,730**
Clearmont	115	123	124	125	126	127	128	132
Dayton	678	742	748	753	758	763	768	793
Ranchester	701	756	762	767	771	776	782	808

TABLE 5-7C
Population forecast for Wyoming, Counties, Cities, and Towns: 2000 to 2020

Area	2000 Census	2010 Forecast	2011 Forecast	2012 Forecast	2013 Forecast	2014 Forecast	2015 Forecast	2020 Forecast
Sheridan	15,872	17,124	17,261	17,380	17,481	17,594	17,713	18,303
Weston Co.	**6,644**	**6,730**	**6,720**	**6,710**	**6,690**	**6,670**	**6,650**	**6,570**
Newcastle	3,248	3,265	3,261	3,256	3,246	3,236	3,227	3,188
Upton	872	873	872	871	868	865	863	852
Study Area	**158,449**	**181,830**	**184,020**	**186,060**	**187,920**	**189,970**	**192,060**	**192,060**

TABLE 5-8
Year 2000 Population in Wyoming and Study Area Counties by Age and Age Cohort Percent of the Total

Geographic Area	Age						
	0 to 9	10 to 19	20 to 39	40 to 64	65 to 79	80+	Total
Wyoming							
Number	65,067	80,279	129,791	160,952	43,151	14,542	493,782
Percent	13%	16%	26%	33%	9%	3%	
Campbell County							
Number	5,241	6,245	9,375	11,066	1,397	374	33,698
Percent	16%	18%	28%	33%	4%	1%	
Converse County							
Number	1,685	2,043	2,800	4,195	1,044	285	12,052
Percent	14%	17%	23%	35%	9%	2%	
Crook County							
Number	699	1,027	1,199	2,094	646	222	5,887
Percent	12%	17%	20%	36%	11%	4%	
Johnson County							
Number	834	1,042	1,332	2,592	948	327	7,075
Percent	12%	15%	19%	37%	13%	5%	
Natrona County							
Number	4,417	10,622	17,762	20,793	2,272	6,152	66,533
Percent	13%	16%	27%	31%	3%	9%	
Sheridan County							
Number	3,049	4,103	5,877	9,410	2,922	1,199	26,560
Percent	11%	15%	22%	35%	11%	5%	
Weston County							
Number	705	1,090	1,447	2,366	745	291	6,644
Percent	11%	16%	22%	36%	11%	4%	

Source: U.S. Census, 2000.

TABLE 5-9
Projected Population Growth Rates for Wyoming and Study Area Counties

	Change 2010 to 2015			Change 2015 to 2020		
Area	**Numeric**	**Percent**	**Average Annual Percent**	**Numeric**	**Percent**	**Average Annual Percent**
Wyoming	19,170	3.5%	0.7%	19,880	3.6%	0.00711
Campbell County	4,560	10.6%	2.1%	4,980	10.5%	2.1%
Converse County	420	3.1%	0.6%	420	3.0%	0.6%
Crook County	220	3.4%	0.7%	210	3.1%	0.6%
Johnson County	760	8.7%	1.7%	810	8.5%	1.7%
Natrona County	3,360	4.5%	0.9%	3,400	4.4%	0.9%
Sheridan County	990	3.4%	0.7%	990	3.3%	0.7%
Weston County	-80	-1.2%	-0.2%	-80	-1.2%	-0.2%
Study Area	10,230	5.6%	1.13%	10,730	5.6%	1.1%

Notes:
2000 state, county, and municipality population are 2000 Census data with official revisions included 2007 state, county, and municipality population estimate was produced by U.S. Census Bureau
2010 to 2020 state and county population forecasts were developed based on trends of demographic and economic variables
Municipality population forecasts were simply calculated by applying the place/county ratios to the appropriate county population forecasts

Source: Wyoming Department of Administration and Information, Economic Analysis Division, 2008a.

Population Race and Ethnicity. The large proportion of the estimated 2000 population of each of the counties comprising the Study Area is categorized as "white," ranging from almost 98 percent in Crook County to 94.2 percent in Natrona County. The percentage "white" for the state of Wyoming is lower at 92.1 (see **Table 5-10**. The share of the population categorized as "minority" is greatest in Natrona County (8.3 percent) followed by Converse County (8.1 percent), Campbell (5.9 percent), Sheridan (5.4 percent), Weston (5.3 percent), Johnson (4.3 percent) and Crook (2.7 percent). At the state level, the share is 11.1 percent. Residents of Hispanic origin make up 6.4 percent of the state population, 3.5 percent of Campbell County population, 5.5 percent of Converse County population, 0.9 percent of Crook County population, 2.1 percent of Johnson County population, 4.9 percent of the Natrona County population, 2.4 percent of Sheridan County population, and 2.1 percent of the Weston County population.

Of the other major racial groups, American Indians and Alaska Natives contribute 2.3 percent of the state population, but only about 1 percent or less of each of the county populations.

TABLE 5-10
Estimated Population Composition by Race and Ethnicity (2000)

	Estimated Population by Race								
Geographic Area	White	Black or African American Alone	American Indian and Alaska Native Alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some Other Race	Two or More Races	Hispanic	Minority Population*
Wyoming	92.1	0.8	2.3	0.6	0.1	2.5	1.8	6.4	11.1
Campbell County	96.1	0.2	0.9	0.3	0.1	1.1	1.3	3.5	5.9
Converse County	94.7	0.1	0.9	0.3	0	2.5	1.5	5.5	8.1
Crook County	97.9	0.1	0.1	0.1	0	0.3	0.7	0.9	2.7
Johnson County	97.0	0.1	0.6	0.1	0	0.6	1.6	2.1	4.3
Natrona County	94.2	0.8	1	0.4	0	1.9	1.7	4.9	8.3
Sheridan County	95.9	0.2	1.3	0.4	0.1	0.8	1.3	2.4	5.4
Weston County	95.9	0.1	1.3	0.2	0	0.9	1.5	2.1	5.2

* Population other than non-Hispanic white.

Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrix P8.

Population Poverty Status. According to U.S. Census (2000), the proportions of the population living below the poverty level (as defined in 1999) were 11.4 percent for the state, 7.6 percent for Campbell County, 9.1 percent for Crook County, 11.6 percent for Converse County, 10.1 for Johnson County, 11.8 percent for Natrona County, 10.7 for Sheridan County, and 9.9 percent for Weston County.

5.4.1.2 Construction Impacts

The number of non-local temporary workers likely to enter the Area of Site Influence during the peak construction month could total 263 and average about 123 over the 12-month construction period. It is not expected that these temporary workers will be accompanied by children and, thus impacts to population would be minor—less than 0.5 percent of the existing seven-county population of over 180,000.

5.4.1.3 Operations Impacts

During operations, it is expected that 17 permanent workers would be hired and would relocate to the local region. This is expected to have a negligible impact to the population of the local area.

5.4.2 Economic and Fiscal Conditions

Rule I Section 7(i)(ii) – A study of the area economy including a description of methodology used. The study may include, but is not limited to, the following factors:

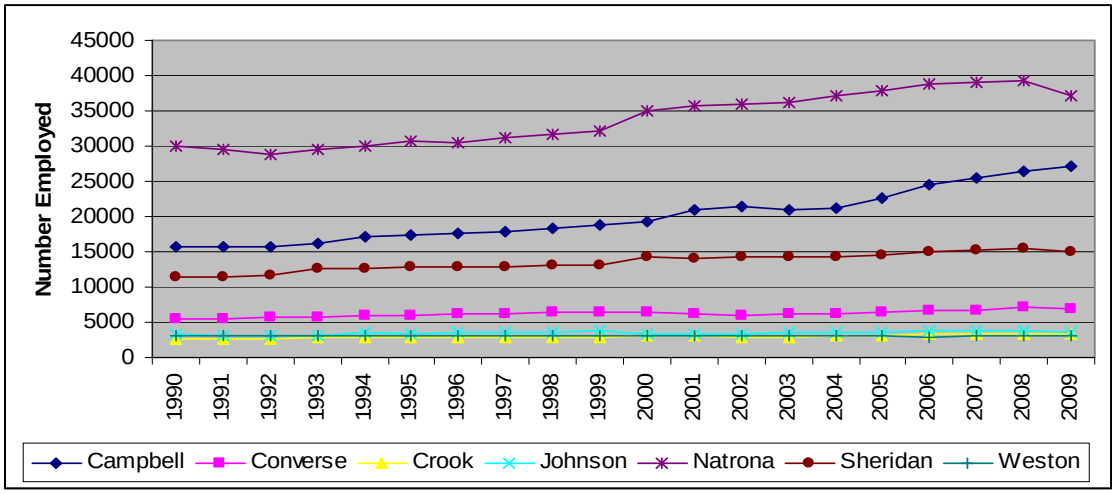
(A) Employment projections by major sector;
(B) Economic bases and economic trends of the local economy;
(C) Estimates of basic versus non-basic employment;
(D) Unemployment rates

This section addresses past, present, and future economic conditions (labor force, employment, and unemployment); income and earnings by industrial sector; commuting patterns and work centers; existing labor characteristics and availability; and government revenues (property, sales, use, and lodging taxes and residential property values).

5.4.2.1 Existing Conditions

Employment and Unemployment. During the period 2000 through 2009, total employment in the Study Area increased by just over 11,384 jobs or 13.5 percent, more than twice the 5.5 percent increase for the State of Wyoming over the same time period. As illustrated in **Figure 5-7**, the counties within the Study Area experienced very different changes in employment. Campbell County employment grew by 7,864 jobs (40.7 percent), Converse County jobs increased by 605 (9.6 percent), Crook County picked up 162 jobs (5.3percent), Johnson County jobs increased by 50 (1.5 percent), 2,105 new jobs (6.0 percent) were added in Natrona County, employment in Sheridan County increased by 756 jobs (5.3 percent), and Weston County lost 158 jobs (-5.0 percent).

FIGURE 5-7
Non-Seasonally Adjusted Employment by County (2000 through 2009)



Notes:
Because of changes in the estimation methodology, there is a break in the data set between 1999 and 2000. Therefore, pre-2000 data is not comparable to data from 2000 to present. 2009 data uses November 2009 information and is considered preliminary.

Source: Wyoming Department of Employment Research and Planning, 2010 and US Bureau of Labor Statistics, 2010 Series LAUCN56005006, LAUCN56009004, LAUCN56011004, LAUCN56019003, LAUCN56025005, LAUCN56033005, LAUCN56045005.

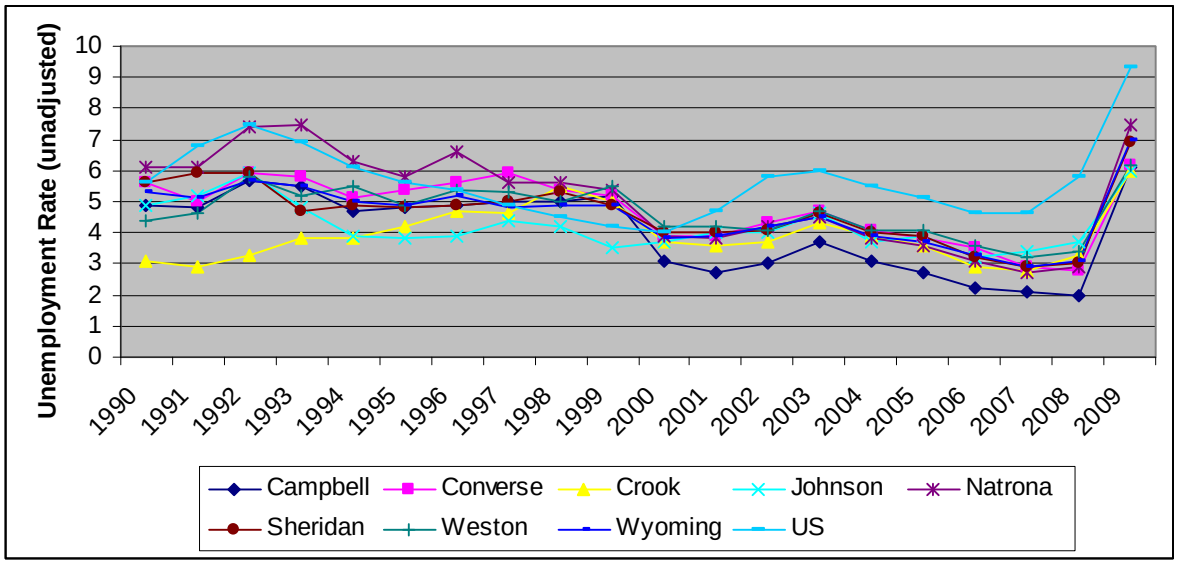
The unemployment rate in the Study Area has generally trended downwards over the period 1990 to 2007 with periodic increases when employment growth faltered (e.g., 1992 to 1993, 1995 to 1996, 2001 to 2003, and 2008). Unemployment rates for each of the counties of the Study Area illustrate similar trends over the time period. The trend in unemployment rates in the Study Area counties, the state, and the nation during the period 1990 through 2009 can be seen in **Figure 5-8**.

Recent information regarding initial monthly claims for unemployment benefits suggests that unemployment is on the rise. **Figure 5-8A** shows a comparison of unemployment rates for the Study Area counties, the state and the nation for the year 2000 relative to 2009. In 2000, the unemployment rates for the counties in the Study Area hovered around 3 or 4 percent. In contrast, 2009 unemployment rates for the counties in the Study Area ranged from a low of 6 percent in Crook and Johnson counties to a high of 7.5 percent in Natrona County. It is clear from **Figure 5-8** that the current unemployment rates are high by historical standards, but are well below the unemployment rate of 9.3 percent for the nation. In all cases, unemployment has risen substantially with Campbell rising 97 percent, Converse rising 59 percent, Crook rising 62 percent, Johnson rising 62 percent, Natrona rising 92 percent, Sheridan rising 73 percent, and Weston rising 48 percent. The entire state of Wyoming rose 84 percent for the period while the U.S. rose 133 percent. For the duration of economic slowdown, both the local and non-local labor force is likely to have greater availability for staffing projects than has historically been the case.

The information presented in **Figure 5-9** illustrates how monthly claims for unemployment benefits compare to the same month in the preceding year over the period from January 1998 to August 2009. The period between September 2001 and May 2003 was one of an increasingly deteriorating employment picture. Prior to this period, from mid-year of 1999, a period of steady and sustained improvement occurred. Another period of steady and sustained growth occurred between June 2003 and December 2007. The year 2007 saw the start of a trend of increasing claims for unemployment benefits with the number increasing rapidly in the last quarter of 2008 and reaching historical highs during the first half of 2009. In March 2009, the number of claims was over 150 percent higher than in the corresponding month in 2008.

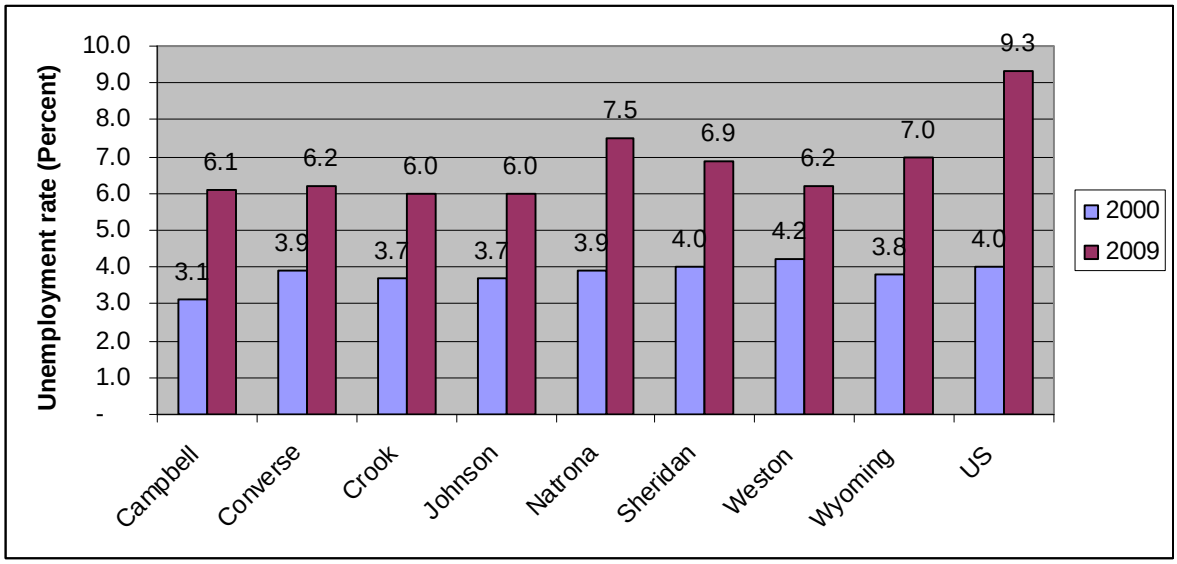
The information presented in **Figure 5-10** illustrates how the number of claims for unemployment benefits, at the state level, vary through the year and between years. Year 2009 began with a historical high in monthly claims relative to preceding years and remained high for the duration of the year.

FIGURE 5-8
Non-Seasonally Adjusted Unemployment Rate for Counties, State, and Nation (1990 through 2009)



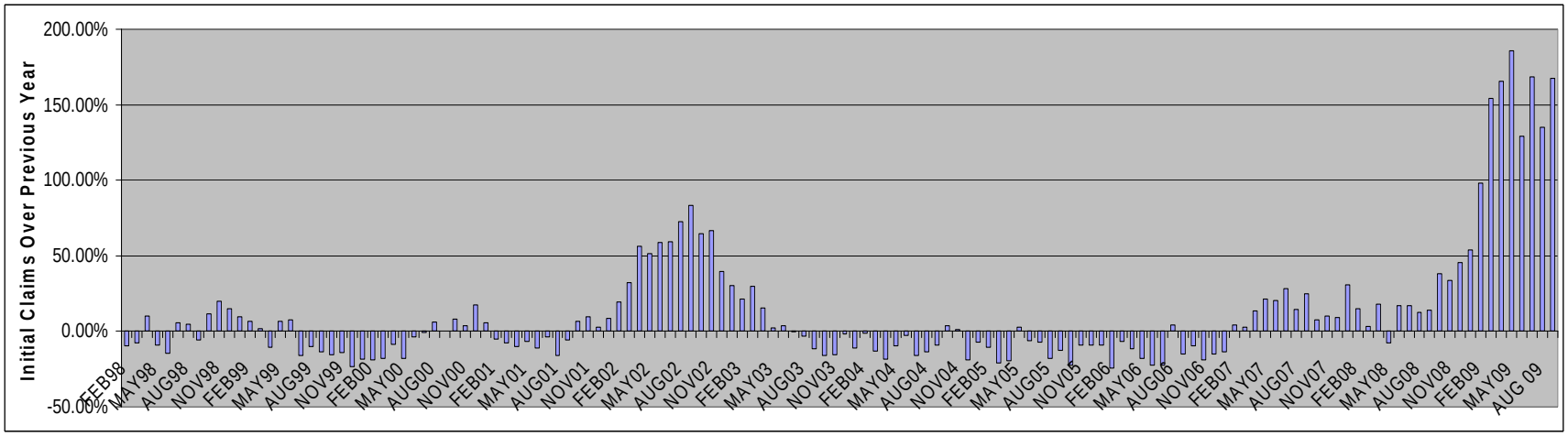
Source: Wyoming Department of Employment, 2010, US Bureau of Labor Statistics, 2010, Series LAUCN56005005, LAUCN56009003, LAUCN56011003, LAUCN56019004, LAUCN56025006, LAUCN56033006, LAUCN56045004, LAUST56000005, LNU04000000.

FIGURE 5-8A
Comparison of Unemployment Rates (not Seasonally Adjusted) for the Years 2000 and 2009



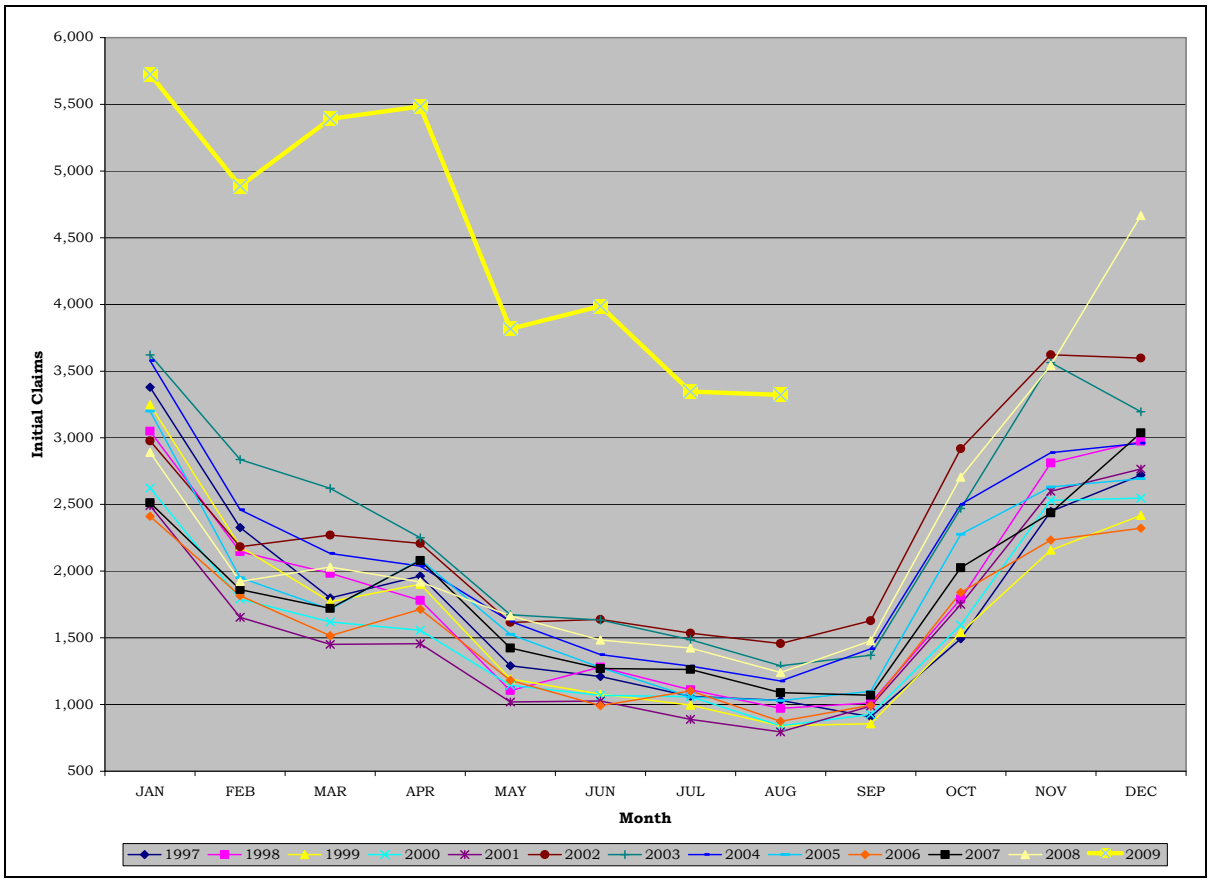
Source: Wyoming Department of Employment Research and Planning, 2010 and US Bureau of Labor Statistics, 2010 Series LAUCN56005006, LAUCN56009004, LAUCN56011004, LAUCN56019003, LAUCN56025005, LAUCN56033005, LAUCN56045005.

FIGURE 5-9
Monthly Initial Claims for Unemployment in the State, Year to Previous Year (January 1998 through August 2009)



Source: Wyoming Department of Employment, Research and Planning, 2010, Statewide Normalized Initial Claims by Industry in NAICS—Updated SEPTEMBER, 2009. http://doe.state.wy.us/lmi/ui/NAICS_Statewide_Initial.htm

FIGURE 5-10
Initial Claims for Unemployment by Month and Year in Wyoming (1997 through 2009) Showing Seasonality of Workforce Requirements throughout the Year



Source: Wyoming Department of Employment, Research and Planning, 2010. UI -Tables – Initial Claims Chart. http://doe.state.wy.us/lmi/ui/NAICS_Statewide_Initial.htm

Employment by Industrial Sector. Over the period 1970 through 2000, total employment in the Study Area increased by 53,880 jobs, as shown in **Table 5-11**. Farm employment fell by 8.3 percent and federal employment fell by 4.4 percent over this period, but employment in all sectors rose. The sector of the economy experiencing the greatest change was the services sector where the number of full- and part-time jobs increased by 16,270 jobs, or about 189 percent. This sector grew in relative importance accounting for 17.02 percent of total employment in 1970 and 23.81 percent in 2000. The construction sector grew by 115.1 percent by picking up close to 4,000 jobs over this period. Jobs in manufacturing increased by close to 1,400 and in transportation and utilities jobs grew by over 1,800.

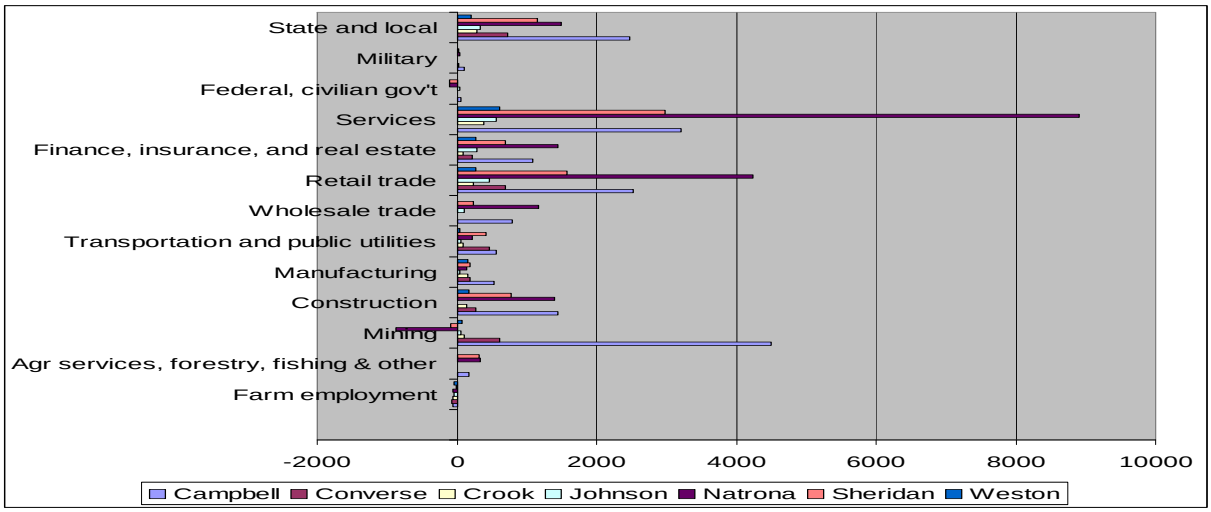
Natrona County accounted for most of the Study Area job growth in the services and retail sectors; whereas Campbell County lead in the mining, construction, and state and local government sectors as can be seen from **Figure 5-11**.

TABLE 5-11
Study Area: Employment by Industrial Sector (1970 and 2000)

	1970		2000		Change in Employment (1970-2000)	
	Number	**Percent of Total**	**Number**	**Percent of Total**	**Number**	**Percent of Relative Change**
Total Full-time and Part-time Employment	**50,657**		**104,537**		**53,880**	**106.4%**
Employment by Type						
Wage and salary employment	40,484	79.92%	80,517	77.02%	40,033	98.9%
Proprietors employment	10,173	20.08%	24,020	22.98%	13,847	136.1%
Farm proprietors employment	2,434	4.80%	2,740	2.62%	306	12.6%
Nonfarm proprietors employment	7,739	15.28%	21,280	20.36%	13,541	175.0%
Employment by Industry						
Farm employment	4,095	8.08%	3,756	3.59%	-339	-8.3%
Nonfarm employment	46,562	91.92%	100,781	96.41%	54,219	116.4%
Private employment	37,543	74.11%	84,957	81.27%	47,414	126.3%
Agr services, forestry, fishing, and other	430	0.85%	1,133	1.08%	703	163.5%
Mining	6,308	12.45%	10,684	10.22%	4,376	69.4%
Construction	3,434	6.78%	7,388	7.07%	3,954	115.1%
Manufacturing	2,413	4.76%	3,809	3.64%	1,396	57.9%
Transportation and public utilities	3,491	6.89%	5,329	5.10%	1,838	52.6%
Wholesale trade	2,015	3.98%	4,362	4.17%	2,347	116.5%
Retail trade	8,138	16.06%	18,136	17.35%	9,998	122.9%
Finance, insurance, and real estate	2,690	5.31%	6,779	6.48%	4,089	152.0%
Services	8,624	17.02%	24,894	23.81%	16,270	188.7%
Government and government enterprises	9,019	17.80%	15,824	15.14%	6,805	75.5%
Federal, civilian	1,790	3.53%	1,711	1.64%	-79	-4.4%
Military	715	1.41%	918	0.88%	203	28.4%
State and local	6,514	12.86%	13,195	12.62%	6,681	102.6%

Source: Wyoming Department of Administration and Information, Economic Analysis, 2010. Full Time and Part-Time Employment by Type and By Industry (SIC): 1969 to 2000. http://eadiv.state.wy.us/i&e/i&e.html

FIGURE 5-11
Change in Employment by Sector and County (1970 through 2000)



Source: Wyoming Department of Employment, Research and Planning, 2010. Full Time and Part-Time Employment by Type and By Industry (SIC): 1969 to 2000. http://eadiv.state.wy.us/i&e/i&e.html

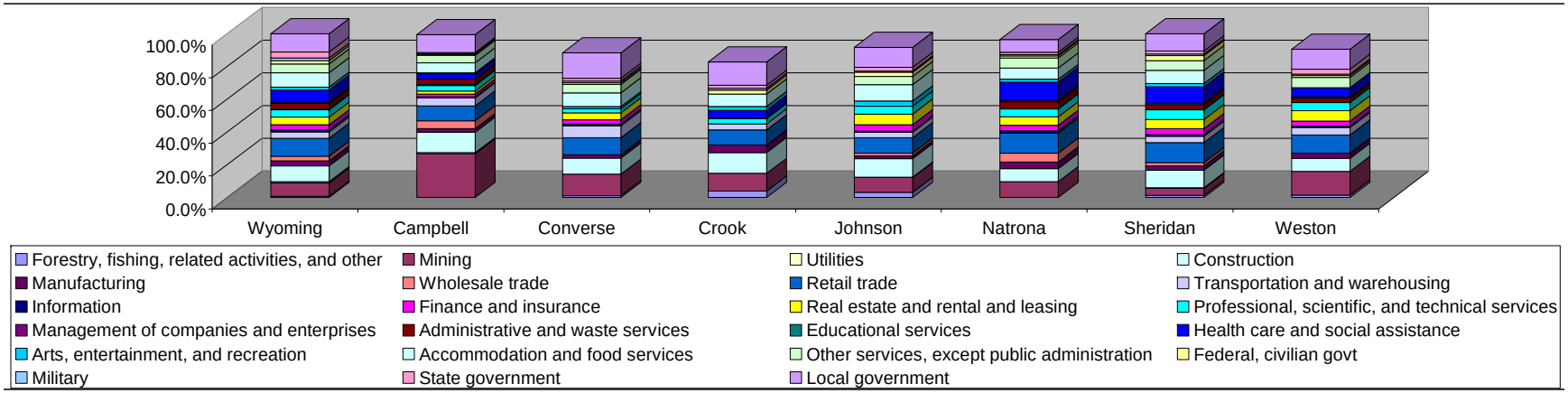
Table 5-12 shows that as of 2007, major shares of nonfarm employment in Campbell County were contributed by the following industrial sectors: Mining (26.6 percent), construction (12.5 percent), and local government (11 percent). In Converse, Crook, and Johnson counties, local government contributed the largest share at 15.5, 14.3, and 12.3 percent, respectively. In Natrona and Sheridan counties, the retail trade sector led with 12.4 and 12.1 percent of total employment, respectively, and in Weston County, the mining sector at 14.6 percent accounted for the largest share of employment. The construction sector's share ranged from a low of 7.9 percent in Weston County to a high of 12.6 percent in Crook County. These percentages are illustrated in **Figure 5-12**.

TABLE 5-12
Share of Employment by Industrial Sector (2007)

	Wyoming	Campbell	Converse	Crook	Johnson	Natrona	Sheridan	Weston
Forestry, fishing, related activities, and other	0.8%	n.d.	1.2%	3.8%	3.2%	n.d.	1.3%	1.4%
Mining	8.2%	26.6%	13.1%	10.9%	9.1%	9.6%	4.3%	14.6%
Utilities	0.7%	0.7%	n.d.	n.d.	0.2%	n.d.	0.4%	n.d.
Construction	9.7%	12.5%	9.7%	12.6%	11.3%	8.0%	10.7%	7.9%
Manufacturing	3.2%	2.2%	2.1%	4.7%	1.5%	4.1%	2.5%	3.1%
Wholesale trade	2.6%	4.9%	n.d.	n.d.	1.7%	5.4%	2.1%	n.d.
Retail trade	11.0%	9.0%	10.3%	9.2%	9.5%	12.4%	12.1%	11.1%
Transportation and warehousing	3.9%	4.8%	7.3%	3.8%	3.2%	n.d.	4.0%	4.6%
Information	1.3%	0.7%	1.1%	n.d.	0.9%	1.3%	1.0%	0.9%
Finance and insurance	3.1%	1.7%	2.7%	n.d.	3.8%	3.4%	3.7%	3.2%
Real estate and rental and leasing	4.7%	1.9%	4.1%	n.d.	6.6%	5.1%	5.4%	6.2%
Professional, scientific, and technical services	4.5%	3.4%	2.6%	3.0%	4.8%	4.8%	6.0%	4.9%
Management of companies and enterprises	0.3%	0.8%	n.d.	n.d.	n.d.	0.2%	0.1%	n.d.
Administrative and waste services	3.5%	3.1%	n.d.	n.d.	n.d.	4.3%	3.0%	2.7%
Educational services	0.9%	n.d.	n.d.	0.5%	n.d.	0.6%	1.0%	0.8%
Health care and social assistance	7.4%	3.3%	n.d.	4.6%	n.d.	11.1%	9.9%	5.7%
Arts, entertainment, and recreation	1.8%	0.5%	1.2%	2.3%	3.1%	1.8%	2.1%	n.d.
Accommodation and food services	8.8%	6.2%	8.3%	7.7%	9.9%	7.0%	8.0%	n.d.
Other services, except public administration	5.4%	4.6%	5.3%	n.d.	5.1%	6.1%	5.9%	6.2%
Federal, civilian govt	1.9%	0.3%	0.8%	2.4%	2.5%	1.2%	3.2%	1.1%
Military	1.6%	0.8%	1.1%	1.0%	0.9%	0.8%	0.9%	0.9%
State government	3.9%	0.5%	1.8%	1.9%	2.1%	1.4%	1.8%	3.0%
Local government	11.0%	11.1%	15.5%	14.3%	12.3%	7.8%	10.6%	12.1%

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.
http://www.bea.gov/regional/docs/footnotes.cfm?tablename=CA25N
Regional Economic Information System

FIGURE 5-12
Non-Farm Employment, Contribution by Industrial Sector for County and State (2007)



Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. http://www.bea.gov/regional/docs/footnotes.cfm?tablename=CA25N.

As can be seen from the list of major employers presented in **Table 5-13**, businesses associated with energy resources predominate in Campbell and Converse counties and education, health-care, and local government service providers are important employers in all of the counties.

TABLE 5-13
Top 10 Major Employers in each County within the Study Area

Enterprise	Number of Employees	Product or Service
Campbell County		
Campbell County School District	1,400	Education
Rio Tinto Energy America	990	Mining
Thunder Basin Coal Co.	1,100	Mining
Powder River Coal Co.	1,565	Mining
Campbell Co. Memorial Hospital	860	Health Care
Campbell County	564	Government
Foundation Coal West	548	Mining
Hettinger Welding	300	Welding
Wal-Mart	230	Retail
City of Gillette	226	Government
Converse		
Powder River Coal Co – North Rochelle Mine	375	Mining
Converse County School District	300	Education
Kennecott Energy – Antelope Coal Mine	291	Mining
Memorial Hospital of Converse Co	247	Health Care
Union Pacific	200	Railroad
Dave Johnson Power Plant	196	Power Plant
Converse County	100	Government
Power Resources Uranium Mine	79	Mining
City of Douglas	63	Government
Safeway	55	Retail
Crook		
Nieman Sawmill	102	Timber
Crook County Medical Services	101	Health Care
Sundance Schools	100	Education
Moorcroft Schools	80	Education
Timber Industry	70	Timber
Hulett Schools	57	Education
Crook County	53	Government
Powder River Energy Corp	47	Utility
Energy Electric	33	Construction
WYDOT	33	Transportation
Johnson		
Johnson Co. Memorial Hospital	238	Health Care
Johnson Co. School District	227	Education
Three Way Inc	193	Pipeline contractors
Johnson Co	82	Government

TABLE 5-13
Top 10 Major Employers in each County within the Study Area

Enterprise	Number of Employees	Product or Service
Bureau of Land Management	80	Federal Government
SANJEL	50	Oilfield Service
DJ's Thriftway	50	Retail grocery
City of Buffalo	47	Government
Best Western Crossroads Inn	42	Hotel
Rocky Mountain IGA	45	Retail grocery
Natrona		
Natrona County School District No. 1	1,427	Education
Wyoming Medical Center	946	Health Care
Key Energy	620	Energy Production
TIC (The Industrial Company)	600	Industrial Builders
City of Casper	507	City Government
Wal-Mart	386	Retail
JW Williams	357	Oil and Gas Engineering
Office Max	339	Call Center
Casper College	331	Education
Wyoming Machinery Company	315	Caterpillar Dealer
Sheridan		
Sheridan Co. School Dist. #2	NA	Education
VA Medical Center	NA	Health Care
Sheridan County Memorial Hospital	NA	Health Care
Wal-Mart	NA	Retail
Holiday Inn	NA	Hotel
BNSF Railroad	NA	Railroad
Rehab Enterprises of NE Wyoming	NA	Healthcare
Sheridan County School District	NA	Education
Sheridan College	NA	Education
Weston		
Weston County School District #1	1,200	Education
Weston County Hospital and Manor	138	Health Care
Jacobs Ranch Mine	130	Mining
Weston Co School District #7	86	Education
Wyoming Refining Company	76	Oil Refining
Weston County	58	Government
Dixon Brothers	35	Trucking
City of Newcastle	33	Government
Union State Bank	9	Financial Services
Town of Upton	7	Government

NA = information was not available.

Source: Wyoming – Community Profiles http://www.whywyoming.org/communities/

Construction Labor Characteristics. From 2001 to 2007, state employment in the construction industry increased by 9,434 jobs as is reported in **Table 5-14**. Within the Study Area, Campbell County led with 1,310 new construction jobs, followed by Natrona County, which saw construction employment increase by 1,267. The remaining counties within the Study Area also showed increases in jobs with Sheridan County up by 586, Johnson County by 240, Crook County by 184, Converse County by 138, and Weston County by 31. In the Study Area, construction employment grew by 3,756 jobs from 8,808 jobs in 2001 to reach 12,564 in 2007.

The average annual wage for persons in construction and extraction occupations for the state of Wyoming (as of May 2006) was $39,194, which was 14 percent higher than the average for all occupations ($34,246).

TABLE 5-14
Construction Employment

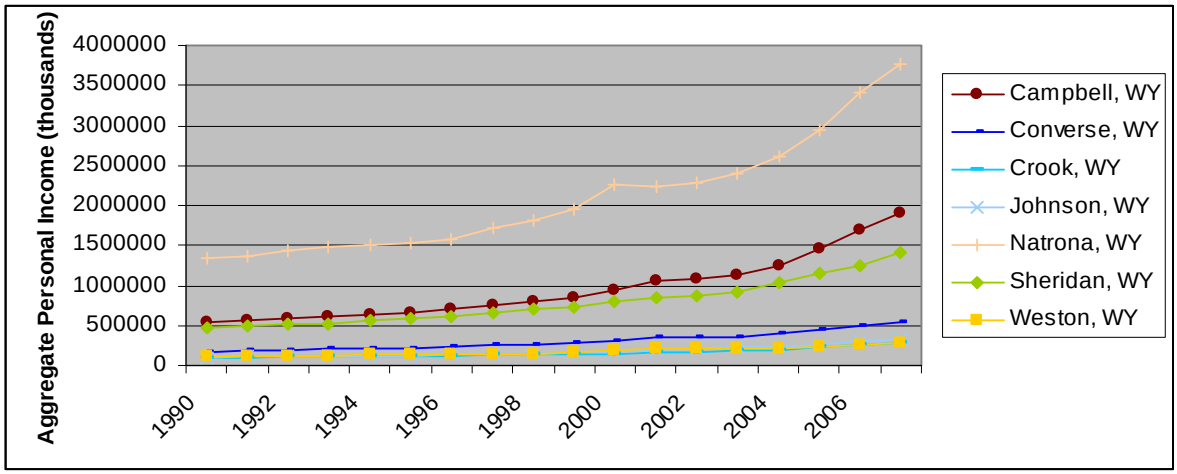
Area	2001	2007	Change
Wyoming	**27,226**	**36,660**	**9,434**
Campbell	2,667	3,977	1,310
Converse	572	710	138
Crook	287	471	184
Johnson	396	636	240
Natrona	2,997	4,264	1,267
Sheridan	1,536	2,122	586
Weston	353	384	31
Study Area	8,808	12,564	3,756

Source: Wyoming Department of Administration and Information, Economic Analysis Division. http://eadiv.state.wy.us/i&e/wyemp01_07.htm.

Earnings and Income. Total aggregate personal income increased in each of the counties over the period 1990 through 2007 (unadjusted for inflation), remained steady in the first decade and then increased over the remainder of the period, as shown in **Figure 5-13**. Aggregate income is lowest in Crook County at $274 million in 2007. Natrona County's personal income was the highest in the Study Area, reaching $3.77 billion in 2007 and in Campbell County, personal income was over $1.9 billion. The Study Area's share of personal income in the state ranged between about 32 and 36 percent over the period. In 2007, the share of the statewide total contributed by Campbell County was 7.7 percent, which compares to Natrona County's 15.3 percent and Crook County's 1.1 percent.

Per capita personal income has also risen, as shown in **Figure 5-14** and **Table 5-15**, and that of Natrona County residents has consistently exceeded that of the state. In 2007, Natrona County's per capita personal income of $52,543 was the highest in the Study Area and exceeded the state level of $47,047. Campbell County's personal per capita income of $47,151, about matched that of the state, while Johnson County, with $40,462 in per capita personal income, was ranked the lowest in the Study Area.

FIGURE 5-13
Aggregate Personal Income by County (1990 to 2007)



Source: BEA and CH2M HILL, 2010.

FIGURE 5-14
Per Capita Personal Income for the State and the Counties in the Study Area

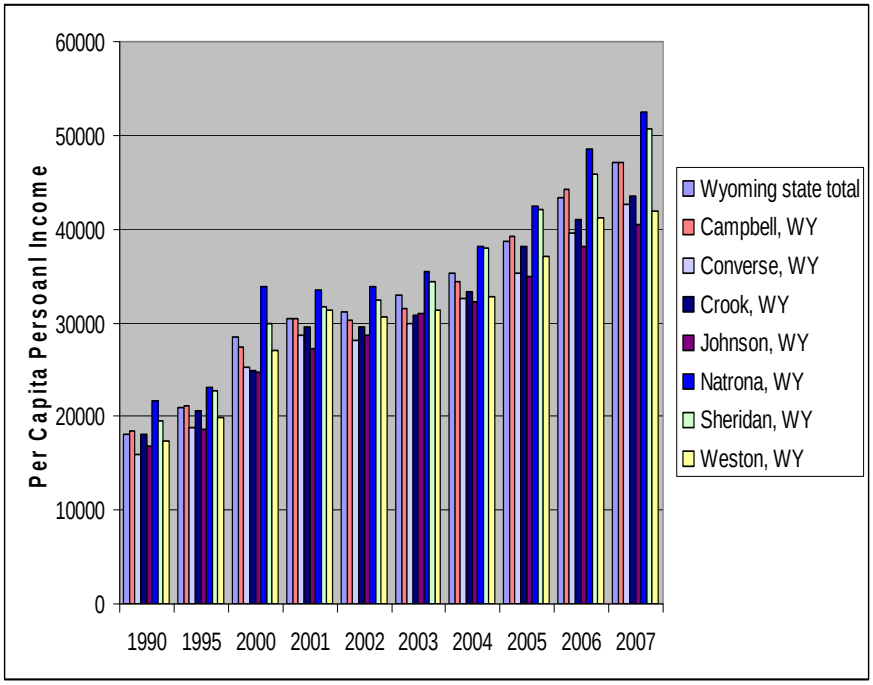


TABLE 5-15
Per Capita Personal Income (not adjusted for inflation)

Area	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
Wyoming Total	18,002	21,039	28,470	30,374	31,115	32,902	35,314	38,755	43,381	47,047
Campbell, WY	18,453	21,163	27,391	30,512	30,182	31,480	34,350	39,172	44,317	47,151
Converse, WY	15,913	18,738	25,270	28,575	28,104	29,879	32,571	35,373	39,527	42,602
Crook, WY	18,117	20,684	24,841	29,623	29,507	30,814	33,263	38,199	41,041	43,462
Johnson, WY	16,777	18,658	24,668	27,199	28,640	30,923	32,237	34,897	38,179	40,462
Natrona, WY	21,732	23,191	33,907	33,482	33,847	35,479	38,081	42,414	48,605	52,543
Sheridan, WY	19,551	22,784	29,846	31,711	32,331	34,425	38,033	42,068	45,800	50,669
Weston, WY	17,452	19,814	27,054	31,322	30,646	31,350	32,820	37,110	41,113	41,992

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. http://www.bea.gov/regional/docs/footnotes.cfm?tablename=CA1-3, Accessed February 2010.

5.4.2.2 Governmental Revenues and Finances

Assessed Property Values. The assessed value of real property is the major source of *ad valorem* taxes. Properties are assessed at both the state and local (county) levels—the state assesses the value of utility and mineral properties and the counties assess residential, agricultural, commercial, and industrial land and improvements.

The total assessed value of real property in 2009 for the seven-county Study Area was $10.7 billion as displayed in **Table 5-16**. Of this total, 53 percent was contributed by Campbell County; 17 percent was contributed by Johnson County; 12 percent was contributed by Natrona County; 7.4 percent was contributed by Sheridan County; and 10 percent was contributed by the remaining counties. Together, the counties in the Study Area accounted for about 36.5 percent of the assessed value of all real property in Wyoming.

TABLE 5-16
Assessed Valuation by Type of Property and County (2009)

	Locally Assessed Valuation				State Assessed Valuation		
County	**Agricultural Land**	**Commercial Land, Improvements, and Personal Property**	**Residential Land, Improvements, and Personal Property**	**Industrial Property**	**Non-minerals (Utilities, Railroads, and Airlines)**	**Minerals**	**Total**
Campbell	$8,227,417	$212,724,975	$65,107,868	$475,259,582	$124,775,167	$4,824,459,509	$5,710,554,518
Converse	$10,251,267	$75,888,815	$17,019,398	$66,308,730	$112,966,174	$412,496,651	$311,478,077
Crook	$10,386,518	$42,974,792	$7,353,471	$9,554,807	$6,804,430	$135,205,437	$595,732,413
Johnson	$12,358,717	$78,113,249	$18,151,660	$95,591,282	$4,855,558	$1,614,781,191	$1,823,851,657
Natrona	$6,095,732	$444,883,447	$178,938,207	$75,737,918	$43,371,447	$538,905,675	$1,287,932,426
Sheridan	$10,824,844	$272,798,792	$57,457,247	$36,245,084	$14,162,267	$402,035,450	$793,523,684
Weston	$4,192,152	$32,958,352	$4,837,830	$8,362,567	$13,673,818	$92,308,876	$156,333,595
Study Area	$62,336,647	$1,160,342,422	$348,865,681	$767,059,970	$320,608,861	$8,020,192,789	$10,679,406,370
State Total	**$199,817,548**	**$4,443,480,331**	**$1,113,103,301**	**$1,958,387,669**	**$1,107,862,470**	**$20,396,881,862**	**$29,219,533,181**

Source: Wyoming Department of Revenue, 2007.

Of the six types of properties assessed, the greatest contribution is associated with mineral properties which accounted for over 84 percent of the total assessed value in Campbell County and 75 percent of total assessed value in the Study Area. For the state as a whole, the contribution was about 70 percent. In Campbell County, the second largest contribution is associated with industrial properties (8.3 percent of the total) and agricultural land with about .1 percent of the total, contributes the smallest share.

Ad valorem taxes (calculated by applying county- and use-specific mill rates to the assessed value of property) support a number of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education. **Table 5-17** displays the major beneficiaries of *ad valorem* taxes at the state level.

TABLE 5-17
Beneficiaries of *Ad Valorem* Taxes in Wyoming (2007)

Beneficiary	Percent of Total
Schools	54.47
Counties	18.53
Foundation Program	18.73
Special Districts	6.91
Municipalities	1.36

Source: Wyoming Department of Revenue, 2007.

Sales, Use, and Lodging Taxes. Sales and use tax collections are two principal sources of revenue for state and local governments. Local governments can also impose a lodging tax. The rates for each of these taxes for the counties of the Study Area are shown in **Table 5-18**.

TABLE 5-18
Wyoming Sales, Use, and Lodging Tax Rates by County (effective January 1, 2009)

County	State Tax Rate	General Purpose Option	Specific Purpose Option	Total Sales and Use Tax Rate	Local Government	Lodging Tax Rate	Total Tax Rate
Campbell	4%	1%		5%	Campbell	2%	7%
Converse	4%	1%		5%	Converse	3%	8%
Crook	4%	1%	1%	6%	Crook	2%	8%
Johnson	4%	1%		5%	Johnson	2%	7%
Natrona	4%	1%		5%	Natrona	3%	8%
Sheridan	4%	1%	1%	6%	Sheridan only*	4%	10%
Weston	4%	1%		5%	Weston	4%	9%

* Lodging tax is imposed only in these cities or towns, i.e. not on a county-wide basis.

Source: Wyoming Sales, Use and Lodging tax Revenue Report, 2009. p. 10.
http://eadiv.state.wy.us/s&utax/Report_FY09.pdf

Sales Tax. The state-imposed sales tax rate is 4 percent and revenues collected are divided 69 percent to the state and 31 percent to the counties. Each of the counties of the Study Area imposes a 1 percent general purpose optional sales tax, as is shown in Table 5-18. Revenue derived from the optional sales tax, less administrative costs, is returned by the state to the county of origin. Total sales tax collections for the years 2007 through 2009 for each county in the Study Area are presented in **Table 5-19**. In fiscal year (FY) 2009, Campbell County collected over $163 million, accounting for close to 19 percent of the state total. Sales tax collections in Natrona County were about $102 million, Sheridan County about $36 million, Converse County close to $24 million, Johnson County approximately $16 million, and Crook and Weston counties were each about $5 million.

TABLE 5-19
Sales and Use Tax Collections by County (2007-2009)

	Total Sales Tax Collections by County		
County	**FY 2007**	**FY 2008**	**FY 2009**
	Total Taxes	Total Taxes	Total Taxes
Campbell	$137,822,376	$153,037,064	$163,087,080
Converse	$15,066,741	$17,911,639	$23,819,787
Crook	$5,011,478	$5,526,730	$5,421,838
Johnson	$15,403,002	$14,740,268	$15,732,777
Natrona	$93,393,353	$103,055,887	$102,415,653
Sheridan	$31,194,308	$39,166,921	$35,814,045
Weston	$4,660,348	$4,624,664	$4,889,516
State of Wyoming	$799,254,374	$849,216,844	$863,512,486

	Total Use Tax Collections by County		
County	**FY 2007**	**FY 2008**	**FY 2009**
	Total Taxes	Total Taxes	Total Taxes
Campbell	$17,317,851	$20,783,856	$20,354,359
Converse	$1,888,515	$2,419,868	$3,072,352
Crook	$1,179,713	$1,261,553	$988,683
Johnson	$1,441,142	$1,265,030	$790,289
Natrona	$7,493,952	$9,557,224	$9,750,220
Sheridan	$3,801,338	$3,441,550	$6,014,307
Weston	$1,141,330	$1,491,530	$1,266,220
State of Wyoming	$113,045,113	$124,173,967	$118,196,963

Source: Wyoming Sales, Use and Lodging Tax Revenue Report, 2009. pgs. 17, 50.
http://eadiv.state.wy.us/s&utax/Report_FY09.pdf

Use Tax. A state use tax is imposed on purchases made outside a taxing jurisdiction for first time, storage, or other consumption within that jurisdiction thus preventing sales tax avoidance. Use tax is a complement to sales tax. Effective January 1, 1981, the adoption of an optional sales tax required a change in the use tax rate of equal amount. The state-imposed tax rate is 4 percent. State use tax collections are shared between state government and the county of origin on the same distribution basis as sales tax. Use tax collections for the state totaled less than 14 percent of the sales tax revenues in 2009. Use tax collections by year and county are shown in Table 5-18.

Lodging Tax. Cities, towns, and counties may impose an excise tax of up to 4 percent on all sleeping accommodations for guests staying less than 30 days. All tax collections, less state administrative costs, are distributed to the taxing jurisdiction. At least 90 percent of the tax distributions must be used to promote travel and tourism. The tax collections for each of the counties, cities and towns comprising the Study Area are shown in **Table 5-20**.

Industrial Siting Impact Assistance Funds. Under the ISA statutes (Wyoming State [W.S.] 35-12-101 through 35-12-109), the criteria that potential industrial facilities must meet to be awarded a construction permit (found at W.S. 35-12-102[a][vii]) also qualify a county or town to receive industrial impact assistance tax payments. The impact assistance payments are distributed to the county treasurer, and the county treasurer distributes to the county and to the cities and towns therein based on a ratio established by the ISC during a public hearing held in accordance with W.S. 35-12-110. The ISC reviews the distribution ratio for construction projects on a regular basis and makes appropriate adjustments.

A governing body that is primarily affected by the facility, or any person issued a permit pursuant to W.S. 35-12-106, may petition the ISC for review and adjustment of the distribution ratio upon a showing of good cause. The impact assistance payment is in addition to all other distributions under this section, but no impact assistance payment is made for any period in which the county or counties are not imposing at least a 1 percent tax authorized by W.S. 39-15-204(a)(i) and 39-16-204(a)(i) or at least a total of a 2 percent sales tax authorized under W.S. 39-15-204(a)(i), (iii) and (vi) and at least a total of a 2 percent use tax authorized under W.S. 39-16-204(a)(i), (ii) and (v). The project is deemed to be located in the county in which a majority of the construction costs will be expended, provided that upon a request from the county commissioners of any adjoining county to the ISC, the council may determine that the social and economic impacts from construction of the industrial facility or federal or state government project upon the adjoining county are significant and establish the ratio of impacts between the counties and certify that ratio to the state treasurer who will thereafter distribute the impact assistance payment to the counties pursuant to that ratio.

This program of industrial impact assistance tax payments is designed to assist cities, towns, or counties in deflecting the impact a major industrial project may have on community resources. This program measures the increase in tax revenue caused by the industrial project and matches that increase with additional monies from the state General Fund to help communities respond to project-related impacts. This tax distribution is transferred from the state General Fund, via the office of the State Treasurer, directly to County Treasurers' offices.

TABLE 5-20
Lodging Tax Collections by County and Local Entity (1998-2009)

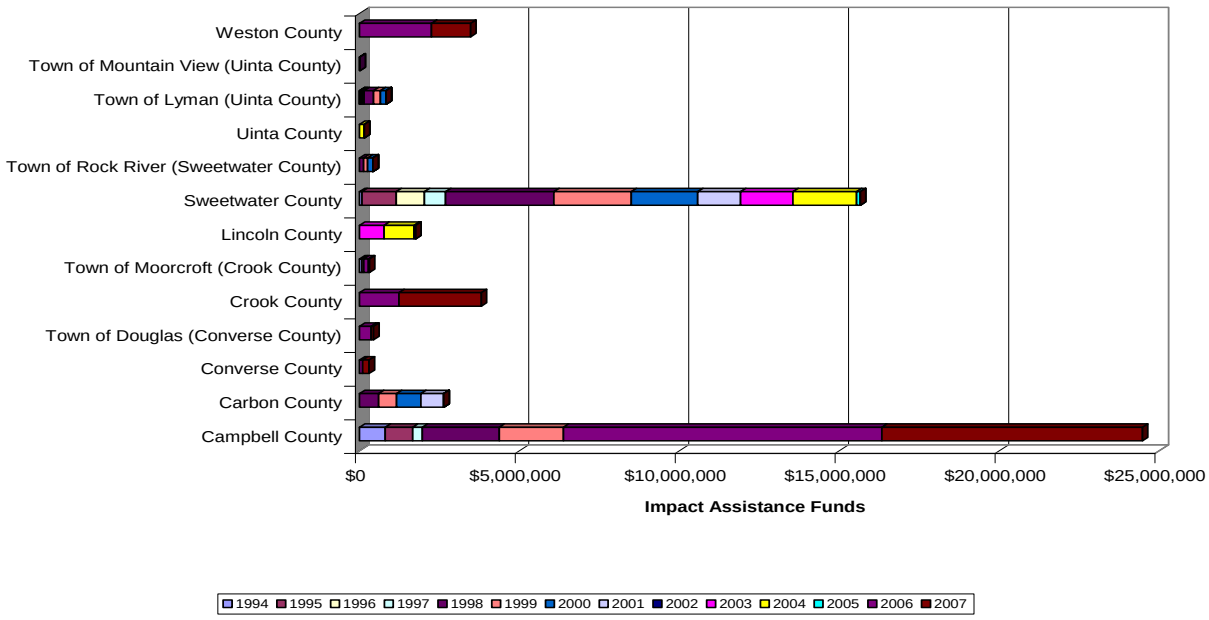
Area	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Campbell County	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	($1,010)
Gillette	$141,447	$169,749	$191,230	$196,793	$219,385	$220,235	$230,215	$251,211	$51,226	$0	$0	$123,894
Wright	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,820
TOTAL	$141,447	$169,749	$191,230	$196,793	$219,385	$220,235	$230,215	$251,211	$51,226	$0	$0	$129,704
Converse County	$4,507	$4,416	$4,431	$3,455	$2,955	$3,822	$4,603	$4,179	$4,553	$4,484	$7,697	$13,701
Douglas	$45,085	$58,095	$58,310	$48,933	$55,896	$57,393	$84,436	$104,480	$130,936	$159,723	$197,526	$184,532
Glenrock	$992	$1,355	$1,895	$2,195	$2,849	$2,554	$3,865	$3,763	$2,670	$3,878	$3,530	$6,300
TOTAL	$50,584	$63,866	$64,636	$54,583	$61,701	$63,769	$92,904	$112,421	$138,158	$168,085	$208,753	$204,533
Crook County	$7,373	$8,318	$7,721	$5,907	$6,314	$7,297	$6,676	$6,720	$7,059	$8,336	$9,275	$8,717
Moorcroft	$3,262	$4,137	$4,606	$4,780	$5,057	$4,972	$4,877	$4,120	$5,752	$6,603	$6,984	$7,919
Sundance	$19,266	$20,845	$24,115	$25,259	$24,262	$27,241	$25,113	$24,571	$25,761	$30,872	$33,052	$30,236
Hulett	$995	$920	$1,886	$3,179	$2,915	$3,528	$3,502	$4,303	$4,121	$4,491	$8,446	$11,262
Pine Haven	$0	$0	$0	$0	$0	$0	$0	$0	$49	$120	$141	$172
TOTAL	$30,896	$34,220	$38,328	$39,125	$38,548	$43,038	$40,168	$39,714	$42,741	$50,422	$57,899	$58,306
Johnson County	$29,770	$31,478	$31,922	$32,797	$31,121	$32,814	$33,258	$31,557	$34,242	$34,826	$28,609	$27,863
Buffalo	$35,027	$41,099	$46,856	$57,682	$57,908	$63,048	$64,807	$64,216	$75,908	$91,733	$106,190	$98,859
Kaycee	$959	$751	$644	$1,328	$1,346	$1,340	$1,436	$1,841	$1,983	$2,253	$2,343	$2,403
TOTAL	$65,756	$73,328	$79,422	$91,807	$90,376	$97,203	$99,501	$97,614	$112,133	$128,812	$137,142	$129,125
Natrona County	$59,320	$66,922	$38,715	$7,905	$9,924	$13,501	$16,494	$18,955	$10,575	$98,071	$118,348	$96,924
Bar Nunn	$190	$1,119	$1,207	$1,086	$1,141	$1,428	$1,786	$3,000	$2,740	$2,639	$0	$0
Casper	$198,689	$194,555	$239,124	$320,458	$435,095	$445,254	$495,972	$515,190	$609,841	$562,380	$635,505	$827,616
Edgerton	$1,005	$1,104	$1,176	$1,534	$2,374	$1,691	$3,312	$3,718	$4,730	$3,812	$3,818	$3,245
Evansville	$20,212	$21,695	$33,283	$45,562	$61,643	$58,035	$59,380	$80,629	$100,098	$181,317	$251,286	$245,033
Mills	$949	$0	$766	$544	$171	$200	$989	$1,986	$2,181	$8,027	$0	$0
TOTAL	$280,365	$285,396	$314,271	$377,089	$510,348	$520,110	$577,933	$623,478	$730,165	$856,247	$1,008,958	$1,172,819
Sheridan County	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sheridan	$137,994	$150,326	$173,425	$170,336	$173,508	$174,554	$191,495	$214,636	$450,132	$552,138	$592,804	$558,886
TOTAL	$137,994	$150,326	$173,425	$170,336	$173,508	$174,554	$191,495	$214,636	$450,132	$552,138	$592,804	$558,886
Weston County	$17,562	$15,891	$14,238	$15,706	$16,233	$13,599	$14,268	$15,028	$30,120	$36,124	$36,964	$35,601
Newcastle	$6,009	$6,952	$7,360	$8,776	$8,871	$7,936	$7,345	$9,731	$18,797	$24,347	$28,906	$27,041
Upton	$950	$781	$768	$945	$1,015	$1,797	$1,182	$1,222	$2,741	$4,087	$4,814	$8,631
TOTAL	$24,521	$23,625	$22,366	$25,427	$26,119	$23,332	$22,795	$25,982	$51,659	$64,559	$70,684	$71,274
STATE TOTAL	**$2,884,671**	**$3,115,266**	**$3,369,913**	**$3,603,625**	**$3,939,521**	**$4,108,475**	**$4,738,192**	**$4,960,822**	**$5,859,863**	**$6,843,052**	**$7,825,924**	**$8,049,157**

Source: State of Wyoming, Department of Revenue

Source: Wyoming Sales, Use and Lodging Tax Revenue Report, 2009. pgs. 66-68
http://eadiv.state.wy.us/s&utax/Report_FY09.pdf

Figure 5-15 illustrates the impact assistance tax payments received from FY 1994 through 2007 by counties and cities or towns. These totals represent the amount of extra revenue counties, cities, and towns receive in direct proportion to any increase in their tax collection to mitigate project-related impacts.

FIGURE 5-15
Impact Assistance Tax Payments (1995 through 2007)



Source: Wyoming Department of Revenue, 2007.

Table 5-21 provides the impact assistance funds in tabular form covering the period from fiscal year 2000 to fiscal year 2009. In 2008, Campbell County received about $3.3 million in impact assistance funds and this figure increased to over $11 million in 2009. Natrona County received about $36,000 in 2008 and over $208,000 in 2009. In Crook County impact assistance funds totaled about $506,000 in 2008 and almost $1.9 million in 2009.

TABLE 5-21
Distributions of Impact Assistance Fees FY 2000 through FY 2009 by Entity and by Source (Sales or Use Tax)

Entity	Sales Tax	Use Tax	Total
FY 2000			
Campbell County	0.00	0.00	0.00
Carbon County	226,643.73	535,189.23	761,832.96
Sweetwater County	1,960,798.00	115,214.91	2,076,012.91
Town of Lyman	170,504.19	10,018.69	180,522.88
Town of Rock River	49,751.96	117,480.56	167,232.52
Totals	*2,407,697.88*	*777,903.39*	*3,185,601.27*
FY 2001			
Campbell County	0.00	0.00	0.00
Carbon County	476,011.62	242,543.31	718,554.93
Sweetwater County	1,198,702.46	142,096.02	1,340,798.48

TABLE 5-21
Distributions of Impact Assistance Fees FY 2000 through FY 2009 by Entity and by Source (Sales or Use Tax)

Entity	Sales Tax	Use Tax	Total
Town of Lyman	0.00	0.00	0.00
Town of Rock River	0.00	0.00	0.00
Totals	*1,674,714.08*	*384,639.33*	*205,935,341*
FY 2002			
(No Distributions)			
Totals	*0.00*	*0.00*	*0.00*
FY 2003			
Lincoln County	524,282.23	246,694.23	770,976.46
Sweetwater County	1,114,099.80	524,225.26	1,638,325.06
Totals	*1,638,382.03*	*770,919.49*	*2,409,301.52*
FY 2004			
Lincoln County	724050.90	211,446.58	935,497.48
Sweetwater County	1,538,608.08	449,324.02	1987932.10
Uinta County	156,893.89	0.00	156,893.89
Totals	*2,419,552.87*	*660,770.60*	*3,080,323.47*
FY 2005			
Lincoln County	46,763.52	7,649.75	54,413.27
Sweetwater County	99,372.45	16,255.71	115,628.16
Totals	*146,135.97*	*23,905.46*	*170,041.43*
FY 2006			
Campbell County	8,901,406.34	1,053,142.52	9,954,548.86
Weston County	2,014,515.51	238,217.83	2,252,733.34
Crook County	1,106,748.79	131,334.75	1,238,083.54
Converse County	88539.90	10,506.77	99,046.67
Town of Moorcroft	130,223.98	15,387.49	145,611.47
Town of Douglas	325,559.97	38,468.76	364,028.73
Totals	*12,566,994.49*	*1,487,058.12*	*14,054,052.61*
FY 2007			
Campbell County	6,680,926.52	1,464,055.95	8,144,982.47
Weston County	1,006,608.07	217821.70	1,224,429.77
Crook County	2,104,969.45	468,253.93	2,573,223.38
Converse County	168,397.58	37460.30	205,857.88
Town of Moorcroft	26,119.04	5531.80	31,650.84
Town of Douglas	65,297.61	13,329.49	78,627.10
Totals	*10,052,318.27*	*2,206,453.17*	*12,258,771.44*

TABLE 5-21
Distributions of Impact Assistance Fees FY 2000 through FY 2009 by Entity and by Source (Sales or Use Tax)

Entity	Sales Tax	Use Tax	Total
FY 2008			
Converse County	270,356.14	18,600.25	288,956.39
Natrona County	36,147.95	0.00	36,147.95
Johnson County	46,220.39	11,939.75	58,160.14
Campbell County	2,719,569.81	577390.00	3,296,959.81
Crook County	421,433.99	84,912.54	506,346.53
Albany County	2,375.93	0.00	2,375.93
Carbon County	13,463.55	0.00	13,463.55
Weston County	95,276.54	31,314.16	126590.70
Sheridan County	50,239.54	12,977.98	63,217.52
Totals	*3,655,083.84*	*737,134.68*	*4,392,218.52*
FY 2009			
Carbon County	11,087,114.34	0.00	1,087,114.34
Albany County	150,558.51	0.00	150,558.51
Converse County	1,252,801.51	116,384.88	1,369,186.39
Natrona County	192,575.18	15,445.96	208,021.14
Campbell County	9,502,831.94	1,564,746.31	11,067,578.25
Weston County	199,235.37	35,591.41	234,826.78
Crook County	1,621,844.45	256,516.41	1,878,360.86
Johnson County	123,849.01	22,124.39	145973.40
Sheridan County	134,618.47	24,048.26	158,666.73
Totals	***14,265,428.78***	***2,034,857.62***	***16,300,286.40***

Source: State of Wyoming Department of Revenue 2009 Annual Report. Pg 20.
http://revenue.state.wy.us/PortalVBVS/uploads/Department%20of%20Revenue%20%2010.29.2009.pdf.

5.4.2.3 Future Economic Conditions

Rule I Section 7(i)(ii)(A) – A study of the area economy including a description of methodology used. The study may include, but is not limited to, the following factors:

(A) Employment projections by major sector

Economic Projections. The following description of potential future economic conditions in Wyoming is derived from the report entitled *10 Year Outlook Wyoming Economic and Demographic Forecast 2007 to 2016*, prepared by the Wyoming Department of Administration and Information (EAD, 2007a). Because this report was prepared in 2007, it does not reflect the unanticipated economic downturn in 2008. However, such forecasts are intended to capture the long term trend rather than year to year variations.

Wyoming's economy is largely driven by natural resources, and in 2005, the mining industry contributed approximately one-third of both the state's total earnings growth and

job growth. In addition, the multiplier effect associated with the mining industry results in stimuli in many other industries such as wholesale trade, transportation, and professional and business services. The total job growth rate of 4.9 percent in 2006 was the second highest in the nation, and the personal income growth rate of 10.4 percent in 2006 was virtually the highest. The mining industry provides high-paying jobs, and as such, its strong presence in Wyoming means that income growth in the state is always closely associated with mining activity. Housing permits in Wyoming have outpaced the western United States and the United States as a whole since 2003. Residential construction is expected to slow down; however, housing in the state is expected to remain very affordable compared to the national average.

Wyoming's population is aging rapidly and is expected to continue to do so. In 2000, the median age of 36.2 in the state passed the national average of 35.3. By 2010, the expected median age of 39.3 for Wyoming will be 2.3 years older than the United States level, and the size of the older population (age 65 and over) will reach over 81,000 by 2014, compared to today's 61,000.

Although mining jobs are expected to slow to more sustainable levels, the increased demand for the natural resources in the state from national markets will help provide a steady source of mining jobs and revenues for the state. Outside of the mining industry, however, the state's future prospects will be somewhat limited by a job market that fails to attract high-growth job opportunities. Although migration has recently reversed to a positive trend, many younger workers will move to other states with more versatile job opportunities. Wyoming is the least diversified state in the nation in terms of employment distribution across industries.

Mining Industry. The mining sector has been the greatest contributor of economic and revenue activity in Wyoming's recent history. After it experienced a boom in the late 1970s, a bust in the mid-1980s, and a slow and steady decline in the 1990s, the mining sector demonstrated strong growth from 2000 to 2007. The 33,000 mining jobs in 1981 were the highest level on record, and tallied 14.7 percent of total Wyoming non-agricultural wage and salary employment. However, by 1999, the number shrank to only 15,500. The employment increased 5.6 percent in 2000 and another 13 percent in 2001, holding up well in 2003 as commodity prices rebounded. The number of mining jobs went up again over 10 percent annually in 2004. The energy-driven growth continued through 2007, as low industrial diversity tied the state's fortunes to mining extraction, most recently dominated by natural gas production. Recent years have seen a slowdown in revenue and jobs from the state's mining industry, but a rebound is anticipated.

The state benefits from increases in mining activity in many ways. First, increased demand for oil, natural gas, and coal means increased mineral production revenue and sales and use tax collections for both state and local governments. In addition, because mining job salaries are over twice as much as the average for all other industries, increased demand for mining employment trickles down into the economy through increased per capita income and increased levels of consumer spending. On the other hand, the state's economy and revenue also fluctuate significantly along with the rise and fall of commodity prices.

Construction. Nationally, strong real estate and housing industries were strong until the recently when Wyoming experienced the slowdown in this sector much like the rest of the

nation. The housing boom's economic contribution mid-decade had been enormous, accounting for approximately one-fourth of real gross domestic product (GDP) growth over the period 2002 through 2007. The direct effects from housing are through construction activity, real estate transactions, and mortgage finance. The multiplier benefits are substantial, such as demand in numerous supplying industries, and the income earned from construction-related industries drives spending elsewhere in the economy. As the fastest growing sector in the 1990s, the construction industry in Wyoming added 7,100 jobs in that decade at an annual average rate of 5.2 percent. Again for 2002, the construction sector remained the strongest industry in the state, expanding by 1.9 percent due to historically low interest rates.

The substantial job growth in the general building and specialty trades subsectors is directly caused by the residential construction boom. From 1992 to 2002, total residential home permits averaged nearly 1,800 units per year, compared to an annual range of 500 to 800 units from 1987 to 1991. However, the number of permits expanded dramatically to 2,877 in 2003 and 3,318 in 2004. The single-family permits nearly doubled from 1,485 houses in 2001 to 2,815 in 2004 and 2,328 permits issued in 2003 broke the record set in 1980. Housing units authorized for the first 6 months of 2005 showed another 14 percent increase over the same period the previous year. Consistent with the national downturn in housing starts, the state saw the number of annual housing units fall to 2,669 in 2008, which is the lowest level since 2002.

Retail Sales. As the third-largest sector in Wyoming's economy, the retail trade industry (North American Industry Classification System [NAICS]) experienced fast job growth in the first half of the 1990s, averaging nearly 2 percent each year. However, it slowed down to only about 1 percent annually up until 2007, largely due to out-migration from the state. While the average increase rate for the FY 1991 to 2000 was 7.3 percent, the annual non-auto taxable retail sales were up only 3.1 percent from FY 2001 to FY 2003. However, mostly driven by strong natural gas exploration, expanding housing market, and net migration, the retail sales were robust again. For FY 2004, both the taxable non-auto and auto retail sales recorded significant expansions, at 15.1 and 12.9 percent, respectively. The non-auto retail sales continued the strong pace in FY 2005 and increased another 7.2 percent from the previous year's level. However, seemingly dragged down by the high gasoline prices, the automobile sales in the state almost came to a virtual stall, and only edged up a mere 1.4 percent during the past fiscal year. Much like the nation, the real concern for many retailers in the state is how to continue competing with remote sellers who do not have to charge sales tax.

Services. The economy is continuing its long-term trend of shifting more toward a service oriented than goods-oriented one. Much like the rest of the country, the service industries grew continually in Wyoming, even during the 1980s recession. The upward pace accelerated in the 1990s, at an annual rate of 3.3 percent. Despite the slowdown of the economy, total employment for various service industries still increased 2.5 and 2.2 percent in 2001 and 2002, respectively. Mainly caused by the decrease in food services and administrative services, overall employment increased only 1.6 percent in 2003 and 2.1 percent in 2004. The services sectors are forecasted to be the fastest growing industry—both in terms of growth rate and total number of new jobs. Business, social assistance, and health services will be the main drivers. Despite the structural difference between the

Wyoming and national economies, the growing pace in services sector is similar for both. The service sector industry was and will be the fastest growing sector in the Wyoming economy as it continues to undergo a structural shift from goods-producing to service-producing economy.

Tourism. With over $1 billion in direct expenditures and 28,000 jobs, Wyoming's travel and tourism industry is an important part of the overall economy, particularly for the northwest region of the state. The primary attractions for tourists are Yellowstone National Park and the Grand Teton National Park. Each year, millions of people from all over the world visit them. However, tourism itself is not classified as an independent or separate economic sector, but mainly included in accommodation and food services sector. Its economic effect crosses many retail trade- and services-related sectors such as gasoline stations, general merchandise stores, arts, entertainment, and recreation services. Unfortunately, most jobs directly connected with tourism are mostly lower skilled and lower paying by nature. Looking into the future, travel and tourism for Wyoming may not deviate much from the past trend (i.e., an extremely slow increase).

Government. As the largest employment sector for Wyoming, the government jobs sector is one of the mainstays in the state's economy, particularly in the southeast region. It also serves as a big stabilizer to the overall economy. During Wyoming's economic bust period of the 1980s, government employment only experienced a 1-year decline in 1986, while the state's total employment suffered 18 percent contraction from 1981 to 1987.

Because of the nature of a sparsely distributed population, state and local governments have to hire a relatively large number of employees to serve the residents, from public schools, fire districts, to road maintenance. The proportion of Wyoming's state and local government full-time employees was the highest in the country in 2003, at 869 per 10,000 population, while the national average was 542 employees. Other states with higher state/local government employee rates were also states with big land areas and low population such as Alaska, New Mexico, and Nebraska. The lower proportions of government employment are states with high population density such as Pennsylvania and Florida. Wyoming also ranked the third highest in terms of per capita state and local government expenditures in 2002.

In 2004, the government sector contributed 64,590 jobs, or one-fourth of the total, to Wyoming's economy. However, it was one of the slowest growing industries in the 1990s, but has performed well since 2000. It will remain a consistent and steady source for new jobs in the future. From 1990 to 2000, government in Wyoming created 5,500 jobs for an annual growth rate of 1 percent, compared with the overall growth rate of 1.9 percent for the state as a whole. Nearly all of the new jobs added were in local government, which includes K–12 education and hospitals. State government experienced only a slight increase while federal government recorded a minor decline during the same period. Since 2000, state government jobs increased 3.1 percent annually due to the accelerating revenues from mineral production.

Over the forecast period, the government sector is expected to add 4,870 new jobs, for a total of 69,460 jobs in 2014. Most of the growth is projected to occur in local government, with slower growth for state government and contraction for federal government.

Future Employment Growth. Over the period 2006 through 2016, non-agricultural employment in the state is forecast to increase by 1.6 percent annually, on average, as shown in **Table 5-22**. Several industrial sectors are expected to exceed this rate of growth, including the following: construction (2.7 percent), wholesale trade (2.3 percent), transportation and warehousing (2.5 percent), professional and business services (2.4 percent), education and health care (3.3 percent), leisure and hospitality (2.4 percent), and other services (1.8 percent). Some of the sectors with the lowest growth rates include utilities (0.5 percent), manufacturing (0.6 percent), and government (0.8 percent). As a result of these differing growth rates, the share that each sector contributes to total non-agricultural employment will change.

TABLE 5-22
2007 Forecast of Wyoming Nonagricultural Wage and Salary Employment (in thousands) (2006 and 2016)

			Change 2006 through 2016			Share of Total	
Nonagricultural Employment Type	**2006**	**2016**	**Numeric**	**Percent**	**Average Annual Percent**	**2006**	**2016**
Natural Resources and Mining	26,590	31,610	5,020	18.88%	1.74%	7.77%	7.87%
Utilities	2,300	2,410	110	4.78%	0.47%	0.67%	0.60%
Construction	23,610	30,900	7,290	30.88%	2.73%	6.90%	7.70%
Manufacturing	10,080	10,700	620	6.15%	0.60%	2.94%	2.66%
Wholesale Trade	8,200	10,280	2,080	25.37%	2.29%	2.40%	2.56%
Retail Trade	30,800	35,240	4,440	14.42%	1.36%	9.00%	8.78%
Transportation and Warehousing	11,290	14,470	3,180	28.17%	2.51%	3.30%	3.60%
Information	4,210	4,920	710	16.86%	1.57%	1.23%	1.23%
Financial Activities	11,100	12,690	1,590	14.32%	1.35%	3.24%	3.16%
Professional and Business Services	16,960	21,500	4,540	26.77%	2.40%	4.96%	5.35%
Education and Health Care	22,600	31,310	8,710	38.54%	3.31%	6.60%	7.80%
Leisure and Hospitality	32,520	41,010	8,490	26.11%	2.35%	9.50%	10.21%
Other Services	10,920	13,030	2,110	19.32%	1.78%	3.19%	3.25%
Government	65,550	70,730	5,180	7.90%	0.76%	19.15%	17.62%
Federal	7,330	7,330	0	0.00%	0.00%	2.14%	1.83%
State	15,310	16,090	780	5.09%	0.50%	4.47%	4.01%
Local	42,910	47,310	4,400	10.25%	0.98%	12.54%	11.78%
Total Nonagricultural Employment	**342,280**	**401,530**	**59,250**	**17.31%**	**1.61%**		

Source: Wyoming EAD, 2007.

Between 2002 and 2006, real personal income in the state of Wyoming increased at an average annual rate of 5.4 percent. During the period 2006 to 2016, real personal income in the state was projected in 2007 report to increase at an annual rate of 6.4 percent, as seen in **Table 5-23**. The projected rate of growth in the civilian labor force between 2006 and 2016 of

1.3 percent would be slightly lower than the rate experienced between 2002 and 2006 of 1.4 percent.

TABLE 5-23
Wyoming Personal Income, Wage and Salary Earnings, Labor Force, Employment, and Unemployment (2002, 2006, 2016)

	2002	2006	2016
Total Personal Income (Then-year $)	$15,463,330	$20,948,050	$34,481,470
Real Personal Income (2000-year $)	$14,995,590	$18,472,030	$34,481,470
Per Capita Personal Income (Then-year $)	$30,991	$40,676	$61,236
Per Capita Personal Income (2000-year $)	$30,053	$35,868	$44,372
Median Household Income (Then-year $)	$39,963	$48,351	$65,626
Wages and Salaries	$7,568,720	$10,497.020	$17,237,250
Civilian Labor Force	269,650	284,690	324,630
Number Employed	258,460	275,620	315,210
Number Unemployed	11,190	9,070	9,430
Unemployment Rate (Percent)	4.2	3.2	2.9

Source: Wyoming EAD, 2007a.

Growth in the construction sector is highly sensitive to both population growth and governmental spending on infrastructure. Between 2002 and 2006, employment in the construction sector increased at an average annual percentage rate of 4.4 percent. Between 2006 and 2016, that rate is projected to decline to 2.7 percent. Growth in total construction employment is expected to slow from 4.2 percent, on an average annual basis, between 1990 and 2004 to 3.8 percent between 2000 and 2014, as illustrated by the information presented in **Table 5-24**. Growth in heavy and civil engineering employment, however, is projected to increase in the future relative to its past trend. This long term forecast was prepared in 2007 and it does not reflect the slowdown in Wyoming's economy over the period from 2008 through the first quarter of 2010. Any new project that would increase construction employment in 2010 and early 2011 would help put the State's construction industry back on the path toward economic recovery.

TABLE 5-24
Construction Employment in Wyoming 1990, 2000, 2004, and 2014

	1990	2000	2004	2014 Projected	Change		Average Annual Change	
					1990 to 2004	2004 to 2014	1990 to 2004	2004 to 2014
Construction of Buildings	2,099	4,285	4,148	6,000	2,049	1,852	4.99%	3.76%
Heavy and Civil Engineering Construction	3,866	5,301	5,128	7,870	1,262	2,742	2.04%	4.38%
Special Trade Contractors	4,815	8,085	9,901	14,034	5,086	4,133	5.28%	3.55%
Total Construction	**10,780**	**17,671**	**19,177**	**27,904**	**8,397**	**8,727**	**4.20%**	**3.82%**

Source: Wyoming Statewide Long-Term Employment Projections by Industry: 2004-2014, Wyoming DOE, April 2007.

5.4.3 Construction Impacts

A variety of tools are available to estimate regional economic impacts, but by far the most widely used today are I-O models combined with social accounting matrices (SAMs). Referred to as I-O/SAM models, these tools form the basis for estimating economic impacts for industry (manufacturing, mining, construction) commercial business activity (restaurants, hotels) and agriculture (irrigation and livestock water uses).

The I-O/SAM model is an accounting framework that traces spending and consumption among various economic sectors, including businesses, households, government, and "foreign" economies in the form of exports and imports. "Direct effects" represent the response (e.g., change in value-added or employment) for a given industry's expenditures of final demand for that same industry. Value-added refers to the additional value of a commodity produced by that industry over the cost of commodities used to produce it from the previous stage of production. It is the *net* measure of the economic contribution of an industry to the regional economy less the intermediate goods and services used. "Indirect effects" represent the response by all local industries caused by the iteration of purchasing for a given industry. "Induced effects" represent the response by all local industries caused by the expenditures of new household income generated by the direct and indirect spending.

Collectively, indirect and induced effects are referred to as "secondary impacts." In their entirety, all of the previously discussed changes (direct and secondary) are referred to as "total economic impacts." By their nature, total impacts are greater than initial changes because of secondary effects. The magnitude of the increase is what is popularly termed a "multiplier effect." I-O models generate numerical multipliers that estimate indirect and induced effects. The I-O/SAM models are run using propriety software known as IMPLAN PRO (Input Output Model for Planning Analysis). IMPLAN is a modeling system originally developed by the USFS in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.

5.4.3.1 Construction Impacts on Employment and Value Added

Using IMPLAN software and data, transaction tables were estimated for the three potentially affected counties (Campbell, Crook, and Natrona) in Wyoming. These three counties comprise the direct region of influence and are upon where the analysis focuses. This region contains over 121,000 people and has over 45 thousand households.

Each transaction table in IMPLAN contains 509 economic sectors and allows users to estimate a variety of economic statistics. The most relevant measures for the purpose of understanding the economic impacts to the region due to the Project construction impacts are value-added and employment. For perspective, current economic conditions for the three-county region of influence in terms of employment, output, value-added and labor income derived from data compiled by the IMPLAN which uses the information provided by the U.S. Bureau of Economic Analysis (BEA), the BEA's Regional Economic Information System (REIS), the US Bureau of Labor Statistics, the Census of Agriculture, the US Bureau of the Census, the Bureau of Census Economic Census, the Bureau of Census Annual Survey of Manufacturers, and the Internal Revenue Service Quarterly Payroll File (FICA). The latest available data are for 2008 and appear in **Table 5-25**.

The top 10 industries in terms of their employment contribution to the region-wide economy are shown in Table 5-25. The region produces over $9.8 billion in annual value-added output per year and employs over 93 thousand people. Output (Column 3 in Table 5-25) is a measure of the total goods and services used and produced by a given industry and is closely related to sales. It does not net out the intermediate sales of goods and services and so is subject to double counting. Nevertheless, it does provide a measure of economic activity in terms of sales in the region.

The estimate of economic impacts from TPWRJ's construction activities on the three-county economic region is measured in terms of value-added and employment. Local construction costs for the Project are estimated to be $13.725 million for materials purchased locally and $1.352 million for local labor as shown in **Table 5-26**. These values reflect an estimate of expenditures predicted to be spent within the Study Area during the construction phase. Expenditures by industry sector are shown and are used as direct inputs into IMPLAN. The largest local expenditures from the Project are gravel and aggregates ($6.5 million) for site prep and roads, concrete ($3.3 million) for foundations, lodging ($985,000) and meals and incidentals ($591,000) for the outside labor force. For this analysis, it is assumed the outside labor force would send their payroll remittances to their home origins. It is also assumed the local labor force would spend their payroll within the local economy.

TABLE 5-25
Top 10 Industries by Employment in the Three Potentially Affected Counties

	Employment	Output	Labor Income (2010 dollars)	Total Value Added
Total for the Three County Area	**93,320**	**18,610,336,542**	**5,170,324,150**	**9,848,366,796**
Employment and payroll only (state and local government, education)	5,328	328,278,720	289,836,128	328,278,688
Mining coal	5,119	1,986,718,848	564,675,904	1,097,298,816
Wholesale trade businesses	5,044	988,537,024	374,236,352	644,242,112
Food services and drinking places	4,799	248,872,560	82,724,304	119,944,584
Employment and payroll only (state and local government, non-education)	3,572	222,350,160	196,312,192	222,350,160
Extraction of oil and natural gas	3,088	2,065,750,272	476,972,352	1,322,541,440
Construction of new nonresidential commercial and health-care structures	3,076	487,646,656	179,552,496	205,198,064
Support activities for oil and gas operations	3,055	947,568,256	231,730,400	428,424,576
Real estate establishments	2,827	402,358,784	71,206,920	317,460,032
Drilling oil and gas wells	2,219	1,847,455,488	221,815,088	1,066,758,080

Source: IMPLAN data for 2008.

TABLE 5-26
Local Expenditures

Category	Local Spending	Materials	Industry Sector	Industry Description	Labor	Industry Sector	Industry Description
1 TURBINE PROCUREMENT		$ -			$ -		
2 TPW CONSTRUCTION MANAGEMENT	Lodging	$140,900	411	Hotels and motels	$53,000	369	Construction engineering services
	Meals	$27,540	413	Food services and drinking places			
3 ENGINEERING		$5,000	369	Construction engineering services	$ -		
4 MOBILIZATION AND SITE	Surveying	$180,000	369	Surveying and mapping services	$290,000	369	Surveying and mapping services
5 CIVIL – SITE ROADS / CRANE PADS					$220,000	36	Construction of other new non-residential structures
	Site security	$200,000	387	Property protection services	$ -		
	Water trucks	$620,000	365	Industrial truck rental or leasing	$ -		
	Lodging	$20,000	411	Hotels and motels	$ -		
	Aggregates	$6,500,000	319	Gravel, construction, merchant wholesalers	$ -		
6 CIVIL – OFF SITE / IMPROVEMENTS		$ -			$ -		
7 FOUNDATIONS					$486,000	36	Construction of other new non-residential structures
	Foundations	$80,000	29	Building oil and gas well foundations on a contractual basis	$ -		
	Concrete	$3,300,000	161	Concrete batch plants (including temporary)	$ -		
	Equipment rental	$420,000	365	Construction machinery and equipment rental or leasing without operator	$ -		
	Lodging	$831,859	411	Hotels and motels			
	Meals	$499,116	413	Food services and drinking places			

TABLE 5-26
Local Expenditures

Category	Local Spending	Materials	Industry Sector	Industry Description	Labor	Industry Sector	Industry Description
8 WTG ERECTION AND INSTALLATION					$154,000	36	Construction of other new non-residential structures
	Lodging	$326,508	411	Hotels and motels	$ -		
	Meals	$64,505	413	Food services and drinking places			
	Equipment rental	$40,000	365	Construction machinery and equipment rental or leasing without operator	$ -		
9 ELECTRICAL COLLECTION SYSTEM		$40,000	319	Power transmission equipment, electrical, merchant wholesalers	$77,000	36	Construction of other new non-residential structures
10 SUBSTATION		$75,000	266	Substation transformers, electrical power distribution, manufacturing	$ -		
11 TRANSMISSION LINE		$25,000	319	Power transmission equipment, electrical, merchant wholesalers	$22,000	36	Construction of other new non-residential structures
12 INTERCONNECTION					$ -		
13 METEOROLOGICAL TOWERS		$ -			$ -		
14 O&M BUILDING	Everything but the steel building frame	$330,000	319	Building materials, fiberglass (except insulation, roofing, siding), merchant wholesalers	$50,000	36	Construction of other new non-residential structures
TOTAL		**$13,725,428**			**$1,352,000**		

Table 5-27 shows the summary results of the analysis, and **Table 5-28** shows the top 10 industries in the region by employment that will be affected by the Project. All dollar values are in 2010 dollars. The IMPLAN model uses the Bureau of Labor Statistics (BLS) Growth Model to convert nominal dollars into 2010 dollars. Local construction costs are estimated to be $15.1 million. This creates 84 jobs directly involved with the Project with a total of 130 jobs in the three-county region. Total value added is estimated at $11.6 million. Total sales volume as measured by total output is $21.6 million.

TABLE 5-27
Economic Impacts from Local Construction Expenditures

Local Construction Costs Total	Total Value Added	Total Output	Direct Jobs Created	Total Jobs Created
$15.1 million	$11.6 million	$21.6 million	84	130

Source: CH2M HILL, 2010.

TABLE 5-28
Top 10 Industries Affected by the Project in Terms of Employment

	Employment	Labor Income	Value Added	Output
Wholesale Trade Businesses	38	2,933,057	5,049,213	7,768,214
Construction of Other New Nonresidential Structures	19	1,141,835	1,210,550	2,946,412
Architectural, Engineering, and Related Services	11	626,397	635,363	1,188,793
Ready-mix Concrete Manufacturing	9	691,941	1,017,819	3,312,431
Hotels and Motels, Including Casino Hotels	5	108,289	197,468	338,198
Investigation and Security Services	4	135,026	157,111	222,034
Food and Beverage Establishments	4	77,795	112,797	226,438
Commercial and Industrial Machinery and Equipment Rental	4	233,100	476,413	1,182,231
Real Estate Businesses	3	70,492	314,273	402,710
Employment Services	2	69,067	74,597	95,008

Source: CH2M HILL, 2010.

Wage and Benefits for Construction and Operations. The Research and Planning section of the Wyoming Department of Employment, in cooperation with the BLS, conducts an Occupational Employment Statistics (OES) Wage Survey. The OES program estimates occupational employment and wages. Data obtained from polled establishments are used to estimate occupational employment and wage rates for unemployment insurance (UI) covered wage and salary jobs in non-farm establishments. Wages for the OES Wage Survey include base pay rates, cost-of-living allowances, guaranteed pay, hazard pay, incentive pay, commissions, piece rates and production bonuses, length-of-service allowances, on-call pay, and portal-to-portal pay. The hourly wage estimates are calculated using a year-round, full-time figure of 2,080 hours per year (52 weeks times 40 hours).

Employee Wage Estimates. Based on information compiled in the 2008 Wyoming Wage and Benefit Summary (Wyoming Department of Employment, 2008), hourly wages are presented for skilled labor categories that are expected to be present throughout both the construction and operations phases. **Table 5-29** provides a breakdown of these hourly wages.

TABLE 5-29
Average Wages per Occupation Classification (in $ 2007) Based on 2006 Occupational Employment Statistics Data

Occupation Classification	Mean Wage	Mean of Lower 1/3	Mean of Upper 2/3	25th Percentile	50th Percentile (median)	75th Percentile
Construction Occupations						
Crane and Tower Operators	22.85	17.68	25.44	18.94	22.83	27.28
Excavating and Loading Machine and Dragline Operators	17.01	12.30	19.36	12.91	14.84	21.49
Industrial Truck and Tractor Operators	20.21	16.31	22.17	17.86	21.11	23.16
Cement Masons	16.83	12.36	19.05	13.54	16.75	19.84
Electricians	22.06	15.08	25.55	16.46	21.80	27.24
Operating Engineers and other Construction Equipment Operators	20.17	16.16	22.17	17.13	19.47	22.78
Structural Iron and Steel Workers	21.92	13.89	25.92	16.21	23.38	27.48
Civil Engineers	32.79	24.52	36.92	26.20	32.77	39.41
Construction Laborers	14.73	11.79	16.21	12.73	14.61	16.76
1st Line Supervisors/ Managers of Construction Trades and Extraction Workers	28.09	19.20	32.53	21.26	26.29	32.84
Industrial Machinery Mechanics	21.30	15.84	24.02	14.05	17.43	21.47
Operation and Maintenance Occupations						
1st Line Supervisors/Managers of Mechanics, Installers, and Repairers	27.26	17.51	32.15	20.81	24.82	35.84
Mobile Heavy Equipment Mechanics, except engines	20.99	16.93	23.02	17.73	20.66	24.07
Industrial Machinery Mechanics	21.30	15.84	24.02	17.43	21.47	25.18
Maintenance and Repair Workers	19.32	12.81	22.58	14.08	17.22	22.69

TABLE 5-29
Average Wages per Occupation Classification (in $ 2007) Based on 2006 Occupational Employment Statistics Data

Occupation Classification	Mean Wage	Mean of Lower 1/3	Mean of Upper 2/3	25th Percentile	50th Percentile (median)	75th Percentile
Millwrights	26.00	19.06	29.46	21.94	27.73	30.62
Electrical Power-Line Installers and Repairers	27.86	20.33	31.64	23.31	28.37	33.41
Helpers – Installation, Maintenance and Repair Workers	11.00	8.64	12.19	8.94	10.17	12.60

Source: Wyoming DOE, 2009.

A review of Table 5-29 shows that mean wages for the construction occupations in 2007 dollars ranged from a low of $14.73 per hour for construction laborers to a high of $32.79 for civil engineers. If the 2007 mean hourly wages are extrapolated over a 2,080-hour work year, annual salaries without benefits range from $30,600 to $68,200. It is important to note that hourly wage and benefit costs showed considerable variation across Wyoming industries and geographies in 2008. Therefore, these hourly labor wages are solely depicted to show what type of data were reported in the 2008 report and to prepare an estimate of salary for a full year of employment.

Project Employee Benefits Estimates. **Table 5-30** provides a statewide assessment of relationships of compensation components for all industries, as well as the construction and trade/transportation/utilities sectors in Wyoming.

According to the Wyoming Department of Employment benefits analysis, 86.3 percent of total compensation in 2006 was attributable to wages and salaries followed by insurance contributions (9.1 percent) and retirement plans (4.6 percent). Based on a review of Table 5-30, benefits paid to employees are expected to vary by contractor/subcontractor and status of full-time versus part-time positions.

TABLE 5-30
Percentage of Full- and Part-Time Wyoming Employees Offered Selected Benefits by Industry, 2003 to 2006

	All Industries		Construction		Trade, Transportation, and Utilities	
Benefit	**Full-Time Employees**	**Part-Time Employees**	**Full-Time Employees**	**Part-Time Employees**	**Full-Time Employees**	**Part-Time Employees**
Child Care	6.0	1.6	5.7	0.2	4.8	0.0
Dental Plan	69.7	11.2	46.2	5.0	67.8	5.5
Dependent Health Insurance	74.9	11.0	55.8	2.7	74.9	5.5
Short-Term Disability	31.0	4.0	16.8	3.4	27.2	2.1
Educational/Tuition Assistance	47.6	20.7	22.4	10.5	34.5	10.3
Flexible Spending Account	47.5	18.8	17.6	1.7	43.6	11.1
Health Insurance	79.2	12.1	60.3	6.1	80.7	7.2
Hiring Bonus	22.5	7.7	5.0	0.7	33.8	8.4
Life Insurance	69.7	8.9	45.3	4.2	67.1	7.4
Long-Term Disability	44.1	6.0	13.2	1.8	34.8	0.7
Paid Holidays	77.7	26.4	52.1	10.0	82.2	24.4
Paid Personal Leave	38.3	13.5	28.5	1.2	36.0	7.7
Paid Sick Leave	47.0	17.5	18.8	0.0	38.8	4.1
Paid Vacation	76.0	21.8	60.9	4.8	74.3	12.5
Retirement Plan	77.8	30.8	56.9	6.4	76.4	19.2
Operate in Shifts	44.5	40.7	6.1	2.3	38.8	33.0
Shift Differentials	49.2	26.3	78.1	33.4	57.5	41.1
Vision Plan	44.3	6.8	22.8	1.4	43.7	4.5

Source: Wyoming Department of Labor, 2008.

5.4.4 Taxes

The benefits related to the Project from a tax revenue perspective would occur based mostly on the *ad valorem* taxes that would be collected over the life of the Project. Also, in conjunction with associated ancillary activities, as discussed later, state and local tax revenues would be generated during construction and operation of the proposed facility. Although some of these tax revenues will be distributed on a local level, the state controls such distribution.

5.4.4.1 Ad Valorem Taxes

Rule I Section (7)(vii)(B) – An estimate of the cost of components of the industrial facility, which will be included in the assessed value of the industrial facility for purposes of ad valorem taxes for both the construction and operations periods. This estimate should include a breakdown by county if the components of the industrial facility will be located in more than one county.

Ad valorem taxes support a variety of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education. Assessed property values are the basis for *ad valorem* taxes. Property values related to the Project are determined annually on a centralized basis by the State Department of Revenue (WDOR).

It is the WDOR's role to estimate the fair market value (FMV) of the industrial facility, including the value of the land and improvements. It is the owner's responsibility to provide the WDOR with all necessary information enabling them to make this determination. The owner provides the WDOR will all property located in the state on the lien date, which is January 1 of each calendar year. Developments or Construction Work in Progress (CWIP) are taxable prior to their completion and operation, especially in the case of multi-year construction schedules. Under such circumstances, the owner provides the WDOR with cumulative construction costs that are then incorporated into their appraisal.

After the WDOR determines the FMV of the industrial facility, the assessed value is stated as 11.5 percent of this value. The assessed value is then allocated to the county within which the Project is located. This county then applies the property tax levy (for the tax district within which each Project is located) to calculate the annual property taxes due.
The proposed site is located in rural Campbell County where the 2009 tax levy is 58.80 mills. Thus for every $1,000 of assessed value of real property (land and improvements), Campbell County will levy property taxes of $58.80 annually. The property tax revenues received by the county are distributed across a number of taxing entities as shown in **Table 5-31**, with the majority supporting public education. TPWRJ estimated that property taxes of approximately $2.2 million would be payable to Campbell County in 2011, as constructions would be substantially completed by January 1, 2011. Substantial *ad valorem* tax revenues would be generated annually by the proposed facility. An assessment of these tax revenues is presented in the section addressing operational impacts.

TABLE 5-31
Percentage of Mileage by Taxing Entity, Campbell County (2009)

Taxing Entity	Percent of Mileage
General County Levy	16
County Library	1
County Fair	0
County Airport	0
County Museum	0
County Health District	1
County Recreation Levy	1
County Hospital District	5
Campbell County Cemetery	0
Weed and Pest	0
County School District	43
County Wide School Levy	10
School Foundation Program	20
School BOCHES	1
School Recreation Levy	2

5.4.4.2 Sales, Use, and Lodging Taxes

Rule I Section 7(vii)(A) – An estimate of the cost of the industrial facility subject to sales and use taxes and expected payments by quarter for the construction period. This estimate should include a breakdown by county if the components of the industrial facility will be located in more than one county.

The State of Wyoming levies a state sales tax of 4 percent on a wide array of goods and services purchased within the state. The use tax is a companion to the sales tax and is imposed upon goods purchased tax-free outside Wyoming for use in Wyoming. Collected taxes are shared between the state (69 percent) and counties (31 percent). Counties can levy the following additional sales and use taxes: general purpose option tax of 1 percent, specific purpose option tax of 1 percent, and lodging tax of up to 4 percent on hotel and motel room charges.

Campbell County has a 5.25 percent sales and use tax (statewide base of 4 plus 1 percent optional county plus 0.25 percent capital facilities tax) (Wyoming Business Council, 2010a). Crook County has a 6 percent sales and use tax (statewide base of 4 plus 1 percent optional county tax plus 1 percent capital facilities tax) (Wyoming Business Council, 2010b). Natrona County has a 5 percent sales and use tax (statewide base of 4 percent plus 1 percent optional county tax) (Wyoming Business Council, 2010c).

Subparagraph 39-15-105-(viii)-(N) of the State of Wyoming statutes addresses activities that are exempt from state and local sales and use taxes. The section addresses the sale of equipment used to generate electricity from renewable resources. Renewable resources are defined to include wind generation, solar, biomass, landfill gas, hydro, hydrogen, and geothermal energy. The exemption provided by this subparagraph is limited to the acquisition of equipment used in a project to make it operational up to the point of interconnection with an existing transmission grid including wind turbine generators (WTGs), generating equipment, control and monitoring systems, power lines, substation equipment, lighting, fencing, pipes, and other equipment for locating power lines and poles. The exemption shall not apply to tools and other equipment used in construction of a new facility, contracted services required for construction, and routine maintenance activities and equipment used or acquired after the project is operational. Based on the previous, Project-related expenditures prior to commercial operation are not expected to result in sales and use taxes.

Local tax revenues would, however, accrue from the sale of goods and services to non-local workers. It is possible that local tax revenues totaling over $1.276 million would accrue to Campbell, Crook, and Natrona counties combined over the construction period. The sources of these potential tax revenues are shown in **Table 5-32**.

TABLE 5-32
Estimate of Tax Revenues Accruing to Local Governments from Non-Local Worker Expenditures in Campbell, Crook, and Natrona Counties

Type of Tax	Tax Rate (%)	Quarters						Annual		Aggregate
		2010				2011				
		Q1	Q2	Q3	Q4	Q1	Q2	2010	2011	2010–11
State	4.00	29,647	355,294	529,812	192,759	28,713	0	1,107,513	28,713	1,136,226
General Purpose Option	1.00	7,597	44,379	49,025	17,330	1,149	0	118,331	1149	119,479
Specific Purpose Option	0.00							0	0	0
Economic Development County Option	0.00							0	0	0
Lodging	2.00	424	6,312	9,864	3,602	574	0	20,202	574	20,776
Total	7.00	376,68	405,985	588,701	213,691	30,436	0	1,246,045	30,436	1,276,481

Source: TPWRJ, 2010.

Lodging tax revenues could accrue to the counties in which Project-related construction workers temporarily reside. Estimates of these potential tax revenues are presented in Table 5-32. However, these estimates will vary from the eventual experience because (1) the actual distribution of construction workers is not known at this time, and (2) the durations of their stays are not known and lodging taxes are levied only on sleeping accommodations for guests staying less than 30 days.

5.4.5 Operation Impacts

5.4.5.1 Operations Impacts on Employment and Value Added

In this analysis the economic impact to the region resulting from operation and maintenance (O&M) costs are estimated. Following completion of the Project, it is anticipated that annual O&M of the newly installed equipment would require up to 15 new positions, which would all be filled by non-local workers at a labor expense of $3.681 million per year.

The results of the analysis are shown in **Table 5-33**.

TABLE 5-33
Economic Impact of O&M Costs

O&M Costs	O&M Costs Per Year	Total Value Added	Total Output	Direct Jobs Created	Total Jobs Created
	$3.681 million	$15.7 million	$21.9 million	15	36

Source: CH2M HILL, 2010.

O&M expenses are estimated to generate $15.7 million in value added, increase total employment in the region by 36 jobs and increase output by $21.9 million.

The top 10 industries affected in terms of employment are shown in **Table 5-34**.

TABLE 5-34
Top 10 Industries Affected by O&M Expenditures

Sector	Description	Total Employment	Total Labor Income	Total Value Added	Total Output
31	Electric power generation, transmission, and distribution	15	3,866,290	14,010,632	18,966,592
413	Food services and drinking places	3	56,275	81,595	163,801
39	Maintenance and repair construction of nonresidential structures	1	90,322	94,181	156,761
360	Real estate establishments	1	29,509	131,559	168,580
319	Wholesale trade businesses	1	74,440	128,147	197,155
394	Offices of physicians, dentists, and other health practitioners	1	76,041	88,225	124,648
329	Retail Stores – General merchandise	1	21,024	31,296	47,551
397	Private hospitals	1	49,553	52,027	91,651
320	Retail Stores – Motor vehicle and parts	1	25,843	32,335	44,067
331	Retail Nonstores – Direct and electronic sales	1	6,595	23,058	32,204

Source: CH2M HILL, 2010.

5.4.5.2 *Ad Valorem* Taxes during Project Operations

Ad valorem tax revenues would accrue to Campbell County as described above each year until the value of the property has been fully depreciated. The property tax revenues received by the county are distributed across a number of taxing entities, as shown in **Table 5-35** with the majority supporting public education.

Over the period 2011 through 2015, the estimated total *ad valorem* tax revenue generated would be approximately $10.3 million in nominal terms. This estimate is based on straight-line depreciation over 25 years on $343.8 million in property improvements with an estimated fair market value of $330.1 million and a corresponding initial assessed value of about $38.0 million. As shown in **Table 5-36**, property tax revenue is estimated at $2.232 million in 2011. Over the 25-year life of the Project, total property taxes in the amount of $30.6 million would be paid to Campbell County. This estimate of total property taxes is based on nominal dollars. At a discount rate of 4.625 percent (i.e., current yield on 30-year U.S. Treasury bond), the corresponding figure in net present value terms is about $20.9 million.

TABLE 5-35
Campbell County Levy Mills and Revenue Distributions 2008 and 2009

Purpose		2008 Levy	2008 Tax		2009 Levy	2009 Tax
State General Fund		0.000	$0		0.000	$0
General County Levy		9.921	$46,851,885		9.293	$53,067,839
County Library Levy		0.702	$3,312,161		0.603	$3,441,967
County Fair Levy		0.090	$422,715		0.077	$436,580
County Airport Levy		0.182	$858,745		0.151	$861,383
County Museum Levy		0.089	$418,956		0.075	$424,589
County Health District		0.359	$1,693,736		0.304	$1,734,924
Joint Powers Fire Board		0.000	$0		0.000	$0
County Recreation Levy	12.000	0.657	$3,100,197	11.088	0.585	$3,339,903
County Bond Redem		0.000	$0		0.000	$0
County Bond Interest		0.000	$0		0.000	$0
County Hospital Dist		3.000	$14,168,467		3.000	$17,131,664
Special Cemetery Levy		0.531	$2,509,162		0.106	$600,685
Weed & Pest Levy		0.132	$621,402		0.105	$597,104
County School Dist		25.000	$118,070,561		25.000	$142,763,863
County Wide School Levy		6.000	$28,336,935		6.000	$34,263,327
School Foundation Program		12.000	$56,673,869		12.000	$68,526,654
School Dist Bond Redem		0.000	$0		0.000	$0
School Dist Bond Interest		0.000	$0		0.000	$0
School BOCHES		0.500	$2,361,411		0.500	$2,855,277
School BOCES		0.000	$0		0.000	$0
School Recreation Levy		1.000	$4,722,822		1.000	$5,710,555

TABLE 5-35
Campbell County Levy Mills and Revenue Distributions 2008 and 2009

Purpose	2008 Levy	2008 Tax	2009 Levy	2009 Tax
TOTAL	60.163	$284,123,024	58.799	$335,756,314
MILL LEVIES				
County			58.799	
City of Gillette			66.799	
Town of Wright			66.799	
ASSESSED VALUATION		$4,722,822,444		$5,710,554,518

Source: Campbell County Tax Assessor http://www.ccgov.net/assessor/tax_distribution.html. Accessed February 2010.

TABLE 5-36
Estimate of *Ad Valorem* Taxes Paid Per Year (millions) in nominal dollars

2011	2012	2013	2014	2015	25-Year Total
$2.232	$2.150	$2.066	$1.982	$1.897	$30.6

Source: TPWRJ, 2010.

5.4.6 Wind Energy Projects and Residential Property Values

There exist concerns regarding the possible adverse impact that wind energy projects might have on residential property values. Three potential types of stigma have been identified as possible sources of downward pressure on property values due to siting wind energy projects. They are described as follows:

- **Area Stigma:** A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines
- **Scenic Vista Stigma:** A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista
- **Nuisance Stigma:** A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home

A synopsis is provided below of three technical studies that address one or more of these concerns. The first analytical study was conducted by the Renewable Energy Policy Project (REPP, 2003). This report reviews data on property sales in the vicinity of wind projects and uses statistical analysis to determine whether and the extent to which the presence of a wind power project has had an influence on the prices at which properties have been sold. The hypothesis underlying this analysis is that if wind development can reasonably be claimed to hurt property values, then a careful review of the sales data should show a negative effect on property values within the viewshed of the projects. For all projects for which there were

sufficient data, a statistical analysis was undertaken to determine how property values changed over time within the viewshed of a wind energy facility and in the comparable community without views of a wind energy facility. The database contained more than 25,000 records of property sales within the viewshed and the selected comparable communities.

The study looked at price changes for each of 10 projects in three ways—Case 1 looked at the changes in the viewshed and comparable community for the entire period of the study, Case 2 looked at how property values changed in the viewshed before and after the Project came on-line, and Case 3 looked at how property values changed in the viewshed and comparable community after the Project came on-line.

Case 1 looked first at how prices changed over the entire period of study for the viewshed and comparable region. Where possible, data for three years preceding and 3 years following the on-line date of the Project was collected. For the 10 projects analyzed, property values increased faster in the viewshed in eight of the 10 projects. In the two projects where the viewshed values increased slower than for the comparable community, special circumstances make the results questionable. Kern County, California is a site that has had wind development since 1981. Because of the existence of the old wind machines, the site does not provide a look at how the new wind turbines will affect property values. For Fayette County, Pennsylvania the statistical explanation was very poor. For the viewshed the statistical analysis could explain only 2 percent of the total change in prices.

Case 2 compared how prices changed in the viewshed before and after the projects came on-line. In nine of the 10 analyzed cases, the property values increased faster after the project came on line than they did before. The only project to have slower property value growth after the on-line date was Kewaunee County, Wisconsin. Since Case 2 looks only at the viewshed, it is possible that external factors drove up prices faster after the on-line date and that analysis is therefore picking up a factor other than the wind development.

Finally, Case 3 looked at how prices changed for both the viewshed and the comparable region, but only for the period after the projects came on-line. Once again, for nine of the 10 projects analyzed, the property values increased faster in the viewshed than they did for the comparable community. The only project to see faster property value increases in the comparable community was Kern County, California. The same caution applied to Case 1 is necessary in interpreting these results (Kern County, California is a site that has had wind development since 1981; therefore, the site does not provide a look at how modern wind turbines will affect property values).

If property values had been harmed by being within the viewshed of major wind developments, then it would be expected to be shown in a majority of the projects analyzed. Instead, to the contrary, this study found that for the great majority of projects the property values actually rose more quickly in the viewshed than they did in the comparable community. Moreover, values increased faster in the viewshed after the projects came on-line than they did before. Finally, after projects came on-line, values increased faster in the viewshed than they did in the comparable community. In all, the REPP study analyzed 10 projects in three cases; of 30 individual analyses, REPP found that for 26 of those, property values in the affected viewshed performed better than the alternative.

The second study, Hoen (2006), provides a statistically rigorous analysis of the potential relationship between wind farm siting and residential property values using a database comprised of 280 home sales within 5 miles of a wind energy project, in Madison County, New York. This study failed to find any statistically significant relationship between either proximity to or visibility of the wind farm and the sale price of homes. Additionally, the analysis failed to uncover a relationship between sales price and view even when concentrating on homes within a mile or that sold immediately following the announcement and construction of the wind farm. The conclusion of the study was that, in this community, a view of the wind farm does not produce either a universal or localized effect. Residential property values were not positively or negatively affected by the wind energy project.

The instruments used to measure any effect were (1) the hedonic pricing model and (2) measurements of turbine visibility. The hedonic model has been well tested in various applications including, but not limited to, assessments, in valuing nearby open spaces, the effects of high voltage transmission lines, and environmental stigmas. It is particularly effective at discerning universal influences, and the question of effects on property values is not whether one or two houses are affected but rather if groups of houses are affected in a predictable universal way. The measurement of turbine visibility was accomplished by counting the numbers of points or turbine blades seen from the house. Distance was measured by linear distance between the home and the wind tower.

Whereas the two preceding studies primarily addressed scenic vista stigma, the recent study by Hoen, et al. (2009) addressed the potential relationship between residential property values and all three types of factors or effects (i.e., area stigma, scenic vista stigma, and nuisance and health effects). To support their research, the authors collected data on almost 7,500 sales of single-family homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states. They used three different types of modeling approaches including eight different hedonic pricing models, repeat sales, and sales volume models. By employing this range in approaches, the authors explored the many different ways that siting a wind farm could affect property values.

The potential relationship between property value and each of the three effects were tested separately. For the area stigma effect, they tested whether or not distance from the facility alone has any effect after the facility was constructed. Regarding the scenic vista value, two measurements were devised—a qualitative one using an on-site rating comparing sales of homes with views with those without and a quantitative one using distance and number of turbines seen comparing sales of homes with views and those without views. To investigate the potential relationship between property value and nuisance and health, sales within 1 mile (including homes with and without a view) were compared to all others.

The research design demonstrated a statistically significant relationship between the quality of a view and home value. However, the evidence is not sufficient to conclude that views of turbines affect home sales. Nor is there sufficient evidence to conclude distance from the facility (area stigma) affects home values. Regarding scenic vista values, no decrease was found and there is not sufficient evidence to conclude that views of the facility affect scenic vista values.

The various analyses are strongly consistent in their conclusions that none of the models uncovers conclusive evidence of the existence of any widespread property value impacts

that might be present in communities surrounding wind energy facilities. Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. Sample sizes were smaller for tests of nuisance effects (i.e., 125 observations), but no statistically significant relationship was found between home values and homes located within 1 mile of the nearest wind facility where the exposure to nuisance factors was most likely.

5.4.6.1 Construction and Operation Impacts

Based on the findings of the research studies described prior that investigated the relationship between different aspects of wind energy developments and changes in residential property values, it is anticipated that residential property values will not experience adverse reaction to construction of the Project.

5.4.7 Housing and Housing Availability Analysis

Rule I Section 7(iv) – Housing. An analysis of housing facilities by type, including a quantitative evaluation of the number of units in the area and a discussion of vacancy rates, costs, and rental rates of the units. The analysis should include geographic location, including a quantitative evaluation of the number of units in the area required by the construction and operation of the proposed industrial facility and a discussion of the effects of the proposed industrial facility on vacancy rates, costs, and rental rates of the units. Specific housing programs proposed by the applicant should be described in detail.

This section addresses the following six major topics: (1) composition of the existing housing, (2) housing inventory and residential construction trends, (3) home value and rental housing costs, (4) rental housing vacancies, (5) housing needs, and (6) temporary accommodations.

5.4.7.1 Existing Conditions

Housing Stock. Statewide, housing units increased in Wyoming by 8.07 percent between 1980 and 1990. This was well above the 1.9 percent rate of growth in Wyoming households during the period, suggesting that housing became more available during that decade. In contrast, between 1990 and 2000, total housing units in Wyoming increased by 10.05 percent, which was below the 14.67 percent growth in Wyoming households. Because household formation occurred more quickly than the creation of housing units, this resulted in a tightening of housing supply over this decade. As shown in **Table 5-37**, the number of housing units increased by 10.07 percent between 2000 and 2008, to an all-time high of 246,393 units. Over the same time period, the number of households increased by 6.47 percent. These statistics illustrate that housing production has responded to increased housing demand in Wyoming (Wyoming Housing Database Partnership [WHDP], 2009).

Within the Study Area, the Census Bureau estimates that total housing units saw an increase of 18.40 percent in Campbell County between 2000 and 2008, from 13,288 to 15,733; for Converse County, housing units rose by 6.19 percent from 5,669 to 6,020; for Crook County, housing units increased 8.62 percent from 2,935 to 3,188; in Johnson County, housing units rose 7.91 percent from 3,503 to 3,780; in Natrona County, total housing units saw an increase of 6.31 percent from 29,882 to 31,767; in Sheridan County, housing units increased

11.89 percent from 12,577 to 14,072; and finally, in Weston County, total housing units rose 2.97 percent from 3,231 to 3,327. In all, housing units in the Study Area increased 9.57 percent from 71,085 to 77,887 units.

TABLE 5-37
Housing Unit Estimates for Wyoming and Study Area Counties

	Number of Units		
Area	**2000**	**2008 (estimated)**	**Percent Change**
Wyoming	225,959	246,393	10.07
Campbell Co.	13,288	15,733	18.4
Converse Co.	5,669	6,020	6.19
Crook Co.	2,935	3,188	8.62
Johnson Co.	3,503	3,780	7.91
Natrona Co.	29,882	31,767	6.31
Sheridan Co.	12,577	14,072	11.89
Weston Co.	3,231	3,327	2.97
Study Area	**71,085**	**77,887**	**9.57**

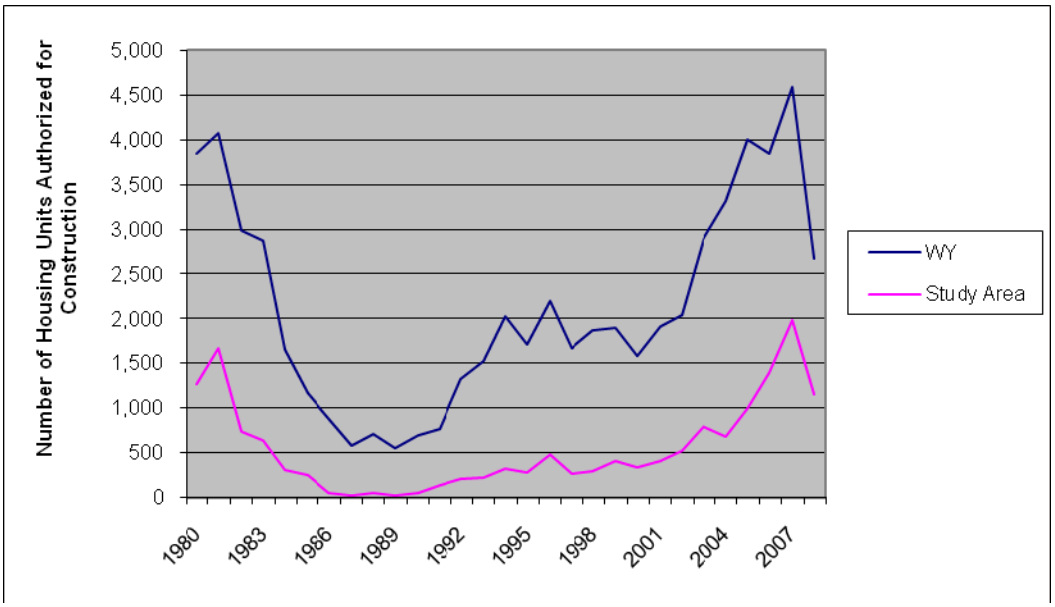
Source: Wyoming Housing Database Partnership, 2009.

There were a total of 62,199 occupied housing units in the seven-county Study Area at the time of the 2000 U.S. Census. Natrona County, with 26,819 units accounted for over 43 percent of the total. Campbell County had the second greatest number of occupied housing units with 12,207, followed by Sheridan County with 11,167 units. Most of the housing stock is owner- rather than renter-occupied, with anywhere from 69 to 79 percent of the units being owner-occupied.

Housing Construction Activity. The residential construction industry is highly cyclical in nature and sensitive to the state of the economy and financial conditions. Such cycles are often national and regional in scope, although noticeable differences in small geographical areas can occur.

The level of housing units authorized for construction in the state of Wyoming in 2007 (4,584 units) was the highest since 1980, as can be seen from the information presented in **Figure 5-16**. Residential construction activity in the state consistently declined from a high point in 1981 (with over 4,000 units permitted) to 1987 when 578 units were authorized for construction. The absolute low point was reached in 1989 when a total of 555 units were authorized for construction. Construction activity picked up with consistent growth between 1989 and 1994 and a total of 2,020 units were authorized for construction in the latter year. Activity remained relatively stable between 1994 and 2002, after which rapid growth occurred, culminating in an annual total of 4,584 units authorized for construction in 2007. Consistent with the national downturn in housing starts, the state saw the number of annual housing units fall to 2,669 in 2008, which is the lowest level since 2002.

FIGURE 5-16
New Residential Construction for Study Area and State (1980 through 2008)

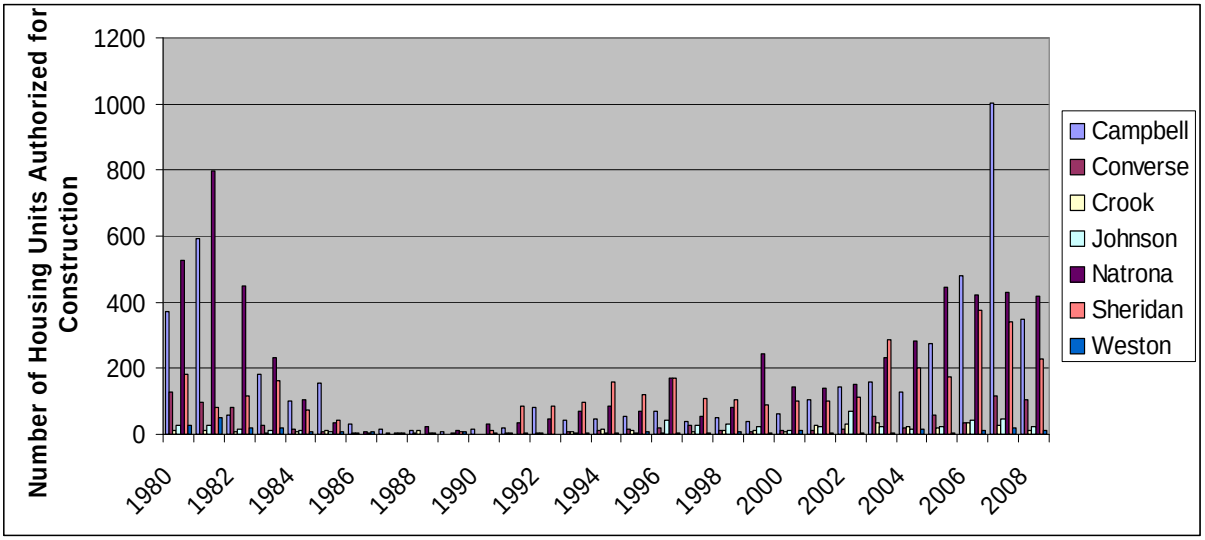


Source: Wyoming Housing Database Partnership, 2009.

The pattern of construction activity in the Study Area generally mirrors that of the state as is evident in Figure 5-16. The contribution that residential construction activity in the Study Area has made to that of the state has varied substantially. In 1981, the Study Area contributed about 41 percent of all new residential units authorized for construction in the state. By 1987, this share had declined to less than 6 percent. From 2001 through 2008, the share contributed by the Study Area generally rose from about 22 percent to 43 percent.

The majority of the housing authorized for construction in the Study Area was built in Natrona County, but in 2006 and 2007, Campbell County's authorizations exceeded those in Natrona County. With the exception of Sheridan County, the contributions from the remaining counties in the Study Area are small in comparison as can be seen from the information presented in **Figure 5-17**.

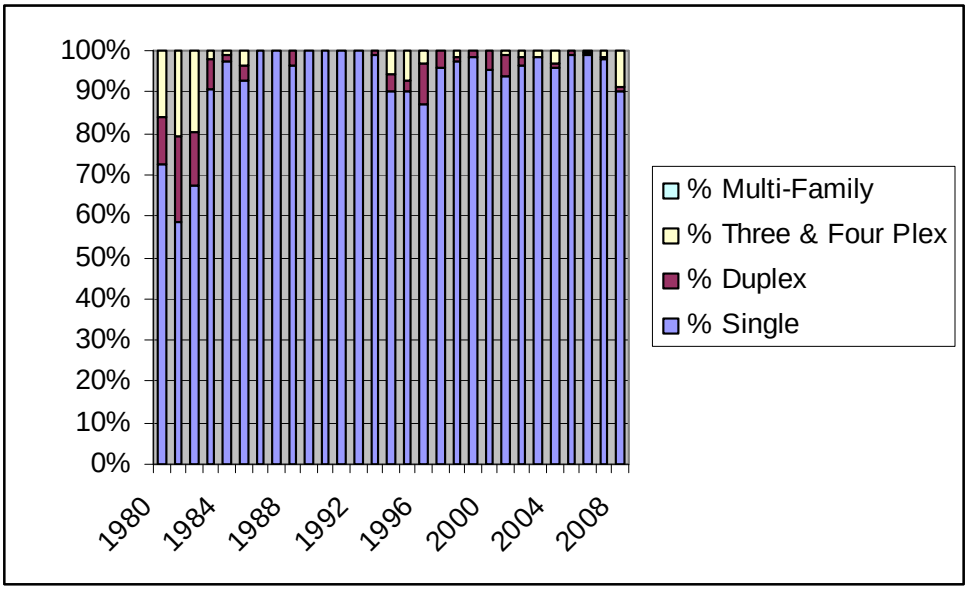
FIGURE 5-17
New Residential Construction by County (1980 through 2008)



Source: Wyoming Housing Database Partnership, 2009.

Single-family units comprised the large majority of housing units constructed in all but a few years as can be seen from the information presented in **Figure 5-18**. Construction of structures containing five or more units in the Study Area has been concentrated in a few years, especially 1980 through 1982, 1996, and 2008.

FIGURE 5-18
New Residential Construction by Type of Structure in the Study Area (1980 through 2008)



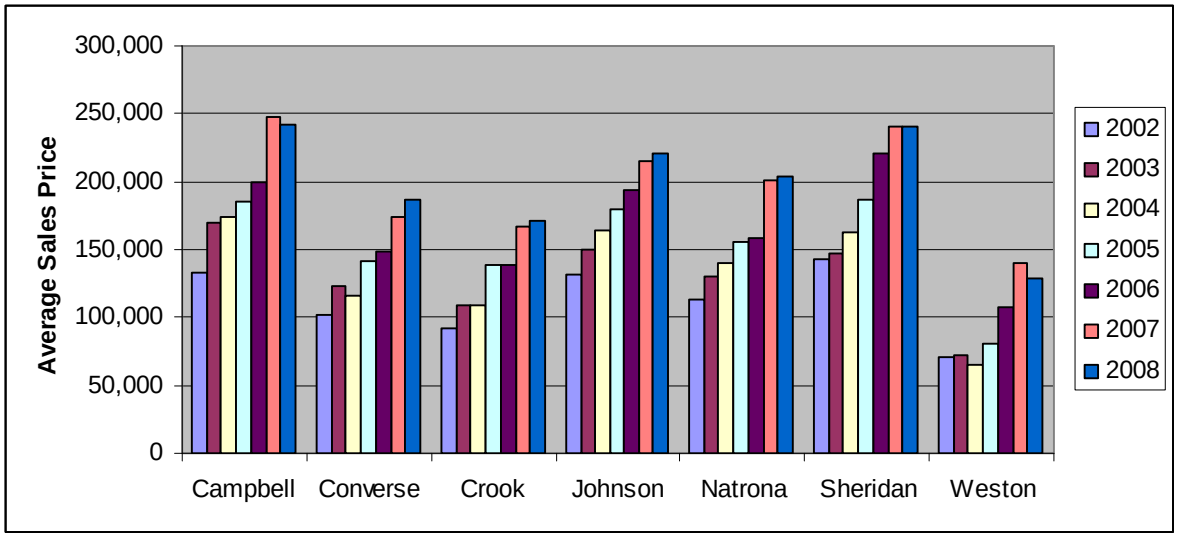
Source: Wyoming Housing Database Partnership, 2009.

5.4.7.2 Home Value and Rental Housing Costs

Home Values. Through the 1960s, home values in the state of Wyoming experienced only modest change. The 1970s saw a steep rise in median values from around $14,000 to $17,000 to around $60,000 to $70,000. During this decade dramatic average annual changes in value of 14.6 percent occurred for the state. Between 1980 and 1990, the state experienced an average annual percentage decrease of 2.6 percent. This was followed by another growth spurt in the 1990s with average annual percentage changes of between 4 percent and 5 percent. Robust growth in home values between 2000 and 2008 occurred with average annual percentage changes in excess of 11 percent. This is the case despite the 3.4 percent decrease in the average sales price of homes between 2007 and 2008.

The recent history of home sales for the Study Area counties is demonstrated in **Figure 5-19** and **Table 5-38**. Each county shows increasing sales prices, with steeply rising prices in 2007 and modest declines in 2008. In 2008, housing prices at $242,341 are highest in Campbell County, followed by Sheridan County ($240,270); Johnson County ($220,549); Natrona County ($204,154); Converse County ($187,131); and Crook County ($170,602). Homes in Weston County, with an average price of $129,108, are the least expensive. The ranges in median prices in 2008 go from a low of $135,500 in Weston County to a high of $225,000 in Campbell County.

FIGURE 5-19
Average House Value for Counties in the Study Area (2002 through 2008)



Source: Wyoming Community Development Authority, 2009.

TABLE 5-38
Home Sales in the Study Area from 2002 through 2008. (Assessor data: Nominal Dollars and Annual Percent Change)

County	2002	2003	2004	2005	2006	2007	2008	Sales	8%	Median
Campbell	133,582	170,218	173,420	185,874	199,945	247,150	242,341	474	-1.9	225,000
Converse	101,357	123,707	115,800	141,949	148,804	173,375	187,131	149	7.9	186,000
Crook	92,382	109,050	109,050	138,128	138,568	166,892	170,602	36	2.2	163,590
Johnson	131,782	149,472	164,125	180,209	194,500	214,710	220,549	96	2.7	192,125
Natrona	113,059	130,446	139,651	156,281	158,950	201,269	204,154	854	1.4	182,250
Sheridan	142,565	146,776	162,917	186,095	220,225	240,779	240,270	400	-0.2	206,000
Weston	70,674	72,765	64,784	80,313	107,437	140,127	129,108	56	-7.9	135,500
Simple Avg	**121,140**	**132,708**	**142,501**	**159,776**	**187,869**	**239,019**	**258,082**	**5,849**	**8.0**	
Weighted Avg						**265,044**	**256,045**		**-3.4**	**190,000**

Source: Wyoming Community Development Authority, *The 2009 Wyoming Profile of Demographics, Economics, and Housing, vol. 1*, August, 2009.

Rental Housing Costs. For workers seeking temporary relocation to an area, housing rental rates for apartments, houses, and mobile home lots, are generally more relevant than home sale prices. At the state level, the recent data reported by the Wyoming Community Development Authority (WCDA, 2009) show an increase in average apartment rents from $549 in fourth quarter 2006 to $599 by fourth quarter 2007. By the end of 2008, rent rose another 8.5 percent to $650. Average rent for houses rose from $878 in fourth quarter 2007 to $940 in fourth quarter 2008, which represents a 12.2 percent increase. Over the same 1-year period, state average rents for mobile home lots increased from $232 to $263.

The most recent data in the Study Area reported by the Economic Analysis Division of the Wyoming Department of Administration and Information covers the annual period from second quarter, 2007 to second quarter 2008. The data on average rental rates are reported in **Tables 5-39** and **5-40**. Rental rates for apartments and mobile home lots rose over this period for all of the counties in the Study Area and house rentals rose in all but Crook and Weston counties. Mobile home rentals rose for all counties except for Johnson County and Weston County which experienced modest decreases. For all housing types, average rents are highest in Campbell County at $717 for an unfurnished two-bedroom apartment (excluding gas and electric), $318 for a mobile home lot with water, $1,314 for an unfurnished two or three bedroom single family house (excluding gas and electric), and $988 for a mobile home rental including the lot rental and all utilities. Renters can do somewhat better in Natrona County, but any savings in rent would need to be balanced against the time and out of pocket costs associated with a longer commute. Crook County appears more promising as the rental differential is much larger. Average rental rates are about half the rates in Campbell County, but the supply of housing is much more limited, as is shown in Table 5-39.

TABLE 5-39
Average Apartment, Mobile Home Lot and House Rental Rates for Counties in the Study Area

	Apartment [1]			Mobile Home Lot [2]			House [3]		
County	2Q08	2Q07	Percent Change	2Q08	2Q07	Percent Change	2Q08	2Q07	Percent Change
Campbell	$717	$691	3.80%	$318	$292	9.10%	$1,314	$1,127	16.70%
Converse	$529	$474	11.60%	$175	$160	9.40%	$600	$596	0.70%
Crook	$426	$367	16.30%	$158	$142	11.80%	$465	$510	-8.80%
Johnson	$554	$504	9.90%	$193	$170	13.70%	$800	$712	12.40%
Natrona	$702	$542	29.60%	$229	$215	6.40%	$1,088	$945	15.10%
Sheridan	$608	$597	0.0	$345	$275	25.50%	$974	$927	0.1
Weston	$576	$500	15.20%	$120	$125	0.0	$647	$655	-1.20%

[1] Two-bedroom units, unfurnished, excluding gas and electric
[2] Single-wide, including water
[3] Two or three bedroom, single-family, excluding gas and electric

Source: Wyoming Department of Administration and Information, Economic Analysis Division (EAD). WYOMING COST OF LIVING INDEX – TABLE V, AVERAGE RENTAL RATES – 2Q08 and 2Q07. http://eadiv.state.wy.us/housing/housing.html. Accessed February 4, 2010.

TABLE 5-40
Average Mobile Home Rental Rates for Wyoming and Counties in the Study Area

	Mobile Home [1]		
County	2Q 2008	2Q 2007	Percent Change
Campbell	$988	$830	0.2
Converse	$520	$496	4.90%
Crook	NA	NA	NA
Johnson	$571	$586	-2.60%
Natrona	$548	$525	4.20%
Sheridan	$654	$520	25.60%
Weston	$396	$403	-1.70%

[1] Cost reflects total monthly rental expense, including the lot

Source: Wyoming Department of Administration and Information, Economic Analysis Division (EAD). WYOMING COST OF LIVING INDEX - TABLE V, AVERAGE RENTAL RATES – 2Q08 and 2Q07. http://eadiv.state.wy.us/housing/housing.html. Accessed February 4, 2010.

5.4.7.3 Rental Housing Vacancies

The State of Wyoming Housing Database Partnership estimates rental housing vacancy rates on a semi-annual basis. Consistent with the housing plan, the county of primary interest for house rental is Campbell County. The most recent survey of property managers was conducted during June of 2009 and included 58 completed surveys for Campbell County. Of the 2,788 rental units surveyed, 160 (5.74 percent) were vacant. This compares to a statewide average of 6.06 percent for the first half of 2009. One year ago, the corresponding estimate for the vacancy rate in Campbell County was 7.18 percent. Thus, the vacancy rate has fallen from this historical high for Campbell County. Even the current 5.74 percent is high for Campbell County, which often experienced vacancy rates of less than 1 percent, indicating a very tight housing rental market. The WCDA (2009) noted that the recent spike in rental vacancy rates corresponds with the sharp rise in multifamily construction seen in 2007, when 604 units were permitted. According to the 2009 survey of eight park managers for the Mobile Home Parks in Campbell County, of the 1,838 lots included in the survey, 154 were vacant; indicating the vacancy rate for lots was 8.4 percent.

The early 2009 vacancy rate of 2.47 percent for Crook County was based on a survey of 81 units and Natrona County's vacancy rate was 3.15 percent based on a survey involving 3,268 units (WCDA, 2009). The survey of mobile home lots included 405 lots for Natrona County and revealed a vacancy rate of 5.2 percent. No mobile home lots from Crook County were included in the survey (WCDA, 2009).

Rental property vacancy rates for the City of Gillette, Campbell County are of particular interest as this is the closest moderately size community to the Project site. As shown in **Table 5-41**, from 2006 through 2008, vacancy rates for apartments remained low at around 1 percent; whereas vacancy rates for manufactured homes in 2007 and 2008 were around 5 percent. The corresponding rental vacancy rates for 2009 were not published, but to the extent that the vacancy rates for the City of Gillette follow the same pattern as the County, it is likely that the rental vacancy rates are higher than the 2008 rates in the City as well.

TABLE 5-41
Rental Vacancy Rates by Quarter, City of Gillette, 2005 through 2008

Apartments and Other	Q1	Q2	Q3	Q4	Average for Year
Buildings					
2005	2.1	1.7	0.5	0.3	1.10%
2006	0.2	0.2	0.2	0	0.10%
2007	0.1	0.1	0.1	0.1	0.10%
2008	0.1	0.1	0.1	0.1	0.10%
Manufactured Home Parks					
2005	19.6	16.9	16.1	12.8	16.35%
2006	10.3	8.9	8.9	8.1	9.05%
2007	8.0	7.8	3.0	2.0	5.0%
2008	4.8	4.9	5.10%	5.1	4.90%

Notes:
Sample Size 2005: 1,351 apartments and other buildings and 1,321 manufactured home rental spaces
Sample Size 2006-2008: 1,351 apartments and other buildings and 1,388 manufactured home rental spaces

Source: City of Gillette Planning Department, 2009.

5.4.7.4 Temporary Accommodations

Temporary accommodations, for purposes of this report, are defined as hotel and motel rooms and sites for RVs. In some cases, RV sites can be rented on a long-or a short-term basis. For this reason, this type of housing is included under housing rentals as well as under temporary accommodations.

Hotels and Motels. Based on information from the State of Wyoming Department of Tourism and Smith Travel Research, a listing of hotels and motels by location and number of rooms was compiled. The information is presented in **Table 5-42**.

Based on information from Smith Travel Research for the period from 2003 to 2009, hotel and motel occupancy rates are presented in **Figure 5-20**. The vacancy rate is highly seasonal ranging between highs around 50 percent in December and January to lows around 20 percent in June through August. The estimated occupancy rates are derived from a sample of hotels and motels in the communities in the Study Area. These data were collected for the broader Study Area to assist with identifying the Area Primarily Affected by non-local workers. In years when facilities close to a project site have low vacancy rates, for example due to multiple projects, alternatives more distant from the project become more viable. However, it is reasonable to assume that workers will tend to choose housing opportunities that are more convenient to their work when such opportunities are available, affordable, and suitable.

TABLE 5-42
Hotel and Motel Rooms and RV Sites by County and Community (2009)

County	Community	Hotel/Motel	No. Rooms
Campbell	Gillette	Fairfield Inn & Suites Gillette	80
		Country Inn & Suites Gillette	60
		Greentrees Crazy Woman Campground	85 RV sites
		Holiday Inn Express Hotel & Suites	83
		Wingate by Wyndham Gillette	84
		Americas Best Value Inn/Gillette	76
		Day's Inn	137
		Econo Lodge Gillette	62
		Super 8 Gillette	60
		Best Western Tower West Lodge	189
		Clarion Hotel Gillette	159
		Howard Johnson Inn Gillette	80
		Settle Inn & Suites Gillette	86
		Hampton Inn Gillette	57
		Cam-Plex RV Parks	1,730 RV sites
		Roy Raussback RV Park	18 RV sites
		High Plains Campground	65 RV sites
		Hoy Mobile Home Park	75 RV sites
		Candlewood Suites	83
		Arrowhead Motel	32
		Budget Inn Express	50
		Comfort Inn & Suites Gillette	60
		Mustang Motel	30
		National 9 Inn Gillette	79
		Smart Choice Inn	62
		Motel 6 Gillette	74
	Wright	Wright Hotel	71
		M&A Hotel	19
		National 9 Inn	27
Converse	Douglas	Alpine Inn	40
		Best Western Douglas Inn & Conference Center	117
		Douglas KOA Campground	87 RV sites
		First Interstate Inn	43
		Holiday Inn Express Hotel & Suites	76

TABLE 5-42
Hotel and Motel Rooms and RV Sites by County and Community (2009)

County	Community	Hotel/Motel	No. Rooms
		Plains Motel	30
		The Hotel LaBonte	32
		Motel 6 Douglas	na
		Sleep Inn & Suites Douglas	63
		Super 8	37
	Glenrock	All American Inn	21
		Deer Creek Village RV Park	50 RV sites
		Historic Hotel Higgins	16
		Glendo Lakeside RV Park	44 RV sites
		Mabuhay Motel	17
	Rolling Hills	Comfort Inn Evansville	56
Crook	Hulett	Hulett Motel	16
		Motel Pioneer	15
	Moorcroft	–	–
	Pine Haven	Empire Guesthouse & RV Park	6 RV sites
		Empire Guesthouse & RV Park	5
		Cedar Ridge RV Park	25
	Sundance	Bearlodge Campground	8 RV sites
		Bear Lodge Motel	33
		Rodeway Sundance Mountain Inn Hotel	41
		Sundance Mountain Hideaway Bed & Breakfast	3
		Sundance Campground and Trailhead	10 RV sites
		Mountain View RV Park & Campground	100 RV sites
Johnson	Buffalo	Buffalo Bill [Cabin] Village at the Buffalo Bill Village Resort	83
		Buffalo Lodge Inn & Grill	24
		Buffalo Bill Cody's House	3
		Comfort Inn at Buffalo Bill Village Resort	75
		Holiday Inn Express & Suites Buffalo	69
		Econo Lodge of Buffalo	42
		Buffalo KOA Kampground	72 RV sites
	Kaycee	Kaycee Bunkhouse	4
		KC RV Park	18 RV sites
		Powder River Cabins & Campground	15 RV sites
		Cassidy Inn Motel	19
		Hole in the Wall Campground	11 RV sites

TABLE 5-42
Hotel and Motel Rooms and RV Sites by County and Community (2009)

County	Community	Hotel/Motel	No. Rooms
		Powder River Cabins & Campground	30
		Siesta Motel	13
Natrona	Casper*	Alcova Lake Campground	200 RV sites
		Best Western Ramkota Hotel	229
		BLM Lodgepole Campground	14 RV sites
		Casper East RV Park & Campground	62 RV sites
		Casper Mountain Campgrounds	29 RV sites
		Comfort Inn	56
		C'mon Inn	125
		Colonial House Motel	19
		Courtyard	100
		Days Inn	119
		First Interstate Motel	59
		Fort Caspar Campground	92 RV sites
		Hampton Inn Suites	100
		Hilton Garden Inn	121
		Holiday Inn	120
		Holiday Inn Express Hotel	84
		La Quinta	120
		Mainstay Suites	93
		Motel 6	111
		Muddy Mountain-Rim Campground	8 RV sites
		National 9 Showboat Inn	45
		Parkway Plaza Hotel	287
		Pathfinder Reservoir	3 RV sites
		Quality Inn & Suites	92
		Ramada Plaza	200
		Ranch House Motel	12
		Red Stone Motel	59
		Royal Inn	37
		Sage and Sand Motel	33
		Shilo Inn Hotel	101
		Skyler Inn	66
		Sleep Inn & Suites	80
		Super 8 East	57
		Super 8 West	66

TABLE 5-42
Hotel and Motel Rooms and RV Sites by County and Community (2009)

County	Community	Hotel/Motel	No. Rooms
		Topper Motel	20
		Virginian Motel	19
		Westside Inn	42
		Yellowstone Motel	17
	Midwest/Edgerton	Teapot Motor Lodge	20
	Alcova	The Inn at Alcova	8
		North Platte Lodge	8
		River Inn	8
Sheridan	Clearmont	–	
	Sheridan	Sheridan Cottages	2
		Candlewood Suites Sheridan	73
		Sheridan Big Horn Mountain KOA	128 sites
		Best Western Sheridan Center	139
		Holiday Inn Sheridan	212
		Wink's of Wyoming	4
		Trail's End Motel and Lounge	84
		Alamo Motel	19
		Comfort Inn	62
		Greybull Motel	13
		Wingate Inn	66
		Americas Best Value Inn	39
		Hampton Inn Sheridan	65
		Mill Inn	45
		Day’s inn	47
		Quality Inn	61
		Apple Tree Inn	24
		Budget Host Inn	44
		Super 8 Motel	39
		Motel 6	68
		Peter D's RV Park	54 sites
Weston	Newcastle	Roadside Motel	10
		Sundowner Inn	12
		Auto Inn Motel and Campground	36 sites
		Fountain Inn	60
		Hilltop Motel	15
		Four Corners Country Inn B&B, RV Park	11

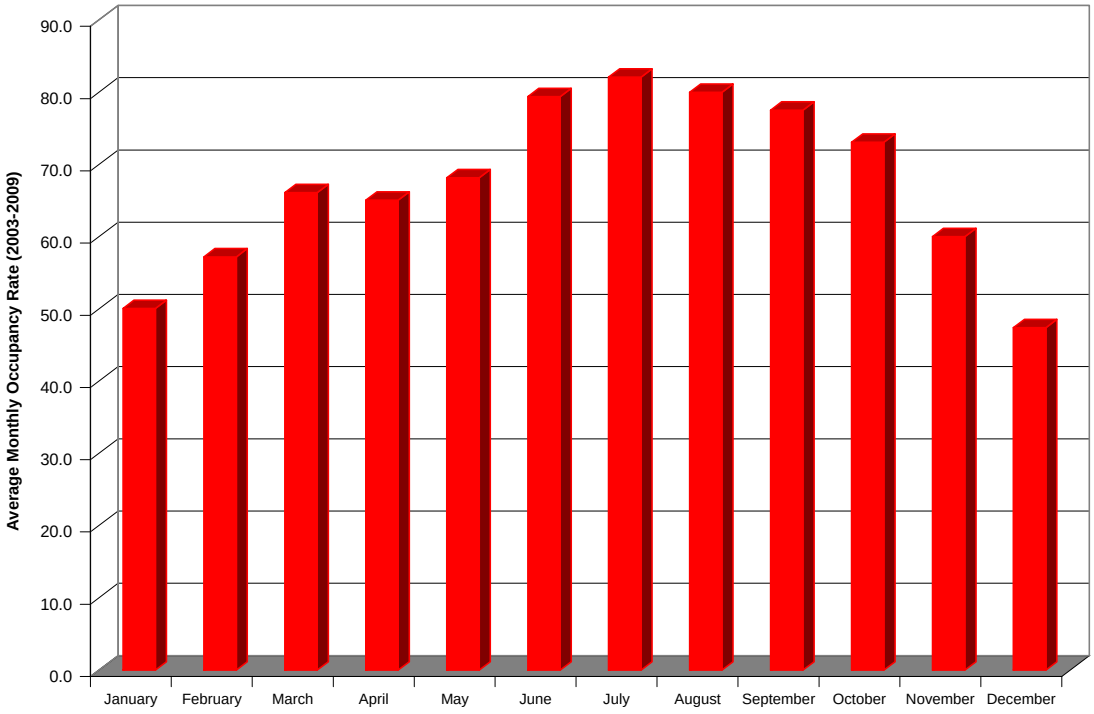
TABLE 5-42
Hotel and Motel Rooms and RV Sites by County and Community (2009)

County	Community	Hotel/Motel	No. Rooms
		Mallo Camp & Motel	16
		Pines Motel	12
		Sage Motel	12
		Stardust Motel	16
		Sundowner Inn	11
		Roadside Motel	10
		EVA – Great Spirit Ranch Bed & Breakfast	4
	Upton	Upton Motel	NA
		Weston Inn	23
Study Area Total			**9,749**

* Includes the communities of Casper, Bar Nunn, Evansville, and Mills
NA = not available

Source: Wyoming Official State Travel Website, Smith Travel Research, and CH2M HILL, 2010.

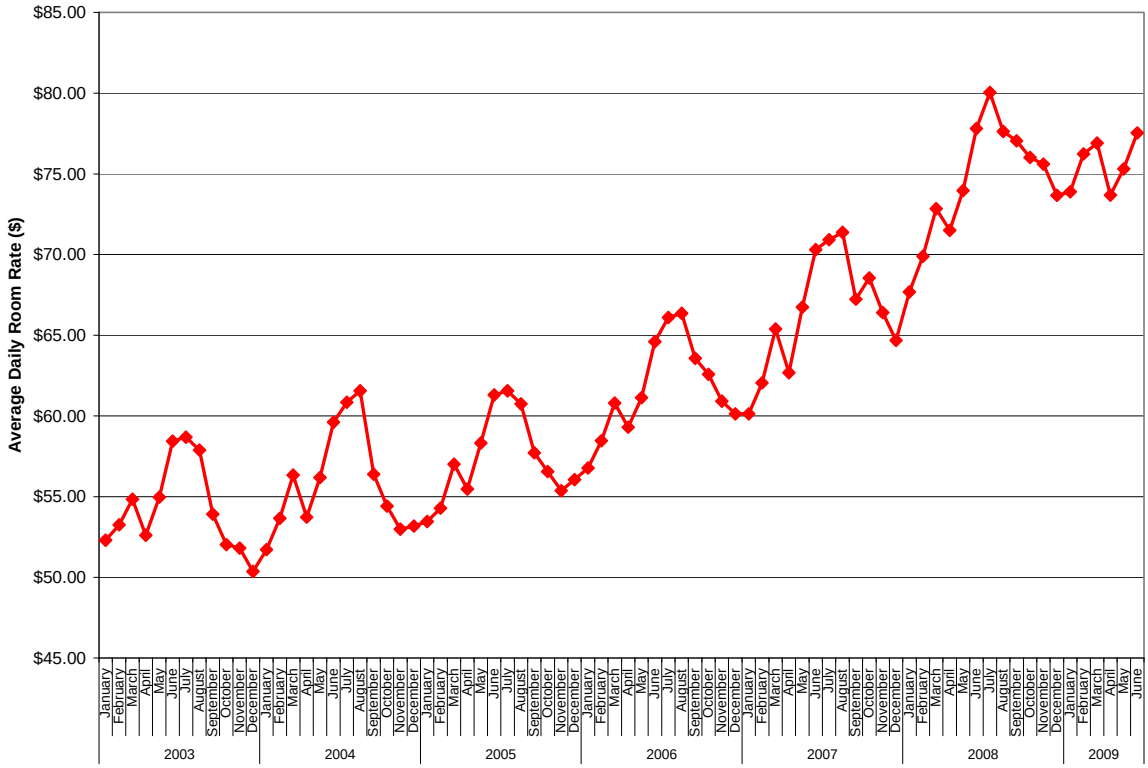
FIGURE 5-20
Study Area Average Monthly Occupancy Rate (2003 through 2009)



Source: Smith Travel Research, 2009.

The average daily room rate fluctuates depending on the month, as can be seen from the information presented in **Figure 5-21**. Room rates generally vary little from January through May and then gradually increase, peaking in July and August, and decrease throughout the remainder of the year. The rate, however, has trended upwards over the period, from just under $55 in 2003 to $75 in 2008. From 2003 to 2005, the average hotel rate increased approximately 3 percent a year. Between 2005 and 2007, the price increased about 7 percent annually and between 2007 and 2008, the price increased by 12 percent.

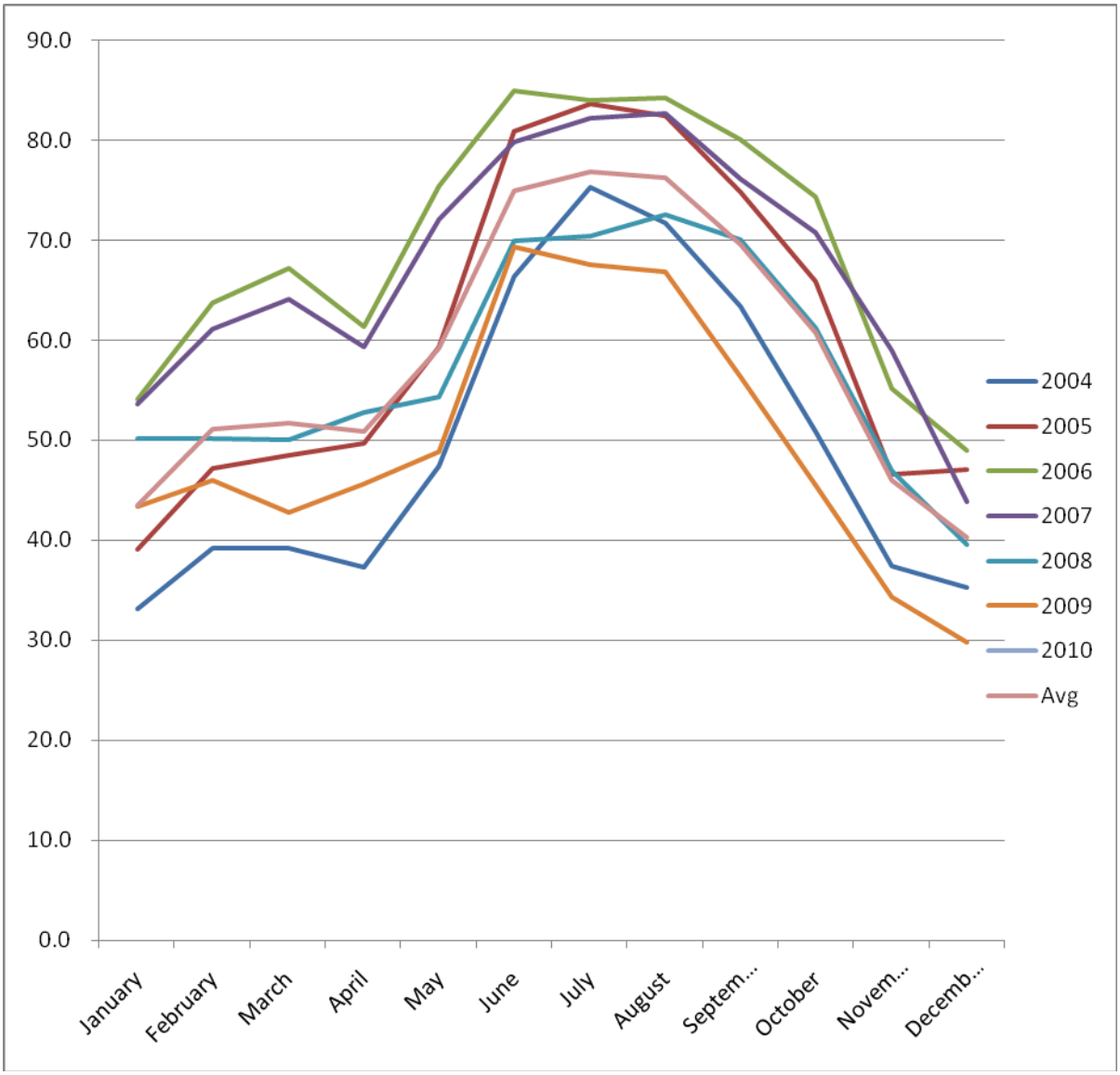
FIGURE 5-21
Monthly Average Daily Room Rate (2003 through 2009)



Source: Smith Travel Research, 2009.

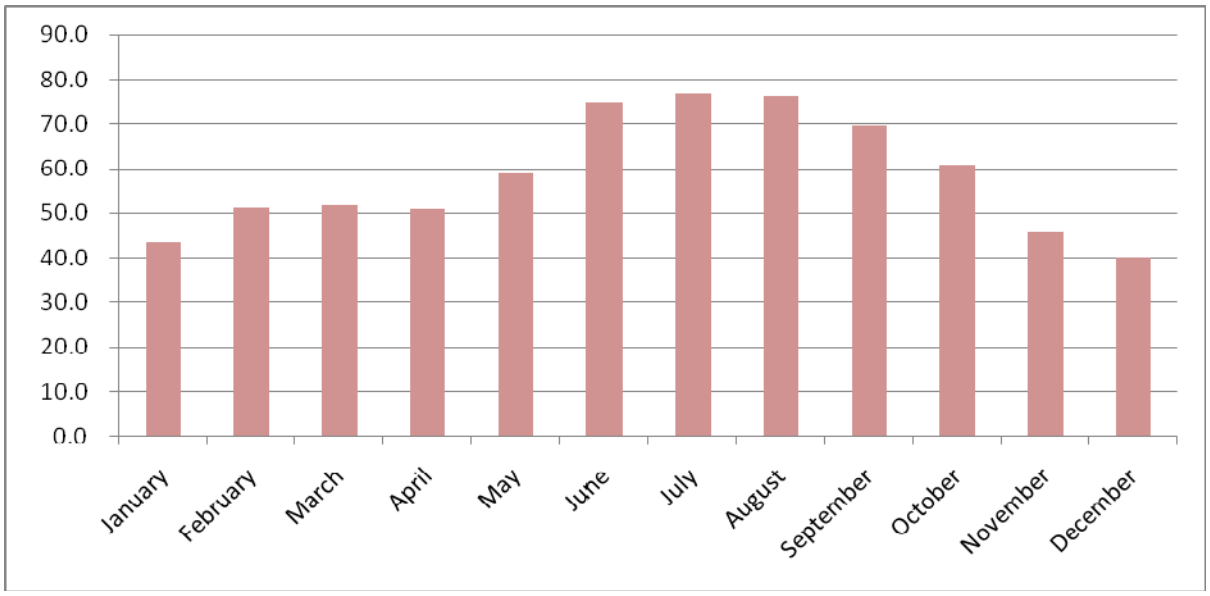
Given the observed non-local worker preference for locating in Gillette observed from recent projects located in Campbell County, it is important to look at the availability of temporary housing in Gillette. The results from the Smith Travel Research for Gillette are summarized in **Figures 5-22** and **5-23** and **Table 5-43**. From Figure 5-22, it is clear that occupancy rates are lowest in the winter months and highest in the summer months. Occupancy rates in 2008 and 2009 were low by historical standards. Whereas the average peak occupancy rate in July was historically about 77 percent as shown in Figure 5-23 and Table 5-43, in 2009, occupancy peaked at 70 percent in May and fell to 68 percent by July.

FIGURE 5-22
Hotel and Motel Occupancy Rates for Gillette, Wyoming for January 2004 to January 2010



Source: Smith Travel Research, 2010.

FIGURE 5-23
Average Monthly Hotel and Motel Occupancy Rates for Gillette, Wyoming January 2004 to January 2010



Source: Smith Travel Research, 2010.

TABLE 5-43
Average Monthly Hotel and Motel Occupancy Rates for Gillette, Wyoming January 2004 to January 2010

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Avg	43.5	51.1	51.8	50.9	59.2	75.0	76.9	76.3	69.6	60.7	46.0	40.3

Source: Smith Travel Research, 2010.

Recreational Vehicle Sites. Many RV sites in the region provide accommodation for visits with durations of weeks or months. Table 5-42 includes the number of RV site hookups for year-round camping areas within the seven-county Study Area. The City of Gillette has the most RV sites (1,973).

5.4.7.5 Construction Impacts

The construction phase of the Project would employ from a low of 24 non-local workers in the first month of construction to a peak of 263 workers in October. The average number of non-local workers over the 12-month construction period is about 118.

5.4.7.6 Number of Units Required

Estimates of selected characteristics of the peak-month workforce are shown in **Table 5-44**. It is estimated that a total of 258 single non-local construction workers would relocate to the Area of Site Influence. Up to five non-local workers could be accompanied by family members and it is assumed that all workers would secure temporary accommodations for the duration of their involvement in the Project.

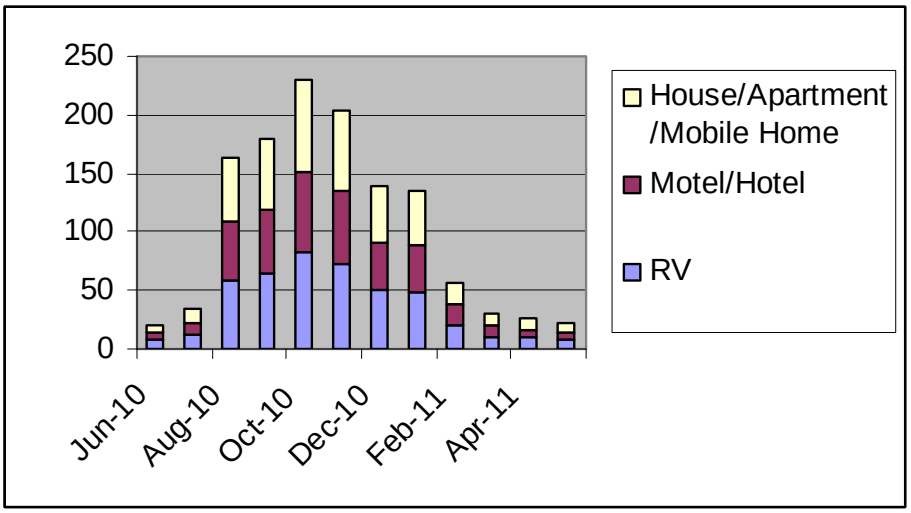
TABLE 5-44
Estimate of Local and Non-local Construction Worker Breakdown During Peak Month

Peak Monthly Workforce	Number of Workers
Local Workers	46
Non-local Workers	263
Non-local Workers Bringing Families	5
Non-local Single Workers	258
Housing Requirement	**Number of Rooms**
Permanent Housing Units	0
Temporary Accommodation Units	230
Recreational Vehicle Spaces	83
Houses, Apartments, and Rental Mobile Homes	78
Hotel and Motel Rooms	69
Temporary Accommodation Units by Occupancy	**Number of Type**
Single-occupancy	197
Double-occupancy	33

Source: TPWRJ, 2010; CH2M HILL, 2010.

The estimated housing requirements shown in Table 5-44 are based on the assumption that one-quarter of the single, non-local workers will share temporary accommodation units such as hotel/motel rooms, apartments and mobile homes, single-family rental houses, or RVs (i.e., double-occupancy). The remaining three-quarters would occupy units singly. The aggregate demand for accommodations created by the non-local workers could total 230 units. The manner in which demand for temporary accommodation units (by type) would vary over the construction period is exhibited in **Figure 5-24**. The demand for housing units is disaggregated into the three different types of units. Following are the shares: 36 percent for RVs; 34 percent for apartments, rental mobile homes, and single-family homes; and 30 percent for hotel and motel rooms.

FIGURE 5-24
Temporary Accommodation Units (by Type) Required to House Non-local Construction Workers



5.4.7.7 Construction Workforce Housing Plan

Rule I Section 7(xiii)(F) - Housing. Preliminary evaluations of or plans and proposals for alleviating social or economic environmental impacts upon local government or any special districts which may result from the proposed facility, which evaluations, plans and proposals shall cover housing.

TPWRJ has engaged in a preliminary assessment of housing options to ensure that housing is available to temporary construction workers employed during the construction period from June 2010 until May 2011. Due to the variety of the housing options and locations within commuting distance of the site, the housing market analysis suggests that there will not be a housing shortage for the non-local work force.

To accomplish a successful and implementable housing plan, TPWRJ conducted an extensive temporary housing market survey in the Area of Site Influence. Housing availability was determined by compiling a listing of temporary housing purveyors in Gillette and the surrounding area. This narrow focus is based on the observed worker location choices from the recent energy projects (i.e., Wygen III and Dry Fork) sited in Campbell County. Individual and follow-up phone calls and e-mails were conducted during February and March of 2010 to document a number of temporary housing options, variables, most likely costs, and expressions of interest in accommodating the TPWRJ workforce. TPWRJ did not attempt to obtain commitments from any of the providers, for any of the types of housing. Rather the analysis is based on the stock of temporary housing, vacancy rates, and the willingness of purveyors to house the workers. This analysis is based on peak and average demand for temporary housing.

Table 5-45 provides a breakdown of the housing vacancies in Gillette by type of housing. **Appendix D** provides copies of the survey responses received to date from the hotels and motels in the Gillette area.

TABLE 5-45
Potentially Available Temporary Accommodations

Type of Rental Housing	Number of Accommodation Units Required by Project During Peak Month (Demand)	Number of Accommodation Units in Gillette Area	Vacancy Rate [2]	Number of Available Accommodation Units in Study Area (Supply)	Housing Gap (Supply minus Demand)
Recreational Vehicle Spaces	83	1,973	8.4%	166	+83
Houses, Apartments, and Rental Mobile Home[1]	78	2,639	3.0%	79	+1
Hotel/Motel Rooms	69	1,640	23%	377	+308
TOTAL	**230**			**622**	**+392**

[1] Based on City of Gillette rental units only
[2] The vacancy rate for hotel/motel rooms is based on the average occupancy for the peak month over the January 2004 to January 2010 period.
+ indicates a surplus of housing units

Source: Smith Travel Research, 2010; CH2M HILL, 2010.

The aggregate sum of rooms available for use by members of the construction workforce during the peak occupancy month numbers about 622. This compares to a peak demand of 230 units. The potential supply in the Gillette area alone exceeds demand by close to 400 units.

5.4.7.8 Effects on Vacancies of Local Motel/Hotels, Recreational Vehicles and Apartments

The supply of temporary accommodations in the Study Area includes hotel and motel rooms, apartments, single-family rental housing units, rental mobile homes, and RV spaces located in RV parks. Estimates of the available supply of each type of accommodation are shown in Table 5-45, along with the demand generated by the non-local workers associated with the Project. The number of potentially available units is derived from applying the vacancy rates shown to the total number of each type of unit in the Study Area. More than adequate housing is available to meet the needs of the non-local workers.

Implementation of the Project would reduce housing vacancy rates as the demand absorbs a fraction of the available units. Table 5-45 shows estimates of vacancy rates, by type of accommodation unit, prior to and during the period of peak construction activity of the Project.

Given (1) the letters of intent to provide accommodations secured by TPWRJ regarding available hotel/motel rooms, and (2) the available supply of other types of temporary accommodations in Converse and Natrona counties, the likely demand for 280 accommodation units would be satisfied.

5.4.7.9 Operations Impacts

During operation of the proposed facility, it is estimated that there would be 15 full-time employees. No impacts to housing resources are expected.

5.4.8 Public Education

Rule I Section 7(vi)(H) – Public facilities and services availability and needs, which may include, but are not limited to: Educational facilities, including an analysis based upon enrollment per grade, physical facilities and their capacities, and other relevant factors with an assessment of the effect that the new population will have on programs and facilities.

The major topics addressed in this section are location and characteristics of educational facilities, current and historical school enrollment, and student-teacher ratios for Campbell, Crook, and Natrona counties per the expected non-local worker temporary relocations to these counties.

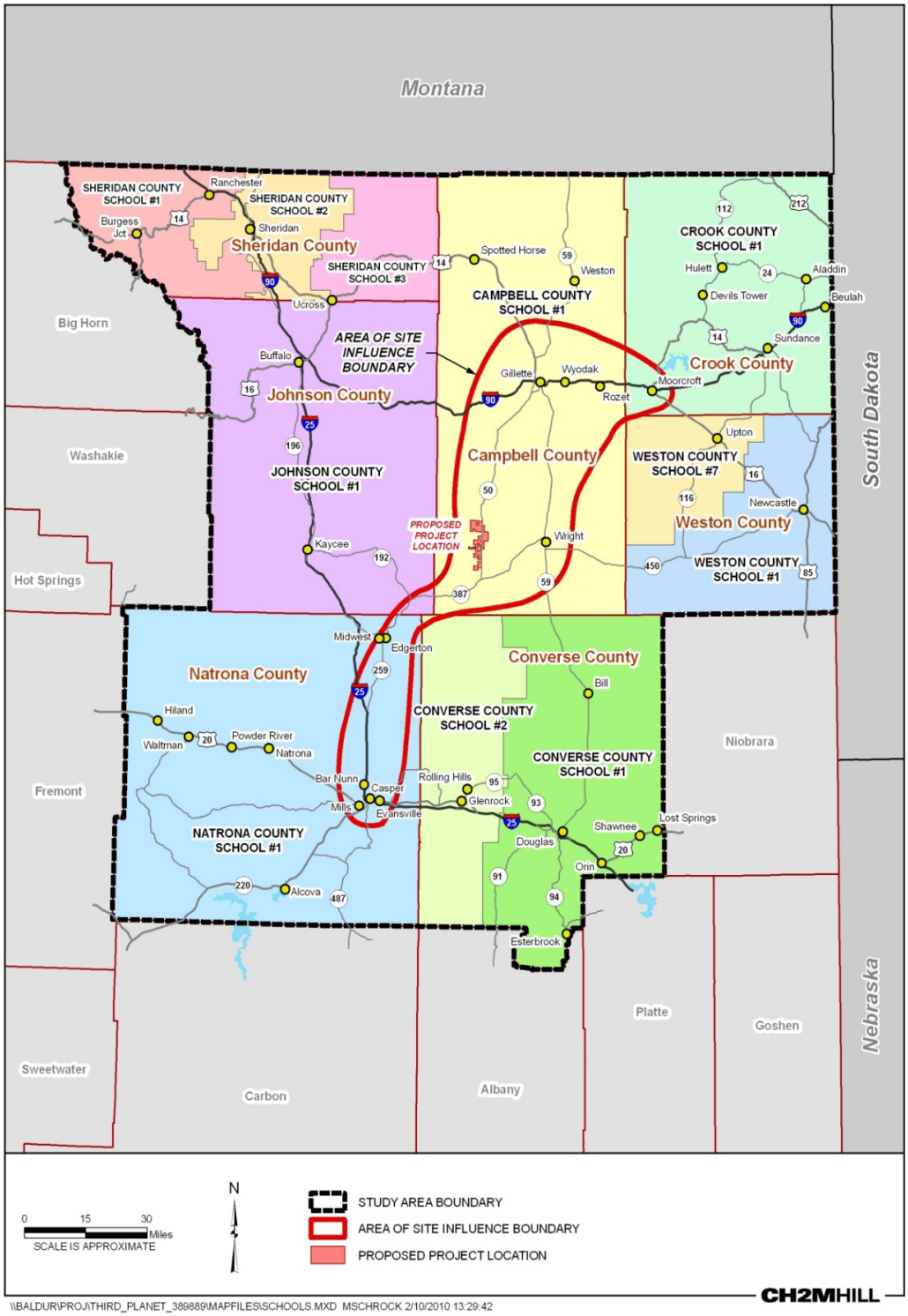
5.4.8.1 Location and Characteristics of Educational Facilities

The seven-county Study Area contains the following school districts: Campbell County School District 1, Converse County School Districts 1 and 2; Crook County School District 1; Johnson County School District 1; Natrona County School District 1; Sheridan County School Districts 1, 2, and 3; and Weston County School Districts 1 and 2.

The service areas corresponding to these 11 school districts are illustrated in **Figure 5-25**. These 11 school districts operate a total of 116 educational facilities. This figure also shows that the Area of Site Influence primarily overlaps Campbell County School District 1, a populated portion of Natrona County School District 1, and a small corner of Crook County School District 1. Of these districts, Natrona County District 1 is the largest district, with 34 educational facilities, followed by for Campbell County School District 1 with 21 facilities, and Crook County School District 1 with six facilities, including one school offering kindergarten through 12th grade, three elementary schools, and four secondary schools. **Table 5-46** shows the type and number of schools by district and selected district-wide characteristics.

Revenues per student in 2008 vary by school district with Campbell County District 1 reporting revenues per student at $16,113, Natrona County District 1 with $17,432 per student, and Crook County District 1 with $19,384 per student. Additionally, the contribution to total revenues from federal, state, and local sources for each of the school districts varies. Federal revenues comprise the smallest shares for Campbell County and Crook County School Districts, but the county contributed the smallest share for Natrona County. The highest share for Campbell County was 64 percent from local government, but for Crook and Natrona County, the state contributed the largest shares at 68 percent and 70 percent, respectively.

FIGURE 5-25
Public School Districts in the Study Area



Source: CH2M HILL, 2010.

TABLE 5-46
Selected Characteristics of School Districts (2008)

	Campbell County School District No. 1	Crook County School District No. 1	Natrona County School District No. 1
Elementary Schools	16	3	31
Secondary Schools	5	4	2
Enrollment	**7,985**	**1,103**	**11,642**
Kindergarten enrollment	196	88	987
Grade 1	198	84	897
Grade 2	182	67	913
Grade 3	170	86	879
Grade 4	162	73	885
Grade 5	176	65	857
Grade 6	153	77	859
Grade 7	160	91	876
Grade 8	116	83	935
Grade 9	116	86	926
Grade 10	119	94	1,011
Grade 11	78	100	818
Grade 12	64	91	802
Staff (full-time equivalent [FTE])			
Total	1445	231	2,004.5
Teachers	590	101	833.0
Student Instructional Aids, Support Staff, counselors	395	56	555
Administration	166	27	317
Other General Support (O&M, Bus Drivers, Mechanics, Food Service)	293	47	299
Student-Teacher Ratio	10.29	8.65	14.2
Revenue Source (Percent)			
Local	$82,893,993 (64%)	$4,809,879 (22%)	$37,342,862 (18%)
County	$29,971,234 (23%)	$1,382,712 (6%)	$8,934,855 (4%)
State	$10,429,333 (8%)	$14,594,501 (68%)	$142,301,238 (70%)
Federal	$5,372,802 (4%)	$593,529 (3%)	$14,362,620 (7%)
Total	**$128,667,362**	**21,380,621**	**$202,941,575**
Revenue per Student	**$16,113**	**$19,384**	**$17,432**

Source: Wyoming Department of Education, 2009.

5.4.8.2 Student Enrollment

Student enrollment as of October 1, 2009, totaled 8,207 in Campbell County; 1,085 in Crook County; and, 11,749 in Natrona County. As shown in **Table 5-47**, between 2000 and 2009, Campbell County enrollment increased by 719 students (9.6 percent), while enrollment fell by 91 pupils in Crook County and by 289 students in Natrona County.

TABLE 5-47
School District Enrollment (1991 to 2008)

Year	Campbell County District #1	Cook County District #1	Natrona County District #1
2009	8,207	1085	11,749
2008	7,985	1103	11,642
2007	7,589	1085	11,604
2006	7,617	1111	11,444
2005	7,337	1080	11,408
2004	7,198	1035	11,546
2003	7,234	1075	11,590
2002	7,368	1087	11,650
2001	7,441	1122	11,835
2000	7,488	1176	12,038
Change (2000-2009)			
Numeric	719	-91	-289
Percent	9.6%	-7.74%	-2.40%
Average Annual Percent	1.1%	-0.9%	-0.3%

Source: Wyoming Department of Education, 2009.

5.4.8.3 Student-Teacher Ratios

A commonly used measure of overall school quality is the student-teacher ratio (i.e., the ratio of total student enrollment in a school, school district, or other unit to the number of FTEs certified teachers). This ratio provides a means of comparing different educational units, such as school districts, to a state or national parameter. As a whole, the pupil-teacher ratios, which can be used as an indicator of school quality, within the Study Area tend to be better than the state and national standards. The National Student -Teacher Ratio has essentially remained unchanged since 2000 and is approximately 15.9 students per teacher.

Of the three school districts comprising the Study Area, Crook County School District 1 (with a 2008 student-teacher ratio of 8.65) had the lowest ratio followed by Campbell County District 1 with 10.29 and Natrona County District 1 with 14.2. All three school districts are below the national ratio of 15.3, while Crook County District 1 and Campbell County District 1 are also below the state ratio of 12.4. Each of the school districts

in the Study Area compare well to the respective values for the state as a whole and to national levels.

5.4.8.4 Capital Improvement and Expansion Plans

The Capital Improvement Plans (CIPs) for the school districts are designed to address the requirements of anticipated baseline growth and changing demographic conditions in the school districts as well as periodic maintenance and repair of existing facilities and infrastructure.

5.4.8.5 Construction Impacts

The number of non-local workers likely to enter the Study Area during the peak on-site employment month would total 263. Based on the historical data, it is expected that less than 3 percent of these non-local workers would be accompanied by family members. Thus, no impacts to public education are anticipated.

5.4.8.6 Operations Impacts

The permanent workforce associated with the O&M of the proposed facility (15 workers) is not expected to impact public education.

5.4.9 Public Safety

Rule I Section 7(vi)(D) – Public facilities and services availability and needs, which may include, but are not limited to: Existing police and fire protection including specific new demands or increases in service levels created by the proposed industrial facility.

This section addresses the availability of fire protection and law enforcement services and crime levels in the counties comprising the Study Area.

5.4.9.1 Fire Protection Services

A total of 29 fire stations operated by 14 fire departments, the majority of which are staffed on a volunteer basis, are located in the Study Area. **Table 5-48** lists the fire departments and selected personnel characteristics for each department. The largest departments are those of the City of Casper and Natrona County Fire Protection District in Natrona County. The Campbell County Fire Department services the entire County with 10 fire stations, 24 full-time paid staff, 150 volunteer firefighters, and five emergency medical technicians.

TABLE 5-48
Fire Departments in Campbell, Crook, and Natrona Counties

Fire Department	No. of Stations	No. of Firefighters		Emergency Medical Services (EMS)	Basic Emergency Medical Technicians (EMTs)	Advanced EMTs
		Full-time Paid	Volunteer			
Campbell County Total	**10**	**24**	**150**		**0**	**0**
Campbell County Fire Department	10	24	150	No	0	0
Crook County Total	**5**	**0**	**235**	**Yes**	**5**	**4**
Hulett Fire Department	1	0	18	Yes	NA	NA
Moorcroft Volunteer Fire Department	1	0	25	Yes	2	2
Sundance Volunteer Fire Department	1	0	17	No	0	0
Crook County Fire Department	1	0	155	No	0	0
Pine Haven Volunteer Fire Department	1	0	20	Yes	3	2
Natrona County Total	**14**	**101**	**172**		**124**	**47**
Bar Nunn Volunteer Fire Department	1	0	21	Yes	18	0
Casper Fire Department	5	73	0	Yes	71	38
Casper Mountain Fire Department	1	0	86	NA	NA	NA
Evansville Fire Department	1	0	21	NA	NA	NA
Mills Volunteer Fire Department	1	0	35	Yes	7	6
Natrona County Fire Protection District	2	21	7	Yes	14	5
Natrona County International Airport Fire Department	1	7	2	No	2	0
Salt Creek Emergency Services Stations 16 and 17	2	0	21	Yes	12	0

NA = No data available

Source: Wyoming State Fire Marshal, 2009.

As shown in **Table 5-49**, in 2008, the fire organizations in Campbell County responded to 1,733 incidents, of which 216 were fire calls and 937 were EMS rescue calls. Crook County had 92 total incidents, including 76 fire calls and two EMS rescues. In Natrona County, the fire organizations reported 8,672 incidents, of which 480 were fire calls and 5,931 were EMS rescue calls.

For other types of incidents, the Wyoming Emergency Response Act (35-9-151) established seven Regional Emergency Response Teams (RERTs) under the authority of the director, Wyoming Office of Homeland Security. Members of these teams are specially trained and available to respond to hazardous materials and weapons of mass destruction incidents. Each county in Wyoming has a coordinator responsible for mitigation and preparedness activities to protect against and prepare for disasters. This involves planning, training, exercising, procuring/maintaining equipment, and designating facilities for shelter and other purposes.

TABLE 5-49
Fire Incidents in Campbell, Crook and Natrona Counties (2008)

Department	Total Incidents	Fire Calls	EMS Rescue Calls	Civilian Fire Injuries	Firefighter Injuries	Civilian Fire Deaths	Firefighter Deaths
Campbell Total	**1,733**	**216**	**937**	**3**	**0**	**0**	**0**
Campbell County Fire Department	1,733	216	937	3	0	0	0
Crook Total	**92**	**76**	**2**	**0**	**0**	**0**	**0**
Hulett	NA	2008					
Moorcroft	16	10	2	0	0	0	0
Sundance	NA	2008					
Crook County	**72**	**64**	**0**	**0**	**0**	**0**	**0**
Pine Haven	4	2	0	0	0	0	0
Natrona Total	**8,672**	**480**	**5,931**	**2**	**0**	**1**	**0**
Casper	6,038	222	4,139	2	0	0	0
Natrona Airport	50	2	16	0	0	0	0
Bar Nunn	204	23	116	0	0	0	0
Salt Creek Emer.	NA	2008					
Evansville	226	40	148	0	0	0	0
Mills	NA	2008					
Natrona County	**2,154**	**193**	**1,512**	**0**	**0**	**1**	**0**
Casper Mountain	NA	2008					

NA = not available

5.4.9.2 Law Enforcement Services

Law enforcement in the Study Area is provided by the state (highway patrol), counties (Sheriff's departments), and municipalities (police departments) from a number of locations throughout the counties, as shown in **Table 5-50**.

TABLE 5-50
Police Stations in the Study Area

Name	Address	City	County
Campbell County Sherriff's Office	600 W Boxelder Rd Gillette, Wyoming 82718	Gillette	Campbell
Gillette Police Department	P0 Box 518 Gillette, Wyoming 82717	Gillette	Campbell
Crook County Sherriff's Office	309 Cleveland Sundance, Wyoming 82729	Sundance	Crook
Hulett Police Department	PO Box 307 123 Hill Street Hulett, Wyoming 82720	Hulett	Crook
Moorcroft Police Department	04 North Big Horn Ave. PO Box 70. Moorcroft, WY 82721	Moorcroft	Crook
Sundance Police Department	213 Main St Sundance, Wyoming 82729	Sundance	Crook
Wyoming Highway Patrol	P.O. Box 2963 Casper, WY 82602	Casper	Natrona
Natrona County Sheriff Department	201 North David Street Casper, WY 82601	Casper	Natrona
Casper Police Department	201 North David Street Casper, WY 82601	Casper	Natrona
Evansville Police Department	235 North Curtis Street Evansville, WY 82636	Evansville	Natrona
Mills Police Department	704 Fourth Street Mills, WY 82644	Mills	Natrona

Source: USA Cops, 2010.

As of 2008, each of the counties had the following number of officers: 92 in Campbell County, 15 in Crook County, and 160 in Natrona County. The number of officers per 1,000 residents was very close to the state average of 2.3 for all three counties. However, the number of index crimes per officer varied in 2008, from a low of 9.7 in Crook County to a high of 18.5 in Natrona County, the latter of which was higher than the state average of 13.1. Selected characteristics (for 2008) of each of the local law enforcement agencies in the Study Area are presented in **Table 5-51**.

TABLE 5-51
Law Enforcement Personnel in Campbell, Crook, and Natrona Counties and the State

Location	Total Employees	Officers		Civilians		Officers per 1,000 Population	Index Crimes per Officer
		Male	Female	Male	Female		
Campbell County	**135**	**84**	**8**	**4**	**39**	**2.2**	**12.6**
Sheriff	62	41	5		16	2.9	5.8
Gillette	73	43	3	4	23	1.8	19.4
Crook County	**23**	**14**	**1**	**0**	**8**	**2.5**	**9.7**
Sheriff	14	7			7	1.8	10.4
Moorcroft	5	3	1		1	4.6	11.0
Sundance	4	4				3.3	7.3
Natrona County	**206**	**139**	**21**	**5**	**41**	**2.2**	**18.5**
Sheriff	58	41	5	1	11	3.5	6.4
Casper	124	79	15	4	26	1.8	26.0
Evansville	11	8	1		2	3.8	11.6
Mills	13	11			2	3.5	10.9
State	1.637	1,092	99	81	365	2.3	13.1

Source: Wyoming Office of Attorney General, 2008.

5.4.9.3 Crime

Reported crimes (i.e., crimes known to law enforcement) are categorized into the more serious Part 1 crimes and less serious Part 2 crimes. Part 1 crimes (also referred to as index crimes) are further subdivided into crimes against persons (murder, forcible rape, robbery, and aggravated assault) and crimes against property (burglary, larceny, and motor vehicle theft). Part 2 crimes are classified into the following groups: manslaughter by negligence; arson; other assault; forgery and counterfeiting; fraud; embezzlement; buying, receiving, or possessing stolen property; vandalism; carrying or possessing weapons; prostitution and commercial vice; sex offenses (except rape and prostitution); drug abuse – sale and manufacture; drug abuse – possession; gambling; offenses against family and children; driving under the influence; liquor laws; drunkenness; disorderly conduct; vagrancy; and all other (except traffic).

The number of reported crimes is directly related to the number of residents and, thus, most crimes occur in the largest community—the City of Casper. This is evident from the information in **Table 5-52**. However, for comparative purposes, the most relevant statistic is the crime rate per 10,000 inhabitants, as this statistic adjusts for the size of the population. In 2008, this crime rate for index crime events ranged from a low of 246.4 per 10,000 inhabitants in Crook County, to a high of 410.6 in Natrona County. Campbell County's rate of 279.5 was higher than for Crook County but fell below the state average of 299.1 in 2008. The large proportion of index crimes is classed as crimes against property. This type of crime represented over 90 percent of all index crimes.

TABLE 5-52
Number of Reported Index Crime Events (2008)

Location	Murder	Rape	Robbery	Aggravated Assault	Burglary	Larceny	Motor Vehicle Theft	2008 Total	2007 Total	% Change	2008 Population Coverage	Crime Rate per 10,000 Inhabitants
Campbell County	**0**	**8**	**1**	**58**	**161**	**867**	**65**	**1160**	**1.241**	**-6.50%**	**41,510**	**279.5**
Sheriff		1		29	55	181	21	267	260	-4.60%	15,812	188.9
Gillette		7	1	29	108	706	44	893	961	-71%	25,698	347.5
Crook County	**1**	**3**	**0**	**1**	**41**	**97**	**3**	**146**	**90**	**62.20%**	**5,925**	**246.4**
Sheriff		1			15	55	2	73	83	15.90%	3,834	190.4
Mooraoft	1	1		1	20	20	1	44	15	1033%	886	508.1
Sujdance		1			8	22		29	12	141.70%	1,225	238.7
Natrona County	**1**	**36**	**21**	**136**	**500**	**2,121**	**151**	**2,966**	**3,347**	**-11.40%**	**72,242**	**410.6**
Sheriff		6	1	10	111	139	27	294	389	-244%	3,012	2258
Casper	1	30	19	109	368	1,805	116	2,448	2,747	-109%	53,890	418.0
Evansville			1	10	10	81	2	134	93	11.80%	2,.359	440.9
Mills				7	11	98	8	120	118	2%	3,174	378.1
State TOTAL	**10**	**178**	**85**	**956**	**2.165**	**11,454**	**705**	**15,553**	**16,076**	**-3.30%**	**519,923**	**299.1**

Source: Wyoming Office of Attorney General, 2008.

Part 2 crimes are considered less serious in nature than Part 1 crimes, but they are significantly more numerous and often of an anti-social nature with the majority related to alcohol and drug abuse. Part 2 crimes are classified into the following groups: manslaughter by negligence; arson; other assault; forgery and counterfeiting; fraud; embezzlement; buying, receiving or possessing stolen property; vandalism; carrying or possessing weapons; prostitution and commercial vice; sex offenses (except rape and prostitution); drug abuse – sale and manufacture; drug abuse – possession; gambling; offenses against family and children; driving under the influence; liquor laws; drunkenness; disorderly conduct; vagrancy; and all other (except traffic). Information regarding Part 2 crimes is available only in the form of arrest data as shown in **Table 5-53**. As the numbers show, drug- and alcohol-related arrests and other assaults top the list of offenses that result in arrests. In 2008, the crime arrest rate for Campbell County stood at 105.3 per 1,000 residents, which is higher than the 61.7 crime rate in Crook County but below 116 crime rate for Natrona County.

TABLE 5-53
2008 Arrests by Type of Crime and County

Classification of Offenses	Sex	Campbell County		Crook County		Natrona County	
		Adult	Juvenile	Adult	Juvenile	Adult	Juvenile
Murder and Non-Negligent Manslaughter	M	0	0	0	0	2	1
	F	0	0	1	0	0	0
Forcible Rape	M	4	0	0	0	8	3
	F	0	0	0	0	0	0
Robbery	M	0	2	0	0	8	3
	F	0	0	0	0	0	0
Aggravated Assault	M	42	2	2	0	27	3
	F	7	1	0	0	5	1
Burglary	M	32	0	3	0	49	20
	F	0	0	0	0	4	2
Larceny-Theft	M	94	48	8	5	173	95
	F	44	46	1	1	130	101
Motor Vehicle Theft	M		2	0	0	8	10
	F	2	2	0	0	1	1
TOTAL INDEX OFFENSE ARRESTS	**M**	**179**	**54**	**13**	**5**	**275**	**135**
	F	**53**	**49**	**2**	**1**	**140**	**105**
Grand Total Index Arrests as Percent of Overall Grand total		**7.7%**		**5.2%**		**8%**	
Manslaughter by Negligence	M	2	0	0	0	0	0
	F	0	0	0	0	0	0
Arson	M	0	2	0	0	1	2
	F	0	0	0	0	1	2
Other Assaults	M	302	52	11	2	318	74
	F	97	24	3	0	115	44

TABLE 5-53
2008 Arrests by Type of Crime and County

Classification of Offenses	Sex	Campbell County		Crook County		Natrona County	
		Adult	Juvenile	Adult	Juvenile	Adult	Juvenile
Forgery and Counterfeiting	M	7	0	2	0	20	2
	F	8	0	0	0	4	0
Fraud	M	20	1	3	0	24	0
	F	3	2	0	0	17	2
Embezzlement	M	0	0	0	0	0	0
	F	1	0	0	0	1	0
Stolen Property: Buy. Receive.	M	7	0	0	2	1	0
Possess	F	0	0	0	0	1	0
Vandalism	M	34	30	1	0	57	36
	F	5	6	0	0	16	12
Weapons: Carry. Possess. etc	M	9	0	0	0	20	17
	F	1	0	0	0	0	1
Prostitution and Commercialized Vice	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
Sex Offenses	M	18	4	1	0	16	3
(Except Rape & Prostitution)	F	3	0	0	0	2	0
Drug Abuse Violations Total	M	197	26	16	5	339	106
	F	88	7	5	3	99	28
(1) Sale Manufacture subtotal	M	28	0	4	0	25	2
	F	12	1	0	0	10	0
(2) Possession Subtotal	M	189	26	12	5	314	104
	F	54	6	5	3	89	28
Gambling Offenses	M	0	0	0	0	0	0
	F	0	0	0	0	0	0
Offenses Against Family and Children	M	40	2	2	0	21	1
	F	9	1	0	0	12	0
Driving Under the Influence	M	750	10	78	0	749	8
	F	142	2	5	0	244	5
Liquor Laws	M	196	49	21	4	441	160
	F	90	30	9	4	187	108
Drunkenness	M	194	0	11	0	601	2
	F	32	0	3	0	121	1
Disorderly Conduct	M	92	31	1	0	28	1
	F	35	0	0	0	12	0
Vagrancy	M	0	0	0	0	13	13
	F	37	0	0	0	0	4

TABLE 5-53
2008 Arrests by Type of Crime and County

Classification of Offenses	Sex	Campbell County		Crook County		Natrona County	
		Adult	Juvenile	Adult	Juvenile	Adult	Juvenile
All Other Offenses (Except Traffic)	M	873	98	135	12	2.338	303
	F	303	85	29	5	827	119
Suspicion	M	0	0	0	0	2	0
	F	0	0	0	0	0	0
Curfew and Loitering Law Violations	M	NA	0	NA	1	NA	94
	F	NA	0	NA	0	NA	39
Run-aways	M	NA	4	NA	2	NA	8
	F	NA	4	NA	4	NA	4
Total male	M	2927	363	295	33	5,264	965
Total Female	F	883	196	56	17	1.799	474
TOTAL	M	3810	559	351	50	7.063	1,439
Grand Total		**4369**		**401**		**8,502**	
Population		41,473		6,457		73,129	
Arrests/1,000 population		105.3		61.7		116.0	

Source: Wyoming Office of Attorney General, 2008.

5.4.10 Construction Impacts

5.4.10.1 Fire Protection

The temporary influx of a peak number of 263 residents associated with the construction phase of the Project would have negligible effect on the quality of service provided by fire protection agencies.

The Project area is bisected by a north–south stretch of SH 50, approximately 35 miles southwest of Gillette, Wyoming, and crossed by portions of two gravel county roads—Moore Road and Van Buggenum Road. Responses to any emergencies at the Project site could be responded to by multiple fire protection agencies in both Campbell County and nearby Natrona County.

Fire emergencies would generally be initiated through 911 calls, alerting the appropriate fire/ambulance crews for dispatch. It is anticipated that the Campbell County Fire Department would be the first responder in case of a fire event. TPWRJ will proactively coordinate with the appropriate fire departments to minimize fire safety hazards, coordinate response efforts, and effectively train TPWRJ and subcontracting personnel in fire safety issues. TPWRJ's General Contractor will also maintain a safety officer on site for the duration of construction activities; the safety officer will coordinate emergency management and response, provide onsite training and certification to new site personnel, and enable

additional training opportunities such as CPR and first aid, to enable qualified administration of basic first responder care should an emergency situation arise.

5.4.10.2 Law Enforcement

Law enforcement services would be provided to the Project site by the Gillette, Moorcroft, and Casper Police Departments. As shown in Table 5-50, the current level of service ranges from about 2.2 to 3.8 officers per 1,000 in population. Thus, the temporary increase in persons attributable to construction of the Project could equate to an increase in demand addressed by one additional law enforcement officer. However, this increase in demand would last for a short period and would not justify the hiring of additional personnel.

With an index crime rate of about 280, 246, and 411 per 10,000 residents in Campbell, Crook, and Natrona counties, respectively, the additional number of construction workers could account for an increase of between seven and 12 crimes annually assuming the average of the crime rate index for the three counties would hold for the population of construction workers. However, unlike the general population of the three counties the construction population has additional incentives to reduce criminal incidences.

It is stressed that TPWRJ and its contractors will take a hard line on criminal activity. At a recent TPW construction project in Texas, lasting over a year and including more than 300 non-local personnel, there were no Part 1 or Part 2 crimes committed by any of the construction personnel. Any personnel found to have committed a Part 1 or Part 2 crime while employed for the TPWRJ Project will be disciplined to the fullest extent, including termination of employment, and to the extent possible, TPWRJ will facilitate prosecution for any such criminal activity.

5.4.10.3 Operations Impacts

The local workforce of 15 associated with the O&M of the proposed facility would represent a negligible increase in the demand for fire protection and law enforcement personnel.

5.4.11 Health Care

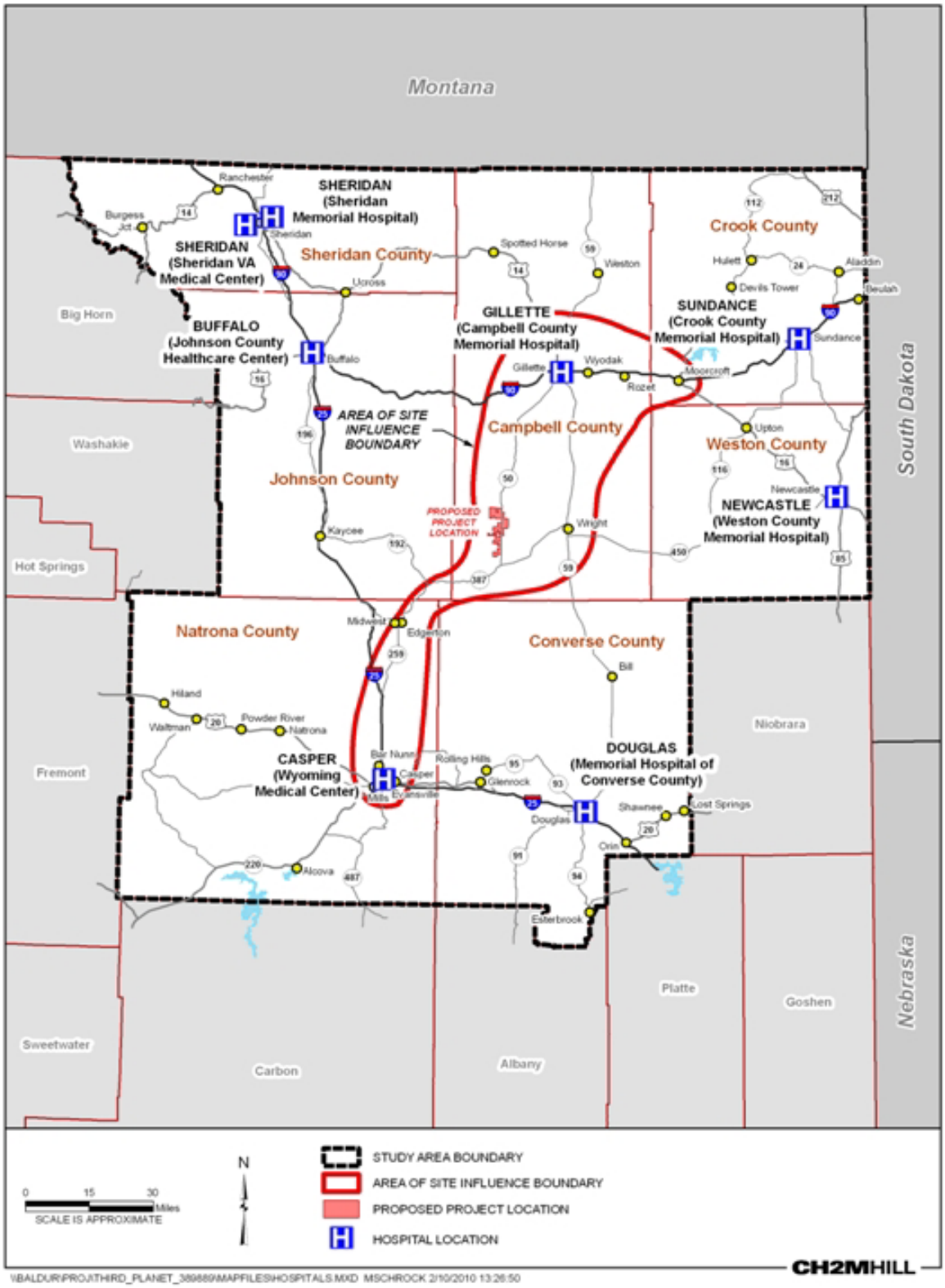
Rule I Section 7(vi)(E) – Public facilities and services availability and needs, which may include, but are not limited to: an analysis of health and hospital care facilities and services.

This section discusses the location and characteristics of health-care facilities in the three-county area of primary influence, including the number and type of facilities, staffing levels, availability of emergency medical services, and the health needs of the existing population.

5.4.11.1 Location and Characteristics of Health-Care Facilities

Two hospitals are in the area of influence as illustrated in **Figure 5-26**. They are the Campbell County Memorial Hospital (CCMH) located in Gillette and Wyoming Medical Center located in Casper in Natrona County. Both hospitals are located in the major community of their respective counties.

FIGURE 5-26
Location of Hospitals in the Study Area



Source: CH2M HILL, 2010.

CCMH is a health-care system consisting of a 90-bed acute-care hospital; 150-bed long-term care facility; two primary care clinics; urgent care clinic; ear, nose, and throat (ENT) clinic; obstetrics and gynecology (OB/Gyn) clinic; and orthopedic clinic. CCMH is accredited by the Joint Commission and Det Norske Veritas (DNV). Other services include dialysis, home medical resources, home health and hospice, medical and radiation oncology, 24-hour employee daycare, inpatient and outpatient behavioral health services, occupational health services and rehabilitation services (CCMH, 2010). According to the American College of Surgeons (1999), the CCMH is a Level III Area Trauma Hospital (Wyoming Health Care Commission, 2006).

CCMH recently began a 3-year, $65-million expansion project that will include a new surgery floor, extensive interior remodeling, and a 210-space parking structure. Current construction/remodeling projects include a 6,000-square-foot Emergency Department expansion/remodel and a laboratory remodel/automation project. Both projects are scheduled to be completed by spring 2010 (CCMH, 2010).

The Wyoming Medical Center in Natrona County has 250 hospital beds, 150 physicians on staff, offers a wide range of specialties, and functions as a regional medical center. It includes two Centers of Excellence, *The Heart Center of Wyoming* and *Wyoming Neuroscience and Spine Institute*, and offers 50 specialties. Emergency services are provided by Wyoming Medical Center's Emergency Department, a Regional Trauma Center. The one air ambulance program in the state, Wyoming Medical Center's Life Flight, operates both a helicopter, which is based at the hospital, and a fixed-wing aircraft at the local airport. This service is for emergency care for the severely injured or critically ill. It also coordinates with other facilities in transporting patients throughout the United States and Canada. Selected summary statistics from an American Health Association Survey of over 5,000 hospitals across the nation related to patient volume are provided in **Table 5-54**. These data were extracted from the U.S. News and World Report Web site, which maintains a searchable directory. According to that directory, the CCMH had annual admissions of 3,812 compared to 9,245 Wyoming Medical Center in Natrona County. Campbell County also had fewer inpatient surgeries—1,103 compared to 3,280 at the Wyoming Medical Center. There were also fewer outpatient surgeries and emergency room visits at the CCMH. The level of non-surgical outpatient activity was the highest category for both hospitals—148,522 outpatient visits at the CCMH and 76,075 at the Wyoming Medical Center in Natrona County.

TABLE 5-54
Hospitals in the Study Area: Selected Statistics

	Campbell County Memorial Hospital	Wyoming Medical Center, Natrona County
Admissions	3,812	9,245
Inpatient Surgeries	1,103	3,280
Outpatient Visits	148,522	76,075
Outpatient Surgeries	1,824	2,227
Emergency Room Visits	23,163	35,807

Source: U.S. News & World Report, 2010.

Another measure of health-care service levels relates to the availability of primary care physicians. The Wyoming Department of Health recently evaluated the status of the primary care provider workforce (2009). Primary care providers are physicians practicing family practice, general practice, internal medicine, pediatrics, or OB/Gyn, and non-physician providers such as physician assistants, nurse practitioners, and nurse midwives. The Wyoming Department of Health estimated the number of primary care physicians needed using Rural Health Works formulas and compared the needs to the number of physicians in place; the results are shown in **Table 5-55**.

TABLE 5-55
Estimated Number of Primary Care Physicians Needed

County	No. Primary Care Physicians Needed	No. Primary Care Physicians in Place	Shortage
Campbell	17.27	22	4.73
Crook	3.07	2	-1.07
Natrona	33.11	35	1.89

Source: Wyoming Department of Health, 2009.

Campbell County's needs were estimated at 17.27 and with 22 primary care physicians, they show a surplus of close to five physicians. Crook County's need of three physicians was much lower, but they only have two primary care physicians, leaving them with a shortage of one. Natrona County had the highest needs, namely 33, which they exceed by two.

Public health response coordinators (PHRC) develop and maintain county public health emergency response plans. They work with county health officers and local emergency planning committees to coordinate county health and medical plans with the Wyoming Department of Health and other agencies including hospitals, emergency medical services, and county emergency management agencies. PHRCs are responsible for ensuring that county public health staff are prepared to respond to emergency events that could have harmful effects on the health and welfare of the general public.

In 2002, Campbell County contained 442 certified EMS providers, 49 certified ambulance attendants (CAAs), and seven ambulances, as can be seen from the information presented in **Table 5-56.** As expected due to the differences in their population size, Crook County had fewer providers and Natrona County had a larger number. Natrona County had the lowest certified ambulance attendant LOS with a value of 0.9 compared to 1.4 for Campbell County and 3.4 for Crook County. However, from the perspective of area to cover, Natrona attendants had only 92.6 square miles per attendant compared to 144.9 square miles per attendant in Crook County and 329 square miles per attendant in Campbell County.

TABLE 5-56
Emergency Medical Services by County

	Campbell County	Crook County	Natrona County
Certified EMS Providers	442	72	433
CAAs	49	20	58
CAAs Per 1,000 residents	1.4	3.4	0.9
Square Mile per Attendant	329	144.9	92.6
Number of Service Providers Reporting	1	3	4
Number of Ambulances (vehicles)	7	7	9
Ambulance Runs	2,309	369	5,362*

* With one service not reporting.

Source: Wyoming Department of Health, 2002.

5.4.11.2 Health Needs of the Existing Population

This section discusses a report prepared for the Wyoming Health Care Commission in 2007 entitled *Status and Future of Health Care Delivery in Rural Wyoming*. Wyoming is undergoing significant changes in population. According to this report, which was published prior to the recent economic downturn, some areas of the state were expected to continue experiencing extraordinary growth, while others were expected to continue to endure population decline. Like many predominantly rural states, Wyoming is seeing a dramatic increase in the number of persons aged 65 and over. However, Wyoming is also experiencing substantial growth in the working-age population that supports the growth in extraction of natural resources. The two population shifts will put different pressures on the health-care system. The increase in persons aged 65 and older will create more demand for geriatric care and care management of patients with multiple chronic conditions associated with the elderly. The increase of working-age persons will increase demand for dental services, preventive services, and primary care services associated with young families.

Wyoming has an adequate array of facilities offering inpatient services, hospitals, and skilled nursing facilities (nursing homes). Despite the availability of these institutional services and the presence of qualified clinical personnel, many Wyoming residents who could be served in Wyoming are using health services in Colorado and Nebraska.

The key findings of the analysis contained in the report are as follows:

- The demographic shift of the aging population will increase an already growing demand for health-care professionals. Recruitment and retention should be priorities at all levels, from local to state, including public and private entities.
- To decrease the number of health-care professionals who leave Wyoming, the state should support and encourage increased participation in programs with proven success.

- Stakeholders in Wyoming health-care delivery recommended a step-wise strategy of integrating services in local communities and then building regional systems.
- Stakeholders believe there is no pattern of sustained leadership in health care in Wyoming, but there are potential sources of leadership that can be explored.
- Community members expressed concern about continuous population growth combined with the number of providers reaching retirement, and stressed the importance of recruitment and retention efforts.
- Respondents identified services for the elderly as a current or future need, particularly assisted living.
- Considering the combined effect of the direct and indirect impact on Wyoming's economy, health care accounts for 10.3 percent of the state's total employment, 10.5 percent of the state's total income, and 8.2 percent of the state's total output.
- The estimated total lost revenue for Wyoming hospitals due to inpatient out-migration to Colorado, Utah, and Nebraska was $101.3 million in 2003. As a result, an estimated $32.5 million less was spent in other economic sectors of Wyoming communities in the same year.
- Other states have formal or informal networks of providers to coordinate care. Examples of strong comprehensive networks across providers are the Alaska Federal Health Care Access Network and the Nebraska Rural Comprehensive Care Network.
- State health agencies use advisory groups to provide technical assistance and formulate recommendations. The Health Policy Commission in New Mexico, for example, is an independent commission monitoring the health status and health-care services in the state.

5.4.11.3 Construction Impacts

The estimated peak month non-local construction workforce of 263 persons could generate a demand for less than a single physician. This compares to a current surplus of five primary care physicians in Campbell, Crook, and Natrona counties combined. As current health-care services in this area include an adequate array of facilities offering inpatient services, hospitals, and skilled nursing facilities (nursing homes), the impact from the temporary workforce would be negligible.

This same temporary increase in population could be responsible for about 100 additional emergency room visits, on an annual basis. When compared to almost 60,000 annual visits taking place currently, such potential increase would have a negligible effect on the provision of emergency room care. Also, at 1.4 CAAs per 1,000 population, the temporary workforce would not require hiring additional ambulance personnel.

Medical emergencies would be initiated through 911 calls alerting the EMS system. Calls to 911 from the Project area would be received by the Campbell County Sheriff and police departments in Gillette and the appropriate fire/ambulance crews are paged for dispatch.

TPWRJ and its General Contractor's safety officer will proactively coordinate with Wyoming Life Flight to ensure that landing zone requirements are met at all times during construction and operation of the Project for both daytime and nighttime response calls.

Also, appropriate TPWRJ and contractor crews will be adequately trained in rescue techniques used while working in turbine tower and nacelle environments. The proposed Project site is located in between the Wyoming Medical Center (205-bed, acute-care regional hospital) located in Casper and CCMH (a 90-bed, acute-care hospital).

All construction and operations personnel working on the turbines will be deployed in pairs. An appropriately scaled portion of turbine maintenance staff will be trained in the lowering of injured colleagues to prepare for the possibility of an injury while working in the wind turbine that prevents a worker from climbing down the tower safely. A rescue basket, especially designed for this purpose, will be kept at the operations and maintenance facility and will be available for use by local emergency medical services. Training in its use will also be provided to local EMS and Wyoming Life Flight rescue team personnel through initial construction efforts coordinated by the General Contractor's safety officer.

The vast majority of non-local workers are not expected to be accompanied by family members, and it is assumed that all workers would secure temporary accommodations for the duration of their involvement in the Project. It is unlikely that the presence of the non-local workers in the area, for the relatively short period of construction, would adversely impact the demand for human services or over-extend existing facilities and personnel.

5.4.11.4 Operations Impacts

The jobs created through the O&M of the proposed facility would be staffed by 15 workers. Based on current LOS statistics, these workers, and any associated family members and dependents, would not generate a noticeable increase in demand for health-care personnel, services, or facilities and, thus, Project-related impacts would be negligible. The addition to the local economy of permanent direct and secondary jobs will add to the stability of the local workforce and communities and is unlikely to increase the demand for human services. Increased long-term employment will benefit the social and economic condition of present and expected inhabitants in the Area of Site Influence. No substantial impairments to the health, safety, and welfare of the present or expected inhabitants in the Area of Site Influence are anticipated.

5.4.12 Municipal Services

Rule I Section 7(vi)(B and C) - Public facilities and services availability and needs, which may include, but are not limited to:

(B) Sewer and water distribution and treatment facilities including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels.

(C) Solid waste collection and disposal services including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population-related increases in service levels.

This section describes the location and characteristics of the following five primary municipal services provided to residents of the two-county Study Area:

- Wastewater treatment facilities
- Water distribution and treatment facilities
- Nonhazardous waste collection and disposal
- Electricity service
- Natural gas service

5.4.12.1 Wastewater Treatment

Sewers systems collect residential, commercial, and industrial sources of wastewater and convey them to the Gillette Wastewater Treatment Facility. With recent upgrades completed in early 2007, the plant capacity has increased from 3.85 to 5.12 million gallons per day (mgd) and treats an average of 3.2 mgd (City of Gillette, 2010). Wastewater in rural areas is discharged to private leaching fields or septic tanks. The CIP for the City of Gillette shows planned improvements to the sewer system totaling more than $18 million. Other municipal wastewater treatment plants in Crook County and Natrona County are listed in **Table 5-57**.

TABLE 5-57
Municipal Wastewater Treatment Plants in Campbell, Crook, and Natrona Counties

City or Town	Name	County
Gillette	Gillette WWTF	Campbell
Hulett	Hulett WWTF	Crook
Moorcroft	Moorcroft Wastewater Lagoon	Crook
Pine Haven, Town of	Pine Haven WWTP	Crook
Mills	Mills Wastewater Lagoons	Natrona
Midwest, Town of	Midwest Wastewater Lagoon	Natrona
Edgerton	Edgerton Wastewater Lagoon	Natrona
Evansville	Evansville Wastewater Lagoon	Natrona
Casper	Casper WWTF	Natrona

Source: Wyoming Department of Environmental Quality, Municipal Wastewater Treatment, 2010.

5.4.12.2 Potable Water Treatment and Distribution

Water in the Study Area is provided through municipal water services in the cities and the more densely populated areas. The Study Area contains 37 community water purveyors, including the following: 19 in Campbell County, five in Crook County, and 13 in Natrona County, as shown in **Table 5-58**. The majority are small community water systems serving a small number of residents. Exceptions are the City of Casper serving 57,000 residents with a use of 9.3 mgd and the city of Gillette.

In Campbell County, the City of Gillette operates the municipal water supply. The annual average water production is 4.4 mgd and peak water production is 13.9 mgd. Average gallons per capita per day are 138.6. The rural portion of the Study Area is serviced primarily by private wells. The CIP for the City of Gillette shows planned improvements to the water system totaling more than $31 million.

The primary water source for the city is Madison Formation wells, located north of Moorcroft, moving approximately 8,800 gallons per minute (gpm) between the Pine Ridge storage reservoir and the Donkey Creek Pump Station. Between Donkey Creek Pump Station and the City of Gillette, the transmission pipeline conveys 10,500 gpm. In addition, the Madison Pump Station has the capacity to pump about 8,950 gpm and Donkey Creek Pump Station has a capacity of approximately 9,150 gpm.

TABLE 5-58
Community Water Systems in Campbell, Crook and Natrona Counties

Water System Name	Population Served	Avg Day Use (gallons per day [gpd])	Peak Day Use (gpd)	Avg Gallons Per Capita per Day
Campbell County				
American Road	215	21,901	58,094	101.9
Antelope Valley Improvement and Service (I&S) District	1,280	NA	620,000	NA
Cedar Hills WC	250	2,731	6,581	10.9
Central Campbell County I&S District	1,656	156,000	500,000	94.2
Crestview	500	50,830	118,067	101.7
Eight Mile I&S District	87	12,636	23,193	145.2
Force Road JPB	200	30,000	144,000	150.0
Freedom Hills I&S District	640	81,490	136,710	127.3
Gillette	31,745	4,400,000	13,900,000	138.6
Green Valley Estates I&S District	120	26,027	NA	216.9
Means Water and Sewer	300	NA	NA	NA
Newton Industrial Park	25	NA	4,500	NA
People's I&S District	Unknown	NA	NA	NA
Sleepy Hollow	1800	225,000	600,000	125.0
South Fork Estates Water District	141	10,000	75,000	70.9
Southside Well I&S District	65	5479	13,000	84.3
Wessex Improvement and Service District	20	1800	3,000	90.0
Westridge Water Users Association	300	NA	NA	NA
Wright Water and Sewer District	2,640	355416	792,000	134.6
Crook County				
Hulett	906	10,000	13,000	11.0
Moorcroft	550	822	350,000	1.5
Pine Haven	1,200	42,981	205,000	35.8
Sundance Municipality	120	260,274	650,000	216.9

TABLE 5-58
Community Water Systems in Campbell, Crook and Natrona Counties

Water System Name	Population Served	Avg Day Use (gallons per day [gpd])	Peak Day Use (gpd)	Avg Gallons Per Capita per Day
Vista West I&S District	906	25,000	32,000	208.3
Natrona County				
Air Base Acres	200	10,000	13,000	50
Casper	57,000	9,340,758	26,000,000	163.9
Central Wyoming Regional Water System JPB	25	NA	NA	NA
Countryside Court	125	NA	NA	NA
Edgerton	169	23,562	50000	139.4
Town of Evansville	2,500	439,000	800,000	175.6
Midwest	408	113	247,000	0.3
Town of Mills	3,350	420,340	1,600,000	125.5
Pioneer Water and Sewer District	1,500	87,671	172,000	58.4
Pleasant View Water Company	130	NA	NA	NA
Riverside Trailer Court	300	NA	NA	NA
South Riverside Acres Water Improvement District	35	NA	NA	NA
Wardwell Water and Sewer Dist.	3,225	345,499	NA	107.1

Source: Wyoming Water Development Commission, 2009.

5.4.12.3 Nonhazardous Waste Collection and Disposal

There are a variety of different waste disposal facilities including industrial landfills; solid waste treatment, storage, and disposal (SWTSD); Type I municipal waste; and Type II municipal waste. Campbell County has 18 such facilities in all. An active Type I municipal waste facility is located in Gillette and a Type II municipal facility is proposed for Wright.

Table 5-59 lists the Type I and Type II municipal waste facilities in Campbell, Crook, and Natrona counties and their status (historic, active or proposed). Crook County has one active facility and one historic facility, while Natrona County has two active facilities and one proposed facility.

Community size and activities, such as construction, influence both the quantity and composition of municipal solid waste (MSW). As seen from the information in **Table 5-60** based on 2005 data, Natrona County generates the greater quantity of MSW at 123,440 tons annually, as well as the larger per capita generation of 9.7 pounds per person per day. Natrona County daily per capita production of MSW is the highest in the state and accounts for 20 percent of the MSW per year in the state. Campbell County's per capita generation of

MSW is equal to the state average of 6.5 and Crook County's waste generation per capita is slightly lower.

TABLE 5-59
Type I and Type II Municipal Waste Disposal Facilities Within Campbell, Crook, and Natrona Counties

Facility	Facility Type	Facility Status
Campbell County		
Gillette	Type I Municipal	Active
Wright	Type II Municipal	Proposed
Crook County		
Moorcroft	Type II Municipal	Historic
Sundance	Type II Municipal	Active
Natrona County		
Casper Balefill	Type I Municipal	Active
Central Wyoming Regional Landfill	Type I Municipal	Proposed
Midwest-Edgerton #2 (10.391)	Type II Municipal	Active

Source: WDEQ, 2010.

TABLE 5-60
Solid Waste Generation by County

County/Area	Tons of MSW per Year	Pounds of MSW per Person per Day*	Percent of State Total
Campbell County	44,477	6.5	7.3
Crook County	7,108	6.3	1.2
Natrona County	123,440	9.7	20.0
State Total	607,069	6.5	NA

* Based on 2005 population
NA = Not Applicable

Source: Wyoming Business Council, 2007.

5.4.12.4 Electricity Service

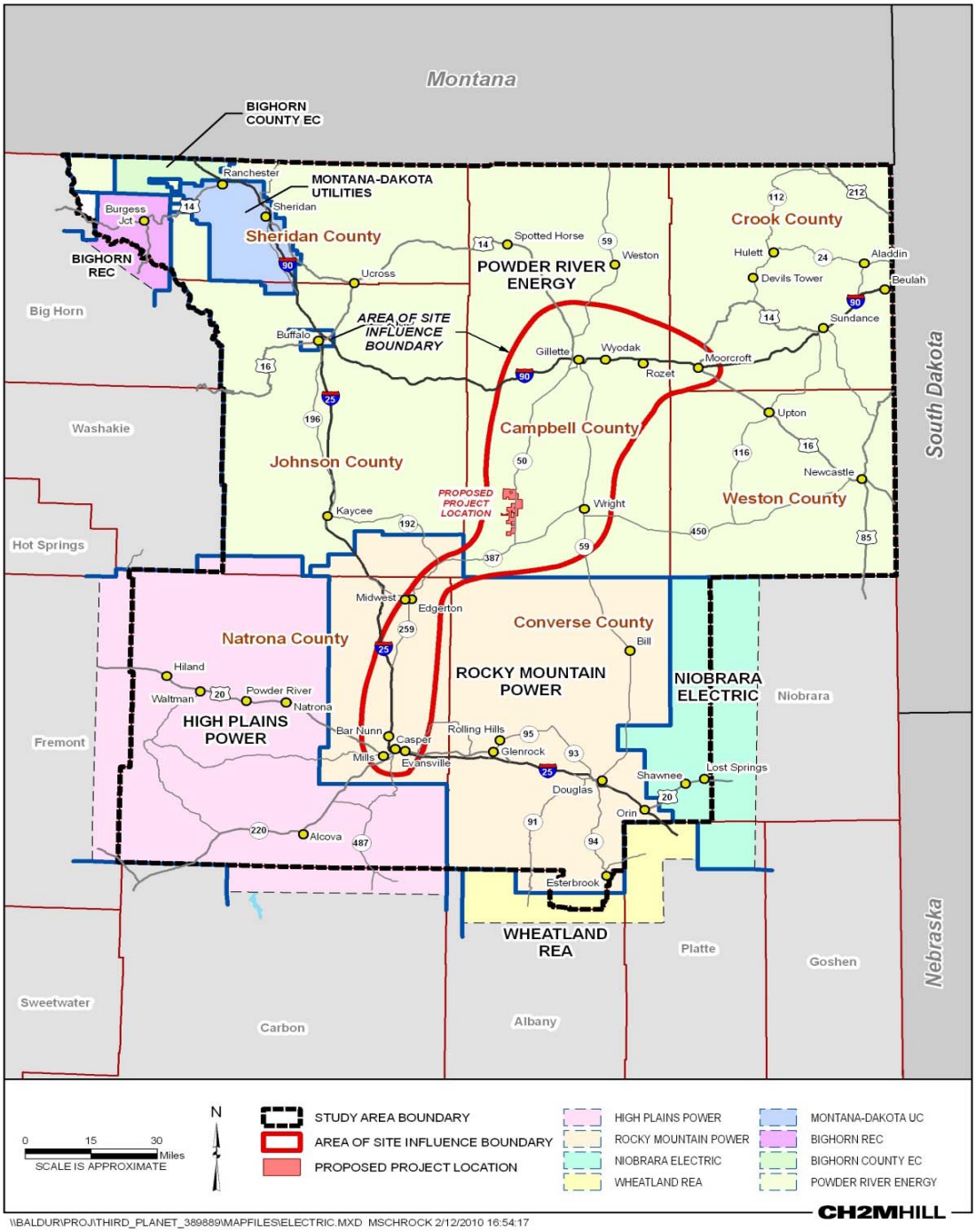
Two primary suppliers of electricity are within the area of influence, as shown in **Table 5-61** and illustrated in **Figure 5-27**. Rocky Mountain Power services the major communities in Natrona County and Powder River Energy Corporation (PREC) services Campbell County and Crook County. PREC is expected to provide construction and operations electricity service to the Project site.

TABLE 5-61
Electric and Gas Utility Company Service Areas for the Area Primarily Affected

Company	Counties Served
Electricity	
Powder River Energy	Campbell County, Crook County
Rocky Mountain Power	Natrona County
Gas	
MGTC Inc.	Campbell County, Crook County
Source Gas	Natrona County, Crook County

Source: Wyoming Public Service Commission, 2003.

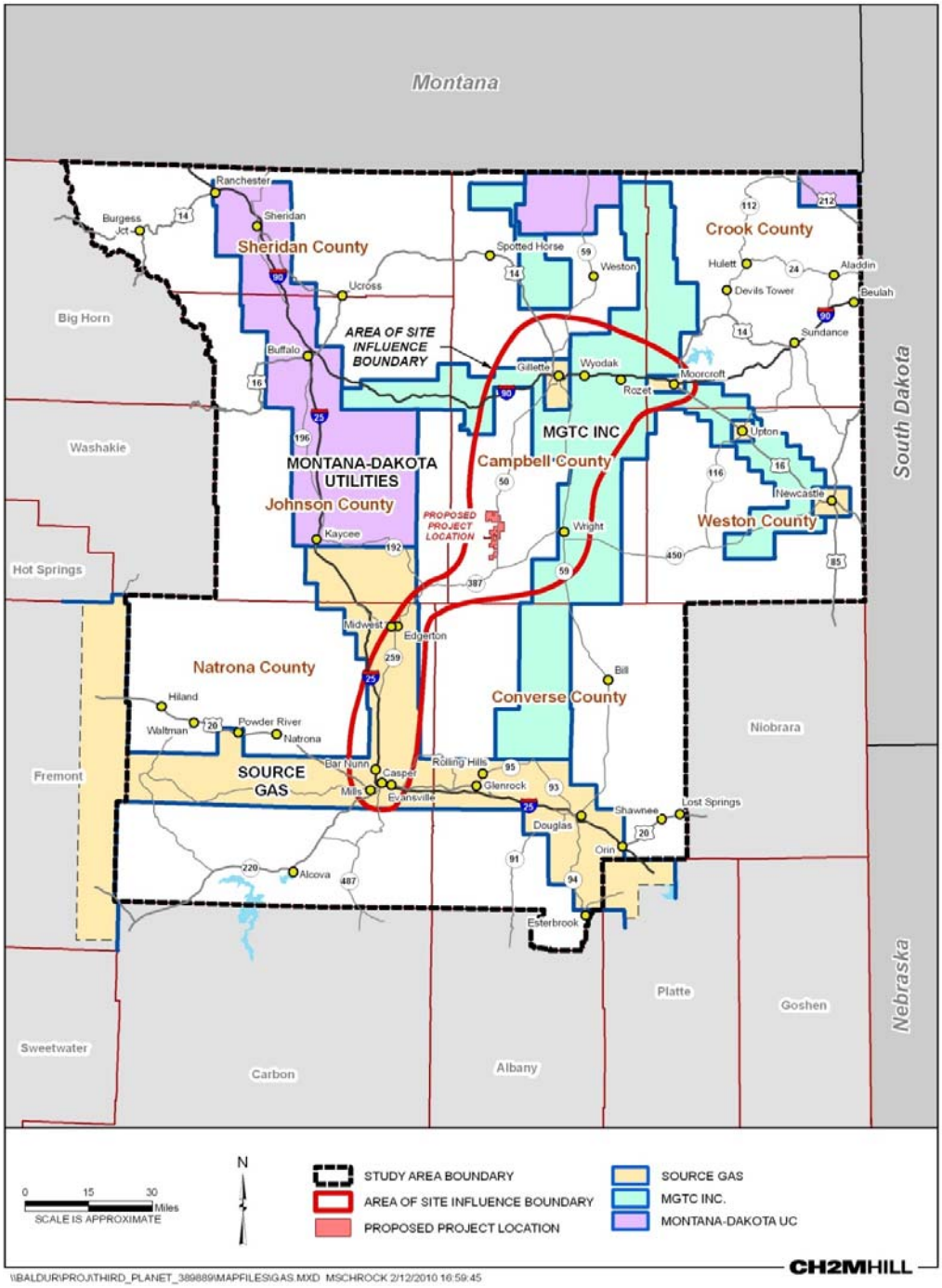
FIGURE 5-27
Electric Certificated Areas



5.4.12.5 Natural Gas Service

Natural gas service is provided to sections of Campbell, Crook, and Natrona counties by two purveyors. Virtually all major communities in these counties are served by Source Gas, as shown in **Table 5-61** and illustrated in **Figure 5-28**.

FIGURE 5-28
Gas Certificated Areas



5.4.12.6 Construction Impacts

It is expected that non-local construction workers would reside mostly in hotel/motels and RVs located at established sites and apartments in the existing housing stock of the Area of Site Influence. The addition of 263 peak-month non-local residents would not increase the number of accommodation units in the Area of Site Influence. The additional temporary population could increase the demand for municipal services such as water, wastewater, and solid waste. However, such a modest increase for this short duration would have negligible effects on the provision of these services.

Wastewater Treatment and Potable Water Treatment and Distribution. The additional temporary population could increase the demand for municipal services such as potable water and generate additional quantities of wastewater. However, such a modest increase for this short duration would have negligible effects on the provision of these services.

Waste Collection. The U.S. Environmental Protection Agency (EPA) publishes information on the generation and disposal of waste in the U.S. Total MSW generation in the United States in 2006 was 251 million tons (EPAb, 2007); however, 82 million tons (or 32.5 percent) of the materials were recycled. Organic materials were the largest component of the MSW—specifically, paper and paperboard products accounted for 34 percent, with yard trimmings and food scraps accounting for 12.9 and 12.4 percent, respectively (EPAb, 2007). Plastics comprised 12 percent; metals made up 8 percent; and rubber, leather, and textiles accounted for 7 percent. Wood waste accounted for 6 percent, glass 5 percent, and other miscellaneous wastes made up approximately 3 percent. Based on this information, an average of 4.6 pounds of municipal waste were generated per person per day and 1.5 pounds of individual waste generation were recycled nation-wide in 2006 (EPAb, 2007).

MSW Materials. For the purposes of this analysis, we assume that workers will be on-site 10 hours a day and 7 days a week, and that there will be no yard trimmings or recycling. To calculate potential personal waste volumes generated by the on-site workforce, the 4.6 pounds of waste per person per day was prorated by dividing the construction person daily hours on-site and multiplying by the average daily waste volume (minus the 12.9 percent attributable to yard trimmings). The resulting assumption is that each non-local construction employee will generate approximately 1.6 pounds of waste per person per day. However, due to the lack of yard waste and other durable and non-durable wastes generated on a daily basis, the 1.6 pounds per person per day likely represents a significant overestimation. In addition, if recycling of plastic and aluminum is implemented, the pounds per day of waste generation would be further reduced.

Based on the 1.6 pounds per person per day of waste generation, at the peak non-local worker employment of 263 workers, the average daily waste volume would be approximately 420.8 pounds. Therefore, during the peak construction month of October 2010, approximately 13,045 pounds of non-compacted MSW could be generated. All solid waste materials generated by activities at the Project site will be disposed of in an appropriate manner at suitable disposal sites, most likely at the Campbell County Landfill via delivery by a roll-off servicing company in Gillette.

Construction Waste Materials. Construction solid waste materials (e.g., excess construction materials) would be generated during the construction period. Construction wastes primarily would consist of packaging material associated with each WTG. Other potential wastes may include erosion control materials, such as straw bales, silt fencing, and scrap steel. When feasible, these construction wastes will be recycled. Steel scrap will be separated and recycled to the extent feasible. Wood from concrete forms will be reused when possible and then recycled. Estimates of the types and quantities of waste materials generated during the construction period are presented in **Table 5-62**.

TABLE 5-62
Description of Estimated Construction Waste Materials for Each Wind Turbine Generator

Component	Description	Dimensions	Estimated Volume (cubic yards [yd^3])	Uncompacted Loose Refuse Conversion* (300 to 600 pounds per cubic yard) in pounds
Down Town Assembly (DTA) Components	Electrical Simplification System (ESS) cabinet will be in a wooden plywood crate with pallet bottom.	8' x 3.5' x 8.3"	8.6 yd^3 (if not compacted)	3,870
	ESS cabinet will be wrapped in a Vapor Corrosion Inhibitor (VCI) bag.	8' x 4' x 8.2' ~ .004" thick	9.7 yd^3 (if not compacted)	4,365
	ESS cabinet exhaust fan in a wooden plywood crate with pallet bottom.	2.8' x 2.7' x 1.4'	0.40 yd^3 (if not compacted)	180
	ESS platform may be in a wooden plywood crate with pallet bottom.	8' x 8' x 2.5'	5.9 yd^3 (if not compacted)	2,655
Towers Sections (Base, Mid, Top)	Each tower section will have tarps on each end. The tarps are handled as "shipping fixtures" and are returned to suppliers.	N/A	No solid waste. Shipping fixtures are returned to suppliers.	N/A
Machine Head	Shipping fixture to be returned to factory.	N/A	No solid waste	N/A
Hub	Hubs are shipped with shrink wrap.	0.5 yd^3 when removed.	0.5 yd^3	225
Blades	Shipping fixtures to be returned to factory.	N/A	No solid waste	N/A
Parts Shipped Loose	Parts ship loose; includes bus bar kits, bolts, etc. In addition, there will be smaller cardboard boxes, plastic wrap and miscellaneous packaging materials on smaller items.	Bolts are in wooden crates 3' x 3' x 2'.	0.75 yd^3 (if not compacted)	338

* Assumes average of 450 pounds for calculation conversion (300 + 600 / 2 = 450)

Source: EPA, 2007a.

Portable toilets will be provided for on-site sewage handling during construction and will be pumped and cleaned regularly by the construction contractor. No other wastewater will be generated during construction.

Hazardous Wastes. Any hazardous materials will be used in a manner that is protective of human health and the environment, will comply with all applicable local, state, and federal laws and regulations, and be disposed of in appropriate, licensed facilities. Accidental releases of hazardous materials (e.g., vehicle fuel during construction) will be prevented or minimized through proper containment of these substances during use and transportation to the site. Any oily waste, rags, or dirty or hazardous solid waste will be collected in sealable drums and removed for recycling or disposal by a licensed contractor.

In the unlikely event of an accidental hazardous materials release, any spill or release will be cleaned up and the contaminated soil or other materials disposed of and treated according to applicable regulations. Spill kits, containing items such as absorbent pads, will be located on equipment and in temporary storage facilities onsite to respond to accidental spills, if any were to occur. Employees handling hazardous materials will be instructed in the proper handling and storage of these materials, as well as where spill kits are located. The balance of plant General Contractor will be responsible for obtaining approval of a spill-prevention and counter-measures control plan.

Electricity and Natural Gas Service. The temporary addition of about 263 non-local workers during the peak month of construction would not noticeably increase the demand for electricity and natural gas in the region and impacts would be negligible.

5.4.12.7 Operations Impacts

The jobs created through the O&M of the proposed facility would be staffed by workers originating as non-local, but who would take up residence in the Area Primarily Affected. Negligible quantities of wastewater, potable water, MSW, hazardous waste materials, electricity, and natural gas would be associated with this minor population influx. The O&M building will use a new groundwater well to supply water for domestic use and discharge to an on-site septic system. Power for the O&M building is expected to be provided by Powder River Energy Corporation. TPWRJ will secure all permits required to provide utility service to the O&M building prior to construction of associated infrastructure. Thus, Project-related impacts would be negligible.

5.5 Summary of Impacts

Tables 5-63 and 5-64 present a summary of impacts for the major resources address earlier. As can be seen, impact levels are low (less than 1 percent of baseline conditions) in all areas with the exception of vacant housing. However, the peak demand for temporary housing can be accommodated by the supply. This peak demand condition, it should be emphasized, would persist only for a short period of time.

Table 5-63
Summary of Direct Project Effects and Project-Induced Impacts

Direct Project Effects		
	Peak Month	**Construction Period Average**
Construction Phase		
Total On-site Workers	309	139
Non-local Workers	263	118
Local Workers	46	24
Operations Phase	Average Annual	
Local Workers	15	

TABLE 5-64
Summary of Direct Project Effects and Project-Induced Impacts

Project-Induced Impacts			
Employment (FTEs in 2010)	**Study Area Baseline Condition**	**Project Effect**	**Project Impact**
Construction Phase			
Direct	1,909	84	4.40%
Total	93,320	130	0.14%
Operations Phase			
Direct	318	15	4.7%
Total	93,320	36	0.04%
Housing Available for Rent			
Total (Permanent and Temporary)	889	280	31.5%
Recreational Vehicle Spaces	27	20	74.9%
Apartments and Mobile Homes	149	13	9.0%
Single Family Residences	103	38	37.4%
Motel and Hotel Rooms	616	208	33.8%
Public School			
Students	20,730	0.0	0.0%
Teachers and Staff	3,681	0.0	0.0%
Fire Protection			
Full-Time Paid Personnel	124	0.0	0.0%
Emergency Medical Technicians	180	0.0	0.0%

TABLE 5-64
Summary of Direct Project Effects and Project-Induced Impacts

	Project-Induced Impacts		
Employment (FTEs in 2010)	**Study Area Baseline Condition**	**Project Effect**	**Project Impact**
Law Enforcement			
Officers	267	1	0.4%
Index Crimes (crimes per 10,000)	357	357	0.02%
Healthcare			
Physicians (FTE)	59	1	1.7%
Emergency Room Visits	58,970	100	0.2%
Solid Waste Generation (pounds per month)			
Non-Local Workers	16,500,000	13,000	0.1%
Taxes			
Ad Valorem Campbell County (2009)	$335.8 million	$2.2 million	0.7%
Cumulative *Ad Valorem* (2012 – 2035)		$29.4 million	

Source: CH2M HILL, 2010.

5.6 Cumulative Impacts

Rule I Section 7(vi)(I) – Problems due to the transition from temporary construction employees to operating workforces should be addressed. Changes in levels of services required as a result of the proposed industrial facility should specifically be addressed. Cumulative impacts of the proposed industrial facility and other developments in the Area of Site Influence should be addressed separately. This assessment should examine increased demands associated with the construction and operational phases of the proposed industrial facility, as well as effects on the level of services as the construction or operational workforces decline.

Cumulative environmental impacts, as defined in the ISA Rules and Regulations, are the combined impacts upon the environment to the social or economic conditions resulting from construction and operation of the proposed industrial facility and from construction and operation of other on-going or proposed developments in the Area of Site Influence. Proposed developments to be included in cumulative impacts include those developments that are actively planning and have public information available, or may be actively permitting. Consideration is given to the following projects: potential construction of the Two Elk power plant and completion of construction and then operation of the Dry Fork electric generation facility. The Two Elk project has been approved, but construction has not yet commenced. It is anticipated that a third project, Wygen III, will have completed its construction phase, thus only the operation phase of Wygen III is relevant.

5.7 Two Elk Generation Partners

The Two Elk project is a proposed 310-megawatt (MW) coal-fired power plant adjacent to Arch Coal's Black Thunder Mine near the Town of Wright in southern Campbell County. The power plant would burn "waste," or lower-grade coal, from the Black Thunder Coal Mine.

The Two Elk project was originally permitted by the ISC in 1997. However, construction was delayed and an updated construction workforce estimate was developed in 2010 and is presented in **Table 5-65**. Following construction, approximately 45 full-time employees would operate and maintain the power plant.

TABLE 5-65
Two Elk Generation Partners: Total Construction Workforce

Const. Year	2009		2010				2011				2012				2013			
Calendar Qtr	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Total	25	33	35	42	52	72	146	295	477	575	527	361	234	87	35	23	5	0

Source: Two Elk Generation Partners, 2010.

5.8 Basin Electric Dry Fork Station Unit 1

The Dry Fork project is a 422-gross-MW coal-based electric generation facility located north of the City of Gillette in Campbell County. Basin Electric is constructing the project and they will operate it upon completion. The construction workforce schedule supplied by Basin Electric is shown in **Table 5-66**.

TABLE 5-66
Basin Electric Estimate of Local and Non-Local Construction Workforce

Const. Year	2007		2008				2009				2010				2011	
Calendar Qtr	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Local[a]	3	41	63	37	44	70	178	165	209	228	226	208	116	130	61	13
Non-local[b]	11	147	223	133	155	247	632	586	741	807	801	736	411	463	218	48
Total	14	188	286	170	199	317	810	751	950	1035	1027	944	527	593	279	61

[a] The estimate for local workers was based on multiplying the total workforce by the 22 percent estimate in the ISA application.

[b] The estimate for non-local workers was based on multiplying the total workforce by the 78 percent estimate in the ISA application.

The workforce estimates for each quarter are based on the average employment for the quarter.

Source: Basin Electric Power Cooperative, 2007.

A review of Table 5-66 shows that a peak of 1,035 construction workers occurred in the fourth quarter of 2009. Basin Electric anticipated that approximately 78 percent of the workers would consist of a non-local workforce, and approximately 22 percent of the workers would be local workers who are assumed to reside in Gillette and surrounding areas. Their most recent lodging report covering this peak construction period, showed the actual percentage of non-local workers was closer to 88 percent. The assumption that most workers would reside in Gillette and other nearby communities was supported by the data. About 96 percent of their workforce reported living in Gillette. Following completion of construction, operation and maintenance of the power plant will require approximately 75 full-time employees.

5.9 Wygen III

This project began construction in the first quarter of 2008. **Table 5-67** shows the construction workforce peaking during the second half of 2009, and construction winding down during the first quarter of 2010. The operations workforce is estimated to be about 18 over the life of the project.

TABLE 5-67
Cumulative Workforce Estimates of Wygen III, Dry Fork, and Two Elks Power Plant Projects, 2008 to 2014

Time Period	Two Elk	Dry Fork	Wygen III	TPWRJ	Total
First Quarter 2008	0	286	26	0	312
Second Quarter 2008	0	170	65	0	235
Third Quarter 2008	0	199	106	0	305
Fourth Quarter 2008	0	317	141	0	458
First Quarter 2009	0	810	236	0	1,046
Second Quarter 2009	0	751	309	0	1,060
Third Quarter 2009	25	950	315	0	1,290
Fourth Quarter 2009	33	1,035	314	0	1,382
First Quarter 2010	35	1,027	219	0	1,281
Second Quarter 2010	42	944	38	28	1,052
Third Quarter 2010	52	527	18	169	766
Fourth Quarter 2010	72	593	18	256	940
First Quarter 2011	146	279	18	99	543
Second Quarter 2011	295	61	18	32	405
Third Quarter 2011	477	75	18	24	594
Fourth Quarter 2011	575	75	18	15	683
First Quarter 2012	527	75	18	15	635
Second Quarter 2012	361	75	18	15	469
Third Quarter 2012	234	75	18	15	342
Fourth Quarter 2012	95	75	18	15	203
First Quarter 2013	63	75	18	15	171

TABLE 5-67
Cumulative Workforce Estimates of Wygen III, Dry Fork, and Two Elks Power Plant Projects, 2008 to 2014

Time Period	Two Elk	Dry Fork	Wygen III	TPWRJ	Total
Second Quarter 2013	68	75	18	15	176
Third Quarter 2013	50	75	18	15	158
Fourth Quarter 2013	45	75	18	15	153
First Quarter 2014	45	75	18	15	153
Second Quarter 2014	45	75	18	15	153
Third Quarter 2014	45	75	18	15	153

Sources: Two Elk Generation Partners, 2010; Basin Electric Power Cooperative and BHC, 2007; TPWRJ, 2010.

5.9.1 Cumulative Workforce Estimates

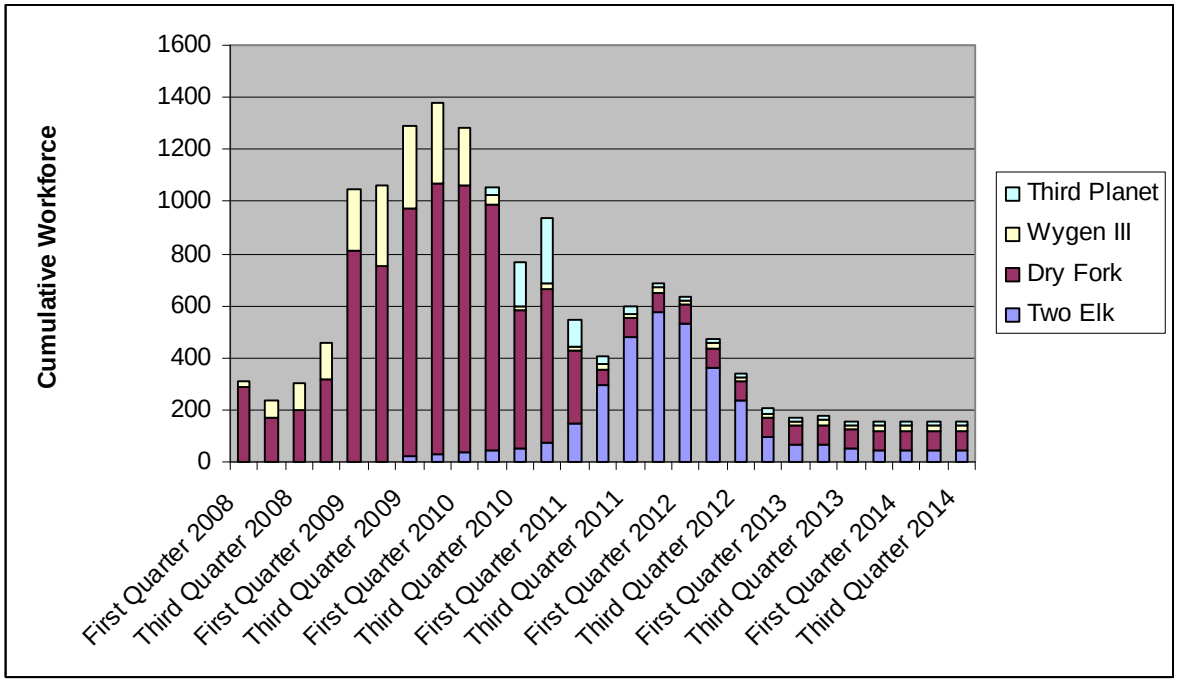
Table 5-67 provides a composite view of the most up-to-date quarterly construction and operation workforce estimates for the Wygen III, Two Elk Generation (assumed), Dry Fork, and TPWRJ projects. Due to Dry Fork and Wygen III, construction employment peaked in fourth quarter 2009. It is expected to stay elevated during the first quarter of 2010. By second quarter 2010, Wygen III will have completed construction and have commenced the operations phase and Dry Fork will be ramping down its construction workforce. Two Elk's commenced construction in third quarter 2009 and will continue ramping up the construction workforce through 2010 and 2011, peaking in fourth quarter 2011. TPWRJ would begin construction in second quarter 2010 and complete construction by the beginning of third quarter 2011. Thus, at no time will TPWRJ contribute to peak construction in the region. Instead, along with Two Elk, TPWRJ will help ameliorate the effects from the rapidly declining workforces of Dry Fork and Wygen III. Also, the modest permanent workforce of about 15 employees will slightly contribute to the stability of the local economy.

5.9.2 Summary of Cumulative Impacts

Direct cumulative employment related to temporary industrial facility construction projects peaked in fourth quarter 2009 at 1,349 workers

As shown in **Figure 5-29**, TPWRJ would not contribute to this cumulative peak. However, the Project would contribute toward sustaining construction employment in the Study Area at an elevated level, especially from third quarter 2010 until first quarter 2011. Thereafter, TPWRJ would contribute a modest amount toward long-term employment in the region by maintaining its expected 15 person operations workforce. Peak cumulative conditions during construction of the Project would be identical to those described in earlier, resource-specific sections.

FIGURE 5-29
Cumulative Number of Workers, by Quarter



Source: CH2M HILL, 2010.

A substantial share of basic economic activity in Campbell County and surrounding counties is related to energy resources. No specific information regarding potential workforce requirements for future energy-related projects is available, nor is it anticipated that any new projects would commence within the timeframe for constructing the proposed wind energy project. Thus, no competing demand for appropriately skilled workers, either from the local labor force or from outside the region is currently anticipated.

5.9.2.1 Trade-off Analysis

The proposed Project is expected to create significant and on-going tax benefits and a modest temporary increase in employment throughout the Study Area and Area of Site Influence. It is anticipated that Project-related impacts, especially on community services, would be minor and distributed throughout the Area of Site Influence with the majority occurring in the Gillette area.

Implementation of the Project would create both primary and secondary employment opportunities, contribute modest growth to the local economy including the service sectors, and provide a substantial source of revenues for local governments through the collection of significant *ad valorem* taxes. The potential for short-term impacts associated with implementation of the Project on socioeconomic resources is minimal

The major long-term impact of the Project would be the additional revenue collected by the state and distributed to Campbell County through increased *ad valorem* taxes. The increased *ad valorem* tax revenues would be distributed by the state and counties for schools, roads, and other community infrastructure. Further expansion of energy-related resources in the

region will continue to add jobs to the growing economies and generate additional tax revenues.

5.9.3 Beneficial and Adverse Impacts

The proposed Project is expected to create long-term tax benefits to Campbell County and a modest increase in employment. Project-related impacts, especially on community services, would be small and distributed across the communities of the Area of Site Influence, but concentrated in the Gillette area in Campbell County. The Project would have the following benefits to the local communities and counties comprising the Study Area and Area of Site Influence:

- The creation of 130 FTE jobs over the construction period—about 15 percent of these jobs would be filled by local workers, on average, over the construction period.
- The creation of a total of 36 jobs annually would be attributable to operations and maintenance.
- *Ad valorem* (property) taxes accruing to Campbell County would increase as a result of an increase in the fair market value (and assessed value) of the real property comprising the Project site. *Ad valorem* taxes would be approximately $2.2 million annually commencing in 2011.
- Sales tax revenues attributable to the Project could total almost $209,000 over the construction period.
- Temporary construction workers are expected to reside mostly in local hotels and motels. It is likely, depending on their length of stay, that Campbell, Crook, and Natrona counties could gain revenues from the lodging tax levied on room expenditures.

5.9.4 Impacts to Community Services

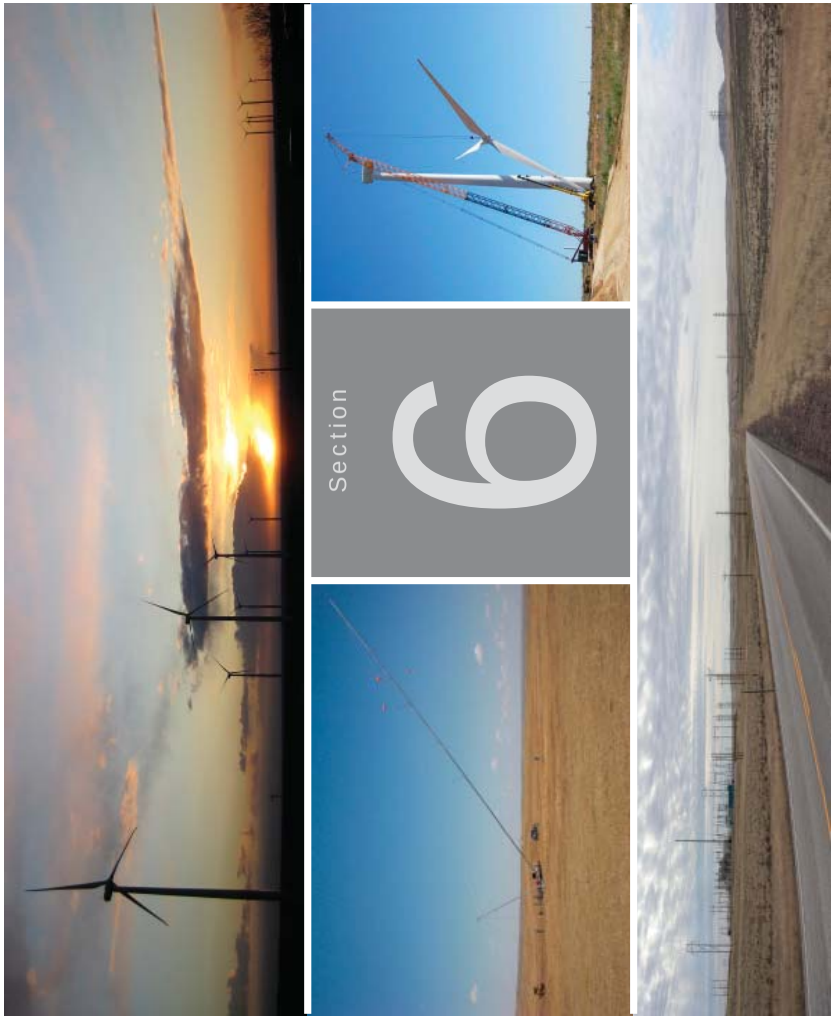
During the construction phase of the Project, the number of non-local workers (and any accompanying family members) entering the area temporarily would peak at 263. Only a small proportion of these workers would be accompanied by family members or occupy permanent housing. The potential impacts this inflow of persons would have on community services in the Area of Site Influence would be negligible. Their short-term presence would have negligible impacts on law enforcement, fire protection, health care, or municipal services.

If RV sites and hotel/motels are the primary temporary lodging choices, the most noticeable impact would be on the availability of RV sites, hotel, and motel rooms for other visitors, especially tourists during the summer months. However, the demand exerted by the temporary workers would not exhaust the likely available supply of vacant units, especially given that TPWRJ's expected workforce construction peak would primarily occur outside of peak tourism months.

5.10 Mitigation Measures to Offset Adverse Cumulative Impacts to Housing

Housing is a concern of communities throughout the Area of Site Influence. However, it is expected that the majority of non-local workers would choose to stay in RVs, hotels and motels and, to this end, the Project proponent has acquired letters of interest from hotels and motels and verbal expressions of interest from campgrounds in the Gillette area to provide accommodations for these workers. Moreover, the demand for temporary housing is anticipated to decline with the falling construction workforces associated with current industrial facility construction projects in Campbell County. Letters of interest from local hotels are shown in **Appendix C**.

Section 6
Evaluation of Environmental Impacts



6.0 Evaluation of Environmental Impacts

Rule I Section 7(j) – Evaluation of Environmental Impacts. The items shall be noted and evaluated as they would exist if the proposed facility were built. Each evaluation should be followed by a brief explanation of each impact and the permit issued that regulates the impact. If the impact is not regulated by a state regulatory agency or federal land management agency, the application must including (sic) plans and proposals for alleviating adverse impacts. Cumulative impacts of the proposed industrial facility and other projects in the area of site influence should be addressed separately.

Potential environmental impacts associated with the construction, operation, and maintenance of the Reno Junction Wind Energy Facility (the Project) are presented in this section. Resource data were collected from existing sources and field studies performed for the Project. Impact analyses were conducted to evaluate the effects of the Project on the natural environment. Methods of mitigating and avoiding impacts will be implemented as part of the Project and are incorporated into the impact analyses and site-specific monitoring plans. Unless otherwise stated, the area of analysis for the evaluated environmental resources consists of the area within the Project boundary as detailed in **Appendix A**. Resource maps for each resource are included in **Appendix D**.

6.1 Physical, Chemical, Biological, and Radiological Discharges

Rule I Section 7(ix) – Inventory of estimated discharges including physical, chemical, biological and radiological characteristics.

No anticipated chemical, physical, biological, or radiological discharges are associated with construction or operation of the Project that would substantially impair the health, safety, or welfare of the present or expected inhabitants in the area of site influence or the Project area.

6.2 Air Quality

Rule I Section 7(x) – Inventory of estimated emissions and proposed methods of control.

Rule I Section 7(xii) – The procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions or discharges.

6.2.1 Regulatory Jurisdiction

The Wyoming Department of Environmental Quality (WEDQ) – Air Quality Division (AQD) implements adopted air quality standards and regulations. Air emissions associated with construction and operation of the Project will be subject to the WDEQ-AQD Standards and Regulations. Specifically, Chapter 6 of the Standards and Regulations establishes permitting requirements for all sources being constructed or operating in the State of Wyoming. In addition, fugitive dust is a regulated source pollutant under Chapter 3, Section 2(f)(i)(A).

6.2.2 Area of Site Influence

The area of site influence for air quality impacts is defined as the regional air quality basin.

6.2.3 Construction Emission Sources and Impacts

Construction Emission Sources

Fugitive Dust – Fugitive dust emission estimates contain a high amount of variability owing to the meteorological, physical, and chemical factors on which emissions are based. These factors result in a high variability on both a local and regional level.

Particulate Matter – Particulate matter—consisting primarily of cement dust but including some aggregate and sand dust emissions—is the primary pollutant of concern. In addition, emissions of metals are associated with this particulate matter. Most emission points are fugitive in nature. The main point source is the transfer of cement and pozzolan material to silos, which are vented to a fabric filter.

Each turbine tower will be supported by a reinforced- and poured-concrete foundation. The foundation could be either a spread-foot or caisson-type concrete foundation. A portable on-site batch plant will be operated to mix concrete for the turbine foundations. The 100 wind turbine generator (WTG) foundations will require approximately 275 to 400 cubic yards (yd^3) of concrete per General Electric (GE) 1.5-megawatt (MW) xle tower. Additional concrete will be needed for Project substation foundations, transformer pads, and other equipment. The most efficient way to produce this volume of concrete will require the use of an on-site portable concrete batch plant.

Raw materials, such as aggregate, sand, cement, and water, will be delivered to the mobile batch plant by truck for on-site concrete production. If possible, they will be obtained on the property of participating or nearby landowners to minimize hauling distances and the amount of off-site traffic in the area of site influence. These raw materials are typically staged in temporary silos on site and proportionately combined based on the required concrete mix design for each foundation or pad. The concrete is placed in the delivery trucks and continuously mixed on the way to the turbine site, where the concrete is poured into the foundation forms.

Construction Impacts

Fugitive Dust – Fugitive dust will be generated directly from construction activities. The following construction activities have been identified as having the potential for generating fugitive dust:

- Vehicle and motorized equipment movement on paved and unpaved access roads
- Vegetation grubbing and clearing and grading
- Trenching and backfilling
- Material loading, hauling, and unloading
- Use of material storage piles
- Use of parking, staging, and storage areas

Particulate emission factors for concrete batching are detailed in **Table 6-1** and are expressed in pounds of pollutant per cubic yard of concrete.

TABLE 6-1
Estimated Project Emissions per Yard of Truck-Mix Concrete

Component	Total Particulate Matter (lb/yd^3)	Fine Particulate Matter (lb/yd^3)
Aggregate delivery to ground storage	0.0064	0.0031
Sand delivery to ground storage	0.0015	0.0007
Aggregate transfer to conveyor	0.0064	0.0031
Sand transfer to conveyor	0.0015	0.0007
Aggregate transfer to elevated storage	0.0064	0.0031
Sand transfer to elevated storage	0.0015	0.0007
Cement delivery to silo	0.0002	0.0001
Cement supplement delivery to silo	0.0003	0.0002
Weigh hopper loading	0.0079	0.0038
Mixer truck loading	0.0346	0.0096
Total dust emissions estimate per yard of concrete	0.0716	0.0275
Total dust emissions estimate for Project concrete (35,000 yd^3)	2,506	963

Source: EPA, 2008.

A review of Table 6-1 shows that the estimated particulate emissions are minor. Therefore, construction of the Project would result in minimal impacts and would not pose a substantial impairment to the health, safety, or welfare of the present or expected inhabitants in the area of site influence or the Project area.

6.2.4 Operation Emissions Sources and Impacts

Operation Emissions Sources

The sources of pollutants during operation of the Project would be limited to the vehicles and equipment used by maintenance staff. The emissions from these sources would be minor in comparison with the levels of activity that would be required to exceed emissions thresholds; thus, these emissions are not quantified.

No air emissions will be generated from operation of either the WTGs or the substation.

Operation Impacts

The operation of the WTGs will have negligible effects on air quality (e.g., no visible plumes, fogging, misting, icing, impairment of visibility, or changes in ambient levels caused by emitted pollutants). Potential fugitive dust from operations staff vehicles traveling within

the Project area would be minimal and no substantial impairment to the health, safety, or welfare of the present or expected inhabitants in the area of site influence or the Project area is anticipated.

6.2.5 Methods for Control

Rule I Section 7(xii) – The procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions or discharges.

Construction - Methods for Control

Fugitive Dust – Potential dust sources that could exist at the site during construction include access and maintenance road construction; temporary staging areas; and clearing and excavations for substation, crane pads, underground collection system, project transmission line, and turbine foundations. A fugitive dust control plan, including measures such as applying water or dust suppressants to exposed soil/material piles, will be implemented at the Project site to control and prevent the creation of dust associated with construction activities. The use of water trucks to wet the surface of access roads and other potential work area sources of fugitive particulate matter will be used as appropriate during construction activities. The Project will minimize impacts from fugitive dust by applying water to disturbed ground during construction, by graveling permanent roadways, by erosion control, by re-vegetation, and by imposition of appropriate construction and operation speed limits on site roads.

Water trucks will be the primary means of dust abatement during all phases of construction. Water trucks will be used as appropriate during construction activities to wet the surface of access roads and other potential work area sources of fugitive particulate matter. Where roads are paved, dust mitigation may not be necessary. These measures are expected to reduce dust during construction to levels that have no significant impact on air quality, vegetation, or wildlife species. Upon completion of construction, many of the unimproved roads on the Project site, previously used for access to the area, will have been graveled. The existence of these roads should significantly reduce traffic on the many unimproved roads and four-wheel-drive tracks now within the site boundary.

Particulate Matter – The concrete batch plant will include appropriate filtration in accordance with the air quality permit. In addition, the selected balance of plant contractor or subcontractor and holder of the issued air quality permit would be responsible for ensuring that the batch plant is operated in accordance with the issued permit conditions.

The use of a portable batch plant on private fee lands for making concrete would be a permitted source (i.e., the plant would have an operating permit with emissions limitations issued by the State of Wyoming). Therefore, a WDEQ-AQD permit will be required prior to operate the concrete batch plant pursuant to Chapter 6, Section 2 of the WDEQ's Regulations and Standards. The required air permit will be obtained and maintained by the batch plant operator. Therefore, the resulting construction emissions will not result in a significant detriment to or significant impairment of the environment or the social and economic condition of present or expected inhabitants in the area of site influence.

Operations – Methods for Control

No air emissions will be generated from operation of the WTGs or substation. Therefore, no additional methods for control have been proposed. TPWRJ will minimize Project vehicle emissions by ensuring proper maintenance and by enforcing operational strategies and driving behaviors that optimize efficiency. In addition, potential fugitive dust from the operation of Project vehicles traveling on access roads within the Project area would be minimal. TPWRJ will implement operational speed limits to further reduce fugitive dust associated with gravel road travel.

Operational air quality impacts will be minimal and would not result in any substantial impairment to the health, safety, or welfare of the present or expected inhabitants in the area of site influence.

6.3 Noise

W.S. § 35-12-109(a)(xiii)(S)– An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility.

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Existing sources of noise in the immediate vicinity of the Project include daily traffic of oil and gas maintenance crews and tank trucks, operation of oil and gas infrastructure including pumps, derricks, and a compressor station, operation of a gas-fired power plant adjacent to Basin Electric's existing Pumpkin Buttes substation, traffic from Wyoming State Highway (SH) 50, ranching activities, and overhead aircraft.

6.3.1 Regulatory Jurisdiction

Industrial Siting Division (ISD) regulations state that noise is a resource issue that must be taken into account in the application process. However, numeric limits have not been specified at the state or within Campbell County.

6.3.2 Area of Site Influence

The area of site influence for noise evaluations consisted of the entirety of the Project boundary, all leased lands within, and a lineal distance extending 1 mile.

6.3.3 Fundamentals of Acoustics

It is useful to understand how noise is defined and measured. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. **Table 6-2** summarizes the technical noise terms used in this report.

Table 6-3 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 6-2
Definitions of Acoustical Terms

Term	Definitions
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals.
A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent sound Level (L_{eq})	The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady-state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent sound level is considered to be related directly to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time.
Day–night level (L_{dn} or DNL)	The day-night level is a 24-hour average L_{eq} where 10 dBA is added to nighttime levels between 10:00 PM and 7:00 AM. For a continuous source that emits the same noise level over a 24-hour period, the L_{dn} will be 6.4 dB greater than the L_{eq}.
Statistical noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L_{50} is the level exceeded 50 percent of the time).

TABLE 6-3
Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier Deck Jet Operation	140	
	130	Pain Threshold
Jet Takeoff (200 feet [ft])	120	
Auto Horn (3 ft)	110	Maximum Vocal Effort
Jet Takeoff (2,000 ft) Shout (0.5 ft)	100	
New York Subway Station Heavy Truck (50 ft)	90	Very Annoying; Hearing Damage (8-hour, continuous exposure)
Pneumatic Drill (50 ft)	80	Annoying
Freight Train (50 ft) Freeway Traffic (50 ft)		
	70	Intrusive; Telephone Use Difficult
Air Conditioning Unit (20 ft)	60	
Light Auto Traffic (50 ft)	50	Quiet
Living Room or Bedroom	40	
Library Soft Whisper (5 ft)	30	Very Quiet
Broadcasting Studio	20	Recording Studio
	10	Just Audible

Source: Adapted from Table E in NY DEC, 2001.

The measurement of sound is not a simple task. Consider typical sounds in a suburban neighborhood on a normal or "quiet" afternoon. If a short duration of those sounds is plotted on a graph, it would look very much like **Figure 6-1**. In this figure, the background, or residential sound level in the absence of any identifiable noise sources, is approximately 45 dBA. During roughly three-quarters of the time, the sound level is 50 dBA or less. The highest sound level, caused by a nearby sports car, is approximately 70 dBA, while an aircraft generates a maximum sound level of about 68 dBA.

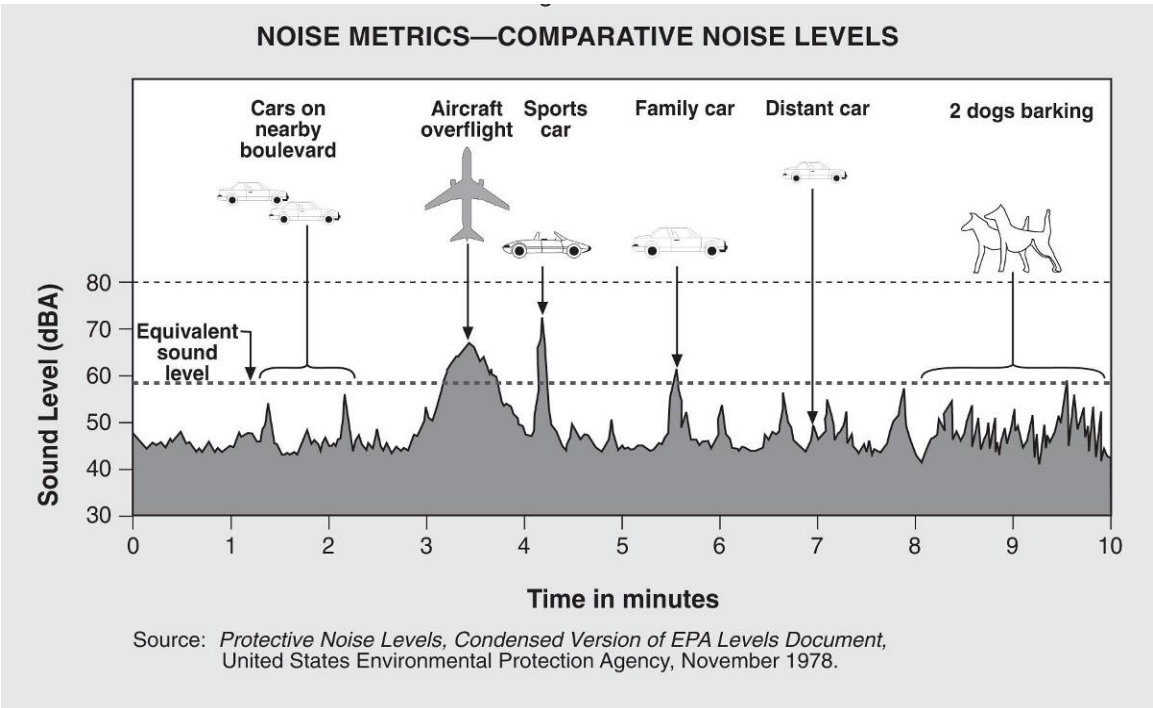


FIGURE 6-1
Noise Metrics—Comparative Noise Levels

It is important to understand the difference between sound pressure levels and sound power levels. Sound power level data are used in acoustic models to predict sound pressure levels. This is because sound power levels take into account the size of the acoustical source and account for the total acoustical energy emitted by the source. For example, the sound pressure level 15 ft from a small radio and a large orchestra may be the same, but the sound power level of the orchestra will be much larger because it emits sound over a much larger area. Similarly, 2-horsepower (hp) and 2,000-hp pumps can both achieve 85 dBA at 3 ft (a common specification), but the 2,000-hp pump will have a significantly larger sound power level. Consequently, the noise from the 2,000-hp pump will travel farther. A sound power level can be determined from a sound pressure level if the distance from and dimensions of the source are known. Sound power levels will always be greater than sound pressure levels, and sound power levels should never be compared with sound pressure levels such as those in Table 6-3.

6.3.4 Construction Impacts

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control studied noise from individual pieces of construction equipment, as well as from

construction sites for power plants and other types of facilities, as shown in **Table 6-4**. Because specific information about types, quantities, and operating schedules of Project construction equipment is not known at this stage, data from the EPA document for industrial projects of similar size have been used. These data are conservative because the evolution of construction equipment generally has gravitated toward quieter design. Use of these data is reasonable for estimating noise levels, given that they are still used widely by acoustical professionals.

TABLE 6-4
Average Noise Levels from Common Construction at a Reference Distance of 50 feet

Construction Equipment	Typical Average Noise Level at 50 ft (dBA)
Air compressor	81
Backhoe	85
Concrete mixer	85
Concrete pump	82
Crane, mobile	83
Dozer	80
Generator	78
Grader	85
Loader	79
Paver	89
Pile driver	101
Pneumatic tool	85
Pump	76
Rock drill	98
Saw	78
Scraper	88
Shovel	82
Truck	91

Source: EPA, 1971.

Table 6-5 shows the total composite noise level at a reference distance of 50 ft, based on the pieces of equipment operating for each construction phase and the typical usage factor for each piece. The calculated level at 1,500 ft is probably conservative because the only attenuating mechanism considered was geometric spreading, which results in an attenuation rate of 6 dBA per doubling of distance; attenuation related to the presence of structures, trees or vegetation, ground effects, and terrain was not considered.

Because the Project's major construction activities are temporary and generally limited to the daytime hours, and given the distance to the nearest nonparticipating residence (approximately 0.5 mile), noise levels resulting from construction of the Project will not significantly impair the environment or the social and economic condition of present or expected inhabitants.

TABLE 6-5
Composite Construction Site Noise Levels

Construction Phase	Composite Equipment Noise Level at 50 ft (dBA)	Composite Equipment Noise Level at 1,500 ft (dBA)
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

Source: EPA, 1971.

6.3.5 Operation Impacts

Standard acoustical engineering methods were used in the noise analysis. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2: *Acoustics – Sound Attenuation During Propagation Outdoors, Part 2: General Method of Calculation* (ISO, 1993a) and Verein Deutscher Ingenieure (VDI [Society of German Engineers]) 2714: *Outdoor Sound Propagation* (VDI, 1988). Atmospheric absorption for conditions of 10°C and 70-percent relative humidity (conditions that favor propagation) was computed in accordance with ISO 9613-1: *Acoustics – Sound Attenuation During Propagation Outdoors, Part 1: Calculation of the Absorption of Sound by the Atmosphere* (ISO, 1993b).

Each wind turbine was considered to be a point source of noise at the hub height with the octave band sound power level of up to 106 dBA, which is representative of the maximum level from the anticipated turbine. This sound power level represents the maximum turbine noise level determined in accordance with IEC 61400-11: *Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques* (IEC, 2006) and is representative of expected warranted levels for the WTGs being considered for this Project.

The expected sound levels resulting from the indicative layout are depicted in the Predicted Sound Level Contours figure in **Appendix D**. The predicted Project sound levels are less than 50 dBA at all residences and less than 45 dBA at all but the closest residence (a participating landowner), assuming all of the turbines operate at their expected warranted levels. Such levels would generally be considered acceptable at residences. As indicated in the Predicted Sound Pressure Levels Map, the anticipated noise level decreases with increasing distance from the Project. When winds are less than those necessary to generate maximum noise levels (8 m/s referenced to 10 m height) the turbines emit less noise, and the expected levels at the residences would be less than those described above or depicted in the noise contours. While Wyoming has not established numeric noise limits, Washington, Oregon and Colorado State noise regulations allow for levels up to 50 dBA (in Oregon, this is typically limited to participating residences). USEPA guidelines suggest maintaining an Ldn of 55 dBA. This is equivalent to a 55 dBA during the day and 45 dBA at night or 49 dBA for a source that operates over a continuous 24 hr period.

6.4 Soils and Geologic Hazards

W.S. § 35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility.

Geologic and soils data from the Wyoming State Geological Survey, U. S. Geological Survey (USGS), and the Web Soil Survey provided by the Natural Resources Conservation Service (NRCS) were reviewed for information on geology, soil characteristics and earthquake hazards in the Project and vicinity.

In addition, site-specific soils data and subsurface conditions were obtained from a preliminary geotechnical investigation. This investigation was conducted to evaluate preliminary subsurface conditions and provide preliminary geotechnical design recommendations. This investigation included drilling soil borings, conducting laboratory testing on soils and rock, and providing preliminary recommendations for design and construction. Information from the preliminary geotechnical investigation was used in this application to describe and confirm general subsurface characteristics of the on-site soils and bedrock.

The following sections present an overview of the site geologic setting and soil characteristics, provide a discussion of potential impacts, and describe mitigation measures to avoid or minimize potential impacts.

6.4.1 Regulatory Jurisdiction

ISD regulations state that soils and geology are resources that must be evaluated in the application process. However, no adopted regulations, rules, or guidelines exist outside of prudent engineering practices and recommended building standards and codes.

6.4.2 Area of Site Influence

The area of site influence is defined for geology and soils resources as the Project boundary, and all leased lands within.

6.4.3 Geologic Setting

The site is within the Powder River Basin geologic province. The Wasatch Formation bedrock geologic unit underlies the project site (Sharp and Gibbons, 1964; Denson, et al., 1990; Reheis and Coates, 1982). The Wasatch Formation is described as "brown and gray claystone and siltstone with thick lenses of coarse-grained, crossbedded arkosic sandstone; generally poorly consolidated but have some well-cemented resistant sandstone beds; and thin beds of coal and carbonaceous shale common locally." Based on subsurface information from the Preliminary Geotechnical Report (RRC, 2010), the Wasatch Formation at the site consists of interbedded sandstone, shale, claystone, and siltstone, with occasional lignite seams.

Surficial geologic units of variable thickness overlie most of the bedrock units at the site (Case, et al., 1998; Reheis and Coates, 1982). Surficial geologic units include alluvium terrace deposits, residuum/slopewash/alluvium, residuum/slopewash/alluvium over shallow bedrock, and slopewash/alluvial fan/terrace deposits (see Soils Map in **Appendix D**). The

surficial geologic units mapped by Reheis and Coates (1982; 1987) include flood-plain and low terrace alluvium, high-terrace alluvium, eolian deposits, and residuum on Wasatch Formation. These units are described as the following.

Flood-plain and Low Terrace Alluvium

Sand and silt interbedded with crossbedded gravel lenses; pebbles of sandstone, ironstone, fossil wood, and lithologies derived from the White River Formation. These units are deposited by streams and are mapped along the floodplain and lowest terraces of modern streams.

High Terrace Alluvium

Sand and silt interbedded with crossbedded gravel lenses; pebbles of sandstone, ironstone, fossil wood, and lithologies derived from the White River Formation. These units were deposited by older streams at higher levels than present-day streams and are mapped 10 to 60 ft above the present floodplain and lowest terraces.

Eolian Deposits

Sand and silt occurring in dunes or in irregular sheets blanketing the terrain; massive to faintly bedded, including small areas of residuum.

Residuum on Wasatch Formation

Sandy and silty weathered material with a variable clay content; grades downward into unweathered Wasatch Formation; may contain sheetwash alluvium or eolian material in upper 3 ft.

Based on boring logs provided in the data report (RRC, 2010), the unconsolidated surficial geologic units typically consist of sands with varying amounts of clay and silt; and lean clays with varying amounts of sand. The surficial soils typically range from 5 to 30 ft thick, based on drilling logs. At the time of the subsurface investigation in December 2009, groundwater was typically deeper than the borings, which were drilled to 55 ft (RRC, 2010). However, groundwater levels may fluctuate throughout the year.

Geological and Paleontological Areas of Interest

The site is underlain by the Wasatch Formation. Under the Probable Fossil Yield Classification (PFYC) system, the Bureau of Land Management (BLM) classifies the Wasatch Formation as Class 5, which means "highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation (BLM, 2009)." The PFYC is primarily intended to address potential risks and impacts to paleontological resources on public lands. The Wasatch Formation is relatively flat-lying and typically covered by surficial geologic deposits and soils across the site. Very limited or no disturbance of the Wasatch Formation is anticipated as a result of project construction and no impacts to fossils within this formation are anticipated.

No mines are located within the site boundaries. A few borrow pits used for sand and gravel production are located in the Project vicinity.

6.4.4 Soils

Surficial soils present on the site include numerous soil complexes that classify primarily as loam and fine sandy loam (NRCS, 2010). Soils at the site are typically well-drained and are formed in slopes typically between 0 and 6 percent, but locally as steep as 30 percent along drainage systems and hillsides. No soils at the site meet the state and federal criteria of prime farmland soils. Wyoming does not maintain a list of soils of statewide concern. The Soils Map in **Appendix D** shows a soils map of the Project area. **Table 6-6** summarizes the properties of the predominant soils that underlie the proposed facility.

TABLE 6-6
Summary of Surficial Soils and Physical Properties

Soil Series	Texture (see notes)	Slopes (percent)	Soil Erodibility Factor (K)	Wind Erodibility Group*	Shrink/ Swell Potential
Forkwood-Cushman	Loam	0 to 6	0.32	5	Low
Forkwood-Cambria	Loam	0 to 6	0.32	5	Low
Forkwood-Ulm	Loam	0 to 6	0.32	5	Low
Theedle-Kishona	Loam	0 to 6	0.32	4L	Moderate
Cambria-Kishona-Zigweid	Loam	0 to 6	0.32	5	Moderate
Theedle-Shingle	Loam	3 to 30	0.32	4L	Moderate
Theedle-Kishona	Loam	6 to 20	0.32	4L	Moderate
Hiland-Bowbac	Fine Sandy Loam	0 to 6	0.24	3	Low
Hiland-Bowbac	Fine Sandy Loam	6 to 15	0.24	3	Low
Cushman-Cambria	Loam	0 to 6	0.32	5	Moderate
Keeline-Tullock	Loamy Sand	6 to 30	0.15	2	Low
Turnercrest-Keeline-Taluce	Fine Sandy Loam	6 to 30	0.24	3	Low

Notes:
*****A wind erodibility group consists of soils that have similar properties that affect their susceptibility to wind erosion, primarily in cultivated areas. The soils assigned to Group 1 are the most susceptible to wind erosion, and those assigned to Group 8 are least susceptible. As shown in the table, the soils within the project boundary range from 2 to 5, which indicates moderate to moderately high susceptibility to wind erosion**.**

Loam = A soil having approximately 40 percent sand, 40 percent silt, and 20 percent clay
Fine Sandy Loam = A soil having more than 50 percent sand and equal parts of silt and clay
Loamy Sand = A soil with 70 to 90 percent sand with minor silt and clay content

Source: NRCS, 2010.

Because numerous soil complexes are within the project boundary, the soils that underlie the most acreage and areas of proposed turbine and road locations (i.e., areas with the most potential disturbance) were evaluated for properties and potential limitations. The most widespread soils in the project area include the Forkwood-Cushman loams, 0 to 6 percent slopes; Forkwood-Cambria loams, 0 to 6 percent slopes; Forkwood-Ulm loams, 0 to

6 percent slopes; Theedle-Kishona loams, 0 to 6 percent slopes; Cambria-Kishona-Zigweid loams, 0 to 6 percent slopes; Theedle-Shingle loams, 3 to 30 percent slopes; Theedle-Kishona loams, 6 to 20 percent slopes; Hiland-Bowbac fine sandy loams, 0 to 15 percent slopes; Cushman-Cambria loams, 0 to 6 percent slopes; Keeline-Tullock loamy sands, 6 to 30 percent slopes; and the Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30 percent slopes.

6.4.5 Soil and Geologic Hazards

Potential soil and geologic impacts include both those to the environment because of the proposed Project and also those to the proposed Project from the affected environment.

The following section describes the potential impacts to soil resources and potential impacts to the Project from geologic hazards in the Project boundary. The analysis is based on review of existing literature, published geologic mapping, earthquake hazard mapping, and seismic characterization and site-specific geotechnical and soils data.

Soil Erosion

The erosion factor (K) indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. As shown in Table 6-6, the soils on the site have an erodibility factor that ranges from 0.15 to 0.32 (NRCS, 2010), which indicates low to moderate erosion potential. No soils within the Project boundary exceed the soil erodibility factor (K) limit of 0.37 set by the NRCS as a limiting factor for erosion hazard.

Shrinking/Swelling Soils

Changes in soil moisture cause certain clay minerals in soils to either expand or contract. The amount and type of clay minerals in the soil influence the change in volume. Structures or roads built on shrinking or swelling soils could be damaged by the change in volume of the soil. Linear extensibility (shrink-swell potential) refers to the change in length of an unconfined clod as its moisture content is decreased from a moist state to a dry state. The volume change is reported as percent change for the soil. The uppermost soils on the site have a linear extensibility (i.e., shrinking/swelling potential) between 1.5 and 4.4 percent. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. Therefore, the soils on site are rated as low to moderate swelling potential (see Table 6-6) (NRCS, 2010). Shrink/swell movement is anticipated to be on the order of 0.5 to 1 inch, which will require design considerations such as drainage or impermeable sheeting or cover around foundations (RRC, 2010).

Swelling clays may be present in the claystone layers within the Wasatch Formation. Swell testing on a claystone layer indicated a value of 1.2 percent expansion, which indicates "low" swell potential and thus swelling in claystone layers is not a potential impact. Additional layers of expansive shales or claystone bedrock may be present in the Project

area (RRC, 2010). These layers will be identified and characterized during final design geotechnical investigation.

Soil Collapse Potential

Loose, sandy soils or windblown silty loess have the potential for collapse and settlement when wetted or loaded by foundations or structures. Loose to very loose sandy soils may be present within portions of the Project boundary (RRC, 2010) and will be identified and characterized during the final design geotechnical investigation to be conducted prior to final Project engineering.

Soil Corrosion Potential

Corrosion potential of soils is related to electrochemical or chemical reactions in soil that corrode or weaken concrete and steel. The corrosion rate is influenced by the sulfate and chloride content, clay percentage and type, soil resistivity, moisture content, and pH of the soils. The surficial soils on site are rated as "low" corrosion potential (NRCS, 2010). Sulfate and chloride testing of on-site materials indicated negligible to severe levels. Therefore, consideration should be given to the use of Type II cement with fly ash or the addition or air entrainment agents for higher sulfate resistance. Soil resistivity and pH testing indicated that on-site soils are non-corrosive to mildly corrosive (RRC, 2010).

Soil Properties for Access Roads, Crane Pads, and Foundations

Local roads and streets, as defined by the NRCS, have an all weather surface and carry automobile and light truck traffic all year. The soil properties that affect the traffic supporting capacity include soil strength, subsidence, linear extensibility, potential for frost action, depth to water table, and ponding. Access roads would be built as part of the Project for construction equipment and maintenance vehicles. Numerous gravel-surface roads presently traverse the proposed Project vicinity.

The on-site surficial soils are rated as "somewhat limited" to "very limited" for local roads and streets (NRCS, 2010). A rating of "somewhat limited" indicates the soil has features that are moderately favorable for the specified use and the limitations can be overcome or minimized by special planning, design or installation. Fair performance and moderate maintenance can be expected. A rating of "very limited" indicates the soil has one or more features that are unfavorable for the specified use. The limitations generally can be overcome with soil reclamation, and sound design and installation procedures. The on-site soils received these ratings based primarily on low strength, shrink-swell potential, and frost action.

The surficial soil materials and bedrock that would underlie access roads encountered during the preliminary geotechnical investigation include sands, clays, shale, and sandstone (RRC, 2010). The thickness of the roadway section will be determined based on the traffic duration and frequency, and based on the requirements of the American Association of State Highways and Transportation Officials (AASHTO) for design of aggregate-surfaced roadways. During the final design geotechnical investigation, the soil strength and other properties that affect roadway design and performance will be evaluated and the pavement section will be designed accordingly to support the anticipated traffic loads.

Based on the information from the preliminary geotechnical investigation, the native soils and bedrock materials are capable of supporting crane loads (RRC, 2010). However, limited soil improvements may be required in areas where loose sandy soils are present. These areas will be identified during the final design geotechnical investigation.

The WTGs and substation will be supported on properly designed and engineered foundations. Based on the preliminary geotechnical investigation, native materials at foundation bearing elevations include sands, clays, sandstone, and claystone bedrock. Based on the properties of the soils and bedrock, the use of gravity foundation systems for support of the proposed WTGs is considered acceptable (RRC, 2010). In addition, the use of spread footings and mat foundations for support of structures located within the substation footprint is considered acceptable. Allowable bearing pressures range from 4,000 lbs per square foot on dense sandy to stiff clayey soils, to 6,000 lbs per square foot on sandstone and shale bedrock. The footings will be embedded at least 3 ft below existing grade for confinement and frost penetration. Limited soil improvements or over-excavation may be required in areas where loose sandy soils or potentially swelling clayey soils or claystones are present.

Landslides

On published geologic maps, no landslides have been mapped within the Project boundary (Case, et al., 1998; Reheis and Coates, 1982), and none have been mapped by the Wyoming Geological Survey (WSGS, 2009). The closest mapped landslides are more than 1 mile west of the Project boundary and are limited to the steep flanks of the Pumpkin Buttes (see Soils Map in **Appendix D**). Given the lack of existing landslides on the site, flat-lying bedrock, low potential for soil saturation in the area, and low slope angles, the landslide hazard is expected to be low.

Steep-sided gullies in the vicinity may be subject to localized surficial slumping and bank failures during runoff events and associated rapid erosion and undercutting. Numerous check dams and small reservoirs have been constructed along the drainages. These act as impediments to flow and control runoff and sediment transport and associated soil erosion. Bank slumps or failures are restricted to the gully walls and are small and localized and would not impact or affect the overall stability of Project facilities. Facilities, WTGs, and structures will not be sited or located near channels that may have the potential for rapid erosion, bank failures, or channel migration. Future access road construction over gullies or drainage paths will require appropriate scour and erosion protection, as well as properly sized culverts to pass potential floods.

6.4.6 Faults and Seismicity

A complete seismological characterization of a site typically includes a summary of historical seismicity, an analysis of the Seismic Zone Maps, deterministic analysis of active faults, floating or random earthquake analysis, and probabilistic seismic hazard analysis.

Seismicity

Campbell County and the immediate surrounding area have seven historic earthquakes with magnitude 2.5 and greater. **Table 6-7** presents a summary of the historic earthquakes in the region (Case, et al., 2002). Historical seismic activity has occurred within 30 to 40 miles of the project vicinity, where earthquakes with estimated Modified Mercalli intensity

scales up to intensity V have occurred between 1967 and 1993. However, it appears that no damage occurred as a result of these earthquakes.

TABLE 6-7
Summary of Historical Earthquakes in Campbell County and Vicinity

Date	Location	Magnitude/Intensity	Damage
May 11, 1967	7 miles west-northwest of Pine Tree Junction	4.8	None reported
February 18, 1972	18 miles east of Gillette	4.3	None reported
September 2, 1976	38 miles west-southwest of Gillette	4.8 / IV-V	None reported
May 29, 1984	24 miles west-southwest of Gillette	5.0 / V	Ground shaking observed, loud noise, dishes rattled
September 7, 1984	27 miles west of Gillette	5.1 / V	No significant damage reported
October 29, 1984	25 miles west-northwest of Gillette	2.5	None reported
February 24, 1993	10 miles east-southeast of Reno Junction	3.6	None reported

The Project area is located near the boundary of Seismic Zones 0 and 1, which is defined as a 90 percent chance of not exceeding a peak acceleration of 0.0g to 0.10g in 50 years, or a 500-year return period (the value "g" is the percentage of the acceleration of gravity). A "floating" earthquake is an earthquake that occurs randomly in a tectonic province and is not necessarily associated with a specific known fault. The floating earthquake analysis for the region indicates that the largest "floating" earthquake in the region would have a magnitude of between 6.0 and 6.5 (Geomatrix, 1988). This floating earthquake, placed 10 miles from any structure, would generate horizontal acceleration of approximately 0.15g at the site.

The Uniform Building Code uses the 2,500-year return interval probabilistic earthquake maps for design of structures and facilities. Based on the 2,500-year map (which is the equivalent of a 2 percent probability of exceedance in 50 years), the estimated peak horizontal acceleration in the vicinity of the site would be approximately 0.20g. This would be the equivalent of an Intensity VI to VII earthquake, which is described as "felt by all, many frightened and run outdoors," and can result in "some heavy furniture moved, damage slight" for an Intensity VI earthquake, to "damage negligible in buildings of good design and construction" for an Intensity VII earthquake.

The on-site ground shaking is also a function of soil type, depth to bedrock, and presence of saturated sediments. To determine extent of seismic shaking and develop the proper seismic site class, the strength properties of the soils in the upper 100 ft of the subsurface are evaluated.

The seismic potential for the Project site is low. For new construction, the facilities and turbine foundations will be designed for the maximum considered earthquake (MCE),

according to the International Building Code (IBC), and the site will be assigned a seismic site class based on soil properties. Seismic design issues will be fully addressed in a separate Geotechnical Data Report.

Faults

The USGS's Quaternary Fault and Fold database does not show any known or suspected active faults within a 100-mile radius of the project site (USGS, 2008a). Therefore, no potential for surface fault rupture exists within the Project boundaries. According to the USGS's Quaternary Fault and Fold database (USGS, 2008a), the closest mapped potentially active fault is the Stagner Creek Fault, which is approximately 125 miles to the west of the site. Therefore, no potential impacts due to surface fault rupture exist at the site.

6.4.7 Construction Impacts

There will be a certain amount of disturbance of surficial soils and minor excavation into soils and weak bedrock associated with construction of the facilities, at turbine, substation, and crane pad locations, and along access road and collection system alignments. A stormwater pollution prevention plan (SWPPP) will be developed with the Notice of Intent (NOI) for the required Wyoming Pollution Discharge Elimination System (WYPDES) General Stormwater Construction Permit and implemented to minimize soil erosion during construction of the Project.

Geotechnical Investigation for Final Design

The subsurface conditions at every WTG site can have variable soil properties that influence the engineering design and construction. Therefore, a detailed geotechnical investigation and testing program will be conducted to evaluate the engineering properties of the soils at each proposed location and measure groundwater levels. Geotechnical analyses will be used to calculate bearing capacity of the soils and bedrock and conduct stability analysis of the WTGs.

The geotechnical investigation will consist of a combination of soil borings, rock coring, geophysical investigations, and test pits. Shallow sampling (upper 5 ft of soil) is typically targeted for access roads, crane walk paths, crane pad design, and collector cable design. Deeper sampling (up to 50 ft) will be used to evaluate foundation conditions for each WTG location. Samples collected during the investigation will be tested for engineering properties including compressive strength, Atterberg limits, grain size, and moisture content.

Wind farm civil infrastructure includes permanent and temporary access roads, temporary crane walk paths, crane pads, turbine foundations, substation foundation, and possibly public road improvements. Each of these components requires specific design calculations, drawings, and final engineering design for successful construction and future operation.

Various foundation types can be used for turbine support. These can include gravity/ spread footings, anchored pads, drilled shafts, and deep piles. The foundation type is selected based on soil conditions and depth to bedrock. During the engineering design of turbine foundations, the soil properties of the site, dynamic loading due to operation of the turbine, and site seismic properties will be considered. Foundation load data for each specific turbine type (obtained from the turbine manufacturer) includes extreme and normal

operating loads, required foundation stiffness, and other design criteria used for final foundation design.

Seismic considerations consist of evaluating the site with respect to anticipated maximum earthquake ground motions and the resulting seismic loading on the turbine. Seismic design values are based on the engineering properties of the upper 100 ft of the subsurface soils and rock, and also the short- and long-period spectral response acceleration as a percentage of gravity.

A future geotechnical investigation will be conducted for final WTG foundation design to address the issues described previously. Proper engineering design will be used for all Project facilities. Therefore, no impacts associated with geologic hazards such as seismic events, settlement, or landslides, that would substantially impair health, safety, or welfare, are expected to occur as a result of implementation and construction of the Project.

6.4.8 Operation Impacts

Best Management Practices (BMPs) will be implemented by the contractor during operation of the Project to ensure that erosion will be minimized and other adverse impacts on area soils will not occur. Standard dust control practices will be used to minimize fugitive dust generation. Roads and culverts will be maintained to prevent sedimentation to creeks or waterways. No other construction is anticipated during the operation of the Project that could potentially impact soils.

6.5 Cultural Resources

W.S. § 35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility.

Cultural resources of concern consist of historical or archaeological sites that are listed on or are eligible to be listed on the National Register of Historic Places (NRHP).

6.5.1 Regulatory Jurisdiction

Federal Lands

The National Historic Preservation Act (NHPA) is the principal federal law guiding federal actions with respect to the treatment of cultural, archaeological, and historic resources. Section 106 (16 U.S. Code [USC] 470f) of the NHPA requires federal agencies, prior to taking action to implement an undertaking, to take into account the effects of their undertaking on historic properties and to give the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Office (SHPO) a reasonable opportunity to comment regarding the undertaking. Historic properties are "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP (16 USC 470w [5]). The criteria used to evaluate the NRHP eligibility of properties affected by federal agency undertakings are contained in 36 *Code of Federal Regulations* (CFR) 60.4.

The lead federal or state agency that administers the land or minerals under development, or that issues key permits, would determine the level and scope of cultural resources inventory that would be required for a project. Development of any area that is predominantly federal surface lands would require a complete cultural resource inventory

in compliance with Section 106 of the NHPA. Consideration of potential effects on cultural resources by actions on federal surface lands or involving federal permits or funding would be required by the National Environmental Policy Act (NEPA) or Section 106 of the NHPA.

State Lands

With respect to discoveries located on easements obtained across State-owned lands, the Wyoming Board of Land Commissioners' Rules and Regulations, Chapter 3, Section 9(b) requires that the Director of the Office of State Lands and Investments be notified and that the SHPO, the State Archeologist, State Geologist, or other authority will be notified if "deemed necessary" by the Director. The Project will occupy two parcels of State land and this requirement is in place to ensure that no impacts will occur to cultural resources on State lands.

Private Fee Lands

There are no legal protections granted to cultural resources occurring on private fee lands unless a federal action would serve as the nexus. Based on a review of Industrial Development Information and Siting Act (ISA) statutes and rules, no State laws are applicable to the protection of cultural resources on private fee lands. Lastly, cultural resources located on private fee lands are the property of the landowner and can be treated as desired by the landowner.

6.5.2 Area of Site Influence

The area of site influence is defined for cultural resources as the Project boundary, and all leased lands within.

6.5.3 Survey Results

TPWRJ completed a Class I site files review (100 percent of the Project area) and a Class III Cultural Resource Inventory for approximately 80 percent of the area proposed for disturbance (Cultural Resource Analysts, Inc. [CRAI], 2010). The remaining 20 percent of the area proposed for disturbance was covered with drifted snow and will be inventoried when snow conditions allow, and prior to ground disturbance. The confidential Class III report will be submitted to the SHPO for their review in April 2010.

6.5.4 Construction Impacts

TPWRJ met with SHPO on January 19, 2010, to discuss the Project and detail avoidance strategies associated with eligible and unevaluated NRHP cultural resources within the Project area. SHPO requested complete avoidance of all cultural resource sites identified as eligible or unevaluated for listing on the NRHP to ensure that no impact occurs to cultural resources.

TPWRJ acknowledges the potential value and importance of these resources and has agreed to voluntarily site all Project features to avoid direct impact to cultural resources that are eligible or unevaluated for listing on the NRHP. Based on this recommendation, TPWRJ has sited Project features in response to the Class III inventory and will respond to any future Class III data to ensure that no impacts to cultural resources occur that are eligible or unevaluated for listing on the NRHP. SHPO has confirmed their support of this avoidance strategy to ensure that no adverse effects to cultural resources occur. Therefore, no direct

adverse impacts to cultural resources are anticipated from construction or operation of the Project.

6.5.5 Operation Impacts

The Project is sited on private fee and State of Wyoming lands that have experienced significant industrial development associated with oil and gas extraction. The extensive road network, oil and gas facilities, and intensive use of the Project area by other industries justify the location of the Project. Therefore, operation of the Project will not result in any impact to cultural resources that may significantly impair the health, safety, or welfare of the resource or the health, safety, or welfare of the present or expected resources in the area of site influence.

6.6 Water Supply Yield and Analysis

W.S. 35-12-108(a) – Water Supply Yield and Analysis. Quantity of water available; analysis; public comment; opinions: If an applicant applies for an industrial siting permit, pursuant to W.S. 35-12-106, or for a waiver of the application provisions, pursuant to W.S. 35-12-107, for a facility which requires the use of 800 or more acre-feet per year of waters of the state of Wyoming annually, the applicant shall prepare and submit to the state engineer a water supply and water yield analysis with a request for a preliminary and final opinion as to the quantity of water available for the proposed facility.

The Wyoming Constitution defines that all natural waters within the boundaries of the state are declared to be the property of the State. The Wyoming State's Engineer Office (WSEO) is charged with the regulation and administration of the water resources in Wyoming.

6.6.1 Regulatory Jurisdiction

If an applicant for an industrial siting permit plans to construct a facility that will use more than 800 acre-feet of water per year, the applicant must submit a water supply and water yield analysis to the State Engineer. The WSEO will then review the analysis and "render a preliminary opinion as to the quantity of water available for the proposed facility" (Wyoming Statute [W.S.] 35-12-108[c]). This preliminary opinion will be made available for public comment, and the State Engineer will consider submitted comments in preparing a final opinion. The State Engineer's final opinion will be binding on the Industrial Siting Council (ISC).

6.6.2 Construction Water Uses

Water use during construction will include applications for dust control and as additive in the production of concrete. During Project construction, water will be obtained from an existing groundwater well or a new well issued by the WSEO permit to appropriate groundwater. If possible, water will be obtained on site to minimize hauling distances and hauling traffic within the area of site influence. Once available on site, water will either be put to immediate use or placed in an on-site temporary water storage tank. **Table 6-8** provides an estimate of the construction water uses.

TABLE 6-8
Estimated Water Use During Construction

Material	Foundations[a]	Material Per Foundation (Approximate)	Total Water Use (Approximate)
Water Use for Concrete Mixing			
Water for concrete mixing (30 gallons water per cubic yard of concrete and 300 to 400 yd^3 of concrete per foundation)	100	9,000 to 12,000 gallons of water per foundation	900,000 to 1,200,000 gallons (2.7 to 3.7 acre-feet)
Water Use for Dust Control			
Material	**Days[b]**	**Water Use Gallons/Unit**	**Distance of New and Existing Access Roads**	**Total Water Use**
Road watering during active construction	135	4,000 gallons per lineal mile per day	20 miles	10,800,000 gallons (33.1 acre-feet)
Total Gallons				11,700,000 to 12,000,000 gallons (35.8 to 36.8 acre-feet)

[a] Assumes construction of up to 100 GE 1.5-MW WTGs.

[b] The estimated construction period that will require water was taken from the detailed Project schedule and includes the site civil work task that is estimated at 180 days (45 days access road and 135 foundation construction and erection).

A review of Table 6-8 shows approximately 12,000,000 gallons (36.8 acre-feet) will be required to support the Project over the construction period. Of that total, an estimated 10,800,000 gallons (33.1 acre-feet) will be used to control dust on constructed access roads. The actual amount of water applied daily to access roads is variable and is dependent on daily weather temperatures, humidity, wind speeds, and local precipitation amounts.

Based on the estimated construction water balance calculations, the Project will not exceed the 800 acre-feet-per-year threshold and will not require a WSEO water supply yield analysis or opinion.

6.6.3 Operations Use

Once the Project is operational, only minimal daily water use will be required. The primary water requirement will occur at the operation and maintenance (O&M) building and is likely limited to restrooms, sinks, hand washing station(s), shower, internal/external hose, and dishwasher. Using a very standard assumption for commercial office use for each aspect of water usage, the operational water use will be approximately 1,000 gallons per day (gpd), as shown in **Table 6-9**.

TABLE 6-9
Estimated Daily Water Use During Operations

Use	Frequency (Occurrences per Day)[a]	Consumption (Gallons per Occurrence)[a]	Total Consumption (gpd) (acre-feet per year)
Bathroom sinks	60	2	120
Toilet flushes	60	4	240
Shower	10	30	300
Dish washer	1	15	15
External/internal hose	15	15	225
Maintenance area sinks	25	5	100
		Total	**1,000 gpd (1.1 acre-feet per year)**

[a] Water usage frequency and consumption rates are based on standard commercial facility estimates and observed operational water usage patterns for previous wind generation facilities.

Based on the 1.1 acre-feet per year water balance calculation for operations, the Project will not exceed the 800 acre-feet per year threshold and will not require a WSEO water supply yield analysis or opinion.

6.6.4 Water Sources

Wyoming water law operates under the prior appropriation doctrine, or "first-in-time, first-in-right." Those holding an earlier priority water right are allowed to receive their full portion of water before those with junior rights may receive water under their right.

Water rights can be issued to anyone who plans to make beneficial use of the water. Recognized beneficial uses include irrigation, municipal, industrial, power generation, recreational, stock, domestic, pollution control, instream flows, and other miscellaneous uses. Water rights holders are limited to withdrawals necessary for the specified purpose.

During Project construction, water will be obtained from an existing groundwater well, or a new well issued by the WSEO permit to appropriate groundwater. If possible, water will be obtained on site to minimize hauling distances and hauling traffic within the area of site influence. During operations, water will be obtained from a new groundwater well issued by the WSEO permit to appropriate groundwater.

Compliance with Belle Fourche River Compact

The Belle Fourche River Compact[1], a contract negotiating the appropriation of the river's waters, was signed between Wyoming and South Dakota on March 4, 1943.

The Belle Fourche River Compact of 1943 only restricts surface appropriations. The compact basically allocates 10 percent of the Belle Fourche River's flow at the South Dakota border to

[1] Compacts are agreements between states and water users about how the water in a river or basin will be divided up. It can be by percentages allowed for withdrawal, set volumes of water allowed for withdrawal, area of land that may be irrigated, amount of water that may be stored, or a combination of any and all forelisted methods. Compacts are legal documents detailing specific agreement for water allocations.

Wyoming. No restrictions on groundwater exist under the compact. The Project will not impact the Belle Fourche River Compact because the project will not use surface water. Applicable groundwater permits will be obtained through the WSEO for project related groundwater wells.

6.7 Surface and Groundwater Resources

W.S. § 35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility.

Baseline surface and groundwater resources were reviewed and water use calculations were estimated for the Project in Section 6.6. The following sections detail the baseline conditions and potential Project impacts on surface water and groundwater in the Project area.

6.7.1 Regulatory Jurisdiction

Water quality associated with construction and operation of the Project will be subject to the WDEQ – Water Quality Division (WQD) Standards and Regulations. Specifically, implementing Water Quality Rules and Regulations are found in Chapters 1 to 23, as well as promulgated rules adopted in the Wyoming Environmental Quality Act.

6.7.2 Area of Site Influence

The area of site influence is defined for surface and groundwater resources as the Belle Fourche River Basin.

6.7.3 Surface Water

Belle Fourche Basin

The Project lies within the Belle Fourche Basin, Upper Belle Fourche Sub-Basin watershed (Hydrologic Unit Code [HUC] 10120201). The major named streams within the vicinity of the Project area are the Belle Fourche River, Mud Spring Creek, North Fourmile Creek, Fourmile Creek, All Night Creek, and South All Night Creek. Several stock ponds and coal bed methane reservoirs within gullies, draws, and gulches occur throughout the Project area.

The majority of the Project area lies within the drainage system of Upper Belle Fourche River Sub-basin and its tributaries. Belle Fourche River originates south of the Project area and meanders northeasterly around the Bearlodge Mountains, then swings to the southeast and eventually enters South Dakota. Tributaries to the Belle Fourche River within the Project area include Mud Spring Creek, North Fourmile Creek, Fourmile Creek, All Night Creek, and South All Night Creek, which flow east across the Project area approximately 8 miles to the confluence with the Belle Fourche River. The drainage system near the Project appears to be fed by spring snow melt, summer thunderstorm surface runoff, and groundwater, and it is generally dry by late summer in most years. Surface water resources are presented in the Surface Water map included in **Appendix D**.

Mud Spring Creek

Mud Spring Creek and its tributaries cross the northern end of the Project in Township 44N, Range 75W, Sections 11, 12, 13, and 14; and in Township 44N, Range 74W, Sections 7 and 8.

Mud Spring Creek is an intermittent or ephemeral creek that supports wetlands within the Project area. Approximately 20 linear wetlands or impoundments within or adjacent to Mud Spring Creek are present within the vicinity of the Project area. These impoundments prevent significant erosion and sedimentation in the drainage basin, which is characterized by highly erodible soils. These impoundments also assist in preventing flash floods and scouring along the channel banks.

Fourmile Creek

North Fourmile Creek, Fourmile Creek, and its tributaries cross the Project area within Township 44N, Range 75W, Section 36; Township 44N, Range 74W, Sections 20, 21, 28, 29, and 30; Township 43N, Range 75W, Section 1; and Township 43N, Range 74W, Sections 5, 6, 7, and 18. North Fourmile Creek, Fourmile Creek, and its tributaries are ephemeral and intermittent waterways. Approximately 24 linear wetlands or impoundments within or adjacent to North Fourmile Creek and Fourmile Creek are present within the vicinity of the Project area.

All Night Creek

Tributaries to All Night Creek and South All Night Creek cross the transmission line-portion of the Project area within Township 43N, Range 75W, Section 36; and in Township 43N, Range 74W 19, 30, and 31. All Night Creek, South All Night Creek, and its numerous tributaries are ephemeral and intermittent waterways. Approximately 20 linear wetlands or impoundments within or adjacent to All Night Creek and South All Night Creek are present within the vicinity of the Project area.

303(d) List of Impaired Waters

Based on a review of the WYDEQ's Section 303(d) list of impaired waters, no listed streams are either in or in proximity to the Project area (WYDEQ, 2008a).

Floodplains

According to the Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRM) database, a 100-year floodplain has not been mapped along the Belle Fourche River or within or in the vicinity of the Project area (FEMA, 2009).

Construction Impacts

Numerous unimproved roads cross the upper ephemeral drainages to Mud Spring Creek, Fourmile Creek, and All Night Creek within the Project area. The existing access roads are present to support the oil and gas, coal bed methane, and ranching uses in the western portion of the Belle Fourche sub-basin (WYDEQ, 2008). These existing roads have directly and indirectly impacted the drainage of the Project site. However, the numerous impoundments within the Project area provide storage and runoff control to prevent sedimentation and erosion in the area.

Construction activities are not anticipated to result in significant erosion and subsequent runoff of surficial soils into surface waters. A SWPPP will be developed with the NOI for the required WYPDES General Stormwater Construction Permit and implemented to further minimize any potential impacts on surface water resources during construction of the Project. In addition, the concrete batch plant temporary work area will be covered by the

WYPDES General Stormwater Construction Permit and appropriate permits from the WDEQ–WQD.

Fuel storage areas will be managed and controlled in accordance with federal and state regulations to prevent the release of petroleum products to surface waters. Implementation of BMPs such as proper labeling and storage, secondary containment, and inspection as required by the WYPDES General Stormwater Construction Permit SWPPP will reduce the potential for accidental release of hazardous materials to surface water resources. No impacts to surface water resources are anticipated from use of hazardous materials during construction or operation. In addition, a Spill Prevention, Control, and Countermeasure (SPCC) Plan, as required by 40 CFR Part 112, will be developed and implemented at the site for construction and operations.

Any work within jurisdictional surface waters would be conducted in accordance with Sections 404 and 401 permits of the Clean Water Act (CWA). Drainage systems in sensitive areas such as steep slopes and erodible slopes will be carefully evaluated for additional back-up sediment and erosion control measures. These BMPs may include catch basins, roadway ditches, silt fencing and routine maintenance to remove sediment accumulation. Additional erosion control practices, such as flared-end section and rock dissipation, will be implemented near culvert outlets. Where necessary, trench slopes at the pipe entrance will be stabilized. Therefore, no adverse or significant impacts to surface water resources are anticipated from Project area stream crossings during construction.

Lastly, the proposed Project infrastructure will be constructed outside of the regulatory floodplain. Therefore, no adverse or significant impacts to floodplains in the area of site influence are anticipated as a result of Project construction.

Operation Impacts

TPWRJ will operate the Project in accordance with all issued conditions of approval from the WDEQ-ISD and all relevant local, state, and federal permits. Therefore, operation of the Project will not result in significant impairment to surface water resources that would impair the health, safety, or welfare of current or expected inhabitants in the area of site influence.

6.7.4 Groundwater

The Northeast Wyoming River Basin, Belle Fourche River Sub-Basin watershed contains a wide variety of geologic formations and structural elements. The six major aquifer systems within the planning area include the following (oldest to youngest) (WWDO, 2002):

1. Madison Aquifer System
2. Dakota Aquifer System
3. Fox Hills/Lance Aquifer System
4. Fort Union/Wasatch Aquifer System
5. Tertiary Aquifer System
6. Quaternary Alluvial Aquifer System

Based on the 2002 Wyoming Water Development Office (WWDO) report for the Northeast Wyoming River Basin, the following lithologic character applies to each major aquifer system in area:

1. Madison Aquifer System – sandstone, fine- to course- grained, interbedded with limestone, dolomite, and shale, locally gypsiferous
2. Dakota Aquifer System – sandstone, fine- to course-grained, locally conglomeractic, lenticular, with interbedded siltstone, shale and claystone
3. Fox Hills/Lance Aquifer System – sandstone, fine to medium grained lenticular, interbedded with sandy siltstone and claystone
4. Fort Union/Wasatch Aquifers – sandstone, fine- to medium-grained lenticular, interbedded with siltstone, coal and shale
5. Tertiary Aquifer System – tuffaceous sandstone, fine-grained with silty zones, coarse sand lenses and concretionary zones
6. Quaternary Alluvial Aquifer System – clay rich sandy silt, sand, and gravel, unconsolidated and interbedded, present along most streams

The majority of groundwater use within the Northeast Wyoming River Basin is for agricultural, municipal and domestic, industrial, recreational, and environmental purposes (WWDO, 2002). The significance of ground water in the planning area is demonstrated by the 15,793 active ground water permits within the Northeast Wyoming River Basin (WWDO, 2002). The majority of groundwater permitted wells are for agricultural, domestic, industrial, and coalbed methane uses (WWDO, 2002). Groundwater wells within the Project area vary in depth from 120 to 7,168 ft below ground surface (bgs) with static water levels ranging from 20 to 1,200 ft bgs (WSEO, 2008). A potential water well is proposed at the O&M building site in Section 18 in Township 43N, Range 74W for use in providing water to the batch plant for concrete production and long-term O&M building water needs. The location of wells recorded by the WSEO is presented in the Groundwater and Wells Map in **Appendix D.**

Construction Impacts

One of the environmental benefits of wind generation is that the wind farms require very minimal amounts of water, during both the construction and operations phase. More importantly, wind generation, by its nature, has minimal requirements for water. During the construction phase, water supply needs for the Project will be met with either an existing water right purchase or a new water right allocation (if the water resources in the area have not been fully appropriated).

Portable toilets will be provided for onsite sewage handling during construction and will be pumped and cleaned regularly by the construction contractor. No other wastewater will be generated during construction. Lastly, any quantities of solid waste materials generated by activities at the Project site will be disposed of in an appropriate manner at suitably licensed disposal sites. Licensed waste haulers will be used to remove wastes and dispose of such wastes in licensed and approved facilities according to local regulations and procedures.

The construction impacts to groundwater will not result in substantial impairment to the groundwater resources or the health, safety, or welfare of the present or expected inhabitants in the area of primary affect.

Operation Impacts

Most of the operational water usage would be associated with potable water needs for the operations staff. It is anticipated that a local groundwater well will be used to provide supply for operations activities. In addition, effluent from daily water use will be treated and discharged to an onsite septic system.

A review of Table 6-9 shows that an estimated 1.1 acre-feet per year would be required to operate the Project. A septic permit will be obtained from the implementing agency, and issued conditions will be maintained to protect any potential impacts to groundwater. Therefore, operational impacts to groundwater will not result in substantial impairment to the groundwater resources or the health, safety, or welfare of the present or expected inhabitants in the area of site influence.

6.8 Land Use

Rule I Section 7(i)(i) – Land Use. Land use designation of the site location, including whether the use of the land by the industrial facility is consistent with state, intrastate, regional, county, and local land use plans, if any. The analysis shall include the area of land required and ultimate use of land by the industrial facility and reclamation plans for all lands affected by the industrial facility or its dependent components.

W.S. 35-12-109(xiii)(Q) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special district and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans, and proposals shall cover agriculture.

This section presents information regarding existing and future land uses, zoning, and adopted land use plans and regulations applicable to the Project area. It analyzes the consistency of the Project with current and future land uses, policies, and plans.

6.8.1 Regulatory Jurisdiction

Local land use plans establish the vision for how a jurisdiction can develop and establish the goals, objectives, and action items for achieving that vision. The plans also establish a framework to guide and evaluate future development. A land use plan is a key tool that communities use to protect valued resources, guide development in a predictable manner, and encourage a preferred patterning and design of the built environment. These land use plans, in combination with the zoning code, provide a community the ability to evaluate the compatibility of new development and ensure that the objectives of that community are achieved.

6.8.2 Area of Site Influence

The area of site influence is defined for land use as the Project boundary, which is located within Campbell County.

6.8.3 Consistency with Land Use Plans

Rule I Section 7(xvi) – Consistency with Land Use Plans. Compatibility of the facility with state or local land use plans, if any.

The Campbell County Natural Resource and Land Use Plan was adopted in August 2007. The plan outlines the goals and objectives and the strategies intended to implement those goals for the county. One goal specific to energy development and infrastructure is to "enhance and increase production, processing, and transportation of Campbell County's energy resources." As such, it is the objective of Campbell County officials to encourage the following:

- Use of land and resources to accommodate new growth and foster economic development; and
- Diversification of the county's economic base through the development and demonstration of renewable energy and clean coal technologies such as fuel enhancement, coal-to-fuels, and advanced combustion

In seeking to achieve this goal, Campbell County is committed to encouraging the development of renewable energy resources. The proposed Project supports the goals and strategies put forth in the Campbell County Land Use Plan.

State of Wyoming Lands—Special Use Leases

A Special Use Lease was obtained from the State of Wyoming Board of Land Commissioners, pursuant to Chapter 5, Special Use Leasing under the Board of Land Commissioners Rules and Regulations. The special use lease contains 1,280 acres of state land in the Project area. Special use means any use of land other than grazing, agriculture, extraction of minerals, all named uses authorized within an easement granted pursuant to Chapter 5 of the Rules and Regulations, or hunting, fishing, or general recreational uses pursuant to Chapter 13 of the Rules and Regulations.

6.8.4 Construction Impacts

Existing access roads will be used or improved where practicable to minimize the Project's impact to undeveloped land. The Project will be designed with all WTGs located at least one tip height away from any publicly accessible land. This will ensure that the Project does not impact activities on land adjacent to the Project area. The surrounding land is primarily used for grazing. Construction of the Project would not conflict with any adopted land use plan, policy, or regulation.

6.8.5 Operation Impacts

Direct land use impacts would include the conversion of undeveloped grazing lands to an industrial facility and corresponding access roads. The operation of WTGs is highly compatible with grazing and farming activities. It has been observed at operational wind energy sites that cattle, sheep, and other domestic animals routinely graze underneath operating WTGs without disturbance, and ranchers regularly operate and foster grazing around WTGs. Operation of a wind energy facility would be compatible with existing land uses. Efforts would be made to construct around existing oil and coalbed natural gas drilling equipment to avoid interference with existing extraction activities.

6.9 Recreational Resources

Rule I Section 7 (i) (vi)(G) – An analysis of user-oriented community recreational facilities and programs and urban outdoor recreational opportunities including descriptions of recreational resources, locations of the recreational resources, and the types of recreational resources and an analysis of outdoor, resource-oriented recreational opportunities including locations and types of the recreational resources.

Recreational resources were identified based on information from the State of Wyoming Parks and Historic Trails Department, the towns of Wright and Gillette, and Campbell County Geographic Information System (GIS) Departments. The following provides summary details on the parks and recreational opportunities in the region.

6.9.1 Area of Site Influence

The area of site influence is defined for recreational resources as the Project boundary, all leased lands within, and local and state parks out to a 40-mile radius (see **Appendix D**).

Local City and County Parks

No public parks or recreational facilities are located within the Project area, and the nearest park is located within the town of Wright, approximately 12 miles away. State and federal lands in the Project vicinity provide for recreational hunting, camping, hiking, and off-highway vehicle use, though public access is very limited as most parcels are surrounded by private fee lands.

State and National Parks

No state or national parks are located within a 40-mile radius of the project boundary. However, he Nine Mile Creek segment of the Bozeman Trail, a NRHP-listed site, is located at approximately the intersection of SH 50 and SH 387, approximately 7 miles from the southwestern-most edge of the Project boundary.

6.9.2 Construction Impacts

Because the nearest park is over 12 miles away, access to parklands would not be restricted during the construction phase, nor would construction-related traffic, noise, or dust be expected to impact parks or recreation facilities.

Access to portions of the State parcels comprising the Project site would be temporarily restricted during construction for safety purposes, although access to these parcels is already limited due to leased private grazing activity. Construction-related traffic, noise, and dust would be expected in localized areas of the State parcels.

It is anticipated that the Project would result in a temporary population increase in the area of site influence during construction, especially in the town of Gillette (a town with a population of 19,646, according to the 2000 Census) where 95 percent of temporary, non-local construction workers are expected to reside. It is anticipated that a very small incremental increase in park visitations would occur during construction. This usage would be limited to periods when employees are not working and would not result in a significant increase in annual visitation. Therefore, the Project is not expected to result in impacts to area parks from increased visitation.

6.9.3 Operation Impacts

Operation of the proposed Project would not directly impact any parks or recreation facilities. It would not require the conversion of park or recreation facilities to industrial facilities. The closest park located in the town of Wright lies approximately 12 miles from the Project boundary. Therefore, the Project would not adversely affect recreational opportunities associated with the local park in the Town of Wright, or diminish the quality of the recreational experience for users.

No state or national parks are located within the 40-mile radius. The Nine Mile Creek segment of the Bozeman Trail is located on private fee lands at approximately the intersection of SH 50 and SH 387. This is the historic site of intact wagon ruts that parallel a tributary of the Nine Mile Creek. However, public access is restricted because this trail segment is located on private fee lands. Therefore, operation of the Project would not adversely affect any recreational opportunities.

6.10 Wetlands and Waters of the U.S.

W.S. § 35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility.

A jurisdictional wetland delineation and waters of the U.S. assessment will be completed prior to initiation of construction activities. The jurisdictional delineation methodology will be performed in accordance with the *U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual* (USACE, 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE, 2008). A desktop review and field investigation of the Project layout was completed for the following initial ISA application analysis.

6.10.1 Regulatory Jurisdiction

The CWA (33 USC § 1251, et seq.) is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the U.S. The following are jurisdictions within the CWA:

- Section 404—regulates the discharge of dredged and fill material into waters of the U.S., including wetlands
- Section 402—WYPDES permits for discharge of pollutants
- Section 401—State certification of water quality

6.10.2 Area of Site Influence

The area of site influence is defined as those features that meet the definition of jurisdictional wetlands and waters of the U.S. under the authority of the CWA within the Project boundary.

6.10.3 Wetlands

Potentially jurisdictional wetlands have not been delineated in the areas proposed for disturbance. A delineation will be completed prior to construction.

6.10.4 Waters of the U.S.

Ephemeral and intermittent drainages will be crossed by the Project roads and electrical collection system. Until a delineation of jurisdictional wetlands and waters of the U.S. is completed, all drainages are assumed to be jurisdictional under the CWA.

6.10.5 Construction Impacts

Based on the preliminary site layout, ephemeral and intermittent drainages that are potentially jurisdictional waters of the U.S. would be crossed by Project facilities. According to Section 404(b)(1) (least environmentally damaging practical alternative) , Project impacts to waters of the U.S. are to be avoided or minimized to the maximum extent practicable. TPWRJ accomplished this guideline by carefully siting Project facilities away from potential jurisdictional waters of the U.S. and by designing the Project to make use of existing access roads to the extent practicable. Modifications to the site layout are anticipated to be made throughout the planning process and will occur during the Project engineering design completion stages. Therefore, the final site layout and final access road and collector line engineering designs will be located to minimize impacts to potential jurisdictional waters of the U.S.

Based on experiences from past wind energy projects, all potential impacts to jurisdictional waters of the U.S. will be associated with the construction of access roads. Therefore, the Project would qualify for use of a Nationwide Permit 12 for utility line construction activities and utility line access roads. Nationwide Permit 12 requires preconstruction notification of the local USACE regulatory office before dredge or fill activities may occur in waters of the U.S. if potential acreage impacts meet or exceed 0.1 acre per 'single and complete' crossing. Additionally, Nationwide Permit 12 requires a preconstruction notice for projects with 500 linear feet of potential impacts to waters of the U.S.

The Project will be constructed in accordance with the terms and conditions of any issued CWA permit and will use road and culvert designs provided by licensed engineers to ensure that no significant impacts occur to potential waters of the U.S. In addition, TPWRJ will engage in micrositing that will ensure the avoidance of significant impacts that may impair the health, safety, or welfare of the resource or the health, safety, or welfare of the present or expected waters of the U.S. resources in the area of site influence.

6.10.6 Operation Impacts

The Project will be operated in accordance with the terms and conditions of the issued CWA permit. Use and routine maintenance of roads are not expected to impact waters of the U.S. or wetlands. Operation of the Project would not result in discharges to or alter the flow of any jurisdictional wetlands or waters of the U.S.

6.11 Scenic Resources

Rule I Section 7(xiii)(A) – Scenic Resources. Preliminary evaluations of or plans and proposals for alleviating social, economic or environmental impacts upon local government or any special districts which may result from the proposed facility, which evaluations, plans and approvals shall cover scenic resources.

Visual or scenic resources are the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Visual resource or scenic impacts are generally defined in terms of a Project's physical characteristics and potential visibility and the extent to which the Project's presence would change the perceived visual character and quality of the environment in which it would be located.

6.11.1 Introduction

This analysis documents the existing visual conditions on the site and in the surrounding area and assesses the extent to which the proposed project has the potential to affect the valued qualities of the area's scenic resources.

6.11.2 Regulatory Jurisdiction

ISD regulations state that scenic resources are a resource issue that must be taken into account in the application process. However, visual resource standards have not been specified at the state or county level.

6.11.3 Area of Site Influence

The area of site influence is defined for visual resources as the Project boundary, all leased lands within, and a viewshed radius of 18 miles.

6.11.4 Methodology

Federal Highway Administration (FHWA) Visual Impact Assessment Methodology

This analysis was conducted using the evaluative process set out by the FHWA in *Visual Impact Assessment for Highway Projects* (FHWA, 1988). This analysis approach was developed by a major federal agency that invested considerable resources in its creation, testing, and implementation and as a result, this approach is now widely used to provide systematic and objective evaluations of visual change.

The FHWA visual quality and aesthetics assessment method used for this analysis addresses the following three primary questions:

- What are the visual qualities and characteristics of the existing landscape in the Project area?
- What are the potential effects of the project's proposed alternatives on the area's visual quality and aesthetics?
- Who would see the project, and what is their likely level of concern about or reaction to how the project visually fits within the existing landscape?

Applying the FHWA visual quality assessment method entails the following six steps:

1. Establish the Project's area of visual influence
2. Determine who has views of the Project ("viewer")
3. Describe and assess the landscape that exists before project construction ("affected environment")
4. Assess the response of viewers looking at and from the project, before and after project construction ("viewer sensitivity or concern")
5. Evaluate views of the project during the periods before and after project construction
6. Describe the potential visible changes to the Project area and its surroundings that would result from the project

The first three steps were conducted for the Project to establish the baseline conditions as viewed from specific locations in the surrounding area. The Project's potential changes to the visible landscape and likely viewer responses to those changes were then assessed and systematically compared against the baseline conditions to determine the nature and degree of potential impacts to visual resources.

Specialized Tools and Vocabulary

The FHWA system uses a generally accepted set of tools and well-defined terminology. The following fundamental terminology is used throughout this analysis.

Views are what can be seen of the Project area from the surrounding neighborhoods and communities. Because it is not possible to depict every view toward the project features, representative views have been selected to represent types of views that are available to the general public. The viewpoints from which these representative views are seen are called key observation points (KOPs).

Viewshed is the area surrounding a project area from which the project is, or potentially could be, visible to viewers.

Simulations are images depicting views that have been modified by computer modeling to show the proposed Project within the existing landscape.

Viewers are people who have views of the project. Viewers are usually discussed in terms of general categories of activities (such as residents, workers, recreationists [park users, boaters, or bicyclists], pedestrians, or motorists [both commuters and leisure travelers]) and are referred to as "viewer groups."

Viewer sensitivity (or level of concern) is a combination of the following factors for a specific view:

- How many people have that view and what types of viewers are they?
- How long can they see the view? Residents and recreationists generally have views of long duration while bicyclists and motorists typically have short-duration views.

- What is their likely level of concern about the appearance, aesthetics, and quality of the view? Level of concern is a subjective response that is affected by factors such as the visual character of the surrounding landscape, the activity a viewer is engaged in, and their values, expectations, and interests. Generally residents and recreationists are considered to be highly sensitive viewers and local business staff and commuters are considered to be less sensitive.
- Low viewer sensitivity exists when there are few viewers who experience a defined view or they are not particularly concerned about the view. High viewer sensitivity exists when there are many viewers who have a view frequently or for a long duration, as well as viewers (many or few), such as those in a residential neighborhood, who are likely to be very aware of and concerned about the view. Viewer sensitivity or level of concern does not imply support for or opposition to a proposed project; it is a neutral term that is an important parameter in assessing visual quality.

Visual character is an impartial description of what the landscape consists of and is defined by the relationships between the existing visible natural and built landscape features. These relationships are considered in terms of dominance, scale, diversity, and continuity. Visual character-defining resources and features include the following:

- Landforms: types, gradients, and scale
- Vegetation: types, size, maturity, and continuity
- Land uses: height, bulk, scale, and architectural detail of associated buildings and ancillary site uses
- Transportation facilities: types, sizes, scale, and directional orientation
- Overhead utility structures and lighting: types, sizes, and scale
- Open space: type (e.g., parks, reserves, greenbelts, and undeveloped land), extent, and continuity
- Viewpoints and views to visual resources
- Water bodies, historic structures, and downtown skylines
- Apparent "grain" or texture, such as the size and distribution of structures and un-built properties or open spaces of the landscape
- Apparent upkeep and maintenance

Viewing distance is the distance between the viewed object and the viewer. The closer the viewer is to a viewed object, the more detail can be seen and the greater the potential influence the object has on visual quality. For this analysis, four viewing distances were used. They are (1) immediate foreground (between 0 and approximately 300 ft of the viewers), (2) foreground (between 300 ft and 0.5 mile), (3) middleground (between ½ and 4 miles, and (4) background (beyond 4 miles).[2]

[2] This categorization of distance zones is well established among visual resource analysis practitioners and has been adopted by the U.S. Forest Service as part of its Scenery Management System (USFS, 1995).

Visual quality is an assessment of the composition of the character-defining features for selected views. Under the FHWA visual quality analysis system, the characteristics are evaluated in terms of vividness, intactness, and unity (which are defined later) and are scored for these characteristics. The scores are then averaged for a total visual quality score between 1 and 7, where a low score represents low visual quality and a higher score represents high visual quality. This assessment asks "Is this particular view common or dramatic? Is it a pleasing composition (a mix of elements that seem to belong together) or not (a mix of elements that either do not belong together or are eyesores and contrast with the other elements in the surroundings)?"

Visual quality is evaluated and discussed using the following terms:

- Vividness is the degree of drama, memorability, or distinctiveness of the landscape components.
- Intactness is a measure of the visual integrity of the natural and human-built landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes, as well as in natural settings. High intactness means that the landscape is free of unattractive features and is not broken up by features and elements that are out of place. Low intactness means that visual elements can be seen in a view that are unattractive or detract from the quality of the view.
- Unity is the degree of visual coherence and compositional harmony of the landscape considered as a whole. High unity frequently attests to the careful design of individual components and their relationship in the landscape or an undisturbed natural landscape.

Study Procedure

The study process began with a review of maps, on which the project features had been plotted, and the determination of the Project's viewshed. A viewshed analysis is most commonly a computer-generated graphic that relies on the maximum elevations of the project features and surrounding topography to identify locations from which the project would theoretically be visible via an unobstructed or partial line-of-sight.

For this Project, a viewshed radius of 18 miles was used. Results of this analysis indicated the areas from which the WTGs associated with the Project would have the potential to be visible. Publicly accessible viewpoints were identified within the viewshed. The site and surrounding areas were visited to document the existing visual conditions in the Project area. Photographs were taken toward the locations of the Project features from representative viewpoints, and from this set of views, KOPs were selected to use as the basis for the analysis.

From each of the KOPs, a photograph was taken to provide the basis for development of a simulation to depict the view as it would appear with the completed Project in place. The photographs used as the basis for the simulations were all taken with a digital camera set to take photos equivalent to those taken with a 35-millimeter (mm) camera using a 50-mm focal length. In most cases, single-frame images were used, but from a few locations where wider viewing angles were required, several individual 50-mm frames were spliced together to create a panoramic view. For each view, computer modeling and rendering

techniques were used to produce the simulated images. Existing topographic and site data provided the basis for developing an initial digital model. Project engineers provided site plans and digital data for the proposed facilities. These were used to create three-dimensional (3-D) digital models of the turbine, substation, and transmission line structures. These models were then combined with the digital site model to produce a complete computer model of the Project.

For each simulation viewpoint, a viewer location was digitized from topographic maps and scaled aerial photographs, using 5 ft as the assumed viewer eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the simulation viewpoints to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3-D model combined with high-resolution digital versions of base photographs. The final "hardcopy" visual simulation images that appear in this document were produced from the digital image files using a color printer.

Comparison of the "before" photographs with the simulations of the Project as it would appear after construction provided the basis for determining Project impacts on views and visual quality. In comparing the pre-construction and post-construction conditions, use was made of the numerical rating sheets that the FHWA has devised as an aid to implementation of its visual impact procedure. Comparison of the evaluations of the existing views with the evaluation of the simulations of the views as they would appear with the Project constructed, provided a systematic and consistent basis for evaluating the degree of visual change that would occur as a result of the Project's development. These evaluations of the before and after views provided the backdrop for the qualitative assessments of visual conditions and visual change presented in this analysis.

The procedure described above provides the basis for identifying the degree of turbine visibility and the degree of change in the view that the presence of the WTGs creates. To assess the aesthetic impacts of these changes, visual impact evaluation criteria were applied that were recommended in a recent paper published by the National Research Council (2007). The National Research Council recommends that in evaluating the acceptability of the visual effects of wind power projects, the questions that are appropriate to address are as follows:

- Is the project located within an area of identified scenic or cultural significance?
- Would the project significantly degrade views or scenic resources of statewide significance?
- Is the project on or close to a natural or cultural landscape feature that is a regional focal point?
- Is the project in a landscape area that is visually distinct and rare or unique?
- Is the project unreasonably close (usually less than 0.5 mile) to many residences that would be severely affected, especially as a result of noise, shadow flicker, or being completely surrounded by WTGs?

These questions are addressed below based on the analysis that follows.

6.11.5 Visual Conditions on the Site and in its Surroundings

The Project Site and Landscape Context

The Project is proposed for development on an approximately 22.2-square-mile (14,078-acre) site in Campbell County, Wyoming. This site is located along Wyoming SH 50, approximately 34 miles south southwest of Gillette, Campbell County's largest community and county seat, and 13.8 miles west of the Town of Wright. **Appendix A** shows the Project's location in its regional setting and the relationship of the Project boundaries to the immediate surroundings. The landscape of the project site is typical of that of the larger Thunder Basin within which it lies, consisting of level to rolling lands 5,000 to 5, 500 ft in elevation that are treeless and covered primarily with grass, with scattered areas of sagebrush. The primary activities in this wide open, windswept landscape are cattle and sheep grazing, coal bed natural gas extraction, and to a lesser extent, conventional oil and gas extraction. In this landscape, scattered and widely separated ranch complexes are visible, as well as barbed-wire fences, and networks of unpaved roads leading to gas and oil extraction wells located at regular intervals across much of the area. These roads are often lined with wood pole electric distribution lines that supply the electricity required for operation of the pumps. Several high-voltage electric transmission lines carried on wood H-frame towers cross the site and surrounding area, and the newly built Basin Electric Power Cooperative (BEPC) 230-kilovolt (kV) Pumpkin Buttes Substation complex that includes a gas-fired electric generation peaker plant is prominently visible next to SH 50 in an area that lies within the Project site.

The Project site lies approximately 2 to 4 miles to the east of a topographic feature known as Pumpkin Buttes, a set of three visually distinctive flat-topped buttes (North, Middle, and South) that rise up to an elevation approximately 800 ft above the surrounding plain. Middle Butte consists of three topographic features including North Middle, South Middle, and Indian Butte. The buttes have areas of exposed rock faces, and are vegetated with grass, sagebrush, and scattered groupings of junipers and small pines. The tops of the buttes are used for grazing, and are the site of a concentration of communication towers. Although there is an area of BLM land on Middle Butte, the remainder of the buttes are in private fee land ownership. More importantly, private fee lands surround the BLM parcel, and no existing county, state, or federal roads allow access. Because there is no way for the public to cross the private fee lands and access the BLM lands, no public visitation or use takes place on the buttes. Although the buttes are not an area of public use, they serve as an landmark in the immediately surrounding area.

Within the broader regional context, the Project site is situated in a landscape typical of many Campbell County landscapes. This area does not contain areas of identified statewide or regional scenic significance. As a part of the process of evaluating the visual sensitivity of views in the project area, a review was made of Campbell County's plans, ordinances, and design standards to identify any provisions that designate specific landscape areas or features as scenic resources deserving of special protection. No county plans, ordinances, or standards were found that designate the project area as a protected viewshed or limit or restrict the amount of visual alteration that may occur on state- or privately-owned fee lands. In addition, it was found that no scenic byways have been designated within or near the Project site.

6.11.6 Project Visibility

The first step in understanding the visual impact of the proposed wind Project was to identify the areas within 18 miles from which the Project would be visible. This analysis, known as a viewshed or "zone of visual influence" (ZVI) analysis, was prepared using the viewshed feature of the ArcView GIS program. The results of the analysis are conservative, in that the areas of potential project visibility include areas in which any part of a turbine may be visible, even if what is seen is only the tip of a turbine blade at its highest point during rotation. Although this analysis takes into account the role that topography plays by blocking views towards the WTGs, it does not take into account any screening of views that might be provided by buildings or vegetation in the foreground, or any micro-topography not represented in the digital elevation model used as the basis for the ZVI analysis.

Given the open nature of the landscape, it is not surprising that the results of the ZVI analysis indicate that the WTGs will be readily visible in large areas to the north, east, and south of the project site. However, with increasing distance, because of the rolling nature of the landscape, the areas within which the WTGs have the potential to be visible will become more limited. To the west, the Pumpkin Buttes will block views of the WTGs, and as a consequence, visibility of the WTGs in the areas to the west of the buttes the WTGs will be greatly restricted.

Although the WTGs have the potential to be visible in much of the surrounding area, the extent to which the WTGs would be noticeable and would have the potential to affect the view would be greatly influenced by distance. Studies of the visibility of WTG structures suggest that structures in the size range proposed for this project have the greatest potential to be visually dominant within a radius of about 2 miles from the structures, and that the degree of perceived visual dominance tapers off to a moderate level after about 3.8 miles and a low level after about 9.3 miles (CPRW, 1999).

None of the areas from which the WTGs have the potential to be visible have large numbers of viewers. The Project area is very lightly populated, with few residences scattered across the landscape, generally at great distances from each other. The only activity center of any note is at Savageton, a named place at the intersection of SH 50 and Christensen Road, 3.5 miles north of the Project site, where there is a combined store/bar/restaurant, which provides services and a gathering place for the residents of the surrounding area. Although the WTGs will be visible from many areas of Wright, a community with 1,350 residents, because the WTGs will be 13.8 miles or more in the distance, they will appear very small and will have little effect on the views in which they might be seen. The near views toward the project that will be seen by the greatest numbers of people are the views that will be seen by travelers on SH 50 as it approaches and passes through the Project area.

Based on review of the viewshed analysis that identified the areas from where the Project would be most visible, an understanding of the role of distance in determining the potential visibility and visual impacts of WTGs, and field studies, two representative viewpoints were selected as KOPs to serve as the basis for the analysis. From each of the viewpoints, photographs were taken of views toward the site, and these photos were used as the basis for preparing visual simulations that depict the appearance of the view with the proposed wind power project in place. Comparison of the simulation of the view with the Project in place with the photo of the view as it now appears provided the basis for identifying the

changes to the visual character and quality of the view that the Project would have the potential to bring about. These KOPs are identified and described in the following subsections, and their locations are mapped in **Appendix E**.

View to the Project Site from KOP 1

KOP 1 is a viewpoint at Savageton, which is located at the intersection of SH 50 and Christensen Road, 3.5 miles to the north of the Project site's northern boundary. As indicated previously, Savageton is a named location on the map where there is an establishment that is a combined store/bar/restaurant that provides for the needs of residents and oil and gas service employees in the surrounding area and serves as a local focal point. Figure 1A in **Appendix E** depicts the existing view looking south and southwest toward the Project site from the informal outdoor use area located immediately to the east and south of the Savageton store. This view is the view seen by those visiting the Savegeton store and is generally representative of the view of those driving south on SH 50 as they approach the Project site.

The most readily identifiable orienting features in this view are SH 50, which can be seen as it travels southward at the left side of the view, and the South, South Middle, and North Middle Buttes, which lie between approximately 8 and 12 miles in the distance. The northern boundary of the Project site lies approximately 3.5 miles to the south of this viewpoint, and the site encompasses the portion of the view in the middleground and background that includes the area to the east of the buttes that extends along both sides of SH 50.

This view is wide open, and in the area to the east of the buttes, extends to the far horizon. The view's overall character is that of a rolling grass and sagebrush-covered plain that is devoted primarily to grazing and coalbed methane gas production. The view also includes an area with cultivated fields, infrastructure associated with coalbed methane gas extraction, electric transmission and distribution lines, and on the summit of South Middle Butte, a cluster of communications towers.

The view is typical of views in the general region, but is somewhat more distinctive than many views in the area because of the presence of the Pumpkin Buttes, which are landmarks and create a moderately high level of view vividness. The cultivated lands, grasslands, and sage-covered lands visible in the view create a mosaic of slightly mixed colors and textures that add a moderate level of visual interest to the view. Although the landscape seen in this view has an overlay of electric transmission and distribution lines, communications facilities, and infrastructure related to coalbed methane development, these features do not dominate the landscape, and as a consequence, the level of visual intactness is average. The Pumpkin Buttes and the other elements of the landscape seen in this view combine to create an overall visual composition that is somewhat above average. Taking all of these considerations into account, the overall visual quality of this view is slightly above average.

This view is seen by local residents and travelers who stop at the Savageton store, and by those traveling south on SH 50. The numbers of viewers is not large. The area that the Savageton Store serves is lightly populated. In general, SH 50 does not function as a primary inter-regional route, and as a result, traffic volumes are relatively low. SH 50 is not a designated scenic route, and views in this region have not been designated in plans and

policies as sensitive or requiring special protection. Overall, the sensitivity of this view is moderate, at most.

View to the Project Site from KOP 2 (VP 10)

Figure 2A in **Appendix E** depicts the view looking north from KOP 2, a point located along SH 50, approximately 11.5 miles south of Savageton. This viewpoint is located just south of the site of the proposed Project substation and the view takes in SH 50 and the open landscape to the east and west. In this area, the lands in the foreground, middleground, and background zones to the west of the highway are all a part of the Project site. To the east of the highway, the Project site begins in the area about 1.5 miles to the north and extends further into the middleground and background. This viewpoint was selected to represent the views seen by travelers on Highway 50 in areas where they are in close proximity to the Project site

This view is wide open, and extends northward to the far horizon. The view's overall character is that of a rolling grass and sage brush covered plain that is devoted primarily to grazing and coalbed methane gas production. Tanks and pumps associated with gas and oil production are visible at locations scattered across the landscape. A snow fence is prominently visible in the field on the left side of Highway 50, and similar snow fences are visible on the west side of the road in areas further to the north. In addition to the wood pole electric distribution line visible close to the east side of the road, a north-south transmission line carried on wood H-frame structures is detectable further to the east. In the background on the west side of the road, a transmission line can be seen crossing the landscape in an east-west direction. The transmission lines terminate at the Pumpkin Buttes Substation, which is faintly detectable on a hillside to the east of SH 50 in the view's background zone.

The view is typical of views in the general region, but unlike the view from KOP 1, this view does not include any visually distinctive features. As a consequence, the overall vividness of this view is low. Although the electric distribution and transmission lines and the gas and oil production facilities in this view are somewhat readily visible, they do not dominate the view, and as a result the view has an average level of visual intactness. The elements of this view combine together in a way to create a landscape composition that is average. Taking into account all of the visual dimensions of this landscape, the overall level of visual quality of this view is moderately low to average.

This view is seen by those traveling north on SH 50. In general, SH 50 does not function as a primary inter-regional route, and as a result, the traffic volumes and numbers of visitors are relatively low. SH 50 is not a designated scenic route, and views in this region have not been designated in plans and policies as sensitive or requiring special protection. Overall, the sensitivity of this view is low to moderate.

6.11.7 Project Appearance

Project Construction

As indicated in **Section 3** of this application, the proposal is for 100, 1.5-MW WTGs to be installed on the Project site over one construction phase. The primary construction activities will be associated with construction of the access roads and collection system, followed by

construction of the WTG foundations and project substation, installation of the WTGs and transmission line, and commissioning. These activities are described in detail in **Section 3**.

During the construction period, large earth-moving equipment, trucks, cranes, and other heavy equipment will be in use on the Project site and within the proposed corridors for both the access roads and transmission line and temporary staging yards.

At some times, small, localized clouds of dust created by road-building and other grading activities may be visible at the site, although active dust suppression should minimize the frequency of such dust events. Because of the construction-related grading activities, areas of exposed soil and fresh gravel that contrasts with the colors of the surrounding undisturbed landscape may be visible. Because any visible construction activities would be relatively short in duration, and would not result in any substantial, permanent impact to visual resources, construction-related impacts are not discussed any further in this analysis.

Project Operation

The specifications of the Project features are described in detail in **Section 2**. The Project's most visible features will be the 100 1.5-MW GE xle WTGs. Each turbine will have a hub height of 264 ft (80 m), a rotor diameter of 277 ft (82.5 m), and a height from base to blade tip of 398 ft (121 m). The WTGs will be developed as array strings along permanent unpaved access roads. In addition, there will be a power collection system that includes 34.5-kV collector lines, a step up substation, a 230-kV transmission line, an O&M facility, and unpaved maintenance roads.

The power collector system will collect energy generated at low to medium voltage from each WTG, transform it to 34.5 kV through a pad-mounted transformer located at the base of each turbine. These transformers will be housed in rectangular steel transformer boxes that are approximately 7.5 by 8.5 ft. For the most part, the collector lines will be buried underground, within or adjacent to the turbine access roads. The only exception will be in a segment between the northern and southern units of the Project where the lines will be located overhead supported by single, wooden structures, separate from the 230 kV transmission line. This aboveground segment of the collector line is visible in Figure 2B of **Appendix E**.

The 34.5-kV transmission system will transport the power generated by the Project to a substation that will be located just west of SH 50. The substation will have a single oil-cooled transformer and will include circuit breakers, bus and insulators, relay equipment, and a small control building. The substation site will be graded flat, will be covered with gravel, and will be surrounded by a chain link fence.

To connect the Project substation with the BEPC's Pumpkin Buttes Substation, a 5.3-mile, 230-kV transmission line will be constructed. This line will parallel the existing Black Hills Power Pumpkin Buttes to Teckla 230-kV transmission line and the planned Black Hills Power Pumpkin Buttes to Windstar 230-kV line. The Pumpkin Buttes to Teckla line is carried on wooden H-frame towers and the Pumpkin Buttes to Windstar line will have a similar design. Because of right-of-way space constraints, the Project's proposed transmission line will be carried on single-pole structures fabricated of spun concrete. These poles will be designed to carry to carry the 230-kV conductors above, and for a portion of the transmission line's length, two 34.5-kV collector line circuits below.

To respond to the Federal Aviation Administration's (FAA) aircraft safety lighting requirements, the Project will be marked in accordance with the FAA rules for lighting WTGs that were adopted in 2007. These rules do not require daytime lighting if the towers are bright white or off-white in color. For nighttime marking, the FAA requires lights that flash red (at 2,000 candela). The exact number of WTGs that will require lighting will be specified by the FAA after it has reviewed final Project plans; however, the current rules specify that warning lights be mounted on the first and last WTGs of each string, and every 0.5 mile on the WTGs in between. The nighttime warning lights are designed to concentrate the beam in the horizontal plane, thus minimizing light diffusion down toward the ground and up toward the sky. Aside from any required aircraft warning lights, the WTGs will not be illuminated at night. The lighting at the Project substation and O&M facility will be the minimum required for safety and security.

Project Decommissioning

As described in **Section 3.7.1**, the Project's operational period is assumed to be 25 years or more. At the time the Project begins to reach the end of its useful life, the Project owner will either make plans to upgrade or replace the equipment to extend the Project's operating life, or make plans to remove the Project. At such time as the Project is decommissioned, all visible Project features will be removed and the surface of the site will be restored. As a consequence, after decommissioning, there will be no lasting visual impact of any consequence.

6.11.8 Project Impacts – KOP Analyses

Project effects on the visual quality of the views seen from each KOP are described as follows. Existing and proposed views (simulations) are included in **Appendix E**.

Impacts on View from KOP 1

Figure 1B in **Appendix E** is a simulation of the view from KOP 1 as it would appear during the Project's operational period. As review of this simulation indicates, from this observation point, most of the Project's WTGs would be visible. However, the relative degree of visual impact created by the presence of these WTGs in the view will be attenuated to some degree by their distance from this viewpoint. The closest WTGs will be those seen at the right side of the view in the area in front of the Pumpkin Buttes. These turbine strings will range from 3.5 miles to 5.5 miles in distance from this viewpoint. The WTGs in these strings that are the closest will appear to be relatively prominent in the view. The WTGs behind them will appear smaller in size and less visually prominent with increasing distance. In views more directly toward the south, a small number of WTGs will also lie within 3.5 miles of this viewpoint, but most of the WTGs seen in this part of the view will be located in the background zone, at distances ranging from 5 to 14 miles. These more distant WTGs will appear as relatively small elements in the landscape, and with increasing distance, will have decreasing levels of detectability. For the most part, the WTGs visible in this view will be seen with a land rather than a sky backdrop, which will help to lower their levels of visual contrast.

The presence of the Project in this view will alter the character the landscape it encompasses in that a landscape, that is now a wide-open landscape devoted to grazing and oil and gas development, will have an overlay of a constellation of large, white-colored WTGs. The

result will be to create an impression of a somewhat higher intensity of development of this working landscape. The effects of the Project on the visual quality of the view will be mixed. Because the WTGs, particularly those that are closest to the viewpoint, will, in some cases, have a moderate level of visual dominance, they will increase the apparent intensity of development in the landscape and could be perceived as decreasing the view's level of visual intactness. On the other hand, the addition of the WTGs will increase the vividness of the view, adding new, visually distinctive and visually interesting elements to panorama. The apparent clustering of the WTGs, and their role as a visual counterpoint to the Pumpkin Buttes, may be perceived as being consistent with and even reinforcing the visual unity of the overall composition of this landscape view.

Impacts on View from KOP 2

Figure 2B in **Appendix E** is a simulation of the view from KOP 2 as it would appear during the Project's operational period. From this viewpoint, a small portion of the substation, several WTGs, and the Project transmission line will be visible west of the highway in the foreground of the view, and additional WTGs and more of the transmission line will be visible in the view's middleground and background zones. The closest WTGs will be highly visible, will be partially backdropped against the sky, and their apparent visual dominance will be increased by their proximity to the highway. The WTGs located farther in the distance will appear smaller in size and less visually prominent. The transmission line will be readily visible in the view's foreground zone, but with increasing distance, will be less visually prominent.

The presence of the Project in this view will alter its character, adding large turbine structures and a new, readily visible transmission line to what is now an open, rural, grazing and oil and gas production landscape, increasing the apparent level of development. In terms of the overall visual quality of the landscape seen in this view, the overall level of visual quality level will be reduced slightly, primarily because the visually dominant and contrasting turbine structures will reduce the visual intactness of the view.

Night Lighting

The Project would create new sources of nighttime lighting—the nighttime turbine marking lights that will be required for some of the WTGs by FAA rules and the lighting associated with the substation and O&M facility. The lighting at the Project substation and O&M facility will be the minimum required for safety and security. Because of the measures that will be taken to limit and control the lighting at the substation and O&M facility, and because the substation will be located 1 mile or more from the closest residence, there will be little potential for the lighting at the substation to be noticed by, or to adversely affect, sensitive off-site viewers. Lighting will be designed to avoid glare that might adversely affect motorists, and to ensure that there is no light spill into areas outside of the Project area.

At present, the Project site and immediately surrounding area are dark at night. The flashing red lights that the FAA requires to operate at nighttime will introduce a new element into the Project area's nighttime environment. Because the nighttime aircraft safety lights will be limited in number, red, and highly directional, their potential to create skyglow or backscatter will be minimal. Experience at other wind power sites indicates that the flashing

red nighttime aviation safety lights have the greatest potential to be visible in areas within 1 mile of the site.

6.11.9 Evaluation of Visual Impacts

Visual impacts resulting from the proposed Project would consist of the alteration of the presently open rangeland, sagebrush, and oil and gas production landscape to a landscape in which large WTGs will also be visible. While the WTGs would be noticeable features, particularly in cases where they are located close to SH 50, the visual effects of most of the WTGs will be attenuated by the distance between them and any potential viewers. The results of the KOP by KOP analysis of the visual changes the Project would create are evaluated as follows in light of the criteria established by the National Research Council, as summarized in the Methodology Section. This permits an assessment to be made of the extent to which the Project's visual effects would create impacts that can be considered to be substantial.

- Is the project located within an area of identified scenic or cultural significance? The Project site and surrounding area have not been identified in any adopted state or local plans as being of special scenic or cultural significance.
- Would the project significantly degrade views or scenic resources of statewide significance? Views toward the Project site from the surrounding area do not encompass views toward views or scenic resources of identified statewide significance; therefore, the project will not have adverse effects on such views.
- Is the project on or close to a natural or cultural landscape feature that is a regional focal point? Views toward the Project site from the surrounding area encompass views of Pumpkin Buttes, which are a composition of natural landscape features that serve as a local or sub-regional focal point. The proposed Project will be seen in conjunction with the buttes from some vantage points from the north and east. Figure 1B in **Appendix E** provides a simulation of the view from a typical viewpoint in the area from which both the buttes and the Project WTGs will be visible. As review of this viewpoint suggests, the presence of the WTGs will not necessarily impair the views toward the buttes. In addition, none of the nearby viewpoints from which the buttes and the Project features will be seen together are designated scenic viewing areas, scenic highways, or parks, where views toward the buttes might have special importance or merit special protection.
- Is the project in a landscape area that is visually distinct and rare or unique? The project site is in a landscape area that is typical of this region of Wyoming and has been modified by decades of ranching and energy development. Thus, the project will not have adverse effects on a landscape area that is rare or unique
- Is the project unreasonably close (usually less than 0.5 mile) to many residences that would be severely affected, especially as a result of noise, shadow flicker, or being completely surrounded by WTGs? Only one residence, that of a project participant, lies within 0.5 mile of the proposed turbine sites.

6.12 Vegetation, Special Status Plants, and Rare Plant Communities

35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans and proposals shall cover threatened, endangered and rare species and other species of concern identified in the state wildlife action plan as prepared by the Wyoming Game and Fish Department.

6.12.1 Regulatory Jurisdiction

Special-status plant species are recognized by federal, state, and other agencies for their rarity or vulnerability to various causes of habitat loss or population decline. Some of these species receive specific protection defined by federal or state endangered species legislation. "Species of concern" is an informal term that refers to those species that federal agencies believe might be in need of concentrated conservation actions. Such conservation actions vary depending on the health of the populations and degree and types of threats. Only periodic monitoring may be needed of populations and threats to the species and its habitat. At the other extreme, a species may need to be listed as a federal threatened or endangered species. "Species of concern" receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species under the Endangered Species Act (ESA).

Endangered Species Act—Plants

The ESA establishes broad prohibitions against "taking" endangered or threatened plant species. It is important to note that this prohibition does not extend to plants on federal lands; however, by statute, it is illegal to "remove or reduce to possession" or "maliciously damage or destroy" threatened or endangered plants. Furthermore, protection for listed plants is significantly weaker on private fee lands, where it is illegal to "remove, cut, dig up, or damage or destroy" plants only when it is "in knowing violation of any state law or in the course of any violation of state criminal trespass law." Stated another way, there are no federal prohibitions under the ESA for the take of listed plants on federal or nonfederal lands, unless taking of those plants is in violation of state law. Wyoming has no state laws that prohibit the take of plants.

6.12.2 Vegetation

The Project area is within the Powder River Basin area of the Northwestern Great Plains Ecoregion (Chapman, et al., 2004; Vegetation Map in **Appendix D**). The Powder River Basin consists mainly of mixed grass prairie dominated by blue grama, western wheatgrass, junegrass, Sandberg bluegrass, needle and thread grass, rabbitbrush, fringed sage and other forbs, shrubs, and grasses.

The topography consists of gentle rolling prairie dissected by gentle ephemeral swales and occasional steep erosive ephemeral drainages. Existing private fee and State of Wyoming lands, coalbed methane development and conventional oil and gas development exist in the Project area. The plant community is a mixed sagebrush/grass intermixed with industrial development. Wyoming big sagebrush is a significant component of this mixed sagebrush/ grass plant community. Cool-season grasses make up the majority of the understory with

the balance made up of short, warm-season grasses, annual cool-season grass, and miscellaneous forbs. Plant diversity is relatively low as cheatgrass has invaded the Project site. Western wheatgrass and thickspike wheatgrass are the primary perennial grass species dominant within the site. The Project area is composed mostly of inter-mountain basin big sagebrush steppe, with scattered areas of mixed grass prairie, introduced wetland vegetation, riparian woodland and shrubland, and other incidental vegetation types (USGS, 2007).

6.12.3 Federally Listed Plant Species

The U.S. Fish and Wildlife Service (USFWS) reports two federally ESA-listed plant species as potentially occurring in Campbell County (USFWS, 2010): the Endangered blowout penstemon (*Penstemon haydenii*) and Threatened Ute ladies'-tresses orchid (*Spiranthes diluvialis*) (**Table 6-10**).

TABLE 6-10
Listed Threatened and Endangered Plant Species in Campbell County, Wyoming

Species/Listing Name	Scientific Name	Status	Habitat	Potential for Occurrence
Blowout penstemon	*Penstemon haydenii*	Endangered	Sandhills of Nebraska and isolated areas of Wyoming (Carbon County) in sandy, blowout locations with little to no vegetation present	Unlikely—no observations in project area, and appropriate habitat unlikely to occur on site
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened	Along riparian edges, gravel bars, old oxbows, high flow channels, and wet meadows along perennial steams. It typically occurs in stable wetland and seep areas	Unlikely—no observations in Project area and potential habitat unlikely to occur

Source: CH2M HILL, 2010.

Blowout Penstemon

Blowout penstemon was listed as endangered in 1987 under the ESA. However, in October 2008, the USFWS published a notice of review in the Federal Register initiating the 5-year review to delist species from the ESA. To date, the USFWS has not provided its findings.

The penstemon is a perennial herb, less than 12 inches (30.5 cm) high, with bluish to pale lavender flowers. It grows in active sand dune habitats. A single population is known to occur in Carbon County, Wyoming at the eastern end of the Ferris Sand Dune System near Schoolhouse Creek and Bradley Peak (Fertig, 2000a).

There are no records of blowout penstemon in or near the Project area (Wyoming Natural Diversity Database [WYNDD], 2010; Fertig, 2000a). A site assessment was conducted in 2008 and it was concluded that appropriate habitat does not exist within the Project area (Jones and Stokes, 2008).

Ute Ladies'-tresses Orchid

Ute ladies'-tresses orchid was listed as Threatened in 1992 under the ESA. However, on October 2004, the USFWS published a notice of review in the Federal Register initiating the 5-year review to delist the species from the ESA. To date, the USFWS has not provided its findings.

The orchid grows in open, moist habitats near perennial streams and rivers that are subject to periodic flooding (Heidel, 2007; Keinath, et al., 2003). The flowering period is late July to early September, but plants may remain dormant for long periods of time and may not flower every year (Heidel, 2007; Keinath, et al., 2003). In Wyoming, Ute ladies'-tresses orchid is found in wet, alkaline meadows on the banks or in oxbows of perennial streams (Fertig and Heidel, 2007). Habitats are open and often dominated by grasses. Habitat is maintained by periodic flooding, grazing, or mowing. Threats to the species come from use of herbicides, overgrazing, mowing at critical times in the plant life cycle, and loss of habitat to development or water management actions (Fertig and Heidel, 2007).

Ute ladies'-tresses are presently known from four populations in Wyoming (Fertig, 2000). The four populations occur in (1) Goshen County on Little Bear Creek, (2) Converse County on a tributary of Antelope Creek, (3) Niobrara County between Lusk and Van Tassell, and (4) Laramie County in the vicinity of Midway and Meriden (Fertig 2000). The known populations in Goshen and Converse counties occur on state and public lands (BLM Casper Field Office), and the populations in Niobrara and Laramie counties occur on private fee lands (Fertig, 2000).

There are no records of Ute ladies'-tresses orchid occurring within or near the Project area (WYNDD, 2010). In addition, ICF Jones & Stokes completed a site assessment (2008) and concluded that appropriate habitat does not exist within the Project area. Lastly, the environmental assessments prepared for the Dry Willow I, II, and III Phases did not identify any locations of the Ute ladies'-tresses orchid within the proposed coalbed methane developments that are within close proximity to the Project site.

6.12.4 Rare Plant Communities

Rare plant communities are those that are considered rare in the region, support sensitive species of plants and animals, or are subject to regulatory protection through various federal, state, or local policies or regulations. These communities may or may not contain special status plants. No threatened or endangered plant species are documented within the Project area in the WYNDD (WYNDD, 2010), nor through environmental assessments conducted on adjacent oil and gas development sites. Lastly, the Project area has been subject to substantial disturbance associated with oil and gas development and grazing resulting in substantially degraded habitats.

6.12.5 Construction Impacts

A review of publicly available data did not identify the occurrence of any rare vegetation communities, sensitive plant species, or federally listed plant species in the area of site influence. Meetings were held with the USFWS Cheyenne Ecological Services Field Office on February 24, 2010, and federally listed plants were not raised as a concern by the agency. Similarly, meetings were held with the Wyoming Game and Fish Department (WGFD) on January 19, 2010, and no plant species of concern were raised as warranting management

consideration. Potential habitats for these species or species assemblages were not detected by ICF Jones & Stokes during their botanical review of the Project area (2008); therefore, no anticipated construction impacts to rare vegetation communities, special status plant species, or federally listed plants in the area of site influence are anticipated.

6.12.6 Operation Impacts

Operation of the Project will not result in any impacts to rare vegetation communities, sensitive plant species, or federally listed plant species. Therefore, no long-term impacts to rare plants communities, special status plant species, or federally listed plants in the areas of site influence are expected.

6.13 Terrestrial Wildlife

35-12-109(a)(xiii)(S) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans and proposals shall cover threatened, endangered and rare species and other species of concern identified in the state wildlife action plan as prepared by the Wyoming Game and Fish Department.

This section identifies terrestrial wildlife species known to occur or that could potentially occur within the area of site influence.

6.13.1 Regulatory Jurisdiction

The Wyoming Wildlife Commission operates in accordance with Article 3 – General Powers and Duties of the Commission. Specifically, W.S. §23-1-302(a)(i) – (xxxi) provides for the authorized powers and duties for the Wyoming Wildlife Commission. Of note, all rules and regulations of the Wyoming Wildlife Commission and WGFD must be promulgated in accordance with the provisions of the Wyoming Administrative Procedure Act.

The USFWS has oversight of migratory bird species, whether they are hunted (e.g., waterfowl) or not (e.g., passerine species), bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos)*, and all species listed under the ESA as Threatened, Endangered, or Candidate species. Some of the species groups under USFWS regulations also receive management and protection under state statutes and regulations.

WGFD Guidance

In 2008, at the onset of Project development, TPWRJ met with WGFD to introduce the Project and gain concurrence on appropriate, site-specific preconstruction wildlife surveys. TPWRJ, in consultation with its wildlife consultant, developed a site-specific, preconstruction wildlife survey protocol, provided this protocol to WGFD for review, and met with WGFD to refine and finalize the protocol. WGFD provided a letter to TPWRJ concurring and approving the proposed preconstruction wildlife surveys. TPWRJ met again with WGFD in June 2009 to provide a Project update, review survey results to date, and include additional preconstruction surveys. The WGFD issued draft *Recommendations for Wind Energy Development in Crucial and Important Wildlife Habitat* in October 2009, which were revised in March 2010 to become *Wildlife Protection Recommendations for Wind Energy Development in Wyoming* and further revised on April 5, 2010 (WGFD, 2010). However, at

this time, no final guidance document has been completed or adopted by the Wyoming Wildlife Commission.

TPWRJ subsequently met with Mr. Gamo and Mr. Huber of the WGFD on January 19, 2010, to discuss the Project, wildlife studies completed to date, ISA permit requirements and application submittal, and to identify wildlife resource issues warranting evaluation. Also, in accordance with the adopted and revised ISA statutory requirement to address threatened, endangered and rare species and other species of concern identified in the state wildlife action plan as prepared by the WGFD, TPWRJ deferred to the guidance of the WGFD with regard to the species to evaluate and consider in the analysis and evaluation of potential impacts and development of plans and proposals for alleviating potential impacts.

The January 19, 2010, meeting encompassed issues including avifauna, bats, big game, herpetofauna, and aquatic species. Potential Project-related impacts and the approach to implementing Project-specific monitoring and mitigation are presented in the following sections of this document.

USFWS Guidance

The USFWS issued *Interim Guidance on Avoiding and Minimizing Impacts to Wildlife* from WTGs on May 13, 2003. In 2004, the Director issued a memorandum entitled *Interim Guidelines to Avoid and Minimize Wildlife Impacts from WTGs* (USFWS, 2003) in an attempt to better define the intent of the 2003 Interim Guidance. Currently, the USFWS and a technical advisory committee are in the process of developing new guidelines for siting wind farms and project features to minimize wildlife impacts. At this time, Version 6.1 has been released in draft, but the final guidance document has been not completed or issued to the public.

TPWRJ met with the USFWS on February 24, 2010. The purpose of the meeting was to ensure that proper consideration has been given to species of concern, impact avoidance strategies to ensure that the Project will have no significant adverse impacts to wildlife populations under USFWS jurisdiction, and to ensure that the Project will be constructed and operated in compliance with applicable federal regulations.

6.13.2 Big Game

Big game species expected to occur within the Project area include pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). However, local populations do not rely on the Project area for critical life stages or forage sources. The Project area is part of the Pumpkin Buttes antelope herd unit. The 2004 estimated herd population was 27,109 with a population objective of 18,000 (WGFD, 2004). Mule deer belong to the Pumpkin Buttes herd unit. Mule deer populations have been increasing since 1998 with a 2004 population estimate of 14,800 animals, and a herd objective of 11,000 (WGFD, 2004). Populations of pronghorn and mule deer within their respective hunt areas are above WGFD objectives.

The entire Project area is classified as yearlong use[3] for mule deer, and most of the area is winter-yearlong use[4] for pronghorn range. Additionally, a pronghorn yearlong habitat occurs along Mud Spring Creek.

[3] Year-long use range is when a population of animals makes general use of suitable documented habitat sites within the range on a year-round basis. Animals may leave the area under severe conditions.

Construction Impacts

Impacts to big game during Project construction activities may include temporary displacement to surrounding similar habitats, which would be considered insignificant at the population level.

A comprehensive review of big game ranges and consultation with the WGFD determined that construction of the Project will not affect big game crucial winter ranges, crucial winter year-long ranges, migratory routes, or parturition areas. Therefore, the WGFD does not recommend big game monitoring or timing stipulations during construction of the Project.

Operation Impacts

A comprehensive review of big game ranges and consultation with the WGFD determined that the operation of the Project will not affect big game crucial winter ranges, crucial winter year-long ranges, migratory routes, or parturition areas. Therefore, the WGFD does not recommend big game monitoring or timing stipulations during Project operations. Operational impacts to big game would include minor loss of habitat associated with permanent Project features; however, this too would be insignificant at the population level.

6.13.3 Avifauna

Avian mortality by collision has traditionally been an issue in the siting and operation of wind-energy projects. Although avian mortality rates are dramatically lower compared to older projects because of advances in turbine technology and better siting methodologies, avian mortality concerns remain an important issue for the WGFD and USFWS for wind project permitting in Wyoming.

Avian Species Baseline Assessment

Fixed-point avian use surveys were conducted seasonally from spring 2008 through winter 2010. The objective of the fixed-point avian use surveys was to estimate the seasonal, spatial, and temporal use of the Project area by avian species, with a particular emphasis on raptors. Raptor nest surveys were also completed in conjunction with fixed-point surveys during spring/summer breeding seasons of 2008 and 2009. A total of 416, 20-minute fixed-point surveys were conducted using a standardized protocol similar to that used at most wind resource areas across the United States. Raptor nest surveys were conducted from the ground and fixed-wing aircraft in the springs of 2008 and 2009. Western EcoSystems Technology, Inc. (WEST) analyzed the avian use and raptor nest data collected in the project area to estimate the impacts of project operations on birds, especially raptors (see **Appendix F**) Construction Impacts.

Impacts to nesting raptors during construction will be minimized by adhering to the WGFD and USFWS requested timing and distance stipulations for nesting raptors. Outside of the species breeding periods listed above, human presence and Project construction activities can be expected to disrupt avian use within the vicinity of construction activities. However, the temporary nature of displacement impacts to avifauna is expected to be minimal and not significant. Additionally, the majority of the Project area currently experiences a significant

[4] Winter year-long use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months, there is a significant influx of additional animals into the area from other seasonal ranges.

amount of human activity associated with on-going oil and gas and coalbed methane extraction activities.

Nest and impact avoidance plans were developed with input from the USFWS and WGFD to ensure that impacts to nesting raptors have been minimized or avoided to the extent practicable. Specifically, all active raptor nests have been considered in the Project design to ensure that adequate setbacks occur pursuant to WGFD draft recommendations detailed in **Table 6-11**.

TABLE 6-11
WGFD Recommended Disturbance Free Dates and Buffers for Raptor Nests in Proximity of Wind Development

Raptor Species	Disturbance-Free Dates	Disturbance-Free Buffer
Bald eagle	February 15 to August 15	0.5 mile
Ferruginous hawk	April 1 to July 31	1.0 mile
Golden eagle	February 1 to July 31	0.5 mile
Merlin	April 1 to August 15	0.5 mile
Northern goshawk	April 1 to August 15	0.5 mile
Peregrine falcon	March 15 to August 15	0.5 mile
Prairie falcon	March 1 to August 15	0.5 mile

Source: WGFD, 2010.

Operation Impacts

Many species of passerines (also known as songbirds) migrate at night and may collide with tall human-made structures; however, no large mortality events on the same scale as those seen at communication towers have been documented at wind-energy facilities in North America (NWCC, 2004). Large numbers of songbirds have collided with lighted communication towers and buildings when foggy conditions occur during spring or fall migration. Additionally, the large mortality events observed at communication towers have occurred at structures greater than 500 ft (152 m) in height (Erickson, et al., 2001), likely because most songbirds migrate at altitudes of 900 ft (274 m) or higher (Lincoln, et al., 1998). At approximately 400 feet in height, modern WTGs are well below elevations that would impact migrating songbirds. Migrating songbirds are at risk of turbine collision when ascending and descending from stopover habitats. Avian studies completed in 2008 and 2009 do not indicate the presence of important stopover habitat or stopover use by migrating songbirds. **Appendix F** contains the completed Avian Baseline Report for the Project.

Passerines have been the most abundant bird fatality at wind energy facilities in the western U.S. Both migrant and resident passerine fatalities have been observed at operating wind energy facilities. Given that passerines made up a large proportion of the birds observed during the baseline study for the Project, passerines would be expected to make up the largest proportion of fatalities at the Project site. Exposure indices, which measure expected fatality risk by species, indicate that horned lark is the most likely passerine to be exposed to collision from WTGs. With the exception of horned lark, the baseline study shows that all

passerine species had no measurable exposure indices due to the fact that all individuals were observed flying below the rotor-swept area. Based on the low exposure risks at the Project site, it is unlikely that passerine populations will be adversely affected by direct mortality from operation of the wind-energy facility. Additionally, the available data do not indicate that any portions of the study area warrant being excluded from turbine development due to very high passerine use.

Mean raptor use at the Project site, based on surveys conducted in the fall, spring and winter (0.29 raptors/plot/20-minute survey), was compared with similar data from 40 other wind-energy facilities located primarily in the western U.S. that implemented similar, industry standard protocols and had data for three or four seasons. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-minute survey. Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 to 0.5 raptors/plot/20-minute survey); low to moderate (0.5 to 1.0); moderate (1.0 to 2.0); high (2.0 to 3.0); and very high (> 3.0). Under this ranking, mean raptor use at the Project site is considered to be low and ranked 32nd of the 41 assessed wind-energy facilities in the western and Midwestern United States.

Based on a regression analysis of preconstruction raptor use and post construction mortality for 13 modern generation wind energy facilities where similar methods were used to estimate raptor use and mortality, a significant correlation was found between use and mortality (R2 = 69.9 percent). Due to the low raptor use observed at the Project site, using this regression to predict raptor collision mortality at the Project site results in a fatality estimate of zero., However, a 90-percent prediction interval around this estimate is zero to 0.25 fatalities/MW/year, which means that it can be stated with 90-percent accuracy that raptor collision mortality would be less than 0.25 fatalities/MW/year. Based on the relative abundance of golden eagles, northern harriers, red-tailed hawks, and ferruginous hawks, as well as a higher exposure index for these than other raptor species, a higher potential exists for fatalities of these four species when compared with exposure indices for other raptor species.

Based on a statistical analysis of spatial use of the Project site by raptors, raptor use of the Project area appears to be relatively uniform, and the data do not indicate the presence of any concentration areas for all raptors combined as well as for each of the raptor subtypes examined. The available data do not indicate that any portions of the study area warrant being excluded from turbine development due to very high raptor use.

In 2009, five active raptor nests were present within 1 mile of proposed turbine locations at the Project site, resulting in an active raptor nest density of 0.11 nests per square mile. This is below average in comparison to 20 other wind resource areas evaluated in the western United States, where active raptor nest density ranged from 0.03 to 0.43 nests per square mile and averaged 0.19 nests per square mile.

Baseline data compared with existing data and conclusions gained from the study of other wind energy facilities indicate that the Project will result in no substantial impairment to bird species and the health, safety, or welfare of the present or expected bird inhabitants in the area of site influence.

Although impacts to raptors and all other resident and migratory birds are not expected to be significant or adverse, a post-construction avian mortality monitoring program will be implemented to identify operation impacts to birds. Mortality surveys and monitoring of the Project area will occur during operation in accordance with standard industry monitoring practices acceptable to the WGFD as described in **Section 7**.

6.13.4 Greater Sage-Grouse

The State of Wyoming, as implemented by the WGFD, has management authority over the greater sage-grouse within the state's borders.

Regulatory Jurisdiction

On February 26, 2008, the USFWS announced the initiation of a status review for the greater sage-grouse to assess whether or not listing of the species is warranted for protection under the ESA. A determination was issued by the USFWS on March 5, 2010, that the species is warranted but precluded by higher priority listing actions under the ESA. The USFWS will develop a proposed rule to list the greater sage-grouse as their priorities allow.

Wyoming Governor Dave Freudenthal issued Executive Order (E.O.) 2008-02 on August 1, 2008, directing state agencies to work to maintain and enhance greater sage-grouse habitat in Wyoming. The Executive Order does not create any new authority and legally applies only to state agencies. The recommendations spelled out in the Executive Order originated in the work of the Sage-Grouse Implementation Team. Conservation efforts target core breeding areas for greater sage-grouse and are intended to encourage and support development outside of the identified core area.

Currently, the species is entirely under the management and regulatory authority of the WGFD.

Construction Impacts

Based on a review of the Sage-Grouse Core Breeding Areas Version 2 maps issued with E.O. 2008-02, and consultation with the WGFD, the Project area is outside the greater sage-grouse core population area (see Greater Sage-Grouse Map in **Appendix D**). The 230-kV Project transmission line is also outside of the core population area.

One occupied lek occurs within the Project boundary (Gilbertz II), and another (Little Black Butte) is located within 2 miles of Project features (see **Appendix D**). The lek within the Project boundary was documented as inactive during surveys completed in 2008 and 2009 by TPWRJ and as presented in the greater sage-grouse lek database managed by the WGFD. The lek located within 2 miles of the Project was active in 2008 and 2009.

The lek sites and nesting and brood-rearing habitat have been considered by the WGFD and TPWRJ in the siting and timing of construction planned for the Project. To eliminate potential construction and operational impacts to greater sage-grouse during the breeding season, TPWRJ has agreed with the WGFD to adhere to the following WGFD recommendations:

- TPWRJ will locate all Project infrastructure to observe a minimum 0.25-mile No Surface Occupancy (NSO) buffer from occupied leks.

- TPWRJ will not directly impact nesting or brood-rearing habitat within 2 miles of occupied leks from March 15 through May 15 unless confirmed inactive during the year of construction as per the current draft "Wildlife Protection Recommendations for Wind Energy Development in Wyoming (WGFD, 2010).
- TPWRJ will complete three ground count surveys of leks within 2 miles of the Project area for 3 years of operation, where landowner access is obtained.

The WGFD agreed during the January 19, 2010 meeting that these commitments to avoid, minimize, and monitor potential impacts to greater sage-grouse are sufficient to minimize any potential significant impacts. Therefore, any potential impacts to greater sage-grouse during construction are anticipated to be negligible with no significant population-level impacts that may impair the health, safety, or welfare of the resource or population present in the area of site influence.

Operation Impacts

Based on TPWRJ's adherence to the WGFD requested 0.25-mile NSO around identified leks, impacts to greater sage-grouse during operation are anticipated to be negligible with no significant population-level impacts that may impair the health, safety, or welfare of the resource or the health, safety, or welfare of the resource or population present in the area of site influence.

6.13.5 Bats

Bat casualties have been reported from most wind-power facilities where post-construction fatality monitoring data are available. However, the majority of recorded fatalities in the western United States have occurred during the fall migration period and have involved non-protected bat species.

Regulatory Jurisdiction

Of the 45 species of bats found in the continental United States, six are federally listed as endangered under the ESA and receive incidental take provisions; none of the federally listed bats occur in Wyoming. In addition, 13 bat species are listed as Species of Special Concern by the WGFD. However, these bat species are not afforded protection via incidental take provisions of the ESA or other regulatory mechanisms in Wyoming.

Bat Species

Nine bat species may occur in the vicinity of the Project area based on range of occurrence (Adams, 2003): pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), western small-footed myotis (*Myotis ciliolabrum*), western long-eared myotis (*M. evotis*), little brown myotis (*M. lucifugus*), long-legged myotis (*M. volans*), and Townsend's big-eared bat (*Corynorhinus townsendii*). None of these species are federally listed or otherwise protected by any state or federal laws. The Project site is not located near any large, known bat colonies or other features that are likely to attract large numbers of bats. The Project site consists of hilly terrain that is dominated almost entirely by grassland and shrublands. Based on the lack of forests and wetlands to attract local, breeding bat populations, the majority of bat mortalities would be expected to be individuals migrating through the area rather than local residents.

Acoustic surveys for bats using Anabat™ SD-1 ultrasonic detectors at three ground and three raised stations were conducted from July 21 to October 15, 2009. The objective of the acoustic bat surveys was to estimate the seasonal and spatial use of the study area by bats. A total of 377 bat passes were recorded during 402 detector nights. Averaging bat passes per detector-night across ground stations, a mean of 0.97 bat passes per detector-night were recorded, which is very low compared to bat pass data at most other wind resource areas in Wyoming as well as across the United States The total number of bat passes per detector night was used as an index of bat use in the Project site. Bat pass data represented levels of bat activity rather than the numbers of individuals present because individuals cannot be differentiated by their calls.

Bat activity was uniformly low among acoustic monitoring stations, ranging from 0.15–1.52 passes/detector-night among the six stations. Pass rates were similar between ground and raised stations. Activity levels were highest from mid-August through early-September, which corresponds with the period of fall bat migration when most bat fatalities are reported at other wind-energy facilities in the western United States. Most of the calls (79.0 percent) were < 30 kHz in frequency (e.g., big brown bat, hoary bat); 15.4 percent were > 40 kHz (e.g., Myotis bat species); and the remaining 5.6 percent of the calls were mid-frequency (30-40 kHz; e.g., eastern red bat). Species identification was only possible for the hoary bat and eastern red bat. Hoary bats made up 12.2 percent of all passes, while only one eastern red bat pass was recorded. Activity levels for hoary bats were highest from early-August to early-September, suggesting this species migrates through the study area at this time of year.

Construction Impacts

Construction activities are not expected to coincide with the nocturnal activity of bats, nor are roost sites expected to be directly impacted. Therefore, no substantial impairment to bat species and the health, safety, or welfare of the present or expected bat inhabitants in the area of site influence is expected from construction of the Project.

Operation Impacts

Assessing the potential impacts of wind-energy development to bats at the Project area is complicated by the current lack of understanding of why bat mortality occurs by proximity to WTGs (Kunz, et al., 2007; Baerwald, et al., 2008), combined with the inherent difficulties of monitoring elusive, night-flying animals (O'Shea, et al., 2003). To date, post construction monitoring studies at operating wind-energy facilities suggest that: (1) migratory tree-roosting species (e.g., eastern red, hoary, and silver-haired bats) comprise almost 75 percent of reported bats killed; (2) the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September); and (3) the highest reported fatalities occur at wind-energy facilities located along forested ridge tops in the eastern United States (Gruver, 2002; Johnson, et al., 2003; Kunz, et al., 2007; Arnett, et al., 2008). Recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Jain, 2005; Baerwald, 2006).

The mean number of bat passes per detector night within the Project site was compared to data collected at six operating wind-energy facilities where both bat use and mortality levels have been measured. The level of bat use documented within the Reno Junction Wind Resource Area is lower than that observed at wind facilities in Wyoming and Minnesota,

where reported bat mortalities are low. Assuming that a relationship between observed bat use and mortality exists at wind energy facilities, relatively low levels of bat mortality would be expected to occur in the Project area; the highest observations of mortality within the Project site would be expected between mid August and early September. Based on fatality rates at wind-energy facilities in the western United States, bat call rates observed at this facility, and habitat of the study area, bat mortality at the Project site is expected to be lower than that observed at other facilities in the western United States.

Additionally, impacts to wetland and water resources are minimal by Project design and thus will not directly impact bat foraging habitat.

Although impacts to bats are not expected to be significant or adverse, based on consultations with the WGFD, a post-construction bat mortality monitoring program will be implemented in conjunction with avian mortality monitoring to identify impacts to bats. Mortality surveys and monitoring of the Project area will occur during operation in accordance with standard industry monitoring practices acceptable to the WGFD and USFWS and described in Section 7. Therefore, no substantial impairment to bat species and the health, safety, or welfare of the present or expected bat migrants in the area of site influence is expected from the operation of the Project.

6.13.6 Federally Listed Wildlife Species

Rule I Section 7(xiii)(P) – Preliminary evaluations of or plans and proposals for alleviating social, economic or environmental impacts upon local government or any special districts which may result from the proposed facility, which evaluations, plans and approvals shall cover other relevant areas.

This section identifies federally listed wildlife species known to occur or that could potentially occur within the area of site influence.

Regulatory Jurisdiction

Threatened and endangered wildlife species are protected under the federal ESA of 1973, as amended. Designated threatened and endangered fish and wildlife species are protected from incidental take by implementing acts and federal policies. The following details the ESA and policies that currently protect threatened and endangered species.

Endangered Species Act of 1973. Those species classified as threatened or endangered are protected under the ESA, which is enforced by the USFWS. Threatened or endangered species are considered "federally listed" or "listed" after a final rule has been published in the Federal Register. Federal candidate species, subspecies, or varieties are those plant and animal species being considered for listing as Endangered or Threatened but for which a proposed regulation has not yet been published in the Federal Register. Wyoming does not have an endangered species act; therefore, only those species with federal designation are protected under the ESA.

Because the Project is entirely on private fee land and there is no federal nexus, ESA Section 7 consultation is not required; however, Section 9 compliance may be necessary. If the construction or operation of the Project were to result in the take of one or more threatened or endangered species, TPWRJ would be in violation of the ESA.

Threatened and Endangered Species. Federal endangered species are those plant and animal species, subspecies, or varieties that are in danger of extinction throughout all or a

significant portion of their range. The federal threatened category comprises plant and animal species, subspecies, or varieties likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Candidate Species. Federal candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher-priority listing activities. Candidate species receive no statutory protection under the ESA. However, the USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA.

Construction Impacts

No federally listed wildlife species were documented during 2008, 2009, and 2010 baseline wildlife surveys, nor documented by NEPA analyses conducted by active oil operations within the Project area. Only one ESA-listed species, the black-footed ferret, has the potential to occur in Campbell County. However, there is no potential habitat for the black-footed ferret within the Project area. The USFWS has concluded that development in Campbell County will not result in any take of the black-footed ferret, thus adverse impacts to the species are not expected (Kelly, 2004).

Operation Impacts

Due to the absence of suitable black-footed ferret habitat, no impacts to federally listed threatened or endangered species are anticipated as a result of Project operations.

6.14 Aquatic Wildlife

W.S. 35-12-109(xiii)(R) – An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special district and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans, and proposals shall cover terrestrial and aquatic wildlife.

This section identifies aquatic wildlife species known to occur or that could potentially occur within the area of site influence.

6.14.1 Regulatory Jurisdiction

As outlined previously in **Section 6.6**, water quality concerns associated with construction of the Project fall under the direct jurisdiction of the WDEQ.

6.14.2 Project Aquatic Systems

The Project area is within the Belle Fourche hydrographic basin and is drained by six ephemeral creeks, including South All Night, All Night, Fourmile, North Fourmile, and Mud Spring Creeks. All of these systems are potentially intermittently connected to the Belle Fourche River during annual periods of spring snowmelt and via precipitation events.

Belle Fourche River is classified by the State of Wyoming as a Class 2AB warm water. Class 2AB waters are known to support fish or drinking water supplies or where those uses are attainable. These surface waters are protected for the following beneficial uses: drinking water, game fish, nongame fish, fish consumption, other aquatic life (other than fish),

recreation, wildlife, agriculture, industry, and scenic value (WYDEQ, 2001). Mud Spring Creek, Fourmile Creek, All Night Creek, and their tributaries are classified by the State of Wyoming as Class 3B waters. Class 3B waters are those surface waters shown as not having fish present and are not used for drinking water. These surface waters are protected for the following beneficial uses: other aquatic life (other than fish), recreation, wildlife, agriculture, industry, and scenic value (WYDEQ, 2001). Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna that inhabit waters of the state at some stage of their life cycles (WYDEQ, 2001). Additionally, Class 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length.

Ephemeral and intermittent streams, by definition, do not flow all of the time and function in a state of continuous non-equilibrium. Unlike perennial streams that continuously transport sediment, sediment movement in ephemeral systems occurs only in conjunction with specific runoff events. Under natural conditions, larger scale events and associated high velocity flows can transfer relatively large amounts of coarse sediment into the watershed (Meehan, 1991).

Sediment deposition in aquatic systems is recognized widely in the literature as having varying effects to associative species. New sediment recruitment has for example been recognized as contributing to native plant germination while at the same time restricting seedling growth of non-native species such as saltcedar (*Tamarix ramosissima*). Such accounts presume movement toward improved riparian quality and quantity. Conversely, excessive sediment loading into systems may also have deleterious effects on aquatic fauna through interference with reproduction and feeding (Levick, et al., 2008).

Ephemeral and intermittent streams are known to support diverse assemblages of macro-invertebrates (Grimm and Fisher, 1989). Additionally, ephemeral streams have been recognized (Cummins and Wilzbach, 2005) to indirectly support fish populations in perennial systems through the delivery of nutrients and macro-invertebrates. Hydrologic connectivity is required for many invertebrates to facilitate spatial distribution, even if it occurs only intermittently (Nadeau and Rains, 2007).

The management of ephemeral stream networks can have a direct impact on the hydrology and geomorphology of the overall drainage (Bull, 1997). Road construction and maintenance when not implemented properly have the potential to deleteriously affect hillslope drainage processes and shift naturally occurring hydrologic regimes. This can exacerbate concerns surrounding erosion and sedimentation into nearby perennial reaches (USDA, 2002). Effective management of such systems requires a watershed-based approach, involving preservation of riparian vegetation and channel connectivity, which translates to preserved ecosystem function in the drainage.

Although some ephemeral systems have been recognized as providing temporary habitat for fish, no known populations or individuals have been documented as occurring in the intermittent drainages associated with the Project. In turn, no federally listed or state sensitive fish species occur within the Project area.

6.14.3 Construction Impacts

As with all ground disturbing activities in moderate erosive environments, the concern for sediment transport is primarily associated with the protection of aquatic resources. Primary concerns relative to aquatic resources would be associated with the construction of new roads and culverts, as well as the preservation of riparian vegetation, wetlands, and system connectivity.

Intermittent stream crossings are proposed, all of which will be implemented under the implementing jurisdictions of the CWA. To In addition, crossings will be constructed using culverts designed to carry 50-year flood events, at minimum. However, impacts to ephemeral and intermittent drainages have been limited through micrositing. Therefore, no effects to riparian vegetation or wetlands would occur. Additionally, connectivity in the systems will remain intact.

As no fisheries occur within the Project area, no direct or indirect effects to fisheries would occur as a result of Project construction. Any potential effects to other aquatic resources (e.g., herpetofauna and macro-invertebrates) in the Project area would be mitigated through proposed BMPs (see **Section 7**). These include design of roads and culverts to minimize erosion and sediment transport, revegetation of all disturbed areas to resemble pre-project conditions using native vegetation, implementing erosion retention measures in all areas where the potential for sediment transport occurs, and monitoring of the Project area to ensure that mitigation measures have successfully addressed any concerns associated with increased erosion and sediment transport, as well as retaining natural connectivity in the system. Therefore, construction of the Project will avoid significant impacts that may impair the health, safety, or welfare of the resource or the health, safety, or welfare of the present or expected aquatic resources in the area of site influence.

Construction will use 35.8 to 36.8 acre-feet of water from an existing or new permitted source and will not increase water depletions in the Belle Fourche River System. Therefore, no impacts to aquatic species are expected as a result of water use by the Project.

6.14.4 Operations Impacts

No in-stream activity would occur during operation of the proposed Project. Therefore, no indirect or direct effects are anticipated to occur in association with continued operation and maintenance of the Project. Project operations will consume a small quantity of water from a permitted new or existing well source and will not affect downstream species. Therefore, operation of the Project will avoid significant impacts that may impair the health, safety, or welfare of the resource or the health, safety, or welfare of the present or expected aquatic resources in the area of site influence.

6.15 Transportation

Rule I Section 7(i)(v) – An analysis of transportation facilities containing discussion of roads (surface, type) and railroads (if applicable). An analysis of effects on transportation facilities including effects on service levels of roads, haul routes for materials and supplies, increased rail traffic at grade crossings, and intersection of new access roads with existing roads.

This section documents the assumptions, methodology, and conclusions for analysis of transportation facilities in the Project study area.

As shown in the preliminary site layout (**Appendix A**), the Project is located in the southwest corner of Campbell County, and the majority of the turbines and other site infrastructure are proposed to be west of SH 50. A total of seven access points off of SH 50 are planned; five are existing and will be upgraded as needed, and two are proposed new access routes. As the primary access off SH 50, Moore Road is planned to serve as the route to the laydown yard, component check-in, inspection, and trailer areas located approximately 1.15 miles east of SH 50.

Adjacent Roadways

The project area is divided by a north–south stretch of SH 50 and crossed by portions of Moore Road and Vanbuggenum Road, both unpaved county roads. Access roads to the Project site will directly intersect SH 50 on both the west and east sides. SH 50 is a paved rural, two-lane highway with a posted speed limit of 65 mph. It has narrow shoulders and alternating passing is allowed. SH 387 to the south of the site is also a paved rural, two-lane highway with a posted speed limit of 65 mph, narrow shoulders, and sections with alternating passing opportunities. The intersection of SH 50 and SH 387 is unsignalized, with a stop control for southbound SH 50.

Planned Improvements

According to the WYDOT 2010 State Transportation Improvement Program (STIP), no construction projects are currently programmed for roadways in the immediate study area. However, the plan does identify preliminary engineering for three projects beyond the 2015 planning horizon. Project number P422006 is a planned resurfacing of approximately 16 miles of SH 387, and combined projects 0300040 and 0300041 involve widening and overlay of SH 50 from SH 387 to Savageton. None of these planned improvements are expected to occur prior to or during site construction.

Traffic Counts

The WYDOT collects traffic counts and maintains an annual traffic count database for state highways. Where direct counts are not available, counts are estimated based on permanent and short-term traffic counts. Per the WYDOT database, SH 50 carried approximately 1,400 vehicles (average annual daily traffic) of which 360 were heavy haul trucks (26 percent of the total traffic) near Savageton in 2008. On SH 387 near SH 50, the average annual daily traffic was 880 in 2008 with 230 trucks (26 percent of the total traffic). The WYDOT Planning Division also provided year 2008 turning movement counts at the SH 50 and SH 387 intersection. At the primary site access, Moore Road and SH 50, existing turning movements were estimated based on adjacent count information.

Trip Generation

Personnel

Assembled in stages, construction of each of the 100 WTGs involves both on-site construction personnel and offsite delivery of critical material and turbine components. Light duty personnel vehicles access the site daily and the heavy equipment is typically stored onsite at the last location it is used as long as overnight storage can be done safely and without risk of tampering. At its peak, the site is expected to have approximately 309 workers. Based on previously completed analyses of similar projects in the area, vehicle occupancy of 1.3 would yield approximately 238 personnel vehicles accessing the site daily. These personnel vehicles would arrive first for AM meetings, and then depart for the day's work, occasionally returning at lunch, back into the field, and finally departing in the evening. Based on similar site uses from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* (ITE, 2008), the site is expected to produce three daily trips per employee. The peak-hour trip rates are approximately 0.5 trips per employee, with 80 percent of these trips occurring in the peak direction (entering the site in the morning [AM] and leaving the site in the evening [PM]). Assuming the 1.3 vehicle occupancy described above, and using these trip rates, Project personnel are expected to produce 714 daily trips and 119 peak-hour trips (95 in the peak direction and 24 in the off-peak direction).

Trucks

Each turbine will require approximately 60 concrete and construction trucks, 20 crane component trucks, eight heavy haul trucks for turbine components, and two trucks for forklifts and other material handling equipment. Of these deliveries, only the concrete and construction trucks and the heavy haul trucks delivering turbine components would be recurring trips. The remaining equipment would remain on site for the duration of the construction. Assuming a 5-day work week and continuous construction for the full 11 months, approximately 28 trucks would arrive at the site daily. The delivery of material would be staggered over the course of the work day, with approximately three trucks arriving hourly. This equates to 56 daily and 6 peak-hour truck trips.

Total Trips

In total, the site is expected to generate 770 daily vehicle trips (714 cars/light duty trucks and 56 heavy trucks) and 125 peak-hour vehicle trips (119 cars/light duty trucks and 6 heavy trucks).

Trip Distribution and Assignment

Personnel Access Routes

Personnel transportation to the site comprises the largest portion of daily site generated traffic. The workforce estimates indicate that 98 percent of the site generated personnel traffic will utilize SH 50 to the north of the site from Gillette and Moorcroft. The remaining 2 percent of the personnel are expected to utilize SH 50 to the south of the site from Casper and Midwest. Should some of the workers choose to reside in Wright, those workers would also utilize SH 50 from the south. These personnel are expected to access the site daily and use the following access routes:

- Gillette – SH 50
- Moorcroft – I-90 to SH 50

- Casper – I-25 to SH 259 to SH 387 to SH 50
- Midwest – SH 387 to SH 50
- Wright – SH 387 to SH 50

Once construction is complete, the wind energy operations will require minimal daily personnel and likely only an occasional heavy vehicle. Like the construction period, the site will be accessed from SH 50 via the access road intersections. It is assumed that all operations personnel will drive their own vehicles to the project site and will be primarily based in Gillette. The additional traffic expected during operations is not expected to appreciably impact existing traffic conditions and is therefore not analyzed.

Truck Access Routes

It is expected that the needed construction materials will be trucked to the site. The transportation routes for major components have not yet been established. Routes will be determined by a logistics/trucking company in consultation with GE upon determination of a final delivery date. Regardless of the port of entry, the final transportation will be via SH 50, either from I-90 north of the site, or I-25 to SH 259 to SH 387 south of the site. For purposes of this analysis truck traffic is assumed to utilize I-90 to SH 50. This access scenario represents a conservative assumption with traffic turning left onto Moore Road. The delivery contractor will comply with all heavy vehicle and oversized load requirements and coordinate with WYDOT during final development of routing logistics.

Level of Service

In order to assess the potential traffic impacts associated with the proposed project, existing traffic conditions were analyzed both with and without the construction of the project during the peak hour (existing and construction). The ITE *Trip Generation Manual* (ITE, 2008), the FHWA *Highway Capacity Manual 2000* (FHWA, 2005), and the WYDOT Planning Division were used as resources for this analysis.

Methodology

The operating conditions, or Level of Service (LOS), provided by the highways and study area intersections were assessed using two-lane highway and unsignalized intersection methodologies from the *Highway Capacity Manual 2000* (FHWA, 2005). LOS is a term used to describe operating conditions in a traffic stream and motorists' perceptions of those conditions. Six LOS classifications are given a letter designation from A to F with "A" representing the best operating conditions and "F" the worst. LOS D or better is typically considered acceptable for peak-hour operations.

For two-lane highways, LOS is defined in terms of average travel speed and percent time spent following another vehicle. For unsignalized intersections, LOS is defined in terms of average delay per vehicle by movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street stop-controlled intersections, delay is typically represented in seconds for the minor street approaches and the left turns from the major street.

Assumptions

The directional distribution on the highways is assumed to be a 60/40 split per the *Highway Capacity Manual 2000* default value. The percent no-passing zones are estimated to be 20-percent. The peak hour is estimated to be ten percent of the daily volume for all roadways.

Based on this assumption, the peak-hour volume on the highways will be the same for both the AM and PM peak hour. Therefore, one peak hour is analyzed for existing conditions but both AM and PM peaks are analyzed for site generated traffic. For purposes of this analysis, since minimal background traffic growth is expected, the available counts are assumed to represent existing 2010 traffic conditions. Site generated traffic was added to the existing volumes to determine highway and intersection LOS during construction. While seven access points to SH 50 are planned, Moore Road will serve as the primary access and accommodate most of the site generated traffic. Therefore, the SH 50 and Moore Road intersection is analyzed for a conservative estimate of traffic impacts. The remaining six access points are expected to have less traffic than Moore Road, and the traffic distribution will occur throughout the day at these locations.

Existing Conditions

As shown in **Table 6-12**, the highway segments and intersections analyzed operate at very desirable Levels of Service during the peak hours (LOS A). On the highways, the average travel speed is relatively high and the percent time spent following another vehicle correspondingly low. At the intersections, the approaches and movements experience a modest average delay of 10 seconds per vehicle.

TABLE 6-12
Existing Traffic – Daily and Peak Hour Conditions

Facility	Average Annual Daily Volume	Peak Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
SH 50	1,400	140	26%	A
SH 387	880	88	26%	A
Intersections				
SH 50 & SH 387				
Southbound (stop)	N/A	70	26%	A
Eastbound	N/A	44	42%	A
Westbound	N/A	74	15%	A
SH 50 & Moore Road				
Southbound	N/A	70	26%	A
Northbound	N/A	70	26%	A
Westbound (stop)	N/A	10	15%	A

Source: CH2M HILL, 2010.

Construction Conditions

Construction of the proposed project is anticipated to commence in 2010 and last approximately 11 months. While the additional 770 daily trips represent more than a 50-percent increase in traffic on SH 50, this condition is expected to be temporary during construction and the additional site generated traffic is expected to create minimal impact to

the existing peak-hour traffic operations near the site. As shown in **Table 6-13**, the highway segments and intersections analyzed continue to operate at very desirable Levels of Service during the peak hours (A or B).

TABLE 6-13
Existing Plus Construction Traffic – Daily and Peak-Hour Conditions

Facility	Average Annual Daily Volume	Peak -our Volume	Percent Trucks	Peak-Hour LOS
Highways				
SH 50 North of Moore Road	2,156	263	24%	B
SH 50 South of Moore Road	1,414	142	26%	A
SH 387	894	90	26%	A
Intersections				
SH 50 & SH 387				
Southbound (stop)	N/A	70/72	26%	A/A
Eastbound	N/A	44/44	42%	A/A
Westbound	N/A	76/74	15%	A/A
SH 50 & Moore Road				
Southbound	N/A	168/95	14%/20%	A/A
Northbound	N/A	72/70	25%/26%	A/A
Westbound (stop)	N/A	35/110	9%/6%	B/A

Notes:
XX/YY = AM/PM. The truck percentages onsite and on the surrounding roadways are lower than existing due to the increase in personnel vehicles accessing the site and the fact that site generated truck traffic occurs throughout the day not just during the peak hours.

Source: CH2M HILL, 2010.

Future Conditions

An 11-month construction timeline is currently anticipated. The relatively short duration of construction at the site, the expectation that a minimal amount of traffic will access the site during operations, the rural nature of the surrounding area, and the historically low traffic growth trends suggest that impacts identified under existing conditions would also occur under future conditions. Since site generated traffic is not anticipated to increase beyond current conservative estimates, any change in traffic operations would be attributable to growth in background traffic. For these reasons, future traffic conditions have not been analyzed.

Other Design Considerations

Signing and Striping

Based on aerial and available site photographs, it appears that signing and striping in the area is adequate and maintained. During the 11month construction, “Trucks Entering Highway” warning signs will be displayed to warn drivers on SH 50.

Sight Distance

Based on aerial and available site photographs, and the fact that five of the seven access points are existing, it appears that the planned access points will have adequate horizontal and vertical sight distances on SH 50.

Pavement Maintenance

No pavement assessment was performed. However, based on aerial and available site photographs, it appears the pavement condition of SH 50 and SH 387 is similar to that of other area rural highways and adequately accommodates the existing truck traffic. Due to the short duration of planned construction, a need for long-term pavement maintenance beyond that which is already completed by the State is not anticipated. Should a road use agreement be needed, preconstruction surface assessment, monitoring, and post construction evaluation will be determined through consultation with WYDOT to ensure appropriate mitigation of impacts through maintenance.

Intersection Turning Radii

The largest trucks expected onsite deliver the tower section and machine heads of the turbines. Tower sections are transported using six and nine axle Schnable trailers with steerable dollies. These trailers require a minimum inner turning radius for tire clearance of 137 ft and the tire loadings are a maximum of 20,000 lbs per single axle of 4 tires. The turning radius for a typical machine head transport is 140 ft. Access road surfaces and turn layouts will be designed to meet or exceed these criteria. Site access roads will be improved as needed to a minimum of 30 ft wide for a distance of 200 ft off SH 50 to allow passing, inner and outer tire path radii, and overhang in the center of the trailer.

Requirements, Restrictions, and Permits

- During project construction, roads and highways may be impacted by vehicles hauling materials to and from the site. Contractors will comply with existing federal, state, and county requirements and restrictions to protect the road network and the traveling public. In addition, load limits will be observed at all times to prevent damage to existing paved road surfaces. Arrangements to transport oversized loads will be coordinated with and approved by WYDOT.

Summary and Conclusions

The Project is expected to employee a peak construction workforce of 309 workers and generate approximately 770 daily trips. This represents more than a 50-percent increase in daily traffic on the adjacent SH 50. However, analysis of the peak-hour operations of the surrounding roadway network and intersections indicates the increase in traffic is expected to have a minimal impact to the existing peak-hour traffic operations near the site.

With the exception of the two new access points on SH 50 and the already planned improvements to the five other existing access points, no other significant infrastructure improvements are recommended. New access points will follow the state highway access code and be coordinated with WYDOT. Access road surfaces and intersections will be designed to accommodate the larger trucks and improved to a minimum of 30 ft wide for a distance of 200 ft off SH 50. Due to the size and larger turning radius of the wind turbine haul trucks, special care should be taken by drivers when entering and exiting SH 50 to avoid potential vehicle conflicts.

- Contractors will comply with existing federal, state, and county requirements and restrictions to protect the road network and the traveling public. In addition, load limits will be observed at all times to prevent damage to existing paved road surfaces. Arrangements to transport oversized loads will be coordinated with and approved by WYDOT.

6.16 Cumulative Impacts

Rule I Section 7(j) – Cumulative Impacts. Cumulative impacts of the proposed industrial facility and other projects in the area of site influence should be addressed separately.

The cumulative impacts analysis is organized by resource for clarity of presentation. Potential direct and indirect impacts were analyzed in this ISA application. The environmental impacts evaluation of the Project indicated that, although the construction and operation impacts would not result in significant or adverse resource impacts, minor impacts could occur to some resources; therefore, a cumulative impacts assessment was completed to determine if minor impacts from the Project could, along with other actions in the area of site influence under the jurisdiction of the ISD, contribute to a significant or adverse cumulative impact.

6.16.1 Approach to Cumulative Impacts Analysis

The ISA lacks guidance that defines or details requisite cumulative impact analysis methodology. Therefore, the Council on Environmental Quality (CEQ) was queried to identify cumulative impact methodology and guidance (CEQ, 1997).

Based on a review of CEQ guidance, the following factors were considered for the Project:

- The direct and indirect impacts of the Proposed project
- Which resources, ecosystems, and human communities are affected
- Which impacts to these resources are important from a cumulative perspective

Based on additional CEQ guidance, cumulative impacts would occur if incremental impacts of the Project, added to the environmental impacts of past, present, and reasonably foreseeable future actions, would result in adverse impacts to regional resources. Cumulative impacts could only occur for those resources that are affected by the Project and by other actions whose impacts occur within the same timeframe.

6.16.2 Geographic Scope of Cumulative Analysis

Cumulative environmental impacts, as defined in the ISA Rules and Regulations, means the combined impacts on the environment to the social or economic conditions resulting from construction and operation of the proposed industrial facility and from construction and operation of other ongoing or proposed developments in the area of site influence.

Proposed developments to be included in cumulative impacts include those developments that are actively planning and have public information available or may be actively permitting under the auspices of the Wyoming ISA. Therefore, the geographic scope of cumulative impacts analysis is generally based on the area of site influence of each resource.

6.16.3 Timeframe

Potential impacts from the construction of the Project would be relatively short term, generally occurring over the construction period. However, impacts to soils, air quality, vegetation, and noxious weeds may extend several months beyond the initial construction period until re-vegetation is accomplished. For the purposes of the cumulative impacts analysis, it is assumed that operation of would begin in April 2011.

Potential impacts associated with operation of the proposed Project and transmission line would continue into the foreseeable future, approximately 25 years.

6.16.4 Past, Present, and Reasonably Foreseeable Actions

It is of relative importance to note that portions of the land within Campbell County are under the jurisdiction of federal government and the State of Wyoming. Federally managed lands fall under the jurisdiction of the BLM or the U.S. Forest Service, and NEPA compliance is required for most actions on those lands. Additionally, State of Wyoming lands are managed by the Office of State Lands and Investments for revenues directed into the Wyoming State Land Trust. As such, a Special Use Lease is required from the Board of Land Commissioners to develop industrial facilities on State of Wyoming lands. Therefore, each of these governmental entities have specific planning processes and implementing rules that require evaluation prior to construction and operation industrial projects on fee, state, and federal lands in the area of site influence.

In evaluating the cumulative impacts of other projects at and around the Project site, relevant historical events in the region and present and reasonably foreseeable future actions under the jurisdiction of the ISA were considered.

Some of the past, present, and reasonably foreseeable activities affecting Campbell County land resources include the following, some of which are under the jurisdiction of the ISA:

- Ranching
- Residential and commercial development
- Oil exploration and extraction
- Coalbed methane exploration and extraction
- Pipeline construction
- Electric transmission line construction
- Coal extraction and expansion
- Coal-fired electrical generation facilities
- Uranium exploration and extraction

Wyoming Industrial Development Information and Siting Act Projects Considered

Two Elk Project

The Two Elk Project is a proposed 325-MW waste coal and coal-fired power generation facility located in Campbell County, Wyoming, approximately 13 miles east of Wright, Wyoming. To date, the Two Elk Project has constructed an access road and administration building. The ISD provided an updated construction schedule, and the anticipated timeframe and proximity to the TPWRJ was taken into account.

Dry Fork Project

The Dry Fork Station is a 422-MW coal-fired generation facility currently under construction and approximately 75.7 percent complete (March 2010). The generation facility is located approximately 7 miles north of Gillette, Wyoming. The facility is owned by Basin Electric Power Cooperative and the Wyoming Municipal Power Agency. Sub-bituminous coal from the nearby Dry Fork Mine, north of Gillette, will fuel the Dry Fork Station via a conveyor system.

Wygen III Project

The Wygen Unit III is a 100-MW coal-fired generation facility. On April 1, 2010, it was announced that the plant officially went online several months earlier than expected. The Wygen III Project is not considered further.

6.16.5 Cumulative Impacts

Construction of the Project along with the other listed ISA projects has the potential to contribute to cumulative impacts, especially if the schedules are concurrent.

Air Quality

Powder River Basin coal mines and mine equipment, diesel engine coal trains, coal-fired generation facilities, ranching activities, graveled roads, wind and soil erosion, forest and range fires, local and regional transportation, and residential and commercial buildings all contribute cumulatively to the overall air quality within the Powder River Basin.

Project construction activities could incrementally increase local impacts to air quality from fugitive dust emissions derived from construction traffic and wind erosion. Fugitive dust associated with the operation of a concrete batch plant and construction vehicle emissions could potentially cause particulate concentrations to increase above normal background levels, causing localized dust impacts. However, dust emissions would not contribute to significant cumulative impacts to regional air quality because they would be localized, temporary, and further controlled by access road dust abatement measures to further minimize impacts. More importantly, the Project would avoid cumulative pollutant emissions from fossil-fired facilities that would be necessary to generate equivalent amounts of power.

Noise

The area for potential cumulative noise impacts is the Project area boundary and extending 1-mile buffer. Extensive sound generation exists within the Project area from oil and gas operations and vehicle traffic, ranching activities, aircraft, and vehicle traffic on SH 50. Noise generated by on-site construction activities is not expected to reach the nearest residential areas, and thus will have no cumulative impact on background noise levels. Operational noise will contribute to incremental increases within the Project area.

Soils and Geologic Hazards

There will be localized disturbance of soils associated with construction of facilities at turbine sites and access roads and along the proposed transmission line alignment. These impacts will be minimized by mitigation measures designed to guard against erosion. The Project will be designed and constructed to avoid or minimize impacts, and mitigation measures will be implemented to alleviate potential impacts. No other foreseeable action

from construction and operation of the Project is anticipated to contribute to cumulative impacts on soil resources or geologic hazards within the Project site.

Cultural Resources

The Project layout has been designed to avoid impacts to known cultural resources potentially eligible for listing under the NRHP. Therefore, implementation of this Project would not contribute to any regional cumulative impacts to cultural resources.

Surface and Groundwater

No surface water will be used for the Project, and construction activities are not anticipated to result in any significant sediment discharges into surface waters. Therefore, the Project will have negligible contributions to cumulative sedimentation levels. Approximately 36.8 acre-feet of water will be used for the Project. However, this level of use is not expected to significantly impact the Belle Fourche River Basin, nor effect any provision of the Belle Fourche River Compact.

After the Project is operational, minimal quantities of water are needed. Implementation of mitigation measures to control runoff during construction and operation of the Project will prevent significant impacts to surface waters from erosion and sedimentation. In addition, implementation of BMPs for handling, storage, and use of hazardous materials and adherence to applicable permits during construction and operation of the Project will prevent significant cumulative impacts on surface and groundwater resources. Due to the negligible impacts associated with this Project, water quality and quantity impacts are not expected to contribute to any further exacerbation on a cumulative scale.

Land Use and Recreation

Appropriate planning and evaluation to address cumulative impacts is conducted by the State of Wyoming through the ISA to ensure that the proposed Project is compatible with ongoing activities and land uses. The proposed wind energy facility supports the goals and objectives of the Campbell County Land Use Plan. The overall land use patterns in this area of Campbell County are stable, with most land uses being livestock grazing, agriculture, natural resource extraction, or rural residential. A wind energy facility is compatible with existing land uses within the Project boundary and within the project vicinity. The construction and operation of this proposed facility would not likely serve as an impetus for change in existing land use patterns.

The minimal incremental increase in visitation and use of regional recreational areas during construction of the Project is not anticipated to impact recreational use cumulatively. The small number of workers at the Project area at any one time is not likely to increase cumulative impacts to land use and recreation.

Wetlands and Waters of the United States

Wind energy projects have the ability to locate major Project features to avoid or significantly reduce potential impacts to jurisdictional waters of the U.S. and wetlands. No adverse impacts to jurisdictional wetlands and waters of the U.S. are anticipated from construction or operation of the Project. Therefore, construction and operation of the Project will not significantly impact jurisdictional wetlands and waters of the United States locally, nor will the Project result in cumulative impacts regionally to these resources.

Scenic Quality

The cumulative visual impact analysis considers all of the existing and reasonably foreseeable wind power and other ISA projects in the region in which the Project is located. At present, no wind power projects are located in Campbell County, and TPWRJ's proposed Project is the only wind energy facility currently proposed in the county. The closest existing wind power projects are the Campbell Hill and Glenrock wind projects in Converse County, approximately 50 miles to the south. The closest wind power projects that have been proposed or that are now under active consideration are also located in this same general area of Converse County, 50 miles or more from the site of the proposed Project. The ISA projects within the same region include the Wygen III and Dry Fork coal-fired power plants that are now under construction near Gillette and the Two Elk Power Plant that has been approved for development on a site 13 miles east of Wright, but for which no substantial construction has yet taken place.

To the extent that the WTGs that would be developed as a part of the proposed Project would affect the aesthetic quality of views, the degree of these effects would be dependent on the distance from which they are viewed. According to the systematic observations of WTGs seen at varying distances in Great Britain (CPRW, 1999), the degree of perceived visual dominance of WTGs of the size that are being proposed for this Project have the greatest potential to be visually dominant within a distance of about 2 miles from the structures, tapering off to a moderate level after about 3.8 miles and a low level after about 9.3 miles. Because the existing and proposed energy generation projects within the region are located well beyond the 10 miles from the proposed Project, the proposed Project does not have the potential to combine with the visual effects of other projects to create cumulative effects on views.

Vegetation, Special Status Plants, and Rare Vegetation Communities

No rare or unique vegetative communities are documented or have been mapped within the Project area. Therefore, construction and operation of the Project will not contribute to cumulative loss or degradation of these resources.

Wildlife

Numerous oil, coalbed methane, natural gas, and coal mine projects have been developed and several are in the planning stages within Campbell County. All of the past oil and gas projects have resulted in both localized and regional fragmentation and disturbance, direct and indirect effects, and increase of human presence in rural areas. The construction and implementation of these projects in Campbell County has also resulted in the loss of vegetation communities, which is also a net reduction in wildlife habitat.

The Project will be constructed within an operational oil and gas field. Therefore, the potential for cumulative impacts to wildlife species is significantly reduced. It is extremely important to note that mitigation and protection measures, including but not limited to habitat mitigation, trust payments, conservation easements, seasonal use, and no surface and closed surface occupancy restrictions have been required on most, if not all of the implemented projects reviewed by local, state, and federal agencies in Campbell County. These measures have helped to further reduce cumulative impacts to wildlife species. Lastly, a number of these projects are participating in scientific studies to further study energy and wildlife impacts as required by implementing agency mitigation and protection

measures. Detailed scientific study results will lead to a better understanding of direct and indirect wildlife impacts to better develop and implement mitigation strategies and measures to further reduce wind energy and oil and gas cumulative wildlife impacts.

Avifauna and Bats

Reduced avian use near WTGs has been attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness because of the presence of access roads and gravel pads surrounding WTGs (Leddy, 1996; Johnson, et al., 2000). The presence of WTGs may potentially alter avian use patterns by reducing usage within the Project area. However, it is unlikely that displacement of birds during construction or operation would result in population impacts due to the abundance of undisturbed native habitat within proximity to the Project area.

Potential collisions with WTGs represent a direct impact to local avian species. Comparing Project baseline avian use data to operational monitoring data collected at existing wind projects, raptor collision mortality at the Project site is estimated to be comparable to and lower than other similar-sized projects in the region. Passerines are likely to make up the largest proportion of fatalities at the Project site based on their abundance.

As of March 2009, approximately 28,000 MW of wind energy had been installed nationwide. Avian collision deaths for all existing wind energy projects are estimated at 2.11 fatalities per turbine or 3.04 per MW per year (Erikson, et al., 2005). Assuming similar impacts at all wind energy facilities, approximately 85,000 birds are killed by collision with WTGs annually.

Erikson, et al. (2005) estimated multiple sources of anthropogenic sources of bird fatalities. Proportionally, WTGs account for less than 0.01 percent of all anthropogenic avian collisions. Buildings, power lines, and cats together account for 84 percent, or about 780 million, fatalities annually. Considering all anthropogenic sources of avian fatalities, the relatively small number of bird fatalities expected from Project operation is not a significant cumulative impact. Even as the number of WTGs in the United States increases, WTG-related bird fatalities would still cause no more than a small percentage of all collision deaths related to other non-wind-power-related structures (Erickson, et al., 2005).

With a specific goal of examining cumulative impacts of wind energy facilities on birds and bats, Johnson and Erikson (2008) studied the Columbia Plateau Ecoregion in eastern Washington and Oregon. The study reviewed post construction bird fatality survey results from 11 operational wind farms in the same area. The purpose was to determine if concentrated wind energy development could cumulatively impact birds, or disproportionally impact certain species. The study found that when considered cumulatively, bird fatalities at all 11 locations are distributed among 77 species. When examined by type (i.e., raptors, waterfowl, and upland gamebirds), no species or type was subjected to losses large enough to have a measurable cumulative impact.

Bat casualties have been reported from most wind power facilities where post construction fatality monitoring data are available. In Wyoming, the Foote Creek Rim Wind Energy Facility conducted an avian and bat mortality study between November 1998 and June 2002 (Young, et al., 2003). The majority of recorded fatalities occurred in the western United States. occur during the fall migration period, and the species most often found during

carcass searches were the hoary bat and the silver-haired bat. More importantly, hoary bat and silver-haired bat are not designated as sensitive or federally listed species.

Bat migration patterns and densities in Wyoming are generally lacking. However, with the known presence of bats and subsequent collision mortality at wind projects, bat numbers likely increase during fall migration periods. Subsequently, potential bat casualties may increase during migration periods, as has been the case for those western United States wind projects at which fatality monitoring has taken place. Due to the scarcity of bat-turbine interaction studies, bat mortality as a result of wind energy facility development has been difficult to assess leaving cumulative impacts to bat species as speculative and uncertain.

To determine consistency with mortality probability estimates, TPWRJ will conduct post construction avian and bat fatality monitoring at the Project area commencing upon the completion of construction. It is anticipated that the cumulative contribution to potential bat mortality will be similar to that reported for other studies in Wyoming and the western United States and will add to the industry's and regulating agencies' overall understanding of the resource impacts.

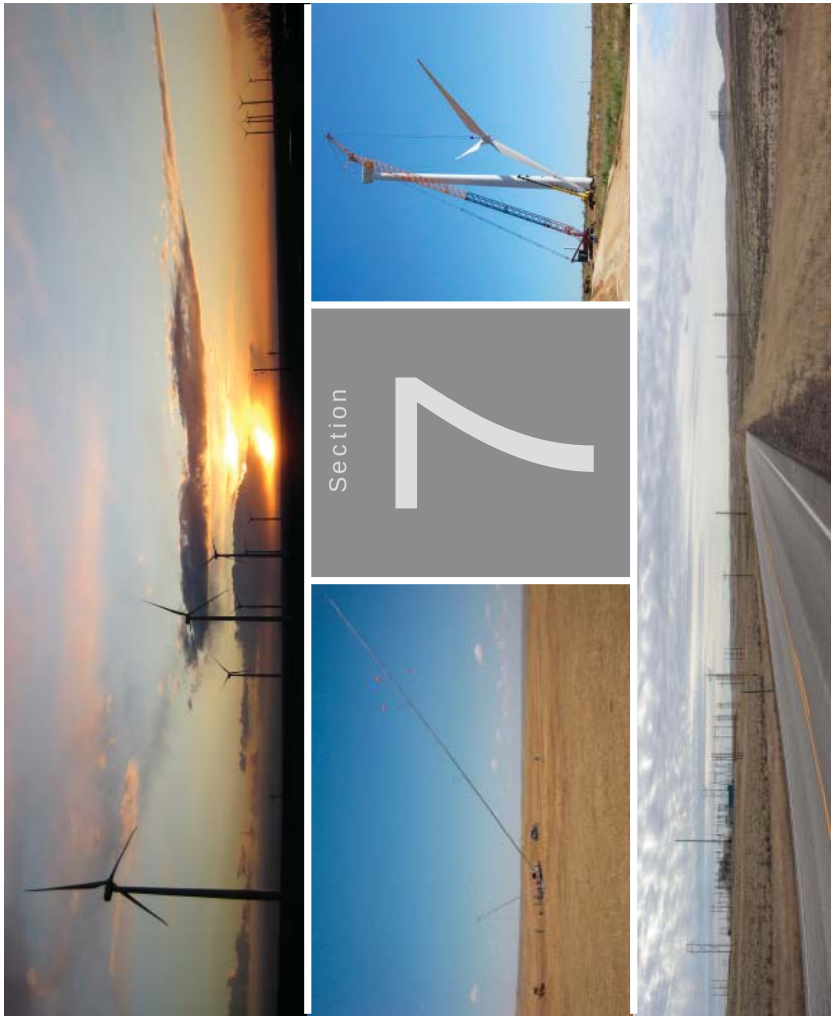
Federally Listed Species

No impacts to black-footed ferrets, Ute ladies'-tresses, or blowout penstemon are anticipated from the Project. Therefore, cumulative impacts to threatened and endangered species or their critical habitat will not occur as a result of the Project.

Aquatic Systems

The TPWRJ Project site only contains intermittent drainages, and the nearest perennial surface water system, the Belle Fourche River, is located approximately 4 miles east of the nearest WTG. Therefore, the TWPRJ project has surface water connections to the Belle Fourche River only during spring runoff periods and high volume precipitation events. Due to the negligible impacts to aquatic resources associated with this Project during construction and operation, water quality and quantity impacts are not expected to contribute to any significant impacts to aquatic resources on a cumulative scale with the other projects operating in the area.

Section 7
Controls, Mitigation, and Monitoring Measures



7.0 Controls, Mitigation, and Monitoring Measures

Rule I Section 7(k)(i) – Controls and Mitigation Measures. The Applicant shall describe the procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the proposed facility, including impact controls and mitigating measures proposed by the Applicant to alleviate adverse environmental, social and economic impacts associated with construction and operation of the proposed industrial facility.

A number of specific controls, mitigation, and monitoring measures will be implemented to alleviate impacts related to construction and operation of the Reno Junction Wind Energy Facility (the Project). These measures are described in the following sections.

7.1 Controls

A broad array of measures has been proposed to mitigate the potential hazards associated with the Project and the exposure of persons, animals, and facilities in the area of site influence. These measures can generally be classified as avoidance, prevention, and exclusionary actions.

The following control measures, in combination with setback distances, significantly reduce the likelihood of the public coming within a hazardous distance of wind turbine generators (WTGs) and electrical equipment. The Project will be designed, constructed, and operated to adequately restrict public access and minimize impacts.

7.1.1 Avoidance

TPW Reno Junction, LLC (TPWRJ) developed a detailed site assessment of known and identified environmental constraints across the entire Project site and used this information in a spatial context to determine the appropriate Project size and location of site facilities. The process of identifying constraints and modifying facility plans to accommodate those constraints was an iterative process that resulted in a number of layout revisions over the course of months. The Project incorporated environmental resource constraints and located WTGs and appurtenant infrastructure during the preliminary design to avoid impacts. In addition, the development of the Project within a heavily industrialized and existing oil and gas field has significantly reduced potential environmental resource impacts. The resulting preliminary site plan considers environmental and land use constraints and utilizes areas that are most appropriate for Project development.

7.1.2 Prevention

Primary among the means of preventing hazards described herein will be adherence to appropriate design and construction protocols such as the International Electrotechnical Commission (IEC) 61400-1: *Wind Turbine Generator Systems – Part 1: Safety Requirements* (IEC, 1999). This will ensure that the load assumptions, design, construction standards, and safety

features are in accordance with industry norms and benefit from the experience of many manufacturers and operators.

A second important form of prevention is the establishment of a skilled workforce and implementation of effective facility-wide maintenance, monitoring, compliance, and security programs. This includes the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP); Spill Prevention, Control, and Countermeasures (SPCC) Plan; Emergency Response Plan; and Fire Protection and Prevention Plan; as well as consultation with the appropriate local agencies.

7.1.3 Exclusion

Every hazard identified herein decreases as some function of linear distance. In many cases, therefore, it has been possible to reduce or eliminate hazards to persons and facilities by prohibiting or controlling their presence in the area of site influence. Where multiple hazard areas overlap, the largest distance should govern. The Project area will have controlled access, and access to the facilities will be limited to persons who are knowledgeable of safety measures and potential risks.

7.1.4 Restricted Public Access

The Project and appurtenant facilities will be located on a combination of private fee and State of Wyoming lands. All of the State of Wyoming lands within the Project boundary are surrounded by private fee lands, and public access will be limited to that granted by the surrounding landowners. Each turbine tower will have a locked entry door at ground level and an internal access ladder with safety platforms for access to the nacelle to prevent unauthorized individuals from climbing the tower. Step-up transformers will be located within locked cabinets at the base of each tower. Additionally, TPWRJ will restrict public access to any related or supporting facilities that could pose a potential safety threat (i.e., the on-site collector substation will be located within a fenced area with a locked gate). Security personnel will be present throughout construction, and the facility will be staffed continuously during operations.

7.1.5 Health and Safety Measures

TPWRJ is committed to a safe and healthy workplace that promotes a zero-accident culture. Additionally, TPWRJ is committed to continuous improvement to identify and control risks so that company safety metrics and performance meets high expectations until zero incidents are achieved. To meet this commitment, TPWRJ's health and safety policies will require the following:

- Operate in compliance with or exceed all health and safety governmental laws, regulations, ordinances, standards, and permit requirements
- Ensure all employees are involved in health and safety programs with appropriate training and communication to work responsibly, make decisions to carry out their duties, and be accountable for the results
- Provide a health and safety plan and structure that ensures effective health and safety management with risks, impacts, and legal requirements controlled through appropriate actions and governance

- Ensure that health and safety goals are set and communicated to all employees and that performance is monitored to promote continuous improvement
- Work to proactively prevent incidents, accidents, and environmental damage before these occur through sustainable actions and process improvements at all locations.
- Enable real-time communication on site through the installation and use of a 50 watt, two-way radio system that will be employed throughout construction and during operations of the facility.

7.1.6 Worker, Environmental, and Facility Controls

There are no health and safety standards specific to the siting or operation of wind energy facilities. Nonetheless, in an effort to prevent personal injury and property or environmental damage, conditions or actions that may put workers, the environment, or the facility at risk have been identified. TPWRJ has taken measures to minimize the potential for an incident to occur and will effectively address incidents if they do occur. Careful planning and design of the facility and its components are in place to protect both workers and the general public during construction and operation of the facility.

Local Emergency Response

TPWRJ met with the Campbell County Emergency Management Agency (CCEMA) on December 4, 2009 and engaged in follow up communications. The CCEMA is a function within the Campbell County Commissioner's Office. Topics of discussion included:

- The City of Gillette has one ambulance, one hospital, and one clinic.
- The Town of Wright has volunteers, a new fire station, and public safety officers.
- Campbell County has approximately 170 volunteers and 25 career emergency first responders.
- The Pumpkin Buttes Wildland Unit Fire Station is the closest station to the Project site.
- Helicopter response would be initiated by Life Flight out of Casper. The travel path to Gillette passes near Pumpkin Buttes, so the pilots are familiar with area flight hazards. CCEMA requested that TPWRJ provide landing zone coordinates along with a training exercise prior to construction initiation.
- Training opportunities are hospital-based or can be contracted through the American Heart Association; CCEMA could arrange for training opportunities for the construction crew. TPW, TPWRJ's parent company, has engaged in similar training activities in past construction efforts.
- Radio is the best form of communication for electrical storm activity warnings that will be important during tower erection.
- TPWRJ and its contractors can obtain text and email updates of local weather and road conditions from the local Wyoming Department of Transportation (WYDOT) Engineer.

- All dialed 911 cell phone or hardline calls in Campbell County are routed to the joint Public Safety Answering Points (PSAP) at the Sheriff's Office and Gillette Police Department Dispatch centers. If a call is placed from the rural lands within the county, the Gillette Police Department dispatchers drop off the line and the issue is handled by the Sheriff's Office. The Sheriff's Office also handles all fire and ambulance 911 calls.
- A situation could arise where a cell phone call is routed through a cell tower physically located in another county. If this scenario occurs, the call would first go to the 911 dispatch center in that particular county, which then would forward the call to the Campbell County's Sheriff's Office dispatch center.
- Elevation can influence the strength of the localized cell service signal. TPWRJ can make arrangements in advance with PASP to test 911 calls from areas of concern within the Project area.
- All fire and emergency response calls south of the Black and Yellow Road and Wyoming State Highway (SH) 50 are initially dispatched out of Wright. The response out of Gillette is usually dependent upon other calls in progress and staffing levels at the time of the received call. In most circumstances, Gillette is often dispatched at the same time and then canceled while enroute, if not needed.
- Winter snow, wind conditions, and night-time driving can complicate any response in Wyoming.
- Distance to the Project area may be another complicating factor for emergency services responses. A "red lights and siren" response may take 20 - 45 minutes to reach the area via the highway with a fire truck or ambulance. Additional travel time can be extended by off-highway travel.

TPWRJ met with Campbell County Sheriff Bill Pownall on February 3, 2010. Topics of discussion included the following:

- General project information
  - Project location
  - Estimate of non-local workforce
  - Likely towns and cities in which construction workforce will reside
  - Likely transportation routes to and from the Project
- Requirement of all non-local employees to obtain Wyoming temporary license tags within 30 days of employment.
- First emergency response would likely be out of Wright.
- Reminder to inform all construction workers to obey posted speed limits on all local and state roads.
- Request to keep the Campbell County Sheriff's Office informed about construction schedule and Project revisions, as they occur.

Occupational Hazards

Construction and operations workers at any facility are subject to risk of injury or fatality from physical hazards. While such occupational hazards can be minimized when workers adhere to safety standards and use appropriate protective equipment, injuries or fatalities from on-the-job accidents can still occur. Occupational health and safety are regulated at the federal level through the Occupational Safety and Health Administration (OSHA) (29 U.S. Code [USC] 651 et seq.). Wyoming has additional laws and regulations that build on the federal law.

Some of the occupational hazards associated with wind energy projects are similar to those of the heavy construction and electric power industries, while others are unique to wind energy projects (e.g., heights, high winds, energized systems, and rotating/spinning equipment). In particular, the hazards of installing and repairing WTGs can be similar to those of building and maintaining bridges and other tall structures.

The WTG manufacturer will provide an operations and maintenance (O&M) manual that will include system safe operating limits and descriptions, startup and shutdown procedures, alarm response actions, and an emergency procedures plan.

TPWRJ and its subcontractors will comply with all applicable local, state, and federal safety, health, and environmental laws, ordinances, regulations, and standards. Some of the main laws, ordinances, regulations, and standards designed to protect human health and safety that will be reflected in the design, construction, and operation of the Project include:

- Occupational Safety and Health Act of 1970 (29 USC 651, et seq.) and 29 *Code of Federal Regulations* (CFR) 1910, Occupational Safety and Health Standards
- Americans with Disabilities Act (ADA) for accessibility at the O&M Building
- Uniform Fire Code Standards
- Uniform Building Code
- National Fire Protection Association (NFPA), which provides design standards for the requirements of fire protection systems
- National Institute for Occupational Safety and Health (NIOSH), which requires that safety equipment carry markings, numbers, or certificates of approval for stated standards
- National Electric Safety Code
- American Concrete Institute Standards
- American Institute of Steel Construction Standards
- American Society for Testing and Materials
- National Electric Code

Public Safety

Warning signs will be posted along the access roads and SH 50 as permitted to inform the public of construction activities and recommend that the public not enter the site. Likewise, signs will be posted to direct construction traffic to stay on Project access roads, where possible, to prevent construction traffic from unnecessarily entering public roadways when avoidable. For areas where public safety risks could exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), warning signs and temporary fences may be erected. Fencing may also be installed around material storage, staging, and/or laydown areas. Other areas determined to be hazardous, or where security or theft is of concern, may also be fenced. Temporary fencing around unfinished turbine bases, excavations, and other hazards will typically be a high-visibility plastic mesh. Security guards, cameras, and/or additional fencing will be used as necessary to protect public health and safety and Project facilities.

Traffic Management

Construction

The potential for traffic issues will be highest during construction, when deliveries of equipment and materials and worker traffic will occur. A traffic study has been completed (see **Section 6**) that details the number and nature of vehicle trips to, within, and from the Project area.

TPWRJ has been in consultation with the Casper and Sheridan WYDOT Districts to ensure the execution of a well-coordinated transportation plan that will minimize risks and inconvenience to the public. The plan will focus on traffic and circulation primarily within and in the immediate vicinity of the Project area. It will be designed to minimize potential hazards from increased truck traffic and worker traffic and to minimize impacts to traffic flow in the vicinity of the Project. The plan will be finalized with WYDOT once final turbine component routing has been established in consultation with TPWRJ's turbine vendor.

Operation

In terms of access traffic, the Project will operate continuously (24 hours per day, 7 days per week) using an automated system. It will employ an estimated 15 full-time workers, with a minimal daily increase in traffic to and from the site.

Electromagnetic Fields

Electromagnetic fields (EMFs) are associated with electric fields and are not specific to wind power projects. EMFs are only considered a possible issue when associated with the siting of high-voltage (more than 115,000 volts) overhead transmission lines in close proximity to residences.

EMFs are generally not an issue related to WTGs, which have low-voltage drop cables (690 volts) contained within steel towers and have a predominately underground collection system, also at a low voltage (34,500 volts). Therefore, exposure of individuals working within and around the WTGs to EMFs generated by the Project would be minimal because of the low voltage. Distribution lines (34,500 volts) for the Project would be underground and cross areas that are not inhabited or used on a regular basis, so that regular long-term exposure of individuals to EMFs would not occur.

EMFs could be generated by the Project's approximate 5–mile, 230,000-volt transmission line. However, the potential for EMF exposure from this Project is anticipated to be very low because the line traverses undeveloped land. The high-voltage transmission line has been sited to avoid occupied residences and developed areas where people would be present for extended time periods. The closest residence is a participating landowner approximately 815 lineal feet from the proposed overhead transmission line route. Further, the transmission line will be designed and built according to industry standards to minimize the potential for significant EMF impacts. Therefore, impacts from Project EMFs are not anticipated to be significant.

Shadow Flicker

Shadow flicker caused by WTGs is defined as alternating changes in light intensity caused by the moving blade casting shadows on the ground and stationary objects, such as a window in a dwelling. No shadow flicker will be cast when the sun is obscured by clouds/ fog or when the turbine is not rotating. Shadow flicker can occur only if the turbine is located in close proximity to a receptor and is in a position where the blades intercept very low-angle sunlight. The Project is not expected to result in any shadow flicker effects to any residences.

Mechanical Failure

The General Electric (GE) 1.5-MW xle WTGs that would be used for the Project meet international engineering design and manufacturing safety standards. This includes tower, blade, and generator design. There is an international quality control assurance program for WTGs, along with a number of relevant safety and design standards. The lead organization for development of international standards for WTG systems is the IEC, and the most broadly applied standard covering machinery and structures is IEC 61400-1: *Wind Turbine Generator Systems – Part 1: Safety Requirements* (IEC, 1999). In the United States, the American Wind Energy Association (AWEA) is the designated organization for participation on IEC committees.

Independent agencies are retained by WTG manufacturers to certify that the design and construction of a given turbine/tower assembly conform to accepted standards in terms of design load assumptions, construction materials and methods, control systems, and safety measures. This is a generalized type of certification provided at the manufacturers' expense. Once a specific system make and model are selected, the user then customarily funds a second independent certification attesting to the applicability of the system design and construction to the site-specific conditions. In addition, foundation design and commissioning checks address potential failure from extreme events such as earthquakes or extreme wind loadings, as well as frequency tuning of the different parts of the structure to avoid failure from dynamic resonance.

There are over 10,000 GE 1.5-MW WTGs in operation world wide with outstanding operational performance and safety records.

Turbine Certification

Because wind has been a common source of power in Europe for decades, European manufacturers have been required to meet rigid standards verifying their design criteria, operational characteristics, supervision of construction, transportation, erection,

commissioning, testing, and servicing. In Europe, Germanischer Lloyd (GL), Det Norske Veritas (DNV), Wind Test GmbH, and Risø (Denmark) are independent testing laboratories that administer regulations for the design, approval, and certification of wind energy conversion systems. There are no well-established testing laboratories in the United States that offer the amount of experience, scrutiny, and knowledge as the listed European agencies. For these reasons, the Project will implement turbine technology that, at a minimum, complies with the European standards.

WTGs designed to European standards have proven to be the most reliable wind energy systems over the past two decades. In Europe, certification pursuant to these standards is mandatory for both permitting and financing. Partly because of these verification programs, lenders in Europe view wind energy equipment in the same way lenders in the United States might view the purchase of heavy construction equipment.

The Project will implement WTGs that have achieved this type of certification by a reputable and experienced third-party verification institute such as GL, DNV, WindTest, or Risø and that demonstrate a minimum design life of 25 years.

Braking System

The electrically actuated individual blade pitch systems act as the main braking system for the WTG. Braking under normal operating conditions is accomplished by feathering the blades out of the wind. Any single-feathered rotor blade is designed to slow the rotor, and each rotor blade has its own back-up battery bank to provide power to the electric drive in the event of a grid line loss. Three independent back-up battery packs or spring units are provided to power each individual blade pitch system to feather the blades and shut down the machine in the event of a grid line outage or other fault. Having all three blades outfitted with independent pitch systems provides redundancy of individual blade aerodynamic braking capability.

Each WTG is also equipped with a mechanical brake located at the output (high-speed) shaft of the gearbox. This brake is only applied immediately on certain emergency stops (E-stops). The brake also prevents rotation of the machinery, as required by certain service activities.

Turbine Control

The WTG can be controlled automatically or manually from either the control panel located inside the nacelle or from a personal computer located in a control box at the bottom of the tower. Control signals also can be sent from a remote computer via a SCADA system, with local lockout capability provided at the turbine controller.

Using the tower-top control panel, the machine can be stopped, started, and turned out of the wind. Service switches at the tower top prevent service personnel at the bottom of the tower from operating certain turbine systems while service personnel are in the nacelle. To override any machine operation, stop buttons located in the tower base and in the nacelle can be activated to stop the turbine in the event of an emergency.

Construction Waste Management

Waste management control procedures will be implemented during the construction phase of the Project.

Solid Waste Management

The generation of solid waste during the construction phase will be handled by contracting with a solid waste hauling and management firm. TPWRJ has contacted the Campbell County Landfill and provided an estimate of the Project's weekly construction solid waste generation. Accordingly, the Campbell County Landfill indicated there is no limit on waste deposition and that the landfill will accept commercial construction waste at a cost $60 per ton. TPWRJ will attempt to separate wood packing materials (i.e., untreated and unpainted) and deposit those materials with the Campbell County composting program.

Portable haul-off 30-cubic-yard dumpsters will be delivered to the Project site and used to collect generated construction waste materials. Currently, there are three roll-off companies in Gillette: Sander Sanitation, Ryan Equipment, and Waste Connections. TPWRJ will solicit waste management bids prior to construction initiation. The contracted waste hauler will remove the portable dumpsters on a weekly basis and ensure proper treatment and disposal. There are no plans to store or treat solid waste at the Project site other than via portable dumpsters.

Fuel and Oil Storage

With respect to the disposal of used oil during construction and operations, TPWRJ will have collection points as needed for the Project, consisting primarily of 55-gallon drums that will be placed on secondary containment pallets in temporary structures for construction and in permanent structures for operations. It is anticipated that used oil generated and stored at the site will not exceed two to three 55-gallon drums during normal operations. Larger amounts of used oil are expected to be temporarily stored on site during scheduled oil changes for the WTGs, which are expected to occur once every 3 years. In addition, the Project will comply with the applicable section of 40 CFR Part 279 associated with used oil generation and management and TPWRJ will contract with appropriate firms to remove used oil from the site for disposal at properly licensed facilities.

Aboveground fuel storage tanks will be used by the General Contractor to facilitate on-site equipment refueling. The storage tanks will comply with relevant rules and regulations. No underground tanks will be used during construction or operation of the Project. All aboveground fuel tanks will have secondary containment systems.

Hazardous Wastes

It is anticipated that no or minimal hazardous wastes will be generated as part of the construction of the Project, resulting in a Resource Conservation and Recovery Act (RCRA) Conditionally Exempt Generator status for the Project. Potential generation of hazardous wastes could include waste paints, solvents, and lubricants. However, the quantities of such wastes are expected to be well below regulatory thresholds for changing generator status to small-quantity or large-quantity generator. Potential U.S. Environmental Protection Agency (EPA) waste codes generated include D001, F003, and F005 wastes.

Any such wastes that are generated will be properly characterized and managed by the General Contractor and by TPWRJ using established SPCC protocols. It is not anticipated that any on-site treatment, storage, or disposal will occur that would require obtaining hazardous waste permits during the construction period. In addition, any wastes generated from a release will be properly characterized and managed by the General Contractor and by TPWRJ.

Spill Management

The General Contractor will develop and implement a SPCC Plan in accordance with 40 CFR Part 112 and Solid Waste Rules and Regulations. If fuels and/or other petroleum-based products are spilled during construction of the Project, a treatment/disposal facility currently permitted by the Solid and Hazardous Waste Division will be contracted to dispose and manage the contaminated soils. The General Contractor will contract with properly licensed firms to clean up contaminated areas and properly dispose of any oily wastes generated as a result of such releases.

Operations Waste Management

Waste management procedures will be implemented during operation of the Project.

Fuel Storage

The Project will include an O&M facility, which will be used, among other uses, to store lubricants, oils, grease, antifreeze, degreasers, and hydraulic fluids used in the operation and maintenance of the facility. Such materials will be stored in approved containers located aboveground. Similarly, lubricants, oils, greases, antifreeze, cleaners, degreasers, or hydraulic fluids being held for delivery to a certified recycling transporter will be temporarily stored in the O&M building in approved containers that will be located aboveground. At this time, it is not anticipated that fuel storage will be required on the Project site during operations.

Hazardous Wastes

The production, use, storage, transport, and disposal of hazardous materials associated with the proposed Project will be in strict accordance with federal, state, and local government regulations and guidelines. No extremely hazardous materials (as defined by 40 CFR 355) are anticipated to be produced, used, stored, transported, or disposed of as a result of operating the facility.

During operations, it is again anticipated that hazardous waste generation will be either zero or minimal, and well below regulatory thresholds for small-quantity or large-quantity program requirements. Once site operations commence, TPWRJ will contract services for oily waste disposal from the site. Lastly, hazardous material wastes, if generated, will be used and handled in a manner that is protective of human health and the environment and that complies with all applicable local, state, and federal environmental laws and regulations.

The WTGs and transformers will likely use or require the use of the following lubricants, oils, greases, antifreeze, cleaners, degreasers, and hydraulic fluids (or comparable products from other manufacturers):

- Simple Green (cleaner and degreaser)
- Oil-Flo (cleaner and degreaser)
- Mobil SHC 632 (gear oil)
- Mobilux EP 1 (grease)
- Mobil SHC 524 (hydraulic fluid)
- Shell DIALA (R) A oil (mineral oil used as transformer coolant)
- Ethylene glycol (standard commercial antifreeze used in radiators)

None of these products contains any compounds listed as extremely hazardous by the EPA. These products will be used in moderate quantities and will be contained entirely within the spill trap and nacelle, so that the possibility of accidental leakage is minimal. Lubricants, oils, antifreeze, and hydraulic fluids will be checked according to periodic maintenance schedules. The schedule calls for fluid checks more often the first year and then every 6 months thereafter. Fluids will be replenished as needed or as recommended by the manufacturer. Fluid changes will be performed up-tower, where any accidental spill will be contained by the nacelle. Spent lubricants, oils, greases, antifreeze, cleaners, degreasers, and hydraulic fluids will be brought back to the O&M building for temporary storage before being recycled by a licensed waste disposal contractor.

Cooling oil used in the transformers does not contain PCBs. The transformers will be inspected regularly.

Towers and other ancillary equipment will arrive on site already painted and will rarely need repainting during the life of the equipment. Should any repainting be necessary, it will be performed by qualified, licensed contractors.

Herbicides may be used to minimize the potential for introduction of noxious weeds. Herbicides will be applied either by the landowner or by a licensed contract professional charged with the selection of appropriate herbicides.

Spill Management

Accidental releases of hazardous materials (e.g., vehicle fuel during construction or lubricating oil for WTGs) will be prevented or minimized through proper containment of these substances during use and transportation to the site. These liquids will be used primarily within the WTGs themselves, where any spill will be contained. Any oily waste, rags, or dirty or hazardous solid waste will be collected in sealable drums and removed for recycling or transported and disposed of by a licensed contractor.

In the unlikely event of an accidental hazardous or non-hazardous materials release, any spill or release will be cleaned up, and the contaminated soil or other materials will be disposed of and treated according to applicable local, state, and federal environmental laws and regulations. Spill kits, containing items such as absorbent pads, will be appropriately located on site to respond to accidental spills, if any were to occur. Employees handling hazardous materials will be instructed in the proper handling and storage of these materials as well as where spill kits are located. Lastly, with respect to containment of oils associated with spills or releases from substation main power transformers, these transformers will have full concrete secondary containment such that any oil releases will not contaminate site soils or groundwater.

7.2 Mitigation Measures

By following industry guidelines and turbine certification processes, TPWRJ will construct a safe, reliable, state-of-the-art facility. In addition, adequate safety devices, company operational policies and plans, and testing and commissioning procedures will be in place to further ensure safe construction and operation of the Project.

7.2.1 Failure of Machinery and/or Structures

Mitigation or prevention of impacts from mechanical failure and the Project's structures will be achieved by a combination of adherence to all appropriate engineering and construction regulations, careful Project planning and controlled site access. WTGs are equipped with multiple safety systems as standard equipment. Critical components have multiple temperature sensors and a control system to shut the system down and take it off-line if an overheating condition is detected. Lightning protection is standard on the WTGs, and a specific engineered lightning protection and grounding system will be installed for the Project.

Safety Setbacks

Due to the existing oil and gas infrastructure and taking into account residences within the Project area, TPWRJ implemented the following setbacks to further ensure safe construction and operations zones:

Roads

- SH 50: 180 m, approximately 1.5 times the tower fall-down distance
- Campbell County Roads (Moore and Van Buggenum): 150 m, approximately 1.25 times the tower fall down distance

Occupied Residences

- Non-participant residences: 0.5-mile buffer

Oil and Gas Infrastructure

- As appropriate per coordination with present oil and gas operators

Blade Throw

During construction, GE's recommended handling instructions and procedures will be implemented to prevent damage to towers or blades that could lead to failure. In addition, certification of the WTG to the requirements of IEC 61400-1 will ensure that the static, dynamic, and defined-life fatigue stresses in the blade will not be exceeded under the combined load cases expected at the Project site. The standard includes safety factors for normal, abnormal, fatigue, and construction loads. This certification, together with regular periodic inspections, will give a high level of assurance against blade failure in operation.

Ice Throw

Under the correct conditions, ice may accumulate on the tower, nacelle, or blades. If the blades are rotating, fragments can break free and be thrown. The distance ice may be thrown depends on the rotational speed of the blade, mass of the ice, wind speed and direction, aerodynamic properties of the ice fragment, and air density (among other variables). Given these variables, it is inherently difficult to determine an appropriate distance to set back a turbine to protect against ice throw. Nonetheless, some estimates can be made and, combined with observational data, effective setbacks can be recommended. Mathematical equations and statistical calculations indicate the probability of an ice throw incident is very low.

Wind Turbine Tower Collapse

Tower collapse is extremely unlikely as the towers and foundations are designed to the Wyoming State Building code, which has adopted the provisions of the 2006 International Building Code (IBC). The Project will employ a modern turbine design, including a safety system ensuring that the WTG is shut down immediately at the onset of mechanical disorders such as nacelle vibration, overspeed, grid electrical disorders, or loss of grid power. In addition, seismic provisions contained in this code will require specific engineering considerations based on site-specific seismic conditions. The tower and associated foundation will be located outside of areas prone to flooding and designed to withstand a 3-second, 130-mph gust per IEC standards. Turbine towers will incorporate structural designs capable of withstanding large seismic events, high winds, and flooding. Because all turbine structures would employ construction procedures certified as described previously, the potential hazards associated with tower collapse are less than significant.

Blade Fragment Throw

Blade fragment throw is a safety hazard which occurs if a rotor blade breaks during rotation, resulting in the ejection of a portion of the blade. Blade fragment throw can occur as a result of rotor overspeed, although such occurrences have been extremely rare and have primarily occurred with older, smaller WTGs that will not be employed at the Project. Material fatigue can also cause a blade to break.

The potential for a blade fragment throw is similar to ice throw concern. Lightning strikes causing blade failure have been documented. Acts of vandalism such as gun shots also could conceivably damage rotor blades, causing a blade fragment to be thrown. Persons, animals, and facilities within the blade fragment throw hazard zone could theoretically be at risk of being struck. However, the Project is not expected to result in any blade fragment throw risk due to the distance of WTGs from residences and public roads, and the extremely low likelihood of blade fragment throw occurring.

7.2.2 Air Quality

The following mitigation measures will be followed to reduce dust and air emissions from the Project's construction-related activities:

- Construction-related dust disturbance will be controlled by the periodic application of water or other permitted dust suppressants to all disturbed areas along the active construction right-of-way and access roads.
- Vehicles and other equipment will be maintained and kept in good repair to minimize emission of exhaust gases.
- Any stationary sources associated with construction activities requiring Wyoming Department of Environmental Quality (WDEQ) – Air Quality Division (AQD) permits will be controlled in accordance with relevant regulations and issued conditions.

7.2.3 Noise

Although no impacts to residents are anticipated, the following mitigation measures will be implemented to reduce noise and the potential for annoyance from the Project's construction-related activities:

- The Project will incorporate a minimum WTG set back of 0.5 mile from all non-participant residences.
- Construction and hauling equipment will be maintained adequately and equipped with appropriate mufflers.
- Noisy construction activities that might result in legitimate complaints, such as pile driving, if required, will be limited to daylight hours when feasible.
- Stationary construction equipment (e.g., air compressors, concrete batch plant, generators) will be located away from residences to minimize noise impacts.

7.2.4 Soils and Geologic Hazards

Plans for alleviating potential geologic hazards and impacts to soils could include, but are not limited to, the following:

- Erosion control measures and reporting measures will be prescribed in the Wyoming Pollutant Discharge Elimination System Permit (WYPDES) permit and administered through construction specifications and General Contractor implementation. An erosion control plan will be prepared that addresses excavation, grading, and placement of erosion control measures during and after construction. Site-specific erosion control measures will be monitored for effectiveness to minimize the impacts to soils during and after construction. On completion of the construction activities, all work areas, except any permanent access roads, will be regraded so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. Revegetation will be implemented for all areas temporarily disturbed by the construction of the facility.
- Construction zones and areas to be disturbed will be well-defined, limited in extent, and managed by onsite inspectors and construction managers.
- Dust generation will be minimized or eliminated by using a combination of commonly employed fugitive dust management practices for various construction-related dust sources. These include covering the ground with fabric or other materials, using dust suppressants (chemical flocculating agents), minimizing disrupted surface areas, reducing speeds, and spraying water.
- Erosion control measures will be inspected periodically and as required after precipitation events. Erosion control measures will be repaired or replaced as necessary.
- Berms and other water-channeling measures may be used to direct storm water runoff to appropriate detention ponds, where appropriate.
- Barriers and other measures including hay bales, silt fences, and straw mulches will be used to minimize and control soil erosion.

- Side slopes created by grading will not exceed the soil strength limits, as prescribed by the final road design and turbine layout engineering design. Potentially unstable areas will be identified and avoided. Temporary excavations greater than 4-ft deep will be sloped or stabilized with trench boxes, in accordance with OSHA and other standards.
- Mitigation for rapid erosion and gullying would include erosion protection structures such as rip rap and gabions in areas identified to be potentially subject to rapid erosion, properly-sized culverts at drainage crossings, and avoiding placing structures or roads in areas that are susceptible to rapid erosion or gullying.
- Seismic design issues will be fully addressed during final design site characterization of the Project. The seismic site class according to the IBC will be determined during subsequent geotechnical investigations. The facilities and turbine foundations will be designed for the maximum considered earthquake (2,500-year return period) according to seismic hazard maps in the IBC.
- Claystone and shale bedrock layers and soils with swelling potential will be identified at each turbine location during final design geotechnical investigations. Swelling clay layers will be mitigated by overexcavating below the bottom of foundations and replacing with structural fill, ensuring proper drainage during construction, and also using spread footings with impermeable backfill to prevent future water introduction and associated soil swelling.
- Areas of soils with collapsing or settling potential will be identified at each turbine location during final design geotechnical investigations. These soils will be mitigated by either overexcavating the soils and replacing with structural fill, or placing the foundations deeper on a stable bearing layer.
- Soils with corrosion potential will be identified during final design geotechnical investigations. Corrosion protection will be designed by a corrosion engineer during the final design phase of the Project. Mitigation for potentially corrosive soils could include using proper sulfate-resistant cement for foundations, and cathodic protection for buried pipes.
- Access roads will be designed based on soil properties and the requirements of the American Association of State Highways and Transportation Officials (AASHTO) for design of aggregate-surfaced roadways. The thickness of the roadway section will be determined based on the strength properties of the underlying soils, and traffic duration and frequency. During the final design geotechnical investigation, the soil strength and other properties that affect roadway design and performance will be evaluated and the pavement section will be designed accordingly to support the anticipated traffic loads.
- If loose sandy soil or swelling clays are present at crane pad locations, soil improvements will include reworking and compacting on-site soils to an appropriate depth and adding structural fill to increase the bearing pressure of the subgrade to support the anticipated crane loads.

7.2.5 Cultural Resources

The following mitigation measures will be followed to reduce cultural resources impacts from the Project's construction-related activities:

- Known cultural resource locations eligible or unevaluated for listing on the National Register of Historic Places (NRHP) shall be avoided by marking them on construction drawings as "no entry" areas and by flagging them in the field, if necessary. Construction crews shall participate in environmental compliance training, including the necessity of avoiding cultural resource sites, to further increase awareness of the site and to prevent accidental damage to known and undiscovered cultural resources.
- Should any previously unknown historic/prehistoric sites or artifacts be encountered during construction, all land-altering activities at that location shall be immediately suspended and the discovery left intact until such time that TPWRJ and the landowner are notified and appropriate measures are taken to ensure compliance with federal and state laws and regulations.
- Should any human remains be discovered, all land-altering activities at that location shall be immediately suspended and the Campbell County Coroner shall be immediately notified.
- If, during micro siting and final site design, Project features are required to be located outside of the area inventoried for cultural resources, additional surveys shall be completed to ensure avoidance of unevaluated or eligible sites.

7.2.6 Topsoil and Vegetation

TPWRJ and its contractors shall exercise care to preserve the natural landscape and shall conduct construction operations to prevent any unnecessary damage to, or destruction of, natural vegetation features. Generally, the Wyoming Department of Environmental Quality, Land Quality Division practices for topsoil handling and revegetation are oriented towards ensuring that mining activities preserve the integrity of the topsoil by minimizing the mixing of productive topsoil with the less productive subsoil during grading, trenching, and backfilling, minimizing risk of contamination, and ensuring that effective revegetation is completed. Where appropriate in temporarily disturbed areas, TPWRJ will incorporate methods to preserve topsoil by placing topsoil in a discrete row or pile along the edge of the disturbed area. Topsoil will be kept segregated from subsoil excavated from the trench or temporarily cleared area. Topsoil segregation would facilitate revegetation of these areas by preserving the more fertile topsoil and native seed bank.

Following completion of construction activities, all work areas, except any permanent access roads, shall be regraded so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. The methods described below are recommended for all areas of temporary ground disturbances throughout the Project area.

A seed mixture will be developed to effectively revegetate all temporarily disturbed areas inside the Project boundary and each respective land owner will have the final authority on the implemented seed mixture.

Seeding and mulching will be done utilizing commercially accepted practices as appropriate for the soil and terrain being restored. Temporary and permanent seeding should be done during the appropriate seasons and moisture regimes, following the onset of winter and spring seasonal rains. Disturbed, unseeded ground may require chemical or mechanical weed control in May or June, before weeds have a chance to go to seed. Erosion control measures may be installed after seeding and may include filter bags, sediment fences, silt curtains, sediment traps, or other similar devices or impervious materials. Erosion control measures will be implemented until soils are stabilized by a vegetation growth from seed planting.

The following mitigation measures will be followed to reduce impacts to native vegetation from construction-related activities:

- TPWRJ and its contractors will exercise care to preserve the natural landscape and will conduct construction operations (including all construction-related activities and TPWRJ's designated access roads and staging areas) to prevent any unnecessary damage to, or destruction of, natural vegetation features.
- Disturbed soil surfaces will be stabilized with the appropriate native seed mixture, or as requested by landowners, as soon as practicable after construction. Areas of soil disturbance shall be seeded as agreed with the landowner.
- Landscape fabric, cellulose, straw mulch, or other suitable erosion control materials will be used according to manufacturer/supplier specifications for application to ensure adequate temporary erosion control.

7.2.7 Noxious Weeds

While ground disturbing activities inherently increase the risk of weed introduction, these risks can best be mitigated through timely re-vegetation. All temporarily disturbed areas not used for Project infrastructure during construction will be seeded in accordance with the plan described above. Upon completion of construction, all staging and laydown areas will be rehabilitated.

To limit infestations and new populations, the disturbed sites will be monitored and any colonizing noxious weeds will be controlled using mechanical or chemical methods. Overall, impacts to native vegetation communities will be minimized through Best Management Practices.

7.2.8 Surface Water and Groundwater

Under Section 402 of the Clean Water Act (CWA), construction stormwater permitting is required for projects that will disturb more than 5 acres. The Project will require a WYPDES Notice of Intent (NOI) to be prepared for a general construction permit for stormwater discharges, as well as a SWPPP for the construction phase at the Project site. The construction SWPPP will focus on sedimentation and erosion controls during construction and will set forth a schedule for regular inspections of appropriate controls at the construction site.

The following mitigation measures will be followed to reduce impacts on surface water and groundwater resources from the Project's construction-related activities:

- Construction activities shall be performed using methods that prevent entrance or accidental spillage of solid matter, contaminant debris, and other objectionable pollutants and wastes into flowing streams or dry water courses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution. These prevention activities will be detailed in the Project SWPPP.
- Borrow pits shall be excavated so that water will not collect and stand in them. Before being abandoned, the sides of borrow pits shall be brought to stable slopes, with slope intersections shaped to carry the natural contour of adjacent, undisturbed terrain into the pit or borrow area, giving a natural appearance.
- Waste piles shall be shaped to provide a natural appearance. Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses shall not be performed without prior approval by the applicable land managing agency or landowner.
- Excavated material or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines, or other water course perimeters where they can be washed away by high water or storm runoff or can, in any way, encroach upon the actual water source itself.
- Turbidity control methods such as settling ponds, gravel filter entrapment dikes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods shall be used to treat waste waters from construction operations before they enter streams, water courses, or other surface waters. Any such waste waters discharged into surface waters shall be essentially free of settleable material.

7.2.9 Jurisdictional Wetland/Waters of the United States

Micro-siting appurtenant linear features during the final design phase will avoid, prevent, or minimize potential impacts to wetlands and waterbodies.

- The Project shall be constructed in compliance with the CWA, where applicable.
- Layout of the Project will be designed to avoid or minimize impacts to waters of the U.S. by locating facilities outside of delineated waters of the U.S. ordinary high water mark, where practicable.
- Nation-wide permit number 12 requires pre-construction notification of the local U.S. Army Corps of Engineers (USACE) regulatory office before dredge or fill activities may occur in waters of the U.S. if potential impacts meet or exceed 0.1 acre per 'single and complete' project crossing.

7.2.10 Visual Resources

The following mitigation measures will be followed to reduce visual resources impacts from construction-related activities:

- TPWRJ and its contractors shall exercise care to preserve the natural landscape and shall perform construction operations to prevent any unnecessary damage to, or destruction of natural features.
- Construction routes not required for operations and maintenance access shall be restored as closely as possible to the original condition, pending landowner consent.

7.2.11 Wildlife Resources

The Wyoming Game and Fish Department (WGFD) has been consulted to aid in identifying potential wildlife impacts from the Project and to reduce and monitor those impacts, if any. It was agreed during the January 19, 2010 meeting and subsequent correspondence that that crucial winter range requirements for monitoring do not apply for big game and that non-core area lek monitoring is required for greater sage-grouse. Likewise, it was agreed that specific aquatic systems monitoring will be required for new intermittent drainage disturbances.

At the request of WGFD, the following measures will be implemented to minimize or mitigate impacts to wildlife:

- TPWRJ will locate all Project infrastructure to observe a minimum 0.25-mile No Surface Occupancy buffer from occupied leks.
- TPWRJ will not directly impact nesting or brood rearing habitat within two miles of occupied leks from March 15 through June 30, unless the lek is confirmed inactive during the year of construction. However, if the current April 2010 draft *Wildlife Protection Recommendations for Wind Energy Development in Wyoming* (WGFD, 2010) are accepted by the Wyoming Game and Fish Commission, TPWRJ will honor Best Management Practice (BMP) Condition No. 10, which limits construction within two miles of occupied leks between March 15 and May 15.
- TPWRJ will construct and site all WTGs in accordance with raptor free disturbance dates presented in the April 2010 draft *Wildlife Protection Recommendations for Wind Energy Development in Wyoming* (WGFD, 2010).

7.3 Monitoring Programs

Rule I Section 7(k)(ii) – Monitoring Programs. The Applicant shall describe the procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the proposed facility, including monitoring programs to assess effects of the proposed industrial facility and the overall effectiveness of impact controls and mitigating actions.

7.3.1 Avian and Bat Fatality Monitoring

In addition to the wildlife mitigation and avoidance measures described above, monitoring studies will be implemented during the first three years of Project operations to estimate the annual number of avian and bat fatalities attributable to WTG collisions. This information will be used to inform the WGFD of the Project's avian impacts, if any, and may be used for future planning efforts of other proposed wind energy facilities.

7.3.2 Greater Sage-Grouse Lek Monitoring

TPWRJ will complete three ground count surveys of leks within 2 miles of the Project boundary during the first three years of operation where landowner access is obtained. The WGFD lek count protocol will be followed, and data collected will be provided to WGFD annually.

7.3.3 Raptor Nest Monitoring

Where landowner access is obtained, TPWRJ will complete a raptor nest survey the first spring season following the beginning of commercial operations to identify any new nests and determine the status of previously documented nests within one mile of the Project boundary. The survey will be completed between late April and early July.

7.3.4 Aquatic Monitoring

The Project area boundary and a preliminary Project layout were provided to WGFD at the January 19, 2010 meeting. The WGFD reviewed the site characteristics in detail and recommended preconstruction and post construction aquatic monitoring in a letter to TPWRJ dated April 9, 2010. However, specifics regarding monitoring were not provided in this letter. Thus, TPWRJ will conduct aquatic monitoring per the recommended level of effort agreed to with WGFD during the January 19, 2010 meeting. Specifically, TWPRJ will document preconstruction conditions at watercourse crossings where new culverts are installed as part of Project construction and/or where watercourses are crossed with new Project access roads (affected areas). Pre- and post-construction monitoring will consist of collecting photos at and immediately downstream (within 50 ft) of each affected area, once prior to construction and once annually post construction. If Project-related facilities are determined to be compromised such that impacts to adjacent watercourses are possible, TPWRJ will repair the facility in a timely manner. TPWRJ also will record observations of amphibians and reptiles incidentally encountered during scheduled aquatic monitoring visits as well as during scheduled avian and bat mortality surveys. WGFD provided the following list of species to consider for presence/absence documentation (**Table 7-1**).

7.3.5 Technical Advisory Committee Review

A Technical Advisory Committee (TAC) will review the monitoring protocols, assess study results, and prepare recommendations for TPWRJ for up to the first three years of operation. The TAC will be composed of representatives from WDEQ – Industrial Siting Division (ISD), WGFD, U.S. Fish and Wildlife Service (USFWS), and resource specialists or representatives designated by TPWRJ.

TABLE 7-1
Herpetofauna to be Considered for Incidental Presence/Absence Documentation

Common Name	Genus	Species	Subspecies
Salamanders			
Blotched Tiger Salamander	*Ambystoma*	*Mavortium*	*Melanostictum*
Toads			
Great Plains Toad	*Anaxyrus*	*Cognatus*	
Rocky Mountain Toad	*Anaxyrus*	*Woodhousii*	*Woodhousii*
Plains Spadefoot	*Spea*	*Bombifrons*	
Frogs			
American Bullfrog	*Lithobates*	*Catesbeianus*	
Northern Leopard Frog	*Lithobates*	*Pipiens*	
Boreal Chorus Frog	*Pseudacris*	*maculate*	
Turtle			
Western Spiny Softshell	*Apalone*	*Spinifera*	*Hartwegi*
Eastern Snapping Turtle	*Chelydra*	*serpentine*	*serpentine*
Western Painted Turtle	*Chrysemys*	*Picta*	*bellii*
Lizards			
Greater Short-horned Lizard	*Phrynosoma*	*Hernandesi*	
Northern Sagebrush Lizard	*Sceloporus*	*Graciosus*	*grasiosus*
Snakes			
Eastern Yellow-bellied Racer	*Coluber*	*Constrictor*	*flaviventris*
Prairie Rattlesnake	*Crotalus*	*Viridis*	-
Plains Hog-nosed Snake	*Heterodon*	*Nasicus*	-
Pale Milksnake	*Lampropeltis*	*Triangulum*	*multistriata*
Smooth Greensnake	*Opheodrys*	*Vernalis*	
Bullsnake	*Pituophis*	*Catenifer*	*sayi*
Black Hills Red-bellied Snake	*Storeria*	*Occipitomaculata*	*pahasapae*
Plains Black-headed Snake	*Tantilla*	*Nigriceps*	
Wandering Gartersnake	*Thamnophis*	*Elegans*	*vagrans*
Plains Gartersnake	*Thamnophis*	*Radix*	-
Red-sided Gartersnake	*Thamnophis*	*Sirtalis*	*Parietalis*

Source: WGFD, 2010.

7.3.6 Employee Orientation Program

Construction workforce members will attend a new employee orientation program, in which they are provided information to enhance wildlife awareness, minimize impacts to wildlife, and understand their role in compliance with TPWRJ permit conditions and commitments. Personnel will be instructed on what to do when encountering dead or injured wildlife during construction.

Section

8

Section 8
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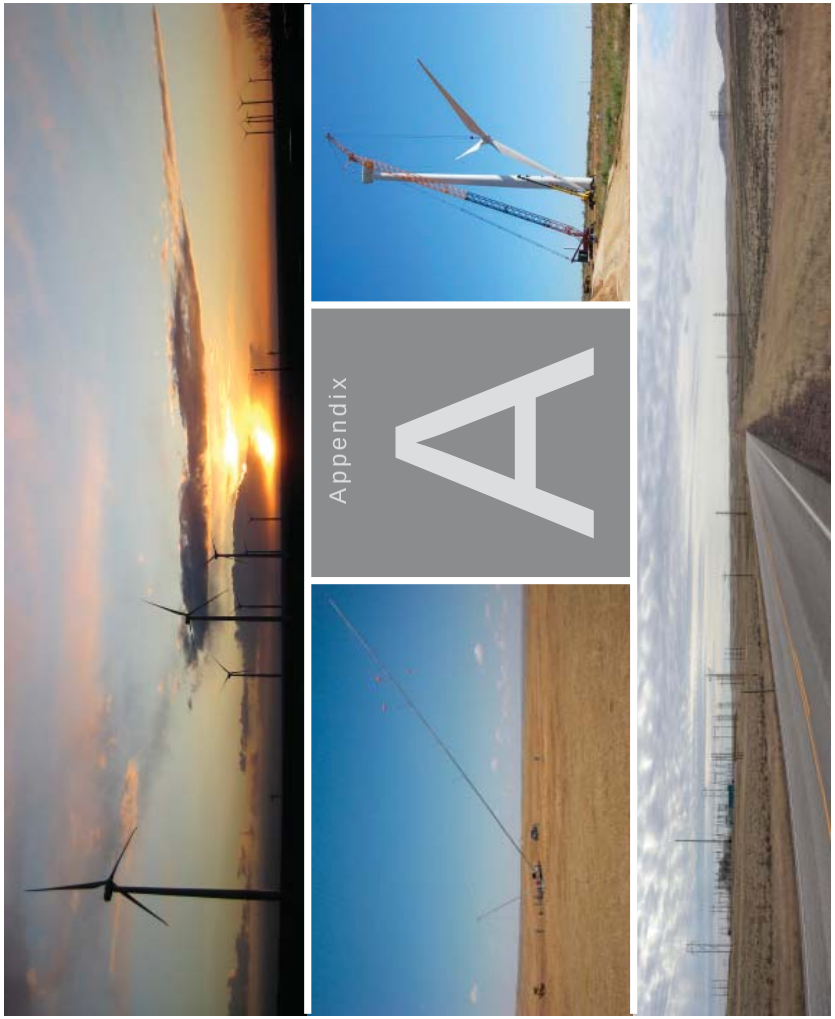
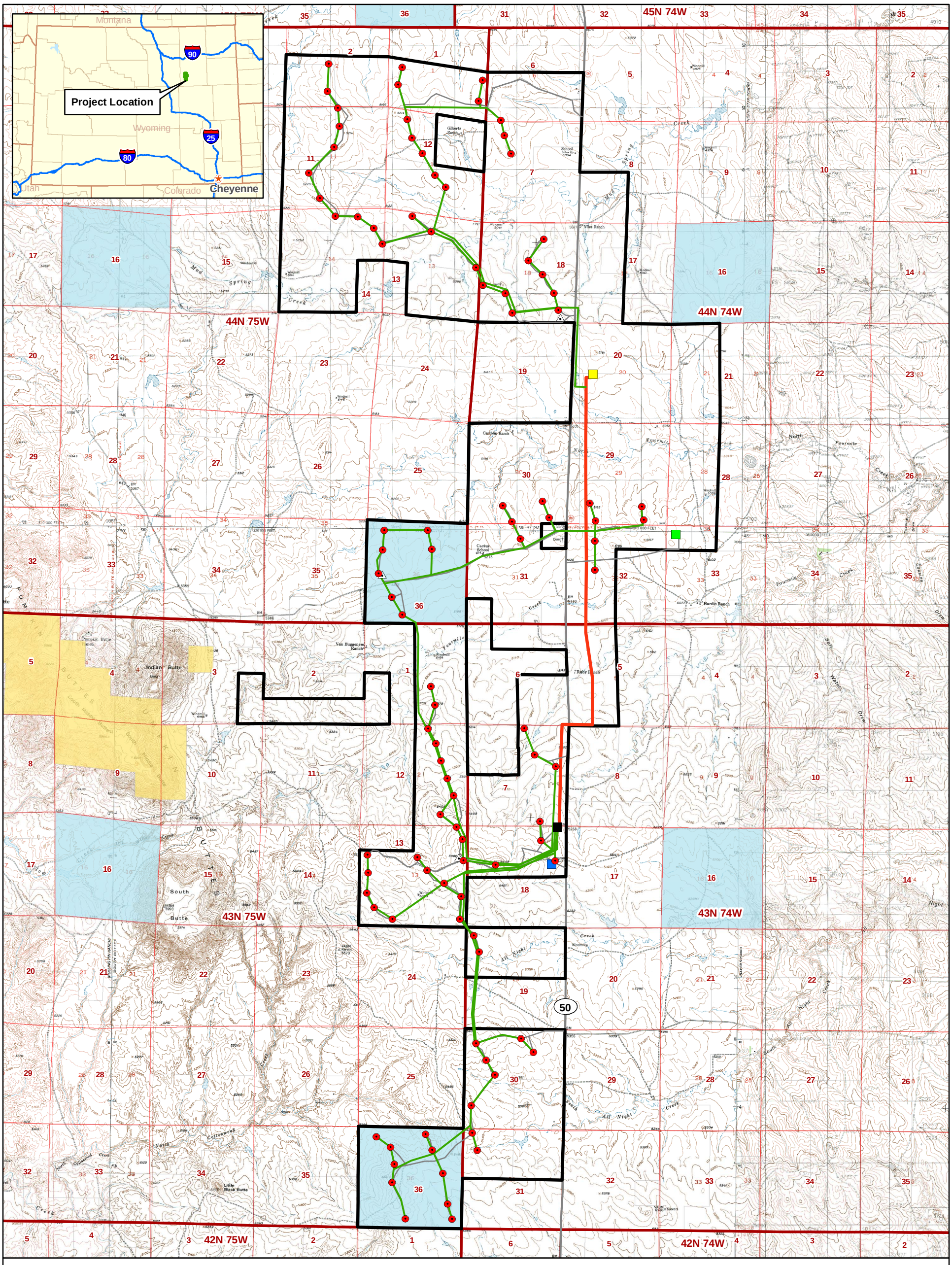
Appendix A
Preliminary Site Layout





Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Land Ownership

BLM
Private
State

Preliminary Site Layout
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

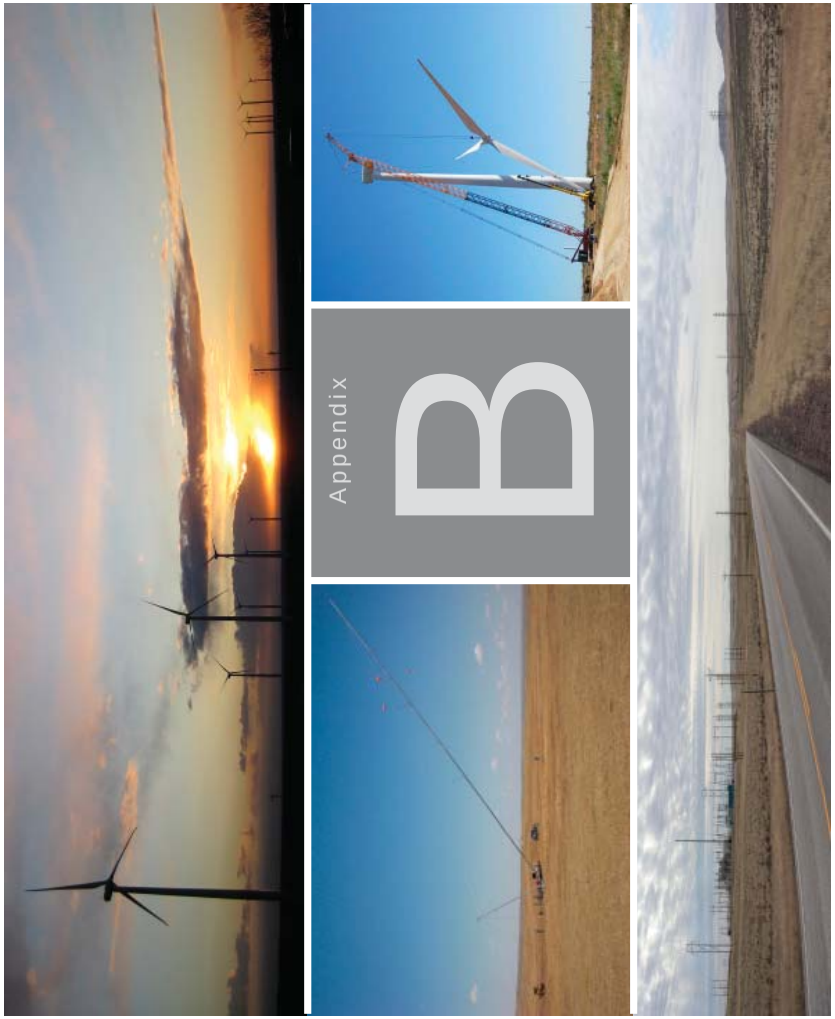
N

Source: BLM, 2009

0 0.5 1 2
Miles

\\COBRA\PROJ\RENO_JUNCTION_WIND_FARM_399159\GIS\MAPFILES\ISA\SITE_MAP_11X17.MXD JQUAN 4/13/2010 13:09:43

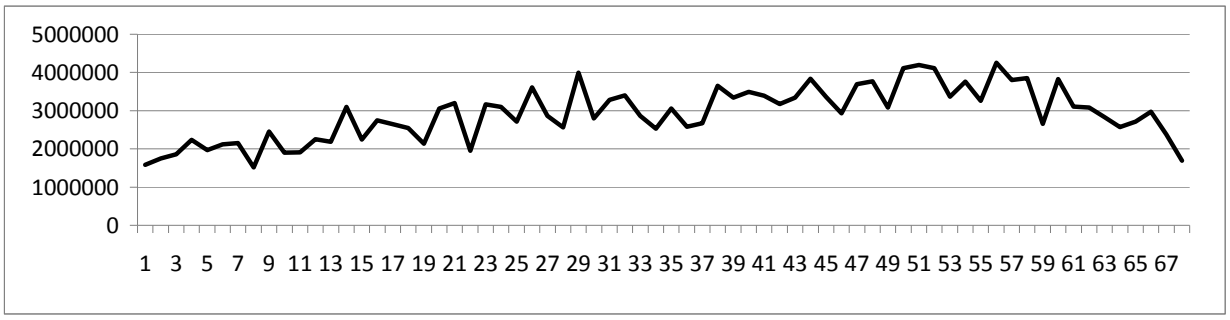
Appendix B
Impact Assistance Calculation



History of State Sales and Use Taxes Given to Campbell County Governments

		State Share Given			State Share Given to Muni's			Total
Serial	Month	Sales	Use	Total	Sales	Use	Total	
1	July 04	19,214	1,492	20,706	1,493,209	66,992	1,560,201	1,580,907
2	Aug 04	26,858	2,573	29,431	1,600,175	123,065	1,723,240	1,752,671
3	Sep 04	27,170	2,061	29,231	1,679,376	147,269	1,826,645	1,855,876
4	Oct O4	26,810	2,204	29,014	2,046,228	163,305	2,209,533	2,238,547
5	Nov 04	27,212	2,499	29,711	1,788,048	147,049	1,935,097	1,964,808
6	Dec 04	24,507	2,457	26,964	1,842,499	252,541	2,095,040	2,122,004
7	Jan 05	22,546	1,888	24,434	1,926,691	203,212	2,129,903	2,154,337
8	Feb 05	24,214	1,759	25,973	1,367,870	122,216	1,490,086	1,516,059
9	Mar 05	26,788	2,285	29,073	2,238,129	187,671	2,425,800	2,454,873
10	Apr 05	20,949	2,230	23,179	1,695,332	186,743	1,882,075	1,905,254
11	May 05	24,262	3,530	27,792	1,771,057	107,283	1,878,340	1,906,132
12	Jun 05	25,271	2,985	28,256	2,036,692	191,984	2,228,676	2,256,932
13	Jul 05	24,351	2,847	27,198	1,921,262	238,753	2,160,015	2,187,213
14	Aug 05	39,913	3,312	43,225	2,819,956	233,878	3,053,834	3,097,059
15	Sep 05	28,414	2,910	31,324	1,986,228	230,344	2,216,572	2,247,896
16	Oct 05	32,345	3,022	35,367	2,571,060	143,783	2,714,843	2,750,210
17	Nov 05	28,606	2,879	31,485	2,403,964	207,730	2,611,694	2,643,179
18	Dec 05	27,171	2,991	30,162	2,222,240	291,293	2,513,533	2,543,695
19	Jan 06	28,025	2,292	30,317	1,996,844	104,423	2,101,267	2,131,584
20	Feb 06	30,196	3,007	33,203	2,743,016	277,549	3,020,565	3,053,768
21	Mar 06	33,732	2,590	36,322	2,909,204	255,592	3,164,796	3,201,118
22	Apr 06	21,888	2,512	24,400	1,813,627	114,087	1,927,714	1,952,114
23	May 06	33,135	5,201	38,336	2,918,503	212,058	3,130,561	3,168,897
24	Jun 06	31,963	4,412	36,375	2,697,308	366,019	3,063,327	3,099,702
25	Jul 06	29,199	3,345	32,544	2,411,128	266,494	2,677,622	2,710,166
26	Aug 06	42,718	5,272	47,990	3,221,708	341,478	3,563,186	3,611,176
27	Sep 06	33,391	4,160	37,551	2,493,909	334,220	2,828,129	2,865,680
28	Oct 06	33,211	4,924	38,135	2,309,982	214,965	2,524,947	2,563,082
29	Nov 06	39,672	5,918	45,590	3,466,546	481,198	3,947,744	3,993,334
30	Dec 06	30,081	4,697	34,778	2,417,870	346,277	2,764,147	2,798,925
31	Jan 07	34,144	4,032	38,176	2,809,964	437,885	3,247,849	3,286,025
32	Feb 07	32,011	4,598	36,609	3,071,970	295,082	3,367,052	3,403,661
33	Mar 07	29,967	3,725	33,692	2,527,289	306,922	2,834,211	2,867,903
34	Apr 07	27,668	3,205	30,873	2,147,152	352,804	2,499,956	2,530,829
35	May 07	34,154	4,746	38,900	2,658,911	360,856	3,019,767	3,058,667
36	June 07	28,029	3,774	31,803	2,291,090	258,916	2,550,006	2,581,809
37	July 07	34,483	5,735	40,218	2,290,296	340,252	2,630,548	2,670,766
38	Aug 07	40,418	6,146	46,564	3,197,082	408,214	3,605,296	3,651,860
39	Sep 07	36,076	2,450	38,526	2,829,502	473,273	3,302,775	3,341,301
40	Oct 07	39,499	9,677	49,176	3,024,612	415,370	3,439,982	3,489,158
41	Nov 07	36,807	3,740	40,547	3,036,265	313,724	3,349,989	3,390,536
42	Dec 07	31,773	4,826	36,599	2,631,149	506,691	3,137,840	3,174,439
43	Jan 08	34,167	4,218	38,385	2,989,245	313,991	3,303,236	3,341,621
44	Feb 08	35,743	5,729	41,472	3,153,859	640,564	3,794,423	3,835,895
45	Mar 08	31,297	4,240	35,537	2,914,946	406,510	3,321,456	3,356,993
46	Apr 08	30,891	3,129	34,020	2,716,596	182,463	2,899,059	2,933,079
47	May 08	34,622	5,031	39,653	3,194,555	457,446	3,652,001	3,691,654
48	Jun 08	33,178	4,002	37,180	3,395,673	333,348	3,729,021	3,766,201
49	July 08	32,534	3,467	36,001	2,809,747	233,637	3,043,384	3,079,385
50	Aug 08	46,487	5,679	52,166	3,574,486	481,579	4,056,065	4,108,231
51	Sep 08	44,616	4,874	49,490	3,803,060	339,547	4,142,607	4,192,097
52	Oct 08	44,347	4,747	49,094	3,720,504	346,704	4,067,208	4,116,302
53	Nov 08	37,687	4,915	42,602	3,064,038	256,970	3,321,008	3,363,610

54	Dec 08	35,956	4,694	40,650	3,369,090	350,641	3,719,731	3,760,381
55	Jan 09	33,771	4,172	37,943	2,944,320	279,518	3,223,838	3,261,781
56	Feb 09	41,692	5,030	46,722	3,683,595	524,730	4,208,325	4,255,047
57	Mar 09	31,623	6,177	37,800	2,989,245	773,152	3,762,397	3,800,197
58	Apr 09	30,708	5,411	36,119	3,084,527	731,672	3,816,199	3,852,318
59	May 09	24,586	3,665	28,251	2,266,553	356,808	2,623,361	2,651,612
60	June 09	30,623	5,482	36,105	2,772,409	1,015,634	3,788,043	3,824,148
61	July 09	27,410	3,205	30,615	2,959,598	118,212	3,077,810	3,108,425
62	Aug 09	31,069	3,050	34,119	2,571,601	474,308	3,045,909	3,080,028
63	Sept 09	29,907	4,098	34,005	2,193,564	599,466	2,793,030	2,827,035
64	Oct 09	28,255	3,534	31,789	2,163,065	379,995	2,543,060	2,574,849
65	Nov 09	32,355	3,265	35,620	2,583,956	94,579	2,678,535	2,714,155
66	Dec 09	29,674	3,014	32,688	2,745,064	192,371	2,937,435	2,970,123
67	Jan 10	23,862	3,477	27,339	2,079,357	274,598	2,353,955	2,381,294
68	Feb 10	28,092	858	28,950	2,250,727	(587,474)	1,663,253	1,692,203
						Base Period Amount =		2,956,366

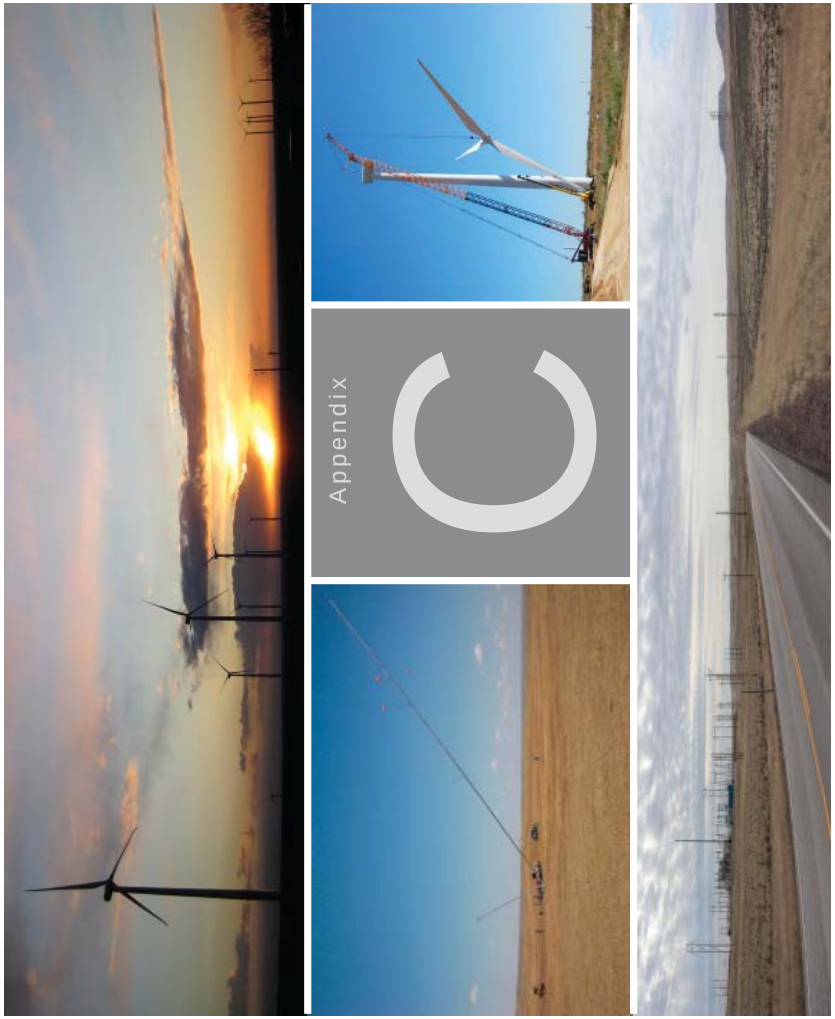


Forecast of Impact Assistance Based on a Twelve Month History

Serial	Month	*SLR*	BasePeriod	**Impact Assistance**
69	Mar 2010	*1,956,544*	2,956,366	***(999,821)***
70	Apr 2010	*1,799,441*	2,956,366	***(1,156,924)***
71	May 2010	*1,642,339*	2,956,366	***(1,314,027)***
72	June 2010	*1,485,236*	2,956,366	***(1,471,130)***
73	July 2010	*1,328,133*	2,956,366	***(1,628,233)***
74	Aug 2010	*1,171,030*	2,956,366	***(1,785,336)***
75	Sept 2010	*1,013,927*	2,956,366	***(1,942,438)***
76	Oct 2010	*856,824*	2,956,366	***(2,099,541)***
77	Nov 2010	*699,721*	2,956,366	***(2,256,644)***
78	Dec 2010	*542,619*	2,956,366	***(2,413,747)***
79	Jan 2011	*385,516*	2,956,366	***(2,570,850)***
80	Feb 2011	*228,413*	2,956,366	***(2,727,953)***

0	Forecast average monthly impact assistance
0	Forecast yearly impact assistance
0.117	Forecast growth rate in sales & use tax

Appendix C
Housing Commitments



Sam Littlefield

From: Charlie Karustis
Sent: Friday, March 12, 2010 9:45 AM
To: Sam Littlefield
Subject: FW: Room rate quotes, Gillette, WY

Charlie Karustis
Director of Development, Western Region
Third Planet Windpower, LLC
Office: 503-281-3188
Cell: 503-720-2510
Karustisc@thirdplanetwind.com

-----Original Message-----
From: bestvaluegillette@vcn.com [mailto:bestvaluegillette@vcn.com]
Sent: Friday, March 12, 2010 11:42 AM
To: Charlie Karustis
Subject: Room rate quotes, Gillette, WY

Dear Mr. Littlefield,

Here is the requested information from our conversation regarding room availability and pricing. The rates quoted will be good thru June 2011.

1. 50 rooms altogether.
2. We have 20 single rooms and 30 double rooms available.
3. Single, Double, Weekly and Nightly rates are as follows:
   $59.99 Single daily occupancy
   $69.99 double daily occupancy
   $350 double occupancy weekly
   $275 single weekly rate occupancy
4. Amenities include: refrigerator and microwave in all rooms, TV?s, iron and iron board, continental breakfast including biscuits and gravy, outdoor pool (seasonal) 5. Nearby restaurants and stores are:
   A. Hardee?s Restaurant across the street
   B. Smiths grocery store
   C. Restaurants within walking distance
   D. Wal-Mart and Kmart stores
   E. Car rental service across street
   F. Kwik Shop convenience Store across the street

I hope this answers all your questions. Feel free to call with any questions that you may have at 307-682-9341.

Sincerely,
Carolyn Patterson
Manager
America?s Best Value Inn
608 E. 2nd Street
Gillette, WY 82717

Sam Littlefield

From: Nicole Brown [bwtwlnmb@yahoo.com]
Sent: Friday, March 12, 2010 4:06 PM
To: Sam Littlefield
Subject: RE: Gillette Hotels

Thank you, for getting back to so fast. Here are the ansnwers I you need:
Best Western Tower West Lodge
109 N US Hwy 14-16
Gillette, WY 82716
(307)686-2210ph
(307)682-5105fax

We have a total of 189 rooms on this property. They break down as follows: 144 doubles, 39 singles, and 6 suites. Our rates range from $79.99-$229.99 for 2010. The highest being our peak season during a countywide event in mid July. We charge person in our rooms instead by bed types.

We do have weekly rates, they are currently $299.00/week. At this time I do not expect this weekly rate to change.

I also do negotiate rates for companies depending on how many nights per year in which they stay. For your project I would be able to do $49.99 single or double occupancy per night or offer the weekly rate of $299.00.

We are a full service hotel. We have a restaurant & Lounge on property. We do not have a comtinental breakfast but do offer every guest a 15% discount off breakfast in our restaurant. Every guest is also welcome to 1 complimentary beverage in our lounge daily. We have an indoor pool & spa, exercise room, and laundry facilities on property, also.

We are located at exit 124 off I-90. There are several restaurants, convienent stores, and 1 grocery store with a 3 block radius.

I hope this is helpful to your project. I look forward to working with you in the future.

--- On **Fri, 3/12/10, Sam Littlefield <*littlefields@thirdplanetwindpower.com*>** wrote:

From: Sam Littlefield <littlefields@thirdplanetwindpower.com>
Subject: RE: Gillette Hotels
To: "Nicole Brown" <bwtwlnmb@yahoo.com>
Date: Friday, March 12, 2010, 9:46 PM

Nicole,

Sorry, I sent it yesterday, and I believe to the address below, but it is as follows. Thanks for following up, as nothing bounced back, so I wouldn't have known it didn't make it.

****

Ms. Brown,

Per our discussion today, I wonder if you can send me an email or letter outlining the following information. It would be great if you could acknowledge receipt of this email, and follow up with an email or email with letter attachment each for the Best Western and Comfort Inn and Suites. Again, we are already working directly with folks at the other hotels you are associated with.

1. Total number of rooms
2. Number of double occupancy, single occupancy, and suites (if appropriate)
3. Expected occupancy rate assuming status quo from right now (i.e. oil prices don't spike to $140)
4. In-hotel amenities (restaurant, continental breakfast, gym, pool, etc., as appropriate)
5. Rates by room type, price breaks for weekly or monthly stay
6. Nearby amenities (grocery store, WalMart, restaurants, recreation center, etc., as appropriate)

If you have hotel flyers that you can attach to the email, that would also be appreciated. My contact information is below. Again, we're hoping to have an email response with whatever information you're able to provide in the next day or so, understanding that it is short notice.

****

&nbs
p;

Best regards,

Sam Littlefield

Project Developer

Third Planet Windpower, LLC

Office: 503-471-1372

Cell: 503-333-9130

littlefields@thirdplanetwind.com

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From: Nicole Brown [mailto:bwtwlnmb@yahoo.com]
Sent: Friday, March 12, 2010 4:42 PM
To: Sam Littlefield
Subject: Gillette Hotels

Good afternoon, Sam! This is Nicole with the Best Western & Comfort Inn & Suites in Gillette, WY. I have not received your questionaire yet, and was wondering if you could re-send it.

Thank you:

Nicole Brown

Operations Manager

bwtwlnmb@yahoo.com

904 Country Club Road/Gillette, Wyoming
Just off of Highway 59 and I-90

(307) 682-6100

Contact Lynn Roush directly to negotiate rates for 2010
Gillette@timberlinehotels.com or
Hotel Direct-307-682-6100 ext.405

- The Candlewood Suites is a new construction, extended stay hotel. We opened in January of 2009.
- Each studio is designed like an apartment with a full kitchen and ample work space.
- The Candlewood Suites has an onsite convenience store, outdoor sports court and an outdoor location for guests to grill.
- Free guest laundry
- Studios have a DVD/CD player an over-stuffed recliner and free high-speed wireless internet.

www.timberlinehotels.com

For additional information or to make reservations please contact Lynn Roush or Stephanie Gerdts at (307) 682-6100

Dear Mr. Littlefield,
It was nice to hear from you again. I figured you were a little busy and would contact me when you were ready. I appreciate you considering our two properties in Gillette. I received Lori's e-mail that she had sent you. Here is the information that you requested about the Candlewood Suites.

1. Total number of rooms – 83
2. Number of double occupancy, single occupancy, and suites (if appropriate).
   24 double occupancy rooms
   55 single occupancy rooms
   4 one bedroom suites
3. Expected occupancy rate assuming status quo from right now (i.e. oil prices don't spike to $10)
   We are offering you special rates and we will not increase your rates due to special events (i.e. Sturgis, CBM Fair, and NHFR).
4. In-hotel amenities (restaurant, continental breakfast, gym, pool, etc., as appropriate)

   We have a gym, free laundry, flat screen TV with DVD players in every room, full size refrigerator with ice maker, dishwasher, disposal, free DVD lending library, Candlewood Cupboard-"convenient store", gazebo with gas grills, all pots and pans, dishes, utensils in room with two burner stove top, coffee, toaster, microwave oven, recliner, desk/table, free Wi-Fi.
5. Rates by room type, price breaks for weekly of monthly stay.
   - nights $89
   - nights $79
   - nights $69
   - 30+ nights $59
6. Nearby amenities (grocery store, Wal-Mart, restaurants, recreation center, etc., as appropriate).

We have a central location that is within a few blocks of Smiths Grocery, Albertson's Grocery, Wal-Mart, Walgreen's, Flying J Truck Stop, and Common Cents Convenience Store. Then across the street from us there is an Applebee's, Quizno's, A&W/Long John Silver's, and Bootlegger's (local Restaurant). A couple blocks further, there is also the China Buffet, Wendy's Dairy Queen, and Las Margaritas (local Mexican restaurant). We are within several blocks of Club Energize.

Thanks again for your time,

Lynn Roush
Director of Sales
Candlewood Suites and Holiday Inn Express, Gillette, WY
307-682-6100 Office
gillette@timberlinehotels.com

Sam Littlefield

From: marykelley@vcn.com
Sent: Thursday, March 11, 2010 4:16 PM
To: Sam Littlefield
Subject: Clarion Inn Information

Hi Sam - the Clarion Inn & Convention Center is happy to submit information to help with your industrial siting process for the wind farm in southern Campbell County. Here are the answers to your
questions:
1. We have 159 rooms total
2. We have 69 non-smoking kings; 6 smoking kings; 2 handicapped non-smoking kings; 6 pet non-smoking kings; 5 pet non-smoking double queens; 58 non-smoking queens; 13 suites with one king.
3. Occupancy averages 40% during slower months and can be 100% during major events in the community. Typical summer occupancy would be 70-75%.
4. We have a pretty long list of amenities: free indoor swimming pool; hot tub; baby pool; steam room; free deluxe continental breakfast (3-4 hot items plus continental items); fitness center; free newspapers; huge parking lot; free shuttle during regular 8-5 hours; pets allowed; free wireless internet; on-site restaurant and bar; room service; free telephone; premium and cable channels; some vehicle hook-ups; Mountain Mudd Espresso on-site; discounts at restaurant and espresso bar; 24-hour front desk staff; massage therapist (male) on-site; banquet and meeting rooms up to 400 person capacity; catering, sack lunches; guest laundry; valet laundry; ATM.
5. Room prices run $65 - $129 with discounts for extended stay, government, military. Discount for guaranteed room block. We would be happy to offer you a great negotiated rate when you get to that point.
6. Nearby amenities: within walking distance - A&W/Long John Silver; Applebee's; Dairy Queen; Great Wall Chinese Restaurant; Las Margaritas Mexican Restaurant; Quizno's; dry cleaners; dollar store; Office Depot; bank; electronic store; Mexican novelties store.

Across the street: Walgreens; Wal-Mart; K-Mart; Albertson's grocery; Perkins Restaurant; pizza restaurant; bagel shop; movie rental and book store; clothing shops; Ace Hardware with P.O. and Penney's outlet; Burger King, KFC; Papa Murphy's Pizza; automotive supplies; several banks; travel agent.

Within a few miles: new recreation center opening in April; movie theatres; bowling; numerous restaurants; downtown; parks; fishing lakes; walking paths; convention center; visitor's center.

Airport is approx. 8 miles north of us.

If there is anything else I can tell you about the Clarion or about Gillette and Campbell County, please feel free to ask. I have been involved in Campbell County tourism and hospitality for quite a few year and am very proud of our community. I hope we have a chance to meet and make a formal presentation to you in the near future. Thank you! Mary Kelley, Director of Marketing, Clarion Inn & Convention Center, Gillette, WY

Sam Littlefield

From: CX-Gillette, WY [cx_gill@countryinns.com]
Sent: Wednesday, March 10, 2010 3:24 PM
To: Sam Littlefield
Subject: RE: Third Planet Windpower hotel needs follow up email
Attachments: image001.png

1. 80 Rooms
2. 32 two Queen rooms, 22 one King rooms, 26 suites in various configurations.
3. As we are a fairly new hotel, occupancy is around 50% at present.
4. Hot buffet breakfast, fitness room, business center. We are attached to the Caribbean Cove Water Park which is an extra fee if not a member of our frequent stayer program, Goldpointsplus.
5. Rates for a guest room currently are 92.99 per night, going up to 119.99 and 129.99 for the summer months. We do have an extended stay rate that is available for stays over 7 days that is 15% off. However, If you can give me an idea of nights, I'm sure we can do better than that. Suites start at $10 to $20 extra depending on configuration. (studio, executive, whirlpool, etc.)
6. We are on the Main "Drag" with a large grocery store across the highway from us as well as a Super Wal-Mart just short of a block away.

There are several dinning options close by, including a Perkins Restaurant, as well as a wide variety of Fast Food places.
Following is some more information on the hotel. If I do say so myself, this is a great property to stay for extended visits. We have several companies and individuals that stay with us on a regular basis, and tell us it is like "coming home" when they stay with us.

Susan Blaylock
General Manager
Country Inn and Suites
Gillette, WY 82718
(T) 307-682-0505
(F) 307-682-0550
cx_gill@countryinns.com

The brand new Country Inn & Suites is providing 5 STAR service for all you hotel needs.

The hotel proudly features:

- Complimentary Full Hot Breakfast Buffet
- Coffee, Tea, Hot Chocolate, fresh baked Cookies 24 hours a day
- Free Wireless High Speed Internet Access
- 32” LCD TV’s with HBO
- Deluxe Oversize Rooms with plenty of Workspace
- Free Airport Shuttle
- Reward yourself with GoldPoints Plus frequent guest program
- Attached to ***CARIBBEAN COVE WATER PARK***

- Smoke Free/ Pet Free facility
- 24hr Expanded Fitness Room
- 24 hr Business Center
- Read It and Return Lending Library

The Hotel is conveniently located:

- Centrally Located
- 7 miles for Gillette Campbell County airport
- Near Shopping and many Restaurants

2597 S. Douglas Highway - Gillette, WY 82718 - 307-682-0505

800-456-4000 cx_gill@countryinns.com www.countryinns.com/gillettewy

Thank you for your interest and we hope to see you soon.

From: Sam Littlefield [mailto:littlefields@thirdplanetwindpower.com]
Sent: Wed 3/10/2010 12:58 PM
To: CX-Gillette, WY
Subject: Third Planet Windpower hotel needs follow up email

Ms. Blaylock
Per our discussion earlier today, I wonder if you can send me an email or letter outlining the following information. It would be great if you could acknowledge receipt of this email.

1. Total number of rooms
2. Number of double occupancy, single occupancy, and suites (if appropriate)
3. Expected occupancy rate assuming status quo from right now (i.e. oil prices don't spike to $140)
4. In-hotel amenities (restaurant, continental breakfast, gym, pool, etc., as appropriate)
5. Rates by room type, price breaks for weekly or monthly stay
6. Nearby amenities (grocery store, WalMart, restaurants, recreation center, etc., as appropriate)

If you have a hotel flyer that you can attach to the email, that would also be appreciated. My contact information is below. Again, we're hoping to have an email response with whatever information you're able to provide in the next day or so, understanding that it is short notice.

Best regards,

Sam Littlefield
Project Developer
Third Planet Windpower, LLC
Office: 503-471-1372
Cell: 503-333-9130
121 SW Salmon Street
Ste. 1100

Portland, OR 97204
littlefields@thirdplanetwind.com

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Sam Littlefield

From: Zanfar Khan [Zanfar.Khan@hilton.com]
Sent: Friday, March 12, 2010 1:38 PM
To: Sam Littlefield
Subject: RE: Third Planet Windpower follow up email.
Attachments: image001.png

Information following.....

From: Sam Littlefield [littlefields@thirdplanetwindpower.com]
Sent: Wednesday, March 10, 2010 1:17 PM
To: GILWY Hampton
Subject: Third Planet Windpower follow up email.

Ms. Carter,
Per our discussion earlier today, I wonder if you can send me an email or letter outlining the following information. It would be great if you could acknowledge receipt of this email.

1. Total number of rooms - 57
2. Number of double occupancy, single occupancy, and suites (if appropriate)
   doubles - 34 singles - 20 suites - 3
3. Expected occupancy rate assuming status quo from right now (i.e. oil prices don't spike to $140)
   75% - 100%
4. In-hotel amenities (restaurant, continental breakfast, gym, pool, etc., as appropriate)
   hot continental breakfast - free internet - indoor pool and hot tub - fitness center
5. Rates by room type, price breaks for weekly or monthly stay
   All rooms --- Monday - Thursday $129 (til May) -- Friday-Sunday $99/night (til May)
   MAY -- $149/night
   JUNE - AUG -- $179/night
   Normal corporate discount -- $20 off during week ($10 off during weekend (til May))
   Talking with Owner on possibility of Price Break for weekly or monthly stays
6. Nearby amenities (grocery store, WalMart, restaurants, recreation center, etc., as appropriate)
   Walking distance - grocery store, Subway, Pizza Hut, Burger King, Los Compadres, Hong Kong Restaurant, Longer Walk -- Gym, Movie Theaters.
   Driving distance - Walmart, Kmart, Walgreens, other groceries and restaurants, rec center, bowling.

If you have a hotel flyer that you can attach to the email, that would also be appreciated.
www.hamptoninn.com

My contact information is below. Again, we're hoping to have an email response with whatever information you're able to provide by the end of this week, understanding that it is short notice. If you can later follow up with weekly or monthly rates, if something like that can be arranged, then that would be great.

Best regards,

Sam Littlefield
Project Developer
Third Planet Windpower, LLC
Office: 503-471-1372

Cell: 503-333-9130
121 SW Salmon Street
Ste. 1100
Portland, OR 97204
littlefields@thirdplanetwind.com

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I-90 and Highway 59
1908 Cliff Davis Drive
Gillette, Wyoming

- **83 Guest Rooms**
- **Complimentary Smart Start Breakfast Bar (including: biscuits and gravy, cheese omelets, scrambled eggs, hard-boiled eggs, bacon, sausage, assorted breads and muffins, cinnamon rolls, yogurt, assorted hot and cold cereals, assorted juices, milk, tea, and coffee)**
- **Complimentary Popcorn and Fresh Baked Cookies every evening**
- **Complimentary High Speed Internet**
- **On-site Business Center**
- **Indoor Pool and Whirlpool**
- **On-site Fitness Center**
- **Microwave and Refrigerator in each guest room**
- **On-site coin operated laundry facility**

Contact Lori VanWinsen-Moore, General Manager at 307-686-9576 or Lynn Roush, Sales Manager for the Holiday Inn Express and Candlewood Suites at 307-682-6100

1908 Cliff Davis Drive
Gillette, WY 82718

www.timberlinehotels.com

Sam Littlefield

From: Holiday Inn Express [hiegillette@yahoo.com]
Sent: Friday, March 05, 2010 4:53 PM
To: Sam Littlefield
Subject: Holiday Inn Express- Gillette, Wyoming
Attachments: Detailed Sales Flyer.doc

Dear Mr. Littlefield,

Thank you for your interest in our beautiful hotel. We have not talked or met, but I manage the Holiday Inn Express in Gillette, Wyoming. Lynn Roush, our hotel's sales manager, forwarded a copy of your e-mail requesting more information about our hotel. I am attaching an informational sheet about our hotel, and here are the answers you were also needing:

1. Total number of rooms- 83
2. Number of double occupancy, single occupancy, and suites (if appropriate)-
   41 double queen rooms (36 non-smoking, 2 smoking, and 3 wheelchair accessible)
   14 king rooms (11 non-smoking, 2 smoking, and 1 wheelchair accessible)
   12 king suites (all non-smoking, negotiated rates do not generally apply to these king suites)
   1 jacuzzi suite (non-smoking, negotiated rates do not apply to this room at all)
3. Expected occupancy rate assuming status quo from right now (i.e. oil prices don't spike to $10)- $89
4. In hotel amenities (restaurant, continental breakfast, gym, pool, etc., as appropriate)-
information is listed on the attached sheet
5. Rates by room type, price breaks for weekly or monthly stay- for a standard room (either a double queen or king room) the rate is $89, as listed above; king suites vary from $129-$159, depending on the date of stay; and the jacuzzi suite varies from $159-$199, also depending on the date of stay. Unfortunately, we do not offer weekly or monthly rates.
6. Nearby amenities (grocery store, WalMart, restaurants, recreation center, etc., as appropriate)- We have a central location that is within a few blocks of Smiths Grocery, Albertson's Grocery, WalMart, Walgreen's, Flying J Truck Stop, and Common Cents Convenience Store. Across the street from us, there is an Applebee's, Quizno's, A&W/Long John Silver's, and Bootlegger's (local restaurant). A couple blocks further, there is also the China Buffet, Wendy's, Dairy Queen, and Las Margaritas (local Mexian restaurant). We are within 6 blocks of the Campbell County Recreation Center and Club Energize (two local rec centers/gyms).

I hope this is information is helpful, but if you should find you have more questions, please feel free to contact either myself or Lynn. I can be reached directly via e-mail or by phone, 307-686-9576, ext. 4404 or toll free 1-866-690-9800.

Thanks and have a great day!

Lori Van Winsen-Moore
General Manager
Holiday Inn Express
1908 Cliff Davis Drive
Gillette, WY 82718
PH: 307-686-9576
FAX: 307-686-9573
hiegillette@yahoo.com
www.timberlinehotels.com

Sam Littlefield

From: M&A Motel [tcdreams@collinscom.net]
Sent: Wednesday, March 03, 2010 10:38 AM
To: Sam Littlefield; Charlie Karustis
Cc: tcdreams@vcn.com
Subject: M&A Motel in Wright, WY

We just wanted to tell you a little about our motel and hope that you will consider staying with us during the course of the Reno Junction Project.

M&A Motel is just two years old and is centrally located on the corners of WY Hwy 387 and 59. Our motel features 17 double queen rooms and 1 handicap accessible room. Included in our amenities are a mini-refrigerator, microwave oven, sink, satelite cable, DSL internet and an onsite laundry facility. We are convienently located next to Subway, Micks Car Wash, Exxon Mobil gas station, and Hanks Bar and Grill. We currently do not allow pets and have a strict non-smoking policy. However, all of our door are exterior doors so you can walk right outside from your motel room. Our staff is dedicated to making your stay with us as enjoyable as possible.
You can check us out on the web @ www.mamotel.net or by phone @ 307-464-1115.
Our current rates are $59.95 per room a night or $350.00 per room for a week.
Please let us know if you have any futher questions or if we may assist you in any way.

Thanks
Kelli Strohschein
M&A Motel Manager

March 11, 2010

Dear Sam Littlefield,

Thank you for calling to inquire about our rooms and accommodations and allowing **National 9 Inn of Wright** the opportunity to offer you great competitive rates!

We are the **absolute best** set-up in town for groups and long-term stays! Our **27 suites** are apartment sized and offer plenty of space and privacy, comfy pillow-top mattresses, kitchen areas with full-sized refrigerators. **We have 13-Doubles, 10 Triples and 4 Executive suites with living rooms.** Your company can save on lodging expenses with our double and triple accommodations offering each guest private sleeping quarters. Our brochure pretty much says it all and I will mail them out today.

- As of now we are about 30% occupied.
- Direct TV – Free High Speed Internet – Outdoor Grill Area – Laundry Facilities – Laundry Service.
- Rates at this time are $69.95 Double Occupancy, an additional $10 per person thereafter. Executive Suites are $79.95 Double occupancy. Peak occupancy rates increase by $10 to $20 per night.
- We do offer weekly (7 nights) and monthly rates (30 nights) usually $10 to $20 off per night.
- We are right across the street from the Latigo Hills Mall. It offers a grocery store, café, bar/bowling alley/pkg liquor, post office, beauty salon, First Place Cellular, Reflections Massage Therapy.
- Half a block to the south is the Wright Recreation Center complete with weight room, racquetball/basketball courts, pool etc.

Again, thank you for your inquiry! We look forward to working with you and we have a very high percentage of repeat customers! We'll do our best to make you feel at home!

Julie Reeves

National 9 Inn

NATIONAL 9 INN

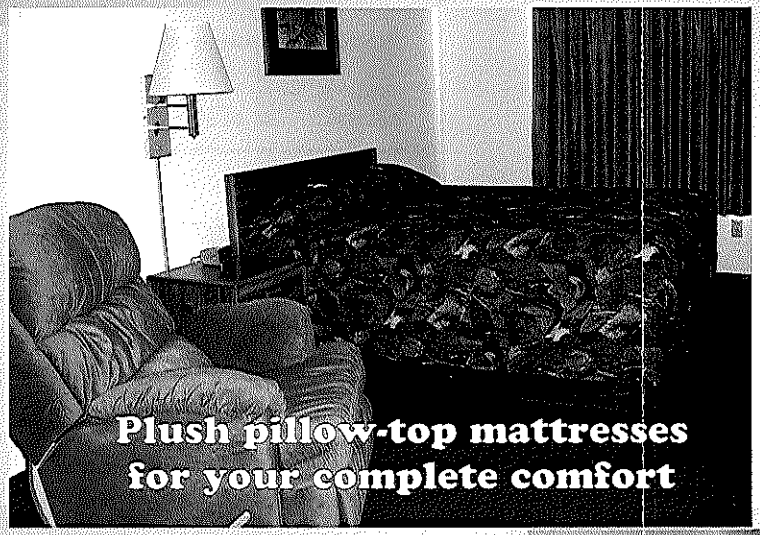
"You won't even know you left home!"

Outdoor Grilling Area

NATIONAL 9 INN

National 9 Inn
519 Latigo Drive
P.O. Box 466
Wright, WY 82732

What a Suite Deal!



Plush pillow-top mattresses for your complete comfort

Guest Laundry Facilities

Full Kitchen
(No Stove)

Comfortable living rooms available in executive suites

National 9 Inn

Welcome to Wright's locally owned and operated motel! Our friendly staff, luxurious large 2-3 bedroom suites, contractor rates, and competitive prices ensure your stay with us will be a pleasant one.

Our centrally located motel offers easy access to every aspect of the town of Wright. The National 9 Inn also offers a wide variety of amenities, such as:

- **Full sized kitchen with microwave, refrigerator, toaster, and coffee maker**
- **Pillow top mattresses**
- **Outdoor grill for your cooking pleasure**
- **Guest laundry facilities**
- **Large suites at regular room prices**
- **Direct TV in every room**
- **Free Wireless Internet**

For rates, reservations and more information, call:

Phone: (307) 464-1510
1-800-524-9999
Fax: (307) 464-1384
Located at: 519 Latigo Drive
P.O. Box 466
Wright, WY 82732

NATIONAL 9 INN

SETTLE INN AND SUITES

1400 Garner Lake Road, GILLETTE

RENO JUNCTION WIND FARM CONTRACTORS AND WORKERS – SPECIAL RATES

$71.95 Standard Room PER NIGHT

WEEKLY – 69.95 PER NIGHT

MONTHLY – 65.95 PER NIGHT

307-685-6363 - www.settleinngillette.com – Tom

Settle Inn is an 86-room hotel with large rooms and suites with 9' ceilings and 32" flat panel TV, free wired and wireless internet, a work desk and comfortable office chair, pillow-top mattress, microwave and refrigerator, coffee maker and hair dryer.

A free Kick Start breakfast buffet with over 25 items, including waffles and biscuits with sausage gravy, is ready when you get up from 5:30 'til 10:00AM every day. **Free appetizers and drinks are offered Monday – Thursday from 5:30PM until 7:00PM. Everybody loves Tom's tacos!**

Main floor has **free laundry**, **fitness center**, **business center**, **pool** and **convenience market.** Convenience store is next door; restaurants are two miles down the road.

Standard Rooms - 12 King and 46 Double-Queen

Suites – 13 King and 6 Whirlpool - $91.95 PER NIGHT

Thanks, Tom Patterson, General Manager

Wright - **Hiway 59** to the south end of Gillette. Turn right on **Garner Lake Road;** go NE 3.5 to 4 miles, past Boxelder, to the **Settle Inn** at **1400 Garner Lake Road**.

I-90, **Exit 129 -** south on **Garner Lake Road** one mile to **Settle Inn** on the right.

Sam Littlefield

From: Wright Hotel [info@wrighthotel.com]
Sent: Thursday, March 11, 2010 12:08 PM
To: Sam Littlefield
Subject: In Reference to your questions about loding

March 11, 2010

Sam Littlefield
Project Developer
Third Planet Windpower, LLC

Hello Sam,

In response to your email you will find the answers to your questions as follows. We have a total of 71 rooms in our hotel. There are 22 rooms with two Queen Beds, 17 rooms that are Standard Kings, 23 rooms that are King Suites and 4 rooms that are King Conference. For sporadic night stays the rates will be King Standards at $74.95, King Suites at $79.95, Two Queens at $89.95 and King Conference at $109.95. Based on a 30 day minimum stay the weekly rates will be $300 per week for single person occupancy (Kings) and $400 per week for 2 person occupancy (Queens). Each room is equipped with a refrigerator, microwave, coffee pot, hair dryer, flat screen TV, and full size iron & ironing board.

A full continental breakfast is served daily from 5:00 am to 9:00 am. This breakfast consists of hot caramel rolls, cold cereal, juice, milk, coffee, hot cereal, toast, English muffins, bagels and hard boiled eggs daily. Then on a rotating basis we have scrambled eggs and bacon, cheese omelets and sausage patties, biscuits and gravy, or waffle sticks with either bacon or sausage patties.

The Open Range Steakhouse is connected to our Hotel and is open Monday – Saturday from 11 am to 2 pm for lunch and 5 pm to 10 pm for dinner. Their menu offers a wide variety of items from Black Angus Beef, Durham Ranch Buffalo, to Chicken Pasta and Seafood. They also have a lounge for you to relax in after a long day at work.

For your other dining needs we have Subway, The Wright Place Café, and Hank's Roadside Bar and Grill. Don's Grocery store is open Monday – Saturday 8:00 am to 8:00 pm and Sunday 10:00 am to 6:00 pm. The Rusty Nail is a bar that is located next to the Rolling Thunder Bowling alley. Big D is the gas station that is open daily from 5:30 am to 9:00 pm and they also have a variety of items for lunches if desired. Their gas pumps are available 24 hours if you have a credit or debit card. The Wright Rec Center is open daily from 8:00 am to 9:00 pm and they have set a fee of $4.00 per day for those guests staying here at the hotel. The Rec Center offers a full basketball court, racquetball courts, swimming pool, and weight room.

Please let me know if I can be of any further assistance to you.

Sincerely,

Alan Waner
General Manager

Sam Littlefield

From: Wright Hotel [info@wrighthotel.com]
Sent: Sunday, March 14, 2010 2:23 PM
To: Sam Littlefield
Subject: Meeting Rooms

Sam,

In my previous correspondence, I neglected to inform you of a most important amenity the hotel has to offer businesses. The lower level of the Steakhouse is available to companies for meetings of various sizes. We have a small private meeting area that will seat up to 16 people that is closed off from the main banquet area. It is equipped with its own wet bar, telephone service, internet access and a large flat screen TV, that can be set up for pin point demonstrations. The larger meeting area will accommodate up to 150 people. If you have lunch or dinner catered by the Steakhouse there will not be a charge for the use of either meeting area. However, if you do not need any food there is a nominal charge of $25 per hour for the use of the meeting areas. With this in mind it is my hope that we will be a serious contender for your upcoming project.

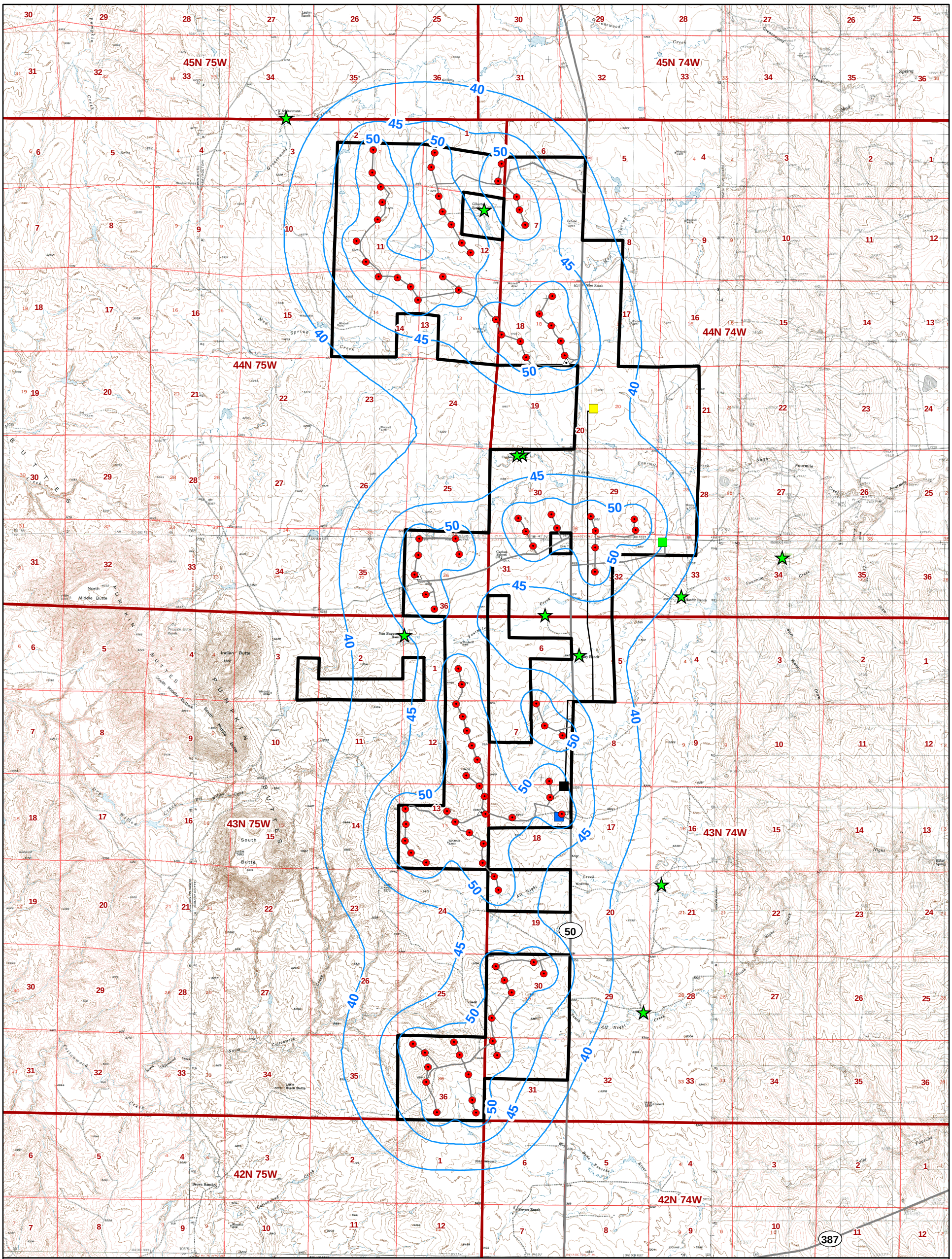
Alan Waner
General Manager

Wright Hotel
PO Box 409
Wright WY 82732
307-464-6060

Appendix

D

Appendix D
Resource Maps



Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Project Road
Project Boundary
Occupied Residence
Noise Contour (dBA)

Predicted Sound Pressure Levels (dBA)
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: BLM, 2009

0 0.5 1 2
Miles

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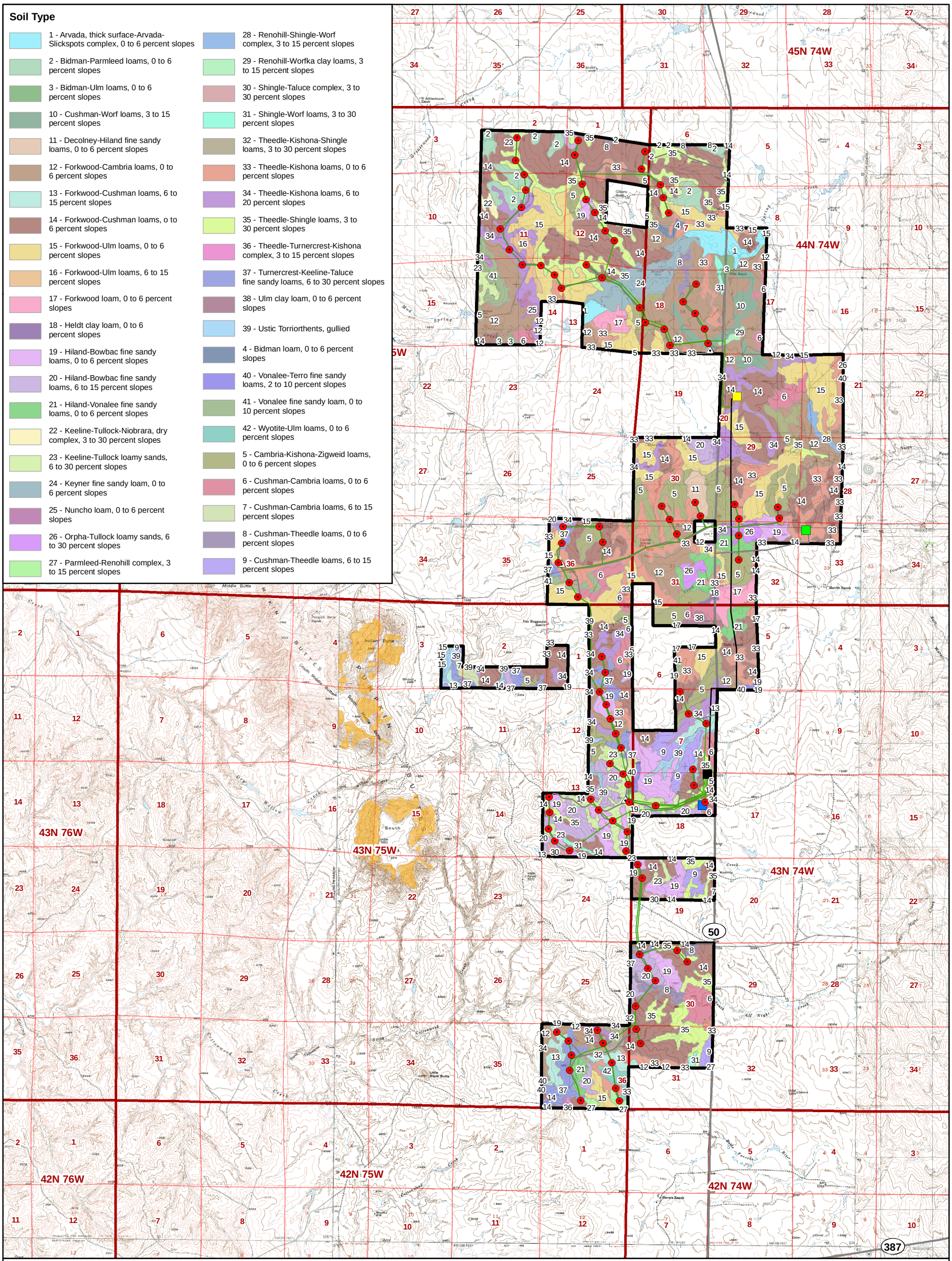

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary
Land Slide Area

Soils
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: NRCS, 2007

0 0.5 1 2
Miles

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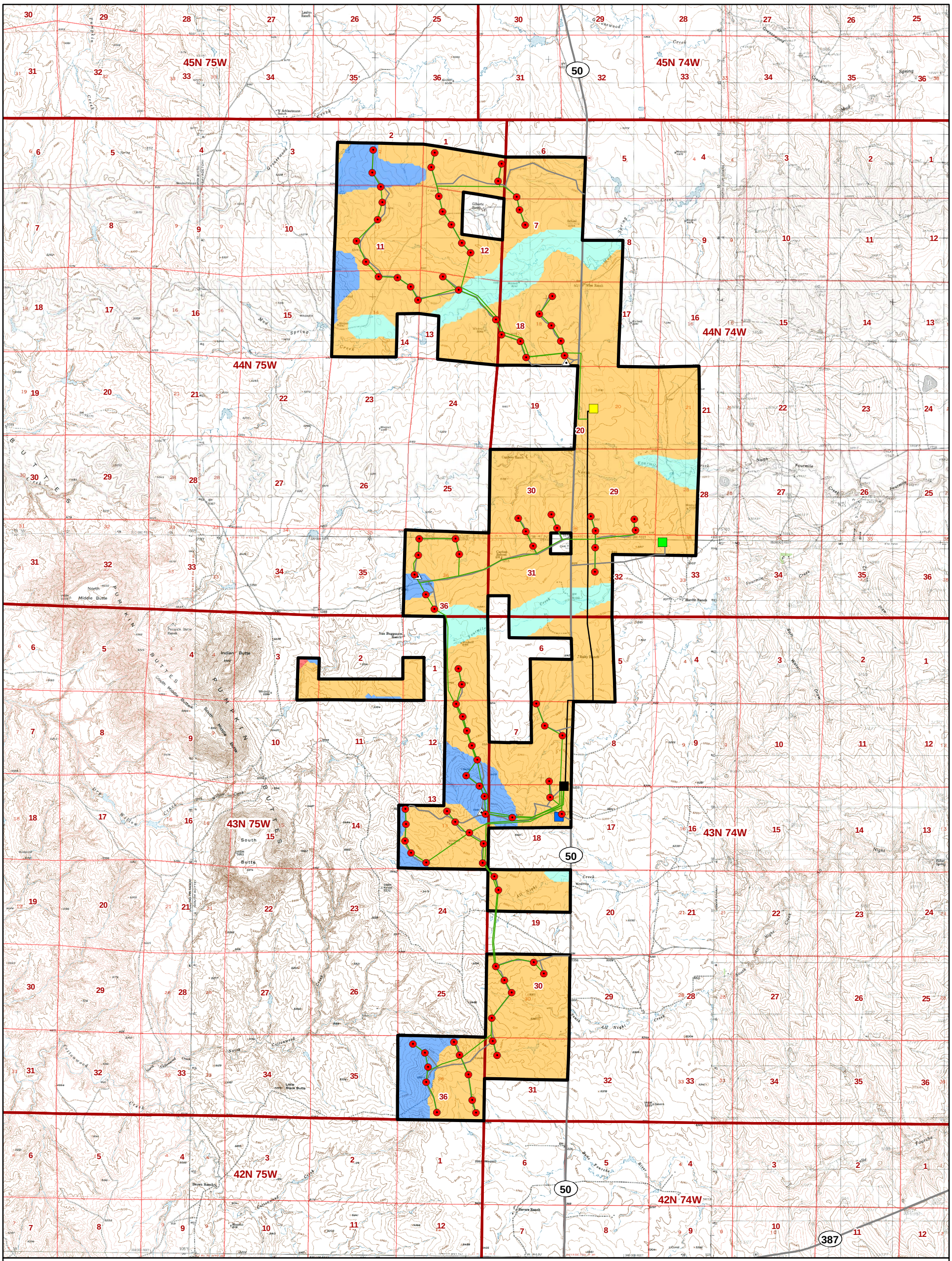

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Alluvium, terrace deposits
Residuum, slopewash, alluvium
Residuum, slopewash, alluvium, bedrock
Slopewash, alluvial fan deposits, Terrace deposits

Surficial Geology
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: Case, et al. 1998

0 0.5 1 2
Miles

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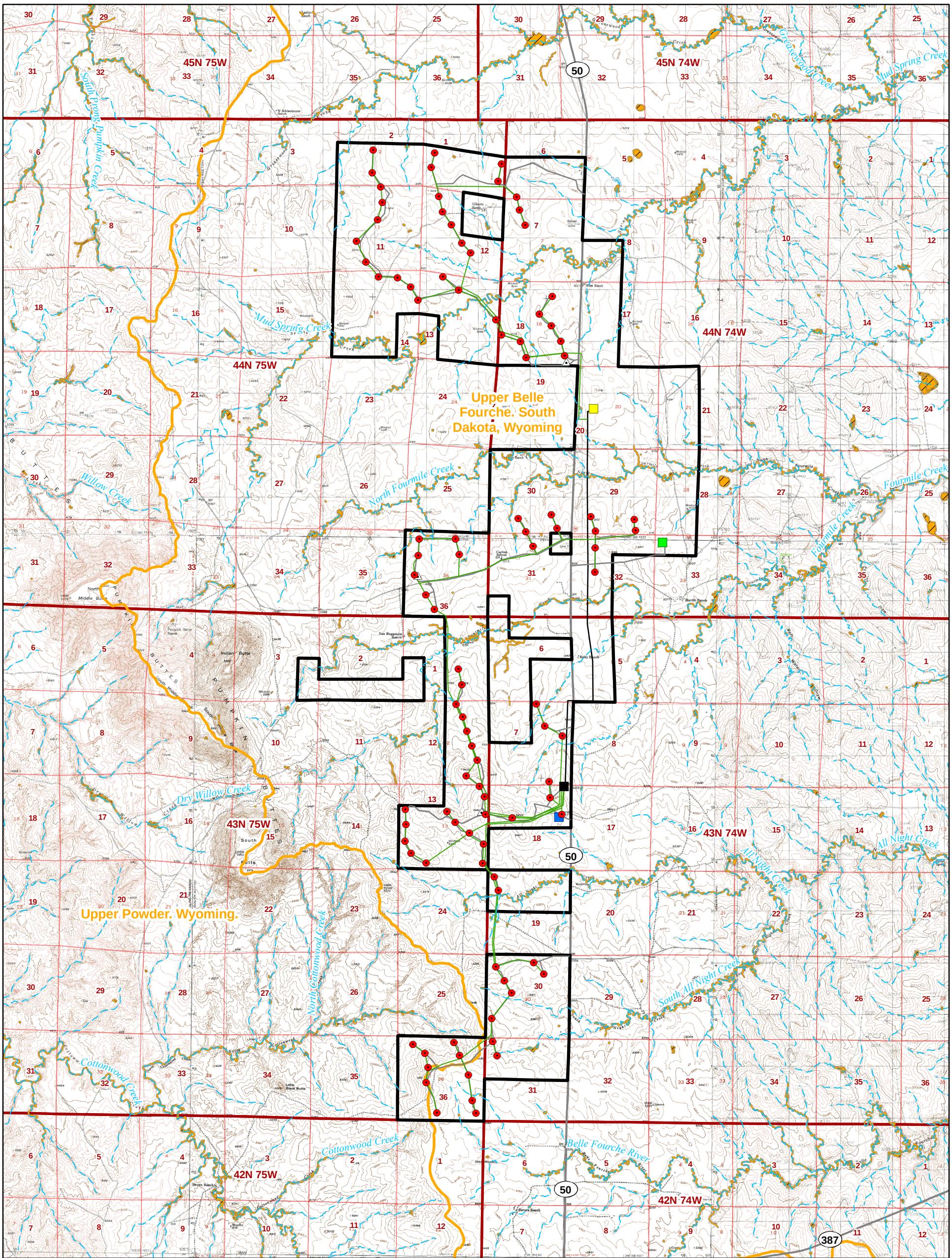

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Intermittent River/Stream - National Hydrography Dataset (NHD)
National Wetland Inventory (NWI) Feature
Hydrologic Unit - National Hydrography Dataset (NHD)

Surface Water
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: NHD, 2009; NWI, 2009

0 0.5 1 2
Miles

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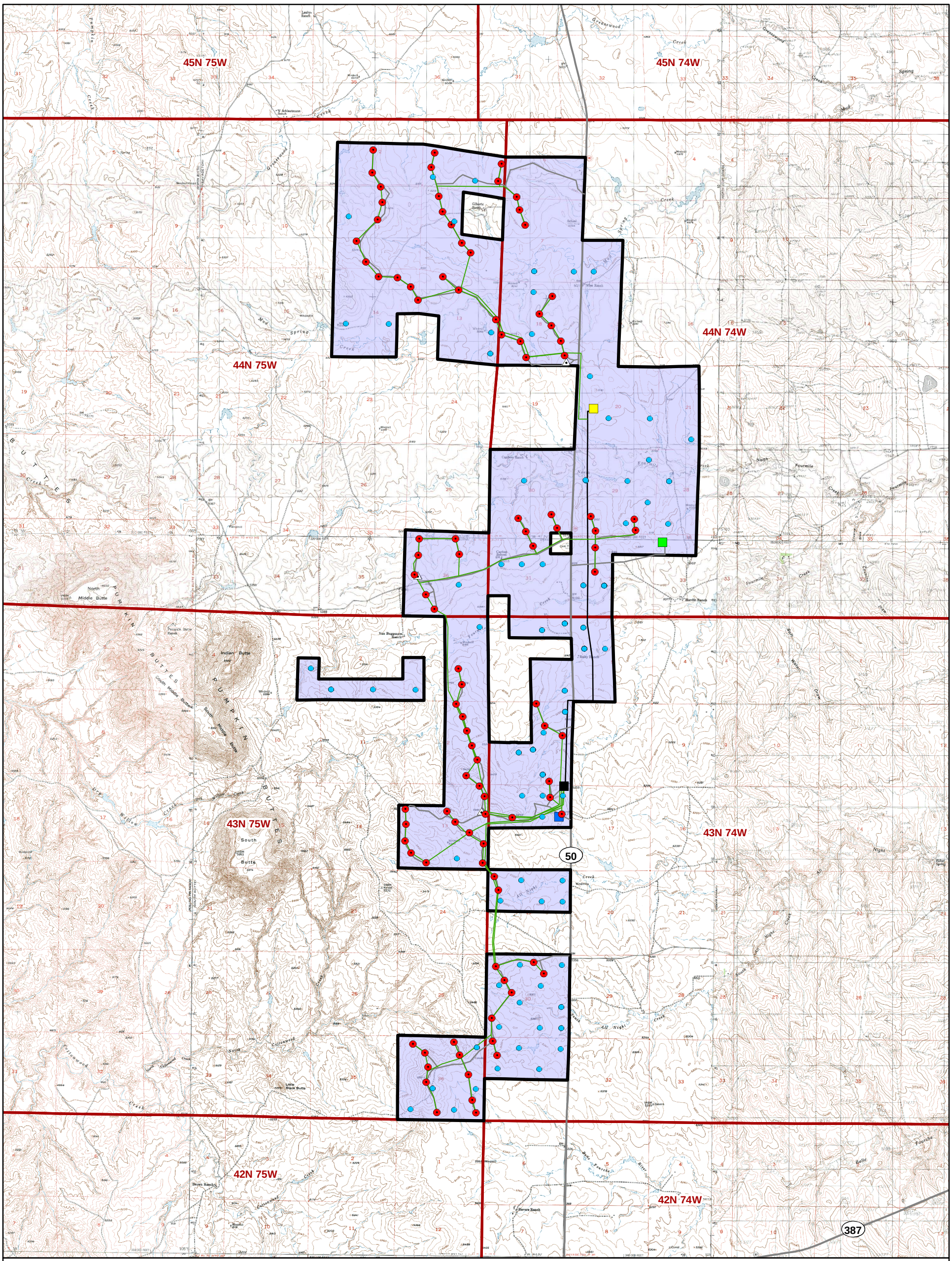

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary
Approximate Well Location

Principal Aquifers

Lower Tertiary Aquifer

Groundwater and Wells
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: Wyoming State Engineers Office (SEO), 2007

0 0.5 1 2
Miles

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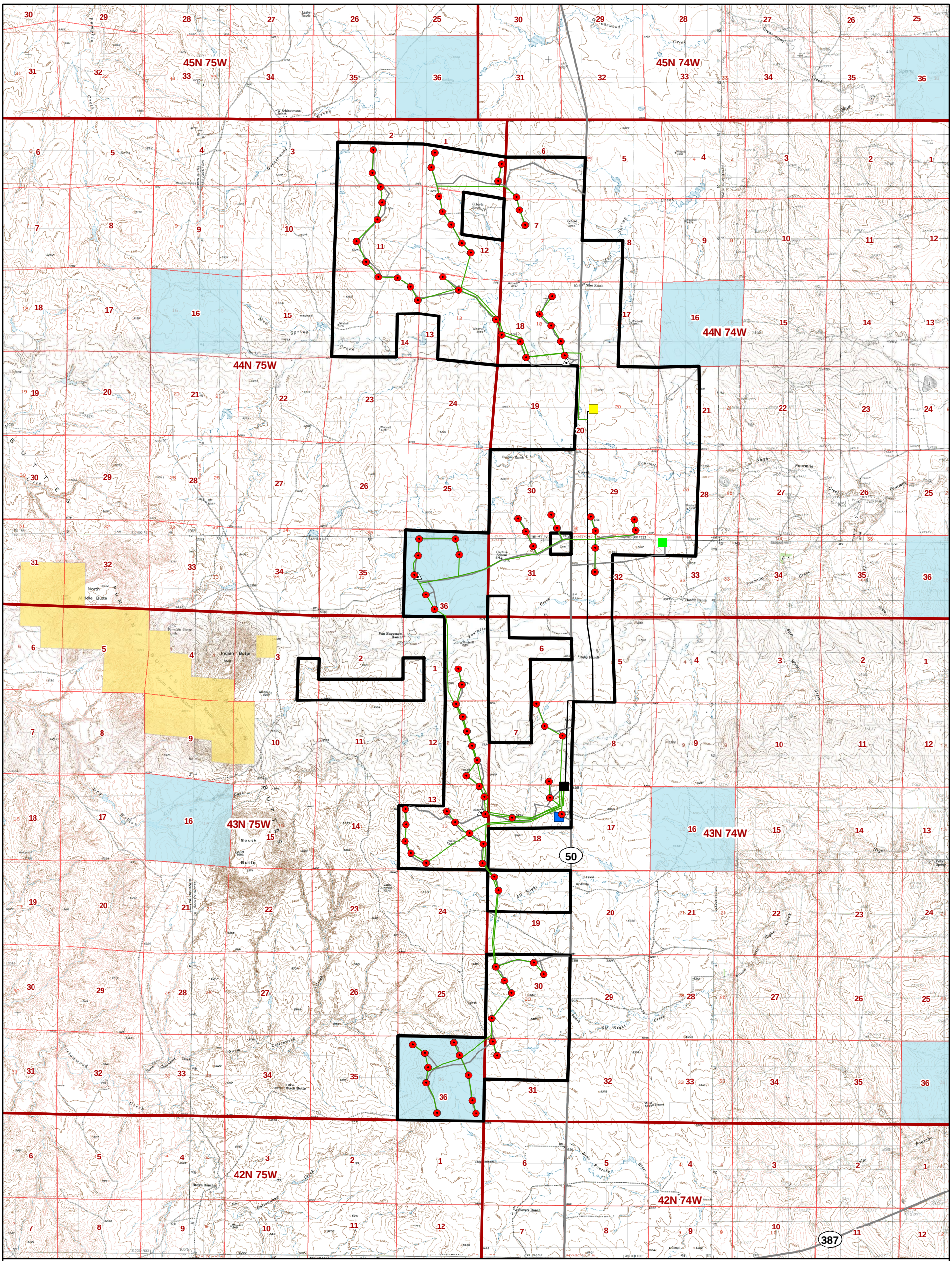

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Land Ownership

BLM
Private
State

Land Ownership
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

0 0.5 1 2
Miles

Source: BLM, 2009

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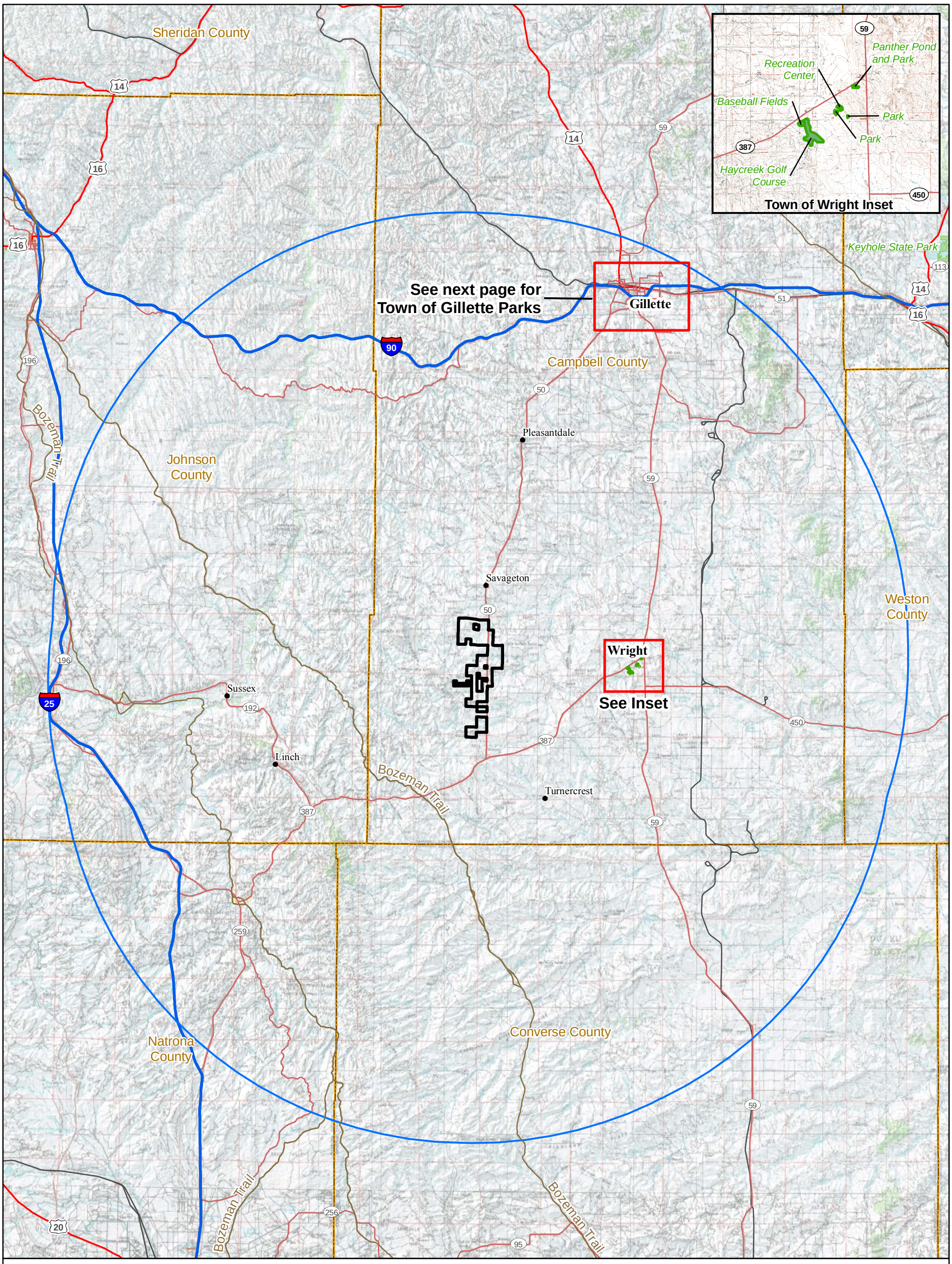

- Town
- Historical Trail
- 40-mile Buffer
- Park
- Project Boundary
- County Boundary

Recreational Resources
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

0 2.5 5 10
Miles

Source: Town of Wright, 2010

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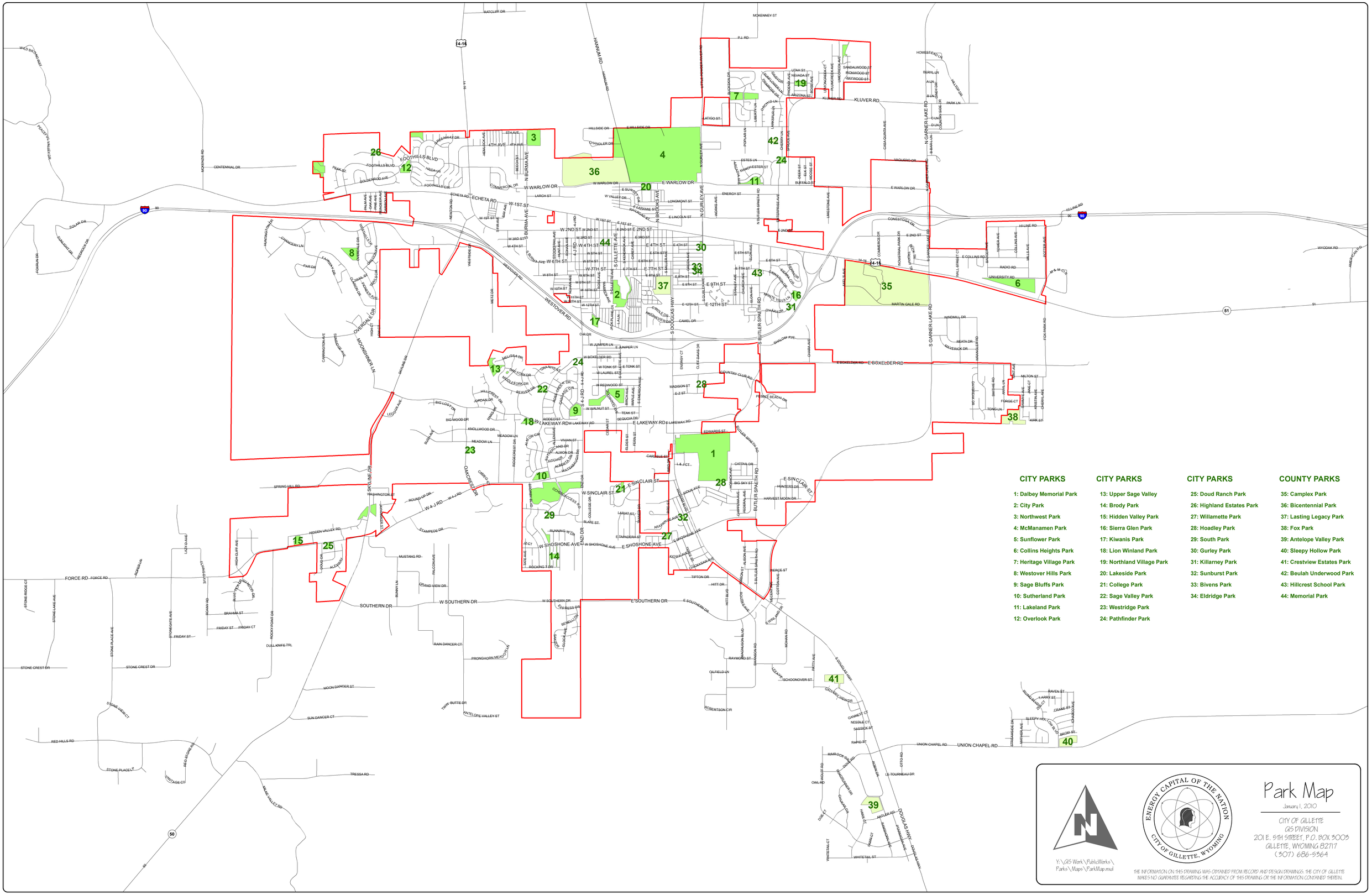
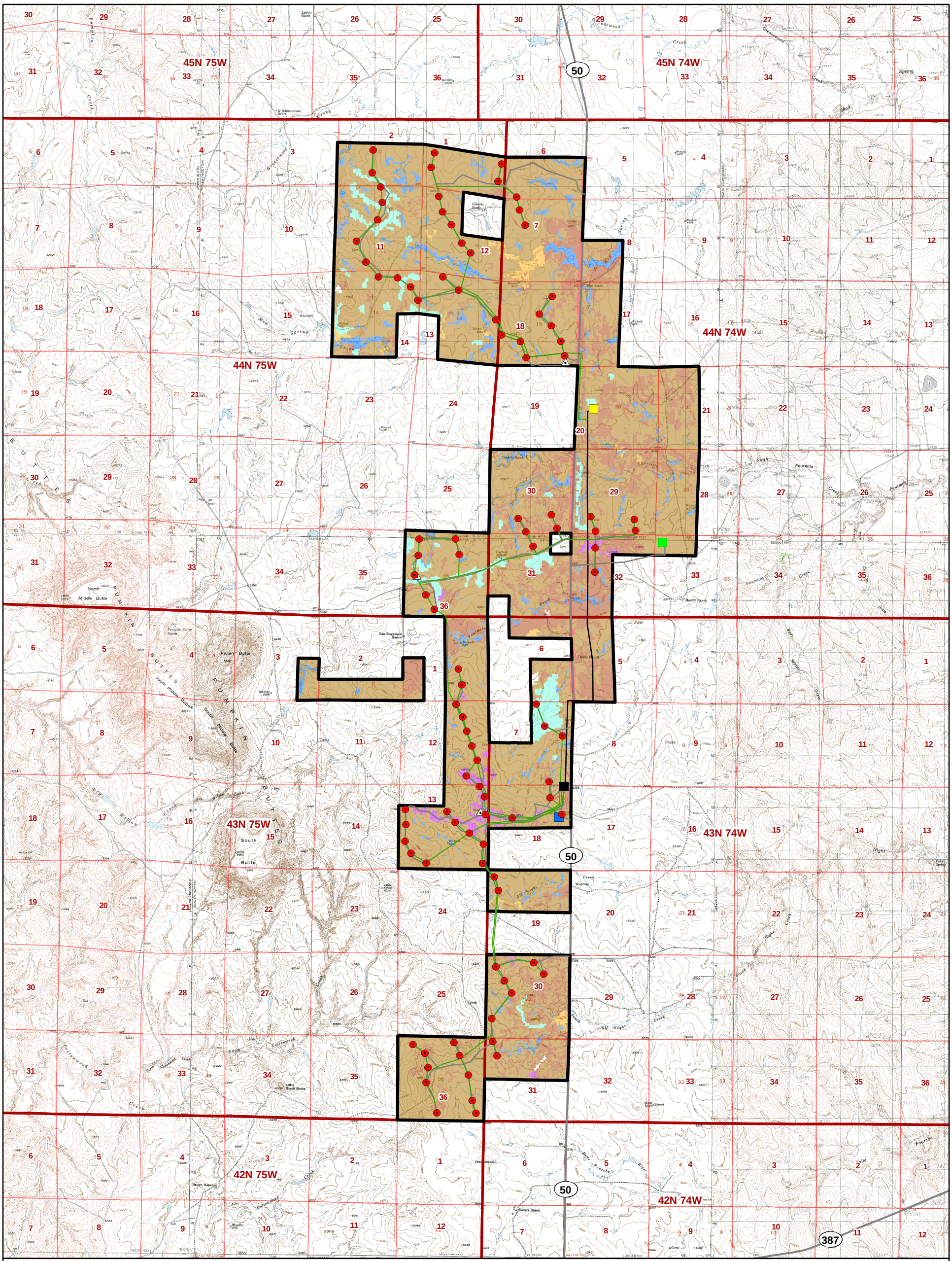

CITY PARKS
1: Dalbey Memorial Park
2: City Park
3: Northwest Park
4: McManamen Park
5: Sunflower Park
6: Collins Heights Park
7: Heritage Village Park
8: Westover Hills Park
9: Sage Bluffs Park
10: Sutherland Park
11: Lakeland Park
12: Overlook Park
CITY PARKS
13: Upper Sage Valley
14: Brody Park
15: Hidden Valley Park
16: Sierra Glen Park
17: Kiwanis Park
18: Lion Winland Park
19: Northland Village Park
20: Lakeside Park
21: College Park
22: Sage Valley Park
23: Westridge Park
24: Pathfinder Park
CITY PARKS
25: Doud Ranch Park
26: Highland Estates Park
27: Willamette Park
28: Hoadley Park
29: South Park
30: Gurley Hollow Park
31: Killarney Park
32: Sunburst Park
33: Bivens Park
34: Eldridge Park
COUNTY PARKS
35: Camplex Park
36: Bicentennial Park
37: Lasting Legacy Park
38: Fox Park
39: Antelope Valley Park
40: Sleepy Hollow Park
41: Crestview Estates Park
42: Beulah Underwood Park
43: Hillcrest School Park
44: Memorial Park
Y:\GIS Work\PublicWorks\Parks\Maps\ParkMap.mxd
ENERGY CAPITAL OF THE NATION
CITY OF GILLETTE, WYOMING
THE INFORMATION ON THIS DRAWING WAS OBTAINED FROM RECORD AND DESIGN DRAWINGS. THE CITY OF GILLETTE MAKES NO GUARANTEE REGARDING THE ACCURACY OF THIS DRAWING OR THE INFORMATION CONTAINED THEREIN.
Park Map
January 1, 2010
CITY OF GILLETTE
GIS DIVISION
201 E. 5TH STREET, P.O. BOX 3003
GILLETTE, WYOMING 82717
(307) 686-5364



Turbine
Laydown Area
O&M Building
Project Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Developed, Open Space
Inter-Mountain Basins Big Sagebrush Steppe
Introduced Wetland Vegetation
Northwestern Great Plains Mixed Grass Prairie
Pasture/Hay
Western Great Plains Riparian Woodland and Shrubland
Western Great Plains Sand Prairie

Vegetation
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: USGS, 2007

0 0.5 1 2
Miles

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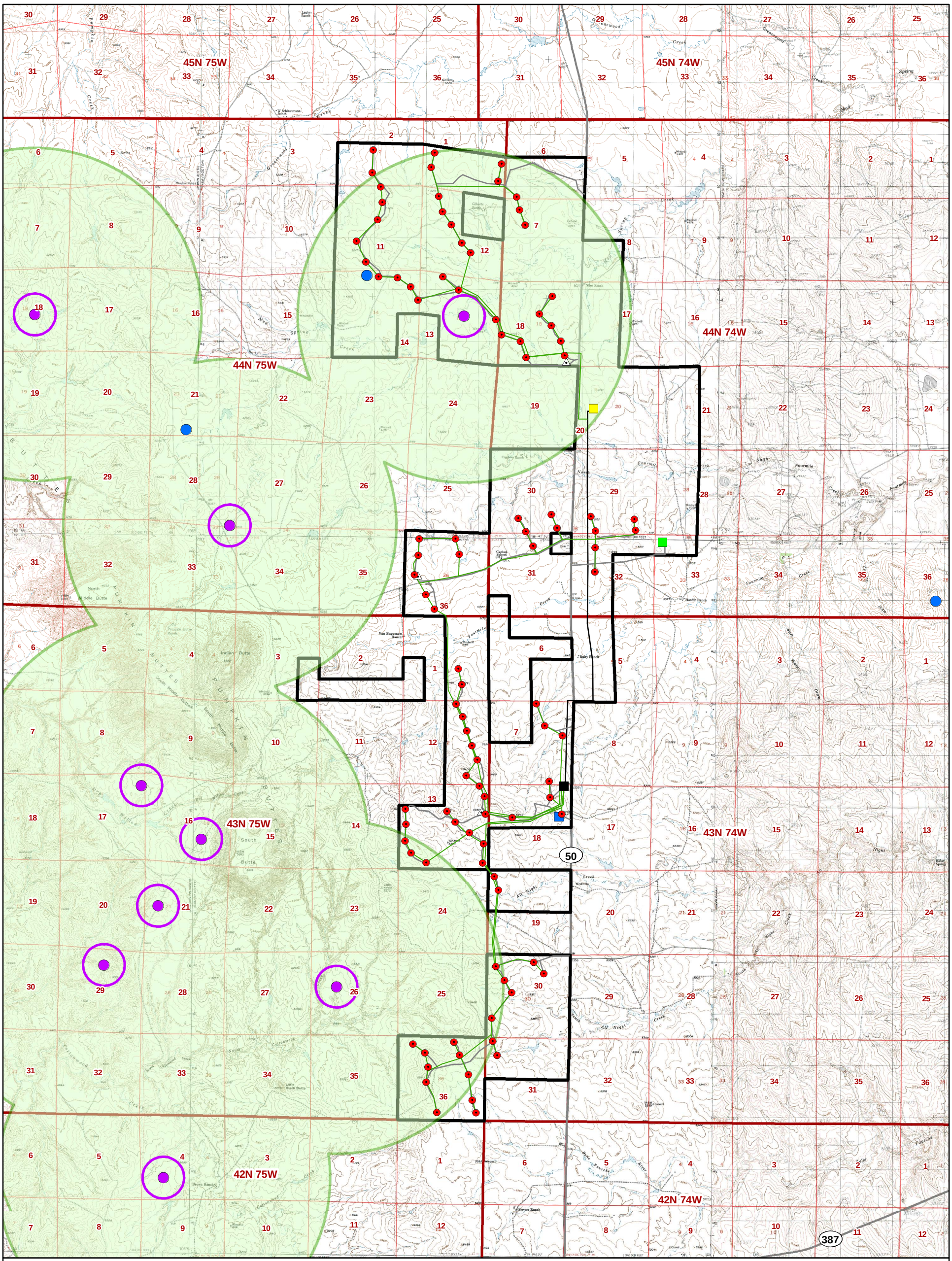

Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary

Greater Sage-Grouse

Occupied Lek
Unoccupied Lek
0.25-mile No Surface Occupancy
2-mile Controlled Surface Use

Greater Sage-Grouse
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: WGFD, 2008

0 0.5 1 2
Miles

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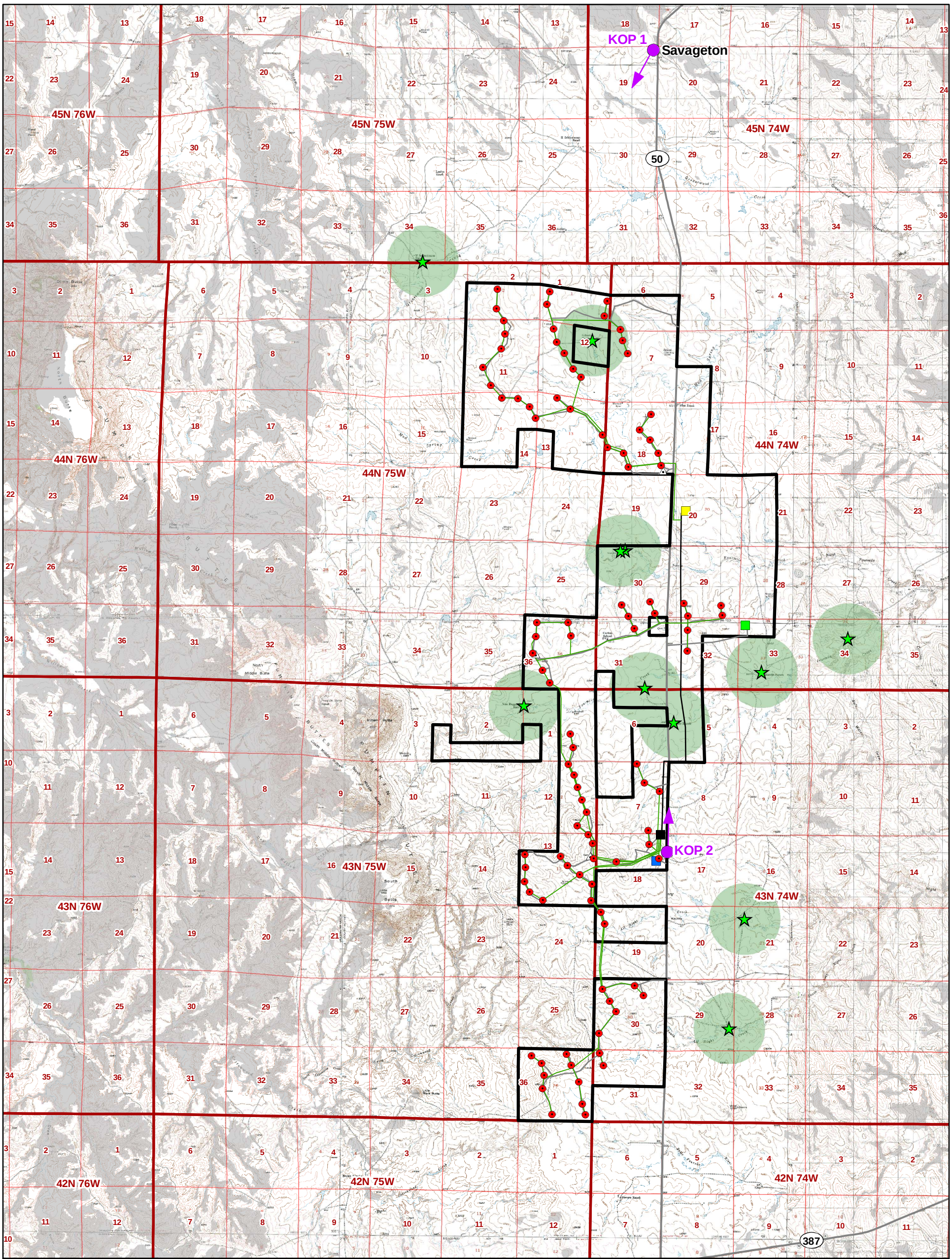
Appendix E
Visual Simulations



Turbine
Laydown Area
O&M Building
Project Substation
Interconnect Substation
Met Tower
Project Transmission Line
Collection Line
Project Road
Project Boundary
Area from which turbines are visible
Area from which turbines are not visible
Occupied Residence
0.5-mile Turbine Setback Zone
Key Observation Point Location and Direction of View

Key Observation Points
Reno Junction Wind Energy Facility
TPW Reno Junction, LLC
Campbell County, Wyoming

N

Source: USGS, 2010

0 0.5 1 2
Miles

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Figure 1A: KOP 1 (existing): View to the south and southwest from Savageton, encompassing Pumpkin Buttes and the site of the proposed Project.

Reno Junction Wind Energy Facility

Campbell County, Wyoming

Figure 1B: KOP 1 (proposed): Simulated view of the proposed project as it would appear in the view from Savageton.

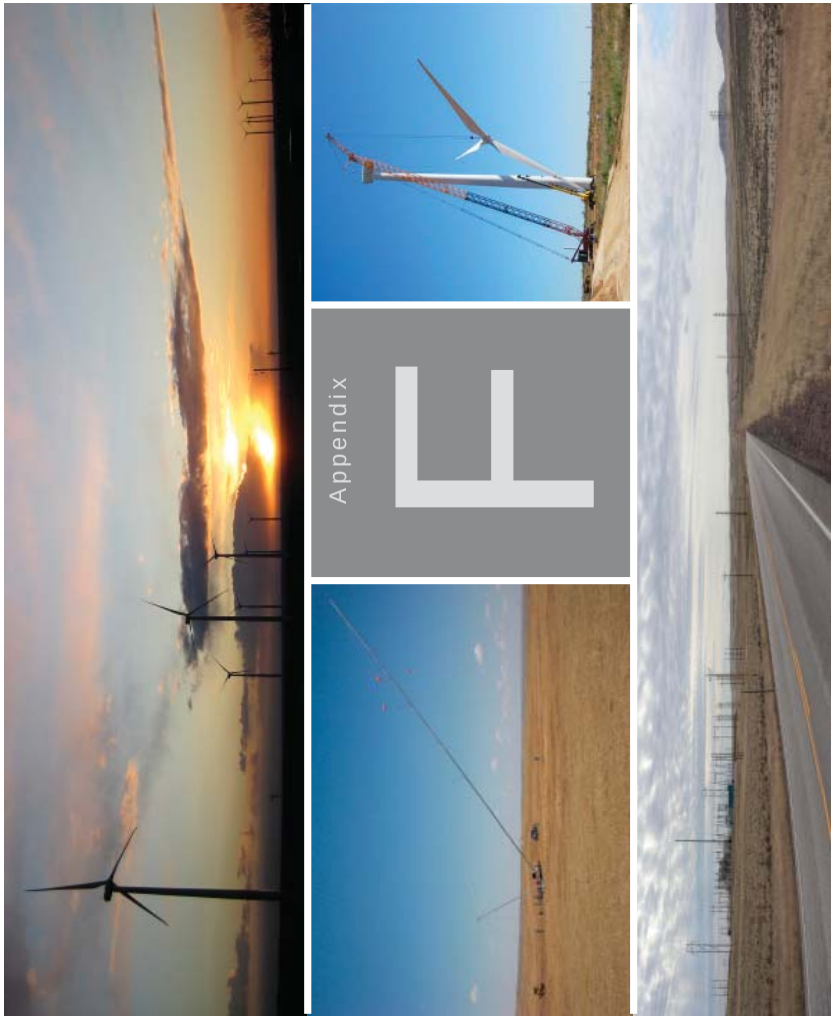
Reno Junction Wind Energy Facility

Campbell County, Wyoming

Figure 2A: KOP 2 (existing): View to the north from Highway 50 from a point adjacent to the project site and 11.5 miles south of Savageton.

Figure 2B: KOP 2 (proposed): Simulated view of the proposed project as it would appear from Highway 50 at a point 11.5 miles south of Savageton and near the proposed project substation.

Appendix F
Avian and Bat Baseline Reports



Analysis of Avian Baseline Data for the Reno Junction Wind Resource Area Campbell County, Wyoming

Prepared for:

Third Planet Windpower

One World Trade Center
121 SW Salmon Street, 11th Floor
Portland, Oregon 97204

Prepared by:

Greg Johnson and Kimberly Bay

Western **E**co**S**ystems **T**echnology**,** Inc.

2003 Central Avenue
Cheyenne, Wyoming

WEST, Inc.

March 25, 2010

EXECUTIVE SUMMARY

Third Planet Windpower, LLC (Third Planet) has proposed a wind-energy facility in Campbell County, Wyoming, near Reno Junction. Avian use surveys were conducted by ICF Jones and Stokes in the Reno Junction Wind Resource Area (RJWRA) in the falls of 2008 and 2009, the spring of 2009, and the winter of 2009/2010. A total of 416, 20-minute fixed-point surveys were conducted using a standardized protocol similar to that used at most wind resource areas across the US. Raptor nest surveys were conducted from the ground and fixed-wing aircraft in the springs of 2008 and 2009. Third Planet contracted Western EcoSystems Technology, Inc. to analyze the avian use and raptor nest data collected in the project area to estimate the impacts of project operations on birds, especially raptors.

Mean raptor use at the RJWRA based on surveys conducted in the fall, spring and winter (0.29 raptors/plot/20-min survey) was compared with similar data from 40 other wind-energy facilities that implemented similar protocols and had data for three or four seasons. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-min survey. Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Under this ranking, mean raptor use at the RJWRA is considered to be low and ranked 32nd when compared to the 41 other wind-energy facilities. Based on a regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, there was a significant correlation between use and mortality (R^2 = 69.9%). Using this regression to predict raptor collision mortality at the RJWRA, based on an adjusted mean raptor use of 0.29 raptors/20-min survey, yields an estimated fatality rate of 0 fatalities/MW/year. A 90% prediction interval around this estimate is zero to 0.25 fatalities/MW/year. Based on the relative abundance of golden eagle, northern harrier, red-tailed hawk, and ferruginous hawk, as well as a higher exposure index than other raptor species, there is higher potential for fatalities of these four species compared to other raptor species.

Based on a statistical analysis of spatial use of the RJWRA by raptors, raptor use of the project area appears to be relatively uniform, and the data do not indicate the presence of any concentration areas for all raptors combined as well as for each of the raptor subtypes examined. The available data do not indicate that any portions of the study area warrant being excluded from turbine development due to very high raptor or bird use.

In 2009, five active raptor nests were present within one mile of proposed turbine locations at the RJWRA, resulting in an active raptor nest density of 0.11 nests/mi^2 within this area. This is below average in comparison to 20 other wind resource areas evaluated in the western US, where active raptor nest density ranged from 0.03 to 0.43 nests/mi^2 and averaged 0.19 nests/mi^2. Raptors nesting closest to turbines likely have higher probabilities of being impacted from collision with turbines, but data on nests very close to turbines (e.g., within a half-mile) are currently inadequate to determine the level of these impacts.

Passerines have been the most abundant bird fatality at wind energy facilities in the western US. Both migrant and resident passerine fatalities have been observed. Given that passerines made up a large proportion of the birds observed during the baseline study, passerines would be expected to make up the largest proportion of fatalities at the RJWRA. With the exception of horned lark, all non-raptor species had no measurable exposure indices due to the fact that all individuals were observed flying below the likely ZOR. Based on the low exposure risks at RJWRA, it is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

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Bird Exposure Index 2
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Waterfowl 4
Shorebirds 4
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Table 2. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Reno Junction Wind Resource Area[a] , September 4, 2008 – February 22, 2010. 17

Table 3a. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010. 20

Table 3b. Mean use (number of birds/100-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010. 22

Table 4. Flight height characteristics by bird type during fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010. Large bird observations were limited to within 800-m and small birds were limited to within 100-m. 23

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INTRODUCTION

Third Planet Windpower, LLC (Third Planet) has proposed a wind-energy facility in Campbell County, Wyoming, near Reno Junction. Third Planet initiated wildlife use surveys in the Reno Junction Wind Resource Area (RJWRA) in the fall of 2008. The avian use surveys were conducted by ICF Jones and Stokes. Third Planet then contracted Western EcoSystems Technology, Inc. to analyze the avian use and raptor nest data collected in the project area to estimate the impacts of project operations on birds.

Fixed-point bird use surveys were conducted by ICF Jones and Stokes to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors. Fixed-point bird use surveys were conducted in the fall of 2008 (September 1 – October 30) and spring of 2009 (April 10 – May 31) at 13 points established throughout the Reno Junction Wind Resource Area. The project area was then slightly enlarged, and additional avian use surveys were conducted at 14 points in the fall of 2009 (August 28 – October 15) and winter of 2009/2010 (December 15 – February 22). The fixed-point surveys conducted by ICF Jones and Stokes were conducted using a standardized protocol similar to that used at most wind resource areas across the US. Surveys were conducted at points with an 800-m radius viewshed for a 20-minute period. In addition to avian use surveys, raptor nest surveys were conducted from the ground and fixed-wing aircraft in the springs of 2008 and 2009. Detailed descriptions of the methods used for the avian use and raptor nest surveys are provided in the reports prepared by ICF Jones and Stokes.

METHODS

Statistical Analysis

Fixed-Point Bird Use Surveys

Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists, with the number of observations and the number of groups, were generated by season, including all observations of birds detected regardless of their distance from the observer. Species richness was calculated as the mean number of species observed per plot per survey (i.e., number of species/plot/20-min survey). Species diversity and richness were compared between seasons for fixed-point bird use surveys.

Bird Use, Composition, and Frequency of Occurrence

For the standardized fixed-point bird use estimates, only observations of large birds detected within the 800-m radius plot were used; small birds observations were limited to 100 m. Estimates of mean bird use (i.e., number of birds/plot/20-min survey) were used to compare differences between bird types, seasons, and other wind-energy facilities.

The frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. Percent composition was calculated as the proportion of the overall mean use for a particular species/bird type. Frequency of occurrence and percent composition provide relative estimates of species exposure to the proposed wind-energy facility.

For example, a particular species might have high use estimates for the study area based on just a few observations of large flocks; however, the frequency of occurrence would indicate that it only occurred during a few of the surveys, therefore making it less likely to be affected by the wind-energy facility.

Bird Flight Height and Behavior

To calculate potential risk to bird species, the first flight height recorded was used to estimate the percentages of birds flying within the likely zone of risk (ZOR) for collision with turbine blades. For the purposes of analysis, a ZOR of 35 m to 130 m above ground level (AGL) was used, which is the blade height of typical turbines.

Bird Exposure Index

A relative index of collision exposure (R) was calculated for bird species observed during the fixed-point bird use surveys using the following formula:

$$R = A*P_f*P_t$$

Where A equals mean relative use for species *i* (large bird observations within 800 m of the observer or 100 m for small birds) averaged across all surveys, P_f equals the proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and P_t equals the proportion of all initial flight height observations of species *i* within the likely ZOR.

Spatial Use

Data were analyzed by comparing use among plots. The objective of comparing use among plots was to look for areas of concentrated use by raptors and other large birds within the study area. This information can be useful in turbine layout design or adjustments of individual turbines for micro-siting.

Due to concerns over use of the project area by raptors, especially, one-way Analysis of Variance (ANOVA) tests were calculated to compare the mean use values at each fixed-point count location for all raptors combined and raptor subtypes for which sufficient data were available. An F-test statistic was used to compute whether the use values at each point were significantly different. The formula for an F statistic is:

$$F = \frac{\left[\sum_i n_i(\overline{Y}_i - \overline{Y})^2 /(K-1)\right]}{\sum_{ij}(\overline{Y}_{ij} - \overline{Y}_{i.})^2 /(N-K)}$$

In the numerator, $\overline{Y}_i$ denotes the sample mean of the ith fixed point location, n_i is the number of visits made at that point location, and $\overline{Y}$ denotes the overall mean use of the raptor subtype being tested. In the denominator, Y_{ij} is the jth visit at the ith point out of K total points, and N is the overall sample size. Degrees of freedom for this test are K-1, N-K. A conservative alpha value of 0.10 was used to determine if the there were significant differences in raptor use among survey points.

Raptor Nest Surveys

Density of active raptor nests based on the latest survey data available (2009) was calculated for the area encompassed by a one-mile buffer around proposed turbine locations using GIS. Active raptor nest density was then compared to similar data for other wind resource areas in the West and Midwest.

RESULTS

Fixed-Point Bird Use Surveys

A total of 416, 20-minute fixed-point surveys were conducted at the RJWRA (Table 1). Two different viewsheds were utilized when calculating the different statistics; species richness, use, percent composition, percent frequency, and exposure index; 800 m for large birds and 100 m for small birds.

Bird Diversity and Species Richness

Fifty-two unique species were observed over the course of all fixed-point bird use surveys, with a mean number of 0.32 large bird species/plot/20-min survey and 0.82 small species/100-m plot/20-min survey (Table 1). Species richness for both large and small birds was highest in the spring, moderate in the fall, and lowest in the winter. A total of 2,810 individual bird observations within 1,150 separate groups were recorded during the fixed-point surveys (Table 2). For all species combined, one species (1.9% of all species) composed nearly half (48.4%) of the observations: horned lark (*Eremophila alpestris*; 1,361 observations). Only four other species composed at least 5.0% of the observations: western meadowlark (*Sturnella neglecta*; 8.8% of observations), lark bunting (*Calamospiza melanocorys*; 8.8%), McCown's longspur (*Calcarius mccownii*; 8.4%), and vesper sparrow (*Pooecetes gramineus*; 6.0%). The most abundant large bird species was Canada goose (*Branta canadensis*; 9 groups, 57 individuals). A total of 133 individual raptors were recorded within the RJWRA, representing 10 species (Table 2). The most abundant raptors were northern harrier (*Circus cyaneus*; 38 groups, 40 individuals), golden eagle (*Aquila chrysaetos*; 34 groups, 39 individuals) and red-tailed hawk (*Buteo jamaicensis*; 10 groups, 12 individuals).

Bird Use, Composition, and Frequency of Occurrence by Season

Mean bird use, percent composition, and frequency of occurrence by season were calculated for each bird type, raptor subtype, and species (Tables 3a and 3b). The highest overall large bird use occurred in the spring (1.06 birds/plot/20-min survey), followed by fall (0.50) and winter (0.32; Table 3a). For small birds, use was highest in the fall (5.14), followed by spring (5.05) and winter (0.43; Table 3b).

<u>Waterbirds</u>

Waterbirds were only observed in spring (0.05 birds/plot/20-min survey; Table 3a). Use by waterbirds in spring was limited to one group of five Franklin's gulls (*Larus pipixcan*). Waterbirds comprised 4.5% of the overall large bird use in spring and were only observed during 1.0% of the spring surveys (Table 4a).

Waterfowl

Waterfowl had the highest use in spring (0.48 birds/plot/20-min survey), compared to other times of the year (winter 0.19, summer 0.08; Table 3a). Higher waterfowl use in spring was largely due to six flocks totaling 26 Canada geese and one flock of 13 green-winged teal (*Anas crecca*; Table 2). In the fall, two flocks totaling 15 Canada geese comprised most of the use, while in the winter, one flock of 16 Canada geese were the only waterfowl observed. Waterfowl made up 45.4% of the overall spring use by large birds and 59.3% of the winter use, but only 16.0% of the fall use (Table 3a). Waterfowl were observed during 7.8% of the spring, 1.3% of the fall and 1.2% of the winter surveys.

Shorebirds

Shorebirds were rarely observed and had higher use in fall (0.05 birds/plot/20-min survey) than spring (0.02); no shorebirds were observed during winter (Table 3a). Shorebirds comprised 10.9% of the overall large bird use in the fall and 1.8% in the spring. Shorebirds were observed during 1.3% of the fall surveys and 1.0% of the spring surveys. The most common shorebirds observed were spotted sandpiper (*Actitis macularia*) and killdeer (*Charadrius vociferous*; Table 2).

Raptors

Raptor use was highest in the spring (0.48 birds/plot/20-min survey), followed by fall (0.32), and winter (0.13; Table 3a). Raptors with the highest use in the spring were northern harriers (0.14 birds/plot/20-min survey) and golden eagles (0.11). These two species also had the highest use in the fall, with the use by each species being 0.11 birds/plot/20-min survey. Raptor use was much lower in the winter, and only three species were observed, including three rough-legged hawks (*Buteo lagopus*), five bald eagles (*Haliaeetus leucocephalus*) and three golden eagles (Table 2). Raptors comprised 45.4% of the overall large bird use during the spring, compared to 63.1% in the fall and 40.7% in the winter. Raptors were observed during 32.7% of spring, 25.0% of fall and 13.1% of winter surveys (Table 4a).

Upland Gamebirds

The only upland gamebirds observed during the study were two flocks totaling seven greater sage-grouse (*Centrocercus urophasianus*) in the fall. Use of the project area by greater sage-grouse averaged 0.03 birds/plot/20-min survey in fall. Greater sage-grouse comprised 6.3% of all large birds observed in fall and were recorded during 0.9% of fall surveys (Table 3a).

Vultures

Vultures were recorded only during the spring (<0.01 birds/plot/20-min survey; Table 3a). Turkey vulture (*Cathartes aura*) was the only vulture species recorded (Table 2). Vultures comprised 0.9% of the overall large bird use during the spring and were observed during 1.0% of spring surveys (Table 3a).

Large Corvids

Large corvids, defined as common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), and black-billed magpie (*Pica pica*) were only observed during the spring (0.02 birds/plot/20-min survey). Large corvids comprised 2.0% of the overall large bird use during the spring and were observed during 1.0% of spring surveys (Table 3a).

Passerines

A 100-m viewshed was used for small birds; therefore, use values are not directly comparable to large bird types, which were recorded out to 800 m. Use by passerines was slightly higher in the fall (5.14 birds/plot/20-min survey) than in the spring (5.05), and was significantly lower during the winter (0.43 Table 3b). Across all three seasons combined, the most commonly recorded passerines were horned lark, western meadowlark, lark bunting, McCown's longspur, and vesper sparrow. Passerines were observed during 88.3% of surveys in the spring, 56.1% of fall surveys, and 14.3% of winter surveys (Table 3b).

Bird Flight Height and Behavior

Flight height characteristics were estimated for both bird types and bird species (Tables 4 and 5). For large bird species, 123 single birds or groups totaling 215 individuals were observed flying within the 800 m plot (Table 4). Overall, 24.2% of large birds observed flying were recorded within the ZOR for collision with turbine blades of 35 to 135 m (114 – 427 ft) AGL, 63.7% were below the ZOR, and 12.1% were above the ZOR (Table 4). The only group of waterbirds observed was flying above the ZOR. Most (57.9%) of the waterfowl were observed flying below the ZOR, 42.1% were within the ZOR, and none were observed flying above the ZOR. All shorebirds, vultures, upland gamebirds, doves/pigeons, and large corvids were observed flying below the ZOR. The majority (61.7%) of flying raptors was observed below the ZOR, 18.7% were within the ZOR, and 19.6% were above the ZOR. Raptor groups most often observed flying within the ZOR were eagles (44.8%), buteos (15.4%) and falcons (11.1%). The vast majority (93.4%) of small passerines observed flying was below the ZOR, 4.0% were within and 2.7% were flying above the ZOR (Table 4).

Bird Exposure Index

A relative exposure index was calculated for each bird species (Tables 5a and 5b). This index is based on initial flight height observations and relative abundance (defined as the use estimate) and does not account for other possible collision risk factors such as foraging or courtship behavior. Horned lark had the highest exposure index with 0.10, followed by Canada goose with 0.08 and golden eagle with 0.03. The only other species with measurable exposure indices were all raptors, including red-tailed hawk, northern harrier, bald eagle, ferruginous hawk, and American kestrel, although their exposure indices were very low (<0.01). Horned lark was the only passerine with a measurable exposure index because this was the only species of passerine ever observed flying at turbine rotor-swept heights (Table 5b).

Spatial Use

For all large bird species combined, use was highest at point ten (1.74 birds/20-min survey). Bird use at other points ranged from zero to 1.16 birds/20-min survey (Figure 1). The high mean use estimate for point ten was largely due to high waterfowl use at this point (1.03 birds/20-min survey). Waterfowl use at the other points ranged from zero to 0.74 birds/20-min survey. Waterbirds were only observed at point 6. Shorebird use was only recorded at four points, where use ranged from 0.06 to 0.26 birds/20-min survey. Vultures were only seen at point 12 (0.03 birds/20-min survey) and greater sage-grouse were only observed at point 10 (0.23 birds/20-min survey). Doves/pigeons were only observed at points 3, 8 and 9 where use was very low, ranging from 0.03 to 0.06 birds/20-min survey. Large corvids were only observed at point 10 (0.06

birds/20-min survey). Passerine use was highest at point 1 (8.71 birds/20-min survey), and ranged from 0.93 to 5.94 at other points.

Raptor use was highest at point 13 (0.48 birds/20-min survey). Raptor use at other points ranged from 0.10 to 0.43 birds/20-min survey. Buteo use was highest at point 11 (0.16) and ranged from zero to 0.14 among the other points. Eagles were observed at 12 of the 14 points, with the highest use observed at point 14 (0.29); use among the other points ranged from 0 to 0.23. Falcons were observed at six of the points, where use ranged from 0.03 to 0.10 birds/20-min survey. Northern harriers had the highest use at Point 13 (0.19), with use ranging from zero to 0.16 among the other points. Accipiters were only observed at point 12.

One-Way Analysis of variance (ANOVA) tests between fixed-point count locations for raptors and raptor subtypes are shown in Table 6. The null hypothesis of these tests is that the mean use at each point-count location for each raptor group is the same. The resulting p-value represents the probability of observing a variation as large as or larger than what was observed in the RJWRA fixed-point count locations. P-values less than 0.10 suggest that there is a significant difference between the mean use of a given raptor group for at least one location. Neither overall raptor mean use nor raptor subtype mean use ANOVA tests yielded significant results, thus giving no evidence that there is spatial selection of raptors within the project area. The available data do not indicate that any portions of the study area warrant being excluded from turbine development due to very high bird use.

In addition to examining overall raptor use by survey point, we also plotted use by raptors within the rotor-swept area by survey point (Figure 2). Use by all raptors combined within the rotor-swept area ranged from zero at two points to 0.19 at point 10. Plots of raptor use within the rotor-swept area strongly reflect overall raptor use by survey point, and also do not suggest that higher risk to raptors would be expected within any portion of the study area based on raptor use and flight height characteristics.

Raptor Nest Surveys

Five active raptor nests were documented during the spring of 2009 within one mile of proposed turbine locations. This area was 44.69 square miles in size. Therefore, active raptor nest density was 0.11 active nests/mi^2.

DISCUSSION AND IMPACT ASSESSMENT

Bird Impacts

Direct Effects

The most probable direct impact to birds from wind-energy facilities is direct mortality or injury due to collisions with turbines or guy wires of meteorological (met) towers. Collisions may occur with resident birds foraging and flying within the study area or with migrant birds seasonally moving through the study area. Project construction could affect birds through loss of habitat, or potential fatalities from construction equipment. Impacts from the decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low.

Equipment used in wind-energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The risk of direct mortality to birds from construction is most likely potential destruction of a nest for ground- and shrub-nesting species during initial site clearing.

At 15 modern wind energy facilities in the western US (West) where raptor fatality estimates are available, raptor fatality rates have ranged from 0 to 0.87/MW/year, and averaged 0.16/MW/year (Johnson and Stephens 2010). The two facilities with the highest raptor fatality rates (0.87 and 0.53/MW/year) are in California. Of the 13 facilities located outside California, raptor fatality rates have ranged from 0 to 0.15, and averaged 0.07/MW/year, or approximately seven raptors for each 100 MW of development. These facilities include nine located in Washington and Oregon, and one each in Montana, Wyoming, Nebraska, Oklahoma, and Texas.

Mortality estimates for all bird species combined are publicly available for 18 wind energy facilities in the West (Johnson and Stephens 2010). Bird fatality rates have ranged from 0.08 – 4.29/MW/year, and averaged 1.90/MW/year. Avian mortality in the West is lower than the national average. Using mortality data from a 10-year period from wind-energy facilities throughout the entire US, the average number of bird collision fatalities is 3.1/MW/year, or 2.3/turbine/year (NWCC 2004). Based on data from 18 fatality monitoring studies conducted in the western US at modern wind energy facilities, where 1,137 avian fatalities representing 124 species were reported, raptor fatalities comprised 20.0% of the identified fatalities. The most common raptor fatalities were American kestrel (81 fatalities), red-tailed hawk (45), turkey vulture (42), and burrowing owl (*Athene cunicularia*; 13). Passerines were the most common collision victims, comprising 59.8% of the fatalities, with horned lark (258 fatalities), western meadowlark (45), and golden-crowned kinglet (*Regulus satrapa*; 43) being found as fatalities the most often. Upland gamebirds were the third most common group found, comprising 10.1% of the fatalities. Ring-necked pheasant (*Phasianus colchicus*; 45 fatalities), gray partridge (*Perdix perdix*; 35) and chukar (*Alectoris chukar*; 18) were the most common fatalities found. Mourning doves (*Zenaida macroura*; 27 fatalities) and rock pigeons (*Columba livia*; 16) comprised 3.9%. Waterbirds such as American coot (*Fulica americana*; eight fatalities) and eared grebe (*Podiceps nigricollis*; five) were relatively uncommon, representing 3.1% of all fatalities. Waterfowl, primarily mallard (*Anas platyrhynchos*; six fatalities) were also infrequently found (1.3% of all fatalities). Only two shorebirds (0.2% of all fatalities) were found. Other groups, such as nightjars, woodpeckers, and swifts combined accounted for 1.8% of all fatalities. Birds that could not be identified to any avian group comprised 2.1% of all reported fatalities.

Although collision mortality is well documented at most wind-energy facilities, population level effects have not been detected, although few studies have addressed this issue. According to The Wildlife Society (TWS 2007), available data from wind-energy facilities suggest that fatalities of passerines from turbine strikes generally are not significant at the population level, although exceptions to this could occur if facilities are sited in areas where rare species are concentrated. Johnson and Erickson (2010) examined the potential for population level impacts caused by avian collision mortality associated with 6,700 MW of existing and proposed wind-energy development in the Columbia Plateau Ecoregion of eastern Oregon and Washington. The number and species composition of bird collision fatalities was estimated based on results of 16 existing mortality studies in the Ecoregion. Estimated breeding population sizes were available for most

birds in the Ecoregion based on Breeding Bird Survey (BBS) data. Predicted mortality rates for avian groups as well as species of concern were compared to published annual mortality rates. Because the additional wind-energy associated mortality was found to comprise only a small fraction of existing mortality rates, it was concluded that population level impacts would not be expected for the Ecoregion as a whole, but that local impacts to some species could occur. In the only study to quantitatively assess potential population level impacts, Hunt (2002) conducted a 4-year radio telemetry study of golden eagles at the Altamont Pass Wind Resource Area (APWRA) in California and found that the resident golden eagle population appeared to be self sustaining despite sustaining high levels of fatalities, but the effect of these fatalities on eagle populations wintering within and adjacent to the APWRA was unknown. Additional research conducted in 2005 by Hunt and Hunt (2006) found that all 58 territories occupied by golden eagle pairs in the APWRA in 2000 remained active in 2005.

Raptor Use and Exposure Risk

Mean raptor use at the RJWRA based on surveys conducted in the falls of 2008 and 2009, the spring of 2009, and the winter of 2009/2010 (0.29 raptors/plot/20-min survey) was compared with other wind-energy facilities that implemented similar protocols and had data for three or four seasons. Similar studies were conducted at 40 other wind-energy facilities. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-min survey (Figure 3). Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Under this ranking, mean raptor use (number of raptors divided by the number of 800-m plots and the total number of surveys) at the RJWRA is considered to be low, and ranked 32nd when compared to the 40 other wind-energy facilities (Figure 3).

Although raptors occur in most areas with the potential for wind-energy development, individual species appear to differ from one another in their susceptibility to collision (NRC 2007). Results from Altamont Pass in California suggest that mortality for some species is not necessarily related to abundance (Orloff and Flannery 1992). American kestrels, red-tailed hawks, and golden eagles were killed more often than predicted based on abundance. Thus far, only three northern harrier (*Circus cyaneus*) fatalities at existing wind energy facilities have been reported in publicly available documents, despite the fact they are commonly observed during point counts at these facilities (Erickson et al. 2001a, Whitfield and Madders 2006). Because northern harriers often forage close to the ground, risk of collision with turbine blades is considered low for this species. In addition, reports from the High Winds wind-energy facility in California document high American kestrel mortality. Relative use by American kestrels at the High Winds facility is almost six times the use of American kestrels at the Altamont Pass facility (Kerlinger 2005). It is likely that many factors, in addition to abundance, are important in predicting raptor mortality.

Exposure indices may also provide insight into which species might be the most likely turbine casualties; however, the index only considers relative probability of exposure based on abundance, proportion of observations flying, and proportion of flight height of each species within the ZOR for turbines likely to be used at the wind-energy facility. This analysis is based on observations of birds during the surveys and does not take into consideration behavior (e.g.,

foraging, courtship), habitat selection, the varying ability among species to detect and avoid turbines, and other factors that may vary among species and influence likelihood for turbine collision. For these reasons, the index is only a relative index among species observed during the surveys and within the RJWRA. Actual risk for some species may be lower or higher than indicated by these data. At the RJWRA, the raptor species with the highest exposure index was golden eagle due primarily to the relatively higher use estimate by this species and tendency to fly more within the turbine ZOR compared to other species. All other species ranked much lower due primarily to the lower use estimates or low proportion of flight heights observed in the ZOR.

A regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality (R^2 = 69.9%; Figure 4). Using this regression to predict raptor collision mortality at the RJWRA, based on an adjusted mean raptor use of 0.29 raptors/20-min survey, yields an estimated fatality rate of zero fatalities/MW/year. A 90% prediction interval around this estimate is zero to 0.25 fatalities/MW/year. Based on the relative abundance of golden eagle, northern harrier, bald eagle, red-tailed hawk, and ferruginous hawk, as well as a higher exposure index than other raptor species, there is higher potential for fatalities of these four species compared to other raptor species.

Active raptor nest density within one mile of proposed turbine locations was 0.11 nests/mi^2. This is below average in comparison to 20 other wind resource areas evaluated in the western US, where active raptor nest density ranged from 0.03 to 0.43 nests/mi^2 and averaged 0.19 nests/mi^2 (Figure 5). Because few raptor fatalities have been found at modern wind energy facilities outside California, correlations are very low between the number of collision fatalities and raptor nest density within one mile of project facilities (Erickson et al. 2002). Raptors nesting closest to turbines likely have higher probabilities of being impacted from collision with turbines, but data on nests very close to turbines (e.g., within a half-mile) are currently inadequate to determine the level of these impacts.

Non-Raptor Use and Exposure Risk

Most bird species in the US are protected by the Migratory Bird Treaty Act (MBTA 1918). Passerines have been the most abundant bird fatality at wind energy facilities in the western US. Both migrant and resident passerine fatalities have been observed. Given that passerines made up a large proportion of the birds observed during the baseline study, passerines would be expected to make up the largest proportion of fatalities at the RJWRA. With the exception of horned lark, all non-raptor species had no measurable exposure indices due to the fact that all individuals were observed flying below the likely ZOR. Based on the low exposure risks at RJWRA, it is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

CONCLUSIONS

Based on data collected during this study, raptor and all bird use of the RJWRA is generally lower than most wind resource areas evaluated throughout the western US using similar methods. In addition, based on spatial analyses, raptor use of the project area appears to be relatively uniform, and the data do not indicate the presence of any concentration areas for all

raptors combined as well as for each of the raptor subtypes examined. Based on the results of the studies to date, bird mortality at the RJWRA would likely be lower than that documented at other wind-energy facilities located in the western US, where bird collision mortality has been relatively low.

Summer avian use data were not collected for the RJWRA. However, Erickson et al. (2002b) analyzed avian use data from the western U.S. and concluded that data from one or two seasons, especially if they include spring and/or fall migration, generally result in the same estimates of relative risk to raptors as do data collected during all four seasons. To further examine this issue using more recent data, we looked at seasonal raptor use estimates from studies conducted throughout the West and Midwest. Based on this analysis, overall raptor use for all four seasons was 0.61 raptors/plot/20-min survey (n=40 studies). Seasonal raptor use estimates were 0.62 in the spring (n=48 studies), 0.63 in the summer (n=43 studies), 0.67 in the fall (n=42 studies), and 0.60 in the winter (n=37 studies). Based on this analysis, in general, raptor use estimates in the summer are very similar to use estimates collected during each of the other three seasons, and are very close to annual estimates of raptor use. Therefore, the lack of summer avian use data for the RJWRA does not likely have a substantial bearing on our predicted fatality rates.

Compared to 40 other wind resource areas in the western and Midwestern US that have similar raptor use data, mean raptor use at the RJWRA is considered to be low, and ranked 32nd when compared to the 40 other wind-energy facilities. Using a regression analysis based on raptor use and mortality for 13 new-generation wind-energy facilities, the predicted raptor fatality rate at the RJWRA is zero fatalities/MW/year, with a 90% prediction interval around this estimate of zero to 0.25 fatalities/MW/year.

Currently, few published studies are available from the western US that compare bird use to bird mortality rates. Based on research conducted at wind-energy facilities throughout the US, raptor use at the RJWRA is within the range of or generally lower than use levels recorded at other wind-energy facilities. Raptor fatality rates are expected to be within the range of fatality rates observed at other facilities where raptor use levels are similar. To date, no relationships have been observed between overall use by other bird types and fatality rates of those bird types at wind-energy facilities. However, the flight characteristics and foraging habits of some species may result in increased exposure for these species at the RJWRA. The surveys conducted for this proposed wind resource area also do not address the impacts of the proposed facility to nocturnal migrants, such as passerines. To date, overall fatality rates for birds (including nocturnal migrants) at wind-energy facilities have been relatively low and consistent in the West. As more research is conducted at facilities in the West, more information regarding the potential direct impacts of wind-energy facilities to bird species will be obtained.

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Table 1. Summary of species richness (species/plot[a]/20-min survey), and sample size by season and overall during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

Season	Number of Visits	# Surveys Conducted	# Unique Species	Species Richness	
				Large Birds	Small Birds
Fall	17	229	35	0.33	0.84
Spring	8	103	34	0.57	1.84
Winter	6	84	7	0.14	0.15
Overall	**31**	**416**	**52**	**0.32**	**0.82**

[a] 800-m radius for large birds and 100-m radius for small birds.

Table 2. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Reno Junction Wind Resource Area[a] , September 4, 2008 – February 22, 2010.

		Fall		Spring		Winter		Total	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**0**	**0**	**1**	**5**	**0**	**0**	**1**	**5**
Franklin's gull	*Larus pipixcan*	0	0	1	5	0	0	1	5
Waterfowl		**4**	**18**	**12**	**50**	**1**	**16**	**17**	**84**
Canada goose	*Branta canadensis*	2	15	6	26	1	16	9	57
gadwall	*Anas strepera*	2	3	1	2	0	0	3	5
green-winged teal	*Anas crecca*	0	0	1	13	0	0	1	13
mallard	*Anas platyrhynchos*	0	0	3	6	0	0	3	6
northern pintail	*Anas acuta*	0	0	1	3	0	0	1	3
Shorebirds		**4**	**13**	**2**	**2**	**0**	**0**	**6**	**15**
killdeer	*Charadrius vociferus*	1	2	2	2	0	0	3	4
long-billed curlew	*Numenius americanus*	1	1	0	0	0	0	1	1
spotted sandpiper	*Actitis macularia*	2	10	0	0	0	0	2	10
Raptors		**65**	**72**	**46**	**50**	**11**	**11**	**122**	**133**
Accipiters		*1*	*1*	*0*	*0*	*0*	*0*	*1*	*1*
Cooper's hawk	*Accipiter cooperii*	1	1	0	0	0	0	1	1
Buteos		*12*	*12*	*15*	*18*	*3*	*3*	*30*	*33*
ferruginous hawk	*Buteo regalis*	0	0	8	9	0	0	8	9
red-tailed hawk	*Buteo jamaicensis*	5	5	5	7	0	0	10	12
rough-legged hawk	*Buteo lagopus*	0	0	0	0	3	3	3	3
Swainson's hawk	*Buteo swainsoni*	7	7	2	2	0	0	9	9
Northern Harrier		*23*	*25*	*15*	*15*	*0*	*0*	*38*	*40*
northern harrier	*Circus cyaneus*	23	25	15	15	0	0	38	40
Eagles		*21*	*25*	*11*	*12*	*8*	*8*	*40*	*45*
bald eagle	*Haliaeetus leucocephalus*	0	0	1	1	5	5	6	6
golden eagle	*Aquila chrysaetos*	21	25	10	11	3	3	34	39
Falcons		*6*	*7*	*3*	*3*	*0*	*0*	*9*	*10*

Table 2. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Reno Junction Wind Resource Area[a] , September 4, 2008 – February 22, 2010.

		Fall		Spring		Winter		Total	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
American kestrel	*Falco sparverius*	4	5	2	2	0	0	6	7
prairie falcon	*Falco mexicanus*	2	2	1	1	0	0	3	3
Other Raptors		*2*	*2*	*2*	*2*	*0*	*0*	*4*	*4*
unidentified raptor		2	2	2	2	0	0	4	4
Vultures		**0**	**0**	**1**	**1**	**0**	**0**	**1**	**1**
turkey vulture	*Cathartes aura*	0	0	1	1	0	0	1	1
Upland Gamebirds		**2**	**7**	**0**	**0**	**0**	**0**	**2**	**7**
greater sage-grouse	*Centrocercus urophasianus*	2	7	0	0	0	0	2	7
Doves/Pigeons		**3**	**4**	**0**	**0**	**0**	**0**	**3**	**4**
mourning dove	*Zenaida macroura*	3	4	0	0	0	0	3	4
Large Corvids		**0**	**0**	**2**	**2**	**0**	**0**	**2**	**2**
American crow	*Corvus brachyrhynchos*	0	0	2	2	0	0	2	2
Passerines		**330**	**1,568**	**646**	**902**	**20**	**89**	**996**	**2,559**
American goldfinch	*Carduelis tristis*	1	7	0	0	0	0	1	7
Baird's sparrow	*Ammodramus bairdii*	0	0	1	1	0	0	1	1
barn swallow	*Hirundo rustica*	1	5	0	0	0	0	1	5
Brewer's blackbird	*Euphagus cyanocephalus*	4	14	0	0	0	0	4	14
Brewer's sparrow	*Spizella breweri*	13	24	22	25	0	0	35	49
brown-headed cowbird	*Molothrus ater*	1	3	0	0	0	0	1	3
Bullock's oriole	*Icterus bullockii*	1	1	0	0	0	0	1	1
chestnut-collared longspur	*Calcarius ornatus*	8	44	18	36	0	0	26	80
clay-colored sparrow	*Spizella pallida*	1	1	0	0	0	0	1	1
cliff swallow	*Petrochelidon pyrrhonota*	0	0	1	1	0	0	1	1
European starling	*Sturnus vulgaris*	1	23	2	11	0	0	3	34
grasshopper sparrow	*Ammodramus savannarum*	0	0	4	4	0	0	4	4
horned lark	*Eremophila alpestris*	166	1,038	186	258	14	65	366	1,361
Lapland longspur	*Calcarius lapponicus*	1	1	0	0	5	23	6	24
lark bunting	*Calamospiza melanocorys*	15	87	110	159	0	0	125	246

Table 2. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Reno Junction Wind Resource Area[a] , September 4, 2008 – February 22, 2010.

		Fall		Spring		Winter		Total	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
lark sparrow	*Chondestes grammacus*	2	8	0	0	0	0	2	8
loggerhead shrike	*Lanius ludovicianus*	0	0	1	1	0	0	1	1
McCown's longspur	*Calcarius mccownii*	11	39	126	196	0	0	137	235
mountain bluebird	*Sialia currucoides*	1	1	0	0	0	0	1	1
northern shrike	*Lanius excubitor*	1	1	0	0	0	0	1	1
red-winged blackbird	*Agelaius phoeniceus*	0	0	1	1	0	0	1	1
rock wren	*Salpinctes obsoletus*	0	0	1	1	0	0	1	1
sage thrasher	*Oreoscoptes montanus*	1	2	3	3	0	0	4	5
savannah sparrow	*Passerculus sandwichensis*	0	0	1	1	0	0	1	1
Say's phoebe	*Sayornis saya*	3	4	2	2	0	0	5	6
snow bunting	*Plectrophenax nivalis*	0	0	0	0	1	1	1	1
song sparrow	*Melospiza melodia*	1	1	0	0	0	0	1	1
unidentified passerine		8	41	5	11	0	0	13	52
vesper sparrow	*Pooecetes gramineus*	36	105	39	63	0	0	75	168
western meadowlark	*Sturnella neglecta*	53	118	123	128	0	0	176	246
Overall		**408**	**1,682**	**710**	**1,012**	**32**	**116**	**1,150**	**2,810**

Table 3a. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

	Use			% Composition			% Frequency		
Species/Type	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**
Waterbirds	**0**	**0.05**	**0**	**0**	**4.5**	**0**	**0**	**1.0**	**0**
Franklin's gull	0	0.05	0	0	4.5	0	0	1.0	0
Waterfowl	**0.08**	**0.48**	**0.19**	**16**	**45.4**	**59.3**	**1.3**	**7.8**	**1.2**
Canada goose	0.07	0.25	0.19	13.5	23.6	59.3	0.9	4.8	1.2
gadwall	0.01	0.02	0	2.5	1.8	0	0.4	1.0	0
green-winged teal	0	0.12	0	0	11.8	0	0	1.0	0
mallard	0	0.06	0	0	5.5	0	0	3.0	0
northern pintail	0	0.03	0	0	2.7	0	0	1.0	0
Shorebirds	**0.05**	**0.02**	**0**	**10.9**	**1.8**	**0**	**1.3**	**1.0**	**0**
killdeer	<0.01	0.02	0	1.7	1.8	0	0.4	1.0	0
long-billed curlew	<0.01	0	0	0.8	0	0	0.4	0	0
spotted sandpiper	0.04	0	0	8.4	0	0	0.8	0	0
Raptors	**0.32**	**0.48**	**0.13**	**63.1**	**45.4**	**40.7**	**25**	**32.7**	**13.1**
Accipiters	*<0.01*	*0*	*0*	*0.9*	*0*	*0*	*0.5*	*0*	*0*
Cooper's hawk	<0.01	0	0	0.9	0	0	0.5	0	0
Buteos	*0.05*	*0.17*	*0.04*	*10.3*	*16.3*	*11.1*	*5.2*	*13.5*	*3.6*
ferruginous hawk	0	0.09	0	0	8.2	0	0	7.7	0
red-tailed hawk	0.02	0.07	0	4.3	6.3	0	2.2	4.8	0
rough-legged hawk	0	0	0.04	0	0	11.1	0	0	3.6
Swainson's hawk	0.03	0.02	0	6	1.8	0	3	1.9	0
Northern Harrier	*0.11*	*0.14*	*0*	*21.9*	*13.6*	*0*	*9.7*	*13.5*	*0*
northern harrier	0.11	0.14	0	21.9	13.6	0	9.7	13.5	0
Eagles	*0.11*	*0.12*	*0.1*	*22.1*	*10.9*	*29.6*	*9.3*	*9.6*	*9.5*
bald eagle	0	<0.01	0.06	0	0.9	18.5	0	1.0	6
golden eagle	0.11	0.11	0.04	22.1	10	11.1	9.3	8.7	3.6

Table 3a. Mean bird use (number of birds/plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

	Use			% Composition			% Frequency		
Species/Type	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**
Falcons	*0.03*	*0.03*	*0*	*6.2*	*2.7*	*0*	*2.7*	*2.9*	*0*
American kestrel	0.02	0.02	0	4.4	1.8	0	1.8	1.9	0
prairie falcon	<0.01	<0.01	0	1.8	0.9	0	0.9	1.0	0
Other Raptors	*<0.01*	*0.02*	*0*	*1.7*	*1.8*	*0*	*0.8*	*1.9*	*0*
unidentified raptor	<0.01	0.02	0	1.7	1.8	0	0.8	1.9	0
Vultures	**0**	**<0.01**	**0**	**0**	**0.9**	**0**	**0**	**1.0**	**0**
turkey vulture	0	<0.01	0	0	0.9	0	0	1.0	0
Upland Gamebirds	**0.03**	**0**	**0**	**6.3**	**0**	**0**	**0.9**	**0**	**0**
greater sage grouse	0.03	0	0	6.3	0	0	0.9	0	0
Doves/Pigeons	**0.02**	**0**	**0**	**3.6**	**0**	**0**	**1.4**	**0**	**0**
mourning dove	0.02	0	0	3.6	0	0	1.4	0	0
Large Corvids	**0**	**0.02**	**0**	**0**	**2**	**0**	**0**	**1.0**	**0**
American crow	0	0.02	0	0	2	0	0	1.0	0
Overall	**0.5**	**1.06**	**0.32**	**100**	**100**	**100**			

Table 3b. Mean use (number of birds/100-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

	Use			% Composition			% Frequency		
Species/Type	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**	**Fall**	**Spring**	**Winter**
Passerines	**5.14**	**5.05**	**0.43**	**100**	**100**	**100**	**56.1**	**88.3**	**14.3**
American goldfinch	0.03	0	0	0.6	0	0	0.5	0	0
Brewer's blackbird	0.01	0	0	0.3	0	0	0.9	0	0
Brewer's sparrow	0.1	0.17	0	1.9	3.3	0	4.8	11.8	0
Bullock's oriole	<0.01	0	0	<0.1	0	0	0.4	0	0
chestnut-collared longspur	0.17	0.21	0	3.3	4.2	0	1.8	7.9	0
clay-colored sparrow	<0.01	0	0	<0.1	0	0	0.4	0	0
cliff swallow	0	0.01	0	0	0.2	0	0	1	0
grasshopper sparrow	0	0.03	0	0	0.6	0	0	1	0
horned lark	3.49	1.46	0.36	68	29	83.3	41.4	59.9	11.9
Lapland longspur	<0.01	0	0.06	<0.1	0	13.9	0.5	0	2.4
lark bunting	0.22	0.84	0	4.4	16.7	0	3	22.6	0
lark sparrow	0.04	0	0	0.7	0	0	0.9	0	0
loggerhead shrike	0	<0.01	0	0	0.2	0	0	1	0
McCown's longspur	0.11	1.27	0	2	25.2	0	2.9	31.9	0
mountain bluebird	<0.01	0	0	<0.1	0	0	0.4	0	0
sage thrasher	<0.01	<0.01	0	0.2	0.2	0	0.4	1	0
Say's phoebe	0	<0.01	0	0	0.2	0	0	1	0
snow bunting	0	0	0.01	0	0	2.8	0	0	1.2
song sparrow	<0.01	0	0	<0.1	0	0	0.5	0	0
unidentified passerine	0.17	0.02	0	3.4	0.4	0	2.5	1.9	0
vesper sparrow	0.4	0.49	0	7.7	9.7	0	10	11.5	0
western meadowlark	0.37	0.51	0	7.2	10.1	0	12.6	31.8	0
Overall	**5.14**	**5.05**	**0.43**	**100**	**100**	**100**			

Table 4. Flight height characteristics by bird type during fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010. Large bird observations were limited to within 800-m and small birds were limited to within 100-m.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight Height Categories 0-35m	35-130 m	>130m
Waterbirds	1	5	300.00	100	0	0	100
Waterfowl	13	76	12.31	90.5	57.9	42.1	0
Shorebirds	5	14	1.60	93.3	100	0	0
Raptors	97	107	85.69	80.5	61.7	18.7	19.6
Accipiters	*1*	*1*	*5.00*	*100*	*100*	*0*	*0*
Buteos	*23*	*26*	*171.48*	*78.8*	*42.3*	*15.4*	*42.3*
Northern Harrier	*38*	*40*	*40.63*	*100*	*87.5*	*5.0*	*7.5*
Eagles	*25*	*29*	*94.36*	*64.4*	*37.9*	*44.8*	*17.2*
Falcons	*8*	*9*	*13.75*	*90.0*	*88.9*	*11.1*	*0*
Other Raptors	*2*	*2*	*175.00*	*50.0*	*0*	*0*	*100*
Vultures	1	1	10.00	100	100	0	0
Upland Gamebirds	2	7	0	100	100	0	0
Doves/Pigeons	2	3	0	75.0	100	0	0
Large Corvids	2	2	15.00	100	100	0	0
Large Birds Overall	**123**	**215**	**71.71**	**85.7**	**63.7**	**24.2**	**12.1**
Passerines	410	1,314	5.54	75.9	93.4	4.0	2.7
Small Birds Overall	**410**	**1,314**	**5.54**	**75.9**	**93.4**	**4.0**	**2.7**

ZOR: The likely "zone of risk" for potential collision with a turbine blade, or 35-130 m (114-427 ft)above ground level (AGL).

Table 5a. Relative exposure index and flight characteristics by large bird species during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
Canada goose	6	0.15	91.2	61.5	0.08	61.5
golden eagle	23	0.08	69.2	44.4	0.03	44.4
red-tailed hawk	7	0.02	75	33.3	<0.01	33.3
northern harrier	38	0.08	100	5	<0.01	5
bald eagle	2	0.02	33.3	50	<0.01	50
ferruginous hawk	8	0.02	100	11.1	<0.01	11.1
American kestrel	6	0.01	100	14.3	<0.01	14.3
green-winged teal	1	0.03	100	0	0	0
spotted sandpiper	2	0.02	100	0	0	0
Swainson's hawk	5	0.02	55.6	0	0	0
greater sage grouse	2	0.01	100	0	0	0
mallard	2	0.01	50	0	0	0
rough-legged hawk	3	0.01	100	0	0	0
Franklin's gull	1	0.01	100	0	0	0
gadwall	3	<0.01	100	0	0	0
unidentified raptor	2	<0.01	50	0	0	0
killdeer	3	<0.01	100	0	0	0
mourning dove	2	<0.01	75	0	0	0
northern pintail	1	<0.01	100	0	0	0
prairie falcon	2	<0.01	66.7	0	0	0
American crow	2	<0.01	100	0	0	0
turkey vulture	1	<0.01	100	0	0	0
Cooper's hawk	1	<0.01	100	0	0	0
long-billed curlew	0	<0.01	0	0	0	0

ZOR: The likely "zone of risk" for potential collision with a turbine blade, or 114-427 ft (35-130 m) above ground level (AGL).

Table 5b. Relative exposure index and flight characteristics for small birds during the fixed-point bird use surveys at the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
horned lark	189	1.97	81.1	6.60	0.1	6.6
American goldfinch	1	0.01	100	0	0	0
Lapland longspur	2	0.02	83.3	0	0	0
lark sparrow	1	0.02	87.5	0	0	0
Brewer's sparrow	14	0.08	52.5	0	0	0
unidentified passerine	9	0.08	97.7	0	0	0
chestnut-collared longspur	10	0.12	89.8	0	0	0
western meadowlark	35	0.27	58.7	0	0	0
lark bunting	45	0.28	65.2	0	0	0
vesper sparrow	29	0.28	62.2	0	0	0
McCown's longspur	69	0.33	77.1	0	0	0
Brewer's blackbird	1	<0.01	33.3	0	0	0
Bullock's oriole	1	<0.01	100	0	0	0
clay-colored sparrow	0	<0.01	0	0	0	0
cliff swallow	1	<0.01	100	0	0	0
grasshopper sparrow	0	<0.01	0	0	0	0
loggerhead shrike	0	<0.01	0	0	0	0
mountain bluebird	0	<0.01	0	0	0	0
sage thrasher	0	<0.01	0	0	0	0
Say's phoebe	1	<0.01	100	0	0	0
snow bunting	1	<0.01	100	0	0	0
song sparrow	1	<0.01	100	0	0	0

ZOR: The likely "zone of risk" for potential collision with a turbine blade, or 114-427 ft (35-130 m) above ground level (AGL).

Table 6. Results of ANOVA test to determine if significant differences occur between raptor use at the 14 avian survey points in the Reno Junction Wind Resource Area, September 4, 2008 – February 22, 2010. P-values >0.10 indicate no significant difference.

Raptor group	Degrees freedom	F-Statistic	P-Value
All Raptors	13	0.82	0.64
Raptor Subtypes			
Accipiters	13	0.99	0.46
Buteos	13	0.62	0.83
Harriers	13	0.82	0.64
Eagles	13	1.43	0.14
Falcons	13	1.11	0.34
Other Raptors	13	0.72	0.74

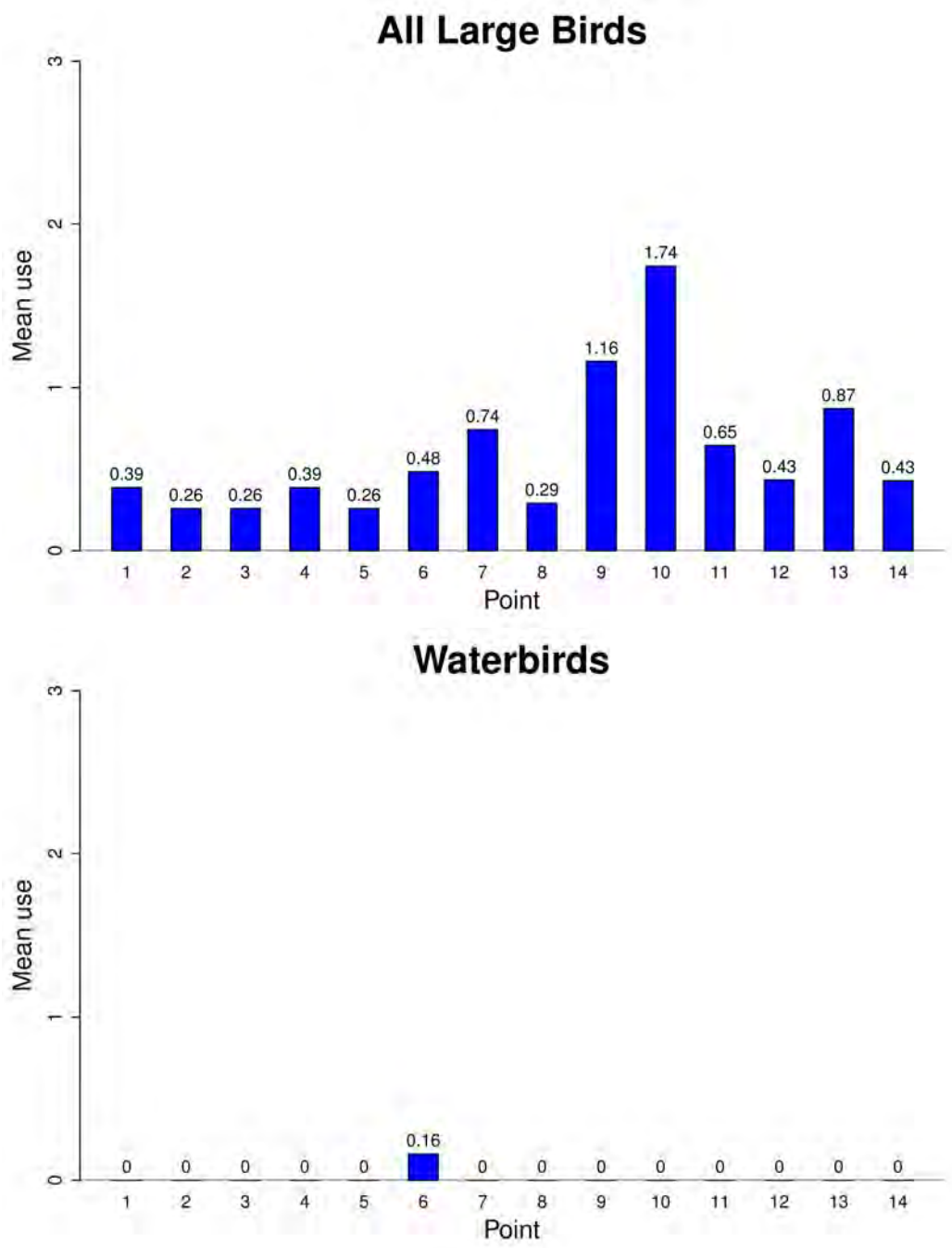


Figure 1. Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

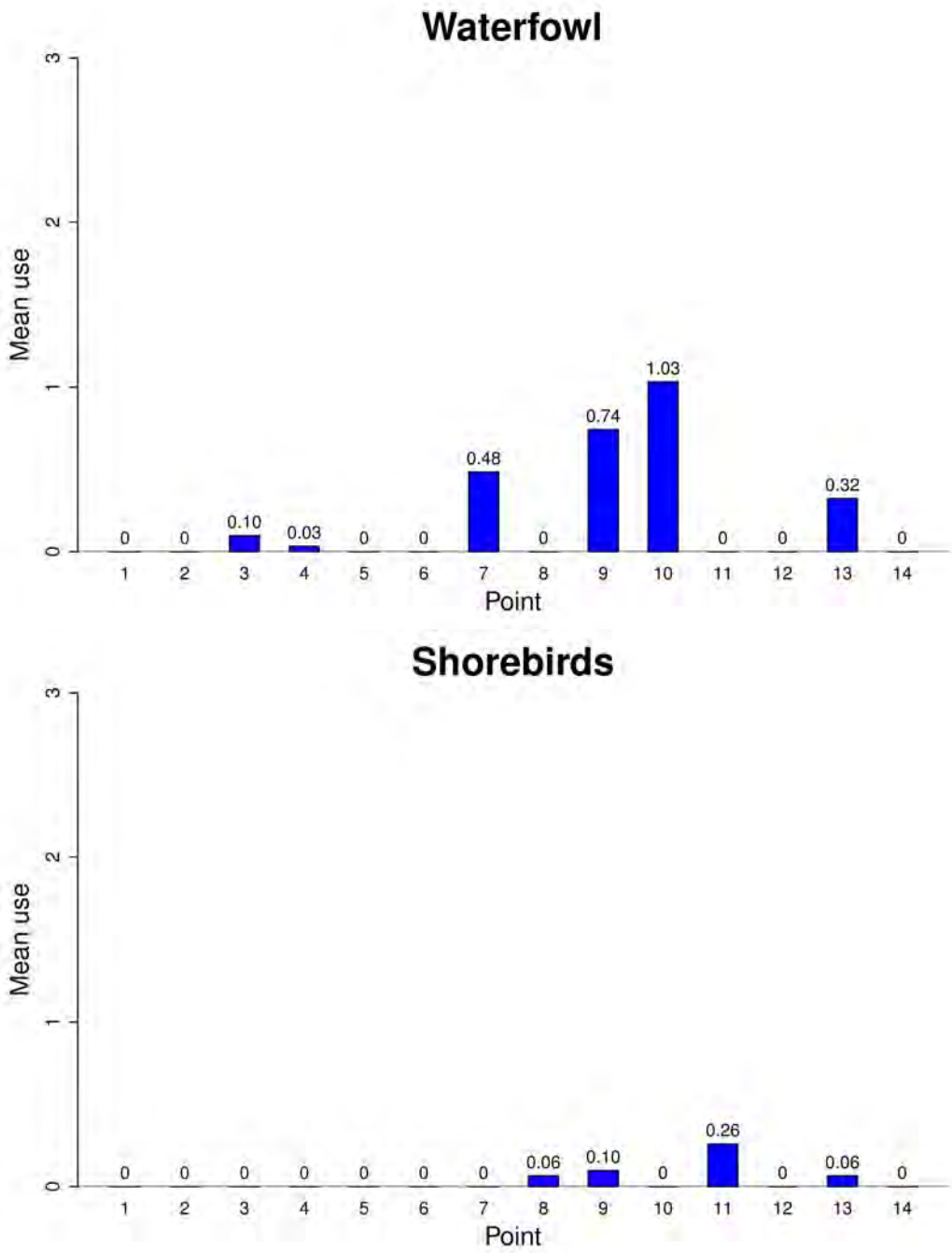
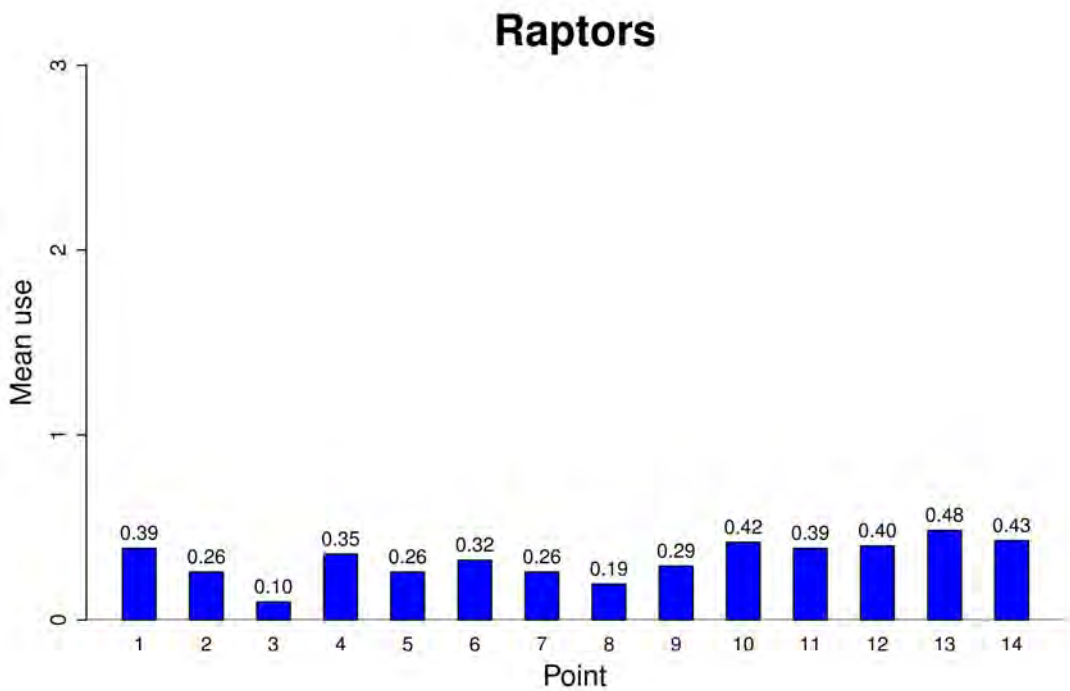


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.



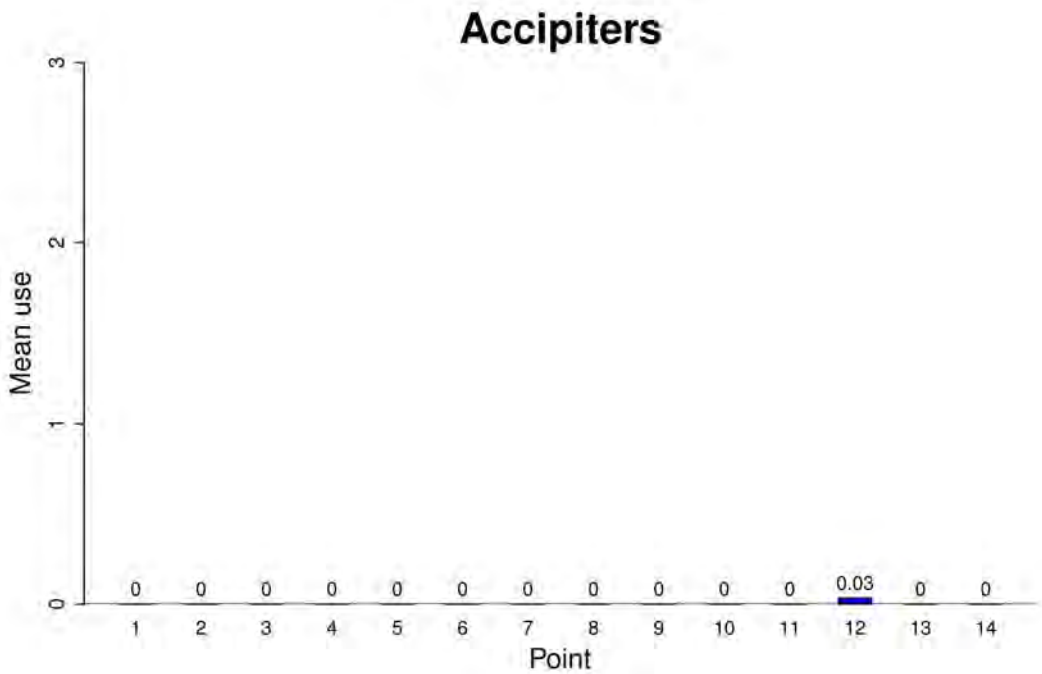
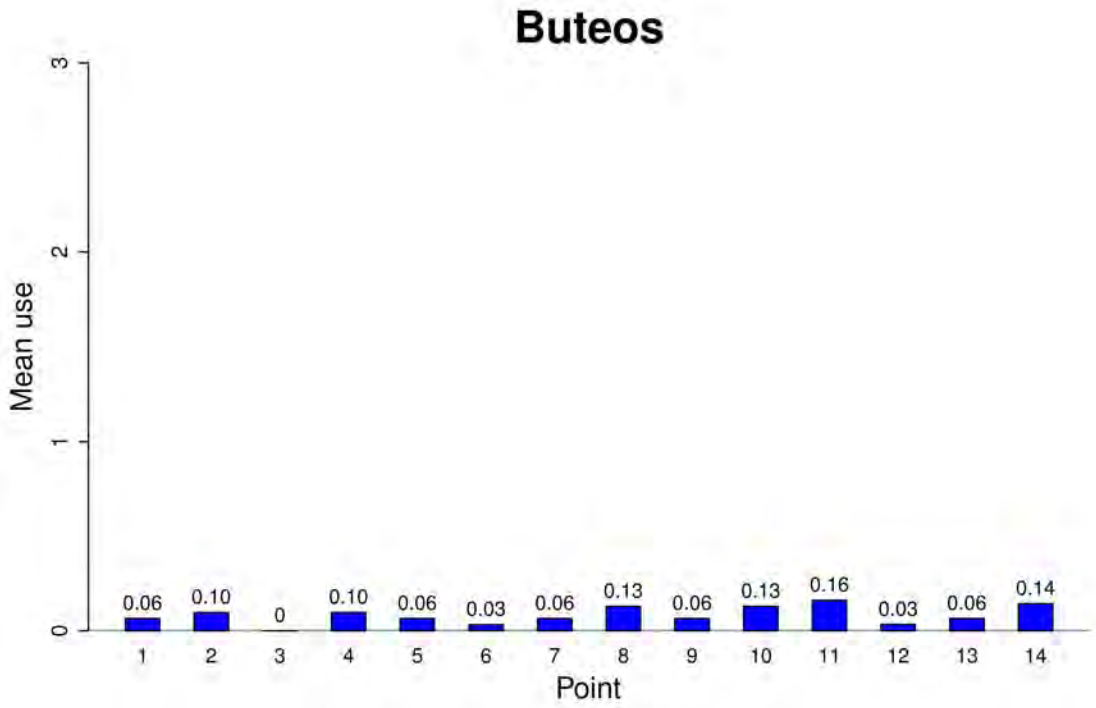


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.



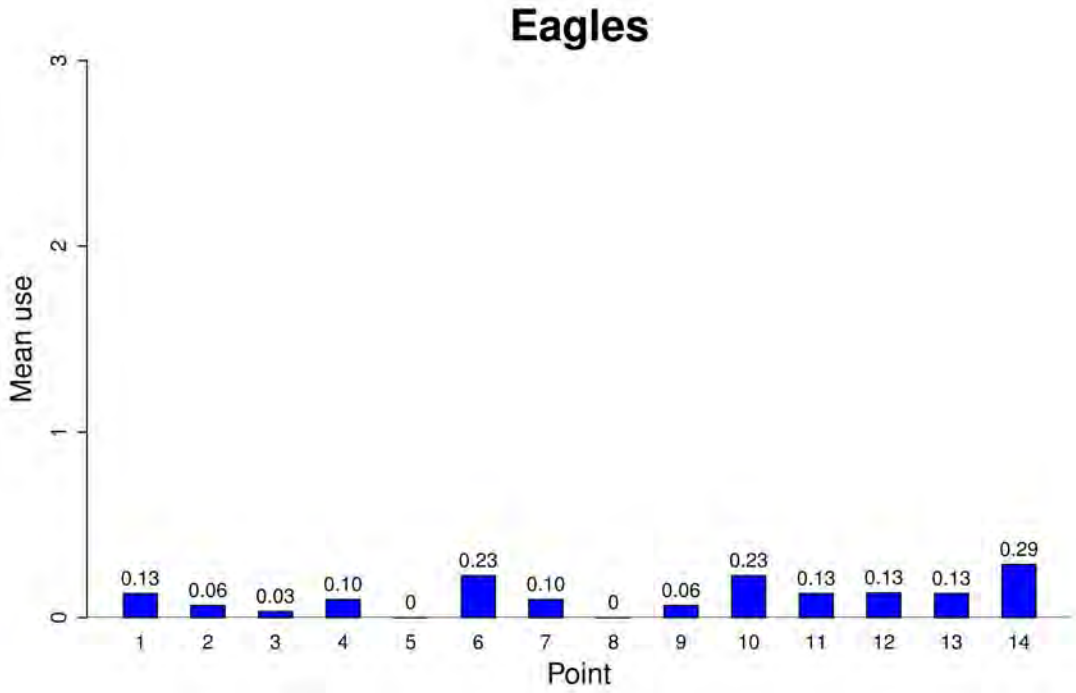


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

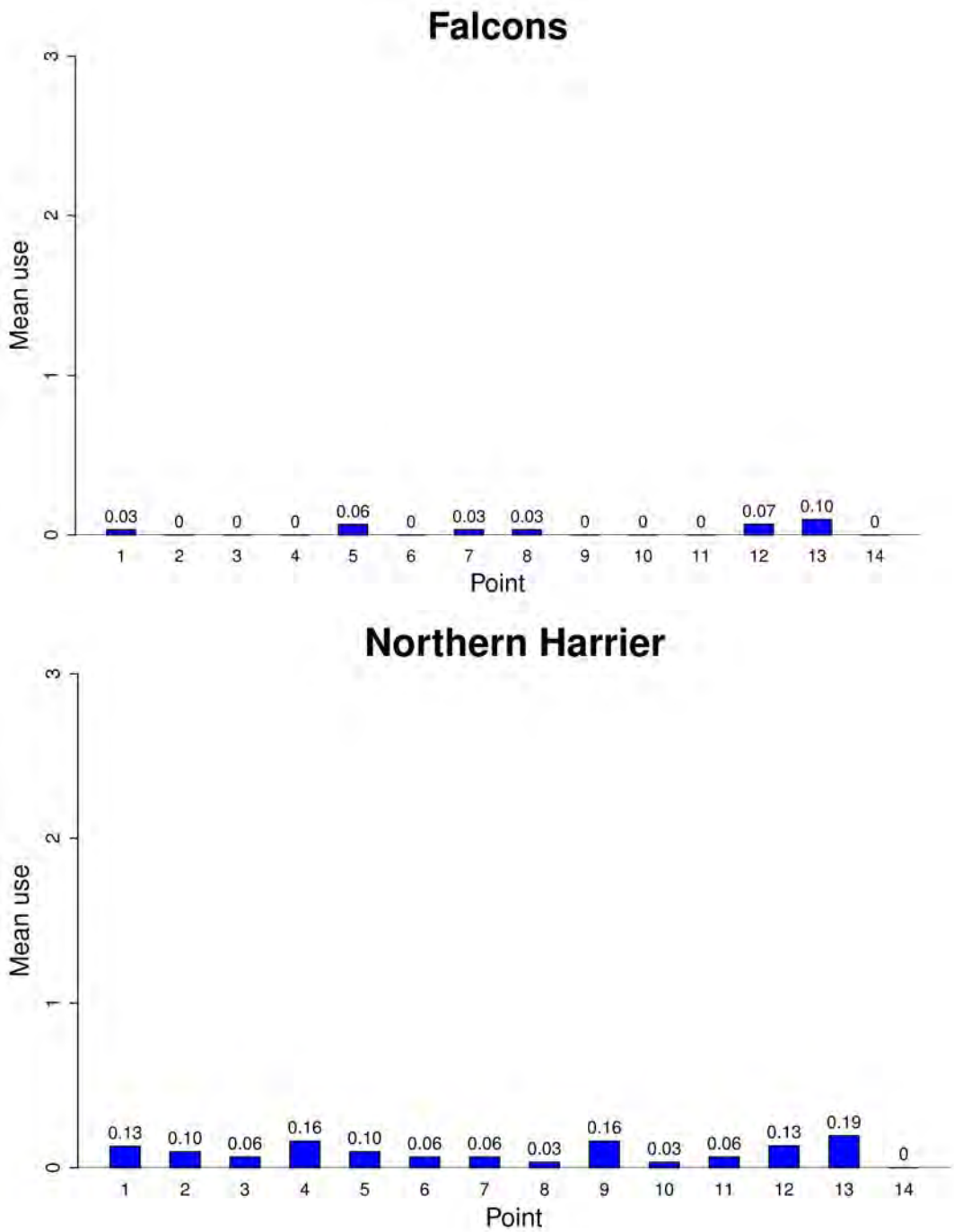


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

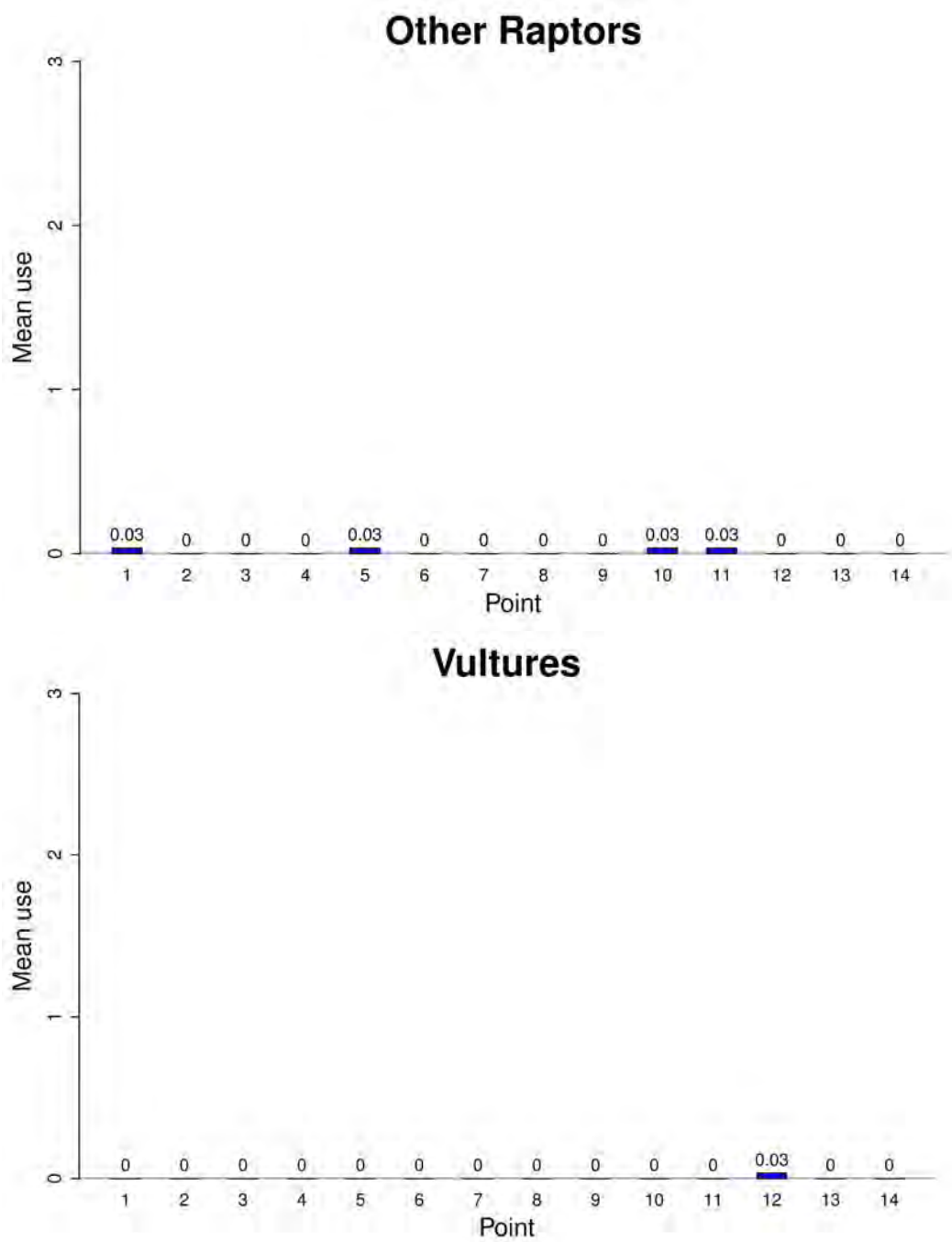


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

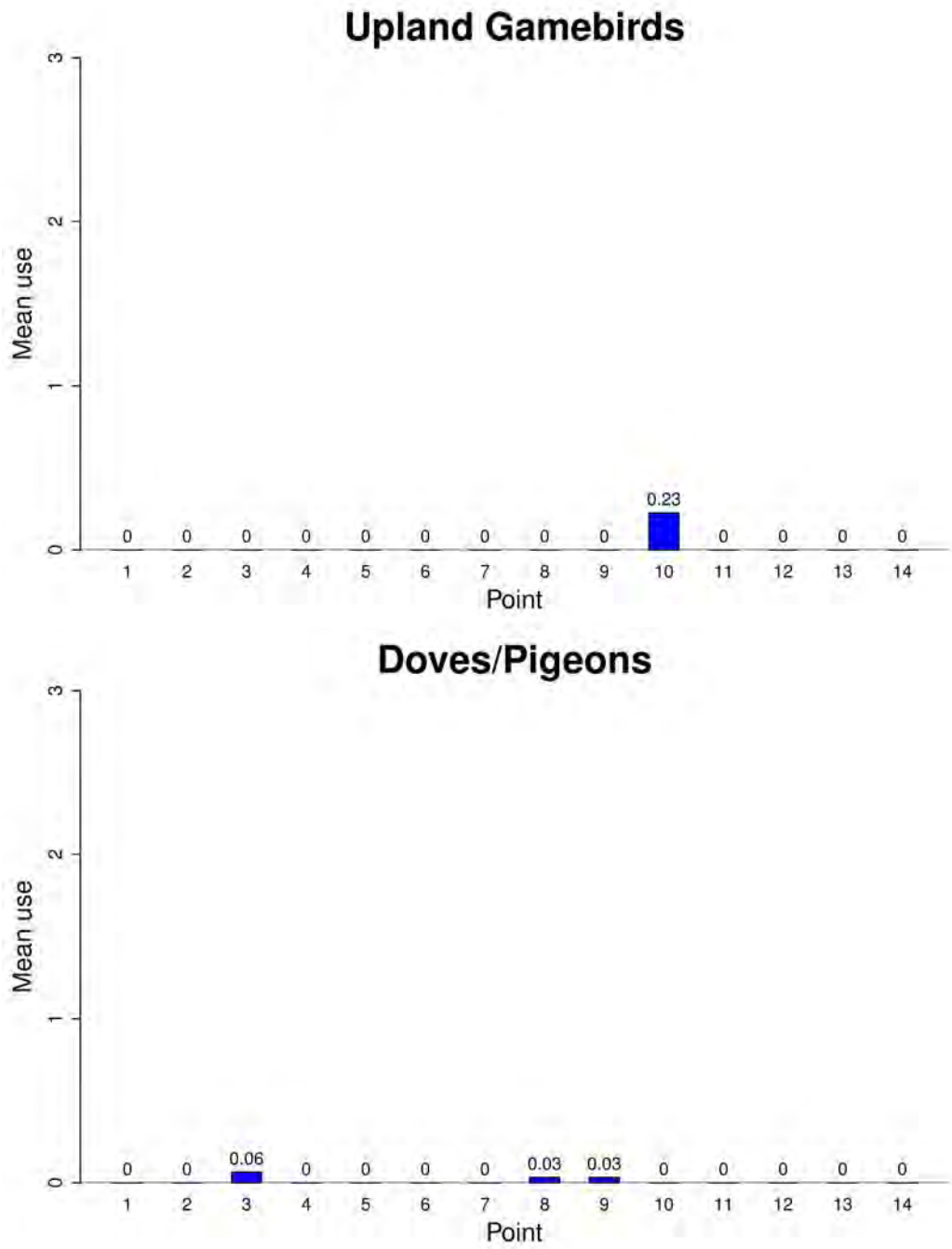


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

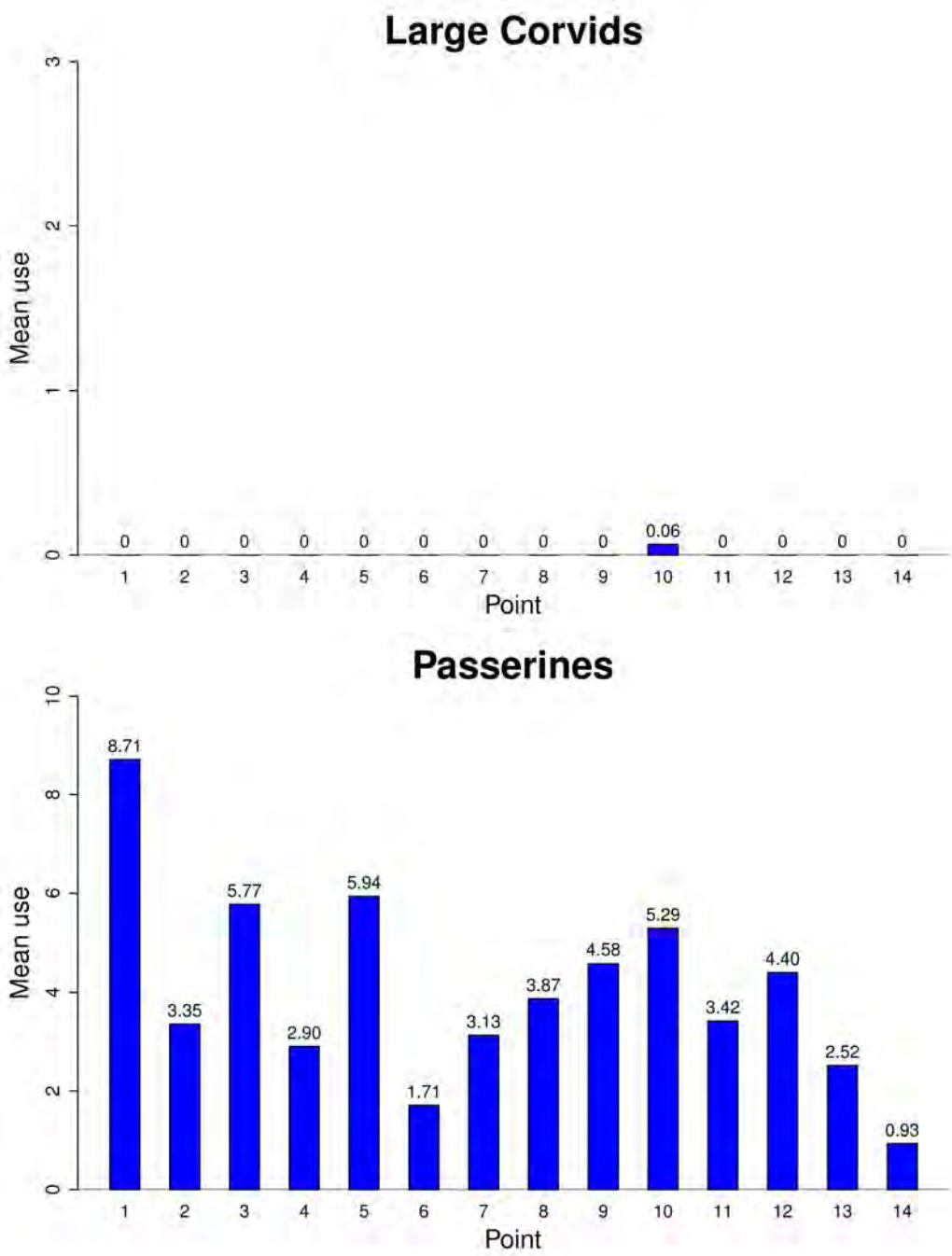


Figure 1 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Reno Junction Wind Resource Area.

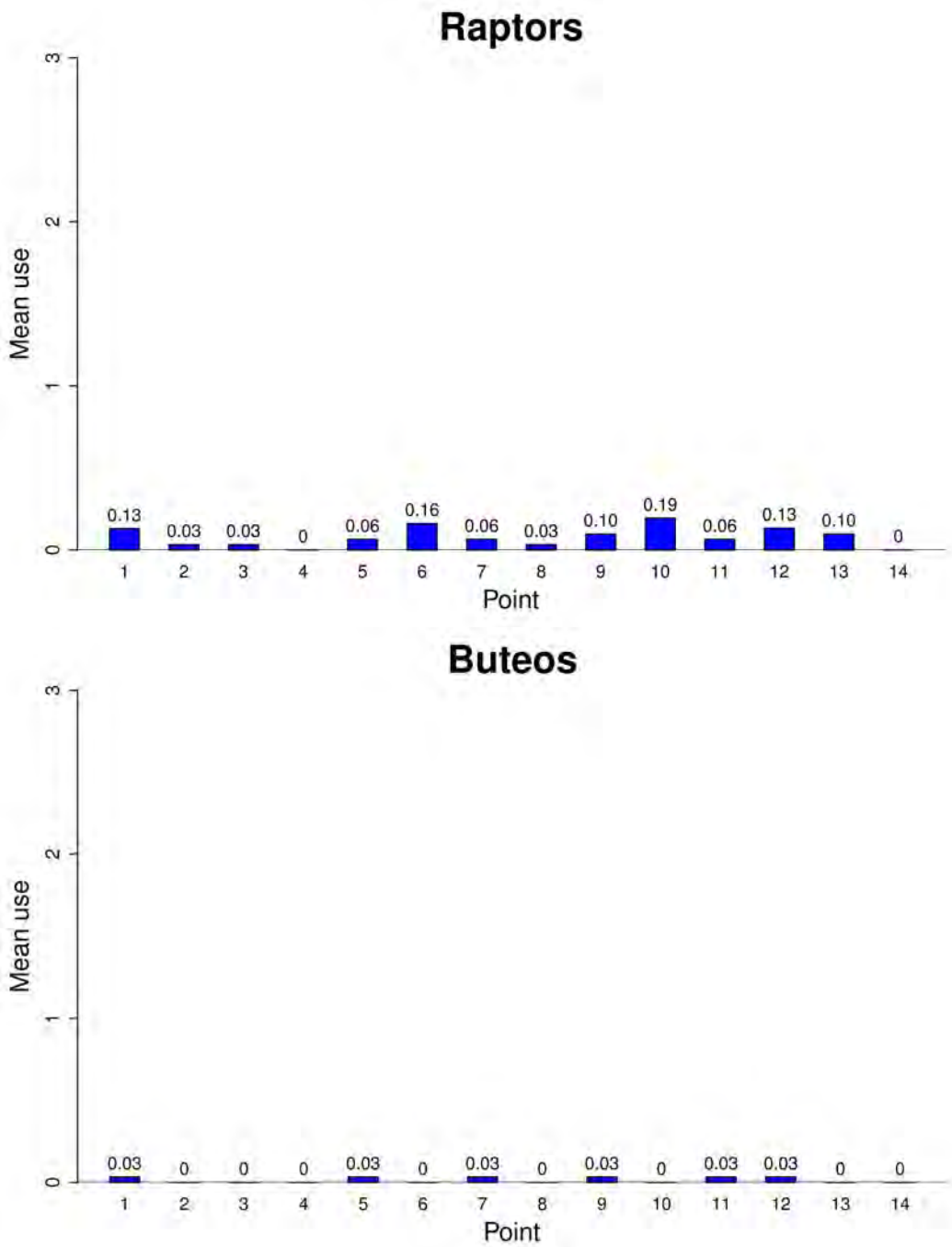


Figure 2. Mean use (number of birds/20-min survey) within the estimated zone of risk at each fixed-point bird use survey point for raptors at the Reno Junction Wind Resource Area.

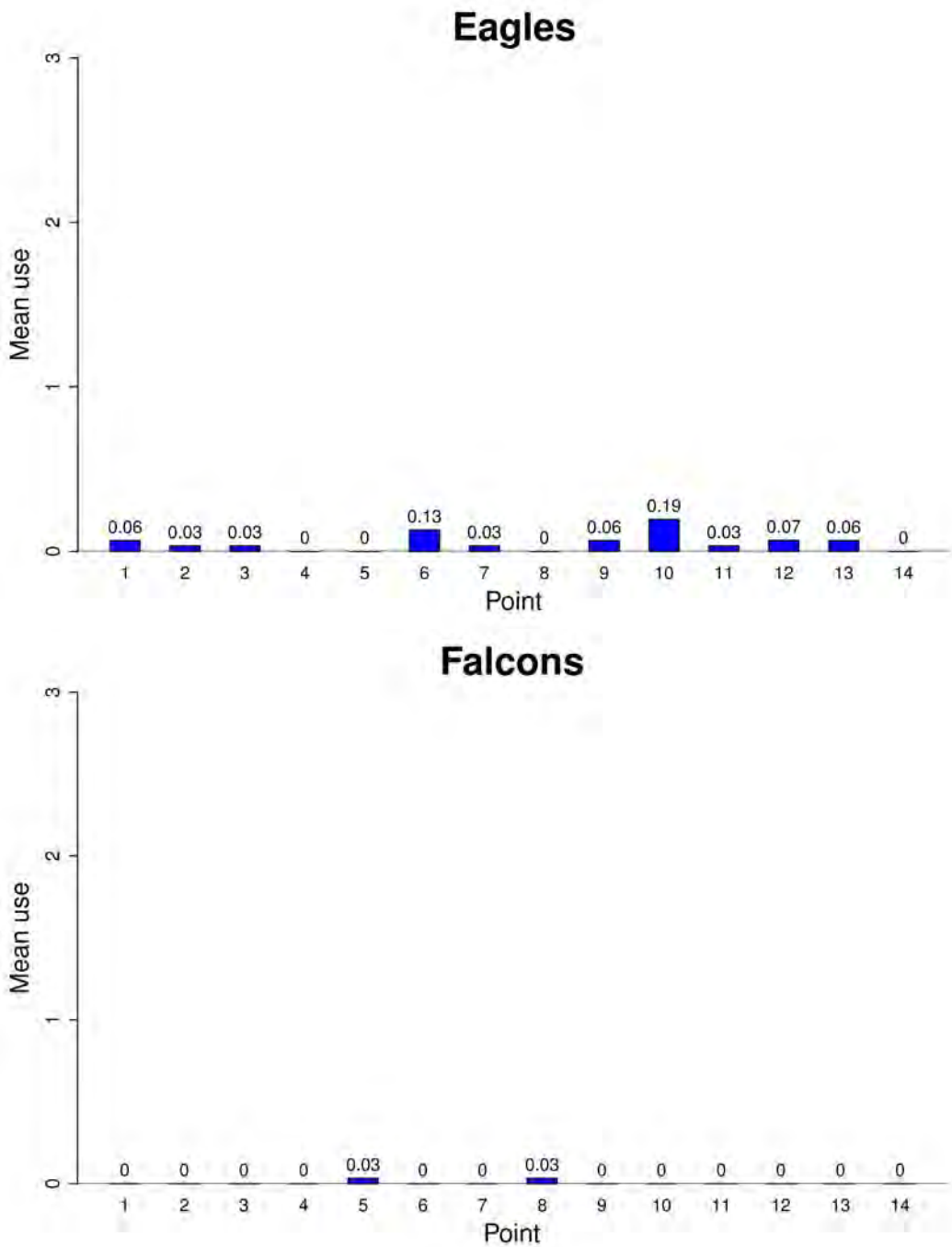


Figure 2 (*continued*). Mean use (number of birds/20-min survey) within the estimated zone of risk at each fixed-point bird use survey point for raptors at the Reno Junction Wind Resource Area.

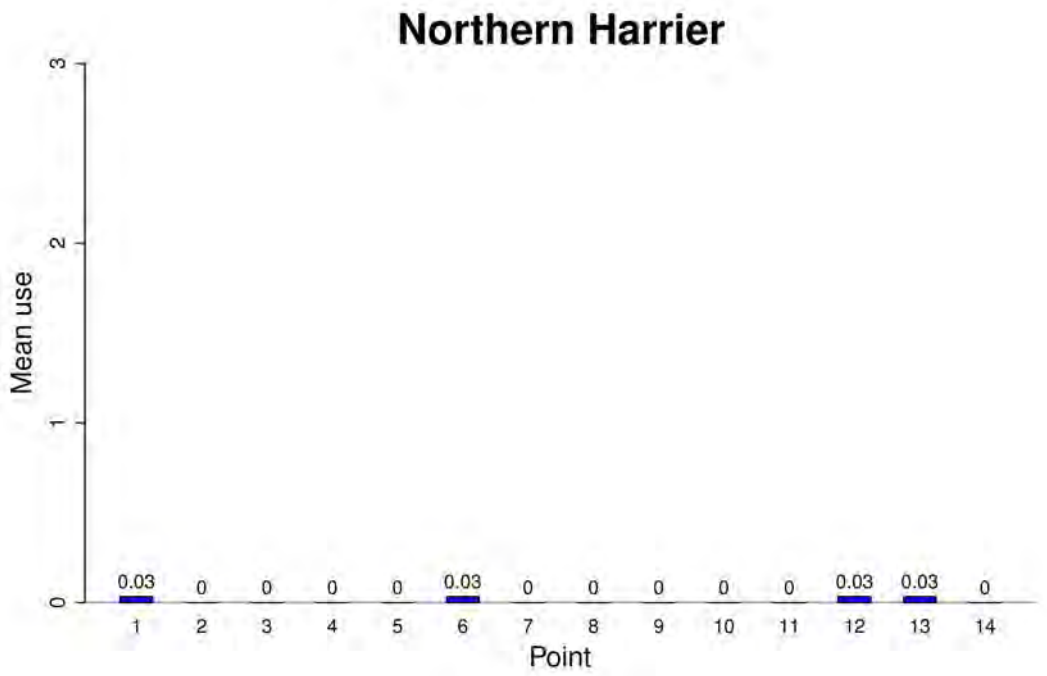


Figure 2 (*continued*). Mean use (number of birds/20-min survey) within the estimated zone of risk at each fixed-point bird use survey point for raptors at the Reno Junction Wind Resource Area.

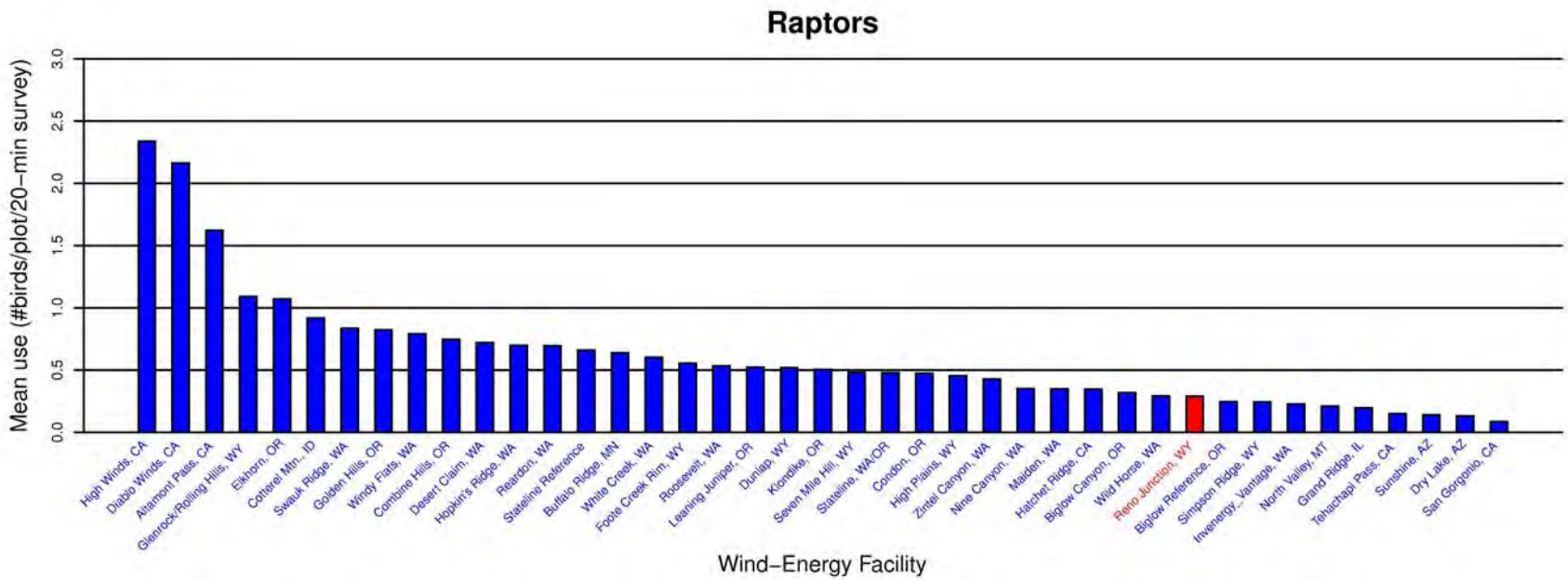
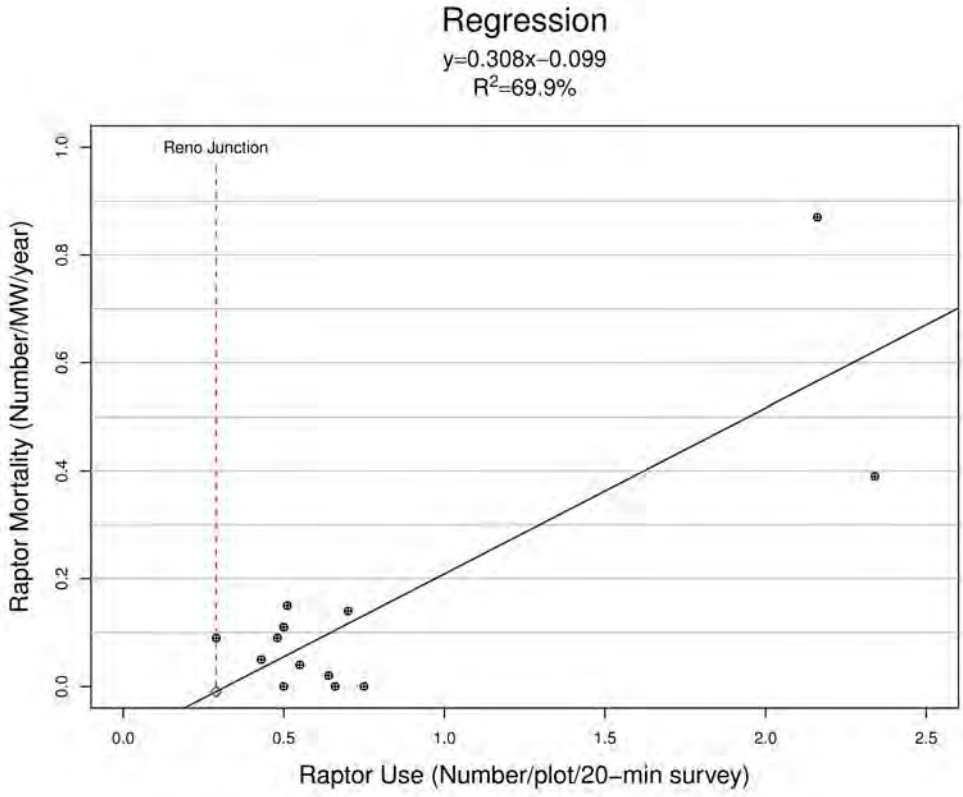


Figure 3. Comparison of raptor use between the Reno Junction Wind Resource Area and other US wind-energy facilities.

Data from the following sources:

Reno Junction, WY	This study.				
High Winds, CA	Kerlinger et al. 2005	Stateline Reference	URS et al. 2001	Maiden, WA	Erickson et al. 2002b
Diablo Winds, CA	WEST 2006a	Buffalo Ridge, MN	Erickson et al. 2002b	Hatchet Ridge, CA	Young et al. 2007b
Altamont Pass, CA	Erickson et al. 2002b	White Creek, WA	NWC and WEST 2005a	Biglow Canyon, OR	WEST 2005c
Elkhorn, OR	WEST 2005a	Foote Creek Rim, WY	Erickson et al. 2002b	Wild Horse, WA	Erickson et al. 2003b
Cotterel Mtn., ID	Cooper et al. 2004	Roosevelt, WA	NWC and WEST 2004	Biglow Reference, OR	WEST 2005c
Swauk Ridge, WA	Erickson et al. 2003a	Leaning Juniper, OR	NWC and WEST 2005b	Simpson Ridge, WY	Johnson et al. 2000b
Golden Hills, OR	Jeffrey et al. 2008	Klondike, OR	Johnson et al. 2002b	Invenergy_Vantage, WA	WEST 2007
Windy Flats, WA	Johnson et al. 2007	Stateline, WA/OR	Erickson et al. 2002b	North Valley, MT	WEST 2006b
Combine Hills, OR	Young et al. 2003c	Condon, OR	Erickson et al. 2002b	Tehachapi Pass, CA	Erickson et al. 2002b
Desert Claim, WA	Young et al. 2003b	Zintel Canyon, WA	Erickson et al. 2002a	Sunshine, AZ	WEST and the CPRS 2006
Hopkin's Ridge, WA	Young et al. 2003a	Homestead, CA	WEST et al. 2007	Dry Lake, AZ	Young et al. 2007c
Reardon, WA	WEST 2005b	Nine Canyon, WA	Erickson et al. 2001a	San Gorgonio, CA	Erickson et al. 2002b



Overall Raptor Use 0.29
Predicted Fatality Rate 0/MW/year
90.0% Prediction Interval 0, 0.25/MW/year)

Figure 4. Regression analysis comparing raptor use estimates versus estimated raptor mortality.

Data from the following sources:

Study and Location	Raptor Use	Source	Raptor Mortality	Source
Buffalo Ridge, MN	0.64	Erickson et al. 2002b	0.02	Erickson et al. 2002b
Combine Hills, OR	0.75	Young et al. 2003c	0.00	Young et al. 2005
Diablo Winds, CA	2.161	WEST 2006a	0.87	WEST 2006a
Foote Creek Rim, WY	0.55	Erickson et al. 2002b	0.04	Erickson et al. 2002b
High Winds, CA	2.34	Kerlinger et al. 2005	0.39	Kerlinger et al. 2006
Hopkins Ridge	0.70	Young et al. 2003a	0.14	Young et al. 2007a
Klondike II, OR	0.50	Johnson 2004	0.11	NWC and WEST 2007
Klondike, OR	0.50	Johnson et al. 2002b	0.00	Johnson et al. 2003b
Stateline, WA/OR	0.48	Erickson et al. 2002b	0.09	Erickson et al. 2002b
Vansycle, OR	0.66	WCIA and WEST 1997	0.00	Erickson et al. 2002b
Wild Horse, WA	0.29	Erickson et al. 2003b	0.09	Erickson et al. 2008
Zintel, WA	0.43	Erickson et al. 2002a	0.05	Erickson et al. 2002b
Bighorn, WA	0.51	Johnson and Erickson 2004	0.15	Kronner et al. 2008

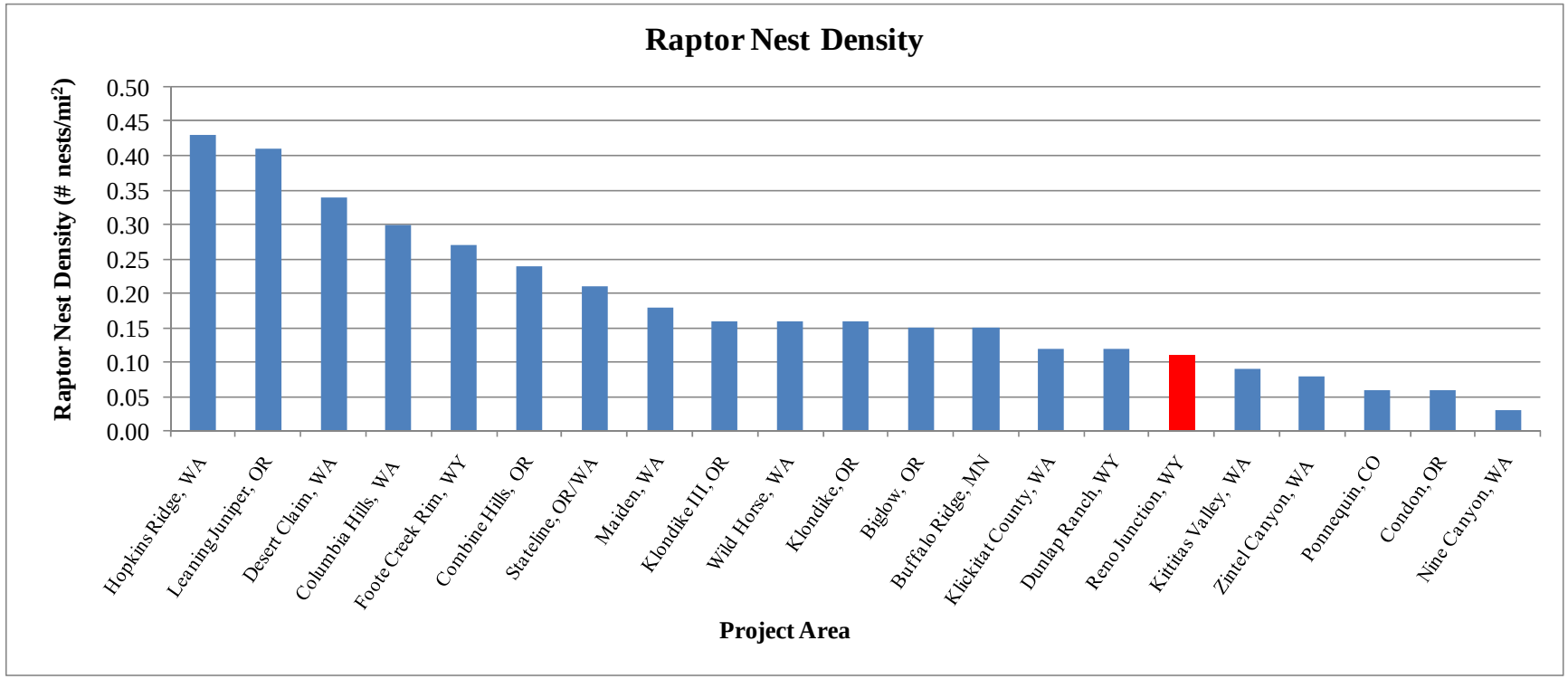


Figure 5. Comparison of raptor nest densities between the Reno Junction Wind Resource Area and other US wind resource areas.

Final Report

Bat Acoustic Studies for the Reno Junction Wind Resource Area Campbell County, Wyoming

July 21st – October 15th, 2009

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EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. initiated surveys in July 2009 designed to assess bat use within the proposed Reno Junction Wind Resource Area, Campbell County, Wyoming. Acoustic surveys for bats using Anabat™ SD-1 ultrasonic detectors at three ground and three raised stations were conducted from July 21 to October 15, 2009. The objective of the acoustic bat surveys was to estimate the seasonal and spatial use of the study area by bats. A total of 377 bat passes were recorded during 402 detector nights. Averaging bat passes per detector-night across ground stations, a mean of 0.97 bat passes per detector-night were recorded.

Bat activity was uniformly low among acoustic monitoring stations. Pass rates were similar between ground and raised stations. Activity levels were highest from mid-August through early-September, which corresponds with the period when most bat fatalities are reported at other wind-energy facilities in the western U.S. Most of the calls (79.0%) were < 30 kHz in frequency (e.g., big brown bat, hoary bat); 15.4% were > 40 kHz (e.g., *Myotis* bat species), while the remaining 5.6% of the calls were mid-frequency (30-40 kHz; e.g., eastern red bat). Species identification was only possible for the hoary bat and eastern red bat. Hoary bats made up 12.2% of all passes, while only one eastern red bat pass was recorded. Activity levels for hoary bats were highest from early-August to early-September, suggesting this species migrates through the study area at this time of year.

The mean number of bat passes per detector night was compared to existing data at six wind-energy facilities where both bat activity and mortality levels have been measured. The level of bat activity documented at the Reno Junction Wind Resource Area was lower than that at wind facilities in Wyoming and Minnesota, where reported bat mortalities are low, and was much lower than at facilities in the eastern US, where reported bat mortality is highest. Assuming that a relationship between bat activity and bat mortality exists, relatively low levels of bat mortality would be expected to occur in the study area, most likely during mid-August to early-September.

Based on fatality rates at wind-energy facilities in the Midwest/Rocky Mountain region of the US, bat call rates observed at this facility, and habitat of the study area, we expect that the potential risk to bats from turbine operations to be somewhat lower than the rates observed at other Midwest/Rocky Mountain facilities.

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INTRODUCTION

Third Planet Windpower is proposing to develop a wind-energy facility in Campbell County, Wyoming. Third Planet Windpower requested Western EcoSystems Technology, Inc. (WEST) to develop and implement a standardized protocol for baseline studies of bat use in the study area for the purpose of estimating the impacts of the wind-energy facility on bats, and to assist with siting turbines to minimize impacts to bats. The protocol for the baseline study is similar to protocols used at other wind-energy facilities in the United States. The protocol has been developed based on WEST's experience studying wildlife and wind turbines at facilities throughout the US and included passive acoustic sampling using Anabat bat detectors at fixed stations to quantify bat use in the study area.

The following is a final report describing the results of Anabat survey surveys during the 2009 study season within the proposed wind resource area. In addition to site-specific data, this report presents existing information and results of bat monitoring studies conducted at other wind-energy facilities. Where possible, comparisons with regional and local studies were made.

STUDY AREA

The proposed wind-energy facility is in southeast Campbell County approximately 10 miles (16 kilometers [km]) west of Wright, Wyoming, and just east of the South Middle Butte (Figure 1). The study area consists of hilly terrain dominated by 70% grassland and 28% scrub-shrublands, with the remaining habitat consisting of developed land (1.5%), pasture (0.03%), and emergent wetlands (0.01%).

METHODS

Bat Acoustic Surveys

The objective of the bat use surveys was to estimate the seasonal and spatial use of the Reno Junction Wind Resource Area (RJWRA) by bats. Bats were surveyed using Anabat™ SD1 bat detectors (Titley Scientific™ Pty Ltd., NSW, Australia). The use of bat detectors for calculating an index to bat impacts is a primary bat risk assessment tool for baseline wind development surveys (Arnett 2007, Kunz et al. 2007a). Bat activity was surveyed using six detectors from July 21 to October 15, 2009, a period corresponding to likely fall bat migration at this site. Three detectors were placed at the base of meteorological towers, and they were each paired with detectors raised on towers to monitor bat activity near the rotor-swept zone, and to compare bat activity at different heights (Figure 1).

Anabat detectors record bat echolocation calls with a broadband microphone. The detection range of Anabat detectors depends on a number of factors (e.g., echolocation call characteristics, microphone sensitivity, habitat, the orientation of the bat, atmospheric conditions; Limpens and McCracken 2004), but is generally less than 30m due to atmospheric absorption on echolocation pulses (Fenton 1991). To ensure similar detection ranges among detectors, microphone

sensitivities were calibrated using a BatChirp (Tony Messina, Las Vegas, Nevada) ultrasonic emitter as described in Larson and Hayes (2000). The echolocation sounds were then translated into frequencies audible to humans by dividing the frequencies by a predetermined ratio. A division ratio of 16 was used for the study. Bat echolocation detectors also detect other ultrasonic sounds made by insects, raindrops hitting vegetation, and other sources, and may interfere with detection of bats. A sensitivity level of six was used to reduce interference from these other sources of ultrasonic noise. Calls were recorded to a compact flash memory card with large storage capacity. All units were programmed to turn on each night an approximate half-hour before sunset and turn off an approximate half-hour after sunrise.

The Anabat detectors were placed inside plastic weather-tight containers with a hole cut in the side of the container for the microphone to extend through. Microphones were encased in PVC tubing with drain holes that curved skyward at 45 degrees outside the container to minimize the potential for water damage due to rain. Containers were raised approximately one m (3.3 ft) off the ground to minimize echo interference and lift the unit above vegetation. Raised Anabat microphones were elevated 45 m (147.6 ft) on meteorological towers using a pulley system. Microphones were encased in a Bat-Hat weatherproof housing (EME Systems, Berkeley, California), and attached to a coaxial cable that transmitted ultrasonic sounds to an Anabat unit at the base of the tower. The Bat-Hat weatherproof housing was modified by replacing the Plexiglas reflector plate with a 45-degree angle PVC elbow, for better comparability with data collected by detectors on the ground.

Statistical Analysis

Bat Acoustic Surveys

The units of activity were number of bat passes (Hayes 1997). A pass was defined as a continuous series of two or more call notes produced by an individual bat with no pauses between call notes of more than one second (White and Gehrt 2001, Gannon et al. 2003). In this report, the terms bat pass and bat call are used interchangeably. The number of bat passes was determined by downloading the data files to a computer and tallying the number of echolocation passes recorded. Total number of passes was corrected for effort by dividing by the number of detector nights.

For each station, bat calls were sorted into three groups, based on their minimum frequency, that correspond roughly to species groups of interest. For example, most species of *Myotis* bats echolocate at frequencies above 40 kilohertz (kHz), whereas species such as the eastern red bat (*Lasiurus borealis*) typically have echolocation calls that fall between 30 and 40 kHz and species such as big brown (*Eptesicus fuscus*), silver-haired (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*), have echolocation that falls at or below 25 kHz. Therefore, we classified calls as high-frequency (HF; > 40 kHz), mid-frequency (MF; < 40 kHz and > 30kHz), or low-frequency (LF; < 30 kHz). To establish which species may have produced calls in each category, a list of species expected to occur in the study area was compiled from range maps (Table 1; Harvey et al. 1999, BCI website). Data determined to be noise (produced by a source other than a bat) or call notes that did not meet the pre-specified criteria to be termed a pass were removed from the analysis.

Within these categories, an attempt was made to identify calls made by two *Lasiurus* species: hoary and eastern red bats. Calls that had a distinct U-shape and that exhibited variability in the minimum frequency across the call sequence were identified as belonging to the *Lasiurus* genus (C. Corben, pers comm.). Hoary and eastern red bats were distinguished based on minimum frequency: hoary bats typically produce calls with minimum frequencies between 18 and 24 kHz, whereas eastern red bats typically emit calls with minimum frequencies between 30 and 43 kHz (J. Szewczak, pers comm.). Only sequences containing three or more calls were used for species identification. These are conservative parameters. Given the high intraspecific variability of *Lasiurus* calls, and the number of call files that were too fragmented for proper identification, it is likely that more hoary and red bat calls were recorded than were positively identified.

The total number of bat passes per detector night was used as an index for bat use in the RJWRA. Bat pass data represented levels of bat activity rather than the numbers of individuals present because individuals could not be differentiated by their calls. To predict potential for bat mortality (i.e. low, moderate, high), the mean number of bat passes per detector night (averaged across monitoring stations) was compared to existing data from wind-energy facilities where both bat activity and mortality levels have been measured.

RESULTS

Bat Acoustic Surveys

Bat activity was monitored at six sampling locations on a total of 87 nights during the period July 21 to October 15, 2009. Anabat units were operable for 79.3% of the sampling period (Figure 2). Equipment failures prevented data collection for raised Anabat unit RJ2h between September 10 and October 15, and for raised unit RJ3h between August 20 and October 15. Levels of wind and insect noise were relatively low throughout the study period (Figure 3). Anabat units recorded 377 bat passes on 402 detector-nights (Table 2). Averaging bat passes per detector-night across locations, a mean of 0.94 ± 0.16 bat passes per detector-night was recorded. The average pass rate for ground stations was 0.97 ± 0.19 bat passes per detector-night, and for raised stations was 0.91 ± 0.17 bat passes per detector-night.

Spatial Variation

Bat activity was similar among the six stations in the RJWRA (Table 2; Figures 1, 4), ranging between 0.67 and 1.15 bat passes per detector-night among ground stations, and between 0.15 and 1.52 bat passes per detector-night among raised stations. Overall activity was lowest at stations RJ2g and RJ2h (0.67 and 0.15 bat passes per detector-night) and highest at paired stations RJ3g and RJ3h (1.15 and 1.52). Detections at paired stations were nearly equal at stations RJ1g and RJ1h (1.09 and 1.06).

Comparing paired stations on just the nights that both ground and raised detectors were operating, bat activity was nearly equal at stations RJ1g and RJ1h, while ground activity was greater than raised activity at station RJ2, and the reverse was true at station RJ3 (Figure 5).

Temporal Variation
Bat activity increased from late July through early September, and then decreased through mid-October (Table 3, Figure 6). Sixty percent of all bat passes were recorded between August 18 and September 7 (Table 3). No bat passes were recorded the week of October 6-12.

Temporal patterns between ground and raised stations were similar (Figure 7), and followed the overall trend. However, raised stations recorded more activity than ground stations through late August, while ground stations recorded more activity through the remainder of the study period.

Species Composition
Overall, passes by low-frequency bats (LF; 79.0% of all passes) outnumbered passes by high-frequency bats (HF; 15.4%) and mid-frequency bats (MF; 5.6%; Table 2), and this pattern was consistent among ground stations (Table 2; Figure 3). Among raised stations, LF bats comprised 97% of passes (Table 2; Figures 3, 5). Patterns of activity were similar among all three species groups during the study period (Figure 6), with most passes recorded between August 18 and September 7 (70% of HF passes, 60% of MF passes, and 56% of LF passes; Table 3). Activity by HF and MF species appeared to peak slightly earlier than activity by LF species, while LF species were recorded further into the study period than the other species groups (Table 3; Figure 6).

Hoary bats comprised 12.2% of total passes detected within the study area, and 15.4% of all low frequency passes (Table 2). Seventy-two percent of hoary bat passes were detected at raised stations (Table 2; Figure 8). Station RJ3h recorded most of the hoary bat activity (33% of 46 hoary bat passes). Most of the hoary bat activity was recorded between August 4 and September 7 (70% of 46 hoary bat passes; Figure 9). No hoary bats were recorded after September 21.

One eastern red bat was recorded on September 6 at raised station RJ3h.

DISCUSSION

Potential Impacts

Assessing the potential impacts of wind energy development to bats at the RJWRA is complicated by the current lack of understanding of why bats die at wind turbines (Kunz et al. 2007b, Baerwald et al. 2008), combined with the inherent difficulties of monitoring elusive, night-flying animals (O'Shea et al. 2003). In addition, because installed capacity for wind has increased rapidly in recent years, the availability of well-designed studies from existing wind-energy facilities lags development of proposed facilities (Kunz et al. 2007b). To date, monitoring studies of wind-energy facilities suggest that:

-bat mortality shows a rough correlation with bat activity (Table 4);

-the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September);

-migratory tree-roosting species (eastern red, hoary, and silver-haired bats) comprise almost 75% of reported bats killed, and;

-the highest reported fatalities occur at wind facilities located along forested ridge tops in the eastern and northeastern US. However, recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Table 4).

Based on these patterns, current guidance to estimate potential mortality levels at a proposed wind-energy facility involves evaluation of the on-site bat acoustic data in terms of activity levels, seasonal variation, and species composition (Kunz et al. 2007b).), as well as comparison to regional patterns.

Overall Activity

To date, six studies of wind-energy facilities have recorded both Anabat detections per night and bat mortality (Table 4). The number of bat calls per night as determined from bat detectors shows a rough correlation with bat mortality, though effort, timing of sampling, species recorded, turbines (type and height), and detector settings (equipment and locations) varied among studies. To our knowledge, none of these studies monitored baseline bat activity before turbines were built, and data for these studies were collected using Anabat detectors placed near the ground (i.e., none raised on met towers). In addition, to our knowledge, none of the detectors were located near features attractive to bats. Thus, this report relies on the mean activity rate for ground-based detectors to assess potential risk of bat fatality at the RJWRA relative to the six studies with similar data.

Bat activity recorded by ground detectors within the RJWRA (mean = 0.97 ± 0.19 bat passes per detector-night) was relatively low compared to that observed at facilities in Minnesota and Wyoming, where bat mortality was low, and was much lower than activity recorded at sites in West Virginia, Iowa, and Tennessee, where bat mortality rates were high (Table 4). Thus, based on the assumed relationship between pre-construction bat activity and post-construction fatalities, bat mortality rates at the RJWRA would be expected to be similar to the 2.2 bat fatalities per megawatt (MW) per year reported at Foote Creek Rim, Wyoming, and much lower than the 31.7 fatalities/MW/year reported at Mountaineer, West Virginia.

Spatial Variation

The proposed wind-energy facility is not located near any large, known bat colonies or other features that are likely to attract large numbers of bats. Activity rates were uniformly low among the six acoustic monitoring stations, all of which were located on hilltops in sagebrush/mixed grass habitat. Stations RJ2g and RJ2h, located in the west-central part of the study area, recorded the fewest bat passes, while stations RJ3g and RJ3h in the north recorded the most bat passes. These latter stations were located approximately 500 m east of a small pond, which may have attracted bats for drinking and foraging opportunities, and may explain the slightly higher activity rates.

Pass rates varied among ground and raised detectors at paired stations. Activity was nearly equal between ground and raised detectors at station RJ1, while ground detections outnumbered raised

detections at station RJ2, and raised detections outnumbered ground detections at station RJ3. However, bat activity was low among all stations, and detection rates only differed by one or fewer bat passes per night between ground and raised stations. These data indicate that bat activity at the RJWRA is low irrespective of altitude, and suggest that risk of collision with turbine blades may also be low.

Temporal Variation

Bat activity was relatively low from late July through mid-August, suggesting low numbers of bats reside at the RJWRA during the summer. Most bat activity at the RJWRA was recorded between mid-August and early September, and may either represent the end of the reproductive season, when pups are weaned and foraging rates are high, and/or it may represent movement of bats through the area during fall migration. Few bat passes were recorded in October, suggesting that most bats had left the area for winter hibernacula or warmer climates. However, equipment malfunctions at stations RJ2h and RJ3h may also account for some of the reduction in bat activity past mid-September.

Activity was similar at ground and raised stations throughout the study period. However, bat passes at raised stations outnumbered those recorded at ground stations through late August, while ground stations recorded more activity than raised stations through the rest of the study period. These results may indicate a tendency for bats to fly at higher altitudes—and thus closer to turbine blades—in July and August, than later in the season. However, a more likely explanation is that only one raised detector was operating past September 7, and may account for the reduction in bat activity among raised detectors for the rest of the study period.

Fatality studies of bats at wind-energy facilities in the US have shown a peak in mortality in August and September and generally lower mortality earlier in the summer (Johnson 2005, Arnett et al. 2008). Fatality surveys at Foote Creek Rim, another wind-energy facility in Wyoming, had the most fatalities during August (Gruver 2002). While the survey effort varies among the different studies, the studies that combine Anabat surveys and fatality surveys show a general association between the timing of increased bat call rates and timing of mortality, with both call rates and mortality peaking during the fall (Kunz et al. 2007b). Based on the available data, it is expected that bat mortality at the RJWRA will be highest from August through early September.

Species Composition

Of the 12 species of bat likely to occur in the study area, six are known fatalities at wind-energy facilities (Table 1). Passes recorded using acoustic detectors were identified to high-, mid-, or low-frequency species groups. Seventy-nine percent of passes were by low-frequency bats, suggesting higher relative abundance of species such as big brown, silver-haired, and hoary bats. At raised stations, low-frequency passes (97% of passes) greatly outnumbered passes by other species groups, and most likely reflects different foraging patterns among species. Many of the low-frequency species likely to be present at the RJWRA tend to forage at higher altitudes than most high- and mid-frequency species due to their wing morphology and echolocation call structure (Norberg and Rayner 1987).

Species composition was similar among ground stations, with passes by low-frequency species outnumbering other species groups, and followed similar temporal patterns. Most passes by all three groups were recorded from mid-August through early-September, consistent with the overall trend. However, activity by high- and mid-frequency species appeared to peak slightly earlier than activity by low-frequency species. Few passes by high- and mid-frequency species were recorded past mid-September, whereas low-frequency species were active (albeit in low numbers) through the end of the study period in late October.

A single pass by an eastern red bat was identified in early September, indicating this species is relatively rare in the study area. Hoary bats comprised 12% of all bat passes, and were most active between early August and early September, when individuals were likely migrating through the area.

Regional Fatality Studies

Bat mortality studies at wind energy facilities across North America show a vast range of bat mortality rates, ranging from 0.00 to 39.70 bat fatalities/MW/year (Table 4). In general, fatality rates are highest in the Northeast and lowest in the Northwest, although a high degree of variation in fatality rates is present for most regions. To date, no fatality data have been made public for the Southwest or Southeast regions. Bat fatality rates at other wind-energy facilities in the Midwest and Rocky Mountain Region have ranged from 0.10 (Buffalo Gap, Texas) and 11.42 (Summerview 2007/2008, Alberta) bat fatalities/MW/year.

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Table 1. Bat species determined from range-maps (Harvey et al. 1999, BCI website) as likely to occur within the Reno Junction Wind Resource Area, sorted by call frequency.

Common Name	Scientific Name
High-frequency (> 40 kHz)	
western small-footed bat[3]	*Myotis ciliolabrum*
cave bat	*Myotis velifer*
tri-colored bat[2]	*Perimyotis subflavus*
Mid-frequency (30-40 kHz)	
eastern red bat[1,2,3]	*Lasiurus borealis*
western long-eared bat	*Myotis evotis*
little brown bat[2]	*Myotis lucifugus*
Low-frequency (< 30 kHz)	
pallid bat[3]	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
big brown bat[2,3]	*Eptesicus fuscus*
silver-haired bat[1,2]	*Lasionycteris noctivagans*
hoary bat[1,2]	*Lasiurus cinereus*
fringed bat[3]	*Myotis thysanodes*

[1]long-distance migrant
[2]species known to have been killed at wind-energy facilities
[3]species occurrence based upon a single source

Table 2. Results of acoustic bat surveys conducted at the Reno Junction Wind Resource Area, July 21 - October 15, 2009.

Anabat Station	Location	# of HF Bat Passes	# of MF Bat Passes	# of LF Bat Passes	# of Hoary Bat Passes*	Total Bat Passes	Detector - Nights	Bat Passes/Night
RJ1g	Ground	30	11	54	2	95	87	1.09±0.26
RJ1h	Raised	0	2	80	15	82	77	1.06±0.41
RJ2g	Ground	18	2	38	1	58	87	0.67±0.16
RJ2h	Raised	0	0	6	3	6	41	0.15±0.1
RJ3g	Ground	9	5	84	10	98	85	1.15±0.23
RJ3h	Raised	1	1	36	15	38	25	1.52±0.33
Total Ground		**57**	**18**	**176**	**13**	**251**	**259**	**0.97±0.19**
Total Raised		**1**	**3**	**122**	**33**	**126**	**143**	**0.91±0.17**
Grand Total		**58**	**21**	**298**	**46**	**377**	**402**	**0.94±0.16**

*Passes by hoary bats included in low-frequency (LF) numbers.

Table 3. Weekly bat activity and the contribution of each week (%) to total recorded activity for high-frequency (HF), mid-frequency (MF), low-frequency (LF) and all bats within the Reno Junction Wind Resource Area.

Week	HF Pass Rate	HF % Composition	MF Pass Rate	MF % Composition	LF Pass Rate	LF % Composition	All Bats Pass Rate	All Bats % Composition	Cumulative % Composition
07/21/09 to 07/27/09	0.04	2.10	0.07	11.22	0.15	1.63	0.26	2.25	2.25
07/28/09 to 08/03/09	0.07	4.06	0.02	3.61	0.33	3.66	0.43	3.72	5.97
08/04/09 to 08/10/09	0.07	4.06	0.07	10.82	0.60	6.54	0.74	6.40	12.37
08/11/09 to 08/17/09	0.12	6.77	0.02	3.61	0.52	5.75	0.67	5.78	18.15
08/18/09 to 08/24/09	0.30	16.84	0.19	28.05	1.33	14.64	1.81	15.75	33.90
08/25/09 to 08/31/09	0.67	37.89	0.18	27.54	1.24	13.65	2.09	18.14	52.04
09/01/09 to 09/07/09	0.26	14.61	0.03	4.33	2.54	27.93	2.83	24.54	76.58
09/08/09 to 09/14/09	0.13	7.58	0.00	0.00	0.77	8.42	0.90	7.81	84.39
09/15/09 to 09/21/09	0.07	4.06	0.04	5.41	1.18	12.94	1.29	11.16	95.55
09/22/09 to 09/28/09	0.04	2.03	0.00	0.00	0.29	3.14	0.32	2.79	98.34
09/29/09 to 10/05/09	0.00	0.00	0.04	5.41	0.07	0.78	0.11	0.93	99.27
10/06/09 to 10/12/09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.27
10/13/09 to 10/15/09	0.00	0.00	0.00	0.00	0.08	0.92	0.08	0.72	99.99

Table 4. Wind-energy facilities in North America, with both Anabat sampling data and mortality data for bat species, grouped by geographic region. To date, no results from southwestern or southeastern wind facilities have been made public.

Geographic Region	Wind-Energy Facility	Activity (#/detector night)	Mortality (bats/MW/year)	Number of Turbines	Total Site MW	Reference
	Reno Junction, WY	**0.97**				**This study**
Midwest & Rocky Mountains	Summerview, Alberta (2007/2008)		11.42	39	70.2	Baerwald 2008
	Summerview, Alberta 2005/2006		10.27	39	70.2	Brown and Hamilton 2006
	Judith Gap, MT		8.93	90	135	TRC 2008
	Blue Canyon II, OK (2006/2007)		3.71	84	151.2	Burba et al. 2008
	Crescent Ridge, IL		3.27	33	49.5	Kerlinger et al. 2007
	Foote Creek Rim, WY (Phase I)	2.2	2.23	69	41.4	Young et al. 2003
	NPPD Ainsworth, NE		1.16	36	59.4	Derby et al. 2007
	Oklahoma Wind Energy Center, OK		0.53	68	102	Piorkowski 2006
	Buffalo Gap, TX		0.10	67	134	Tierney 2007
Northwestern	Nine Canyon, WA		2.47	37	48	Erickson et al. 2003
	High Winds, CA		2.02	90	162	Kerlinger et al. 2006
	Big Horn, WA		1.90	133	199.5	Kronner et al. 2008
	Combine Hills, OR		1.88	41	41	Young et al. 2006
	Stateline, WA/OR		1.70	454	300	Erickson et al. 2004
	Vansycle, OR		1.12	38	24.9	Erickson et al. 2000
	Klondike, OR		0.77	16	24	Johnson et al. 2003
	Hopkins Ridge, WA		0.63	83	150	Young et al. 2007
	Klondike II, WA		0.41	50	75	NWC and WEST 2007
	Wild Horse, WA		0.39	127	229	Erickson et al. 2008
	SMUD, CA		0.07		15	URS et al. 2005
Upper Midwest	Top of Iowa, IA	34.9	10.27	89	80	Jain 2005
	Buffalo Ridge, MN (Phase III)		2.72	138	103.5	Johnson et al. 2000
	Buffalo Ridge, MN (Phase II)	2.1	2.37	143	107.25	Johnson et al. 2000
	Buffalo Ridge, MN (Phase I)		0.76	73	25	Johnson et al. 2000

Table 4. Wind-energy facilities in North America, with both Anabat sampling data and mortality data for bat species, grouped by geographic region. To date, no results from southwestern or southeastern wind facilities have been made public.

Geographic Region	Wind-Energy Facility	Activity (#/detector night)	Mortality (bats/MW/year)	Number of Turbines	Total Site MW	Reference
	Buffalo Mountain ,TN (Phase II)		39.70	18	29	Fiedler et al. 2007
	Mountaineer, WV	38.3	31.69	44	66	Kerns and Kerlinger 2004
	Buffalo Mountain TN (Phase I)	23.7	31.54	3	2	Nicholson et al. 2005
	Casselman, PA		15.66	23	34.5	Arnett et al. 2009
	Maple Ridge, NY (2006)		15.00	195	321.75	Jain et al. 2007
	Mount Storm, WV	35.2	12.21	82	164	Young et al. 2009
	Meyersdale, PA		10.93	20	30	Arnett et al. 2005
Eastern	Maple Ridge, NY (2007)		9.42	195	321.75	Jain et al. 2008
	Noble Ellensburg, NY		5.45	54	80	Jain et al. 2009a
	Noble Bliss, NY		5.05	67	100	Jain et al. 2009c
	Noble Clinton, NY		3.63	67	100.5	Jain et al. 2009b
	Mars Hill, ME (2007)		2.91	28	42	Stantec 2008
	Erie Shores, Ont.		1.51	66	99	James 2008
	Mars Hill, NY (2008)		0.45	28	42	Stantec 2009
	Searsburg, NY		0.00	11	7	Kerlinger 2002

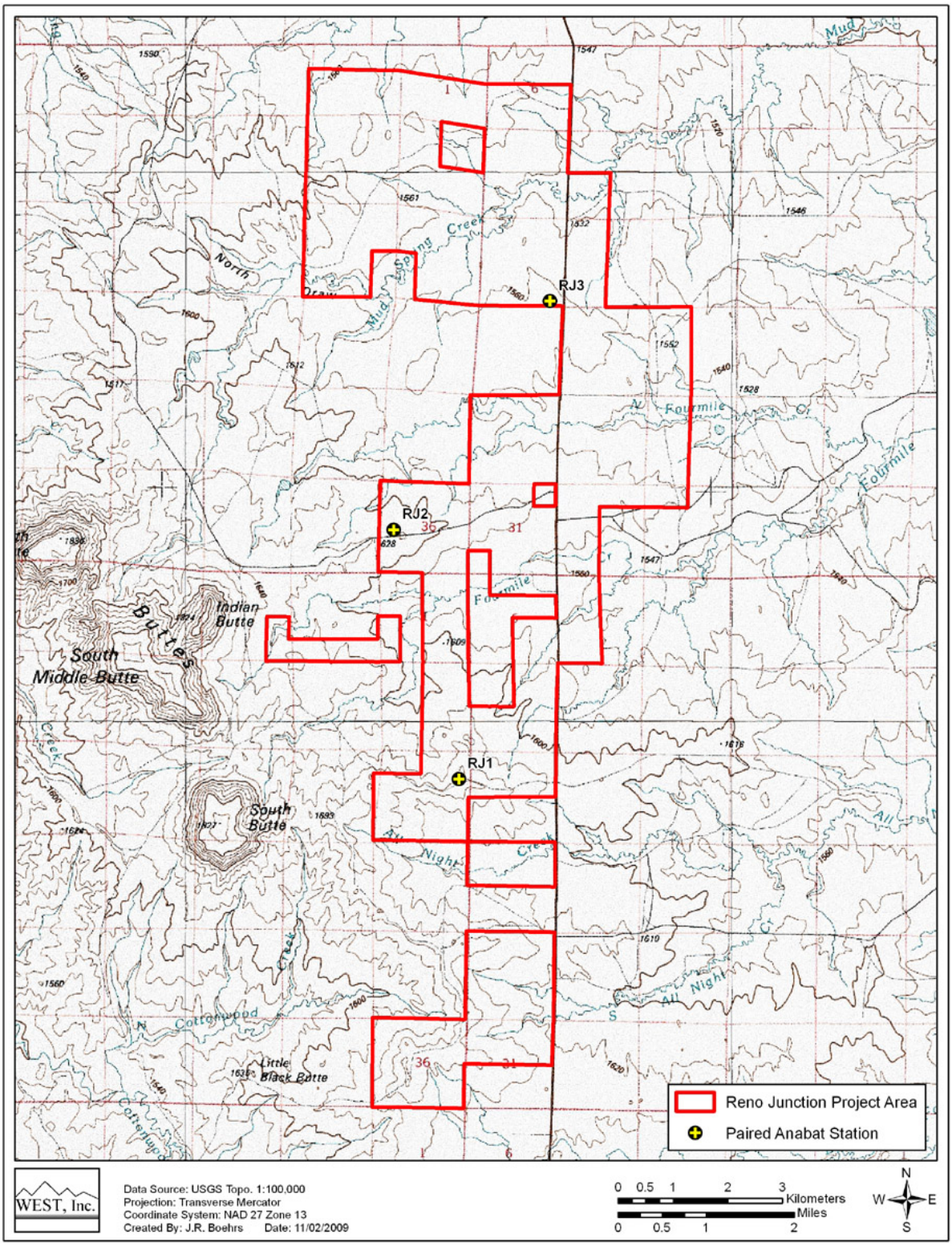


Figure 1. Study area map and Anabat sampling stations at the Reno Junction Wind Resource Area.

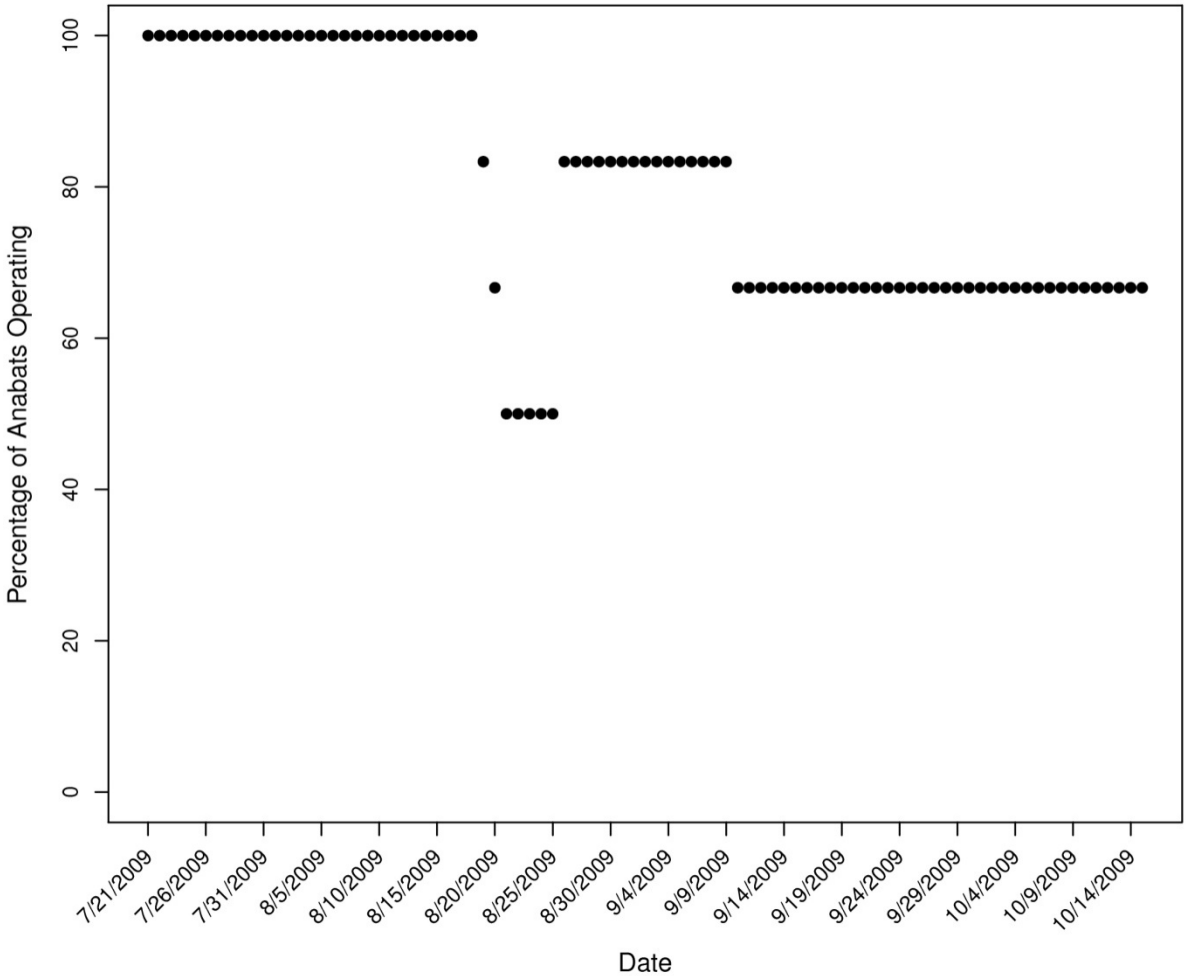


Figure 2. Number of Anabat detectors (n = 6) at the Reno Junction Wind Resource Area operating during each night of the study period July 21 – October 15, 2009.

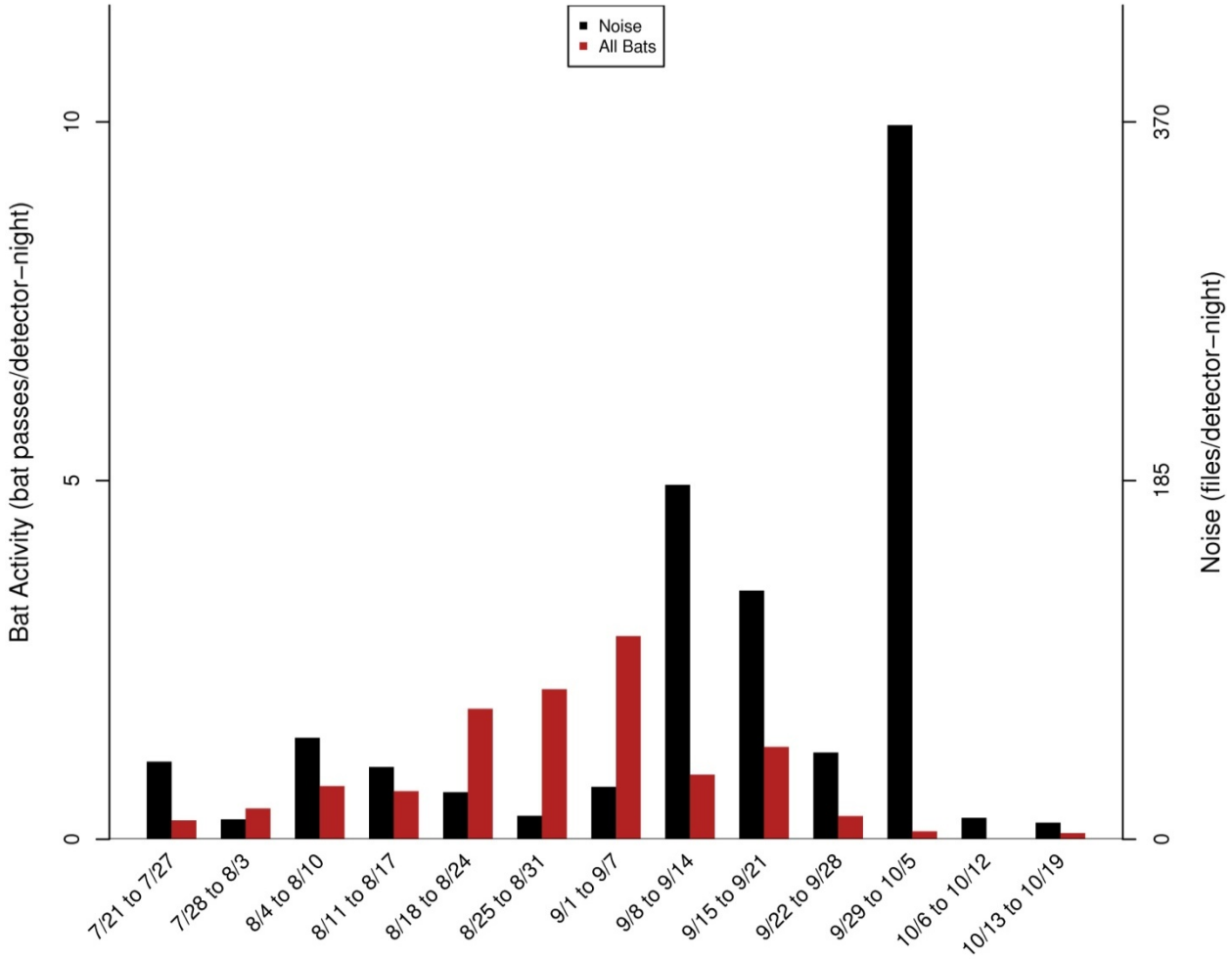


Figure 3. Number of bat passes and noise files detected per detector-night at the Reno Junction Wind Resource Area for the study period July 21 – October 15, 2009, presented weekly. Noise files are indicated on the second axis.

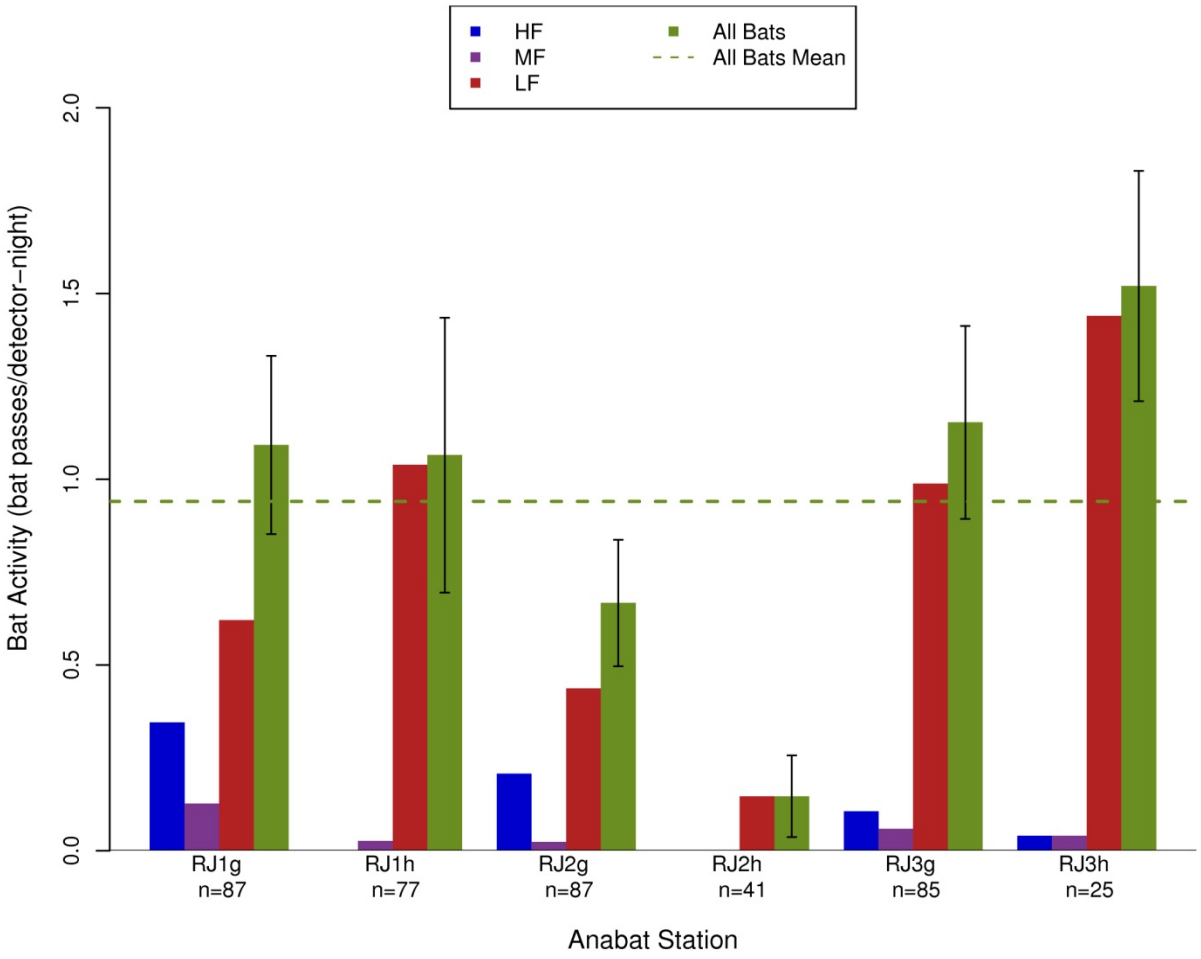


Figure 4. Number of bat passes per detector-night by Anabat station at the Reno Junction Wind Resource Area for the study period July 21 – October 15, 2009. For this study, stations RJ1g and RJ1h, RJ2g and RJ2h, and RJ3g and RJ3h, were paired ground and raised stations.

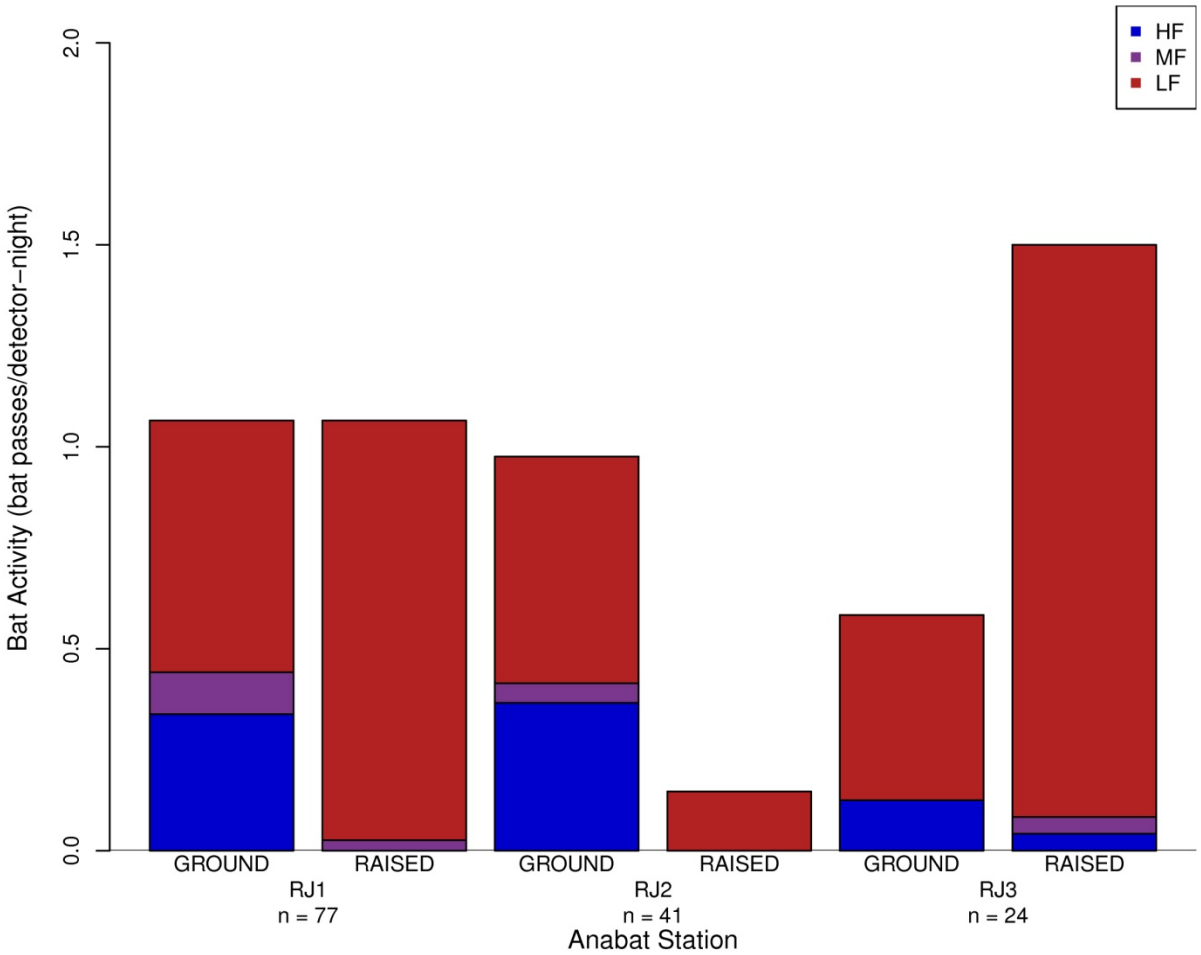


Figure 5. Number of high-frequency (HF), mid-frequency (MF), and low-frequency (LF) bat passes per detector-night recorded at paired ground and high Anabat unit stations at the Reno Junction Wind Resource Area for the study period July 21 – October 15, 2009. Only nights when both paired detectors were operating are included in the data for this figure.

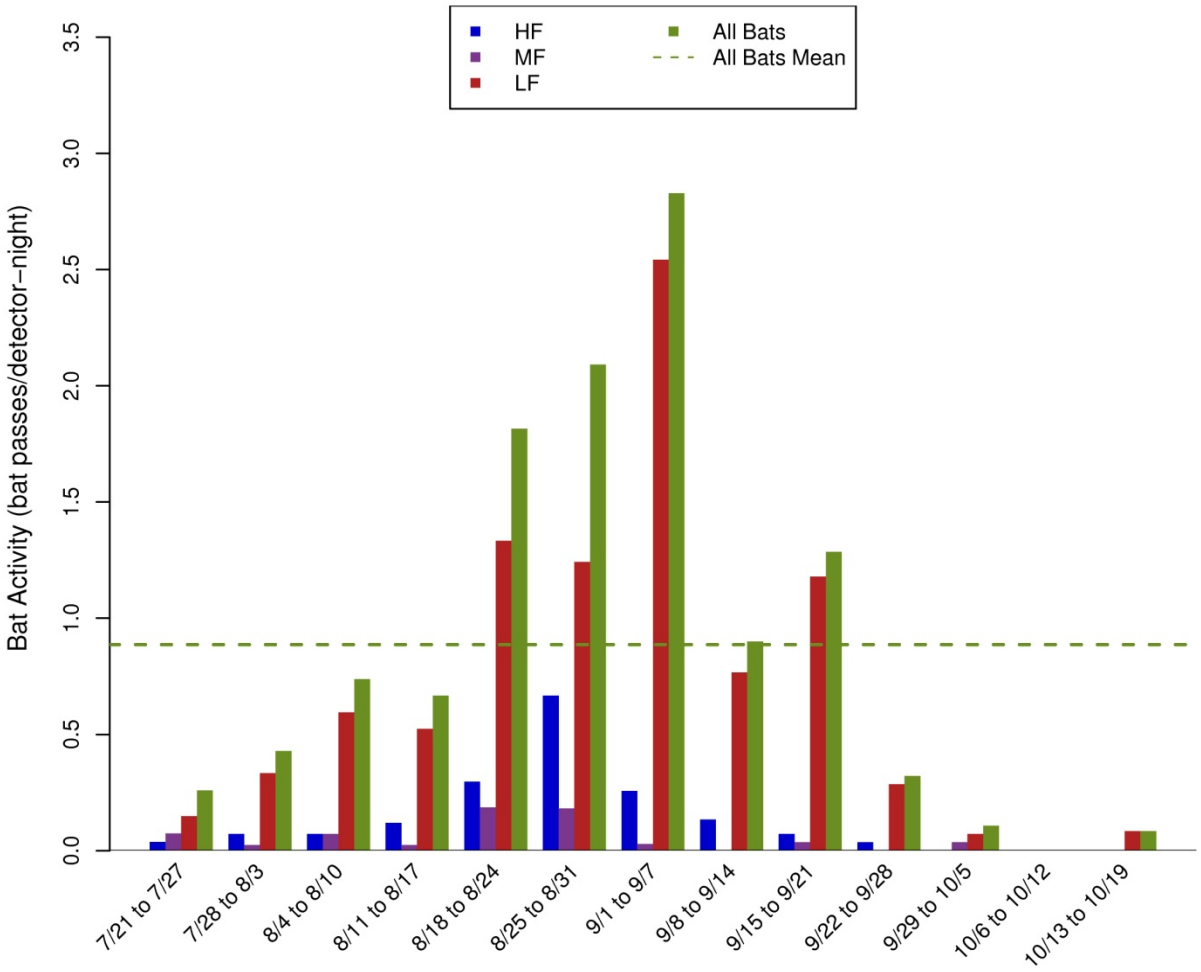


Figure 6. Weekly activity by high-frequency (HF), mid-frequency (MF), and low-frequency (LF) bats at the Reno Junction Wind Resource Area for the study period July 21 – October 15, 2009.

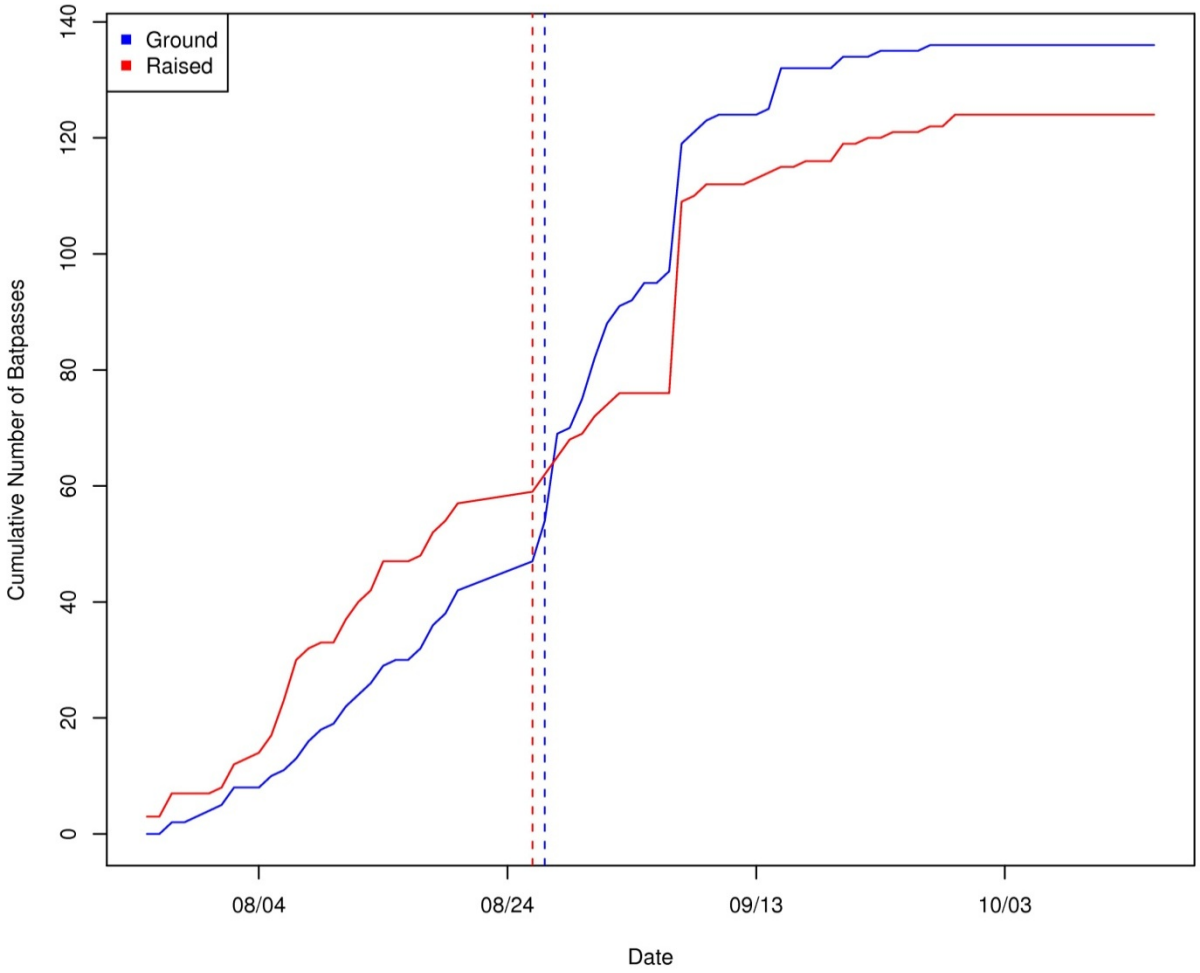


Figure 7. Empirical cumulative distribution of bat passes at ground and raised stations within the Reno Junction Wind Resource Area, July 21 – October 15, 2009. Dashed vertical lines indicate the point at which 50% of the calls occurred, an indication of the median date of bat activity.

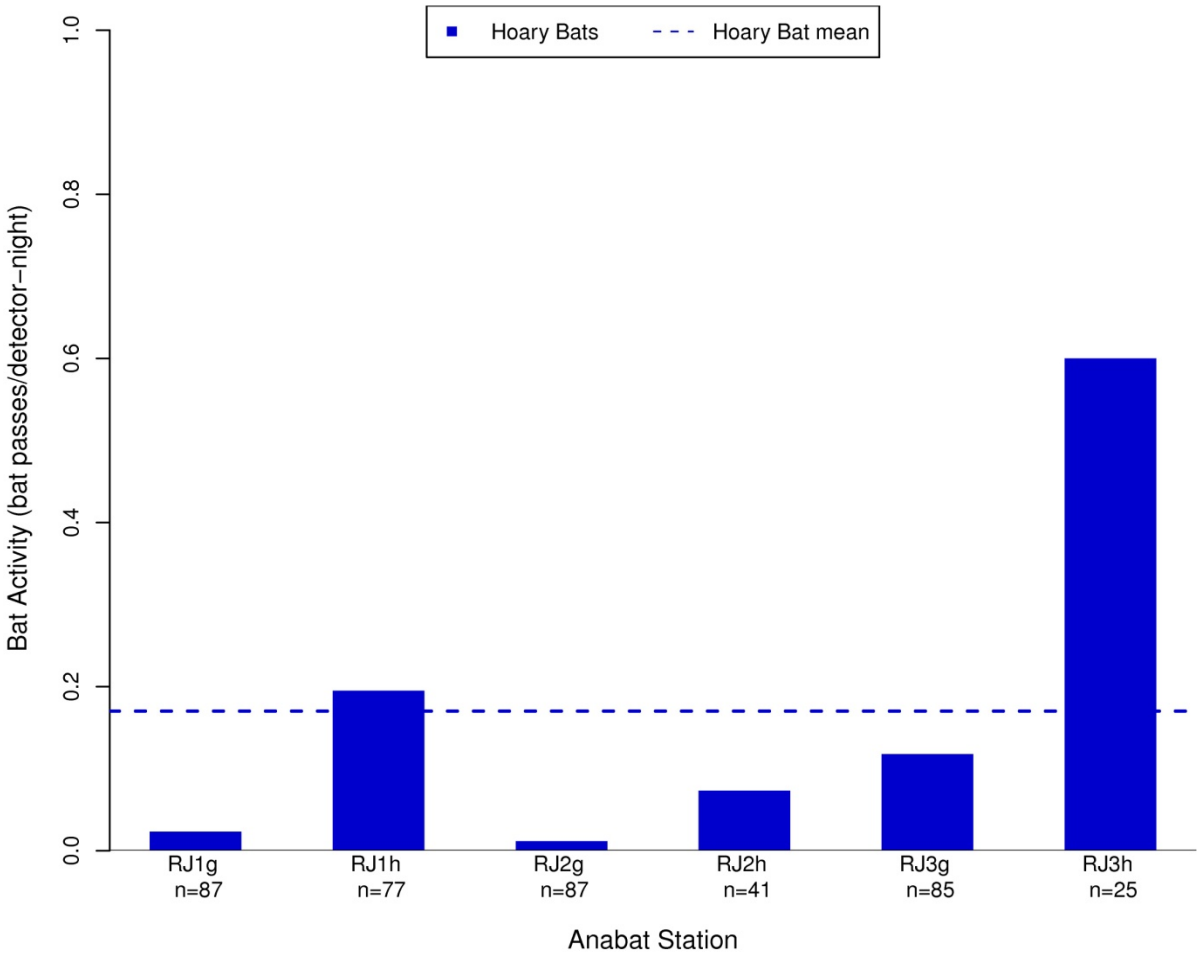


Figure 8. Number of passes per detector–night by hoary bats, by Anabat station at the Reno Junction Wind Resource Area, for the study period July 21 – October 15, 2009. For this study, stations RJ1g and RJ1h, RJ2g and RJ2h, and RJ3g and RJ3h, were paired ground and raised stations.

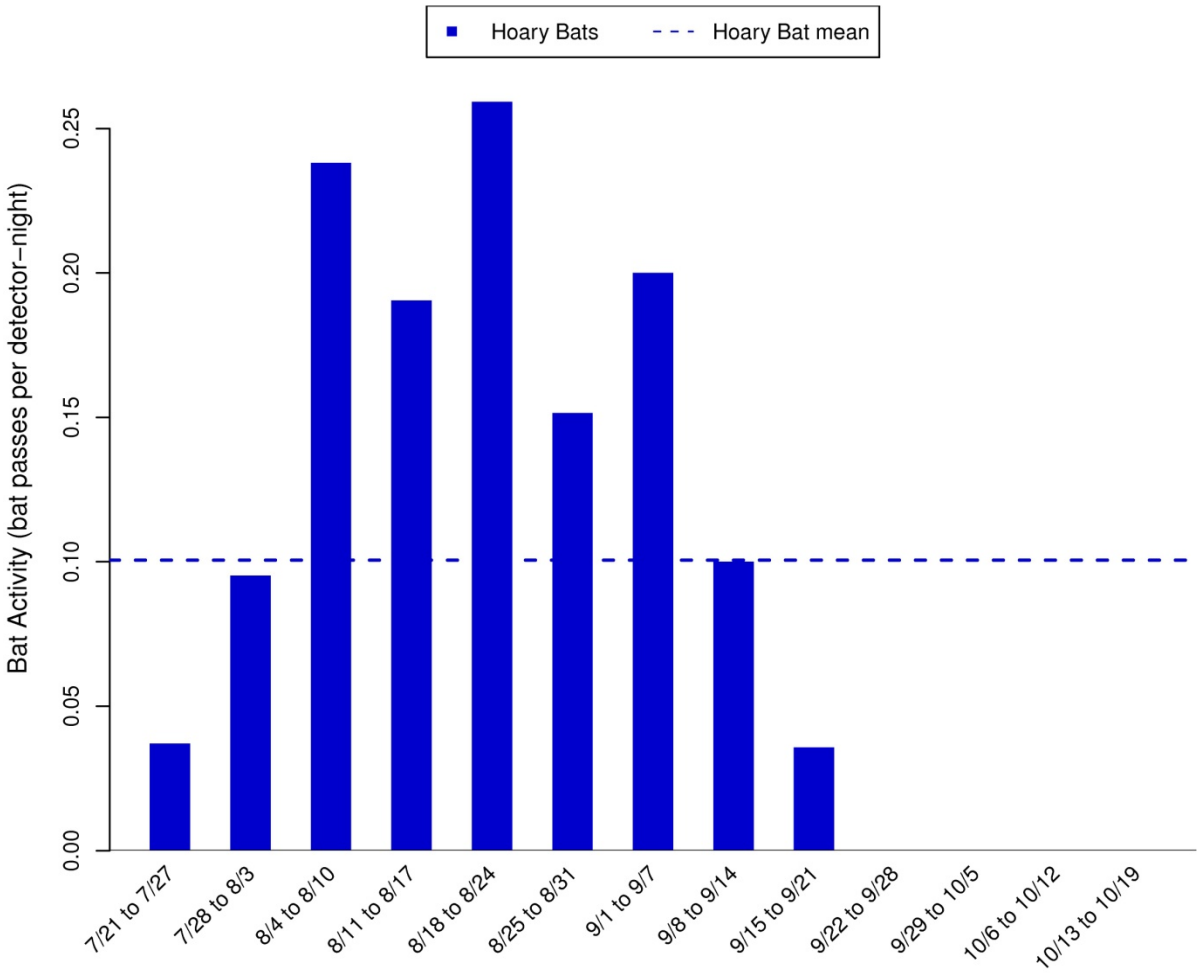
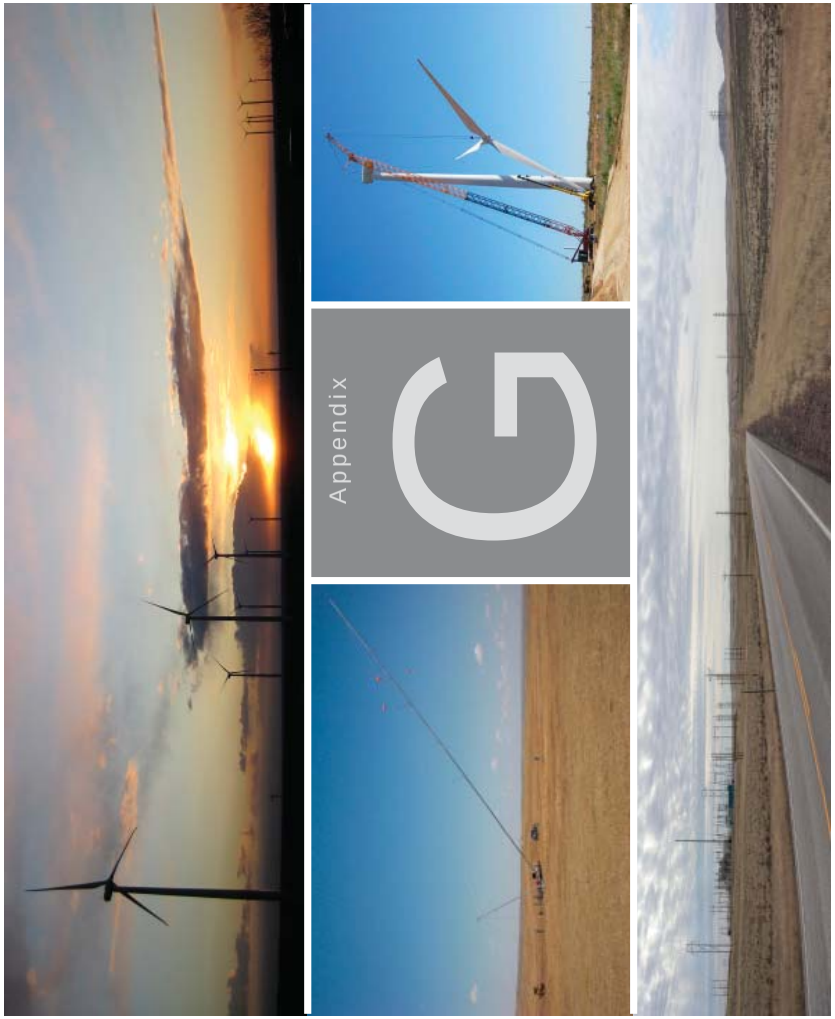


Figure 9. Weekly activity by hoary bats at the Reno Junction Wind Resource Area for the study period July 21 – October 15, 2009.

Appendix G
Agency Correspondence



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March 11, 2010

Ms. Mary Hopkins
State of Wyoming - Department of Parks and Cultural Resources
2301 Central Avenue
Barrett Building
Cheyenne, WY 82002

RE: Jurisdictional Inquiry

Dear Mary:

TPW Reno Junction, LLC (TPWRJ), a subsidiary of Third Planet Windpower, LLC, is submitting this letter to the Wyoming State Parks and Cultural Resources (WSPCR) to obtain clarification on your agency's statutory and regulatory authority under the Wyoming Industrial Development and Information Siting Act (ISA).

TPWRJ has conducted both a statutory and legal review of the ISA. Accordingly, Chapter 12 provides the implementing laws of the ISA, Chapter I provides the rules and regulations, and Chapter II details the rules of practice and procedure. Based upon TPWRJ's review of both the implementing laws and rules and regulations, we submit the following questions to the WSPCR:

1. TPWRJ would like to request WSPCR's interpretation of their regulatory and statutory authority under the ISA to both comment and provide recommendations to the Wyoming Department of Environmental Quality – Industrial Siting Division and the Wyoming Industrial Siting Council.
2. TPWRJ understands the ISA has broad authority with respect to historic impacts within its jurisdiction. However, TPWRJ does not believe the WSPCR has statutory authority, inherent or otherwise, to federalize the National Historic Preservation Act (NHPA) and implement it into state ISA implementing laws. Specifically, TPWRJ interprets that the implementation of federal NHPA and Section 106 consultation processes cannot be ascribed to projects located on fee or State of Wyoming lands, absent a federal nexus. Further, TPWRJ does not believe the WSPCR can require or provide mitigation or Native American tribal consultation recommendations for projects located on fee and State of Wyoming lands that lack a federal nexus. Therefore, TPWRJ requests a written description of WSPCR's statutory and regulatory authority over a Project located on fee and/or State of Wyoming lands, and is also absent a federal nexus.

3. Are any of the lands within the TPWRJ's Project boundaries listed on the National Register? If so, can the WSPCR please provide the details of the listing and any constraints that would apply to the development of the Project?
4. Is the WSPCR aware of any other restrictions that would apply to the Project? Please be specific as to the legal basis for the restriction the WSPCR notes and what the impact of the restriction is on the Project.

Thank you for review of our questions as we look to gain a better understanding of the WSPCR's statutory and regulatory authority as ascribed by the ISA on both fee and State of Wyoming lands.

Respectfully,

Sam Littlefield
Project Developer
littlefields@thirdplanetwind.com

ARTS. PARKS. HISTORY.
Wyoming State Parks & Cultural Resources

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http://wyoshpo.state.wy.us

March 22, 2010

Mr. Sam Littlefield
Project Developer
Third Planet Windpower
121 SW Salmon Street
11th Floor
Portland, OR

Dear Mr. Littlefield:

Thank you for your recent correspondence in regards to our agency's statutory and regulatory authority under the Wyoming Industrial Siting Act. We also appreciate your efforts to discuss this project as early as possible in your planning process. Since there is a need for additional clarification from our meeting on January 19, 2010, I am happy to provide you answers to the questions posed in your March 11, 2010 letter received via email.

As we discussed at our January 19, 2010 meeting, our office provides our professional comments to the Industrial Siting Division of the Department of Environmental Quality on the proposed project's effect on cultural resources. If a facility were to be located near property managed and owned by the State of Wyoming and operated as a State Park and/or Historic Site, then the Division of State Parks, Historic Sites and Trails would also provide their professional comment. W.S. 35-12-110(b)(xx) provides:

"(b) The division shall obtain information and recommendations from the following state agencies relative to the impact of the proposed facility as it applies to each agency's area of expertise:

(xx) Department of state parks and cultural resources;"

There is no intent on our part to deviate from the statute. We will provide information and recommendations to the Industrial Siting Council based upon our professional opinion as to the project's effect on cultural resources. Our recommendations to minimize impacts to cultural resources would also be part of our comment letter to the Council. If there is an opportunity for us to discuss what might be possible in terms of reducing effects to resources, we are happy to meet with you to discuss options.

If you have any additional questions, please feel free to contact me.

Regards,

Mary Hopkins

Mary Hopkins
Interim SHPO
307-777-6311

Cc: Milward Simpson, Director State Parks and Cultural Resources
Sara Needles, Division Administrator, Cultural Resources
Ryan Schelhaas, Senior Assistant Attorney General
Dr. Tom Schroeder, Industrial Siting, Department of Environmental Quality

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4610

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April 9, 2010

WER 11752
Third Planet Windpower
Review of Meeting between Third Planet Windpower and
Wyoming Game and Fish Department on January 19, 2010

Sam Littlefield
Project Developer
Third Planet Windpower
121 SW Salmon Street 11th Floor
Portland, OR 97204-2904

Dear Mr. Littlefield:

The staff of the Wyoming Game and Fish Department has reviewed the meeting between Third Planet Windpower and Wyoming Game and Fish Department on January 19, 2010. We offer the following comments for your consideration.

We appreciate Third Planet Windpower's commitment to continue wildlife monitoring protocols as discussed at our January 19th meeting. We believe these protocols are appropriate for this wind development site. The WGFD suggests Third Planet Windpower maintain contact with our staff as the permitting process moves forward to ensure any potential issues can be addressed expediently and efficiently. We encourage continued coordination with our fisheries staff in regard to erosion and monitoring protocols.

Thank you for the opportunity to comment. If you have any questions or concerns, please contact Scott Gamo, Staff Terrestrial Biologist, at 307-777-4509.

Sincerely,

for

John Emmerich
Deputy Director

JE: MF: sg

cc: USFWS

Daryl Lutz- WGFD, Casper region

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April 9, 2010

WER 11752
Third Planet Windpower
Proposal
Plans to Submit a Section 109 Permit Application
Reno Junction Wind Energy Project
Campbell, County

Sam Littlefield
Project Developer
Third Planet Windpower
121 SW Salmon Street 11th Floor
Portland, OR 97204-2904

Dear Mr. Littlefield:

The staff of the Wyoming Game and Fish Department has reviewed the proposal for plans to submit a Section 109 Permit Application for the Reno Junction Wind Energy Project. We offer the following comments for your consideration.

Aquatic Considerations:

Since the proposed wind energy project will occur within an existing heavily developed area (e.g. an existing oil or gas field), we recommend aquatic monitoring consist of a pre-construction onsite visit followed by yearly onsite visits. The purpose of the yearly onsite visits is to ensure that the BMPs, as outlined in the Storm Water Prevention Plan, are working as designed. If problem/s are occurring, WGFD will provide recommendations to fix the problem/s. WGFD expects the wind energy development project proponent to fix the problem/s in a timely manner. If the problem/s is not fixed in a timely manner, WGFD may recommend additional monitoring be conducted.

Amphibians and Reptiles:

All amphibians and reptiles encountered incidentally during wildlife surveys are documented. Species, geographic coordinates (preferably decimal degrees or UTM), date, age class (adult, juvenile, larval, or egg), general vegetation type, and general comments are requested for each observation. Observations will be collected while performing other wildlife surveys within the study area. We recommend that preconstruction monitoring occur while construction is occurring (spring, summer, and fall of 2010) and 3 years post construction monitoring be

completed. Incidental observations will allow for trend data, which could elucidate possible shifts in species assemblages resulting from energy development.

Thank you for the opportunity to comment. If you have any questions or concerns, please contact Rick Huber, Staff Aquatic Biologist, at 307-777-4558, Al Conder, Casper Region Fisheries Supervisor, at 307-473-3405, or Zack Walker, Herpetologist, at 307-473-3406.

Sincerely,

John Emmerich
Deputy Director

JE: MF: rh

cc: USFWS
Al Conder, Casper Region
Zack Walker, Casper Region