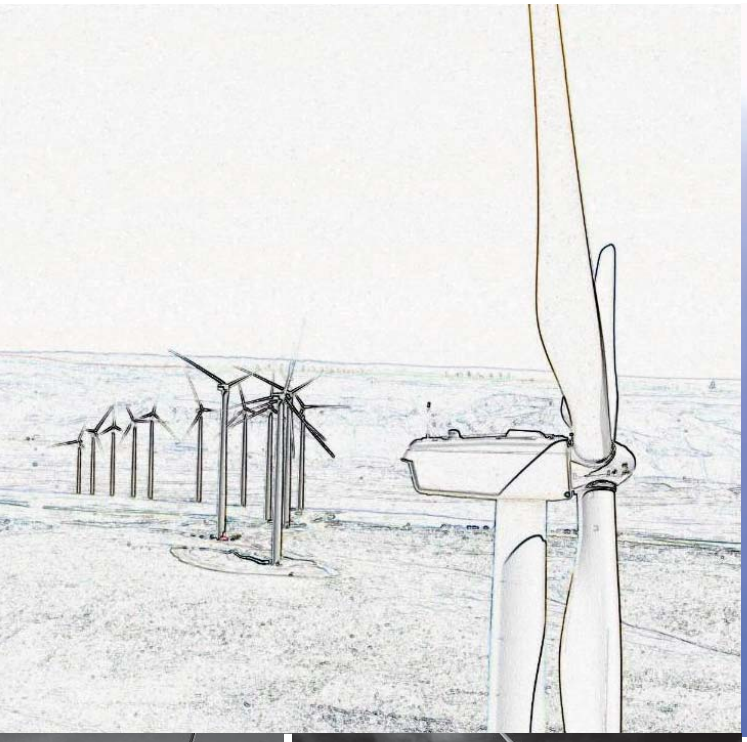
WYOMING INDUSTRIAL DEVELOPMENT INFORMATION AND SITING ACT



Section 109 Permit Application
Glenrock Wind Energy Project
and Rolling Hills Wind Energy Project

Prepared for

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Prepared by:

CH2MHILL

9193 South Jamaica Street
Englewood, CO 80112

November 2007

PACIFICORP ENERGY

1407 West North Temple St., Suite 210
Salt Lake City, Utah 84116

November 26, 2007

Tom Schroeder, Program Principal
State of Wyoming
Department of Environmental Quality-Industrial Siting Division
Herschler Building 4-W, 122 West 25th Street
Cheyenne, WY 82002

RE: Section 109 Permit Application pursuant to Section 35-12-109 of the Wyoming Environmental and Quality Act and Industrial Development Information and Siting Act for the construction and operation of the Glenrock and Rolling Hills Wind Energy Projects

Dear Mr. Schroeder,

PacifiCorp (dba as PacifiCorp Energy) is pleased to submit our Section 109 Permit Application for construction of the Glenrock and Rolling Hills Wind Energy Projects to be located fifteen miles north of Glenrock, Wyoming.

Sixty (60) hard copies of the application and an electronic copy on a compact disc are included with our application. Also, it is my understanding that you have received the requested fee payment for the amount of $34,860.

I will be the designated contact for PacifiCorp and can be reached at (503) 813-5376 or by email at mark.tallman@pacificorp.com. Mary Throne of Hickey and Evans is designated as our legal counsel for the Industrial Siting Process for the project. Mary can be reached at (307) 630-6728 or by email at mthrone@hickeyevans.com.

We are looking forward to working with you and your staff. Please let us know what we can do to assist in making the application proceedings as efficient at possible.

Sincerely,

Mark Tallman

Managing Director, Renewable Resource Acquisition

Verification

I, Mark Tallman, PacifiCorp Energy Managing Director of Renewable Resource Acquisition, hereby affirm and certify that the enclosed Section 109 Permit Application for the Glenrock and Rolling Hills Wind Energy Projects is truthful and accurate to the best of my knowledge.

Subscribed and sworn before me this 24th day of November, 2007.

OFFICIAL SEAL
T R HENDERSHOT
NOTARY PUBLIC - OREGON
COMMISSION NO. 413579
MY COMMISSION EXPIRES JANUARY 22, 2011

Notary Public for Oregon

My commission expires: JAN 22, 2011

Wyoming Industrial Development Information and Siting Act

Section 109 Permit Application

Glenrock and Rolling Hills Wind Energy Projects

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PacifiCorp Energy

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CH2MHILL

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Englewood, CO 80112

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Acronyms and Abbreviations

AADT	annual average daily traffic
AWEA	American Wind Energy Association
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best management practice
CIP	Capital Improvement Plan
Commission	Wyoming Public Service Commission
CPCN	Certificate of Public Convenience and Necessity
CWA	Clean Water Act
Eagle Act	Bald and Golden Eagle Protection Act
EIS	Environmental Impact Statement
EMS	Emergency Medical Service
EPA	U.S. Environmental Protection Agency
EPC	engineer-procure-construct
E-stop	Emergency stop
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FMV	Fair market value
FR	Federal Register
ft	foot/feet
FTE	full-time equivalent
GCC	Glenrock Coal Company
GDP	gross domestic product
GE	General Electric Company
GIS	Geographic information system
Glenrock	Glenrock Wind Energy Project
gpd	gallon per day

HB	House Bill
I-25	Interstate 25
I-80	Interstate 80
IMPLAN	Impact Analysis for Planning
I-O	input-output
IRP	Integrated Resource Plan
ISA	Industrial Siting Act
ISC	Industrial Siting Commission
ISD	Industrial Siting Division
kV	kilovolt
LOS	level of service
LQD	Land Quality Division
m	meter
m/s	meter per second
m^2	square meter
MBTA	Migratory Bird Treaty Act
MEHC	MidAmerican Energy Holdings Company
met	meteorological
MFI	median family income
mpg	mile per gallon
MW	megawatt
NAICS	North American Industry Classification System
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O&M	operation and maintenance
OES	Occupational Employment Statistics
OSHA	Occupational Safety and Health Administration
PacifiCorp	PacifiCorp Energy

Project	Glenrock or Rolling Hills Wind Energy Project (collectively Projects)
REMI	Regional Economic Models, Inc.
RIMS II	Regional Industrial Multiplier System II
RMP	Resource Management Plan
ROI	region of influence
Rolling Hills	Rolling Hills Wind Energy Project
rpm	revolutions per minute
RV	recreational vehicle
SCADA	supervisory control and data acquisition
SH	State Highway
SSURGO	Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
SWTSD	solid waste treatment, storage, and disposal
TAC	Technical Advisory Committee
TESS	threatened and endangered sensitive species
UI	Unemployment Insurance
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WHDP	Wyoming Housing Database Partnership
WRA	wind resource area
W.S.	Wyoming Statute
WTG	wind turbine generator
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System
yd^2	square yard

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Executive Summary

Components

PacifiCorp Energy (PacifiCorp) is submitting a Section 109 Permit Application pursuant to Statute 35-12-109 of the Wyoming Environmental and Quality Act and Industrial Development Information and Siting Act (ISA) for the construction and operation of the Glenrock and Rolling Hills Wind Energy Projects (individually, the "Project" and collectively, the "Projects").

PacifiCorp proposes to construct up to three wind generation projects in phases at the site, which includes privately owned fee lands in Converse County, Wyoming, north of Glenrock, Wyoming. The site encompasses in excess of 14,000 acres of land that extends approximately 12 miles from north to south and is approximately 2 to 3 miles wide.

The wind generation projects include the Glenrock and Rolling Hills Wind Energy Projects; each phase rated at 99 megawatts (MW) to be constructed in 2008. PacifiCorp is currently studying the potential for additional project phases at or associated with this site for construction in 2009, 2010, or later.

PacifiCorp requests issuance of a Section 109 Permit that covers the development of the site as a whole (up to three 99-MW projects). For purposes of this application, PacifiCorp is defining only the details and impacts of the Glenrock and Rolling Hills Wind Energy Projects in this permit application and will define the third project at a later date.

This Section 109 ISA Permit Application addresses the following for the Projects: description, location, schedule, estimated ad valorem and sales and use taxes, estimate of capital costs, purpose, need, and benefit. Summary information regarding socioeconomic baseline conditions, analysis of socioeconomic impacts within the area of impact, potential environmental impacts, and plans for alleviating any identified impacts are also addressed.

Location

Each Project is a 99-MW wind energy generation facility developed by PacifiCorp and will be built on a site that includes PacifiCorp's former Dave Johnston mine property north of Glenrock, Wyoming. Each Project will consist of 66 General Electric Company (GE) 1.5-megawatt sle wind turbine generators (WTG) with 80-meter tubular towers. Appurtenant infrastructure facilities will also include transformers, an operations and maintenance building (which will consist of either a refurbished existing building or a newly constructed building), underground electric cable, fiber optic communication cable, turbine access roads, six permanent meteorological towers, and a supervisory control and data acquisition system. Each Project will deliver its output to a new 34.5/230-kilovolt (kV) substation and then to a common 230-kV transmission line that will interconnect with PacifiCorp's Dave Johnston to Yellowcake 230-kV transmission line at a point near the Dave Johnston power plant.

GE will provide the WTGs and towers, along with final commissioning. Transformers and other long-lead equipment will be purchased directly by PacifiCorp or supplied via a construction contractor. The balance of plant will be constructed via an engineer-procure-construct contract with a general contracting firm selected through a bidding and evaluation process.

Schedule and Cost

PacifiCorp proposes to begin construction on each Project as soon as all relevant permits have been obtained. The current estimated completion date of the Projects under normal construction circumstances, weather conditions, labor availability, and materials delivery is by December 31, 2008.

A Jurisdictional Meeting was held with the Wyoming Department of Environmental Quality (WDEQ) – Industrial Siting Division (ISD) on May 23, 2007, to determine whether a single Project was under the jurisdiction of the ISA. ISD staff reviewed expected costs of the Project and determined that the estimated capital cost of the Project reviewed is expected to be in excess of the current statutory threshold of $168.3 million (Wyoming Statute 35-12-102(vii)). Therefore, PacifiCorp is required to obtain a permit or waiver of permit for the Projects prior to their construction, as specified by the ISA.

Construction and Operation Workforce Requirements

PacifiCorp anticipates that the combined construction workforces for the Projects will vary from a low of six during site geotechnical investigations in January to March 2008, to a high of 187 construction trades man during the peak of construction activities. PacifiCorp anticipates an approximate 9-month construction period (exclusive of the site geotechnical investigations) for the Projects. The majority of the work will be concentrated in a 6-month period (May through October) during which the WTG pads will be constructed, and the WTG will be installed and commissioned. It is during this time that personnel from the equipment manufacturer will be onsite supervising the installation and commissioning of the WTGs. The workforce would peak in July 2008 when it is expected that 187 workers would be onsite throughout the month. Over the 9-month construction period (exclusive of the site geotechnical investigations), there would be an average of almost 129 workers onsite. During the period of most intense activity (May 2008 through October 2008) there would be an average of 173 workers onsite.

During the operations phase, a workforce of about 15 persons in total for both Projects is estimated.

Public Involvement – ISA Statute Meeting Activities

PacifiCorp engaged in a comprehensive and proactive public involvement process and has fulfilled the ISA statutory requirements to conduct meetings with both State of Wyoming (State) agencies and local government officials. PacifiCorp has been and continues to be active in the communities that may be affected by the Project. PacifiCorp representatives participated in numerous informational meetings and presentations and actively sought out

potentially affected municipalities, counties, State agencies, and other stakeholders to discuss potential environmental and socioeconomic issues and recommendations.

PacifiCorp representatives conducted ISA regulatory statute meetings as part of the pre-application filing process to meet with and receive comments from state agencies and local government officials. The Project study area, as identified by the WDEQ-ISD during the Jurisdictional Meeting, determined those local officials to whom PacifiCorp sought to engage and provided meeting invitations.

Socioeconomic Impacts

The purpose of the socioeconomic impact analysis was to supply information to the Industrial Siting Commission regarding potential socioeconomic impacts associated with the Projects.

The socioeconomic impact analysis evaluated the benefits and impacts to the social and economic resources in the study area and primary area of impact, including the benefits related to the tax structure, direct employee opportunities, and indirect employment benefits.

The analysis of the impacts included the effects on the following:

- Housing
- Public safety and security
- Municipal services
- Educational facilities
- Health resources
- Transportation systems

To measure potential impacts, the analysis compared the expected future conditions in the study area with and without the Projects. The study area is defined as Campbell, Converse, Natrona, and Platte Counties. The counties included in the study area were determined in cooperation with the ISD.

Benefits of the proposed Project to both local communities near the Project and the State of Wyoming will realize economic benefits including permanent job creation, ad valorem taxes, and renewable energy generation in a new region in Wyoming.

Due to the relatively small size of the construction workforce, the Project will place minimal demands on new water, sewer, roads, electrical lines, or other local infrastructure. In addition, there would be little measurable increase in non-basic employment, as these jobs are generated from ongoing employment of the existing base of construction workers and would be maintained through the continued employment of both local and non-local construction workers. Therefore, construction and operation of the Projects would not significantly affect the various public and non-public facilities and services described above from the in-migration of workers for non-basic employment opportunities.

Environmental Impacts

Environmental impacts due to construction, operation, and maintenance of the Projects were analyzed. Resource data were collected to identify the characteristics of and to evaluate impacts on the natural environment, including the following:

- Air Quality and Noise
- Soil Resources
- Cultural Resources
- Vegetation
- Geological Hazards
- Surface and Groundwater Resources
- Land Use and Recreation
- Wetland Resources
- Visual Resources
- Wildlife Resources
- Mineral Resources
- Threatened, Endangered, Proposed, and Candidate Species

PacifiCorp will construct and operate the Projects on primarily reclaimed lands within the Dave Johnston mine permit area resulting in minimal environmental impacts. The Projects will have the potential to result in avian collisions with turbines. However, based on comparisons between baseline avian data collected in 2007 and operational monitoring data collected at numerous existing wind projects throughout the United States, raptor and passerine collision mortality is estimated to be low for the Projects. Lastly, all wind turbines have been sited to avoid potential impacts with all known locations of previously surveyed and identified cultural resources.

1.0 Purpose, Need, and Benefit

On a periodic cycle, PacifiCorp undertakes a comprehensive Integrated Resource Plan (IRP) process. The IRP is developed with considerable public involvement from customer interest groups, regulatory staff, regulators, and other stakeholders. Each of these entities is asked to participate actively and provide input and guidance as PacifiCorp considers a number of issues related to long-term resource planning. The IRP planning horizon is typically 20 years, and an action plan identifies steps that will be taken to secure resources for the first 10 years of that horizon. During the IRP process, all material planning assumptions are updated (e.g., load/resource forecasts and a prudent planning margin), and a resource deficiency is identified. The IRP process then models a number of potential new resource portfolios with the ultimate conclusion being the selection of a preferred portfolio that is expected to result in the least cost on a risk-adjusted basis.

1.1 Purpose and Need

PacifiCorp is pursuing the acquisition and development of renewable resources with the intent of reaching the levels established in the 2007 IRP preferred portfolio. Specifically, this level is 1,400 megawatts (MW) by the year 2010 and an additional 600 MW by 2013. Moreover, in connection with MidAmerican Energy Holdings Company's (MEHC) acquisition of PacifiCorp, approved by the Wyoming Public Service Commission (Commission) in Docket No. 20000-EA-05-226 (2006), MEHC committed to acquire 1,400 MW of cost-effective renewable resources (general commitment No. 40). The Glenrock and Rolling Hills Projects (individually, the "Project" and collectively, the "Projects") will meet a part of that commitment.

PacifiCorp, through its subsidiary Rocky Mountain Power, is required to seek a Certificate of Public Convenience and Necessity (CPCN) for the development of each Project.

With the Commission's consent and after securing the relevant permits, PacifiCorp plans to construct each Project with the specific intent of adding two 99-MW wind resources in Wyoming during 2008.

PacifiCorp's transmission group is currently studying interconnection requirements pursuant to a tariff filed by the Federal Energy Regulatory Commission (FERC). The results of these studies will be used to define final interconnection design and construction requirements for each Project.

1.2 Benefits

There are three major benefits attributable to the Projects: ad valorem tax revenues, direct employment, and indirect employment. Construction of the Projects will provide employment opportunities for local and non-local workers. It is likely that some construction workers (and possibly family members) would relocate for the duration of the construction phase. Personal consumption expenditures by direct workers would generate

sales tax revenues for the counties and municipalities at the points of sale. The purchase of goods and services necessary for construction and operation of the Projects could create indirect jobs, and purchases by direct workers could induce additional employment. Another long-term benefit of the Projects comes from permanent employment associated with operation of the wind energy facilities. These employees will add personal income to the local economy. The taxes paid by PacifiCorp and these employees will contribute to the economic viability and health of the region. Lastly, each Project furthers one of the State of Wyoming's (the State) objectives to use one of the State's key attributes (wind) effectively for the benefit of residents (i.e., PacifiCorp's customers; local tax jurisdictions) and the long-term economic health of the state.

Economic benefits of the proposed Projects to both local communities near the site and the state of Wyoming include the following:

- New wind energy investment
- Local service industry expansion
- Zero carbon source of Wyoming wind-generated electricity
- Millions of dollars to be spent on local purchases
- Job creation and stable employment
  - Approximately 187 temporary construction jobs
  - Approximately 15 permanent jobs
- Increased sales tax revenues from temporary and permanent employees during construction and operation
- Additional ad valorem taxes paid by PacifiCorp
- Increased need for local goods and services
- Additional property taxes paid by new employees moving into the area

1.2.1 Point of Delivery - Goods and Services

The construction and operation of the Projects will result in the purchase of goods and services, both for each Project and for the needs of workers. Goods and services during construction will be obtained from various local, regional, and national vendors.

PacifiCorp anticipates the majority of the Projects' components will be trucked to the Project sites. Therefore, since each Project is located within a single county, Converse County will be the primary point of delivery for components associated with each Project.

1.2.2 Taxes

The ad valorem property taxes that PacifiCorp will pay for each Project will significantly contribute to the economic viability and health of the region. The annual taxes assessed on the Projects will depend on a number of factors, including industrial property valuation, mill levy, pollution control equipment exemptions, allocation factor, and obsolescence factor.

2.0 Applicant and Facility Description

PacifiCorp intends to construct, own, and operate up to three 99-MW wind energy generation projects near Glenrock, Wyoming. The site was selected for the Glenrock and Rolling Hills Projects for the following primary reasons: (1) the site is expected to result in a desirable wind resource, (2) the site is located near existing transmission system infrastructure, (3) PacifiCorp is the owner of the private fee-title lands, and (4) the construction and operation of a wind farm on a reclaimed coal mine provides a highly beneficial reuse of brownfield lands.

2.1 Applicant Information

The applicant is:

PacifiCorp
1407 West North Temple, Suite 210
Salt Lake City, UT 84116

Formed in 1984, PacifiCorp is one of the Western United States' leading utilities. PacifiCorp is headquartered in Portland, Oregon, with a total of 6,654 employees. PacifiCorp's service area covers 136,000 square miles, and 1,604,817 customers throughout Utah, Oregon, Wyoming, Washington, Idaho, and California. The company was acquired by MEHC in 2006.

MEHC is a global leader in the production of energy from diversified fuel sources including geothermal, natural gas, hydroelectric, coal, and wind. Based on the American Wind Energy Association's (AWEA) most recent annual wind power rankings, MEHC is number three in the nation among utility companies that own and purchase wind energy. MEHC also leads in the supply and distribution of energy in the United States and United Kingdom consumer markets, with approximately 6.7 million electricity and gas customers. MEHC and its subsidiaries, MidAmerican Energy Company, PacifiCorp, CE Electric UK, Cal Energy Generation, Kern River Gas Transmission Company, and Northern Natural Gas, are established leaders in the world energy marketplace.

PacifiCorp consists of three business units:

- PacifiCorp Energy, which contains the electric generation, commercial and energy trading functions, and the coal-mining operations of the company, is headquartered in Salt Lake City, Utah.
- Pacific Power, which delivers electricity to customers in Oregon, Washington, and California, is headquartered in Portland, Oregon.
- Rocky Mountain Power, which delivers electricity to customers in Utah, Wyoming, and Idaho, is headquartered in Salt Lake City, Utah.

PacifiCorp relies on a variety of generation resources, both to maintain a balanced system and to ensure that all of its customers have access to reliable electricity supplies. In addition to coal-fired, gas-fired, and hydroelectric plants, PacifiCorp's generation system includes a mix of power including thermal generation, mining, hydro power, and renewable energy. Total PacifiCorp-owned generation is 8,261 MW.

The following managers have been designated by PacifiCorp to be responsible for permitting and constructing the Glenrock and Rolling Hills Wind Energy Projects:

Mr. Merrill Brimhall
Project Manager
PacifiCorp Energy
1407 West North Temple, Suite 210
Salt Lake City, UT 84116

Mr. Mark Tallman
Managing Director of Renewable Resource Acquisition
PacifiCorp Energy
825 NE Multnomah Blvd., Suite 2000
Portland, OR 97232

2.2 Location

The Projects are located in Converse County, Wyoming, approximately 15 miles due north of Glenrock, Wyoming (Figure 2-1). The Projects are located entirely on privately held fee lands owned by PacifiCorp. The site encompasses in excess of 14,000 acres of land that extends approximately 12 miles from north to south and is approximately 2 to 3 miles wide. This land ranges in elevation from 5,000 to 6,000 feet above mean sea level. It is anticipated that a transmission line to connect the Projects to PacifiCorp's transmission system will be built along a PacifiCorp-owned property that was once occupied by a railroad line that extended approximately 15 miles from the site to the Dave Johnston power plant.

The site is typical of the Casper-Glenrock-Douglas, Wyoming, area with rolling hills and short-grass prairie lands. The Projects are located on a site that includes the location of the former Dave Johnston coal mine. Strip mining of the location began in 1958, mining ceased in September 2000, and the site has been completely reclaimed. The area is re-contoured and now supports vegetation and animal life native to Wyoming.

In addition to remaining un-mined coal seams, the site may contain other mineral resources. Sub-surface mineral rights for coal, oil, gas, uranium, leonardite, and other hard-rock minerals are held by a number of parties. It is expected that the proposed placement of the turbines and facilities will not inappropriately affect the ability of mineral right-owners to extract these minerals in the future or negotiate a shared use agreement with the surface owner (PacifiCorp).

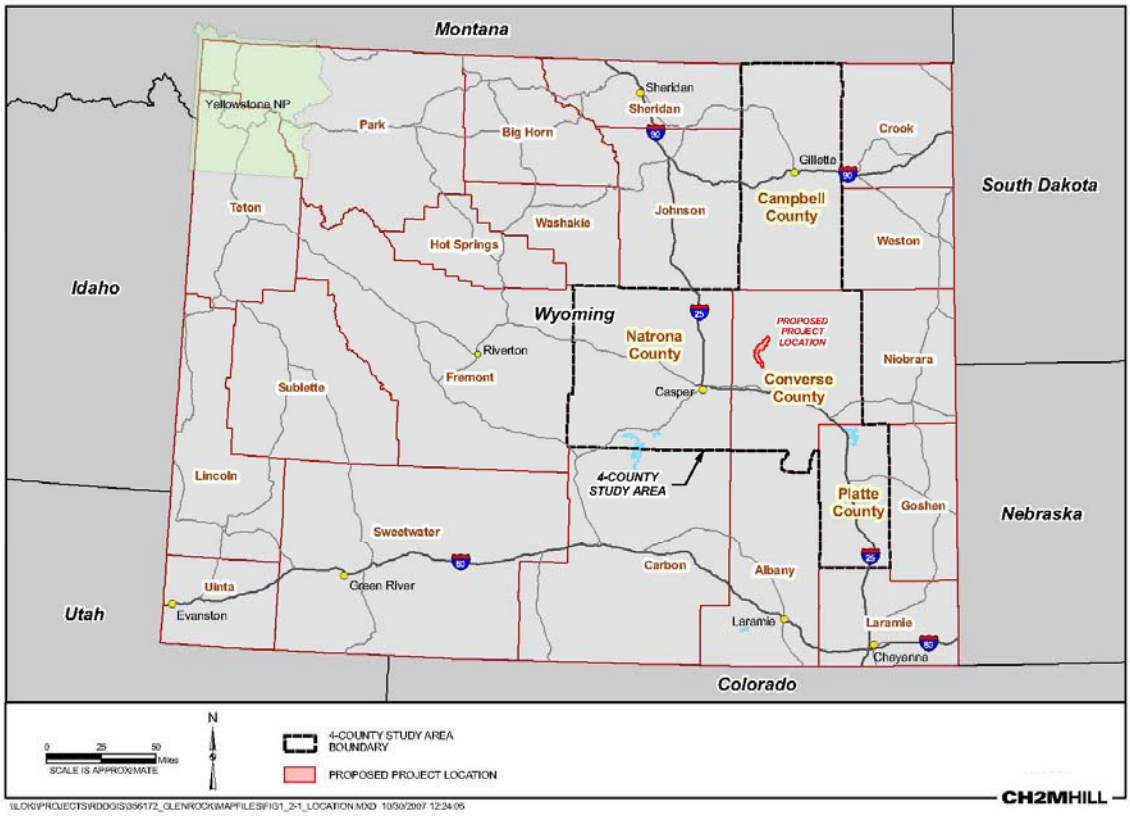

FIGURE 2-1
Project Location Map

2.3 Project Descriptions

PacifiCorp proposes to construct up to three wind generation projects in phases in Converse County, Wyoming, at a site that includes the reclaimed Dave Johnston coal mine. The phases consist of: (1) the Glenrock Wind Energy Project (Glenrock) rated at 99 MW, which is located along the east ridge top portion of the site; (2) the Rolling Hills Wind Energy Project (Rolling Hills) rated at 99 MW, which is located along the west portion of the site; and (3) an additional project rated at up to 99 MW to be further defined by PacifiCorp in the future and potentially constructed in 2009, 2010, or later.

Both Glenrock and Rolling Hills will have 66 wind turbine generators (WTG), a separate system of collector cables, a separate collector substation, separate metering, and separate control equipment (Appendix A). Glenrock and Rolling Hills will share an operations and maintenance (O&M) building (which will either be a refurbishing existing building or newly constructed building), and access roads. Both Projects are anticipated to be constructed in 2008, and PacifiCorp will own both projects.

PacifiCorp requests issuance of a Section 109 Permit that covers the development of the site as a whole (up to three 99-MW projects). For purposes of this permit application, PacifiCorp

is defining only the details and impacts of Glenrock and Rolling Hills, referred to as "the Projects" in this application, and will define the additional project phase at a later date. Each of the project phases is considered by PacifiCorp to be electrically separate and as three different projects from a financial commitment perspective.

2.3.1 Glenrock Project Description

Glenrock includes installation of 66 General Electric 1.5-megawatt (GE 1.5 sle) WTGs with 80-meter (m) tubular towers. Facilities will also include transformers, underground electric cable, fiber optic communication cable, turbine access roads, four permanent 80-m meteorological (met) towers, and a supervisory control and data acquisition (SCADA) system.

Output from Glenrock will be delivered to a new 34.5/230-kilovolt (kV) substation and 230-kV transmission line that will interconnect with a new 230-kV substation near PacifiCorp's Dave Johnston power plant. It is anticipated that a transmission line to connect the Projects to PacifiCorp's transmission system will be built along PacifiCorp-owned property that was once occupied by a railroad line that extends approximately 15 miles from the site to the Dave Johnston power plant.

GE will provide the turbines and steel tubular towers along with final commissioning. Transformers and other long-lead equipment may be purchased directly by PacifiCorp or provided by a construction contractor. The balance of plant will be constructed via an engineer-procure-construct (EPC) contract with a firm selected through a bidding and evaluation process.

2.3.2 Rolling Hills Project Description

Rolling Hills consists of installation of 66 GE 1.5 sle WTGs with 80-m tubular towers. Facilities will also include transformers, underground electric cable, fiber optic communication cable, turbine access roads, two permanent 80-m met towers, and a SCADA system.

Output from Rolling Hills will be delivered to a new 34.5/230-kV substation adjacent to the Glenrock substation.

GE will provide the turbines and steel tubular towers along with final commissioning. Transformers and other long-lead equipment may be purchased directly by PacifiCorp or provided via a construction contractor. The balance of plant will be constructed via an EPC contract with a firm selected through a bidding and evaluation process.

2.3.3 Legal Description

The Projects will be located in Townships 35, 36, and 37 North, and Range 74 and 75 West. The size of the parcel is approximately 14,000 acres. Table 2-1 provides the legal description of the Projects' location.

TABLE 2.1
Legal Description

TOWNSHIP	RANGE	SECTION
T37N	R74W	30
T37N	R75W	25
T37N	R75W	26
T37N	R74W	31
T37N	R75W	36
T37N	R75W	35
T36N	R74W	6
T36N	R75W	1
T36N	R75W	2
T36N	R75W	4
T36N	R75W	3
T36N	R74W	7
T36N	R75W	10
T36N	R75W	11
T36N	R75W	12
T36N	R75W	9
T36N	R74W	18
T36N	R75W	16
T36N	R75W	15
T36N	R75W	13
T36N	R75W	14
T36N	R75W	20
T36N	R75W	21
T36N	R75W	22
T36N	R75W	23
T36N	R75W	29
T36N	R75W	28
T36N	R75W	27
T36N	R75W	26
T36N	R75W	33
T36N	R75W	34
T36N	R75W	35
T35N	R75W	1
T35N	R75W	3
T35N	R75W	2
T35N	R74W	7
T35N	R75W	10
T35N	R75W	11
T35N	R75W	12
T35N	R75W	14
T35N	R74W	18

TABLE 2.1
Legal Description

TOWNSHIP	RANGE	SECTION
T35N	R75W	13
T35N	R75W	23
T35N	R75W	24
T35N	R74W	19
T35N	R75W	26
T35N	R75W	25

Source: PacifiCorp, 2007

2.4 Wind Turbine Generators

The WTG selected for the Projects is the GE 1.5 MW sle (Figure 2-2). The GE 1.5-MW WTG is a three-blade, active yaw- and pitch-regulated machine with power and torque control capabilities. The blade diameter is 77 m (253 feet [ft]), and the height at the hub is expected to be up to 80 m (262 ft). The swept area of the rotor is 4,657 square meters (m^2) (5,570 square yards [yd^2]), and the rotor typically operates at 20 revolutions per minute (rpm). Each Project will include construction and erection of 66 WTGs. The turbines will be mounted on a poured concrete pad and spaced at distances equal to approximately two to three rotor diameters apart dependent on the specific turbine site characteristics.

WTGs consist of three main structures: a tubular tower, the nacelle, and rotor blades. The WTGs for each Project will be grouped in strings, interconnected with an underground power collection system, and linked to both the Glenrock and Rolling Hills substations respectively.

A step-up transformer will be installed at the base of each WTG to increase the output voltage of the WTG to the voltage of the power collection system (34.5 kV). Small concrete slab foundations, a concrete vault, or other suitable base will be used to support the step-up transformers.

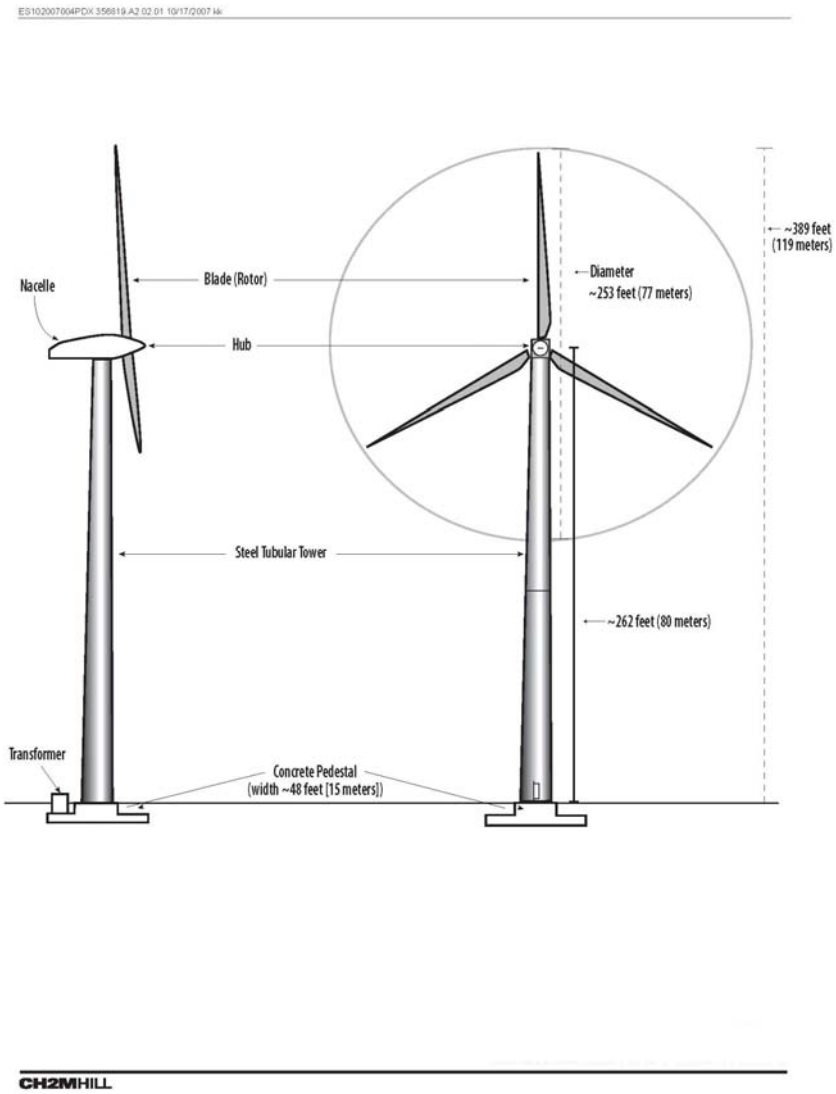

FIGURE 2-2
Wind Turbine and Tower

2.4.1 Rotor Blades

WTGs are powered by three fiberglass epoxy or polyester resin blades connected to a central rotor hub. 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 rotor blades turn slowly, typically 20 rpm at the hub. Although the blades are non-metallic, they are equipped with a sophisticated lightning suppression system.

2.4.2 Nacelle

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. A yaw system is mounted between the nacelle and the top of the tower on which the nacelle resides. The yaw system is composed of a bearing surface for directional rotation of the turbine and a drive system consisting of a drive motor(s) to keep the turbine pointed into the wind to maximize energy capture. A wind vane and anemometer are mounted at the rear of the nacelle to signal the controller with wind speed and direction information.

2.4.3 Tower Structures

The tower that supports the WTG is expected to be a tapered monopole, approximately 80 m (262 ft) in height. It is supported by a reinforced-concrete foundation, ranging from 15 to 24 m (48 to 80 ft) in width, depending upon final design. The towers will be uniformly painted a neutral color approved by the Federal Aviation Administration (FAA) 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 onsite. The tower is designed to withstand the maximum wind speeds expected at the Projects; GE survival wind speed (maximum wind the tower can withstand before failing) is 55 meters per second (m/s), and the 50-year return wind speed (recurrence interval) at the Projects is 54 m/s.

2.4.4 Foundations

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

2.5 Additional Features

2.5.1 Access Roads

In areas where existing roads do not provide access to WTG or substation locations, and along the length of turbine strings, new gravel roads will be constructed. Roads will be designed under the direction of a licensed engineer and compacted to meet turbine and transformer equipment load requirements. Proposed access roads would be located to minimize disturbance, avoid sensitive resources (e.g., raptor nests, cultural resource sites), and maximize transportation efficiency. To allow safe passage of the large transport equipment used in construction, all-weather gravel roads would be built with adequate drainage and compaction to handle 15-ton per axle loads. Road widths would be approximately 20 ft. Passing turnouts would be located approximately every 4 miles along access roads, where needed.

The Glenrock Project is anticipated to include approximately 20 miles of access roads, whereas the Rolling Hills Project is anticipated to include approximately 14 miles of access roads.

2.5.2 Power Collection System

Each Project will have an electrical system consisting of three key elements: (1) a collector system, which collects energy generated at low to medium voltage from each WTG, transforms it to 34.5 kV through a pad-mounted transformer, and delivers the power through a network of electrical conductors to (2) the respective Project substation, which transforms energy delivered by the collector systems from 34.5 kV to 230 kV for transmission via a new 230-kV transmission line to a new 230-kV switching station near the Dave Johnston power plant.

The majority of the collector system will be buried directly in the soil approximately 3 to 4 ft below the ground surface. However, where site-specific considerations require, the collector system may be aboveground. Using aboveground structures allows the collector cables to cross other facilities and span drainages or intermittent streams thus reducing environmental impacts. If used, overhead pole structures will generally be about 35 to 80 ft tall, depending on terrain. Based on the preliminary collector cable layout, approximately 14 miles of collector cable route will be placed underground for the Glenrock Project, and approximately 16 miles of collector cable route will be placed underground for the Rolling Hills Project. Based on the preliminary design, no overhead structures for power collection are anticipated; however, the final design may include an overhead collector cable route.

Examples of specific conditions that will make it environmentally or economically advantageous to run portions of the collection system aboveground are as follows:

- Steep terrain where the use of backhoes and trenching machines is not feasible or safe
- Stream and wetland crossings where an aboveground line avoids or minimizes environmental impacts
- Soil with low-thermal conductivity preventing adequate heat dissipation from the conductor
- Rocky conditions that significantly increase trenching costs
- Economic advantage for overhead construction on circuits into substation

Because detailed geotechnical studies have not yet been completed for the Projects, it is not possible to determine if aboveground collector cables will be advantageous.

2.5.3 SCADA System

A SCADA system will be installed for each Project 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 above the power conductors. The SCADA cables will be installed at least 3 to 4 ft below ground. The host computer(s) is expected to be located in the O&M building control

room at the Project site. The SCADA software consists of applications developed by the turbine vendor and/or a third-party SCADA vendor. Glenrock and Rolling Hills will each have its own SCADA system.

2.5.4 Substations

The collector cable system will link each turbine to the next and to the respective Project collector substation. Glenrock and Rolling Hills will each have its own substation. The substation sites will be surrounded by a graveled, fenced area with transformer and switching equipment and an area to park vehicles. Transformers will be oil cooled and insulated types. The substation equipment may include circuit breakers, power transformer(s), bus and insulators, disconnect switches, relaying, battery and charger, surge arrestors, alternating current and direct current supplies, control building, metering equipment, SCADA provision, grounding, and associated control wiring. The substation facilities will conform to all applicable Wyoming regulations and standards, as applicable.

Output from Glenrock and Rolling Hills will be delivered to two new 34.5/230-kV collector substations and a 230-kV transmission line that will interconnect with a new 230-kV switching station near PacifiCorp's Dave Johnston power plant. It is anticipated that a transmission line to connect both Projects to PacifiCorp's transmission system will be built along PacifiCorp private fee lands, which were once occupied by a railroad line (subsequently removed after active mining operations ceased) that extended approximately 15 miles from the Project site to the Dave Johnston power plant. PacifiCorp's Transmission group is independently studying interconnection requirements pursuant to a FERC-filed tariff. The results of these studies will be used to define final interconnection design and construction requirements.

2.5.5 Meteorological Towers

Four permanent met towers will be placed in the area of the Glenrock Project, whereas two permanent met towers will be placed in the area of the Rolling Hills Project. The permanent towers will be used for the collection of meteorological data for the Projects. The permanent met towers will be lattice-type, free-standing (unguyed) structures. Each tower will be approximately 80 m (262 ft) high with an equilateral triangle base, each side of which will be roughly 8 m (25 ft) long.

2.5.6 Operation and Maintenance Building

Existing buildings, formerly used for mining operations but currently abandoned, will be refurbished for use as an O&M building, or newly constructed buildings will be used for the Projects. The O&M building(s) will include up to two approximately 5,500-square-foot offices (including office space for several contractors); bathroom and kitchen facilities; a break room; a storage area; a garage for vehicle, turbine, and equipment maintenance; and the SCADA equipment. A fenced, graveled area for parking and storage will be provided. The O&M building(s) will each use existing groundwater wells to supply water for domestic use and discharge to the existing septic system. Power for the O&M building(s) will be provided by Rocky Mountain Power.

2.5.7 Lighting Specifications

The WTGs are grouped in strings, and some of the turbines will include aviation warning lights as required by the FAA. The number of turbines with lights and the lighting pattern of the turbines will be determined in consultation with the FAA.

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3.0 Construction and Operations Descriptions

This section describes construction and operations procedures, schedules, workforce estimates, and housing plans associated with both Projects.

3.1 Construction Procedures

The selected balance of plant general construction contractors would prepare each Project site, complete site civil work including construction of access roads, install facilities, oversee construction, and complete final cleanup and restoration of the turbine crane pads, widened access roads, and other temporary disturbance areas.

Heavy construction equipment used to construct the Projects would include earth-moving equipment, cranes, and support staff light trucks. Table 3-1 details the general equipment that is likely to be used for the Projects.

TABLE 3-1
List of General Construction Equipment for the Wind Energy Projects

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

Source: CH2M HILL, 2007

3.1.1 Site Civil Work/Preparation

Prior to breaking ground, the construction area for each Project will be surveyed and clearly demarcated with stakes and flagging. All construction activities would be confined to the flagged areas. After the area is delineated, access roads, WTG locations, and other site locations would be cleared and prepared for safe access. Grading would be minimized to preserve topsoil. Excavated topsoil would be stockpiled alongside the excavated area for replacement after construction.

The tower sections, rotor blades, and other WTG components would be delivered directly to the WTG locations for onsite assembly.

3.1.2 Access Road/Crane Pad Preparation

Roads for each Project and roads shared by the Projects have been located to minimize disturbances, maximize transportation efficiency, and avoid sensitive resources and unsuitable topography to the extent practicable. Existing roads will be built to GE specifications and may need to be widened to accommodate delivery of WTG equipment, if needed. Raw materials used for access road and crane pad preparation will include rock, gravel, and water for dust control and road compaction. In conjunction with the access road construction, crane pads would be established at each WTG location. The purpose of the crane pad is to provide enough space for a large crane to install the tower sections, nacelle, blades, and other components. The crane pad also provides access to the area for maintenance, if necessary. When construction is complete, an approximate area 40 ft long by 50 ft wide would be maintained for O&M procedures.

3.1.3 Tower Foundations

After road and pad construction, crews would begin installation of the tower foundations immediately adjacent to the crane pads. A geotechnical report would be prepared for the Projects to determine the appropriate foundation design. Raw materials used for tower foundations will likely include concrete and steel rebar. During construction, a licensed engineer would prepare a special inspection report for each foundation excavation and pour. The turbine supplier approves the foundation design for each turbine. The source of concrete has not yet been determined, but would likely be localized using a concrete batch plant. The concrete batch plant would likely be located onsite.

3.1.4 Trenching and Placement of Underground Electric Conductor

Backhoe or trenching machines would be used to excavate the cable ditches. Underground electrical and communication cables would be buried adjacent to and connecting with WTG arrays. Two burial methods may be used: trenching or plowing. Trenches are typically excavated 3 to 5 ft wide by 3 to 4 ft deep, and the topsoil is segregated from subsurface soil and segregated into separate piles. Plowing involves a special attachment to a bulldozer that directly buries a cable or combination of three cables while disturbing only a few inches of width of the surface soil. Crews lay the electrical cables into the ditch first and then partially backfill the trench with subsurface soil before installing the communication cables. 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 would be reseeded with the designated reclamation seed mixture.

3.1.5 Substation/Switch Yard

The Project substations and switch yard sites would be cleared and graded. The areas would occupy approximately 5 acres. After site preparation, transformer pads, oil spill containment structure, and other foundations would be excavated, forms would be set, rebar installed, and the concrete poured and cured to create the foundation. Backfilled soil would be compacted, and excess soil would be distributed around the site. Electrical and other equipment would be transported to the site by truck and installed with appropriate construction equipment. Following construction, the substation and switchyard facilities would be surrounded by a security fence, similar in design and height to other PacifiCorp-owned electrical facilities, that is constructed pursuant to prudent utility practices.

3.1.6 Tower Assembly

After the concrete foundations are in place and cured, the WTG towers, nacelles, and blades would be delivered to each WTG location in the order of assembly. Large cranes would be brought onsite to lift the multiple tower sections, nacelle, and three-bladed rotor into place. The first step would be to lift and secure the down tower electrical assembly to the foundation. Next, the first tubular tower base section is lifted over the down tower assembly and secured to the foundation. Subsequent tower sections would be connected to the base tower section. The nacelle, rotor, and other WTG equipment would then be delivered to the turbine pad location. Blades would be bolted to the rotor hub, lifted to the central hub by a construction crane, and then connected to the nacelle.

The adjacent crane pad provides enough space to stage the crane and store the WTG blades and other WTG components while the tower is being erected.

3.1.7 Transformers

Pad-mounted transformers would be located within approximately 20 ft of the base of each turbine tower. The approximately 5-square-ft steel-transformer box, housing the transformer circuitry, would be mounted on an approximately 6- square-ft pad or vault made of fiberglass or concrete. Transformers will contain non-polychlorinated biphenyl (PCB) mineral oil and will be sealed.

3.1.8 Testing

After construction, all systems, controls, and safety equipment would be calibrated and tested before being placed in service for each Project. Qualified technicians, turbine experts, and electricians would test and inspect all WTG components, transformers, communications systems, substation and switchyard, and transmission systems to ensure that they comply with required specifications and are working properly. Each turbine and associated piece of equipment will be tested and inspected upon individual completion. All tests would be conducted and problems corrected prior to final interconnection commissioning.

3.1.9 Cleanup/Reclamation

After construction, the disturbed site areas would be restored similar to pre-construction conditions. The revegetation plan is detailed in Section 7.5.1.

3.1.10 Site Decommissioning

Decommissioning is a step-by-step, methodical deconstruction process that involves removing and disposing of the infrastructure and appurtenant facilities associated with a Project.

If either Project were to terminate operations in the future, PacifiCorp would obtain the necessary authorization from the appropriate regulatory agencies to decommission the facilities. Generally, wind farm projects that are decommissioned contain a high "scrap value" due to the materials and equipment contained in the infrastructure (steel infrastructure, electric generators, and copper).

In general, the decommissioning of the Projects may result in a burial of all foundations, and any unsalvageable material would be disposed of at authorized sites. The soil surface would be restored as close as reasonably possible to its original condition. The Project substations are generally valuable. If the buried/overhead power lines could not be used by PacifiCorp, all structures, conductors, and cables would be removed unless otherwise allowed to remain in place.

Reclamation procedures would be based on site-specific requirements and techniques prescribed in the Dave Johnston mine permit administered by the Wyoming Department of Environmental Quality (WDEQ) – Land Quality Division. In addition, revegetation would be done with approved seed mixes detailed in the mine permit (see Section 7.5.1). Lastly, demolition or removal of equipment and facilities will meet applicable environmental and health regulations and attempt to salvage economically recoverable materials or to recycle the respective Project sites for future uses.

3.1.11 Safety Mechanisms

Safety and emergency systems are incorporated into the design of the WTGs to ensure safe and reliable operation. The following sections describe safety systems incorporated into the design of the WTGs.

3.1.11.1.1 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.

The 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). This brake also prevents rotation of the machinery as required by certain service activities.

Turbine Control. The GE 1.5 sle 60-Hz WTG machine 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 systems of the turbine 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.

Tower Access. Access to the nacelle is provided by a ladder, and a fall-arresting safety system is included. Interior lights are installed at critical points from the base of the tower to the tower top.

Blade Pitch. 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. By having all three blades outfitted with independent pitch systems, redundancy of individual blade aerodynamic braking capability is provided.

3.1.11.1.2 Lightning Protection System

The rotor blades are equipped with a strike sensor mounted in the blade tip. Additionally, a solid copper conductor from the blade tip to root provides a grounding path that leads to the grounding system at the base of the tower foundation. The turbine is grounded and shielded to protect against lightning; however, lightning is an unpredictable force of nature and it is possible that a lightning strike could damage various components notwithstanding the lightning protection deployed in the machine.

3.1.12 Construction Emergency Response/Plan

The balance of plant general contractor will be responsible for the development of Safety and Fire Protection Plans, covering all work to be performed by the general contractor and all site subcontractors during construction of a Project. The Safety and Fire Protection Plan for each Project will be completed by the general contractor and approved by PacifiCorp prior to the initiation of construction activities. In addition, the balance of plant general contractor will comply with all safety requirements of the Occupational Safety and Health Administration (OSHA), as applicable. The balance of plant general contractor will maintain adequate first-aid facilities throughout the construction period. Specifically, prior to construction, the balance of plant general contractor will provide and maintain for the protection of its employees such safety equipment, guarding, and personal protective apparel as is prescribed for safety practices or as required by any law, ordinance, rules, or the exercise of ordinary prudence for the type of work being performed. A PacifiCorp representative will be onsite during the construction phase to monitor the performance of the contractor.

3.2 Construction Schedule

The current timeline for each Project is summarized in Figure 3-1. Initial feasibility, wind resource assessment and modeling, final layout, and limited permitting activities have been conducted in 2007 for each Project. PacifiCorp anticipates that site mobilization and construction will start no later than the second quarter of 2008 or when all required permits and authorizations are in place. For each Project, mechanical completion is anticipated in the fourth quarter of 2008, with commercial operation of both Projects expected at the end of 2008. The Projects are anticipated to be 90 percent constructed in the fourth quarter of 2008.

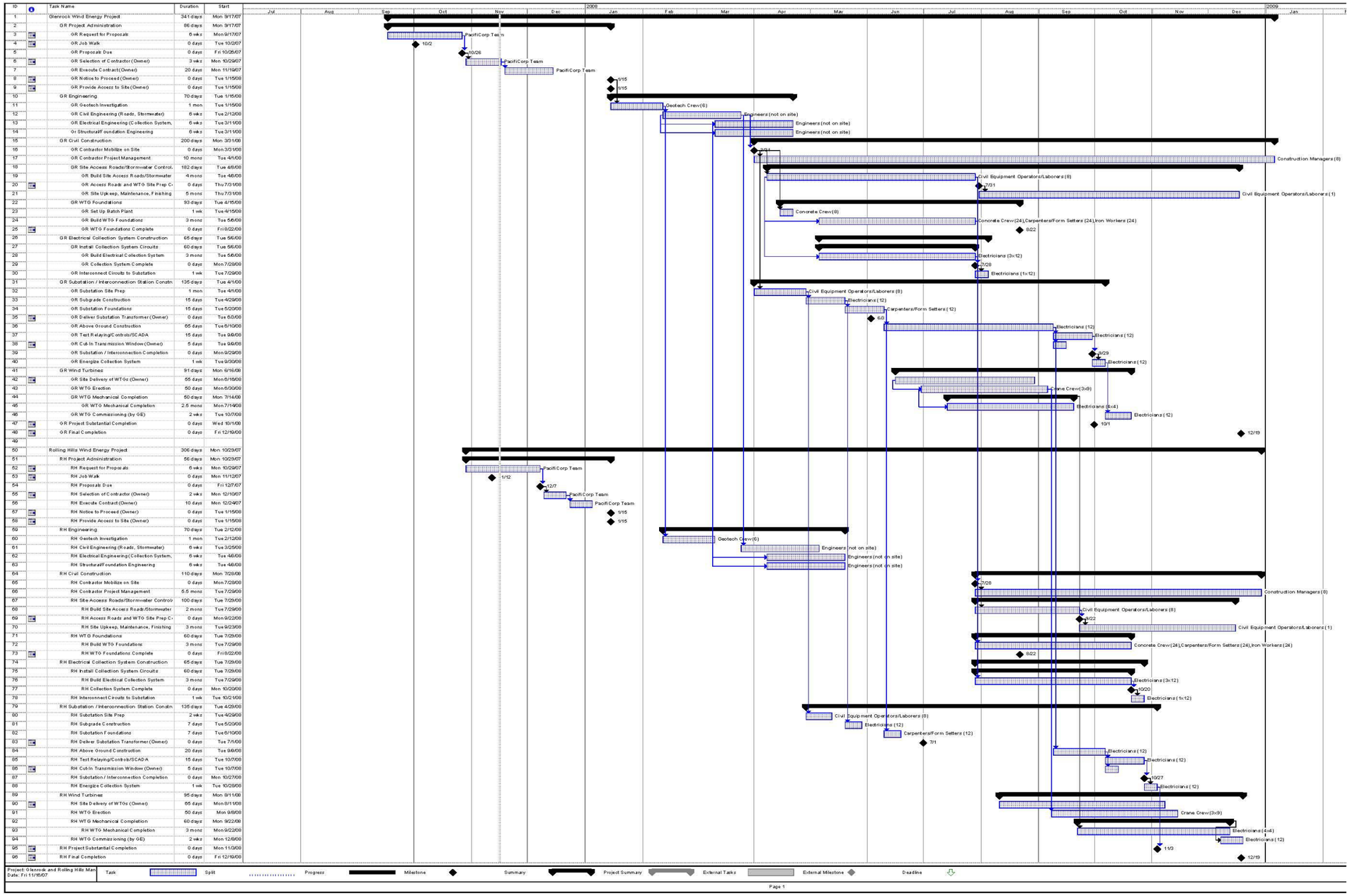

FIGURE 3-1
Construction Schedule

3.3 Construction Workforce Estimate

Construction of each Project would take place over a number of phases and last approximately 9 months (exclusive of site geotechnical investigations). The following describes the general construction phases.

Engineering – perform site geotechnical investigations; perform civil engineering (roads and stormwater); electrical engineering (collection system and substation); and conduct structural engineering (foundations).

Civil Construction – begin contractor mobilization onsite; build site access roads, construct stormwater control structures, and WTG site preparation; and build WTG foundations.

Electrical Collection System – build electrical collection system and interconnect circuits to substation.

Substation and Interconnection Station - construct substation, install transformer, and energize collection system.

WTGs – deliver WTG to each Project, install and commission WTG.

Workforce estimates presented include personnel required for both the Glenrock and Rolling Hills Projects. The majority of the work will be concentrated in a 6-month period (May through October) during which the WTG pads will be constructed, and the WTGs will be installed and commissioned. It is during this time that personnel from the equipment manufacturer will be onsite supervising the installation and commissioning of the WTGs. The workforce would peak in July when it is expected that 187 workers would be onsite throughout the month. Over the 9-month construction period (exclusive of the site geotechnical investigations), there would be an average of almost 129 workers onsite. During the period of most intense activity (May through October) there would be an average of 173 workers onsite. The manner in which the workforce varies over time and in trades man composition over the period of construction can be seen from the information presented in Table 3-2 and Figure 3-2.

TABLE 3-2
Construction Workforce by Month and Type of Worker - Glenrock and Rolling Hills Projects Combined

Month	Constr. Mgrs.	Civil Equip. Operators /Laborers	Concrete Crew	Carpenters & Form Setters	Iron Workers	Electricians	Crane Crew	Geotech Crew	TOTAL
Jan	0	0	0	0	0	0	0	6	6
Feb	0	0	0	0	0	0	0	6	6
Mar	0	0	0	0	0	0	0	6	6
Apr	8	16	8	0	0	0	0	0	32
May	8	16	24	24	24	60	0	0	156
Jun	8	8	24	48	24	48	0	0	160
Jul	8	8	24	36	24	60	27	0	187
Aug	8	9	24	24	24	64	27	0	180
Sep	8	9	24	24	24	64	27	0	180
Oct	8	2	24	24	24	64	27	0	173
Nov	8	2	0	0	0	16	27	0	53
Dec	8	2	0	0	0	28	0	0	38

Source: Black and Veatch, 2007

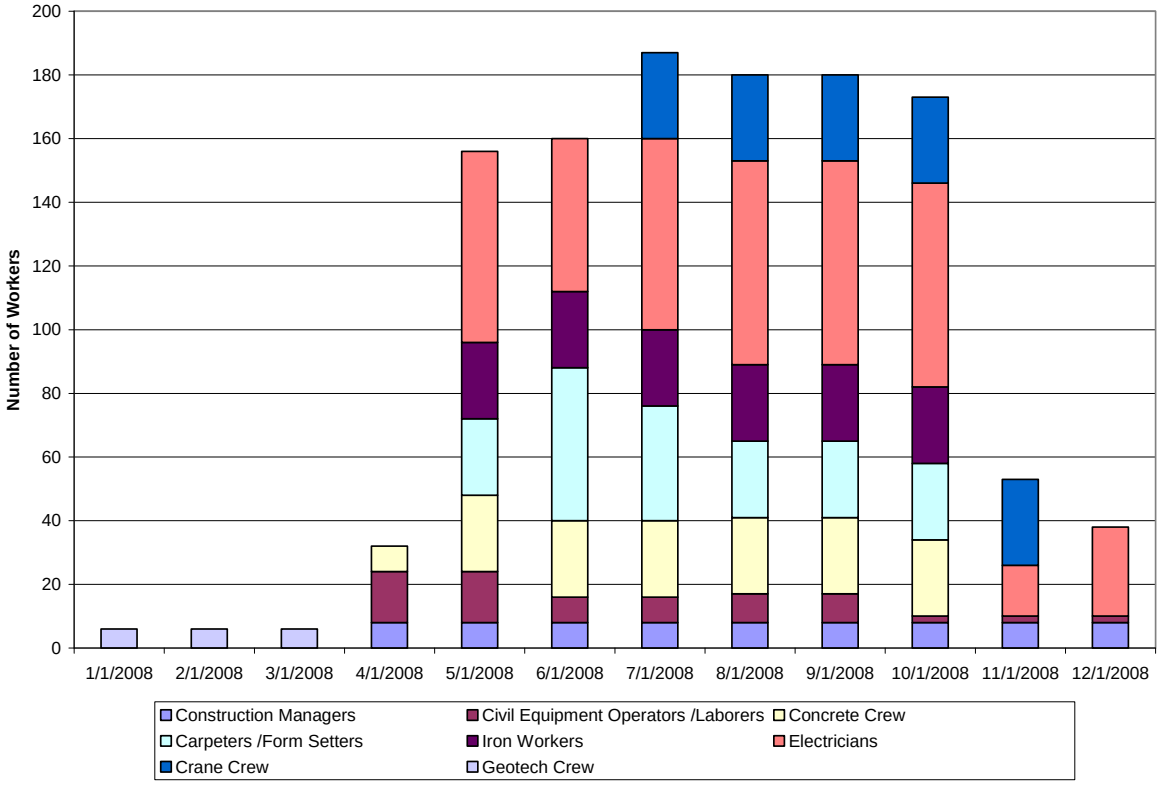

FIGURE 3-2
Estimate of Construction Schedule and Construction Workforce by Trade Type

3.3.1 Construction Management Workforce

It is estimated that 13 construction management workers will relocate with their families during the construction period. Because the construction schedule for the two Projects is anticipated to be 10 months, it is assumed that the construction management will require long-term housing options.

It is anticipated that the construction management will be a non-local workforce and accompanied by family members. It is envisioned that this management workforce will seek to relocate primarily to the Town of Glenrock, City of Casper, and the Town of Douglas. This is primarily due to the choice of several temporary and affordable longer-term rental housing options and relative proximity to the construction site.

3.3.2 Single Worker

Based on the type of labor required to complete construction contracts on the wind energy facility, a majority of the workforce is anticipated to be single and male. Because the majority of the workforce will be relocating as a single entity, PacifiCorp looked to secure motel/hotel and multi-dwelling temporary housing options for this majority group.

3.3.3 Local to Non-local Workforce Ratio

Based on the list of the balance of plant general contractors who attended the site visit pre-bid meeting, it is assumed that 20 percent of the workforce will be local workers and 80 percent will be non-local workers coming to Converse County. At peak construction, this results in an estimated 150 workers who will require temporary housing. The total EPC hours of labor required for the construction is estimated at 190,000 hours.

3.3.4 Local Hiring Practice

PacifiCorp has submitted a request for proposal soliciting bids for a balance of plant general contractor to construct the Projects. Therefore, PacifiCorp will not directly hire trades people for the construction of the two Projects. Conversely, the balance of plant general contractor will hire merit workers locally and also bring in non-local merit workers they may have on their present payrolls. If Union trades people are used, they will be hired through the policies of the Union Hall, which has local jurisdiction, and by trade type.

3.4 List of Permits Required for Construction

The purpose of this section is to identify anticipated permits required for construction. It is expected that all permits required for construction will be obtained prior to the initiation of the major construction activities in the spring of 2008. Regulatory agencies and permits are listed in Table 3-3.

TABLE 3-3
List of Potential Permits for Construction and Operation of each Project

Agency	Permit/Decision	Status	Anticipated Permit Date
Federal			
Federal Aviation Administration	Notice of Proposed Construction or Alteration	Pending final design and File prior to construction	Early 2008
U.S. Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasure Plan (SPCC)	File prior to operation (will be submitted to EPA and Wyoming Department of Environmental Quality [WDEQ])	October 2008
State of Wyoming			
WDEQ	Wyoming Industrial Development Information and Siting Act / Industrial Siting Commission Order	Submit application November 2007	March 2008
	Land Quality Division	Submit Post Mining Land Use Change	Early 2008
	Wyoming Pollutant Discharge Elimination System (WYPDES)—Large Construction General Permit (WYR10-0000)	Submit application 30 days prior to construction	February 2008
	Temporary/Portable Source Air Permit	Pending final design	2008
	Permit to Construct Small Wastewater Facilities (Septic Tanks and Leachfields)	Pending final design	2008
	SPCC Plan	File prior to operation (will be submitted to EPA and WDEQ)	October 2008
Wyoming State Engineers Office	Permit to Appropriate	Pending final design	Early 2008
Wyoming Department of Transportation	Port of Entry	Prior to construction	Early 2008
	Permit for Oversized / Overweight Loads	Prior to construction	Early 2008

Source: PacifiCorp, 2007.

3.5 Construction Workforce Housing Plan

Based on a review of data presented in Section 4.0 and using conservative assumptions for vacancy and occupancy rates, it is expected that temporary housing options will be available for the Projects construction workforces via vacant temporary accommodations (hotel/motel), available housing units to rent, and the use of established recreational vehicle (RV) spaces in the study area.

PacifiCorp previously submitted a competitive solicitation for construction services and is currently in negotiations to award the balance of plant general construction contract for each Project. The workforce from the balance of plant general contractor will make up the majority of the workforce for each Project. In the Request for Proposal document, PacifiCorp contractually obligated the successful balance of plant general contract bidder to provide adequate housing for its non-local workforce. At this time, it is anticipated that the balance of plant general contractor will look to secure temporary lodging by booking motels or hotel rooms at or near the contract daily per diem rate and in relative proximity to the Project sites.

PacifiCorp anticipates completing its balance of plant general construction contract negotiations by February 2008. In the event the balance of plant general contractor award is

delayed or the selected contractor cannot provide adequate housing prior to site mobilization anticipated to occur in February 2008, PacifiCorp will initiate the following housing contingency plan options in the first quarter of 2008:

1. PacifiCorp will contract directly with local motels and hotels for temporary accommodations in the immediate vicinity (Glenrock, Douglas, and Rolling Hills). Temporary accommodations will be selected through consideration of the value, cleanliness, safety, and proximity to the construction site; or
2. PacifiCorp will contract with local RV lot space rental facilities for non-local workforce accommodations who have access to RVs. PacifiCorp has contacted RV lot operators and determined that space for up to 90 units can be obtained on a first-rights-of-refusal basis if deemed necessary. Additional RVs can be rented by PacifiCorp to locate on the lots; or
3. If it appears that the hotel and RV lot spaces are not a viable option for construction workforce housing, PacifiCorp will set up temporary living facilities at the abandoned Dave Johnston Mine Operations facilities. The Dave Johnston facilities can be refurbished within a 3-month time frame and can accommodate up to 200 personnel. The facilities have existing sanitary facilities, locker rooms, and large spaces that could be retrofitted into dormitory-style sleeping areas. PacifiCorp would provide bus or other transportation for all personnel from the Dave Johnston facilities, if used, to the construction site.
4. As a final housing contingency plan, PacifiCorp would contract with a provider to develop a work camp on the construction site. The work camp would be specified to house all workforce personnel (who have not otherwise acquired housing) as well as provide for waste removal, sanitation facilities, and parking areas for the workforce. Several work camp contractors are available, and it is estimated that arranging such a contract and implementation of the work camp would take less than 3 months.

3.6 Operation and Maintenance Activities

After construction, onsite personnel would operate and maintain each Project including the substations.

3.6.1 Wind Turbine Generators

Routine maintenance of the WTGs would 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. On average, each WTG would require 40 to 50 hours of scheduled mechanical and electrical maintenance per year. O&M personnel would perform routine maintenance, including replacing lubricating fluids periodically, checking parts for wear, and recording operating parameters. All roads, pads, and trenched areas would be inspected regularly and maintained to minimize erosion. The O&M staff would perform most repairs with the assistance of contracted personnel, as needed.

Each WTG will be monitored continuously by a SCADA system that communicates major aspects of operation through communication lines to the O&M staff and a 7-day-per-week, 24-hour-per-day facility. Alarm systems will be triggered if operational characteristics fall outside set limits. Each WTG has an automatic braking system to shutdown the WTG blades in the event of malfunctions or excessive wind speeds. Any problems will be reported promptly to onsite O&M personnel for correction.

3.6.2 Operation and Maintenance Buildings

Existing buildings (formerly used for mining operations but currently abandoned) may be refurbished as necessary for use as O&M facilities or newly constructed buildings will be used for both the Glenrock and the Rolling Hills Projects. The O&M building(s) will include up to two approximately 5,500-square-foot offices (including office space for several contractors), bathroom and kitchen facilities; a break room; a storage area; a garage for vehicle, turbine, and equipment maintenance; and the SCADA equipment. A fenced, graveled area for parking and storage will be provided. The O&M building(s) will each use existing groundwater wells to supply water for domestic use and discharge to the existing septic system. Power for the O&M building(s) will be provided by Rocky Mountain Power.

3.6.3 Transformers and Substations

Substations, large step-up transformers, and pad-mounted transformers would be maintained as part of normal operations and maintenance activities and would 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.

3.6.4 Underground Collection Line

Periodic maintenance of underground collection lines would be required during the life of each Project. Maintenance activities would be conducted pursuant to prudent utility practices. Maintenance disturbance associated with all buried collection lines would typically be limited to an approximate 25- to 50-ft-wide construction corridor associated with each proposed linear disturbance. All electrical terminations will occur aboveground in appropriate weather-tight electrical enclosures to facilitate ease of maintenance. Underground collection lines are relatively maintenance free, but maintenance would be conducted as needed.

3.6.5 Products Used for Operations

No substantial quantities of industrial materials will be brought onto or removed from the site during operations. After the Projects are constructed, commissioned, and deemed operational, no new raw materials will be required for Project operations. The only materials that will be brought onto the site will be those related to maintenance or replacement of elements (e.g., nacelle or turbine components and electrical equipment) for each Project. Potentially hazardous materials to be used during operation for maintenance of WTG and associated facilities may include mineral oils (turbine lubricant and transformer coolant), synthetic oils (turbine lubricant and gear oil), general lubricants, general cleaners, ethylene glycol (anti-freeze), vehicle fuel, and herbicides for weed control. These materials will be stored at the appropriate O&M building.

Hazardous materials will be used in a manner that is protective of human health and the environment and will comply with all applicable local, state, and federal environmental laws and regulations. Accidental releases of hazardous materials (e.g., vehicle fuel during construction or lubricating oil for turbines) will be prevented or minimized through proper containment of these substances during use and transportation to the site and used primarily within the turbines 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 materials release, any spill or release will be cleaned up, and the contaminated soil or other materials 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 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.

Minimal energy will be required to operate each Project. Electricity will be required for the O &M building(s), facility lighting, and the station service needs for each Project.

3.7 Operations Workforce Employment

A long-term benefit of the Projects comes from permanent employees who will operate and maintain the wind farm. Upon completion, the operation of both Projects will require approximately 15 full-time employees. Workforce estimates presented include personnel required for Glenrock and Rolling Hills combined. These employees will add beneficial income to the local economy. In addition, the taxes paid by PacifiCorp and these employees contribute to the economic health of the region. It is anticipated that the Projects will have initial operation workforces in late 2008. The four full-time job classifications and estimated number of personnel are displayed in Table 3-4. Employees will be full-time over the calendar year and anticipated life of the Projects. It is assumed that 50 percent of these employees will be people who currently reside within the Projects study area.

TABLE 3-4
Estimated Operations Workforce Summary by Job Classification

Job Classification	Number of Personnel
WTG Maintenance Operators	12
SCADA Instrument Technician	1
Administration	1
Plant Engineer/Manager	1

Source: PacifiCorp, 2007

3.8 Anticipated Operation Life

The economic life of each Project is anticipated to be 25 years, but may be extended depending on market conditions and overall condition of infrastructure.

4.0 Socioeconomic Baseline Data and Analysis of Impacts

The socioeconomic impact baseline data and analysis methodology employed in the application consists of a number of major components including definition of the study area and area of primary impact; description of existing (i.e., baseline) conditions; estimate of direct and secondary economic (i.e., employment and earnings) impacts; impacts of new residents on levels of service of pertinent resources; and development of mitigation measures designed to alleviate potentially adverse impacts.

Following definition of the study area and area of primary impact, which is accomplished primarily through assessment of daily commuting patterns between counties, a description of existing conditions (referred to as "baseline" conditions) and future conditions for a range of resources is presented. The resources selected are population, economic activity, housing, educational facilities, public safety, health care resources, municipal services, and transportation facilities. Where appropriate, level of service (LOS) ratios are calculated for resources, and comparisons made with statewide, national, and standard ratios to provide a perspective for succeeding impact assessment. LOS ratios express the quantity of a service (e.g., expressed as the number of firefighters or law enforcement officers in an 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.

The potential impacts are primarily driven by the numbers of construction and operation workforces entering the region and the additional service workers and families required to support the construction and operation workforces for both Projects. Potential socioeconomic impacts are presented based on workforce estimates required for both the Glenrock and Rolling Hills Projects. LOS ratios are used to estimate the number of additional service personnel required to meet the demands of these new residents while maintaining existing levels of service. If it appears that the resources are unlikely to be able to accommodate the new demands of the Projects, then mitigation measures are proposed.

There are three major benefits attributable to the Projects: tax revenues, direct employment, and indirect employment. Construction of the Projects will provide employment opportunities for local and non-local workers. It is likely that some construction workers (and possibly family members) would relocate to the study area for the duration of the construction phase. Personal consumption expenditures by direct workers would generate sales tax revenues for the counties and municipalities at the points of sale. The purchase of goods and services necessary for construction and operation of the Projects could create indirect jobs, and purchases by direct workers could induce additional employment.

To the degree that workers (with or without their family members) relocate to the area as a direct result of construction and operation of the Projects, additional demands would be placed on resources in the area of impact. For example, accommodations (permanent or temporary) would be required to house the relocating workers, and the new residents could

increase the demand for community resources and services such as public education and police and fire protection. Should the additional demand exceed the capacity of the existing service providers, it could be necessary to implement mitigation measures to alleviate the capacity issues.

This section defines the four-county study area and describes the existing and future conditions in the study area for selected resources. These resources are population, economic activity, housing, educational facilities, public safety, health care resources, municipal services, and transportation facilities.

4.1 Study Area and Area of Impact

4.1.1 Study Area

The socioeconomic impact analysis methodology involves a description of the general baseline (i.e., existing) conditions in the study area surrounding the site. The study area is defined as Campbell, Converse, Natrona, and Platte Counties (Figure 4-1). These counties were identified early in the analysis and in consultation with the Industrial Siting Division (ISD) as potential relocation sites for workers commuting to the site of construction. This decision was based on information regarding the most likely counties from which workers commute to work in Converse County (U.S. Census, 2000), as illustrated in Table 4-1.

TABLE 4-1
Place of Residence of Persons Working in Converse County

Converse, WY		Natrona, WY		Platte, WY		Campbell, WY		Laramie, WY		Fremont, WY		Other WY Counties and Other States	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
4,477	86.2	375	7.2	106	2.0	50	1.0	32	0.6	21	0.4	134	2.6

Source: U.S. Census, 2000, Journey to Work, Prepared by Wyoming Economic Analysis Division.

Approximately 86 percent of people working in Converse County reside in Converse County. Commuting from other counties into Converse County to work is minimal but some commuting from Natrona County to the City of Casper, which is approximately 30 miles from the Glenrock and Rolling Hills Project locations, exists. The proximity of each Project to Casper and convenient access via I-25 makes the majority of socioeconomic impacts likely to occur in both Converse and Natrona Counties.

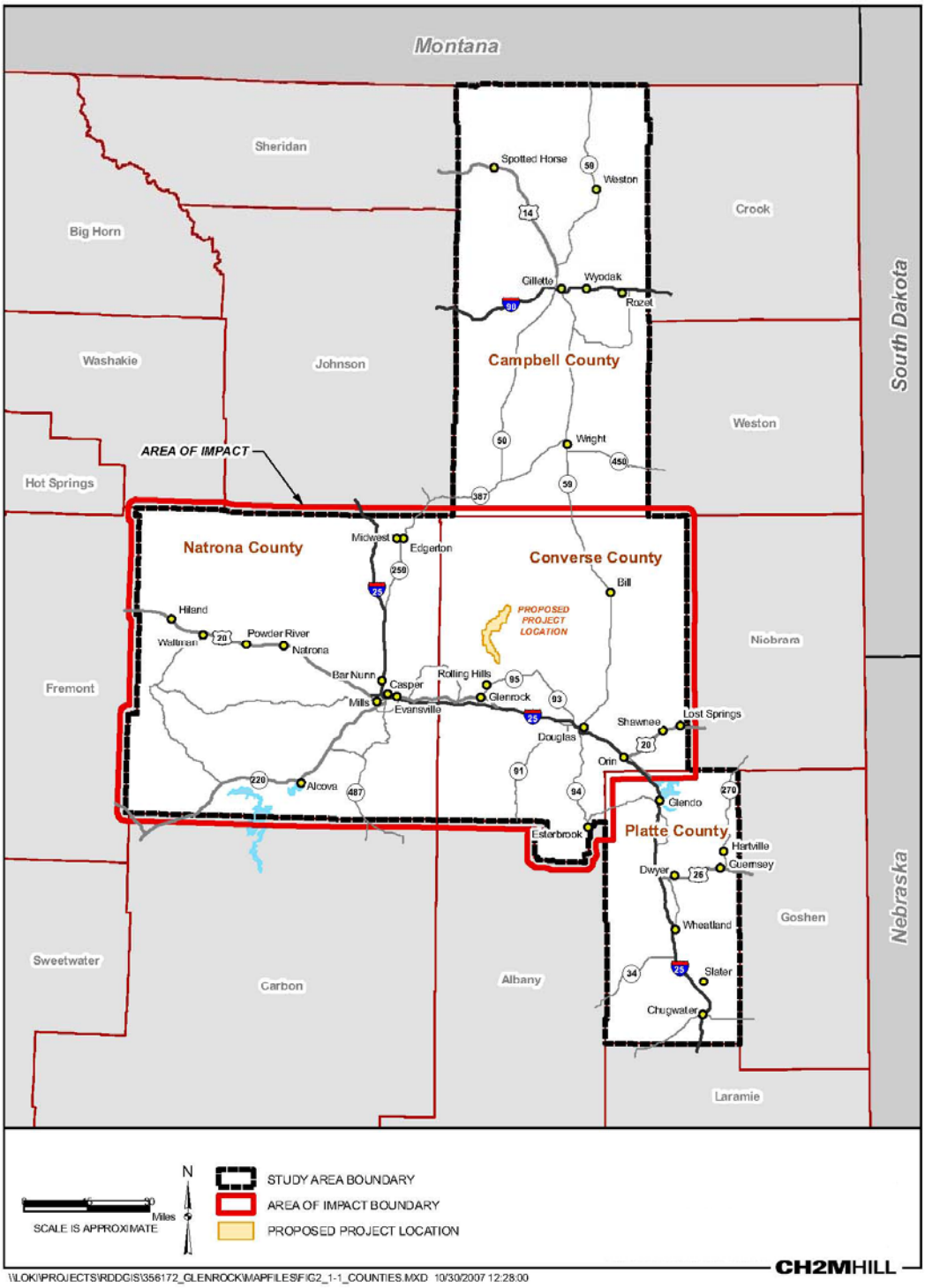

FIGURE 4-1
Counties Comprising the Study Area and Estimated Area of Impact

4.1.2 Area of Impact

Based on a review of the four-county study area, the approximate area of primary impact is defined as a more geographically restrictive area comprising Converse and Natrona Counties, and especially the communities of Glenrock and Douglas in Converse County and Casper in Natrona County (Figure 4-1). It is within these counties and cities that the majority of construction and operations workers are expected to reside and within which PacifiCorp will concentrate efforts to house non-local workers economically. PacifiCorp desires to maximize the benefits of the Projects to the local communities, while minimizing adverse impacts as much as possible.

Almost 90 percent of employed persons in both Converse and Natrona Counties also reside there. Of those persons working in Converse County but who reside elsewhere, most reside in neighboring Natrona County immediately to the west. The converse is true for persons working in Natrona County. The proximity of the Projects to Casper (Natrona County), combined with the county's relative size and convenient access via I-25, make the socioeconomic impacts likely to occur in both counties.

A conservative approach, more likely to estimate greater impacts on the nearby town of Glenrock and on Converse County, will nevertheless be used in this socioeconomic analysis, assuming a relatively large percentage of temporary workers and any accompanying family member would reside in Converse County. While this approach would place a greater burden on PacifiCorp to consider and assist with housing needs potentially, it will conservatively overstate local impacts within Converse County.

While the intent of PacifiCorp is to ensure that adequate housing is available within Casper, Douglas, and Glenrock for the workforce at the Projects, it is recognized that some members of the workforce may choose to reside outside these cities temporarily.

4.2 Baseline Socioeconomic Conditions

This section presents a summary of findings of the baseline socioeconomic conditions within the area of each Project. The purpose of this section is to provide detail on the existing conditions within the study area.

4.2.1 Population

Past, present, and future characteristics of the population in the study area are described in this subsection. These characteristics include historical trends for the study area, counties, and incorporated places; age composition of the county populations; and migration patterns.

4.2.1.1.1 Past and Present Population

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).

Past Population Trends. From 1920 through 2006, the population of the study area increased by more than 95,600. The most dramatic population increases were experienced by

Campbell and Natrona Counties where population increased more than seven-fold in the former and over four-fold in the latter. The population of Natrona County has experienced consistent and substantial growth over the entire period, although there have been decades where the county experienced population decline (1930s and 1980s). Much of the population increase of Campbell County took place after 1960. The population more than doubled in the 1960s and increased by over 80 percent in the 1970s. This was followed by consistent but more moderate growth from 1980 through 2006. Converse County population more than doubled in the 1970s, but this was followed by a population decline in the 1980s and moderate growth between 1990 and 2006. The population of Platte County has experienced a decline in six of the decades between 1920 and 2006. The current population is only 16 percent higher than it was in 1920. Table 4-2 displays population levels for each of the counties, the study area, and the state of Wyoming for the period from 1920 to 2006.

TABLE 4-2
Population Trends in the Study Area (1920 to 2006)

Geographical Area	1920	1930	1940	1950	1960	1970	1980	1990	2000	2006
Campbell County	5,233	6,720	6,048	4,839	5,861	12,957	24,367	29,370	33,698	38,934
Converse County	7,871	7,145	6,631	5,933	6,366	5,938	14,069	11,128	12,052	12,866
Natrona County	14,635	24,272	23,858	31,437	49,623	51,264	71,856	61,226	66,533	70,401
Platte County	7,421	9,695	8,013	7,925	7,195	6,486	11,975	8,145	8,807	8,588
Study Area	35,160	47,832	44,550	50,134	69,045	76,645	122,267	109,869	121,090	130,789
State of Wyoming	194,402	225,565	250,742	290,529	330,066	332,416	469,557	453,588	493,782	515,004

Sources: State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2007 http://eadiv.state.wy.us/demog_data/cntycity_hist.htm; State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2007 http://eadiv.state.wy.us/pop/SUB-06EST.htm

At the beginning of the period from 1920 through 2006, the population of the study area comprised just over 18 percent of that of the state of Wyoming. This percentage reached its lowest level in 1950, and since then has shown a steady increase to its current level of 25 percent. Table 4-3 displays the share of the state of Wyoming population contributed by each of the counties comprising the study area. The smaller counties of Converse and Platte have shown a steadily decreasing share, which was mirrored by Campbell County until 1960. Between 1960 and 2006, however, Campbell County's share of statewide population has steadily increased to almost 8 percent. This rapid and consistent growth in the population of Campbell County is evident in Figure 4-2. The percentage contributed by Natrona County, with by far the largest population of the counties, increased from 7.5 percent to almost 14 percent. Overall, the population of the study area has seen steady growth since 1920 except for during the 1930s and 1980s when it experienced a decline.

TABLE 4-3
Percent Contribution to State of Wyoming Population by Counties Comprising the Study Area (1920 to 2006)

Geographical Area	1920	1930	1940	1950	1960	1970	1980	1990	2000	2006
Campbell County	3%	3%	2%	2%	2%	4%	5%	6%	7%	8%
Converse County	4%	3%	3%	2%	2%	2%	3%	2%	2%	2%
Natrona County	8%	11%	10%	11%	15%	15%	15%	13%	13%	14%
Platte County	4%	4%	3%	3%	2%	2%	3%	2%	2%	2%
Study Area	18%	21%	18%	17%	21%	23%	26%	24%	25%	25%

Sources: State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2007 http://eadiv.state.wy.us/demog_data/cntycity_hist.htm; State of Wyoming, Department of Administration and Information, Economic Analysis Division, 2007 http://eadiv.state.wy.us/pop/SUB-06EST.htm

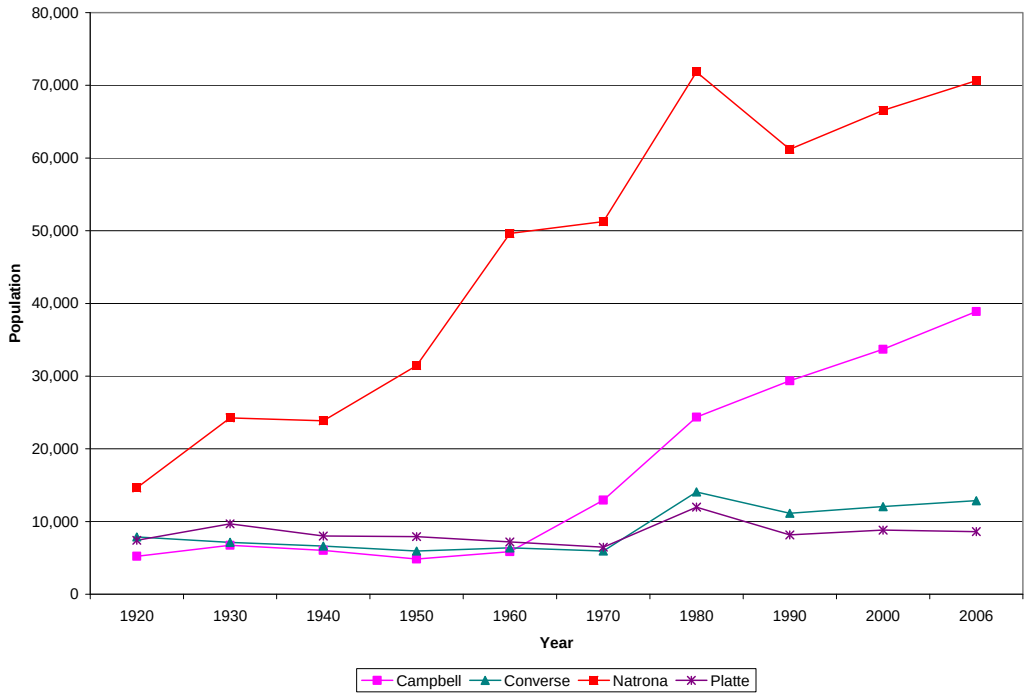

FIGURE 4-2
Population Trends: Counties and Study Area (1920-2006)

4.2.1.1.2 Present Population

This section addresses the density and location, age distribution, and migration trends of the population in the study area.

Density and Location of Population. The majority of the population of each county resides in incorporated communities. The City of Gillette contained 61 percent of the total 2006 population of Campbell County; the cities of Douglas and Glenrock together contained 62 percent of the total population of Converse County (44 percent contributed by Douglas). The City of Casper was home to 74 percent of Natrona County residents, and the larger

Casper urban area (Casper, Evansville, Mills, and Bar Nunn) contained 84 percent of the county population. Wheatland contained 40 percent of the residents of more rural Platte County. The spatial distribution of population as of the year 2000 is illustrated in Figure 4-3.

Age of the Population. The age breakdown or distribution of the population of the individual counties and study area do not differ substantially from that of the state of Wyoming, as shown in Figure 4-4. Almost 35 percent of the population is between 40 and 64 years of age whereas ages 0 to 9 and 10 to 19 comprise about 15 percent each of the total population. Residents over 80 comprise less than 5 percent of the population. The population of Platte County has a majority of persons aged 40 and over compared to other counties in the study area and the state. Campbell County, on the contrary, has a preponderance of persons aged 39 or younger.

Population Migration. Population change is attributable to births, deaths, and net migration. An indication of the relative role played by migration can be gained from an inspection of information developed by the Wyoming Department of Transportation (WYDOT). Drivers taking up residency in the state from elsewhere are required to obtain a state-issued driver's license and surrender one when leaving the state. During the period 2001 through 2006, the study area experienced net in-migration in each year as shown in Figure 4-5 with an average annual net in-migration of about 920 persons. Over the period, the highest number occurred in 2006 with 2,456 out-migrants and 3,961 in-migrants resulting in a net in-migration of 1,505 persons. Each of the counties experienced net in-migration in each of the years 2001 through 2006 with Campbell and Natrona Counties contributing the greatest shares. In-migration to Campbell County was consistently strong, especially considering the small population base compared to Natrona County.

4.2.1.1.3 Future Population

Population projections prepared by the state of Wyoming Economic Analysis Division forecast the population of the study area to increase by about 16,830 residents between 2010 and 2020 (a 12.06 percent increase) at an average annual rate of 1.14 percent as indicated in Table 4-4. The population of Converse County is forecast to grow at a modest average annual rate of less than 1 percent, as is that of Natrona County. The population of Campbell County is forecast to grow at an average annual rate of just over 2.0 percent during the 10-year period. The population of Platte County is projected to decline with most of the loss occurring in Wheatland.

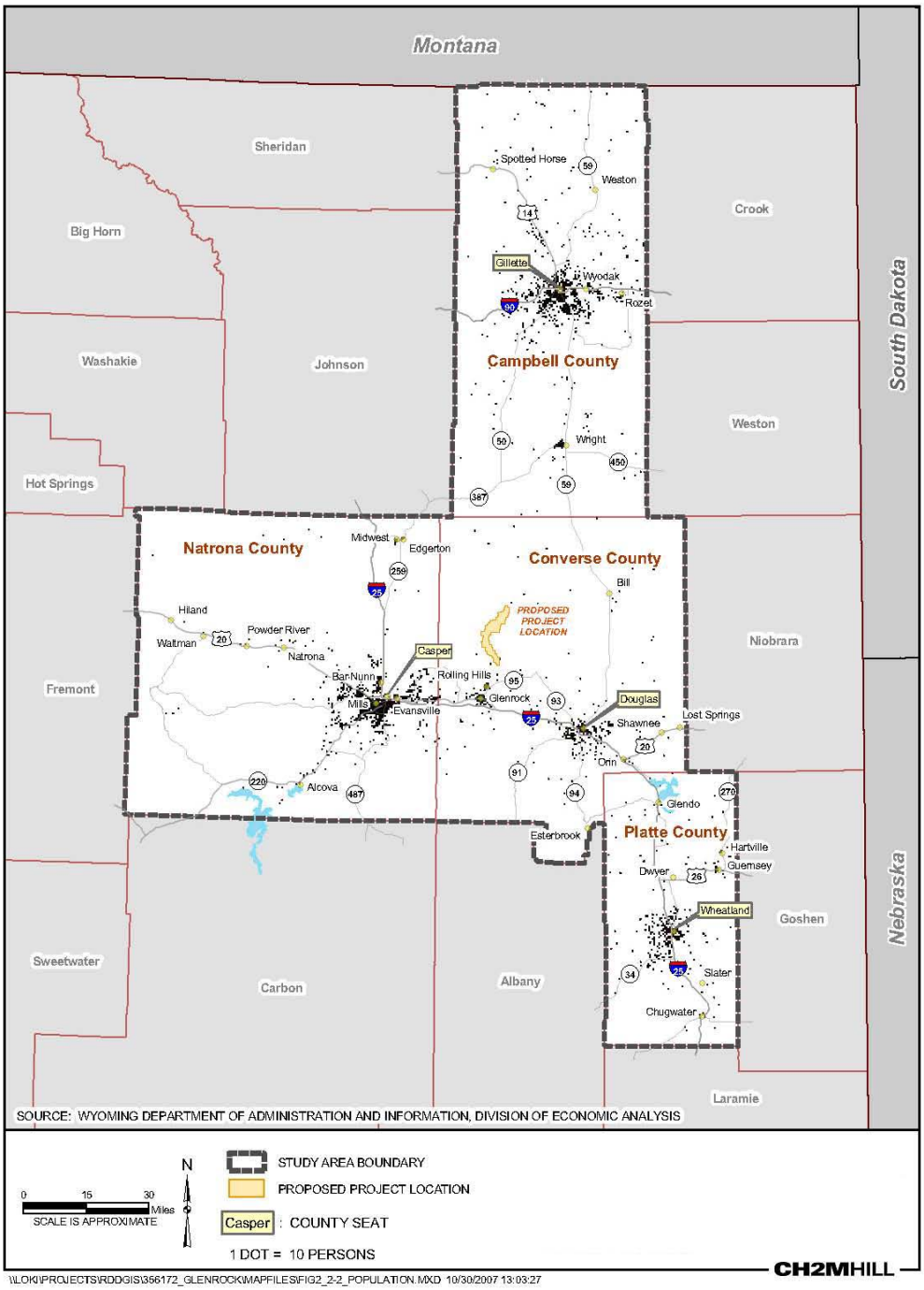

FIGURE 4-3
Population Distribution in the Study Area (2000 Census)

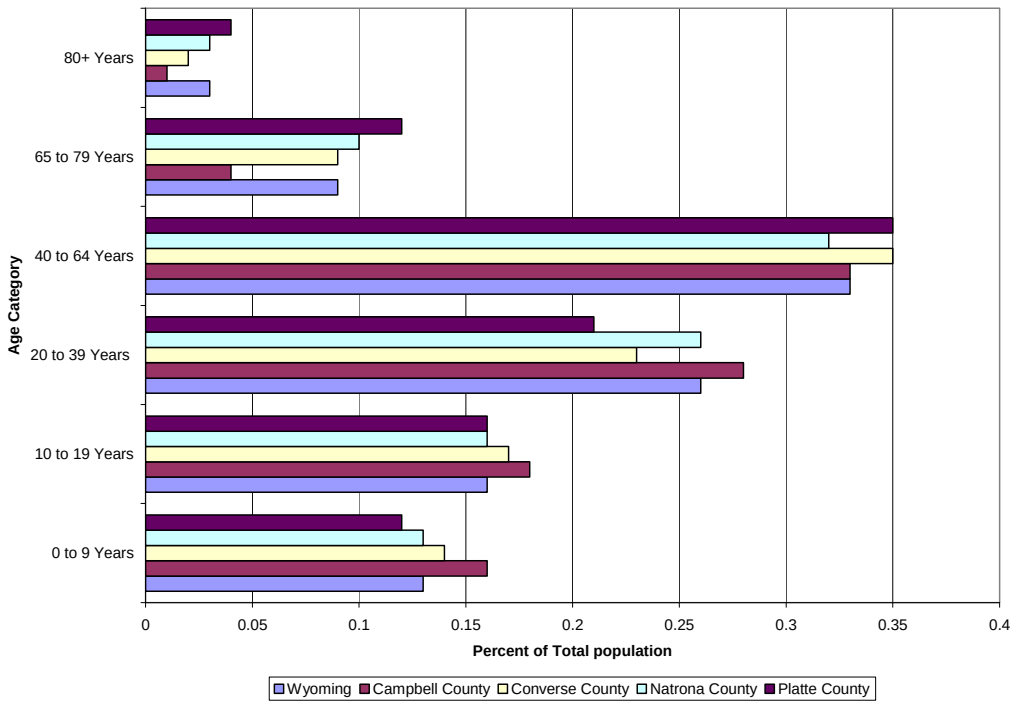

FIGURE 4-4
Population Age Distribution in the Study Area (2000 Census)

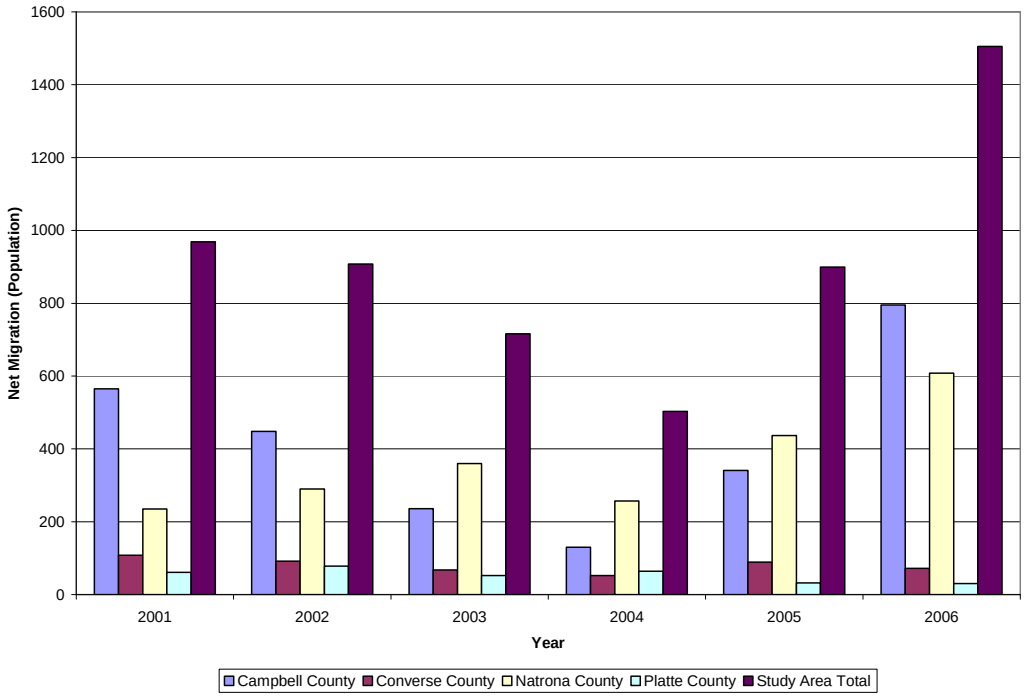

FIGURE 4-5
Net Migration for Counties and Study Area (2001 through 2006)

TABLE 4-4
Population Forecasts for State, Counties, and Places

	2010 Forecast	2015 Forecast	2020 Forecast	2010-2020 Change		
Geographical Area	**2010**	**2015**	**2020**	**Numeric**	**%**	**Av. Ann. %**
Wyoming	**540,040**	**559,210**	**579,090**	**39,050**	**7.23%**	**0.70%**
Campbell County	**43,090**	**47,650**	**52,630**	**9,540**	**22.14%**	**2.02%**
City of Gillette	26,062	28,820	31,832	5,770	22.14%	2.02%
Town of Wright	1,674	1,847	2,041	367	21.92%	2.00%
Balance of Campbell County	15,354	16,983	18,757	3,403	22.16%	2.02%
Converse County	13,400	13,820	14,240	840	6.27%	0.61%
City of Douglas	5,871	6,055	6,239	368	6.27%	0.61%
Town of Glenrock	2,475	2,552	2,630	155	6.26%	0.61%
Town of Lost Springs	1	1	1	0	0.00%	0.00%
Town of Rolling Hills	495	511	526	31	6.26%	0.61%
Balance of Converse County	4,558	4,701	4,844	286	6.27%	0.61%
Natrona County	***74,560***	***77,920***	***81,320***	***6,760***	***9.07%***	***0.87%***
Town of Bar Nunn	1,190	1,244	1,298	108	9.08%	0.87%
City of Casper	55,409	57,906	60,433	5,024	9.07%	0.87%
Town of Edgerton	186	195	203	17	9.14%	0.88%
Town of Evansville	2,503	2,616	2,730	227	9.07%	0.87%
Town of Midwest	458	479	500	42	9.17%	0.88%
Town of Mills	3,098	3,237	3,379	281	9.07%	0.87%
Balance of Natrona County	11,715	12,243	12,777	1,062	9.07%	0.87%
Platte County	***8530***	***8380***	***8220***	***-310***	***-3.63%***	***-0.37%***
Chugwater	231	227	223	-8	-3.46%	-0.35%
Glendo	225	221	271	46	20.44%	1.88%
Guernsey	1,107	1,087	1,066	-41	-3.70%	-0.38%
Hartville	74	72	71	-3	-4.05%	-0.41%
Wheatland	3,437	3,377	3,312	-125	-3.64%	-0.37%
Balance of Platte County	3,456	3,396	3,548	92	2.66%	0.26%
Study Area Total	**139,580**	**147,770**	**156,410**	**16,830**	**12.06%**	**1.14%**

Source: U.S. Census Bureau and State of Wyoming, http//eadiv.state.wy.us/pop/wyc&sc20.htm. Accessed June 2007

4.2.2 Economic Conditions

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).

4.2.2.1.1 Past and Present Economic Conditions

During the period 1990 through 2006, total employment in the study area increased by over 35 percent or 19,500 jobs. Over the same period, the labor force increased by almost 32 percent, while the number of unemployed persons fell by almost 34 percent. The unemployment rate declined from a high of almost 6.7 percent in 1992 to a low of 2.8 percent in 2006. Employment in Campbell County experienced the highest increase of the four counties (57 percent) over the period. Natrona and Converse County experienced moderate growth in the number employed with a 31 percent and 24 percent increase, respectively. Lastly, Platte County experienced flat to moderate growth with an increase of only 4 percent. The trend in labor force, employment, and unemployment levels in the study area during the period 1990 through 2006 can be seen in Table 4-5 and Figure 4-6. The trend in employment for each of the counties of the study area is shown in Figure 4-7.

TABLE 4-5
Study Area Labor Force, Employment and Unemployment (1990 through 2006)

Year	Labor Force	Number Employed	Number Unemployed	Unemployment Rate
1990	57,894	54,638	3,256	5.62%
1991	57,679	54,474	3,205	5.56%
1992	57,668	53,832	3,836	6.65%
1993	59,046	55,157	3,889	6.59%
1994	60,215	56,839	3,376	5.61%
1995	61,200	57,928	3,272	5.35%
1996	61,701	58,138	3,563	5.77%
1997	62,905	59,540	3,365	5.35%
1998	64,031	60,621	3,410	5.33%
1999	65,322	61,883	3,439	5.26%
2000	67,381	64,912	2,469	3.66%
2001	69,321	66,905	2,416	3.49%
2002	69,945	67,250	2,695	3.85%
2003	70,297	67,264	3,033	4.31%
2004	71,364	68,752	2,612	3.66%
2005	73,359	70,892	2,467	3.36%
2006	76,370	74,217	2,153	2.82%
Change (1990-2006)				
Numeric	18,476	19,579	-1,103	Not Applicable
Percent	31.91%	35.83%	-33.88%	Not Applicable
Ave. Ann. %	1.75%	1.93%	-2.55%	Not Applicable

Source: http://doe.state.wy.us/lmi/LAUS/TOC.HTM

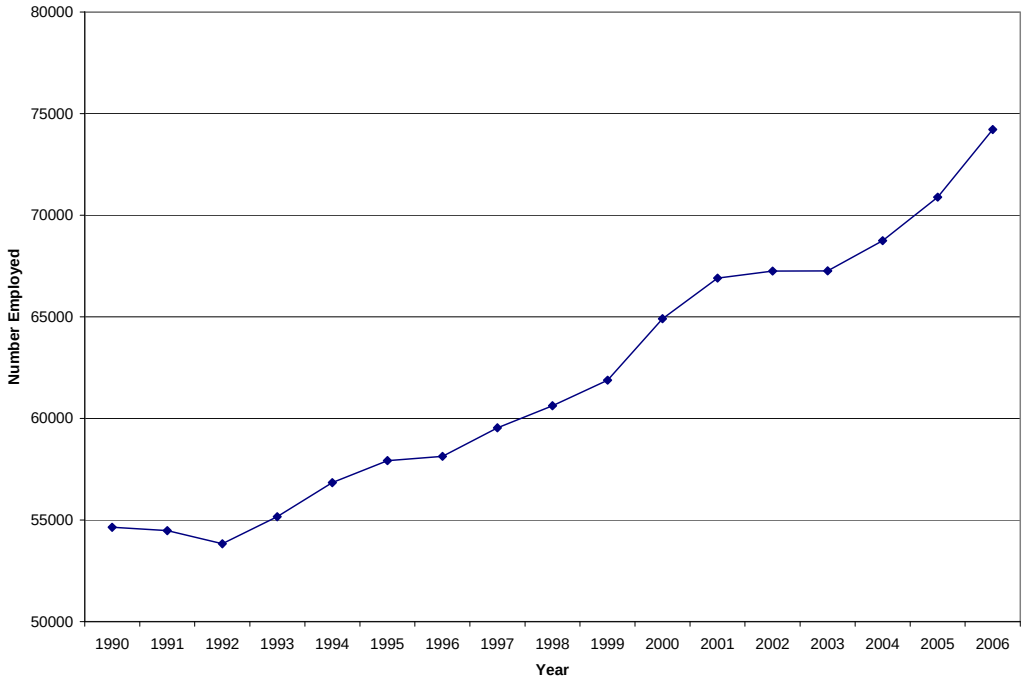

FIGURE 4-6
Employment in the Study Area by County (1990 through 2006)

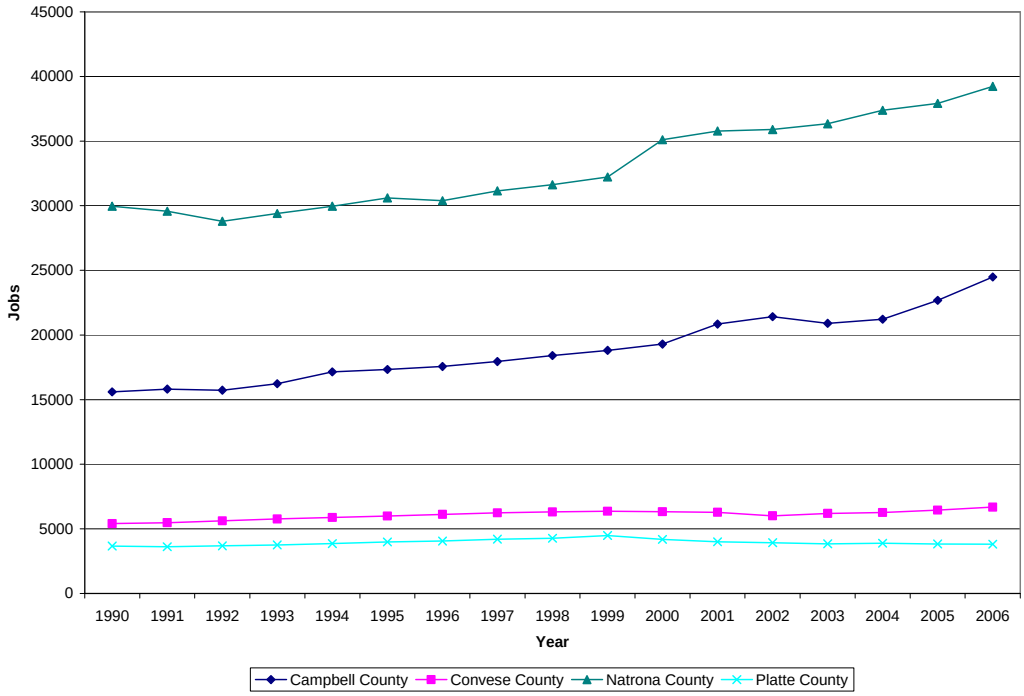

FIGURE 4-7
Employment in the Study Area Counties (1990 through 2006)

The unemployment rate in the study area has generally trended downwards over the period 1990 to 2006 with periodic increases when employment growth faltered (e.g., 1992-1993, 1995-1196, and 2001-2003). Unemployment rates for each of the counties of the study area illustrate similar trends over the period 1990 through 2006 as can be seen from Figure 4-8. All counties experienced a marked drop in the unemployment rate between 1999 and 2001, followed by a rise through 2003, and finally a decline to their lowest levels in 2006.

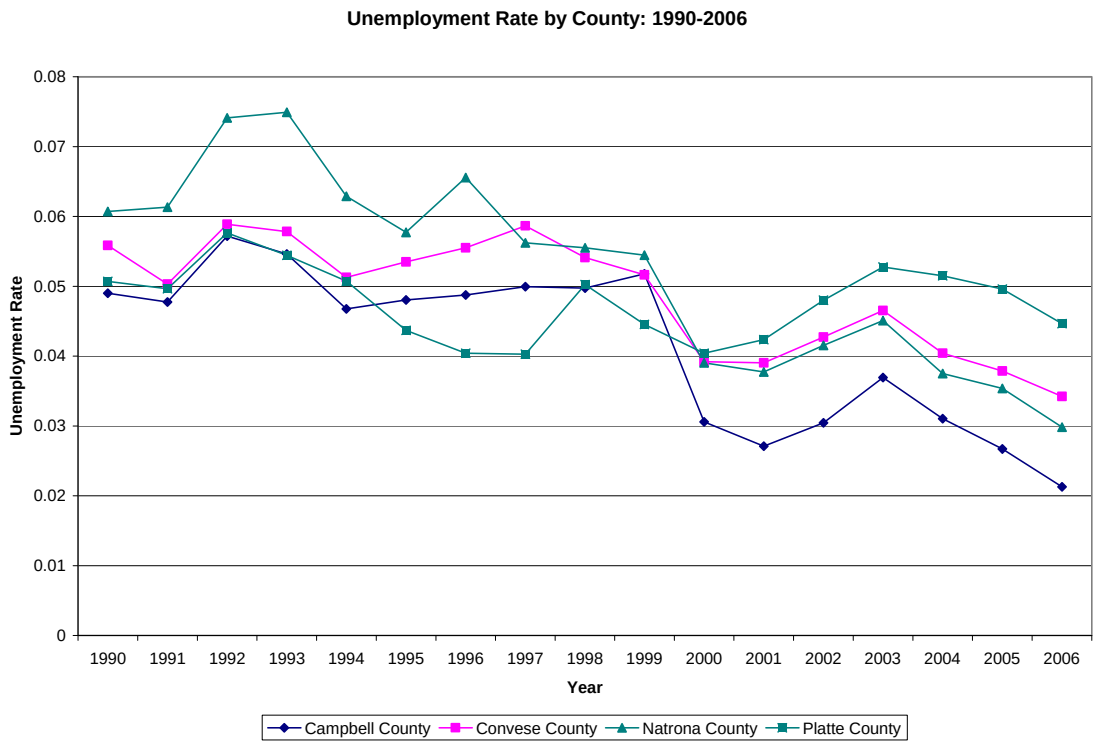

FIGURE 4-8
Unemployment Rate for Counties in the Study Area (1990 through 2006)

4.2.2.1.2 Existing Economic Conditions

Employment by Industrial Sector. Over the period 1970 through 2000, total employment in the study area increased by over 43,600 jobs as shown in Table 4-6. The sector of the economy experiencing the greatest change was the services and professional sector where the number of full- and part-time jobs increased by 29,600 jobs. The contribution made by this sector to total employment increased from 50 percent in 1970 to almost 68 percent in 2000. Much of this increase was accounted for by gains in health, legal, business services (14,066 jobs), and retail trade (8,015 jobs). The government and mining sectors also posted increases while farm employment declined.

TABLE 4-6
Study Area: Employment by Industrial Sector (1970 and 2000)

	1970		2000		Change in Employment (1970-2000)	
	Number	% of Total	Number	% of Total	Number	Percent
Total Employment	37,669		81,283		43,614	
Wage and Salary Employment	30,768	81.68%	64,392	79.22%	33,624	77.09%
Proprietors' Employment	6,901	18.32%	16,891	20.78%	9,990	22.91%
Farm and Agricultural Services	2,736	7.26%	3,306	4.07%	570	1.31%
Farm	2,447	6.50%	2,202	2.71%	-245	-0.56%
Ag. Services	289	0.77%	1104	1.36%	815	1.87%
Mining	5,545	14.72%	9,554	11.75%	4,009	9.19%
Manufacturing (incl. forest products)	1,725	4.58%	2,699	3.32%	974	2.23%
Services and Professional	18,940	50.28%	48,540	59.72%	29,600	67.87%
Transportation & Public Utilities	2,864	7.60%	4,738	5.83%	1,874	4.30%
Wholesale Trade	1,768	4.69%	3,961	4.87%	2,193	5.03%
Retail Trade	5,914	15.70%	13,929	17.14%	8,015	18.38%
Finance, Insurance & Real Estate	2,071	5.50%	5,523	6.79%	3,452	7.91%
Services (Health, Legal, Business, Others)	6,323	16.79%	20,389	25.08%	14,066	32.25%
Construction	2,476	6.57%	5,914	7.28%	3,438	7.88%
Government	6,247	16.58%	11,270	13.87%	5,023	11.52%

Source: Population, Employment, Earnings and Personal Income Trends By County. Prepared by the Sonoran Institute. http://eadiv.state.wy.us/wef/eps.html

The greatest increases in employment for Campbell, Converse, Natrona, and Platte Counties also occurred in services and professional sector of the economy with increases of 8,364, 2,529, 16,607, and 2,100 jobs, respectively over the period. Campbell County's second highest increase in employment was contributed by the mining sector. The numeric changes in employment by sector for each of the counties comprising the study area are illustrated in Figure 4-9.

Income and Earnings. Total aggregate personal income increased in each of the counties over the period 1980 through 2005 (unadjusted for inflation), from $357.5 million to $1.396 billion in Campbell County, $167.6 million to $435.5 million in Converse County, $1.038 billion to $2.888 billion in Natrona County, and $106.0 million to $261.8 million in Platte County. In 1980, the study area contributed 30.0 percent of total statewide aggregate personal income. This share declined to 26.3 percent by 2005. As can be seen in Figure 4-10, contributions to statewide total aggregate personal income increased slightly (6.4 percent to 7.4 percent) for Campbell County and declined for the other three counties. Converse County saw its contribution fall from 3.0 percent to 2.3 percent, Natrona declined from 18.7 percent to 15.2 percent, and that of Platte County declined from 1.9 percent to 1.4 percent.

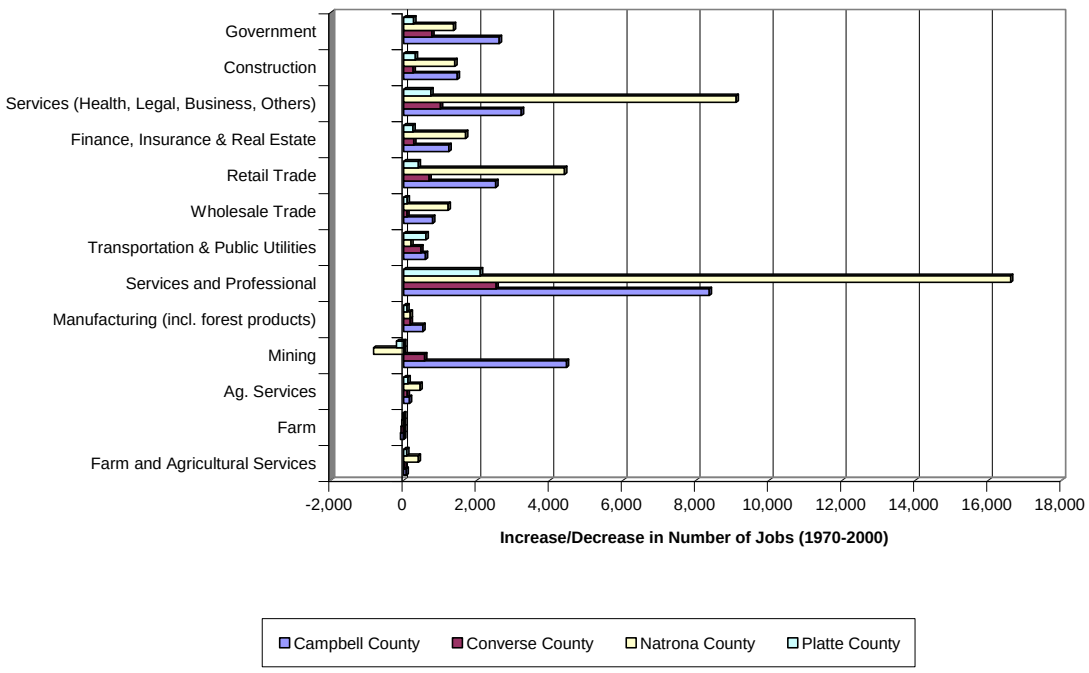

FIGURE 4-9
Change in Employment by Sector and County (1970 through 2000)

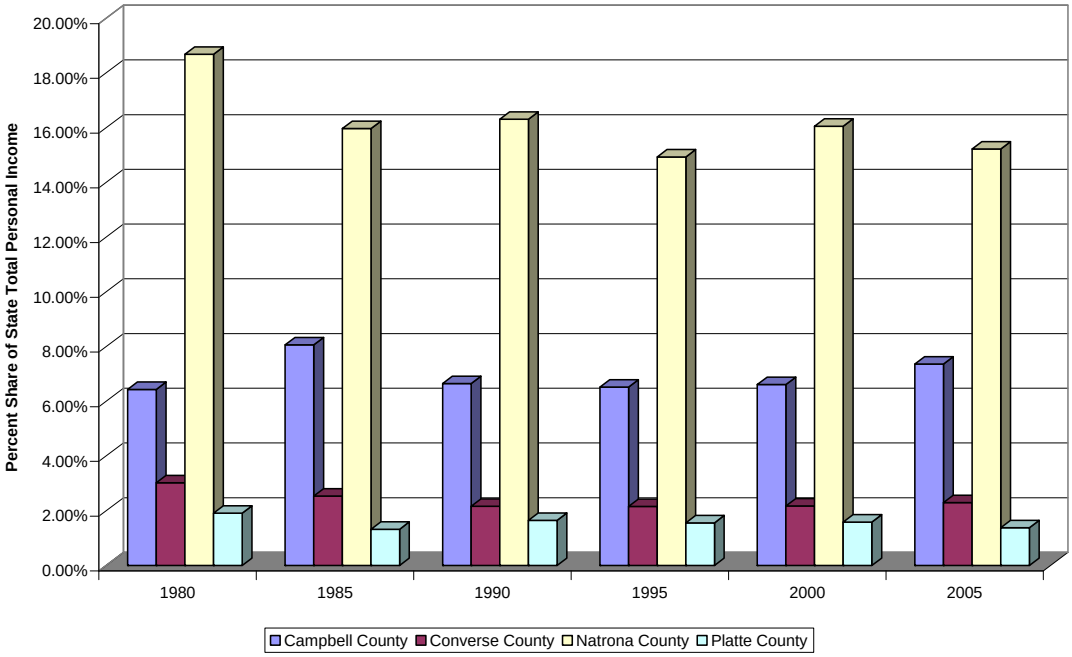

FIGURE 4-10
Personal Income, Contribution to State Total by County (1980 through 2005)

The great share (usually about 70 percent or more) of personal income is derived from wages and salaries. The largest share of total non-farm earnings in the state of Wyoming (which totaled almost $19 billion) was contributed by the services sector (21.5 percent including 7.0 percent by health care and social assistance), mining sector (17.3 percent), and state and local government sector (16.3 percent). Other notable sector contributions were those of construction (8.6 percent) and retail trade (6.4 percent). Differences in these sector contributions exist between the counties and the state. Figure 4-11 illustrates the major differences in shares of total earnings contributed by sectors of the economy for the state of Wyoming and the four counties comprising the study area. The information portrayed in Figure 4-11 only represents that for which there is consistent coverage for all areas and does not include the following sectors: forestry, utilities, wholesale trade, and transportation and warehousing. Additionally, the contribution made by the mining sector to Platte County represents the share as of 1997, which is the most recent information.

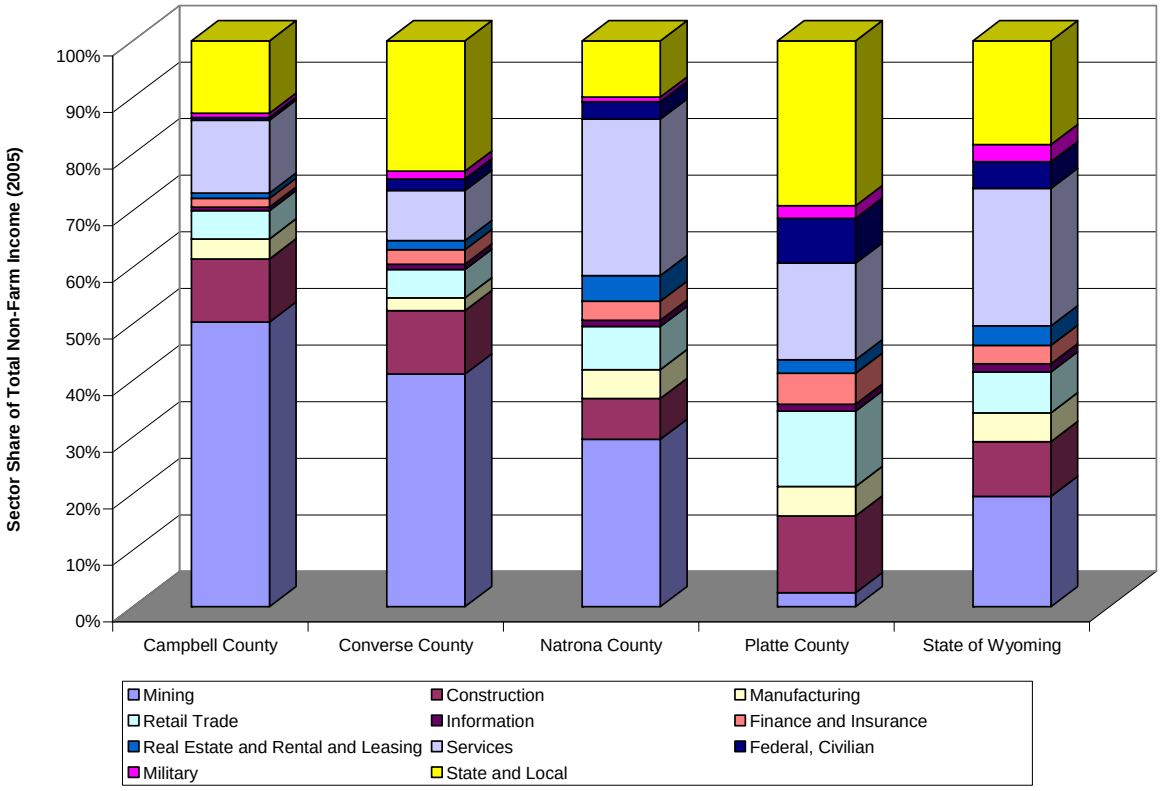

FIGURE 4-11
Non-Farm Earnings, Contribution by Industrial Sector for County and State (2005)

When compared to the state as a whole, Converse County exhibits a concentration of non-farm wage and salary income in the mining and state and local government sectors of the economy. Mining contributed over 40 percent of non-farm earnings (compared with almost 20 percent for the state) and the state and local government sector contributed 23 percent (compared to 18 percent for the state). Earnings associated with employment in the services sector in Converse County contributed significantly less (9 percent) than at the state level

(24 percent). With total non-farm earnings of almost $280 million in 2005, Converse County contributed almost 7 percent of the study area total.

In the case of Campbell County, the greatest difference between the county and state was that just over 50 percent of non-farm earnings were derived from employment in mining. Additionally, the contribution made by the service sector (almost 13 percent) was about half the level for the state. With total non-farm earnings of $1.42 billion in 2005, Campbell County contributed 35 percent of the study area total.

For Natrona County in 2005, contributions by the mining sector (30 percent) exceeded the corresponding value for the state by 10 percentage points while the contribution by the state and local government sector was half that for the state. With total non-farm earnings of $2.25 billion in 2005, Natrona County contributed 55 percent of the study area total.

Of the four counties comprising the study area, Platte County exhibits only a small (2.5 percent) contribution to non-farm earnings by the mining sector. However, the shares contributed by the construction sector (13.6 percent), retail trade (13.3 percent), and state and local government (29 percent) exceeds the corresponding shares at the state level by a wide margin. With total non-farm earnings of $158 million in 2005, Platte County contributed almost 4 percent of the study area total.

Because there are large variations in annual earning per job across the different sectors of the economy, the correspondence between a sector's employment share of total non-farm employment and its share of earnings can be quite different. In the case of the state of Wyoming, the mining sector of the economy contributes 7.3 percent of non-farm employment but 17.5 percent of earnings. The retail trade sector contributes 11.5 percent of employment but only 6.5 percent of earnings, and the accommodations and food services sector contributes 9.2 percent of employment but only 3.9 percent of earnings. The information presented in Figure 4-12 reflects the corresponding shares of both employment and earnings for the state of Wyoming. Such inequalities can be explained by the values of earning per job: over $92,000 annually in mining, $21,700 for the retail sector, and $16,300 for the accommodations and food services sector. Such wage differences are also reflected at the county levels.

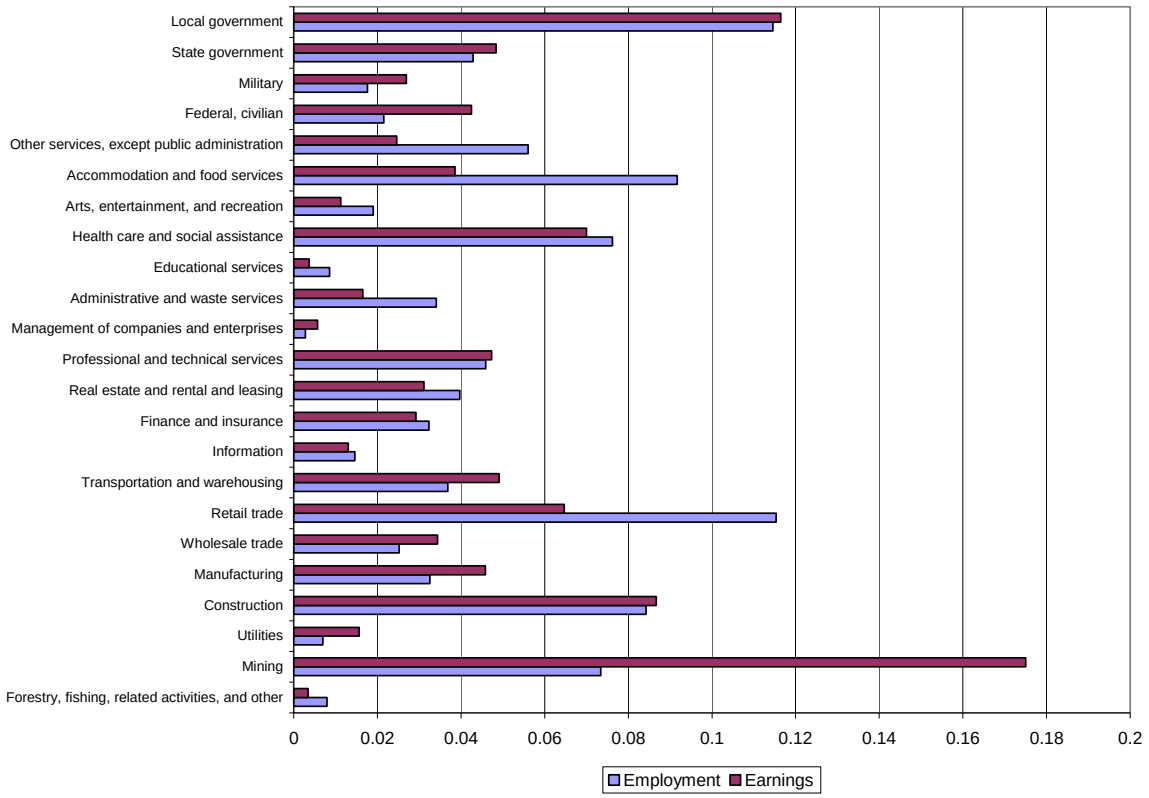

FIGURE 4-12
Employment and Earnings Shares by Industrial Sector, State of Wyoming (2005)

Work Centers and Bedroom Communities. Depending upon the balance between the number of employment opportunities in a county and the number of employed persons who reside in the county, the county can be classified between the two extremes of work center and bedroom community. In the case of a work center, there are typically more job opportunities in the area than resident workers and for a bedroom community the reverse is true. The differentiation between counties in highly urban and metropolitan regions can be quite distinct with the cost of housing playing a significant role. In predominantly rural areas where employment opportunities can often be concentrated in a few large communities, the differentiation between work center and bedroom community can also be quite marked. Much of the role of the community or county as a work center or bedroom community manifests itself through daily commuter patterns.

Information derived from the U.S. Census, 2000 provides a more detailed picture of commuting patterns on a county-by-county basis and is indicative of the economic linkages and interdependencies between counties. Table 4-7 presents information regarding the main workplaces for the residents of each of the counties comprising the study area. In all cases, as expected, the overwhelming majority of county residents work in the same county. Geographically adjacent counties account for the highest commuter flows (e.g., Campbell County residents commuting to Crook County and Converse County residents commuting to Natrona County).

TABLE 4-7
County Economic Interdependencies

Place of Residence County	Place of Work County	Commuters	Place of Residence County	Workplace County	Commuters	Place of Residence County	Workplace County	Commuters	Place of Residence County	Workplace County	Commuters
Campbell Co. WY	Campbell Co. WY	17,225	Converse Co. WY	Converse Co. WY	4,477	Natrona Co. WY	Natrona Co. WY	31,031	Platte Co. WY	Platte Co. WY	3,851
Campbell Co. WY	Crook Co. WY	88	Converse Co. WY	Natrona Co. WY	812	Natrona Co. WY	Converse Co. WY	375	Platte Co. WY	Converse Co. WY	106
Campbell Co. WY	Natrona Co. WY	54	Converse Co. WY	Campbell Co. WY	349	Natrona Co. WY	Campbell Co. WY	210	Platte Co. WY	Laramie Co. WY	73
Campbell Co. WY	Converse Co. WY	50	Converse Co. WY	Laramie Co. WY	25	Natrona Co. WY	Carbon Co. WY	123	Platte Co. WY	Campbell Co. WY	27
Campbell Co. WY	Sheridan Co. WY	43	Converse Co. WY	Platte Co. WY	22	Natrona Co. WY	Fremont Co. WY	73	Platte Co. WY	Harris Co. TX	24
Campbell Co. WY	Albany Co. WY	35	Converse Co. WY	Sweetwater Co. WY	21	Natrona Co. WY	Platte Co. WY	67	Platte Co. WY	Goshen Co. WY	24
Campbell Co. WY	Johnson Co. WY	26	Converse Co. WY	Niobrara Co. WY	20	Natrona Co. WY	Sweetwater Co. WY	39	Platte Co. WY	Other	170
Campbell Co. WY	Weston Co. WY	25	Converse Co. WY	Other	132	Natrona Co. WY	Denver Co. CO	36	Platte Co. WY		
Campbell Co. WY	Denver Co. CO	22	Converse Co. WY			Natrona Co. WY	Park Co. WY	33	Platte Co. WY		
Campbell Co. WY	Other	210	Converse Co. WY			Natrona Co. WY	Johnson Co. WY	27	Platte Co. WY		
			Converse Co. WY			Natrona Co. WY	Harris Co. TX	27	Platte Co. WY		
			Converse Co. WY			Natrona Co. WY	Clark Co. NV	25	Platte Co. WY		
			Converse Co. WY			Natrona Co. WY	Jefferson Co. CO	25	Platte Co. WY		
			Converse Co. WY			Natrona Co. WY	Cascade Co. MT	23	Platte Co. WY		
						Natrona Co. WY	Sheridan Co. WY	21	Platte Co. WY		
						Natrona Co. WY	Boulder Co. CO	20			

Source: U.S Census, 2000, County to County Work Flows, http://www.census.gov/population/www.cen2000/commuting.html

The federal Bureau of Economic Analysis reports annually, on a county basis, on personal income in terms of location of residence. Estimates are developed on how much money is earned in a county by persons residing outside the county (referred to as "total gross earnings outflow") and how much money is brought into a county by residents who work outside the county (referred to as "total gross earnings inflow"). Subtracting one from the other gives the "net residence adjustment" that indicates the role of the county as a "bedroom community" or "work center." Where the total gross earnings inflow exceeds the total gross earnings outflow, the net residence adjustment will be positive and the community is classed as a bedroom community. Conversely, where the total gross earnings outflow exceeds the total gross earnings inflow, the net residence adjustment will be negative and the community is classed as a work center. Where there is a relative balance between inflow and outflow of income, the community or county has a jobs-housing balance. The role that the county plays over time can also change.

Of the four counties comprising the study area, Campbell County is classed as a work center, Converse County is classed as a bedroom community, and Natrona and Platte counties have a balance between jobs and housing. Table 4-8 shows the county commuting patterns.

TABLE 4-8
County Commuting Patterns

County	Net Residence Adjustment (% of Total Income in County in 2005)	Bedroom Community or Job Center
Campbell	-10.1%	Work Center
Converse	+12.6%	Bedroom Community
Natrona	-0.1%	Balanced Community
Platte	-0.1	Balanced Community

Source: *A Socioeconomic Profile*, developed with Economic Profile System (EPS), Sonoran Institute, 2005.

Over the period 1990 through 2005 for Campbell County, the outflow of earned income has exceeded the inflow (i.e., money earned in Campbell County by persons living outside the county has exceeded the money earned by persons living in Campbell County but working outside the county). The gap between outflow and inflow has progressively widened over the period; in 2005, there was a net outflow of over $141 million. This pattern is evident in Figure 4-13. When this net flow (inflow minus outflow) is expressed as a percent of total county income, the resulting net residential adjustment value for each year is as illustrated in Figure 4-14 suggesting that the role of Campbell County as a work center has widened over the years. By 2005, the net residential adjustment value was –10.1 percent.

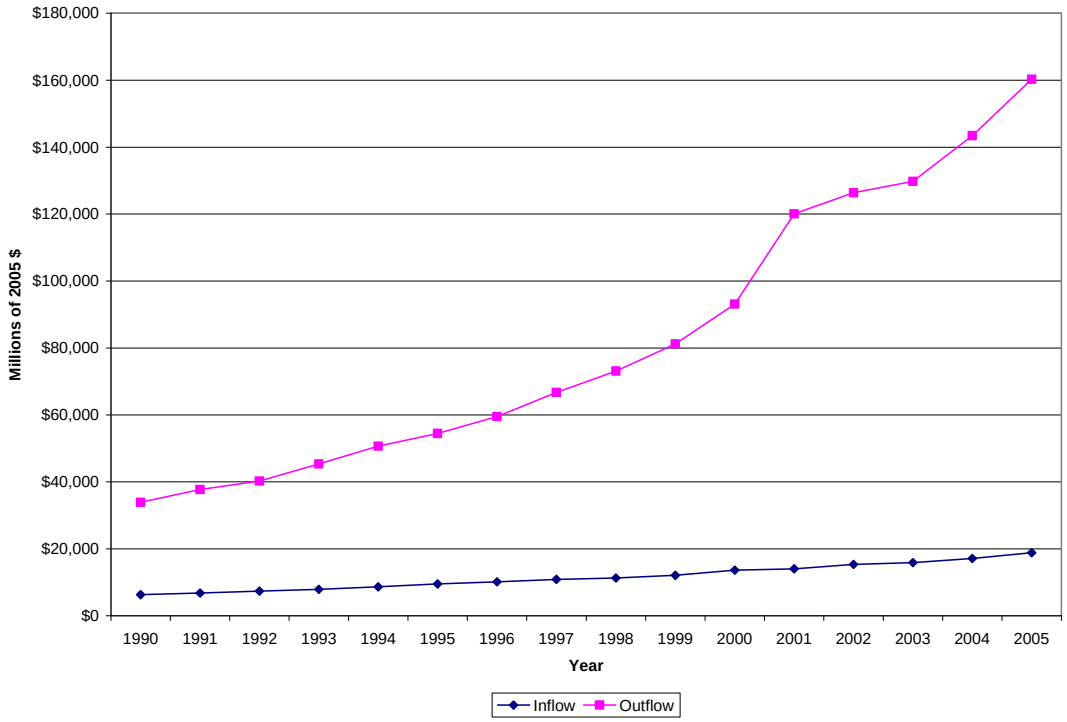

FIGURE 4-13
Inflow and Outflow of Personal Income for Campbell County (1990 through 2005)

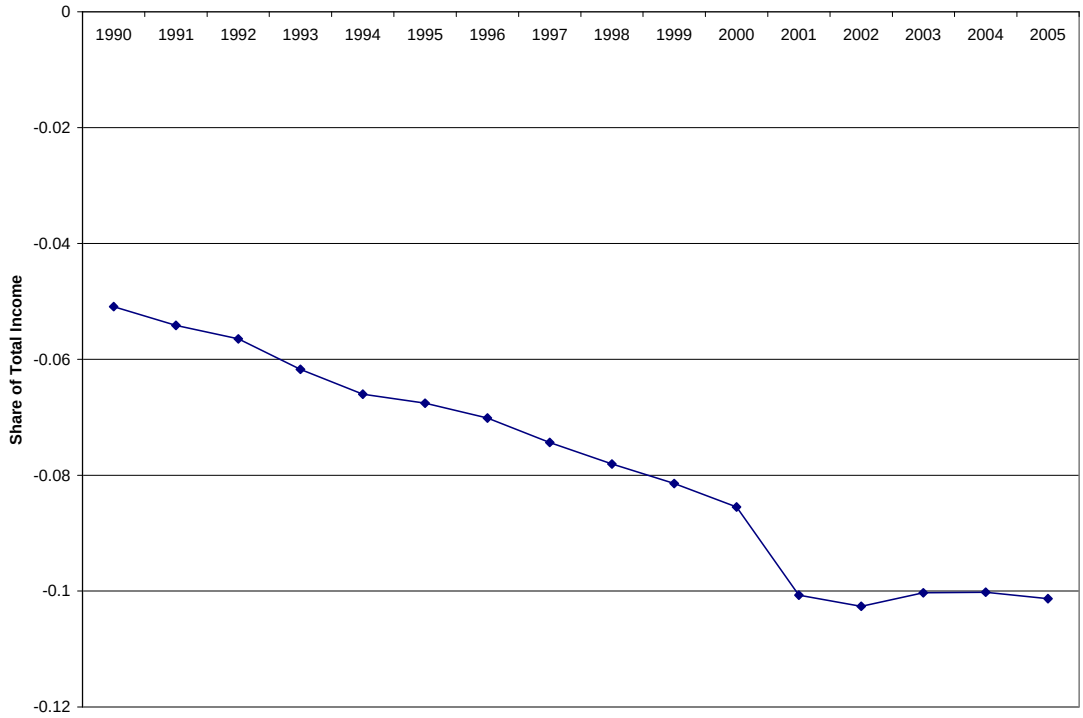

FIGURE 4-14
Net Residential Adjustment for Campbell County (1990 through 2005)

In the case of Converse County, the role of Campbell County described above is reversed. Although incomes have been increasing over the period, income attributable to inflows increasingly exceeds that associated with outflows. In 2005, there was a net inflow of almost $55 million, and the net residential adjustment value stood at +12.6 percent, as shown in Figure 4-15. The role as a bedroom community played by Converse County has been steadily increasing over the period.

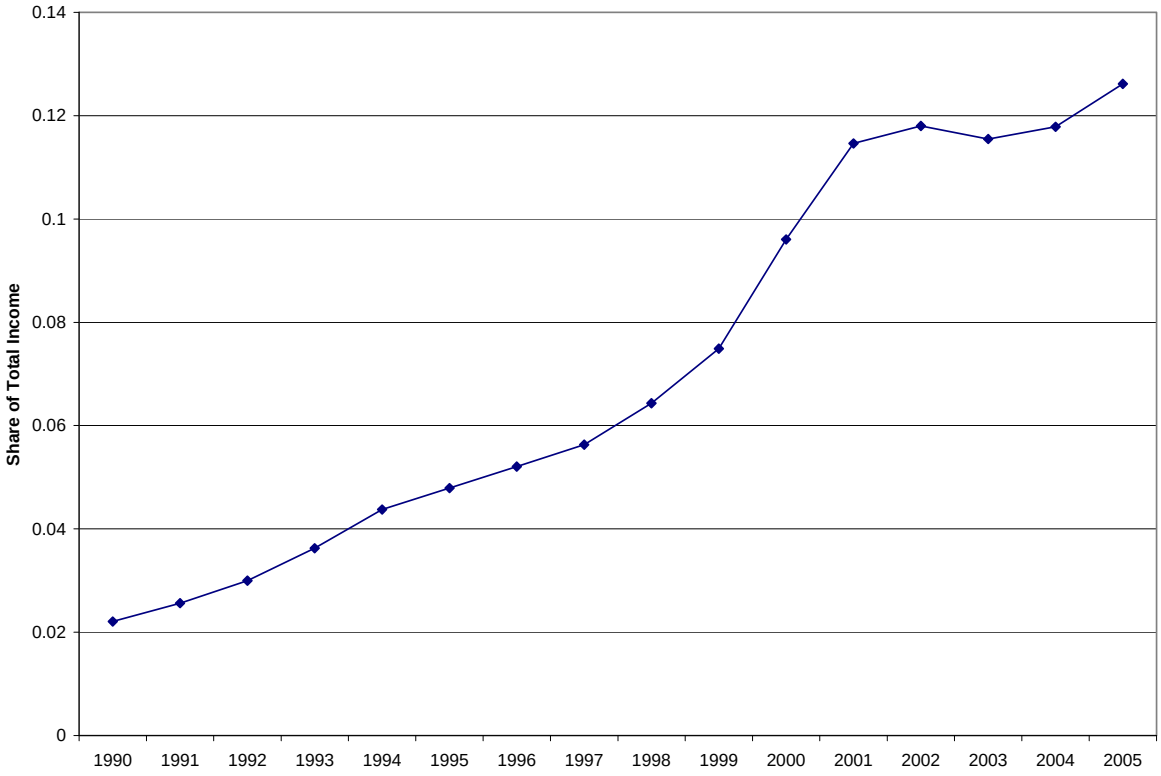

FIGURE 4-15
Net Residential Adjustment for Converse County (1990 through 2005)

The net residential adjustment values for Natrona County over the period 1900 through 2005, as can be seen in Figure 4-16, have been steadily decreasing indicating a swing toward becoming a work center. However, the imbalance between inflow and outflow is small, indicating a relative balance between jobs and residents.

Platte County would appear, from the information presented in Figure 4-17, to be evolving from a work center to a balanced community as the net residential adjustment factor has steadily declined over the period.

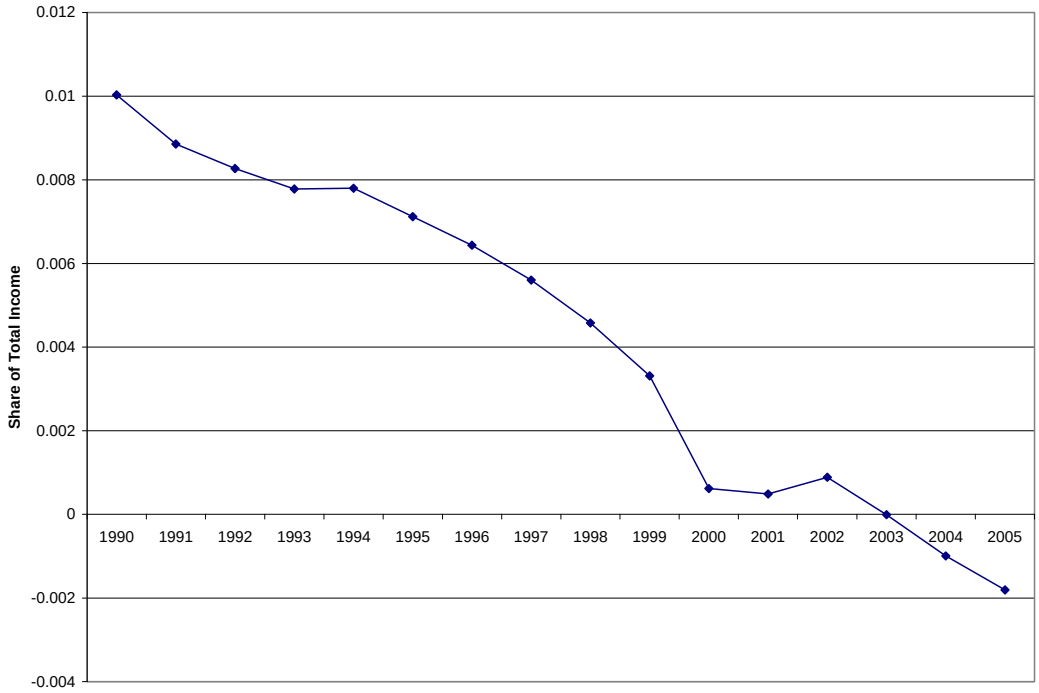

FIGURE 4-16
Net Residential Adjustment for Natrona County (1990 through 2005)

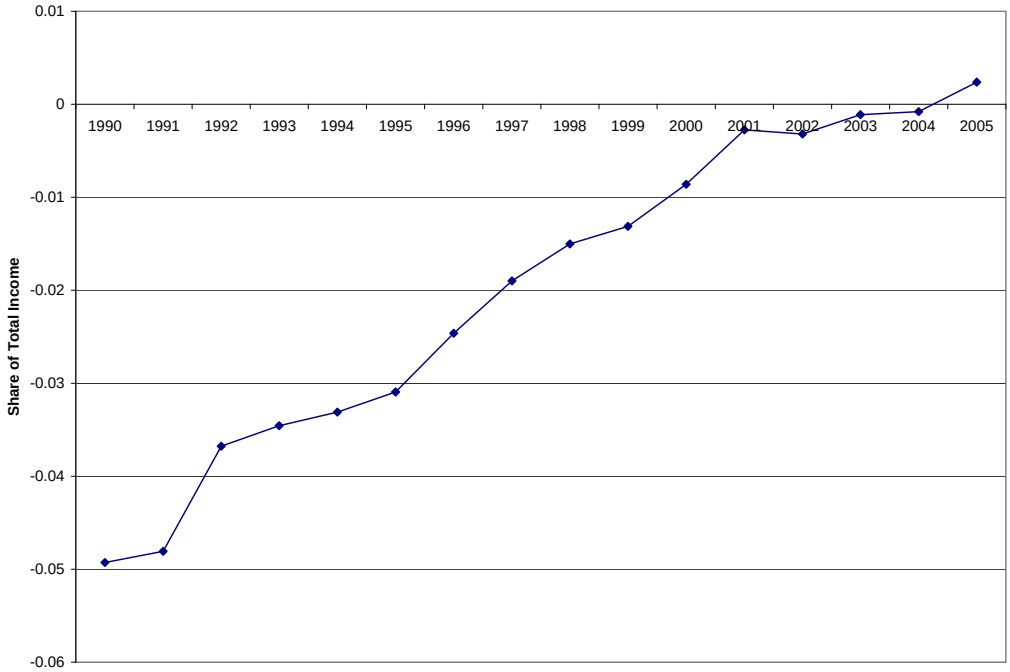

FIGURE 4-17
Net Residential Adjustment for Platte County (1990 through 2005)

4.2.2.1.3 Existing Labor Characteristics and Availability

The following sections focus on past, present, and projected employment and earnings for the construction industry in the study area.

General Construction Labor Characteristics. The number of jobs in the construction trades has increased steadily in Campbell and Natrona Counties and remained fairly constant for Converse and Platte Counties over the period 1990 through 2005 as shown in Figure 4-18. Campbell County experienced virtually uninterrupted growth from 1990 to 2001, a 2-year downturn, followed by a recovery. Between 1991 and 1992, Natrona County experienced a decline of more than 500 construction jobs; however, from 1992 to 2005, the number of construction jobs increased by almost more than 1,350. Although construction employment in Converse and Platte Counties has remained fairly constant over the 16-year period, construction jobs increased by almost 290 and almost 100, respectively. The number of jobs in construction in the study area increased from 4,079 in 1990 to 7,225 in 2005: an almost 80 percent increase. Over this same period, statewide construction employment increased by over 85 percent. The contribution made by the study area to statewide employment in the construction sector has remained relatively constant between 22 and 25 percent since 1992.

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). Average annual wages for workers in construction and extraction occupations were lower than the state level in Converse County ($38,370) but somewhat higher in Campbell County ($41,809), Natrona County ($40,228), and Platte County ($46,946).

During the period 2006 to 2012, specialty trade contractors and heavy and civil engineering construction contractors are two of the top 10 industries expected to add the most jobs. The demand for construction laborers and skilled trades people (e.g., carpenters, electricians, operating engineers, plumbers, and occupations requiring long-term on-the-job training) is also expected to increase substantially over this period. The projected size of the construction workforce in each of the counties of the study area through 2012 is shown in Table 4-9. The projections are based on three average annual growth rate scenarios: 2 percent, 4 percent, and 6 percent. Prospects for the construction sector are also addressed in Section 4.2.4, Future Economic Conditions.

TABLE 4-9
Projected Construction Workforce (2006 through 2012)

Assuming 2 percent average annual growth rate

	2006	2007	2008	2009	2010	2011	2012
Campbell County	2,573	2,624	2,677	2,730	2,785	2,841	2,898
Converse County	326	333	339	346	353	360	367
Natrona County	2,385	2,433	2,481	2,531	2,582	2,633	2,686
Platte County	134	137	139	142	145	148	151
Study Area	5,418	5,526	5,637	5,750	5,865	5,982	6,102

TABLE 4-9
Projected Construction Workforce (2006 through 2012)

Assuming 4 percent average annual growth rate							
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Campbell County	2,573	2,676	2,783	2,894	3,010	3,130	3,256
Converse County	326	339	353	367	381	397	412
Natrona County	2,385	2,480	2,580	2,683	2,790	2,902	3,018
Platte County	134	139	145	151	157	163	170
Study Area	5,418	5,635	5,860	6,095	6,338	6,592	6,855
Assuming 6 percent average annual growth rate							
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Campbell County	2,573	2,727	2,891	3,064	3,248	3,443	3,650
Converse County	326	346	366	388	412	436	462
Natrona County	2,385	2,528	2,680	2,841	3,011	3,192	3,383
Platte County	134	142	151	160	169	179	190
Study Area	5,418	5,743	6,088	6,453	6,840	7,251	7,686

Source: Wyoming Department of Employment (DOE), Research and Planning, http://doe.state.wy.us/lmi/06Q1_QCEW/toc.htm

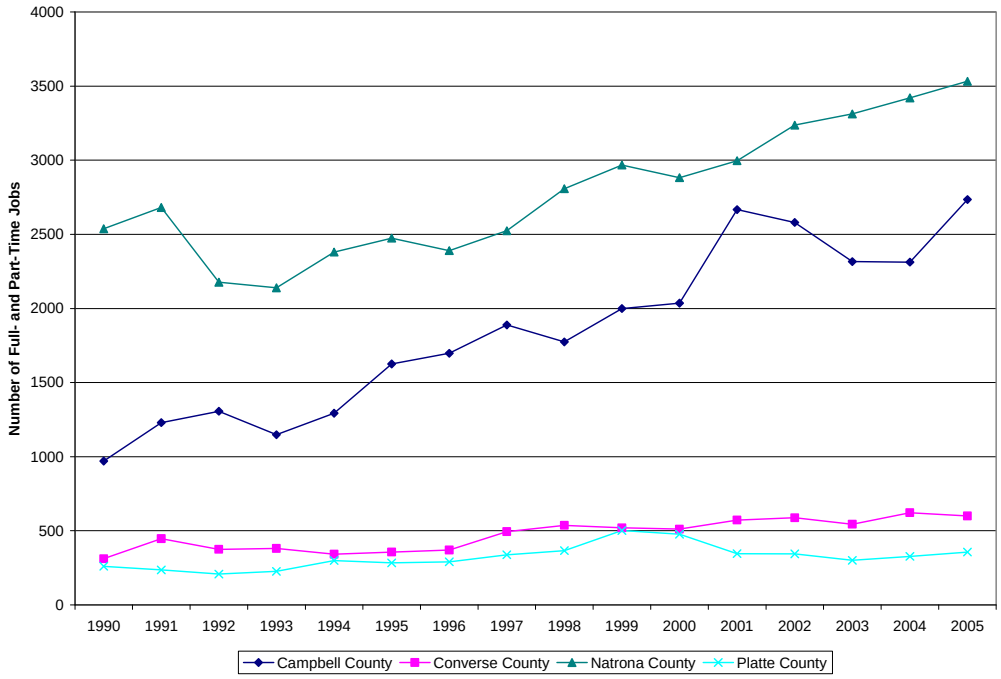

FIGURE 4-18
Construction Employment by County (1990 through 2005)

4.2.2.1.4 Governmental Revenues

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) level. The state assesses the value of utility and mineral properties, while the counties assess residential, agricultural, commercial, and industrial properties.

Total assessed value in 2006 for the four-county study area was $5,786,729,519 as displayed in Table 4-10. Of the total assessed value of real property in the study area, 74 percent was contributed by Campbell County, 8 percent by Converse County, 16 percent by Natrona County, and the remaining 2 percent by Platte County.

TABLE 4-10
Assessed Values by Type of Property and County (2006)

	Locally Assessed Valuation				State Assessed Valuation		Total
County	**Agricultural Land**	**Commercial Land**	**Residential Land**	**Industrial Land**	**Non Minerals (Utilities, Railroads, and Airlines)**	**Mineral Properties**	
Campbell	$7,621,853	$59,301,688	$133,392,805	$286,185,768	$79,254,893	$3,697,804,946	$4,263,561,953
Converse	$10,036,248	$14,321,683	$51,634,989	$40,959,111	$64,537,686	$275,896,314	$457,386,031
Natrona	$5,995,254	$115,362,121	$316,741,307	$33,375,007	$35,863,163	$436.769,082	$944,105,934
Platte	$10,435,956	$12,175,850	$29,210,842	$474,186	$68,478,776	$899,991	$121,675,601
Total	$34,089,311	$201,161,342	$530,979,943	$360,994,072	$248,134,518	$3,974,601,251	$5,786,729,519

Source: State of Wyoming Department of Revenue 2006 Annual Report

Of the six types of assessed value, the greatest contribution is associated with mineral properties, except for Platte County, where the greatest contribution is agricultural land as shown in Table 4-11. The second greatest contribution varies among the counties with industrial land for Campbell County, agricultural land for Converse County, and residential land for Natrona and Platte Counties. Residential land is the third largest contribution for Campbell and Converse Counties while it is commercial land for Natrona and Platte Counties. The remaining three sources of tax revenues contribute less than 15 percent each to the total.

TABLE 4-11
Contribution by Type of Property by County (2006)

County	Agricultural Land	Commercial Land	Residential Land	Industrial Land	Non Minerals Land	Minerals	Total
Campbell	0.20%	1.40%	3.10%	6.70%	1.90%	86.70%	100%
Converse	2.20%	3.10%	11.30%	9.00%	14.10%	60.3%	100%
Natrona	0.60%	12.20%	33.50%	3.50%	3.80%	46.30%	100%
Platte	8.60%	10.00%	24.00%	0.40%	56.30%	0.70%	100%

Source: State of Wyoming Department of Revenue 2006 Annual Report

Mill levies are applied to assessed property values to determine the tax rates for various properties. Average mill levies range from 58.95 in Campbell County to 67.78 in Platte County. Ad valorem taxes support a number of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education. Table 4-12 displays the major beneficiaries of ad valorem taxes in the state.

TABLE 4-12
Beneficiaries of Ad Valorem Taxes in Wyoming (2006)

Beneficiary	Percent of Total
Schools	54.72
Counties	18.44
Foundation Program	18.91
Special Districts	6.71
Municipalities	1.22

Source: State of Wyoming Department of Revenue 2006 Annual Report

Sale, 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.

Sales Tax. The state-imposed tax rate is 4 percent, and the distribution of revenues is 69 percent to the state and 31 percent to the county. Each of the counties of the study area has imposed a 1 percent optional sales tax. The optional sales tax revenue, less administrative costs, is returned by the state to the county of origin. In addition to this optional sales tax, Campbell County imposes an optional excise tax of 0.25 percent. Revenues generated by this optional tax (referred to as the "1 percent capital facilities option tax") are designated solely for the planning, construction, furnishing, equipping, and debt service for any capital improvement project authorized through public election. Figure 4-19 shows sales tax collections by county.

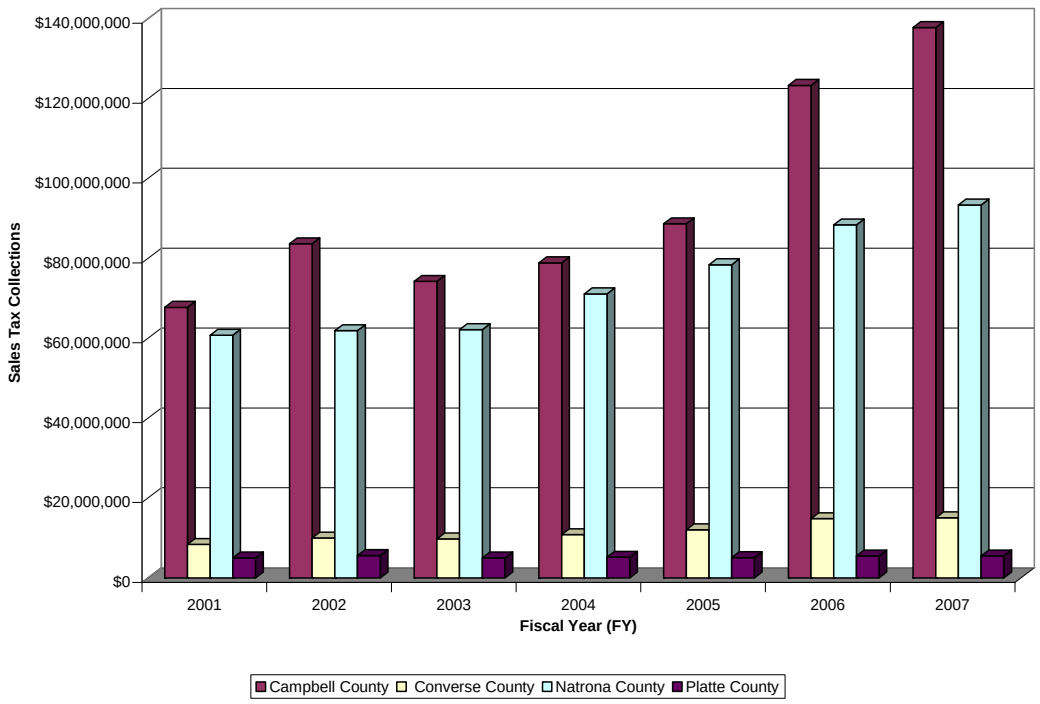

FIGURE 4-19
Sales Tax Collections by County (2001 through 2007)

Renewable Sales and Use Tax Exemption. In 2003, under House Bill (HB) 188, the Wyoming legislature added sales of equipment used to generate electricity from renewable resources to the list of types of sales, purchases, and leases that are exempt from the state excise tax. The exemption 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. Equipment eligible for the exemption includes WTGs, generating equipment, control and monitoring systems, power lines, substation equipment, lighting, fencing, pipes and other equipment for locating power lines and poles. Equipment not eligible for the exemption includes 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. This exemption was originally set to expire on June 30, 2008, but was extended to June 30, 2012, through the passage of HB 319 in 2007.

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 requires 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.

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 rates for each of the counties comprising the study area are shown in Table 4-13.

TABLE 4-13
State and County Sales, Use, and Lodging Tax Rates

County	State Tax Rate	General Purpose Option	Specific Purpose Option	Total Sales and Use Tax Rate	Lodging Tax Rate	Total Tax Rate
Campbell	4%	1%	.25%	5.25%	None	5.25%
Converse	4%	1%	None	5%	3%	8%
Natrona	4%	1%	None	5%	3%	8%
Platte	4%	1%	None	5%	2%	7%

Source: Wyoming Department of Revenue, July 2007

Tax revenue collections for 2007 associated with each of the three taxes for the counties in the study area are displayed in Table 4-14. The large share of these tax collections is contributed by sales taxes in all cases. There are differences in the source (by industry and service sector) of these sales tax collections. For Converse, Natrona, and Platte Counties retail trade contributes the largest share whereas mining assumes that role for Campbell County. Wholesale trade makes up the second highest percentage of sales tax collections for Campbell and Converse Counties with 25 and 16 percent, respectively. For Natrona and Platte Counties, public administration makes up 11 and 14 percent of collections, respectively.

TABLE 4-14
Sales, Use, and Lodging Tax Collections by County (Fiscal Year 2007)

County	Sales Tax	Use Tax	Lodging Tax	Total County Collections
Campbell	$123,337,820	$11,403,031	$51,226	$134,792,077
Converse	$14,839,237	$1,798,863	$138,158	$16,776,258
Natrona	$88,395,192	$6,357,269	$730,165	$95,482,626
Platte	$5,508,289	$1,793,338	$5,438	$7,307,065
Total	$232,080,538	$21,352,501	$924,987	$254,358,026

Source: Wyoming Department of Administration and Information, Economic Analysis Division, Wyoming Sales, Use, and Lodging Tax Revenue Report, FY 2007 Summary. http://eadiv.state.wy.us/s&utax/s&u.html

As shown in Table 4-15, total sales tax collections (state and local) have increased for Campbell, Converse, and Natrona Counties over the period 2001 through 2006 although Converse County experienced a slight decline in 2003. Platte County, however, experienced a fluctuation in collections each year with the largest decline from 2002 to 2003.

TABLE 4-15
Total Sales Tax Collections, by County, 2001 through 2006

FY	Campbell County	Converse County	Natrona County	Platte County
2001	$69,124,541	$8,397,942	$60,774,979	$5,021,379
2002	$83,703,730	$9,996,589	$61,923,336	$5,630,038
2003	$74,958,114	$9,791,374	$62,181,247	$5,014,181
2004	$78,902,577	$10,836,204	$71,128,758	$5,197,429
2005	$88,689,230	$12,083,692	$78,432,104	$5,083,680
2006	$123,337,820	$14,839,237	$88,395,192	$5,508,289

Source: Wyoming Department of Administration and Information, Economic Analysis Division, Sales and Use Tax Distribution Reports
http://eadiv.state.wy.us/s&utax/Report_FY06.pdf

4.2.2.1.5 Future Economic Conditions

Economic Projections. The following description is derived from the report entitled *10 Year Outlook Wyoming Economic and Demographic Forecast 2007 to 2016* prepared by the Economic Analysis Division of the Wyoming Department of Administration and Information in 2007.

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 in comparison to the nation.

Mining Industry. The mining sector has been the most significant economic and revenue player in Wyoming's recent history. After it experienced a boom in the late 1970s, the following bust in the mid-1980s, and a slow and steady decline in the 1990s, the mining sector has demonstrated strong growth since 2000. 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 mining prices rebounded. The number of mining jobs went up again over 10 percent annually in 2004. The energy-driven growth continues, as low industrial diversity ties the state's fortunes to mining extraction, which is dominated by natural gas production recently. This sector is responsible for 40 percent of net payroll gains recently. Multiplier effects are also creating jobs in transportation, distribution, construction, and consumer-related industries, and the state is benefiting from a surge in mineral revenue. The outlook for future revenue and jobs from the state's mining industry looks strong with consistent growth anticipated.

The state benefits from increased 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 industries, increased demand for mining employment trickles down into the economy through increased per capita income and therefore increased levels of consumer spending. On the other hand, the state's economy and revenue also fluctuate violently along with the rise and fall of mining prices.

Construction. Nationally, strong real estate and housing industries have been constant throughout the economy's ebbs and flows in recent years. The housing boom's economic contribution has been enormous, accounting for approximately one-fourth of real gross domestic product (GDP) growth over the past 5 years. 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. While the large amount of new housing construction in the early 1980s was driven by an oil industry boom accompanied by an inflow of migrants, the current housing market in the state is largely driven by price appreciations, much like the national trend. The annual net migration (in-migration less out-migration) to Wyoming was over 10,000 in the late 1970s and early 1980s, but only a couple

of thousand in recent years. A few local markets in the state are trying to meet additional worker demand due to the booming mining exploration such as in Rock Springs, Pinedale, and Casper. On the other hand, in certain areas, rental markets are getting soft as a result of additional new housing. Many residents have taken advantage of low mortgage rates and moved to new houses, leaving their previous homes for sale or rent. In Laramie County, for instance, the number of residential units for sale in the first quarter of 2005 was more than twice as many as 2003, and the number of vacant units for rent almost tripled during the same period. Consequently, rental rates declined.

Overall, job growth in the construction industry is expected to increase in 2005 after it declined 3.4 percent in the past 2 years, albeit at a slower rate of around 4 percent annually. Total employment in construction will surpass the mining industry again by the end of the forecasting period, and 1,700 new jobs are expected be created during this time span.

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 has slowed down to only about 1 percent annually since then, largely due to out-migration from the state. After experiencing a 3.3 percent rise in 2000, the industry lost over 400 jobs during the past 3 years. In the near future, employment in this sector is expected to expand at a modest rate of less than 1 percent a year. While the average increase rate for the fiscal years 1991 to 2000 was 7.3 percent, the annual non-auto taxable retail sales were up only 3.1 percent from fiscal year 2001 to fiscal year 2003. However, mostly driven by strong natural gas exploration, expanding housing market, and net migration, the retail sales were robust again. For fiscal year 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 fiscal year 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 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. Wyoming's various services sectors are expected to add 20,330 jobs in the next 10 years.

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 the world's oldest national park, Yellowstone National Park, and the scenic 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). However, there are at least a few factors that could work to the advantage of the state's tourism industry. First, the weakened American currency may attract more international tourists. Second, the baby-boom generation (born between 1946 and 1964) is starting to retire or will retire in the next few years, assuming the elderly population is more interested in natural amenities than the younger generation. Third, the state's rising revenue and budget surplus are creating an opportunity to protect the state's attractiveness and enhance area attractions. However, the jobs created in the tourism industry are mostly seasonal, and typically low-paying, offering little in the way of long-term growth for the state.

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, nonagricultural employment in the state is forecast to increase by 1.6 percent annually, on average, as shown in Table 4-16. Several industrial sectors are expected to exceed this rate of growth: 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 nonagricultural employment will change as shown in Table 4-16.

TABLE 4-16
Wyoming Nonagricultural Wage and Salary Employment (in thousands): 2006 through 2016

			Change 2006-2016			Share of Total	
	2006	2016	Numeric	Percent	Av. Ann. %	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: http://eadiv.state.wy.us/wef/Outlook2005.pdf

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 is forecast to increase at an annual rate of 6.4 percent annually, as seen in Table 4-17. 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 4-17
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 (%)	4.2	3.2	2.9

Source: http://eadiv.state.wy.us/wef/Outlook2007.pdf

Growth in the construction sector is highly sensitive to both population growth and governmental spending on infrastructure. Population growth in Wyoming is expected to slow in the next decade. Therefore, growth in construction employment is also expected to decline as illustrated by the information presented in Table 4-18. Growth in total construction employment is expected to slow from 5.1 percent, on an average annual basis, between 1990 and 2000 to 1.2 percent between 2000 and 2010.

TABLE 4-18
Construction Employment in Wyoming 1990, 2000, and 2010

	1990	2000	2010 Projected	Change 1990 to 2000	Projected Change 2000 to 2010	Average Annual Change 1990 to 2000	Projected Average Annual Change 2000 to 2010
General Contractors	2,099	4,285	5,242	2,186	957	7.4%	2.0%
Heavy Construction	3,866	5,301	5,408	1,435	107	3.2%	0.2%
Special Trade Contractors	4,815	8,085	9,291	3,270	1,206	5.3%	1.4%
Total Construction	10,779	17,671	19,941	6,892	2,270	5.1%	1.2%

Source: Employment Outlook: 2010, Wyoming DOE, 2003

Projections also indicate that the industry mix in construction will change as the numbers of general contractors and specialty trade contractors are expected to grow more than the construction industry as a whole.

4.2.3 Housing

This section addresses five major topics: (1) the composition of the existing housing stock in the four county study area including the cities of Casper, Douglas and Glenrock; (2) residential construction trends in the counties of the study area; (3) housing costs, availability and need; and (4) temporary accommodations.

4.2.3.1.1 Existing Housing Stock in Four County Study Area

The study area contained a total of 53,368 housing units (occupied and vacant) at the time of the U.S. Census, 2000, with over half of them (29,882 units) located in Natrona County. Approximately 89 percent of the units were occupied; the remaining units were vacant. The housing vacancy rate was highest in Platte County (20 percent), followed by Converse County (17 percent), Natrona County (10 percent), and Campbell County (8 percent) as shown in Table 4-19.

Of the 6,022 vacant units in the study area, almost 35 percent were for seasonal, recreational, or occasional use; 24 percent were for rent; 12 percent were for sale; and about 9 percent were rented or sold but not occupied. The proportion of housing units that were vacant in 2000 varied from a high of 20 percent in Platte County to a low of 8 percent in Campbell County. Converse County had 17 percent of its housing stock vacant.

Of the occupied housing units in the study area, almost 72 percent are owner-occupied and the remaining 28 percent are rental units as presented in Table 4-19. The proportion of renter-occupied units is highest in Natrona County (30.1 percent), which was almost identical to that for the state. The lowest proportion was in Platte County (24.3 percent).

TABLE 4-19
Housing Stock, Occupancy, and Tenure (2000)

	Wyoming	Campbell County	Converse County	Natrona County	Platte County	Study Area
Occupied	86.49%	91.86%	82.80%	89.75%	80.06%	88.72%
Vacant	13.51%	8.14%	17.20%	10.25%	19.94%	11.28%
For rent	20.62%	20.63%	28.21%	25.11%	16.17%	23.46%
For sale only	10.85%	15.26%	9.44%	10.90%	13.95%	11.91%
Rented or sold, not occupied	6.18%	6.94%	7.18%	10.87%	4.10%	8.55%
For seasonal, recreational, or occasional use	44.31%	28.86%	41.13%	34.41%	35.33%	34.64%
For migrant workers	1.24%	0.83%	0.82%	0.65%	0.66%	0.71%
Other vacant	16.80%	27.47%	13.23%	18.05%	29.79%	20.72%
Owner occupied	69.98%	73.61%	74.12%	69.94%	75.75%	71.74%
Renter occupied	30.02%	26.39%	25.88%	30.06%	24.25%	28.26%

Source: http://factfinder.census.gov

Between about 64 and 69 percent of housing units in the counties of the study area are single-family detached units, except in Campbell County where they represent only 50 percent. Mobile homes make up a larger portion of total housing units in Campbell County (26 percent) than the other counties of the study area or the state of Wyoming (16 percent). Table 4-20 displays the breakdown of housing units by occupancy and type of structure for the state, study area, and counties.

TABLE 4-20
Housing Stock by Type of Structure (2000)

	Wyoming	Campbell County	Converse County	Natrona County	Platte County	Study Area
Total Housing Units						
1, detached	64.89%	50.41%	63.45%	68.96%	69.06%	63.77%
1, attached	3.65%	5.98%	3.81%	1.75%	1.66%	3.01%
2	2.54%	1.27%	0.97%	1.87%	1.35%	1.58%
3 or 4	4.56%	4.67%	4.32%	4.59%	4.37%	4.56%
5 to 9	3.00%	2.33%	1.78%	2.24%	1.13%	2.12%
10 to 19	1.89%	3.20%	3.53%	2.34%	0.73%	2.54%
20 to 49	2.18%	5.32%	2.40%	3.01%	0.35%	3.29%
50 or more	1.03%	0.34%	0.78%	2.24%	0.15%	1.44%
Mobile home	15.89%	25.83%	17.90%	12.68%	20.72%	17.19%
Boat, RV, van, etc.	0.38%	0.66%	1.06%	0.33%	0.49%	0.50%
Owner-Occupied Housing Units						
1, detached	79.06%	65.03%	77.26%	85.78%	77.82%	78.78%
1, attached	3.00%	5.14%	3.97%	1.57%	1.13%	2.73%
2	0.47%	0.72%	0.26%	0.25%	0.00%	0.35%
3 or 4	0.36%	0.26%	0.23%	0.34%	0.00%	0.28%
5 to 9	0.23%	0.17%	0.00%	0.12%	0.11%	0.12%
10 to 19	0.10%	0.07%	0.00%	0.09%	0.00%	0.06%
20 to 49	0.09%	0.10%	0.00%	0.17%	0.00%	0.12%
50 or more	0.01%	0.00%	0.00%	0.04%	0.00%	0.02%
Mobile home	16.52%	28.06%	18.02%	11.49%	20.94%	17.31%
Boat, RV, van, etc.	0.17%	0.46%	0.26%	0.16%	0.00%	0.24%
Renter-Occupied Housing Units						
1, detached	36.56%	14.77%	36.05%	36.68%	51.19%	32.30%
1, attached	5.11%	8.85%	4.61%	2.17%	2.96%	4.05%
2	7.17%	3.23%	1.98%	5.16%	6.03%	4.46%
3 or 4	13.97%	17.47%	9.14%	13.84%	15.02%	14.37%
5 to 9	8.65%	7.32%	5.60%	6.47%	3.41%	6.40%
10 to 19	5.63%	11.70%	12.18%	6.91%	2.73%	8.27%
20 to 49	6.81%	18.31%	8.64%	9.44%	1.82%	11.00%
50 or more	3.53%	1.40%	3.62%	7.64%	0.80%	5.32%
Mobile home	12.51%	16.95%	18.19%	11.61%	16.04%	13.78%
Boat, RV, van, etc.	0.05%	0.00%	0.00%	0.07%	0.00%	0.04%
Vacant Housing Units:						
1, detached	55.87%	35.06%	48.31%	50.96%	59.80%	49.00%
1, attached	3.75%	4.35%	2.26%	1.76%	1.99%	2.34%
2	2.91%	0.00%	2.26%	3.13%	0.89%	2.09%
3 or 4	5.27%	3.24%	12.92%	6.27%	7.31%	6.96%
5 to 9	4.54%	5.37%	3.38%	4.08%	1.99%	3.89%
10 to 19	2.74%	3.89%	5.33%	4.08%	1.00%	3.79%

TABLE 4-20
Housing Stock by Type of Structure (2000)

	Wyoming	Campbell County	Converse County	Natrona County	Platte County	Study Area
20 to 49	2.62%	9.99%	3.18%	3.43%	0.00%	4.05%
50 or more	0.76%	0.00%	0.00%	1.53%	0.00%	0.78%
Mobile home	19.57%	33.77%	17.13%	22.72%	24.58%	24.08%
Boat, RV, van, etc.	1.98%	4.35%	5.23%	2.02%	2.44%	3.02%

Source: http://factfinder.census.gov

Large shares of the housing stock (as of 2000) in the study area were constructed in the 1960s. The proportions range from 30 percent in Platte County to 40 percent in Converse County as can be seen from the information contained in Table 4-21. The decade of the 1970s contributed the next highest shares of the housing stock with 14 to 15 percent for all counties except Campbell County. In the case of Campbell County, over 30 percent of the housing stock was constructed in the 1970s. Relatively small shares of the housing stock were constructed in the 1980s and 1990s. Natrona County contains a larger share of older housing than the other counties of the study area, with 19 percent constructed in the 1940s and almost 12 percent in the 1950s. More recent building activity is addressed later in this section.

The largest share of housing units contains three or two bedrooms, and only 2 to 4 percent of housing would be classed as substandard based on the lack of complete plumbing or kitchen facilities.

TABLE 4-21
Housing Stock by Age, Number of Bedrooms, and Quality (2000)

	Wyoming	Campbell County	Converse County	Natrona County	Platte County	Study Area
Age of Housing Units:						
Built 1990 to 2000	7.04%	9.38%	5.56%	3.08%	5.15%	5.09%
Built 1980 to 1989	4.64%	5.43%	3.63%	1.93%	2.96%	3.07%
Built 1970 to 1979	17.33%	31.00%	15.63%	14.14%	14.16%	18.49%
Built 1960 to 1969	26.67%	36.69%	39.72%	31.36%	30.19%	33.48%
Built 1950 to 1959	10.30%	5.75%	9.33%	11.45%	7.51%	9.47%
Built 1940 to 1949	11.03%	2.74%	6.09%	18.87%	8.61%	12.62%
Built 1939 or earlier	6.90%	2.10%	3.53%	6.26%	6.14%	4.92%
Number of Bedrooms:						
No bedroom	1.97%	1.17%	2.01%	2.25%	1.30%	1.87%
1 bedroom	11.00%	7.94%	9.30%	11.22%	10.36%	10.13%
2 bedrooms	28.28%	24.40%	28.96%	26.57%	31.65%	26.71%
3 bedrooms	36.75%	42.34%	36.74%	34.91%	37.17%	37.14%
4 bedrooms	16.48%	19.18%	17.48%	19.32%	14.66%	18.69%
5 or more bedrooms	5.51%	4.98%	5.50%	5.74%	4.86%	5.45%

TABLE 4-21
Housing Stock by Age, Number of Bedrooms, and Quality (2000)

	Wyoming	Campbell County	Converse County	Natrona County	Platte County	Study Area
Lacking complete plumbing facilities	1.92%	1.08%	2.93%	2.09%	3.00%	2.01%
Lacking complete kitchen facilities	2.25%	0.96%	3.48%	2.20%	3.80%	2.16%
Median contract rent	$373	$402	$290	$354	$307	NA

Source: http://factfinder.census.gov

4.2.3.1.2 Housing Inventories Past and Present

The residential construction industry is highly cyclical in nature and sensitive to the state of the economy and financial interest rates. Such cycles are often national and regional in scope, although noticeable differences on a small scale can occur. The number of housing units authorized for construction in the state of Wyoming in 2005 (4,002 units) was last experienced in 1981 (4,074 units), as presented in Figure 4-20. Residential construction activity consistently declined from this high point in 1981 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 in the entire state. Construction activity picked up with consistent growth between 1989 and 1994; 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 with an annual total of 4,002 units authorized for construction in 2005. Construction activity in 2006 declined by over 20 percent from 2005.

The pattern of construction activity generally resembles that of the state described above, but with some differences as is evident in Figure 4-20. The increase in activity evident between 1991 and 2000 at the state level is present, but significantly less pronounced, in the study area. 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 almost 37 percent of all new residential units authorized for construction in the state. By 1986, this share had declined to about 6 percent. Over the 12 years from 1986 through 1998, the share contributed by the study area exceeded 10 percent in only 2 years (1992 and 1996). The contribution made by the study area to total housing construction activity in the state increased significantly after 1998 and reached 23 percent by 2006.

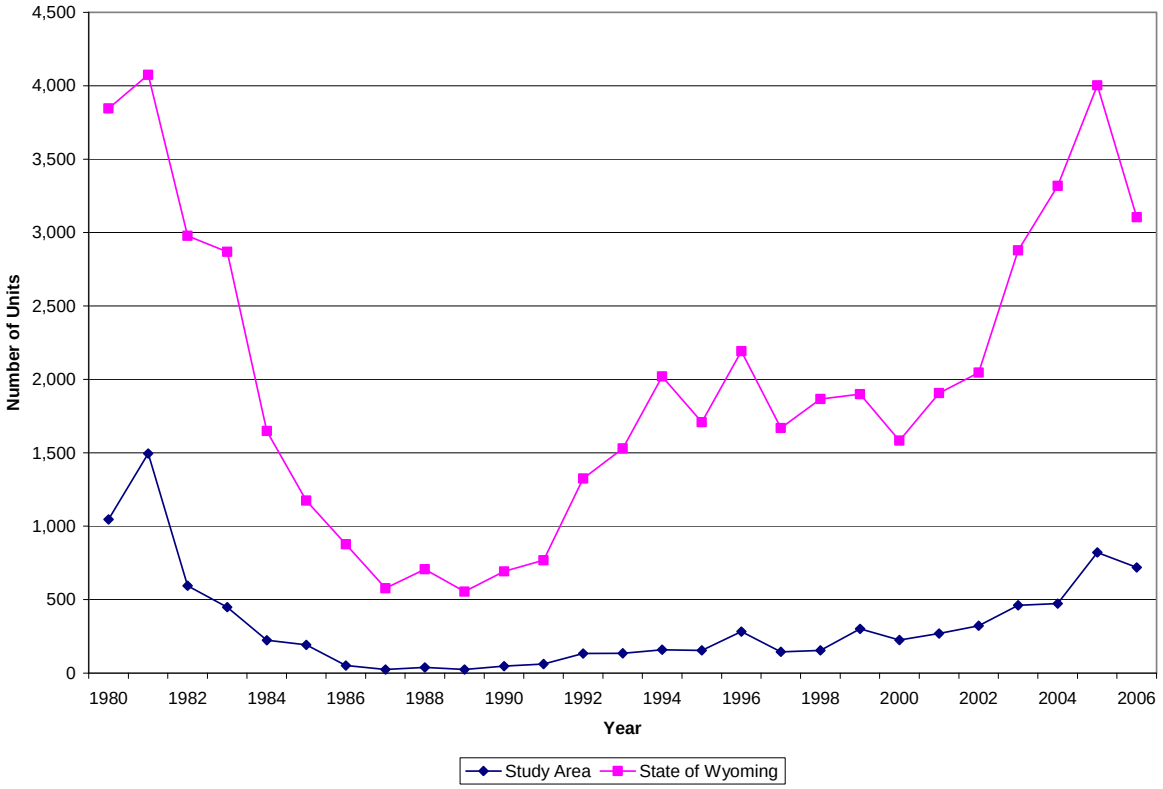

FIGURE 4-20
New Residential Construction for Study Area and State (1980 through 2006)

The majority of the housing authorized for construction in the study area has been built in Natrona and Campbell Counties with relatively small contributions from the other counties, as can be seen from the information presented in Figure 4-21. Construction activity in Campbell County increased dramatically from 1999 through 2005 after a long and relatively stable period prior to that time.

Single-family units were the most constructed housing units as presented in Figure 4-22. Construction of structures containing five or more units has been concentrated in a few years, especially 1980 through 1983, 1999, 2005, and 2006.

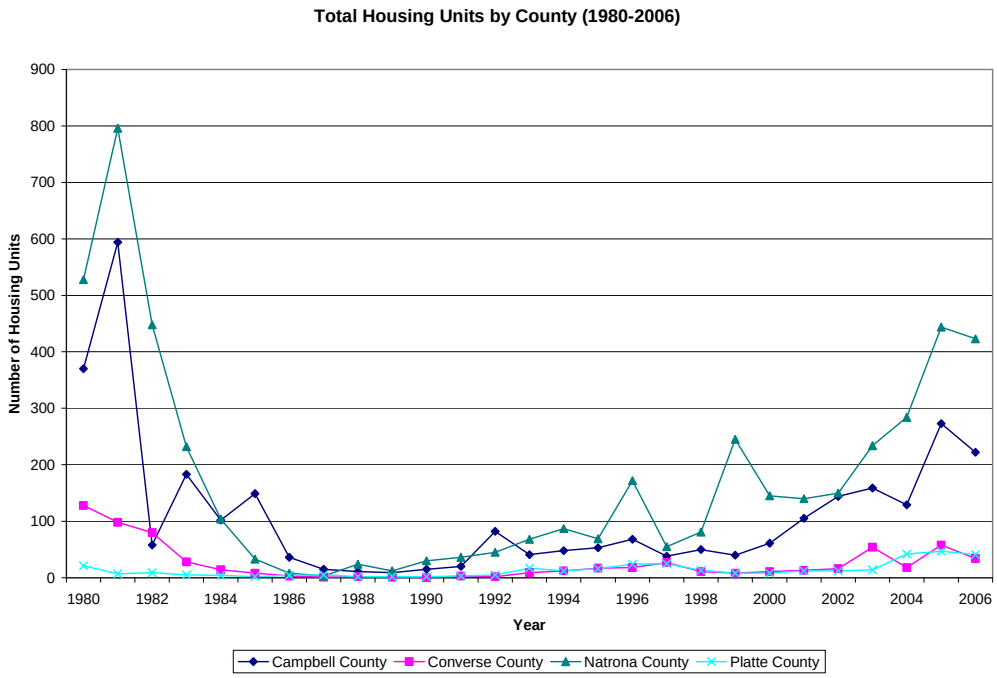

FIGURE 4-21
New Residential Construction by County (1980 through 2006)

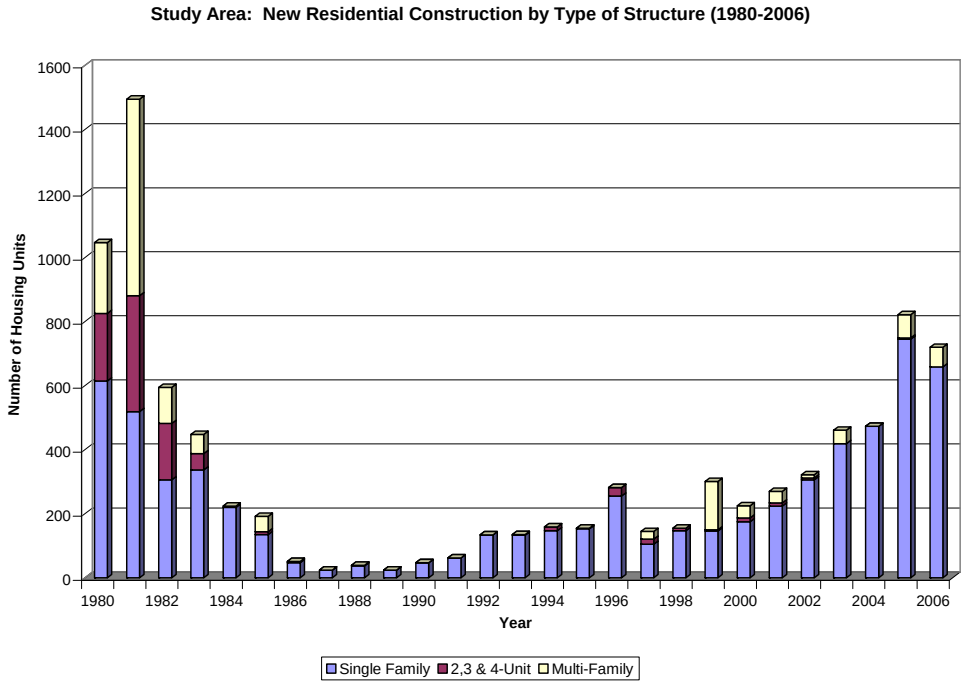

FIGURE 4-22
New Residential Construction by Structure Type in the Study Area (1980 through 2006)

4.2.3.1.3 Home Value and Rent Housing Costs

Home Value. Through the 1960s, home values in the state of Wyoming and three of the counties comprising the study area experienced only modest change. Average annual growth rates (presented in Table 4-22 and Figure 4-23) were as follows: 2.2 percent for the state of Wyoming, 6.0 percent in Campbell County, 2.3 percent in Converse County, 1.3 percent in Natrona County, and 2.8 percent in Platte County. The 1970s saw a steep rise in median values from below $20,000 to around $60,000 to $70,000 when dramatic average annual changes in value of 14.6 percent for the state, 14 percent in Campbell County, 17 percent in Converse County, 15.3 percent in Natrona County, and 15.8 percent in Platte County occurred. Between 1980 and 1990, values saw little upward movement, and Campbell, Converse, and Natrona Counties experienced average annual percentage decreases of 0.4 percent, 2.6 percent, and 2.8 percent, respectively. This was followed by another growth spurt in the 1990s with average annual percentage changes between 3 percent and 5 percent. Robust growth in home values continued through 2006, with the exception of Platte County.

TABLE 4-22
Average Annual Percentage Change in Home Value (1960 through 2006)

	1960-1970	1970-1980	1980-1990	1990-2000	2000-2006
State of Wyoming	2.21%	14.60%	0.30%	4.04%	5.77%
Campbell County	6.03%	13.98%	-0.44%	2.93%	7.49%
Converse County	2.27%	16.87%	-2.58%	4.90%	3.79%
Natrona County	1.28%	15.29%	-2.78%	4.46%	6.58%
Platte County	2.79%	15.82%	0.96%	4.61%	0.42%

Sources: http://factfinder.census.gov and Wyoming Housing Database Partnership, February 2007. *A Profile of Wyoming Demographics, Economics and Housing Semiannual Report Ending December 31, 2006*

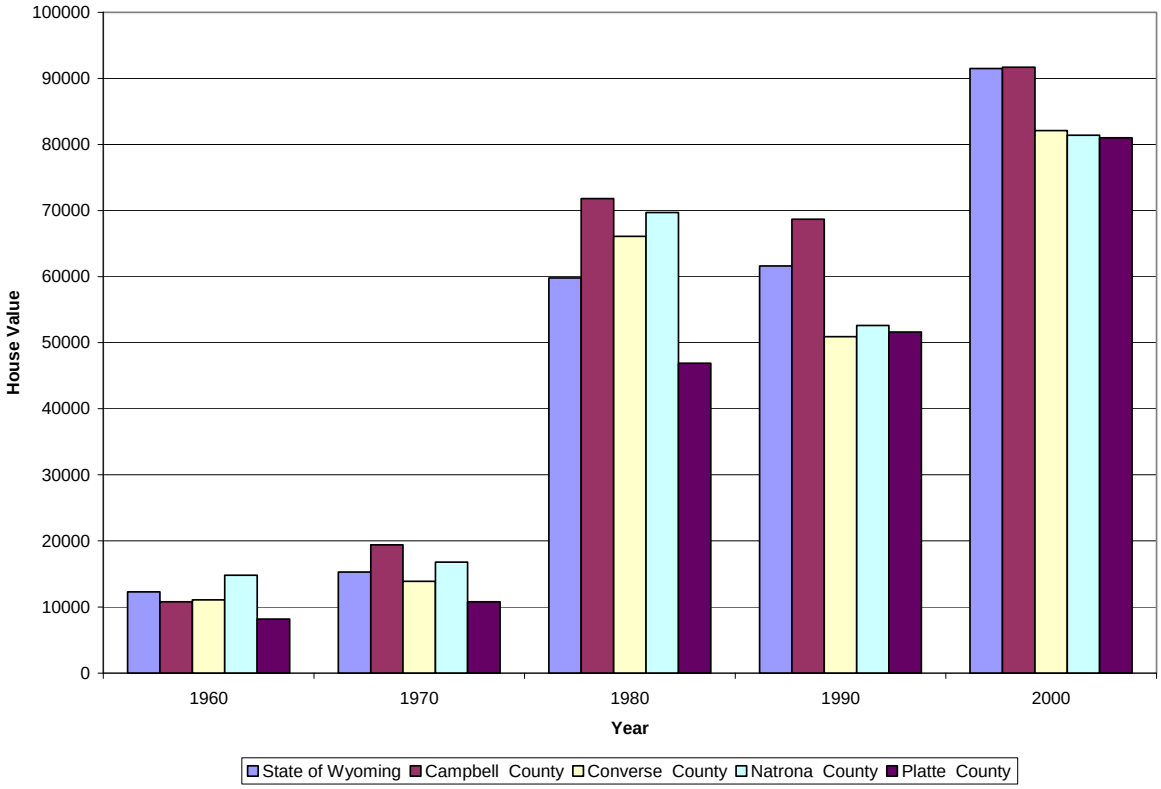

FIGURE 4-23
Median House Value for Counties in the Study Area and State (1960 through 2000)

Rental Housing Costs. Over the period 1960 through 2006, rent levels have mirrored closely those of home values, as presented in Table 4-23 and Figure 4-24. A dramatic increase in rents took place in the 1970s, followed by declines in the 1980s. The period from 1990 through 2006 has seen robust increases in house rental prices.

TABLE 4-23
Average Annual Percentage Change in House Rents (1960 through 2006)

	1960-1970	1970-1980	1980-1990	1990-2000	2000-2006
State of Wyoming	0.72%	11.66%	2.10%	5.05%	6.45%
Campbell County	4.04%	11.41%	-0.80%	4.47%	8.30%
Converse County	0.46%	15.08%	-2.05%	4.63%	6.50%
Natrona County	0.52%	14.20%	-1.66%	4.96%	7.02%
Platte County	-0.90%	15.56%	-0.27%	5.15%	3.60%

Source: http://factfinder.census.gov

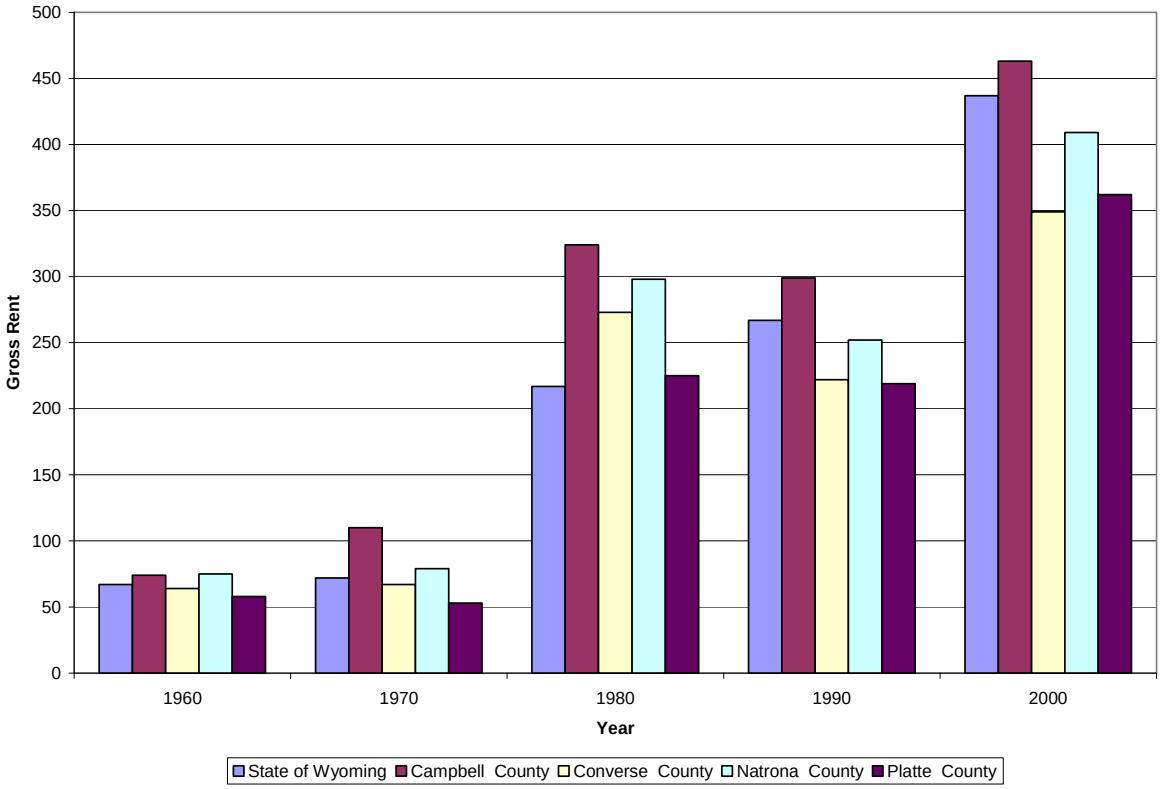

FIGURE 4-24
Gross Rents for Counties in the Study Area and State (1960 through 2000)

A detailed view of changes in house rental prices, between the second quarter of 2000 through the second quarter of 2006 at the state and county level is presented in Figure 4-25. Rental levels in both Converse and Platte Counties have remained below the state averages while those in Natrona County have generally tracked the state values. Monthly house rents in Campbell County have been consistently higher than other counties in the study area and the state. Also, house rents in the past year have risen dramatically from $730 to $975.

Apartment rents show a very similar pattern as illustrated by the information presented in Figure 4-26. Only Campbell County has supported monthly apartment rents above the state average, and they have seen a significant increase since the fourth quarter of 2004. Mobile homes (or mobile home lots) provide an alternative type of rental housing, especially to apartments. Rents for mobile home and lots have also shown consistent price appreciation since 2000. Rental prices for mobile home on lots increased steadily until 2005 when a price spurt took place (Figure 4-27). Trends in rental prices for mobile home lots have been upwards; however, the rate of increase has lagged that of other rental housing as can be seen from Figure 4-28. Rental prices have leveled off and declined in Converse and Platte Counties, respectively, while making an upward spurt in Natrona and Campbell Counties.

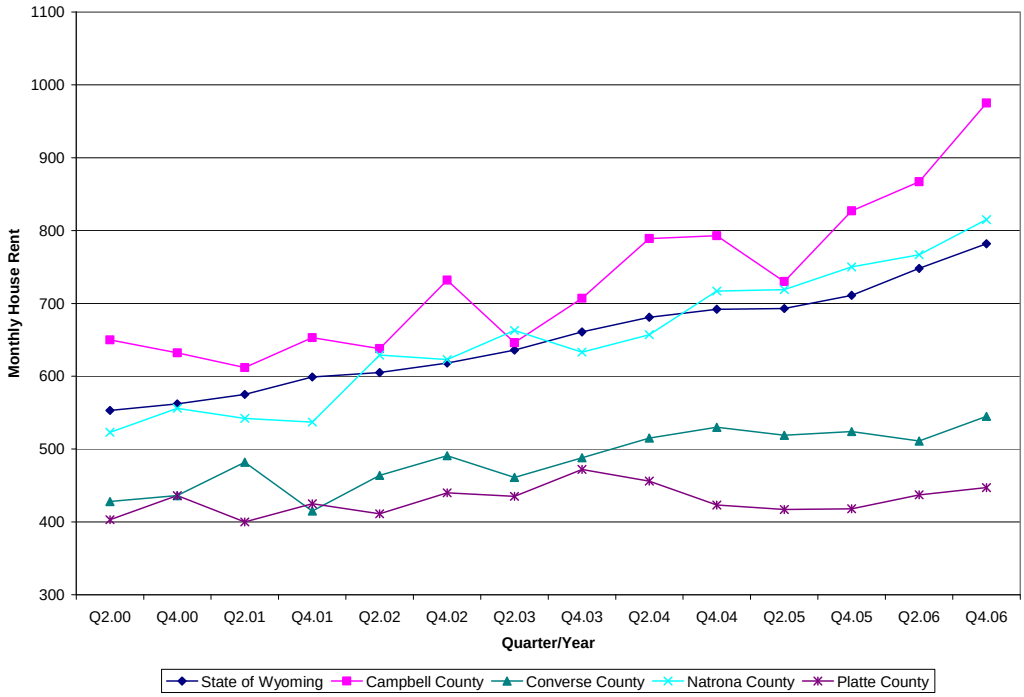

FIGURE 4-25
Monthly House Rent by County and State (2000 through 2006)

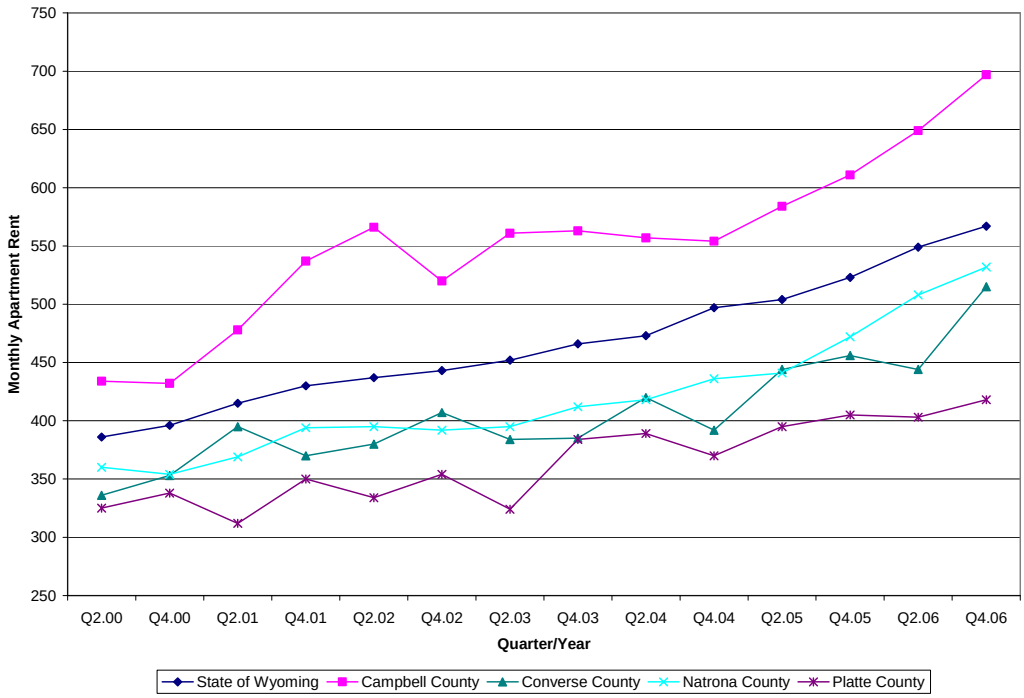

FIGURE 4-26
Monthly Apartment Rent by County and State (2000 through 2006)

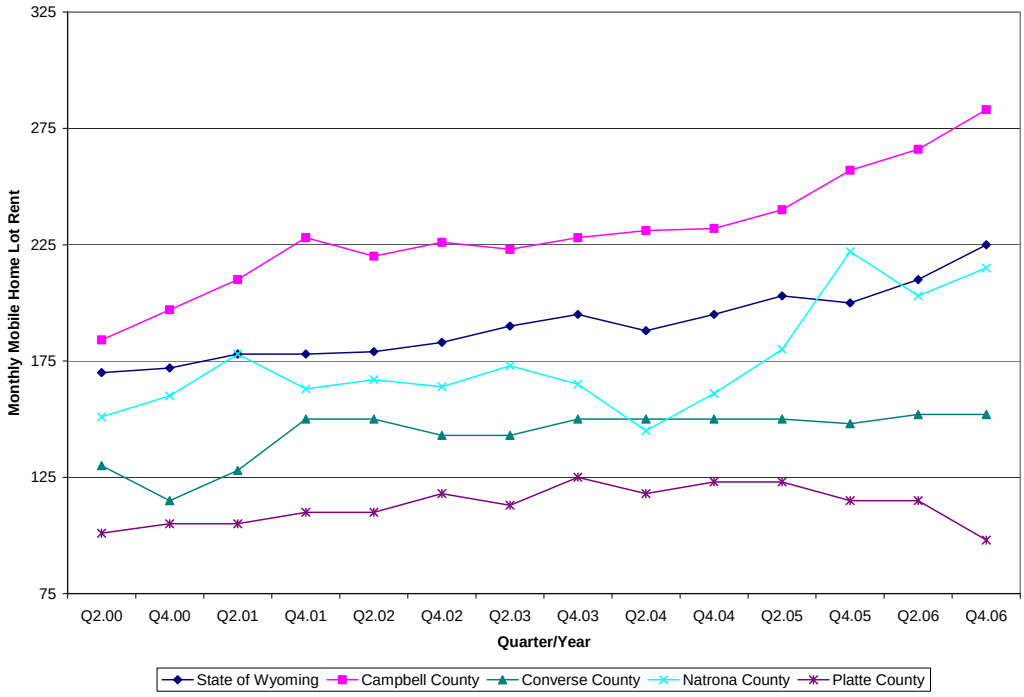

FIGURE 4-27
Monthly Mobile Home on Lot Rent by County and State (2000 through 2006)

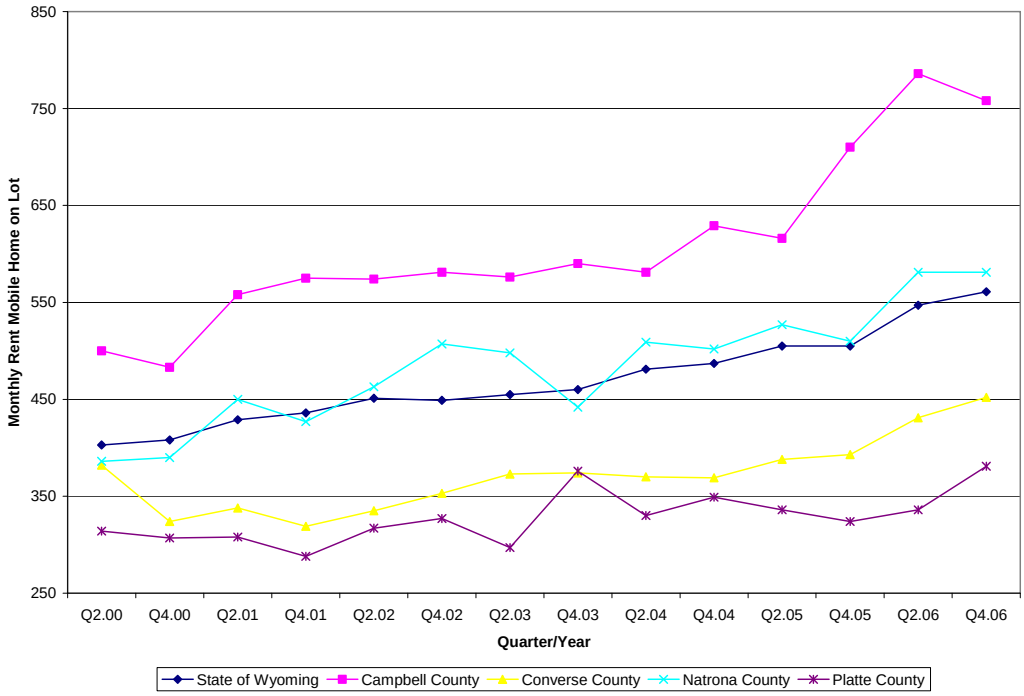

FIGURE 4-28
Monthly Mobile Home Lot Rent by County and State (2000 through 2006)

4.2.3.1.4 Rental Housing Vacancies

The State of Wyoming (2007 Wyoming Housing Needs Forecast) has estimated rental housing vacancy rates on a semi-annual basis from 2001 to 2007 for each county. Vacancy rates for each of the counties comprising the study area are shown in Table 4-24.

The natural vacancy rate can be thought of as the level of rental vacancies needed to accommodate normal turnover rates and search times for rental units in the market place. The natural vacancy rate is always greater than zero because factors such as imperfect information cause tenants to spend time searching for new units and landlords to hold some units off the market for a period of time. The rental housing natural vacancy rate can vary from place to place and over time; however, a commonly referenced level is 5 percent.

As can be seen from the information contained in Table 4-24 and Figure 4-29, vacancy rates in the rental housing markets of Campbell, Converse, and Natrona Counties have consistently been below the natural vacancy rate of 5 percent. The rates indicate an extremely tight rental housing market in the area. The rates are developed from surveys undertaken semi-annually and where a sizeable sample size exists, dramatic swings in values are unlikely. In the case of Platte County, such sizeable changes are attributable to the small sample size.

TABLE 4-24
Semi-Annual Rental Housing Vacancy Rate (%)

Year	Campbell County	Converse County	Natrona County	Platte County
2001-1	0.74	4.58	2.51	1.01
2001-2	0.67	3.38	1.89	8.89
2002-1	1.18	1.90	3.55	4.60
2002-2	3.66	3.28	4.49	11.25
2003-1	1.74	3.08	2.72	5.88
2003-2	1.27	2.78	3.41	1.43
2004-1	2.47	3.97	2.57	6.06
2004-2	2.77	8.32	2.82	2.30
2005-1	1.14	5.08	2.65	0.70
2005-2	0.62	2.27	1.96	11.97
2006-1	0.21	4.70	1.57	15.45
2006-2	0.42	1.44	1.67	23.78
2007-1	0.85	0.75	0.57	5.14

Source: Wyoming Housing Database Partnership, February 2007. *A Profile of Wyoming Demographics, Economics and Housing Semiannual Report Ending December 31, 2006*

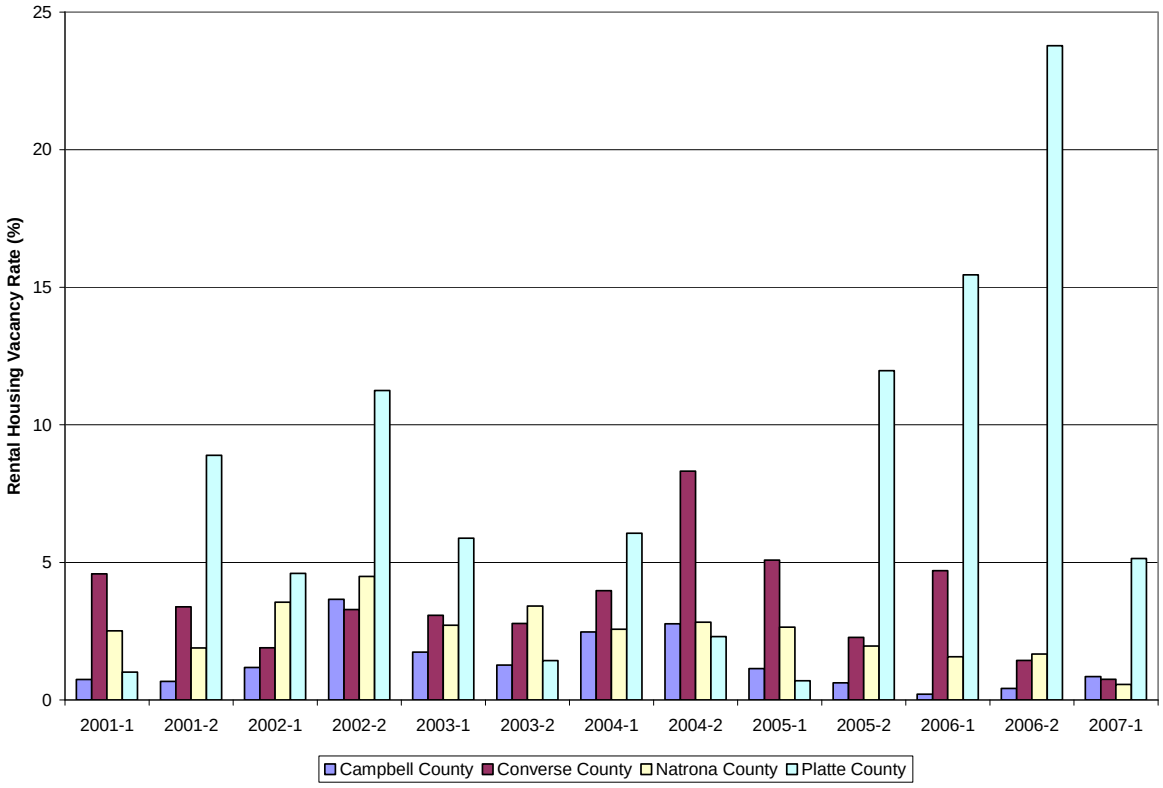

FIGURE 4-29
Rental Housing Vacancy Rate by County (2001 through 2007)

Additional indications of the tight rental housing market are available from the results of an informal survey conducted for this report. Apartment complexes were identified in the communities of Casper, Douglas, and Glenrock and contacted regarding current vacancies and rental costs. The results of the survey are presented in Table 4-25. None of the contacted complexes had units available, many had waiting lists, and vacancies were immediately filled.

TABLE 4-25
Apartment Complexes in the Study Area

Site	City	County	Apartments Available	Monthly Rent
City of Casper:				
Casper Village	Casper	Natrona	0	1 BR: $400/420 & 2 BR: $470/495
Village Gardens Apartments	Casper	Natrona	NA	NA
Oakwood Apartments	Casper	Natrona	NA	NA
Sunridge Apartments	Casper	Natrona	NA	NA
Sage Hills Townhomes	Casper	Natrona	0	2 BR: $650
Aspen Court Apartments	Casper	Natrona	0	1 BR: $469 & 2 BR $539
Platte View Apartments	Casper	Natrona	NA	NA
Foxhill Apartments	Casper	Natrona	0	Efficiency: $380, 1 BR: $425/445, & 2 BR $500/530

TABLE 4-25
Apartment Complexes in the Study Area

Site	City	County	Apartments Available	Monthly Rent
Conquistador Apartments	Casper	Natrona	0	1 BR $400 & 2 BR $500
Normandy Apartments	Casper	Natrona	NA	NA
Quail Run Apartments	Casper	Natrona	0	1 BR: $425/450, 2 BR: $500/525, & 3 BR $575
Kinsman Arms Apartments	Casper	Natrona	NA	NA
Mountain View Apartments	Casper	Natrona	NA	NA
Spring Hill Apartments	Casper	Natrona	0	1,2,& 3 BR Low income based
Gail Gardens Apartments	Casper	Natrona	0	1 & 2 BR HUD
City of Douglas:				
Conestoga Village	Douglas	Converse	NA	NA
LaPrele Apartments	Douglas	Converse	0	2 BR: $703 & 3 BR: $843
Payne Plaza	Douglas	Converse	NA	NA
Westgate Limited	Douglas	Converse	0	2 BR $544
Wind River Apartments	Douglas	Converse	NA	NA
Laurel Gardens Apartments	Douglas	Converse	NA	NA
Amber Valley Estates	Douglas	Converse	NA	NA
City of Glenrock:				
Trails Apartments	Glenrock	Converse	NA	NA
Glenrock Apartments	Glenrock	Converse	NA	NA

Source: www.DexKnows.com
www.forrent.com

A survey conducted by the Wyoming Housing Database Partnership (WHDP) of mobile home parks throughout Wyoming during January 2007 estimated that for the counties comprising the study area Campbell County had the highest vacancy rate of almost 10 percent. Converse County had the lowest vacancy rate of 1.02 percent, and Natrona and Platte Counties had similar vacancy rates at 2.27 and 2 percent, respectively. Table 4-26 displays the survey results for each of the four counties.

TABLE 4-26
Available Mobile Home Lots to Rent (January 2007)

County	Surveys	Lots	Available	Vacancy Rate
Campbell	10	1,848	181	9.79
Converse	2	196	2	1.02
Natrona	8	88	20	2.27
Platte	1	103	2	2

Source: Wyoming Housing Database Partnership, February 2007. *A Profile of Wyoming Demographics, Economics and Housing Semiannual Report Ending December 31, 2006*

A more recent, internet-based, survey of mobile home parks and communities identified 22 in Gillette, one in Wright, three in Douglas, one in Glenrock, 19 in Casper, one in Evansville, one in Wheatland, and two in Guernsey. Of the communities contacted, none identified available units, and only a limited number of lots were available.

4.2.3.1.5 Housing Survey of Needs

The WHDP develops predictions of the demand for housing within the state (down to the county and community level). They are presented in the 2007 Wyoming Housing Needs Forecast. Three separate viewpoints of the future were developed: a moderate growth scenario ending in 2020, a strong growth scenario forecast extending to 2030, and very strong growth scenario forecast extending to 2030.

The housing need predictions are a count of occupied housing units and represent unconstrained demand forecasts. That is, they refer to how the housing market will likely behave if future consumer choices are similar to trends established in the past. The year-to-year supply of housing is not modeled, but supply is assumed to materialize with sufficient household formation. Household formation, interpreted as housing demand, is a product of several factors, but it is defined here by population growth and household size.

Campbell County. The household forecast indicates a total increase of 18,171 households in Campbell County, from 12,207 in 2000 to 30,378 in 2030 as indicated in Table 4-27. Homeowners are expected to increase from 8,989 in 2000 to 23,107 by 2030. Renters are anticipated to increase from 3,218 in 2000 to 7,271 in 2030. Homeownership from the year 2000 to 2030 is expected to increase by 714 households for homeowners with extremely low incomes, by 1,058 households with incomes from 31 to 50 percent of median family income (MFI), and by 2,147 households with 51 to 80 percent of MFI. Rental demand from the year 2000 to 2030 is expected to increase by 754 households for renters with extremely low incomes. Further, rental demand for those households with 31 to 50 percent of MFI is expected to increase by 627 households over the period.

Converse County. The household forecast indicates a total increase of 3,975 households in Converse County, from 4,694 in 2000 to 8,669 in 2030 as indicated in Table 4-27. Homeowners are expected to increase from 3,475 in 2000 to 6,762 by 2030. Renters are anticipated to increase from 1,219 in 2000 to 1,906 in 2030. Homeownership from the year 2000 to 2030 is expected to increase by 234 households for homeowners with extremely low incomes, by 312 households with incomes from 31 to 50 percent of MFI, and by 494 households with 51 to 80 percent of MFI.

Rental demand from the year 2000 to 2030 is expected to increase by 166 households for renters with extremely low incomes. Further, rental demand for those households with 31 to 50 percent of MFI is expected to increase by 160 households over the period.

Natrona County. The household forecast indicates a total increase of 19,650 households in Natrona County, from 26,819 in 2000 to 46,469 in 2030 as indicated in Table 4-27. Homeowners are expected to increase from 18,740 in 2000 to 34,638 by 2030. Renters are anticipated to increase from 8,079 in 2000 to 11,831 in 2030. Homeownership from the year 2000 to 2030 is expected to increase by 891 households for homeowners with extremely low incomes, by 1,445 households with incomes from 31 to 50 percent of MFI, and by 2,452 households with 51 to 80 percent of MFI.

Rental demand from the year 2000 to 2030 is expected to increase by 691 households for renters with extremely low incomes. Further, rental demand for those households with 31 to 50 percent of MFI is expected to increase by 867 households over the period.

Platte County. The household forecast indicates a total increase of 1,639 households in Platte County, from 3,625 in 2000 to 5,264 in 2030 as indicated in Table 4-27. Homeowners are expected to increase from 2,755 in 2000 to 4,256 by 2030. Renters are anticipated to increase from 870 in 2000 to 1,008 in 2030. Homeownership from the year 2000 to 2030 is expected to increase by 141 households for homeowners with extremely low incomes, by 154 households with incomes from 31 to 50 percent of MFI, and by 293 households with 51 to 80 percent of MFI.

Rental demand from the year 2000 to 2030 is expected to increase by 20 households for renters with extremely low incomes. Further, rental demand for those households with 31 to 50 percent of MFI is expected to increase by 27 households over the period.

TABLE 4-27
Household Forecast by County by Tenure (2000 to 2030)

	Campbell County			Converse County			Natrona County			Platte County		
Year	Total	Home-owners	Renters	Total	Home-owners	Renters	Total	Home-owners	Renters	Total	Home-owners	Renters
2000	12,207	8,989	3,218	4,694	3,475	1,219	26,819	18,740	8,079	3,625	2,755	870
2005	14,274	10,583	3,691	5,122	3,833	1,289	28,941	20,488	8,453	3,650	2,817	833
2010	17,943	13,287	4,657	5,696	4,299	1,397	32,827	23,425	9,402	3,874	3,023	851
2015	20,832	15,509	5,323	6,374	4,850	1,525	36,528	26,317	10,211	4,162	3,279	883
2020	23,832	17,867	5,976	7,066	5,422	1,644	39,727	28,949	10,778	4,491	3,571	920
2025	27,011	20,388	6,623	7,836	6,063	1,773	42,905	31,631	11,274	4,864	3,900	964
2030	30,378	23,107	7,271	8,669	6,762	1,906	46,469	34,638	11,831	5,264	4,256	1,008

Source: Wyoming Housing Database Partnership, February 2007. *A Profile of Wyoming Demographics, Economics and Housing Semiannual Report Ending December 31, 2006.*

4.2.3.1.6 Temporary Accommodations

Temporary accommodations, for purposes of this report, are defined as hotel and motel rooms and sites for RVs.

Hotels and Motels. The State of Wyoming Department of Tourism website maintains lists of hotels by location and number of rooms. The information presented in Table 4-28 was compiled from this source and shows the estimated number of rooms by community and county.

TABLE 4-28
Hotel and Motel Rooms by County and Community (2007)

County and Community	Current Number of Rooms
Campbell County	1,375
Gillette	1,348
Wright	27
Converse County	387
Glenrock	23
Douglas	364
Natrona County	2,073
Casper	1,624
Edgerton	20
Evansville	419
Mills	10
Platte County	277
Glendo	24
Guernsey	46
Wheatland	207
Study Area	4,112

Sources: http://wyomingtourism.org, Accessed September 24, 2007, and CH2M HILL calculations

Based on information from Smith Travel Research for the period from 2001 to 2007, hotel and motel vacancy rates are presented in Figure 4-30. The estimated occupancy rates are derived from hotels and motels mostly in Casper, Douglas, Wheatland, Evansville, Douglas, and Glenrock. The vacancy rate is highly seasonal ranging between highs around 60 percent in December and January to lows around 10 to 20 percent in June through August. Since 2005, vacancy rates have been declining during all months of the year. Variation in monthly vacancy rate is shown in Figure 4-31.

The average daily room rate fluctuates depending on the month in the year as can be seen from the information presented in Figure 4-32. 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. From 2002 to 2005, the average hotel rate increased approximately 4.2 percent a year or an average of $2. In 2006, the price increased almost $4 from the previous year resulting in a 6.7 percent increase. Table 4-29 below displays the average daily hotel rate and percent change per year.

TABLE 4-29
Average Daily Hotel Room Rate

Year	Average Cost ($)	Percent Change Over Previous Year
2001	51.93	--
2002	53.92	3.8
2003	54.24	0.6
2004	56.09	3.4
2005	57.75	3.0
2006	61.62	6.7
2007*	66.46*	7.9*

Source: Smith Travel Research
*Year-to-date through August 2007

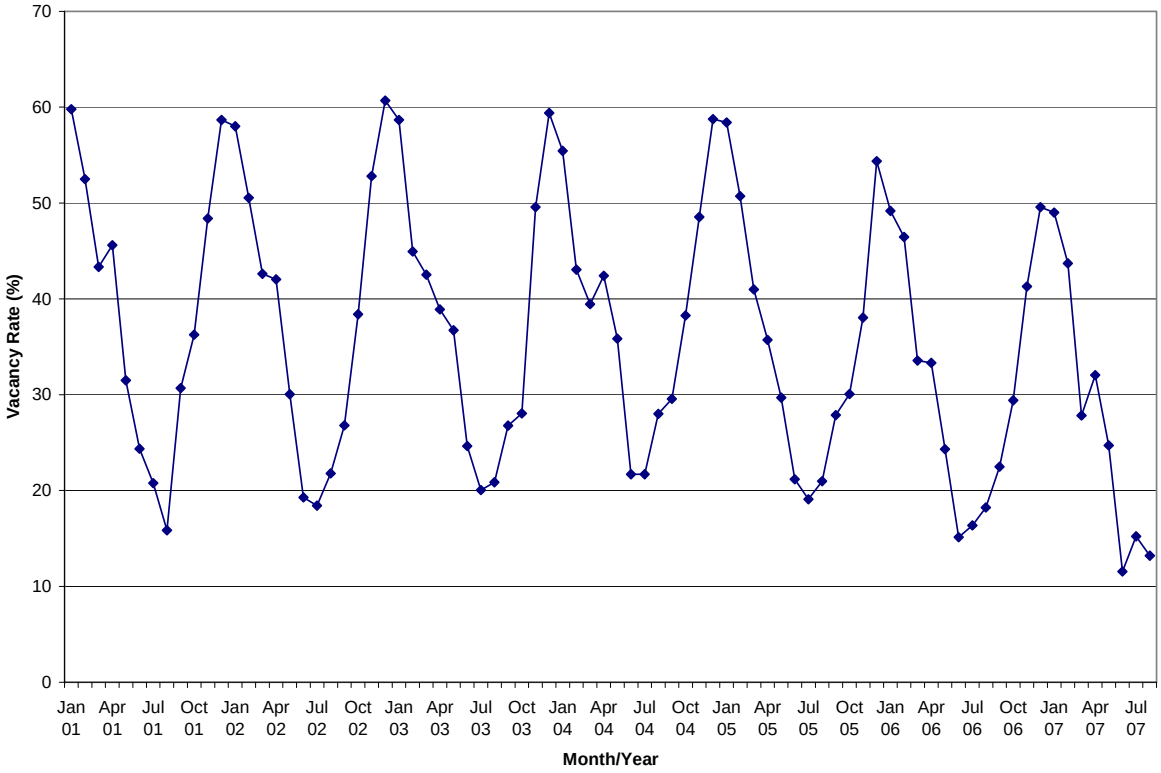

FIGURE 4-30
Hotel-Motel Vacancy Rate in the Study Area (2001 through 2007)

FIGURE 4-31
Hotel-Motel Average Room Rate in the Study Area (2001 through 2007)

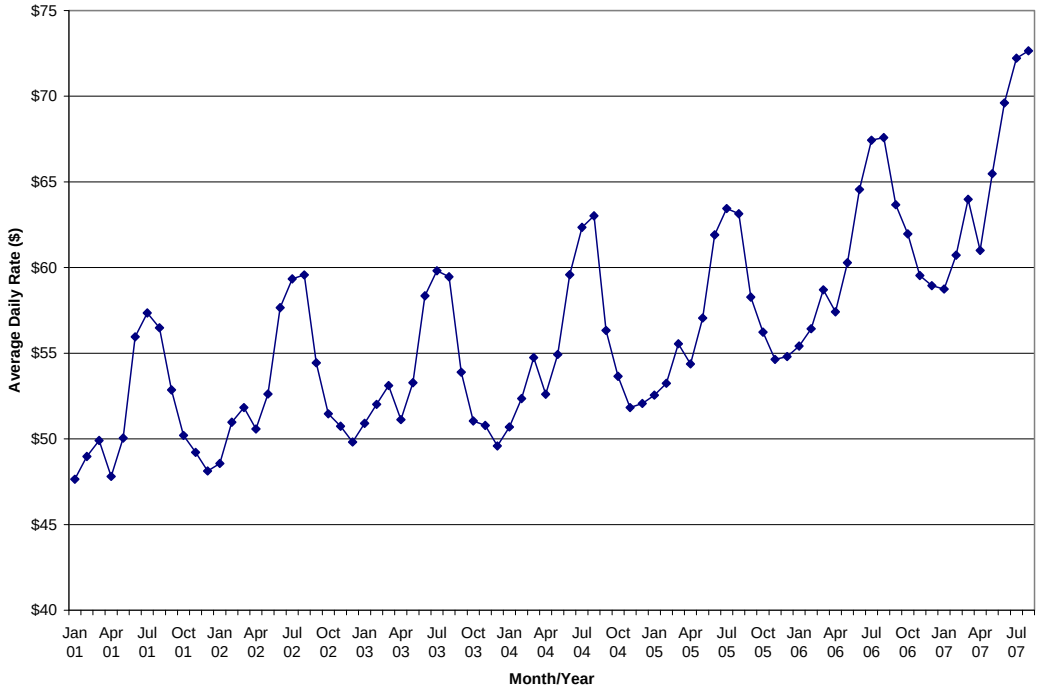

FIGURE 4-32
Hotel-Motel Average Daily Room Rate in the Study Area (2001 through 2007)

Recreational Vehicle Sites. Many RV sites in the region provide accommodation for visits with durations of weeks or months. Table 4-30 displays the number of RV site hookups for the 14 year-round camping areas within the four-county study area. The City of Casper has the most RV locations (seven sites), although Gillette has the most RV site hook-ups. Gillette and Glendo have two locations, and Wright, Glenrock, and Douglas have one location each. Vacancy rates are not currently available for this type of temporary accommodation.

TABLE 4-30
Recreational Vehicle (RV) Sites by County (2007)

Study Area	Location	No. Sites
Campbell County		**1,902**
Gillette	CAM_PLEX Multi-Event Facilities	1,761
Gillette	High Plains Campground	65
Wright	Sagebluff RV Park	76
Converse County		**137**
Glenrock	Deer Creek Village RV Park	50
Douglas	Douglas KOA Campground	87
Natrona County		**402**
Casper	Alcova Lake Campground	200
Casper	Casper East RV Park and Campground	62
Casper	Casper Mountain Campgrounds	29
Casper	Fort Caspar Campground	86
Casper	BLM Lodgepole Campground	14
Casper	Pathfinder Reservoir	3
Casper	Muddy Mountain-Rim Campground	8
Platte County		**56**
Glendo	Glendo Lakeside RV Park, LLC	44
Glendo	Hall's Glendo Marina	12

Source: http://wyomingtourism.org

4.2.4 Education

The major topics addressed in this section are location and characteristics of educational facilities, current and historical school enrollment; student-teacher ratios, and capital improvement and expansion plans.

4.2.4.1.1 Location and Characteristics of Educational Facilities

The four-county study area contains the following six school districts:

- Campbell County School District 1
- Converse County School District 1
- Converse County School District 2
- Natrona County School District 1
- Platte County School District 1
- Platte County School District 2

These six school districts, the service areas of which are illustrated in Figure 4-33, operate a total of 81 educational facilities categorized as follows: 53 elementary schools, 12 junior high/middle schools, 12 high schools, and 1 kindergarten through 12th grade school. Natrona County District 1 is the largest district, with 34 educational facilities, followed by Campbell County District 1 with 21 educational facilities. Table 4-31 shows the type and number of schools by district and selected district-wide characteristics. Revenues per student vary by school district with Natrona County District 1 and Converse County District 1 at about $11,000 followed by Platte County District 1 and Campbell County District 1 around $13,000 to $14,000 per student. Converse County District 2 and Platte County District 2 have values of around $16,000 to $17,000 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 all school districts at between 7 percent and 13 percent. Platte County District 2 receives the greatest proportion of its revenues from the state (72 percent) followed by Platte County District 1 and Natrona County District 1 at just below 60 percent. Local revenue sources, composed of property tax revenues and special impact aid funds, provide the most important funding source in Campbell County District 1 where they comprise 85 percent of all revenues.

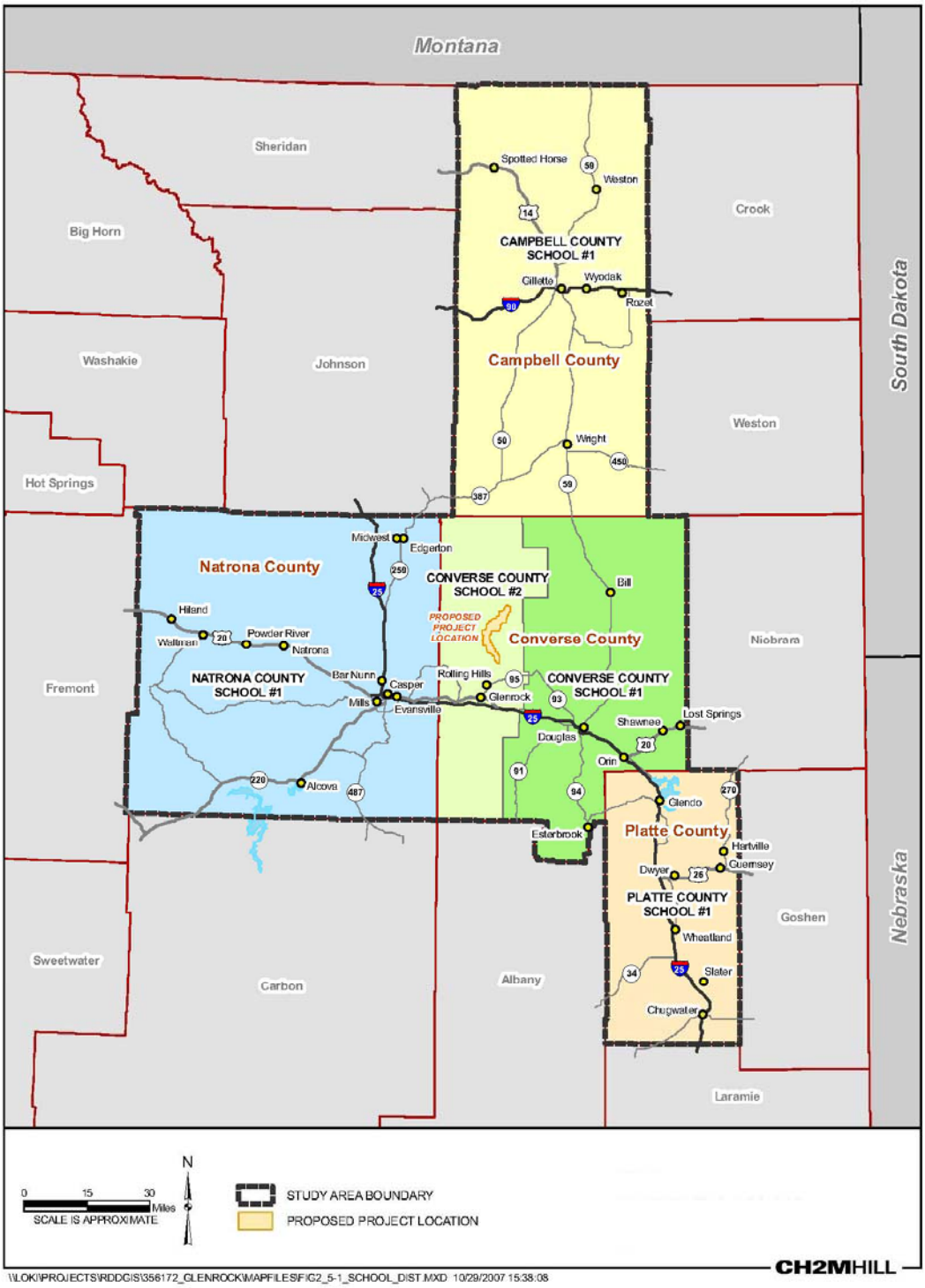

FIGURE 4-33
Public School Districts in the Study Area

TABLE 4-31
Selected Characteristics of School Districts in the Study Area

	Campbell County School District 1	Converse County School District 1	Converse County School District 2	Natrona County School District 1	Platte County School District 1	Platte County School District 2
Elementary	21	8	5	34	10	3
Middle School/Jr. High	15 [a]	6	2	25	4	1
High School	3[a]	1	2	5	3	1
K-12	0	0	0	1	0	0
No. Classroom Teachers (FTE)	514	126	59	823	118	27
Other Staff (FTE)	730	134	61	870	110	22
Instructional Aides	94	46	16	247	24	6
Revenue per Student	$13,891	$11,391	$15,836	$10,902	$12,900	$16,798
Revenue Source (%):						
Federal	7%	11%	8%	13%	10%	9%
Local	85%	57%	50%	27%	33%	19%
State	8%	32%	42%	59%	57%	72%

Source: Wyoming Department of Education http://www.k12.wy.us/
[a] Wright Jr. and Sr. High School is one building but are counted as separate educational facilities

4.2.4.1.2 Student Enrollment

Student enrollment as of October 1, 2006, totaled 22,783 in the study area, as shown in Table 4-32. Natrona County School District 1 had the highest enrollment with 11,444 students, followed by Campbell County School District 1 with 7,617 students. There were 1,617 students in Converse County School District 1 and 1,168 students in Platte County District 1. Converse County District 2 and Platte County District 2 had the lowest enrollment with 691 and 246, respectively.

During the period 1991 through 2006, enrollment in each of the six school districts declined by over 2,700 students (-10.7 percent), as can be seen from the information presented in Table 4-32 and Figure 4-34. The greatest numeric decline of over 1,570 students occurred in Natrona County School District 1. However, the greatest percentage declines took place in Converse County School District 2 (-24.8 percent), Platte County District 2 (-24.5 percent), and Platte County District 1 (21 percent).

TABLE 4-32

School District Enrollment

Year	Campbell District #1	Converse District #1	Converse District #2	Natrona District #1	Platte District #1	Platte District #2	Study Area Total
2006	7,617	1,617	691	11,444	1,168	246	22,783
2005	7,337	1,584	713	11,408	1,155	233	22,430
2004	7,198	1,587	739	11,546	1,187	241	22,498
2003	7,234	1,582	743	11,590	1,228	259	22,636
2002	7,368	1,688	771	11,650	1,256	254	22,987
2001	7,441	1,663	792	11,835	1,315	256	23,302
2000	7,488	1,660	783	12,038	1,351	276	23,596
1999	7,580	1,715	860	12,048	1,436	276	23,915
1998	7,710	1,747	879	12,271	1,494	246	24,347
1997	7,684	1,793	909	12,612	1,533	248	24,779
1996	7,903	1,828	894	12,885	1,495	249	25,254
1995	7,975	1,843	897	12,936	1,483	263	25,397
1994	8,029	1,809	906	13,100	1,539	285	25,668
1993	8,044	1,858	932	13,223	1,526	295	25,878
1992	8,014	1,819	914	13,015	1,541	318	25,621
1991	7,983	1,794	919	13,018	1,479	326	25,519
Change (1991-2006)							
Numeric	-366	-177	-228	-1,574	-311	-80	-2,736
Percent	-4.58%	-9.87%	-24.81%	-12.09%	-21.03%	-24.54%	-10.72%
Ave. Ann. %	-0.31%	-0.69%	-1.88%	-0.86%	-1.56%	-1.86%	-0.75%

Source: Wyoming Department of Education. Accessed July 2007
https://wdesecure.k12.wy.us/pls/warehouse/wde.district_profile.menu

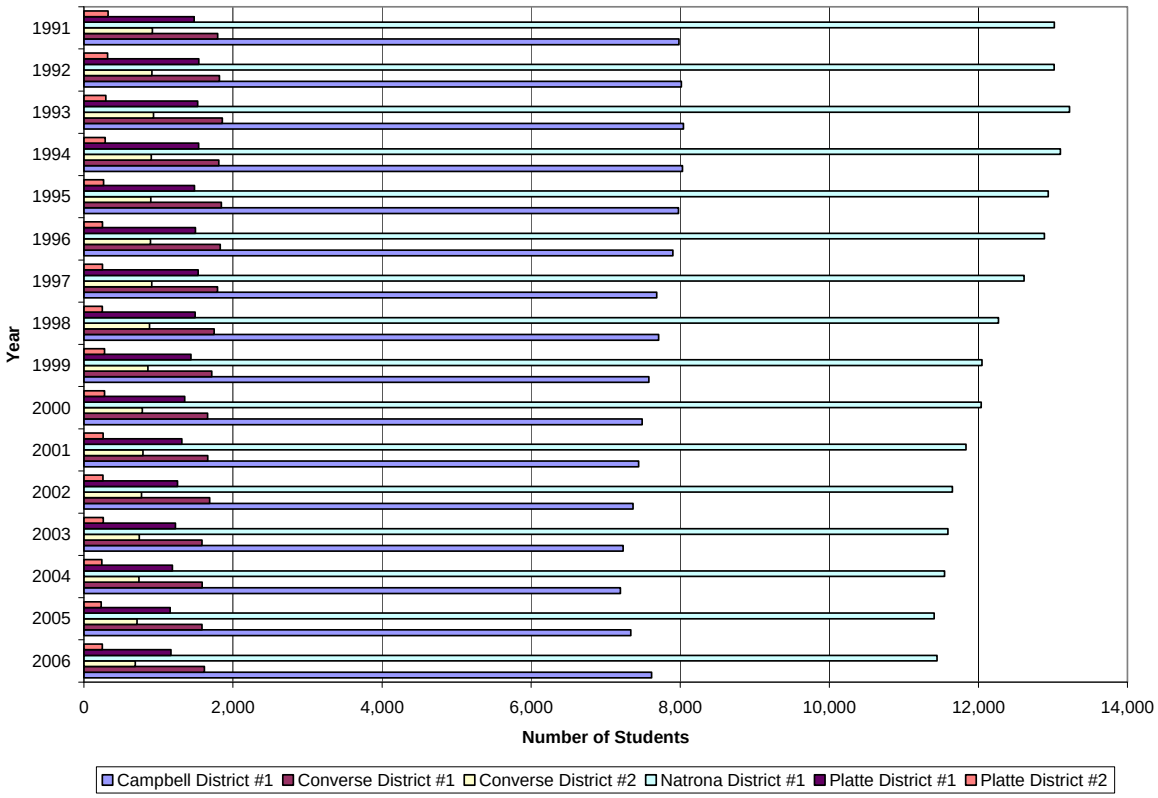

FIGURE 4-34
Public School Enrollment by School District (1991 through 2006)

4.2.4.1.3 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 full-time equivalent (FTE) certified teachers. This ratio provides a means of comparing different educational units such as school districts to a state or national parameter. The approach is to document trends in the student-teacher ratio for each of the school districts in the study area and compare their behavior to the respective values for the state as a whole and to national levels.

Of the school districts comprising the study area, Platte County School Districts 1 and 2 (with 2005 student/teacher ratios of 9.3 and 8.1, respectively) have the lowest ratios. Their ratios are also well below the state and national levels. Natrona County School District 1 had the highest student/teacher ratio of 14.9, followed by Campbell County School District 1 with 13.0, Converse County School District 1 with 12.2, and Converse County School District 2 with 10.9. Overall, the study area average student-teacher ratio was 11.4 in 2005. The ratio for the state of Wyoming has consistently been lower than that of the nation. Table 4-33 and Figure 4-35 displays student-teacher ratios by school district in the study area, the state of Wyoming, and the nation from 1995 to 2005. Over this period, the ratios for all school districts and the State of Wyoming have shown a consistent decline (i.e., fewer students per teacher).

TABLE 4-33

Historic Student-Teacher Ratios

Year	Campbell District #1	Converse District #1	Converse District #2	Natrona District #1	Platte District #1	Platte District #2	Wyoming	United States
2005	13.0	12.2	10.9	14.9	9.3	8.1	12.6	15.5
2004	12.8	12.7	11.4	14.4	9.9	8.7	12.8	15.6
2003	13.5	12.5	11.4	14.4	10.8	9.5	13.2	15.9
2002	13.6	13.3	11.9	14.6	11.3	9.7	13.3	15.9
2001	13.7	13.4	12.2	14.6	11.5	9.9	13.3	15.9
2000	14.3	12.8	11.3	15.1	11.4	10.8	13.5	16.0
1999	14.1	13.0	12.4	15.1	12.2	11.5	13.7	16.1
1998	14.7	13.2	12.6	15.9	12.5	10.3	14.5	16.4
1997	15.0	13.6	12.9	16.5	12.8	10.3	15.0	16.8
1996	15.4	14.2	12.7	16.1	12.9	9.8	15.2	17.1
1995	15.5	13.9	12.7	16.6	13.0	9.4	15.6	NA

Source: Wyoming Department of Education. Accessed July 2007
https://wdesecure.k12.wy.us/pls/warehouse/wde.district_profile.menu

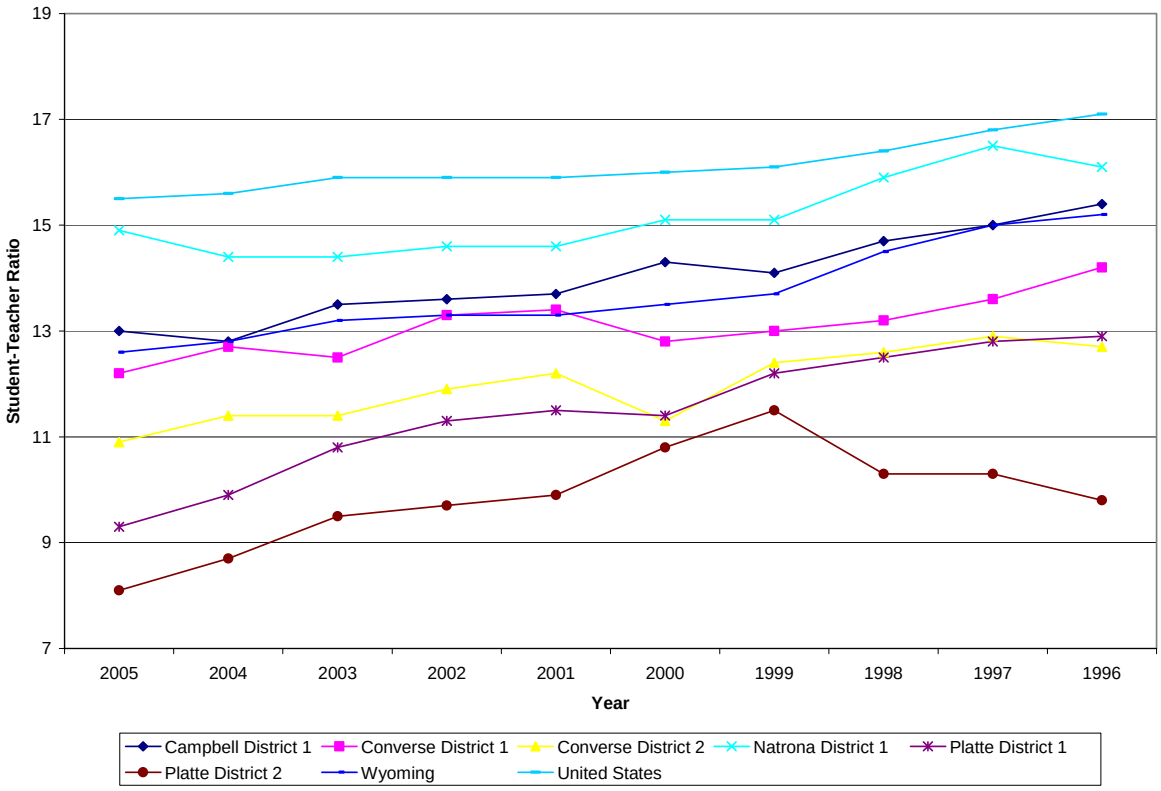

FIGURE 4-35
Student-Teacher Ratio by School District, State of Wyoming, and Nation (1996 through 2005)

4.2.4.1.4 Capital Improvement and Expansion Plans

To assess future needs anticipated as a result of baseline population growth in the study area, local Capital Improvement Plans (CIP) for school expansions were reviewed. The projects contained in these CIPs 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.

4.2.5 Public Safety

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

4.2.5.1.1 Fire and Police Services

The four-county study area has a total of 29 fire stations operated by 16 fire departments, the majority of which are staffed on a volunteer basis. Table 4-34 lists the fire departments and selected characteristics describing each department. Career firefighters are present in the following agencies:

TABLE 4-34
Fire Departments in the Study Area

Name	No. Stations	No. Firefighters		
		Career	Paid per Call	Volunteer
Study Area Total				
Campbell County Total	**10**	**13**	**0**	**170**
Campbell County Fire Department	10	13	0	170
Converse County Total	**3**	**28**	**0**	**67**
Dave Johnston Power Plant Fire Brigade	1	28	0	0
Douglas Fire Department	1	0	0	35
Glenrock/Converse County Volunteer Fire Department	1	0	0	32
Natrona County Total	**10**	**87**	**0**	**114**
Bar Nunn Fire Department	1	0	0	17
Casper Fire Department	5	73	0	0
Casper Mountain Fire Department	1	0	0	35
Evansville Emergency Service	1	0	0	28
Mills Volunteer Fire Department	1	0	0	24
Natrona County Fire Protection District	1	14	0	10
Platte County Total	**5**	**70**	**0**	**75**
Chugwater Fire Protection	1	0	0	18
Platte County Fire District 2F	1	70	0	0

TABLE 4-34
Fire Departments in the Study Area

Name	No. Stations	No. Firefighters		
		Career	Paid per Call	Volunteer
Guernsey Volunteer Fire Department	1	0	0	16
Hartville Volunteer Fire Department	1	0	0	10
Wheatland Volunteer Fire Department	1	0	0	31

Sources: Wyoming Geographic Information System (GIS) data, 2005; Wyoming Department of Revenue Map & GIS Data Index, 3-2-2007, Fire Districts; Firefightingnews.com; http://www.50states.com/wyoming/fire_departments.htm?show=G

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, as shown in Table 4-35.

TABLE 4-35
Police Stations in the Study Area

Name	Address	City	County
Campbell County Sheriff Department	515 Wright Boulevard Wright, WY	Wright	Campbell
Gillette Police Department	201 East 5th Street Gillette, WY 82716	Gillette	Campbell
Glenrock Police Department	219 South 3rd Street Glenrock, WY 82637	Glenrock	Converse
Converse County Sheriff Department	107 North 5th Street Douglas, WY	Douglas	Converse
Douglas Police Department	101 North 4th Street Douglas, WY 82513	Douglas	Converse
Wyoming Highway Patrol	P.O. Box 2963 Casper, WY 82602	Casper	Natrona
Natrona County Sheriff Department	201 North David Casper, WY 82601	Casper	Natrona
Casper Police Department	Hall of Justice 201 North David 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
Midwest Police Department	531 Peake Street Midwest, WY 82643	Midwest	Natrona
Glendo Police Department	204 S. Yellowstone Hwy Glendo, WY 82213	Glendo	Platte
Platte County Sheriff Department	850 Maple Street Wheatland, Wyoming	Wheatland	Platte
Guernsey Police Department	81 W. Whalen	Guernsey	Platte

TABLE 4-35
Police Stations in the Study Area

Name	Address	City	County
	Guernsey, WY 82214		
Wheatland Police Department	951 Water St. Wheatland, WY 82201	Wheatland	Platte

Source: http://50states.com/wyoming/police_departments.htm, http://www.50states.com/wyoming/fire_departments.htm

Over the period 1999 through 2006, the number of law enforcement officers within the study area has remained virtually unchanged at 296. As of 2006, each of the counties had the following number of officers: 90 in Campbell County, 35 in Converse County, 152 in Natrona County, and 19 in Platte County. As can be seen from the information presented in Table 4-36, the majority of the law enforcement officers are located in the communities of Casper and Gillette. These communities have two of the three lowest LOS ratios (officers per 1,000 residents) in the study area (1.7 and 2.0, respectively) and highest number of index crimes per officer.

TABLE 4-36
Law Enforcement Personnel (2006)

County/Agency	Employees			Officers per 1,000 Population	Index Crimes per Officer
	Total	Officers	Civilian		
Campbell County	131	90	41		
Campbell County Sheriff	59	43	16	2.9	7.8
City of Gillette	72	47	25	2.0	21.9
Converse County	55	35	20		
Converse County Sheriff	19	12	7	2.5	3.7
Town of Douglas	26	16	10	2.8	10.8
Town of Glenrock	10	7	3	2.9	5.9
Natrona County	206	152	54		
Natrona County Sheriff	52	43	9	3.3	10.0
City of Casper	133	91	42	1.7	29.8
Town of Evansville	10	8	2	3.4	14.1
Town of Mills	11	10	1	3.4	9.9
Platte County	23	19	4		

TABLE 4-36
Law Enforcement Personnel (2006)

County/Agency	Employees			Officers per 1,000 Population	Index Crimes per Officer
	Total	Officers	Civilian		
Platte County Sheriff	10	7	3	1.7	3.7
Town of Guernsey	3	3	0	2.7	3.3
Town of Wheatland	10	9	1	2.6	14.4

Source: Crime in Wyoming, Annual Report, State of Wyoming Office of Attorney General, 2006

4.2.5.1.2 Crime

Reported crimes (i.e., crimes known to law enforcement) are classified 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). To facilitate comparison between reporting areas with differing characteristics such as number of residents, crime rates are reported as the number of crimes per 10,000 resident persons. Between 1999 and 2006, the number of index crimes in each of the counties of the study area first rose (peaking in 2002 or 2003) and then fell, as can be seen from the information presented in Table 4-37 and Figure 4-36.

TABLE 4-37
Number of Index (Part 1) Crimes by County (1999 through 2006)

Violent Crime								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	73	109	113	90	104	54	76	73
Converse County	20	13	43	27	29	19	21	20
Natrona County	168	233	198	181	156	131	163	168
Platte County	10	9	12	31	21	14	19	10
State of Wyoming	1,201	1,309	1,259	1,329	1,280	1,130	1,137	1,201
Property Crime Rate								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	1,289	1,273	1,498	1,582	1,353	1,277	1,188	1,294
Converse County	354	237	253	292	261	255	219	238
Natrona County	2,547	2,509	2,767	3,184	3,522	3,354	3,315	3,187
Platte County	209	193	161	226	177	219	157	153
State of Wyoming	15,285	14,891	16,038	16,312	16,306	16,573	15,841	15,040

TABLE 4-37
Number of Index (Part 1) Crimes by County (1999 through 2006)

Index Crime Rate								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	1,362	1,382	1,611	1,672	1,457	1,331	1,264	1,367
Converse County	374	250	296	319	290	274	240	258
Natrona County	2,715	2,742	2,965	3,365	3,678	3,485	3,478	3,355
Platte County	219	202	173	257	198	233	176	163
State of Wyoming	16,486	16,200	17,297	17,641	17,586	17,703	16,978	16,241

Source: Crime in Wyoming, Annual Report, State of Wyoming Office of Attorney General, 1999 through 2006

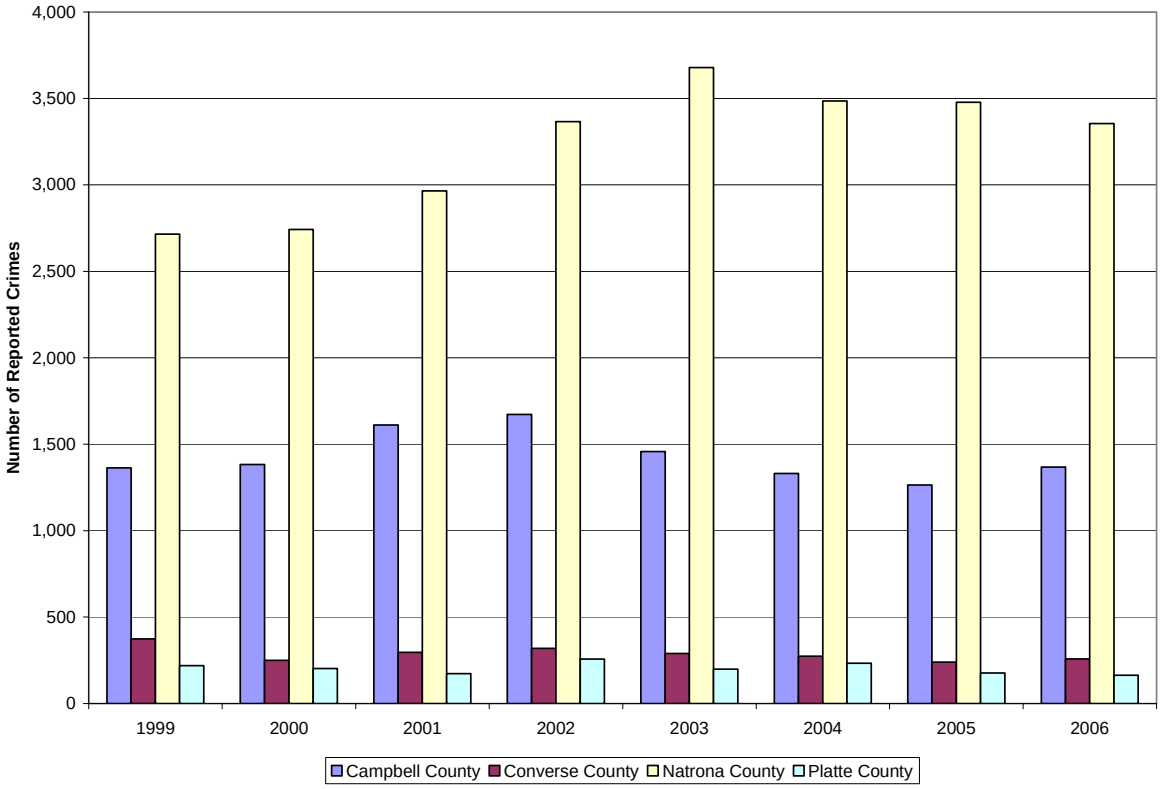

FIGURE 4-36
Number of Index Crimes by County (1999 through 2006)

Crime rates also exhibit a similar pattern over the period, but in recent years, the trend has been downward as can be seen from Table 4-38 and Figure 4-37. In 2006, crime rates increased slightly in Converse and Campbell Counties. Index crimes are highly influenced by crimes against property because these types of crime are much more prevalent than violent crimes. As can be seen from the information presented in Figure 4-38; however, the

violent crime rate has declined in each of the study area counties, and all but Natrona County rank below the rate for the state.

TABLE 4-38
Index (Part 1) Crime Rates by County (1999 through 2006)

Violent Crime								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	19.3	32.3	33.5	25.6	29.2	14.7	20.6	19.3
Converse County	15.5	10.8	35.7	22.0	23.6	15.2	16.7	15.5
Natrona County	23.8	35.3	30.0	27.1	23.3	19.1	23.5	23.8
Platte County	11.5	10.5	14.0	35.5	23.9	16.2	21.8	11.5
State of Wyoming	23.5	26.9	25.9	27.1	26.1	22.9	22.5	23.5
Property Crime Rate								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	340.8	377.8	444.5	449.3	380.3	348.7	321.8	342.1
Converse County	274.2	196.6	209.9	238.4	212.0	204.7	174.0	184.4
Natrona County	360.9	380.4	419.5	477.4	525.5	489.5	477.8	451.5
Platte County	239.8	225.4	188.0	258.5	201.5	253.3	180.2	175.5
State of Wyoming	299.0	305.7	329.9	332.9	332.4	335.2	313.3	294.2
Index Crime Rate								
	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Campbell County	360.1	410.1	478.1	474.9	409.5	363.4	342.4	361.4
Converse County	289.7	207.4	245.6	260.4	235.6	219.9	190.7	199.9
Natrona County	384.7	415.7	449.5	504.6	548.7	508.6	501.2	475.3
Platte County	251.3	235.9	202.0	293.9	225.4	269.5	202.0	187.0
State of Wyoming	322.5	332.6	355.8	360.1	358.5	358.1	335.8	317.7

Source: Crime in Wyoming, Annual Report, State of Wyoming Office of Attorney General, 1999 through 2006

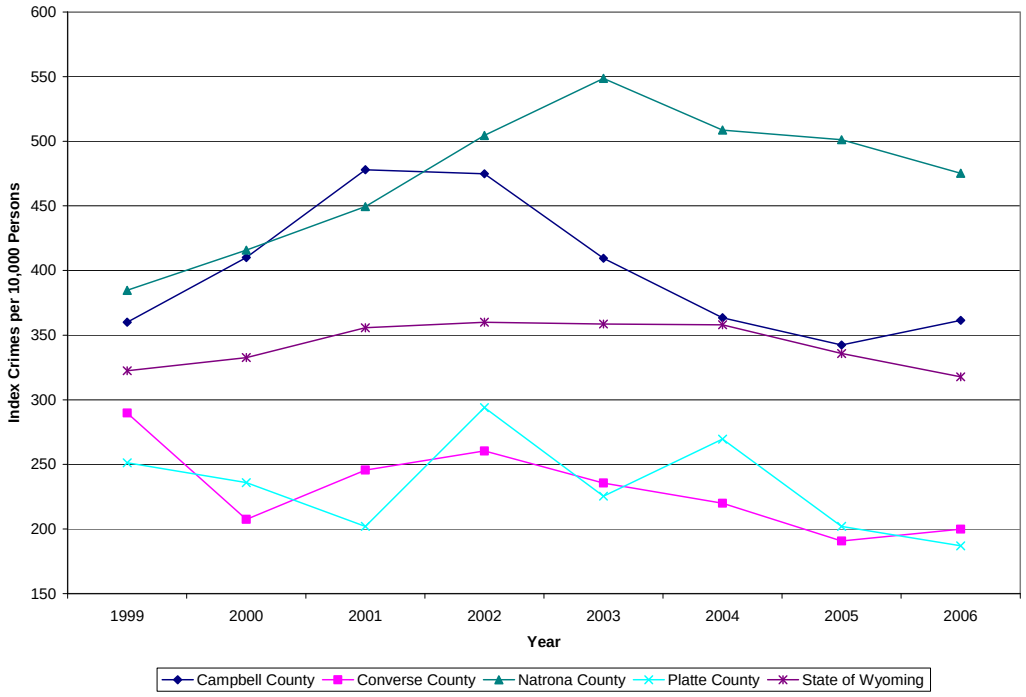

FIGURE 4-37
Index Crime Rate by County and State of Wyoming (1999 through 2006)

FIGURE 4-38
Violent Crime Rate by County and State of Wyoming (1999 through 2006)

4.2.6 Health Care

This section discusses the location and characteristics of health care facilities in the four-county study area, including the number and type of facilities, staffing levels, and LOS measures; availability of emergency medical service; and the health needs of the existing population.

4.2.6.1.1 Location and Characteristics of Health Care Facilities

There are four hospitals in the study area: one located in each of the four counties as illustrated in Figure 4-39. They are Campbell County Memorial Hospital in Gillette, Memorial Hospital of Converse County in Douglas, Wyoming Medical Center in Casper (Natrona County), and Platte County Memorial Hospital in Wheatland. Each hospital is located in the major community and county seat of their respective counties. Although Campbell County has the largest number of hospital beds of the four counties, the LOS ratio (beds per 10,000 residents) is the second lowest, as presented in Table 4-39 and Figure 4-40. The admissions LOS and inpatient surgery LOS for Natrona County are substantially higher than for the other counties, while the outpatient visits and outpatient surgery ratios are lower. These differences are explained by differences in the type and function of the hospitals. The Wyoming Medical Center offers a wider range of specialties and functions as a regional medical center compared to the more restricted range of services offered by the other facilities. The emergency room visit LOS values are similar for each of the counties.

TABLE 4-39
General Hospitals in the Study Area: Selected Statistics

	Campbell	Converse	Natrona	Platte
Number of Beds	209	25	205	68
Admissions	3,623	810	9,867	582
Inpatient Surgeries	963	219	3,364	92
Outpatient Visits	139,263	24,075	69,594	19,605
Outpatient Surgeries	1,800	850	2,119	319
Emergency Room Visits	19,617	4,335	32,556	3,064
Level of Service Ratios (per 10,000 residents)				
Number of Beds	54	19	29	79
Admissions	932	630	1,397	675
Inpatient Surgeries	248	170	476	107
Outpatient Visits	35,810	18,721	9,851	22,744
Outpatient Surgeries	463	661	300	370
Emergency Room Visits	5,044	3371	4,608	3,555

Sources:
Wyoming Healthcare Commission, Statistical Handbook 2006, http://hptc.unmc.edu/wy/handbook.html
http://health.usnews.com/usnews/health/hospitals/directory/glance_6830080.htm.
Wyoming Office of Rural Health, Wyoming Medical Professional Survey: http://wdh.state.wy.us/Media.aspx?mediaId=928
http://eadiv.state.wy.us/pop/wyc&sc20.htm
http://www.wmcnet.org/nursing/index.php
http://www.conversehospital.com/
http://www.ccmh.net/

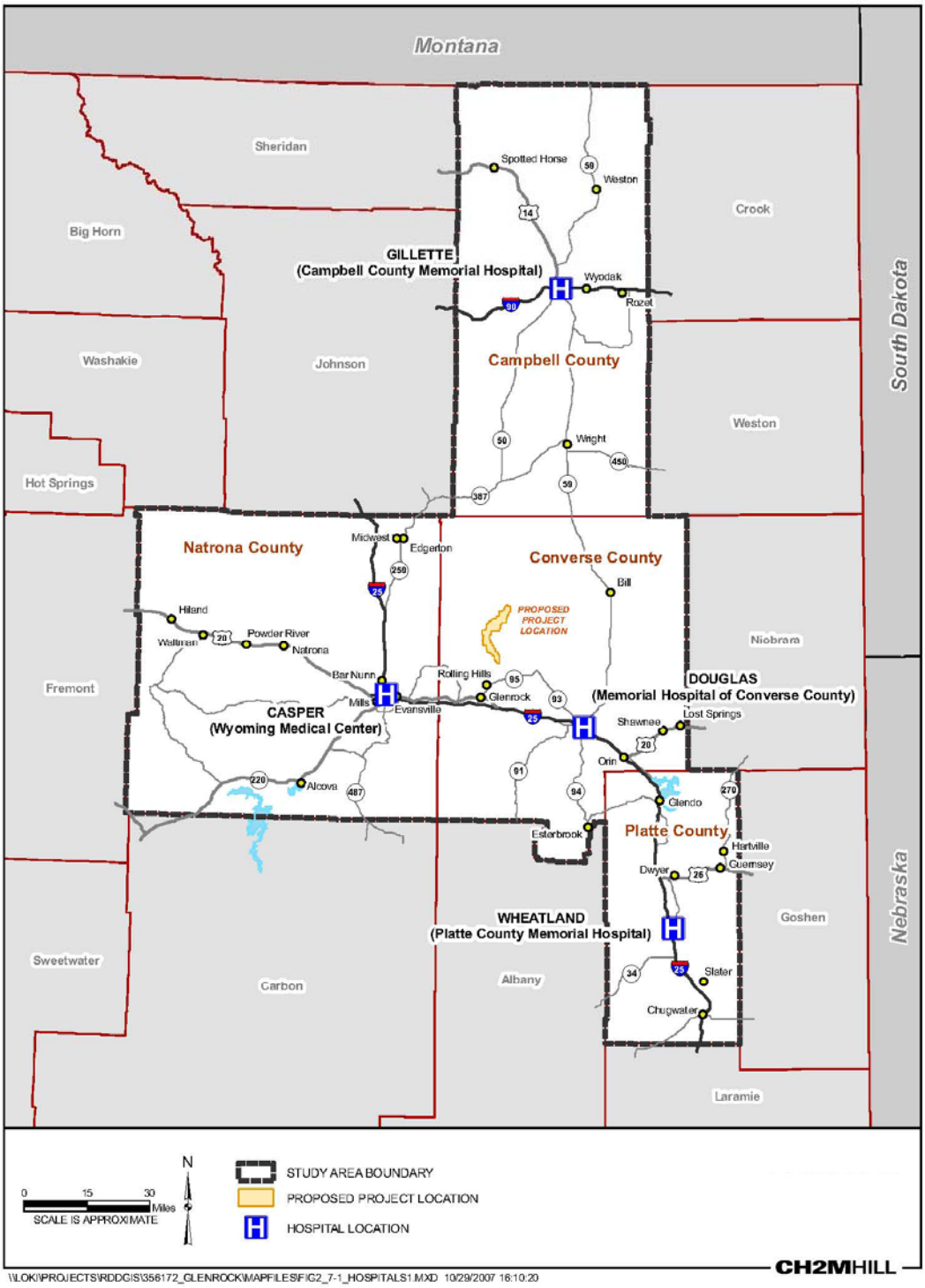

FIGURE 4-39
Location of Hospitals in the Study Area

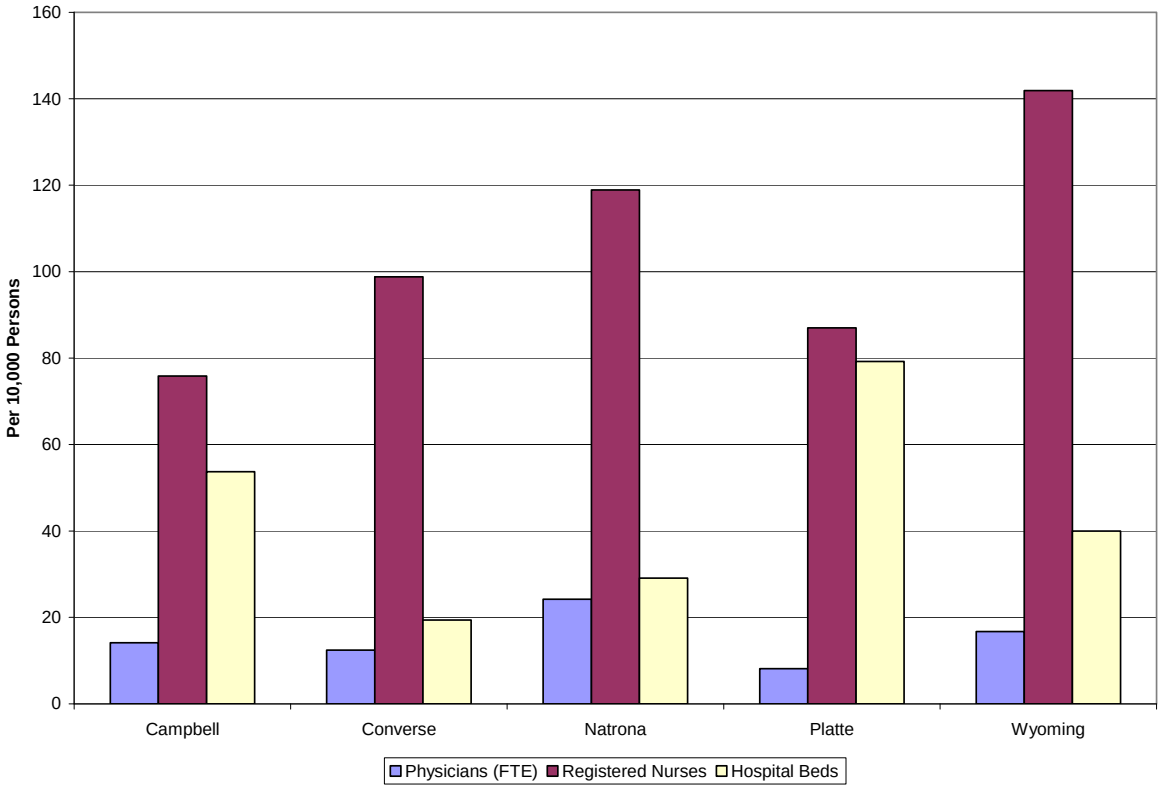

FIGURE 4-40
Level of Service Ratios for Health Care Professionals

The county within the study area with the highest number (69 percent) of physicians is Natrona County, which also has the highest number per 10,000 residents (24.2). Platte County, as can be seen from the information presented in Table 4-40, has the lowest number of physicians per 10,000 resident population (8.1). Only Natrona County and the study area as a whole have a physician LOS higher than that of the state. Natrona County also has higher LOS values than the other two counties for registered nurses and dentists. However, the ratio is less than that of the state for registered nurses. Of the four counties comprising the study area, Platte County exhibits the lowest LOS ratio for physicians (8.1), and Campbell County exhibits the lowest LOS ratio for nurses (7.6) compared to the study area (2.4 and 19.9, respectively) and to the state of Wyoming (1.9 and 25.4, respectively). A comparison of LOS ratios for each of the counties is presented in Figure 4-40.

TABLE 4-40
Health Care Professionals in the Study Area (2006)

	Physicians		Nurses				Dentists		Pharmacists	
County	Full-time Equivalents	Number of Professionals	Total	Registered Nurse	Licensed Practical Nurse	Certified Nurse Assistant	Full-time Equivalents	Number of Professionals	Full-time Equivalents	Number of Professionals
Campbell	55	64	553	295	90	168	13	15	20	22
Converse	16	18	254	127	14	113	3	4	7	6
Natrona	171	160	1,638	840	99	699	36	41	64	73
Platte	7	68	156	75	22	59	2	2	5	7
Study Area	249	310	2,601	1,337	225	1,039	54	62	96	108
Wyoming	858	961	13,076	7,306	1,260	4,510	232	266	342	399
Level of Service Ratios (per 10,000 residents in 2006)										
Campbell	14.1	16.5	142.2	75.9	23.1	43.2	3.3	3.9	5.1	5.7
Converse	12.4	14.0	197.5	98.8	10.9	87.9	2.3	3.1	5.4	4.7
Natrona	24.2	22.6	231.8	118.9	14.0	98.9	5.1	5.8	9.1	10.3
Platte	8.1	78.9	181.0	87.0	25.5	68.4	2.3	2.3	5.8	8.1
Study Area	19.0	23.7	198.5	102.0	17.2	79.3	4.1	4.7	7.3	8.2
Wyoming	16.7	18.7	253.9	141.9	24.5	87.6	4.5	5.2	6.6	7.7

Sources:
Wyoming Healthcare Commission, Statistical Handbook 2006, http://hptc.unmc.edu/wy/handbook.html
http://health.usnews.com/usnews/health/hospitals/directory/glance_6830080.htm
Wyoming State Board of Nursing, 2007
2006 Population: http://eadiv.state.wy.us/pop/wyc&sc20.htm

The majority of physicians in each of the counties and the state of Wyoming are full-time, ranging between 93 percent in Campbell County, 100 percent in Converse County, 88 percent in Natrona County, and 93 percent in Platte County. The state rate is 89 percent, as presented in Table 4-41. There are noticeable general medical staff vacancies in Campbell County with four staff, Converse County with three staff, Natrona County with 37 staff, and Platte County with one staff.

TABLE 4-41
Physician Staffing Levels by County

	Campbell County	Converse County	Natrona County	Platte County	State of Wyoming
Total Number of Physicians	44	18	120	14	836
Full-Time Employed Physicians	41	16	91	5	637
Part-Time Employed Physicians	2	0	8	1	52
Full-Time Contract Physicians	0	2	14	8	108
Part-Time Contract Physicians	1	0	7	0	56
Number of General Medical Staff Vacancies	4	3	37	1	140

Source: Wyoming Medical Professional Survey. Prepared for Wyoming Office of Rural Health by Wyoming Health Resource Network, Inc. and Wyoming Center for Business & Economic Analysis, LLC. October 2004.

Table 4-42 provides information on the types of physicians in each county within the study area as well as the ratio of physicians to the county population. Natrona and Platte Counties

had the highest LOS for both total physicians and specialist physicians along with having higher levels of service than the state as a whole.

TABLE 4-42
Physician Level of Service Ratios by County

Staff and Contract Physicians: Number and Per Capita Ratio	Campbell County	Converse County	Natrona County	Platte County	State of Wyoming
Total Number of Physicians (full- and part-time)	44	18	120	14	836
Number of Specialists (full- and part-time)	34	11	94	13	576
Number of Family Practice and Internal Medicine Physicians (full- and part-time)	10	7	26	1	260
Physicians (per 1,000 Residents	1.10	1.38	1.67	1.62	1.60
Specialists (per 1,000 Residents)	0.85	0.84	1.31	1.51	1.10
Family Practice Physicians (per 1,000 Residents)	0.25	0.54	0.36	0.12	0.50

Source: Wyoming Medical Professional Survey. Prepared for Wyoming Office of Rural Health by Wyoming Health Resource Network, Inc. and Wyoming Center for Business & Economic Analysis, LLC. October 2004. http://eadiv.state.wy.us/pop/wyc&sc20.htm Accessed September 20, 2007

In 2001, the study area contained almost 980 certified emergency medical service (EMS) providers, 157 certified ambulance attendants, and 29 ambulances, as can be seen from the information presented in Table 4-43. The certified ambulance attendant LOS for Platte County is the highest of the counties with a value of 3.5 followed by Converse, Campbell, and Natrona Counties.

TABLE 4-43
Emergency Medical Services by County

	Campbell County	Converse County	Natrona County	Platte County
Certified EMS Providers	385	147	397	49
Certified Ambulance Attendants	42	22	62	31
Per 1,000 residents	1.2	1.8	0.9	3.5
Square Mile per Attendant	113	194	87	68
Number of Service Providers	1	2	5	4
Number of Ambulances (vehicles)	7	5	10	7
Ambulance Runs	2,465	812	4,571	976

Source: Wyoming Department of Health. 2001. *Wyoming Emergency Medical Services System Quick Stats*.

4.2.6.1.2 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. Some areas of the state are experiencing

extraordinary growth, while others are in 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.

4.2.7 Municipal Services

This section describes the location and characteristics of the following five primary municipal services provided to citizens within the four-county study area:

- Electricity
- Natural gas
- Water
- Wastewater treatment
- Waste disposal

4.2.7.1.1 Electricity and Natural Gas

There are six primary suppliers of electricity and four of natural gas in the four-county study area, as shown in Table 4-44.

TABLE 4-44
Electric and Gas Utility Company Service Areas

Company	Counties Served
Electricity	
Rocky Mountain Power	Converse County, Natrona County
High Plains Power	Natrona County
Niobrara Electric	Converse County, Platte County
Powder River Energy	Campbell County
Wheatland REA	Converse County, Platte County
Wyrulec Company	Platte County
Gas	
Kinder Morgan	Converse County, Platte County, Natrona County
MGTC Inc.	Campbell County, Converse County
Northern Gas of Wyoming	Campbell County, Natrona County
Montana-Dakota	Campbell County

Sources: Wyoming Public Service Commission. Wyoming Gas Utilities Certified Areas. March 2003; http://psc.state.wy.us/htdocs/certterr.htm

4.2.7.1.2 Water

The study area contains 66 community water purveyors: 34 in Campbell County; five in Converse County; 21 in Natrona County; and six in Platte County, as shown in Table 4-45. The majority are small community water systems serving a small number of residents. Exceptions are the City of Gillette (Campbell County) serving 24,999 residents with an average daily use of 4.5 million gallons per day (gpd); the Town of Douglas (Converse County) serving 5,300 residents with a use of almost 1.4 million gpd; and the City of Casper (Natrona County) serving 54,000 residents with a use of 9.2 million gpd.

TABLE 4-45
Community Water Systems in the Study Area

Water System Name	Population Served	Primary Water Source Type	Total Maximum Capacity (gpm)	Average Day Use (gpd)	Peak Day Use (gpd)
Campbell County					
American Road Water & Sewer D	215	Groundwater	115	25,000	NA
Antelope Mobile Home Park	351	Groundwater	NA	NA	NA
Antelope Valley	1,280	Groundwater	NA	NA	NA
Cedar Hills Water Association	258	Groundwater	180	2,731	6,581
Cook Road Water District	256	Groundwater	120	NA	NA
Countryside Water Users, Inc.	360	Groundwater	180	20,000	NA
Crestview Estates Subdivision	482	Groundwater	120	76,000	230,000
Eight Mile Subdivision	87	Groundwater	75	6,660	43,200
Force Road Joint Powers Board	244	Groundwater	115	30,000	144,000
Fox Park Subdivision	843	Groundwater	NA	NA	NA
Freedom Hills Subdivision	400	Groundwater	NA	NA	NA
City of Gillette	24,999	Groundwater	7,452	4,450,000	13,580,000
Glory Hole Homeowners Assn	75	Groundwater	NA	NA	NA
Green Valley Estates Imp. Dis.	70	Groundwater	100	53,000	97,000
Heritage Village Subdivision	750	Groundwater	369	61,250	296,138
Highview MHP (Affordable Res Comm)	145	Groundwater	NA	NA	NA
Hitching Post Trailer Court	50	Groundwater	NA	NA	NA
Hoy Mobile Home Park	100	Groundwater	NA	NA	NA
Lemaster Enterprises	70	Groundwater	NA	NA	NA
Mc Gee Mobile Home Park	36	Groundwater	NA	NA	NA
Meadow Springs Serv & Imp Dist	25	Groundwater	NA	NA	NA
Means Imp. & Service Dist.	410	Groundwater	200	NA	NA
Nickelson Farms Water Company	400	Groundwater	NA	NA	NA
People's Improvement & Svc Dis	114	Groundwater	55	33,000	44,000
Section 4 Water System Inc.	120	Groundwater	NA	NA	NA
Sleepy Hollow Subdivision	1,680	Groundwater	NA	NA	NA
Southfork Estates	138	Groundwater	60	10,000	75,000
Southside Water System	60	Groundwater	NA	NA	NA
Stone Gate Estates	268	Groundwater	NA	NA	NA
Stroup Trailer Court	70	Groundwater	NA	NA	NA
Ward Creek Landowners Assoc.	72	Groundwater	NA	NA	NA
Westridge Water Users Assoc.	264	Groundwater	105	70,000	140,000
Wrangler Estates	150	Groundwater	NA	NA	NA
Wright Water & Sewer District	1,500	Groundwater	1,350	15,000	108,000
Converse County					
Town of Douglas	5,300	Surface water	3,900	1,395,600	3,760,140
Fairway Estates	100	Groundwater	115	17,000	43,500
Town of Glenrock	2,283	Groundwater	1,700	600,000	1,400,000
Ridgewater Improvement Distr.	143	Purchased surface water	1,500	28,173	74,015
Town of Rolling Hills	440	Groundwater	400	70,349	387,168
Natrona County					
Air Base Acres	250	Purch surface	NA	10,000	13,000

TABLE 4-45
Community Water Systems in the Study Area

Water System Name	Population Served	Primary Water Source Type	Total Maximum Capacity (gpm)	Average Day Use (gpd)	Peak Day Use (gpd)
		water			
Alcova Dam Trailer Park	45	Groundwater	NA	NA	NA
Broken Wrench LLC	50	Groundwater	NA	NA	NA
Casper Board of Pub Utilities	54,500	Purch surface water	36,111	9,200,000	28,000,000
Central WY Reg Water Sys JPB	25	Groundwater under infl of surface water	NA	NA	NA
Countryside Court	125	Groundwater	NA	NA	NA
Town of Edgerton	169	Purch surface water	350	13,000	50,000
Town of Evansville	2,200	Surface water	NA	NA	NA
Lakeview Improvement & Service District	45	Purch surface water	NA	NA	NA
Town of Midwest	408	Purch surface water	350	90,000	200,000
Town of Mills	3,200	Surface water	3,600	861,750	2,500,000
Natrona County Int'l Airport	312	Purch surface water	NA	NA	NA
Pioneer Water and Sewer District	450	Purch surface water	NA	95,000	154,000
Pleasant View Water Company	130	Purch surface water	NA	NA	NA
Poison Spider Improvement & Services Distr.	100	Purch surface water	NA	NA	NA
Riverside Trailer Court	155	Groundwater	NA	NA	NA
Sandy Lake Estates- ISD	150	Purch surface water	NA	NA	NA
South Riverside Acres Water Impr Dist	50	Groundwater	40	7,272	NA
Thirty-Three Mile Road I & SD	150	Purch surface water	NA	NA	NA
Vista West Water Company	1,600	Purch surface water	NA	NA	NA
Wardwell Water & Sewer Dist.	2,100	Purch surface water	NA	300,000	416,666
Platte County					
Town of Chugwater	244	Groundwater	320	38,850	60,000
Town of Glendo	195	Groundwater	225	95,587	178,685
Town of Guernsey	1,152	Surface water	NA	NA	NA
Town of Hartville	78	Groundwater	1,350	22,000	NA
Town of Wheatland	3,271	Groundwater	2,500	169,599	NA
Y-O Investments, INC	150	Groundwater	NA	NA	NA

Source: EPA Enviromapper. http://www.epa.gov/enviro/ Accessed July 9, 2007. State of Wyoming, Wyoming Water Development Commission, 2004 Water System Survey Report

4.2.7.1.3 Wastewater

The study area contains 19 wastewater treatment facilities located, for the most part, in the larger communities as shown in Table 4-46. The facilities range from small wastewater

lagoon systems to complex treatment facilities such as those serving major population centers.

TABLE 4-46
Wastewater Treatment Facilities Within the Study Area

County	Facility Name
Campbell County	
	Gillette Wastewater Treatment Facility
	Wright Wastewater Treatment Facility
	Crestview Estates W&S District
	Fox Park STP
	Gillette-Campbell County Airport
	Rawhide School
	Winland Enterprises STP
Converse County	
	Glenrock Wastewater Lagoon
	Town of Douglas
Natrona County	
	Camp Sacajawea
	City of Casper
	Edgerton Wastewater Lagoon
	Midwest Wastewater Lagoon
	Sam Hobbs Regional Wastewater Facility
	Tribal A Tensleep Battery #1
Platte County	
	Chugwater Wastewater Lagoon
	Guernsey Wastewater Lagoon
	Hartville Wastewater Treatment Facility
	Wheatland Wastewater Lagoon

Source: U.S. Environmental Protection Agency. Quick Start http://www.epa.gov/enviro/index.html. Accessed September 20, 2007

4.2.7.1.4 Waste (Non-hazardous) Disposal

Table 4-47 lists the types of non-hazardous waste disposal facilities in the study area and their status (active or proposed). Facility types include industrial landfills; solid waste treatment, storage, and disposal (SWTSD) facilities; and Type I and Type II municipal waste facilities.

TABLE 4-47
Waste Disposal Facilities Within the Study Area

Facility Name	Facility Type	Facility Status
Campbell County		
Empire Field	Industrial Landfill	Active
Wright Disposal Service - Proposed	Industrial Landfill	Proposed
Two Elk Ash Landfill	Industrial Landfill	Active
Baler/Transfer Facility	SWTSD	Active
Black Hills Trucking Gillette Terminal	SWTSD	Active
Envirotank	SWTSD	Active
Campbell County - Balefill #1	Type I Municipal	Active
Campbell County - Balefill #2	Type I Municipal	Active
Wright - Proposed Site	Type II Municipal	Proposed
Converse County		
Dave Johnston Plant	Industrial Landfill	Active
Douglas San #1	Type I Municipal	Active
Glenrock #1	Type II Municipal	Active
Glenrock #2 - Proposed	Type II Municipal	Proposed
Natrona County		
Land Treatment Facility, Casper	Industrial Landfill	Active
Naval Petroleum Reserve Ind. #2	Industrial Landfill	Active
Baler/Transfer Facility	SWTSD	Active
Black Hills Trucking-Casper Terminal	SWTSD	Active
Mobile Concrete	SWTSD	Active
Robinson Contracting - UST	SWTSD	Active
True Drilling	SWTSD	Active
Wyoming Tire, Inc.	SWTSD	Active
PCS Treatment Facility-Casper	SWTSD	Proposed
Used Oil Storage Facility	SWTSD	Proposed
Casper Balefill	Type I Municipal	Active
Central Wyoming Regional Landfill	Type I Municipal	Proposed
Midwest-Edgerton #2	Type II Municipal	Active
Platte County		
Laramie River Station Exp.	Industrial Landfill	Active
Wheatland #2	Type II Municipal	Active
Guernsey #2 - Proposed	Type II Municipal	Proposed

Source: State of Wyoming, Department of Environmental Quality, 2007. http://deq.state.wy.us/shwd/database.asp

Natrona County has 13 waste disposal facilities, while Platte County has the fewest with three facilities. The predominant type of waste disposal facility in the study area is the SWTSD facility. There are a total of 11 SWTSDs in the study area, including eight in Natrona County and three in Campbell County.

Community size and activities, such as construction, influence both the quantity and composition of solid waste. As seen from the information in Table 4-48, Natrona County generates the greatest quantity of solid waste at 80,815 tons annually, and Converse County that has the largest per capita generation of 8 pounds per person per day.

TABLE 4-48
Solid Waste Generation by County

County/Area	Tons per Year	Population (2000)	Pounds per Person per Day	Percent of State Total
Campbell County	32,393	33,698	5.3	4.7
Converse County	17,620	12,052	8.0	2.6
Natrona County	80,815	66,533	6.7	11.8
Platte County	4,745	8,807	3.0	0.7

Source: Wyoming Business Council, 2007 http://www.wyomingbusiness.org/business/energy.aspx Accessed Sept 20, 2007

4.2.8 Transportation Facilities

This section identifies major transportation facilities in the study area and their utilization levels and provides a review of transportation plans that identify planned improvements.

4.2.8.1.1 Identification of Major Facilities

Figure 4-41 shows the major road transportation corridors within the study area. Interstate 25 (I-25) extends from the south through the middle of Platte County in a north-south direction before changing to an east-west direction through Converse County. Upon reaching Casper in Natrona County, the interstate highway turns abruptly north. From Douglas in Converse County, State Route 59 runs directly north to Gillette in Campbell County where it intersects with I-90. Table 4-49 details the major roads and highways in each of the counties of the study area and their general direction.

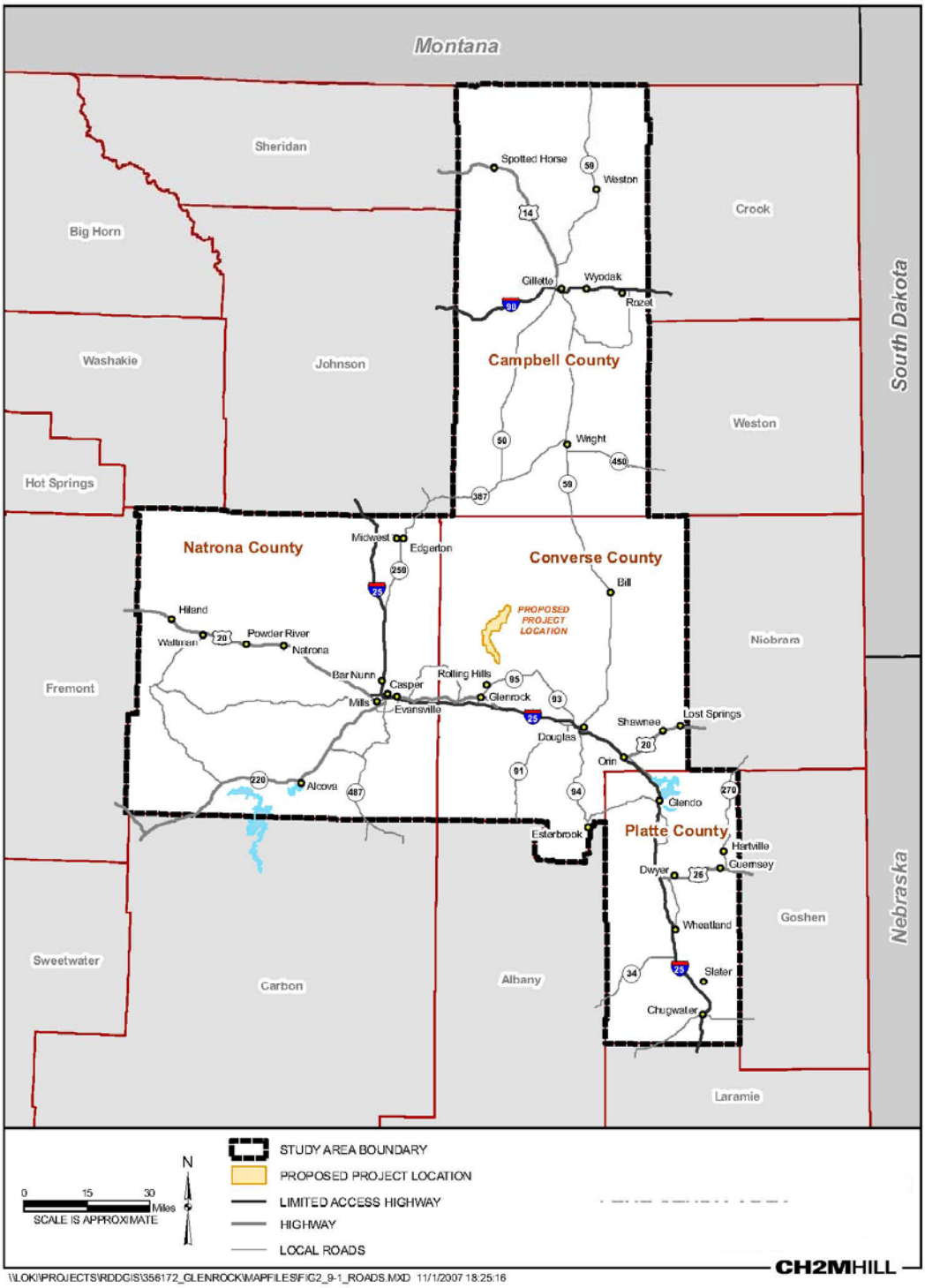

FIGURE 4-41
Major Roads and Highways in the Study Area

TABLE 4-49
Road Systems within the Study Area

County	Road	Type	General Direction
Campbell	I-90	Interstate	East-West
Campbell	US 14 &16	US Highway	North-South
Campbell	SR 59	State Highway	North-South
Campbell	SR 387	State Highway	East-West
Converse	I-25	Interstate	East-West
Converse	SR 59	State Highway	North-South
Natrona	I-25	Interstate	North-South
Natrona	US 87	US Highway	East-West
Natrona	SH 255	State Highway	East-West
Natrona	US 20 & 26 Bus.	US Highway	East-West
Natrona	I-25	Interstate	North-South
Natrona	US 20 & 26	US Highway	East-West
Natrona	SH 220	State Highway	North-South
Natrona	SH 487	State Highway	East-West
Natrona	SH 220	State Highway	North-South
Platte	I-25	Interstate	North-South
Platte	US 25	US Highway	East-West
Platte	US 85	US Highway	North-South

Source: CH2M HILL, 2007

Traffic counts are recorded at a number of locations throughout the state, and those that fall within the four-county study area are shown on Figure 4-42. The highest traffic volumes are generally on I-25 and I-90. However, State Route (SR) 59 carries an equal (and sometimes higher) traffic load, especially near its intersection with I-90 in Gillette (Campbell County) as can be seen from the information presented in Table 4-50. The highest proportion of trucks (measuring between 20 and 25 percent in places) is recorded on SR 220 just southwest of Casper. Interstate highway segments also have generally high (10 to 15 percent) proportions of truck traffic.

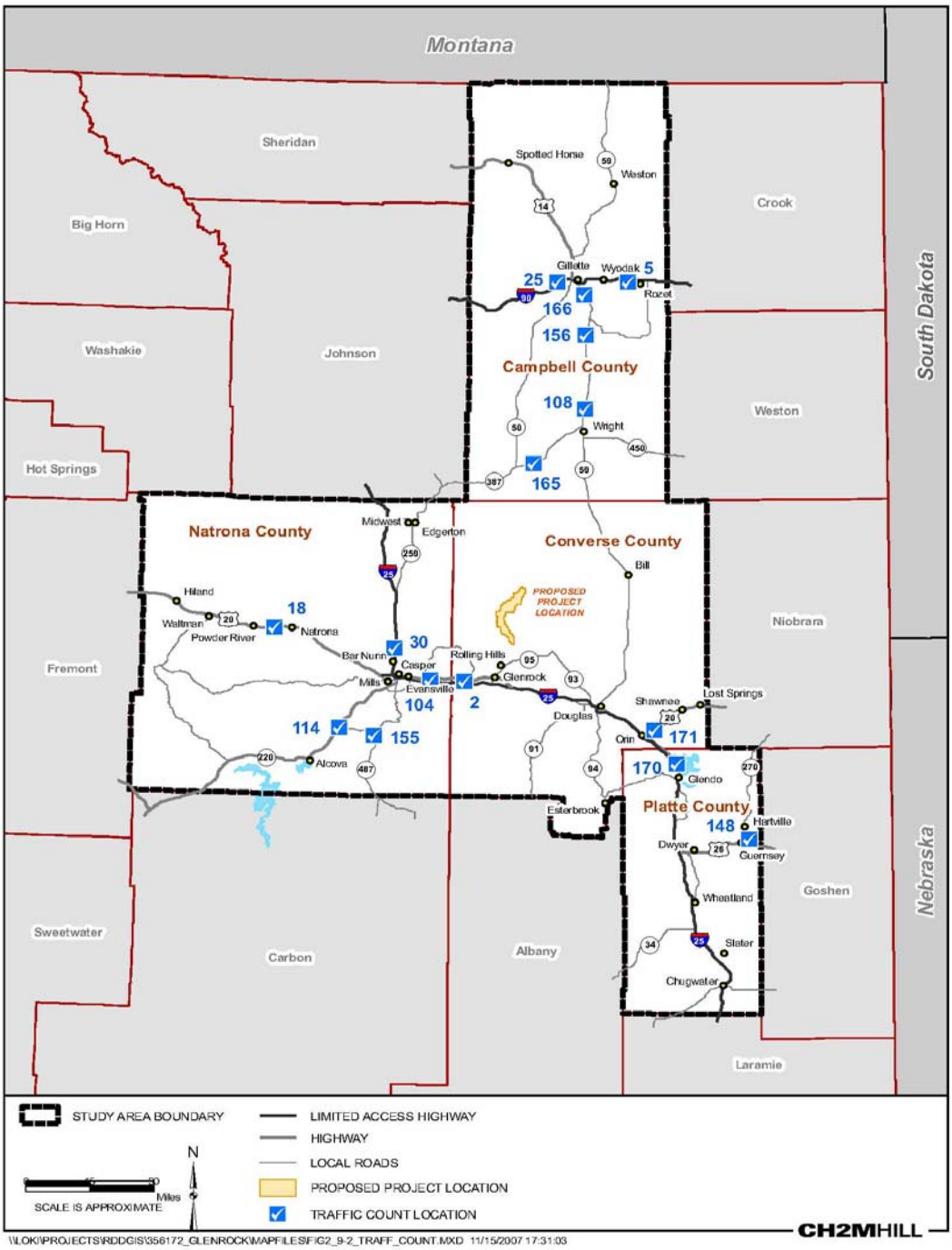

FIGURE 4-42
Traffic Counts in the Study Area

TABLE 4-50
Average Annual Daily Traffic (AADT) and Percent Truck Traffic, by Day and Highway

Station No.	Location	Highway	County	Average Annual Daily Traffic (AADT)							Percent Truck Traffic
				Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
5	Gillette East	Interstate 90	Campbell	6,135	6,449	6,444	6,631	6,719	7,532	6,847	10-15%
25	Gillette West	Interstate 90	Campbell	3,982	4,658	4,867	4,888	5,050	5,375	4,309	10-15%
108	Reno Junction North	SR59	Campbell	2,653	3,704	3,926	3,919	4,036	4,213	2,914	10-15%
156	Gillette South	SR59	Campbell	3,563	5,453	5,821	5,877	5,827	5,977	4,044	5-10%
165	Pine Tree Junction	SR367	Campbell	754	853	878	898	919	1,055	798	15-20%
166	Gillette Donkey Creek	SR59	Campbell	12,073	19,288	20,172	20,292	20,321	20,952	15,115	0-5%
2	Casper East	Interstate 25	Converse	6,671	6,906	6,889	7,192	7,361	8,325	7,138	Not Available
171	Orin Station	US 18/20	Converse	2,148	1,845	1,763	1,890	1,972	2,321	2,079	15-20%
18	Powder River East	US 20/26	Natrona	2,362	2,325	2,254	2,276	2,435	2,938	2,425	10-15%
30	Casper North	Interstate 25/US 87	Natrona	4,917	5,103	5,026	5,176	5,406	6,120	5,073	15-20%
104	Casper East	US 20/26	Natrona	1,866	2,606	2,670	2,670	2,670	2,830	2,316	0-5%
114NE	Goose Egg Southwest	SH 220	Natrona	3,798	3,210	3,076	3,235	3,266	3,897	3,976	20-25%
114SE	Goose Egg Southwest	SH 487	Natrona	814	631	578	571	641	946	824	5-10%
114SW	Goose Egg Southwest	SH 220	Natrona	3,185	2,631	2,608	2,778	2,758	3,178	3,332	20-25%
155	Shirley Basin North	SR 487	Natrona	783	571	517	519	576	855	781	5-10%
148N	Guernsey East	US26	Platte	545	587	580	591	592	673	539	Not Available
148E	Guernsey East	SR270	Platte	1,467	1,653	1,718	1,744	1,783	1,931	1,610	Not Available
148W	Guernsey East	US26	Platte	2,126	2,302	2,317	2,378	2,419	2,671	2,266	Not Available
170	Orin Junction	Interstate 25	Platte	6,178	5,411	4,963	5,192	5,625	6,870	5,571	15-20%

Source: CH2M HILL, 2007

Figure 4-43 shows the location of rail infrastructure and freight volumes carried by the major lines. Within the study area the major lines are operated and maintained by the Union Pacific Railroad and Burlington Northern Railroad. The Union Pacific Railroad operates approximately 880 miles of track in the State of Wyoming and serves the coal-rich Powder River Basin in north central Wyoming with more than 60 coal trains a day traveling to and from the basin. This branch lines passes through Converse and Campbell counties as shown in Figure 4-43. Union Pacific's transcontinental main line across southern Wyoming hosts as

many as 65 trains a day. A main line of the Burlington Northern Railroad from Denver (Colorado) passes through Platte County and extends north to the Powder River Basin by using joint trackage beyond Orin in Converse County (located about 35 miles southeast of the proposed Project sites).

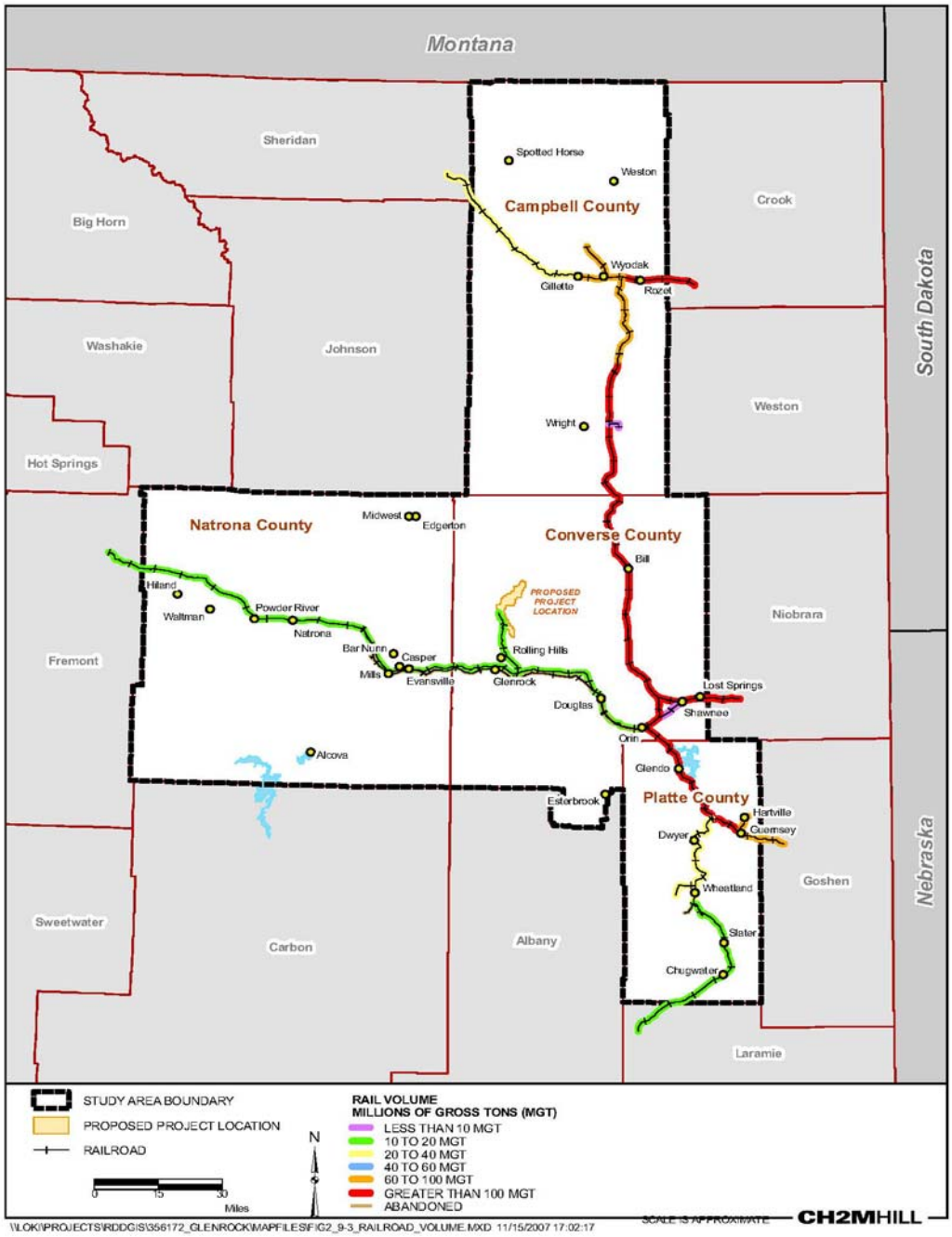

FIGURE 4-43
Rail Volume in the Study Area

4.2.8.1.2 Review of Transportation Plans to Identify Planned Improvements

WYDOT provides most of the transportation planning for the counties within the study area. Activities primarily consist of widening, resurfacing, grading, paving, and bridge repair or replacement.

4.2.8.1.3 Adjacent Roadway Facilities

The proposed Projects would be located approximately 5 miles north of the town of Glenrock. The site would be accessed via 55 Ranch Road, also known as Converse County Road 23. This road was originally built to serve earlier coal mine operations. The road currently has low traffic volume and serves adjacent residential subdivisions and an occasionally active bentonite mine located north of the proposed Project sites. Converse County Road 23 runs perpendicular to WYO 95, which is classed as a major collector road. WYO 95 runs perpendicular to US 20/26/87 (also a major collector road) from the north in the town of Glenrock. US 20/26/87 parallels I-25 between Glenrock and Casper. The interchange between US 20/26/87 and I-25 is approximately 6 miles east of Glenrock. Figure 4-41 shows the major roads and highways in the study area. A review of the current WYDOT 2008 State Transportation Improvement Program indicates that there are no planned roadway improvements for any of these facilities in the near future.

4.2.8.1.4 Potentially Affected Roads and Highways

US 20/26/87 and WYO 95 are the two highways that could be affected by the Projects. Project personnel traffic approaching from the west would use US 20/26/87 to access WYO 95. Personnel and truck traffic from the east would use US 20/26/87 to access WYO 95. Although I-25 would be used during construction of the Projects, it is not expected to be affected permanently after the Projects are operational.

Personnel Access Routes. It is expected that there would be approximately 220 personnel working at the site during the peak construction month. These personnel are expected to live in various locations and use the following access routes:

- Casper/Bar Nunn/Evansville/Mills/ - US 20/26/87 (west of Glenrock) to WYO 95 (181 personnel)
- Douglas/Wheatland – US 20/26/87 (east of Glenrock) to WYO 95 (17 personnel)
- Glenrock – WYO 95 (18 personnel)
- Rolling Hills – 55 Ranch Road (five personnel)

After construction is complete, the proposed Projects would each require 10 to 15 operations personnel in total per day. As during the construction period, the sites would be accessed from 55 Ranch Road via WYO 95 during the operations phase. It is assumed that all operations personnel would drive personal vehicles to the sites. These personnel are expected to live in two locations and use the following access routes:

- Casper - US 20/26/87 to WYO 95 (five personnel)
- Glenrock – WYO 95 (five personnel)

Truck Access Routes. It is expected that construction materials would be trucked to the sites. Each turbine delivery requires eight trucks. Other truck deliveries would consist of gravel for the access road, aggregate and cement for the onsite concrete batch plant, and other supplies. The construction trucks are all expected to access US 20/26/87 at the I-25 interchange east of Glenrock, then follow it to WYO 95 and then to 55 Ranch Road to access the sites. Heavy trucks are not expected to access the sites during the operations period.

4.3 Socioeconomic Impact Analysis

The socioeconomic impact analysis evaluates the benefits and impacts to social and economic resources in the study area, including the benefits derived from increased tax revenue, direct employee opportunities, and indirect employment benefits.

The analysis of the impacts includes effects on the following:

- Housing
- Educational facilities
- Public safety and security
- Health resources
- Municipal services
- Impact Analysis for Planning (IMPLAN) modeling
- Estimate of ad valorem and sales and use taxes
- Transportation systems

4.3.1 IMPLAN Socioeconomic Impact Modeling

A widely used approach to estimating the secondary effects of a project is through input-output (I-O) models. One such model is Impact Analysis for Planning (IMPLAN). IMPLAN is a computer software model that consists of procedures for estimating local I-O models and associated databases. IMPLAN was originally developed by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency and the U.S. Department of the Interior's Bureau of Land Management (BLM) to assist in land and resource management planning.

4.3.1.1.1 Regional Economic Analysis

Regional economics is the study of the economy of a small region, and I-O analysis estimates the dollar value of change in regional economic activity associated with economic linkages and leakages. I-O analysis can also be viewed as a technique for tracking resources and products within an economy. The economic system consisting of producers and consumers is divided into various branches, which are defined in terms of the resources they require as inputs and what they produce as outputs. The quantities of I-O for a given period, usually expressed in monetary terms, are entered into an I-O matrix within which one can analyze what happens within and across various sectors of an economy where growth and decline take place and what effects various policies may have.

A number of regional economic analysis modeling systems (consisting of data as well as analytical software) are available for use in regional economic analysis (e.g., Regional Economic Models Inc. [REMI], Regional Industrial Multiplier System II [RIMS II], and

IMPLAN). IMPLAN is a computer database and modeling system used to create I-O models for any combination of United States counties. For these Projects, IMPLAN was used to estimate the indirect and induced impacts associated with the Projects.

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 which help the user build the I-O model, and (4) tools that allow the user to change data, conduct impact analysis, and generate reports.

4.3.1.1.2 Regional Economic Model

The region of influence (ROI) as defined by IMPLAN inputs for the proposed Projects is Campbell, Converse, Natrona, and Platte Counties, Wyoming. Thus, an IMPLAN I-O model was built for the region comprising these four counties and is used to evaluate the regional economic impacts resulting from the construction and operation of the Projects. Additionally, because the data in IMPLAN are for 2004, and the input estimates are in 2008 dollars, the model results were adjusted to reflect output in 2008. Thus, all estimates reported in this analysis are in 2008 dollars.

4.3.1.1.3 Regional Economic Model Construction and Operation Impacts

In addition to providing stimulus in the form of expenditure on material and supplies, the proposed Projects would employ construction workers. These construction workers in turn are expected to spend much of their income in the counties of the ROI thus stimulating additional output in the various sectors that provide consumer goods and services. As a result of both the expenditure on materials for the Projects and the expenditures by construction workers, the proposed Projects are expected to result in a temporary increase in employment and income within the ROI during the 12-month construction period.

The following assumptions were used in the IMPLAN I-O model:

1. Glenrock Wind Energy Project Construction Duration = 12 months
2. Rolling Hills Wind Energy Project Construction Duration = 12 months
3. Glenrock Wind Energy Project Peak Monthly Construction Workforce = 187
4. Rolling Hills Wind Energy Project Peak Monthly Construction Workforce = 156
5. Glenrock Wind Energy Project Average Monthly Construction Workers = 60
6. Rolling Hills Wind Energy Project Average Monthly Construction Workers = 53

Because the IMPLAN model is a short-term annual model, the construction impact analyses are evaluated for a 1-year period.

Expenditures made by temporarily re-locating construction workers in the local (four-county study area) economy comprised the following categories: lodging, meals, and incidental expenses; entertainment and recreation; and transportation. Per diem amounts for lodging and meals and incidental expenses are those allowed under federal contracts: $78 and $49, respectively. The average roundtrip daily commute is assumed to be 72 miles. This is the weighted average based on 78 percent of workers commuting from the Casper area and the remaining mostly from Douglas and Glenrock. Fuel consumption is assumed to be 15 miles per gallon (mpg) with a fuel price of $2.81 per gallon.

4.3.1.1.4 Direct Benefits

It is anticipated that the combined Projects would employ about 113 FTE workers. During the operations phase of the Projects, there would be 15 FTE employees.

4.3.1.1.5 Secondary Benefits

Construction of the Projects would result in secondary economic impacts (indirect and induced impacts) within the four-county study area. Combined, the Projects are expected to result in annual indirect and induced employment within the ROI of 242 and 55 jobs, respectively. These additional jobs result from Project-related procurements of materials and services in the study area as well as the spending by local construction workers, the latter mostly on accommodations, food services, recreation, and transportation.

Operation of the Projects would require a total of 15 workers, all of who are assumed to reside within the study area. In addition, there would be annual O&M expenditures, 50 percent of which is assumed to be spent locally. Combined, these personal consumption expenditures and procurements could create 20 indirect and 15 induced jobs. A summary of IMPLAN model output values is shown in Table 4-51.

TABLE 4-51
IMPLAN Model Output Values

	Glenrock	Rolling Hills	Projects Combined
Construction Phase:			
Employment:			
Direct	60	53	113
Indirect	130	112	242
Induced	30	25	55
TOTAL	220	190	410
Operations Phase:			
Employment:			
Direct	10	5	15
Indirect	14	7	21
Induced	10	5	15
TOTAL	34	17	51

Source: CH2M HILL, 2007

4.3.1.1.6 Wage and Benefits for Construction and Operations

The Research and Planning section of the Wyoming Department of Employment, in cooperation with the Bureau of Labor Statistics (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).

4.3.1.1.7 Employee Wage Estimates

Based on information compiled in the 2005 Wyoming Wage and Benefit Summary (Wyoming Department of Employment, 2006), hourly wages are detailed for skilled labor categories that are anticipated to be employed throughout the construction phase. Table 4-52 provides a breakdown of these hourly wages.

TABLE 4-52
Average Wages per Occupation Classification (in $US) Based on 2005 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
Crane and Tower Operators	19.37	15.02	21.54	16.45	18.90	21.07
Excavating and Loading Machine and Dragline Operators	19.07	13.98	21.62	15.05	17.45	24.21
Industrial Truck and Tractor Operators	16.94	11.20	19.81	11.96	14.34	23.52
Cement Masons	13.51	10.14	15.20	11.37	13.94	15.84
Electricians	21.20	15.50	23.78	16.93	20.59	25.15
Operating Engineers and other Construction Equipment Operators	18.17	13.15	20.69	14.14	16.96	22.48
Structural Iron and Steel Workers	13.12	11.34	14.01	11.35	12.34	13.34
Mining and Geological Engineers	31.99	23.12	36.43	25.79	33.03	38.84
Construction Laborers	12.02	9.68	13.19	10.00	11.40	13.22
1st Line Supervisors / Managers of Construction Trades and Extraction Workers	26.22	17.24	30.71	19.07	23.98	31.95
Industrial Machinery Mechanics	20.57	13.87	23.92	15.73	19.60	24.74

Source: Wyoming Department of Employment, 2006

A review of Table 4-52 shows that mean wages for the construction occupations in 2005 dollars ranged from a low of $12.02 per hour for construction laborers to a high of $31.99 for geological engineers. If the 2005 mean wages are extracted over a 2,080-hour work year, annual salaries without benefits would range from $25,002 to $66,539. It is important to note that hourly wage and benefit costs showed considerable variation across Wyoming industries and geographies in 2005. Therefore, these hourly labor wages are solely depicted to show what type of data were reported in the 2005 report and to prepare an estimate of salary for a full year of employment.

4.3.1.1.8 Project Employee Benefits Estimates

Table 4-53 provides a Wyoming statewide analysis of relationships of compensation components for both the private sector and local government.

TABLE 4-53
Percentage of Full- and Part-Time Wyoming Employees Offered Selected Benefits by Industry, 2005

	All Industries		Construction		Trade, Transportation, and Utilities	
	Full-Time Employees	Part-Time Employees	Full-Time Employees	Part-Time Employees	Full-Time Employees	Part-Time Employees
Child Care	5.7	0.4	4.9	0.0	4.0	0.0
Dental Plan	67.8	9.4	42.9	5.8	68.0	0.5
Dependent Health Insurance	74.4	9.6	56.1	6.0	75.7	0.5
Short-Term Disability	30.8	1.8	16.9	5.8	24.7	0.5
Educational/Tuition Assistance	46.6	24.7	17.8	5.9	38.6	14.7
Flexible Spending Account	45.5	17.7	15.9	1.5	40.4	11.1
Health Insurance	78.0	11.3	60.6	8.0	79.2	0.9
Hiring Bonus	19.9	5.4	6.1	1.3	27.4	10.8
Life Insurance	66.8	8.1	42.1	6.2	68.5	1.9
Long-Term Disability	45.1	5.7	12.6	0.1	32.2	0.1
Paid Holidays	80.6	25.7	55.4	5.2	83.7	20.2
Paid Personal Leave	33.3	10.2	20.1	1.0	28.9	2.6
Paid Sick Leave	51.7	19.7	22.8	0.0	48.6	2.9
Paid Vacation	74.8	21.3	65.5	10.3	76.5	9.7
Retirement Plan	75.2	28.3	54.7	9.9	70.5	6.0
Operate in Shifts	44.8	44.6	4.0	0.7	40.9	39.8
Shift Differentials	45.8	23.0	34.1	0.0	67.3	49.3
Vision Plan	39.3	4.4	19.6	0.0	43.1	0.1

Source: Wyoming Department of Labor, 2006

According to the Wyoming Department of Employment benefits analysis, 88.5 percent of total compensation in 2005 was wages and salaries followed by insurance contributions (7.5 percent) and retirement plans (4.0 percent). The estimate of employee benefits during both construction and operation is approximately 25 percent of paid salary or hourly wage. Based on a review of Table 4-53, benefits paid to employees are expected to vary by contractor/subcontractor and status of full-time versus part-time positions.

4.3.2 Housing Impact Analysis

The construction phase of the Projects would span 9 months (exclusive of site geotechnical investigations) with the majority of activity taking place over 6 months between May and October. In the absence of existing contractual agreements between PacifiCorp and general

contractors in the region, it is assumed for purposes of this housing analysis that 80 percent of construction workers would originate from outside the region and would secure temporary accommodations for the duration of their involvement in each Project.

4.3.2.1.1 Number of Units Required

It was estimated that 20 percent of the peak workforce would be local residents and 80 percent would be non-local residents. Table 4-54 displays the estimated breakdown of local and non-local workforce for the combined Projects.

TABLE 4-54
Estimate of Local and Non-Local Construction Worker Breakdown During Peak Month

	Glenrock and Rolling Hills Wind Energy Projects
Peak Monthly Workforce	187
Local Workers (20%)	36
Non-Local Workers (80%)	151
Single Non-local Workers	139
Non-local Workers Bringing Families	13
Average Household Size	2.4
Estimated Number of Workers and Family Members	31
Estimated Number of Children Relocating	6
Total People Re-locating from Project at Peak (including families)[a]	169[a]

❑Source: CH2M HILL, 2007

[a] Summary of single non-local workers and estimated number of workers and family members.

As shown above in Table 4-54, it is estimated that a total of 139 single construction workers and 13 construction workers with families would relocate in the area of impact. Based on an average household size of 2.4, the estimated peak monthly number of the 13 construction workers would relocate with an additional 18 family members (Table 4-54). It is assumed that all workers will secure temporary housing accommodations for the duration of their involvement in the Projects.

4.3.2.1.2 Effects on Vacancies of Local Motel/Hotels and Recreational Vehicles

The supply of temporary accommodations can include hotel and motel rooms, apartments, rental housing units, mobile homes, and RV sites. Taking a conservative approach to estimating the potential supply of available temporary accommodations in the study area, a vacancy rate of 10 percent is assumed for hotel/motel rooms and RV sites. As shown in Table 4-55, it is estimated that there would be over 200 hotel/motel rooms available in Glenrock, Douglas, and Casper in addition to almost 54 RV sites for a total of 254 temporary accommodation units. Using temporary housing close to the construction site, the potential supply of temporary accommodation units would be adequate to fulfill the demand that would peak at 139 single construction workers. Additionally, this includes one person per hotel room or RV site and does not take into consideration the occupancy of two- or three-bed hotel rooms.

TABLE 4-55
Potentially Available Hotel and RV Accommodations

City	County	No. of RV Sites	No. Available RV Sites	No. of Hotel Rooms	No. Available Hotel Rooms
Glenrock	Converse	50	5	23	2
Douglas	Converse	87	9	364	36
Casper	Natrona	402	40	1,624	162
TOTAL		**539**	**54**	**2,011**	**200**

Source: CH2M HILL, 2007

4.3.2.1.3 Effects on Apartments and Rental Homes Vacancy Rates

The rental housing natural vacancy rate can vary from place to place and over time; however, a commonly referenced level is 5 percent. The natural vacancy rate can be thought of as the level of rental vacancies needed to accommodate normal turnover rates and search times for rental units in the market. The natural vacancy rate is always greater than zero because factors such as imperfect information cause tenants to spend time searching for new units and landlords to hold some units off the market for a period of time.

As of December 2006, rental housing vacancy rates in the area of impact counties were less than the natural vacancy rate: 3.1 in Converse County and 1.6 in Natrona County. In addition, of the apartment complexes recently contacted in Casper, Douglas, and Glenrock, no units were available for rent. Many of them had waiting lists; therefore, if a unit became available, it was immediately filled. Although no apartments were available to rent, the City planning staff in Casper identified a 1 percent vacancy rate for rental units (including homes for rent).

It is envisioned that the balance of plant general contractor will initiate a workforce plan to identify the timing of the Senior Management/Supervisor start dates and identify their preferred housing choices. Depending on those choices, the balance of plant general contractor will reserve 5th wheel trailer pads or rental housing including securing waiting list slots that presently exist in the area for the key Senior Management/Supervisory personnel. Based on the tight rental property market observed by the low vacancy rates, it is

likely that 13 rental properties would be available for rent with advanced planning (e.g., submittal of waiting list requests by general contractor during first quarter of 2008).

4.3.3 Educational Facilities

With 13 workers likely to bring family members to the area of impact, the potential number of children entering the local public schools would be insignificant and would not result in a significant increase in school enrollment.

4.3.4 Public Safety (Law Enforcement, Fire Services)

Based on a national LOS ratio of 2.3 full-time law enforcement officers per 1,000 residents, the addition of 170 persons to the study area at the peak month would have a negligible effect on the level of service provided by existing law enforcement personnel. With an index crime rate of 2,629 per 100,000 residents in Converse County and 5,000 per 100,000 residents in Natrona County, the addition of construction workers and their family members could account for an increase of between five and nine crimes annually.

The influx of a peak number of 170 residents associated with the construction phase of the Projects would have negligible effect on the existing level of service provided by fire protection agencies.

4.3.5 Health Care

Converse and Natrona Counties have an LOS of 1.38 and 1.67 physicians per 1,000 residents, respectively. For the purposes of this analysis, an estimate for the year-round construction workforce could be responsible for between 55 and 75 emergency room visits annually. Thus the addition of 170 peak month residents would have a negligible effect on the provision of physician services.

4.3.6 Municipal Services

It is expected that in-migrating construction workers would reside in the housing stock of the area of impact in addition to hotel/motels and RVs located at established sites. The addition of 115 average year-round residents could increase the demand for municipal services such as water, wastewater, and solid waste. However, such a modest increase in population for this short duration would have negligible effects on the provision of these services.

4.3.6.1.1 Solid Waste

No substantial quantities of industrial materials will be brought onto or removed from the Project site during operations. The only materials that will be brought onto the site will be those related to maintenance or replacement of infrastructure (e.g., nacelle or turbine components, electrical equipment).

4.3.6.1.2 Hazardous Wastes

Potentially hazardous wastes include turbine and maintenance lubrication and oil products. The only materials that will be removed from the site will be those parts or elements replaced during maintenance activities. Those materials removed or replaced will not constitute significant amounts.

Hazardous materials that could potentially be used on the sites include lubricating oils, cleaners, and solvents. These materials will be used primarily during operations but potentially during construction as well. These hazardous materials will be stored at the Project O&M building(s). The balance of plant general contractor will operate a diesel storage container onsite during construction activities to fuel heavy equipment. The diesel will be stored in an aboveground, mobile tank. To address construction contractor needs, the tank will be provided with secondary containment to prevent any diesel contamination caused by leaks or spills. The small amounts of lubricating oils and greases necessary for equipment maintenance will also be stored in the containment area.

Hazardous materials will be used in a manner that is protective of human health and the environment and will comply with all applicable local, state, and federal environmental laws and regulations. Accidental releases of hazardous materials (e.g., vehicle fuel during construction or lubricating oil for turbines) will be prevented or minimized through proper containment of these substances during use and transportation to the site, and used primarily within the turbines 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 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 onsite temporary storage facilities 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 a spill prevention and countermeasures control plan.

4.3.6.1.3 Non-Hazardous Waste Materials

Solid waste materials (e.g., excess construction materials) will be generated during construction. Construction wastes primarily will consist of concrete waste from turbine pad construction, wood waste from wood forms used for concrete pad construction, and scrap metal steel from turbine tower construction. Some additional wastes could include erosion control materials, such as straw bales and silt fencing, and packaging materials for associated turbine parts and other electrical equipment. When feasible, these wastes generated during construction will be recycled. Steel scraps from turbine towers will be separated and recycled to the extent feasible. Wood from concrete forms will be reused when possible and then recycled.

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.

Minimal solid waste will be generated from operations. Office waste, such as paper and food packaging/scraps, will be generated at the O&M building(s). Some minor and potentially hazardous wastes include used oil, oily rags, or similar wastes related to turbine lubrication and other maintenance. The only other source of waste will be incidental waste

from repair or replacement of electrical or turbine equipment. No industrial wastewater will be generated during operations.

Sewage from the O&M building(s) will be disposed of onsite with a septic system. Specifically, PacifiCorp would use the existing septic system to serve the sanitary uses at the O&M building(s).

The operations personnel will be responsible for the waste management program, ensuring that solid waste is disposed of in dumpsters, and any hazardous wastes are properly disposed of in accordance with applicable rules. It is estimated that less than 1 ton of solid waste will be generated from the Projects' operations. Office waste generated at the O&M building(s) is estimate to be less than 500 pounds per month and will be separated and periodically removed for recycling or disposal at a locally permitted landfill.

4.3.7 Transportation

To assess the potential traffic impacts associated with the proposed Projects, existing and future traffic conditions were analyzed both with and without the project for three time periods: existing, construction, and operations. The Institute of Transportation Engineers' *Trip Generation Manual*, the Federal Highway Administration's *Highway Capacity Manual*, and the WYDOT planning department were used as resources for this analysis.

The operating conditions, or LOS, provided by the highways and the intersections were assessed using *Highway Capacity Manual* two-lane highway and unsignalized intersection methodologies. LOS is a term used to qualitatively 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 is typically considered desirable for peak-hour operations.

For two-lane highways, LOS is defined in terms of average travel speed and percent time spent following another vehicle. US 20/26/87 is multi-lane roadway in the town of Glenrock; however, the two-lane rural sections represent the worst-case scenario for evaluating traffic operations. For unsignalized intersections, LOS is defined in terms of average delay per vehicle for the stop-controlled movements. 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 each movement from the minor approaches and the left turns from the major street.

4.3.7.1.1 Existing Peak-Hour Levels of Service

Volumes and roadway / intersection geometries are inputs to the analysis methodologies. WYDOT provided 2006 and 2016 average daily traffic volumes and truck percentages for the highways. An annual growth factor was calculated from these two volumes and applied to the 2006 volumes to determine the 2007 volumes. The directional distribution is assumed to be a 60 / 40 split per the *Highway Capacity Manual* default value. The peak hour is estimated to be 10 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 morning and evening peak hour. Therefore, one peak hour is analyzed.

WYDOT also provided daily turning movement counts at the US 20/26/87 intersection with WYO 95. As with the highways, the peak hour is estimated to be 10 percent of the daily volume. Table 4-56 shows the existing highway and intersection volumes and corresponding LOS. The intersection LOS is shown for both morning and evening peak hours. The US 20/26/87 volumes vary considerably on either side of the WYO 95 intersection, so two LOSs were calculated for this highway.

TABLE 4-56
Existing Peak Hour Operating Conditions (Year 2007)

Transportation Facility	Average Daily Volume	Peak-Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
US 20/26/87 West of WYO 95	2560	256	6	B
US 20/26/87 East of WYO 95	1390	139	3	B
WYO 95	1850	185	3	B
Intersections				
US 20/26/87 & WYO 95	*	*	*	*
Eastbound Left	*	18/18	6	A/A
Southbound Left	*	36/36	3	B/B
WYO 95 & 55 Ranch Road	*	*	*	*
Eastbound Left	*	3/3	5	A/A
Northbound Left	*	10/10	3	A/A

Source: CH2M HILL, 2007
*No data available

All of the transportation facilities operate at desirable levels of service during the peak hours. On the highways, the average travel speed is relatively high and the percent time spent following another vehicle is correspondingly low. At the intersection, the left turning movements experience an average delay of 10 seconds or less per vehicle. Hence, there were no roadways or intersections identified in the vicinity of the Projects that are presently over capacity.

4.3.7.1.2 Construction Period Peak-Hour Levels of Service

The potentially affected highways and intersections were analyzed with and without the Projects to determine impacts to the transportation facilities due to the construction of the Projects. The construction will take place in 2008.

Background Analysis. For the purpose of the background analysis the highway volumes were increased by the same annual growth rate to obtain 2008 background volumes, and it is assumed the truck percentage does not increase in 2008 (see Section 4.8.9.1). Table 4-57 shows the estimated 2008 background highway and intersection volumes and corresponding LOS. The intersection LOS is shown for both morning and evening peak hours.

TABLE 4-57
Construction Period Peak-Hour Background Operating Conditions (Year 2008)

Transportation Facility	Average Daily Volume	Peak-Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
US 20/26/87 West of WYO 95	2620	262	6	B
US 20/26/87 East of WYO 95	1420	142	3	B
WYO 95	1890	189	3	B
Intersections				
US 20/26/87 & WYO 95	*	*	*	*
Eastbound Left	*	19/19	6	A/A
Southbound Left	*	37/37	3	B/B
WYO 95 & 55 Ranch Road	*	*	*	*
Eastbound Left	*	3/3	5	A/A
Northbound Left	*	11/11	3	A/A

Source: CH2M HILL, 2007
* No data available

All of the transportation facilities operate at desirable levels of service during the peak hours. On the highways, the average travel speed is relatively high and the percent time spent following another vehicle is correspondingly low. At the intersection, the left turning movements experience an average delay of 10 seconds or less per vehicle. With very little volume growth over the one year from 2007, there is little change in operating conditions.

Total Analysis. Adding traffic related to the construction of the Projects to the background traffic yields the volumes for the analysis of the construction period. The trip generation and distribution process used the following assumptions to calculate the additional highway and turn movement volumes due to construction of the Projects:

- Construction will occur in one shift overnight (assume worst-case scenario of high wind during the day will require night shifts).
- The workers all arrive in the evening peak hour and depart in the morning peak hour.
- The average vehicle occupancy is 1.3 people per vehicle.
- All truck trips approach the town of Glenrock from the east.

These assumptions result in the estimation of 139 additional cars traveling to the US 20/26/87 and WYO 95 intersection from the west and 13 cars and 18 trucks from the east per peak hour. From this intersection, a total of 166 additional cars and 18 trucks travel on WYO 95 to access the Projects per peak hour.

Table 4-58 shows the 2008 total highway and intersection volumes and corresponding LOS. The US 20/26/87 volumes vary considerably on either side of the WYO 95 intersection, so two LOSs were calculated for this highway. The truck percentage increases because the highways experience truck travel generated by the construction project. The intersection LOS is shown for both morning and evening peak hours.

TABLE 4-58
Construction Period Peak-Hour Total Operating Conditions (Year 2008)

Transportation Facility	Average Daily Volume	Peak-Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
US 20/26/87 West of WYO 95	2900	401	6	C
US 20/26/87 East of WYO 95	1720	173	13	B
WYO 95	2500	391	11	C
Intersections				
US 20/26/87 & WYO 95	*	*	*	*
Eastbound Left	*	19/158	6	A/A
Southbound Left	*	68/55	26/33	B/B
WYO 95 & 55 Ranch Road	*	*	*	*
Eastbound Left	*	3/3	1	A/A
Northbound Left	*	29/195	66/10	B/B

Source: CH2M HILL, 2007
* No data available

All of the transportation facilities operate at desirable levels of service during the peak hours. However, both US 20/26/87 west of WYO 95 and WYO 95 experience a drop in LOS due to the additional volume, in particular the heavy vehicle volume, generated by construction of the Projects. This equates to a lower average travel speed and fewer passing opportunities that will cause a temporary increase in travel time along these highway segments during the 6-month peak construction period. Likewise, the LOS decreases for the northbound left turn movement at the WYO 95 and 55 Ranch Road intersection. Even though this movement experiences a significant increase in trucks during the 6-month construction peak period, the average delay increases by only 2 seconds.

4.3.7.1.3 Operations Period Peak-Hour Levels of Service

The potentially affected highways and intersections were analyzed with and without the Projects to determine impacts to the facilities due to the operations of the Projects after construction is complete. The operations will begin in 2009, so the analysis year is 2009.

Background Analysis. For the purpose of the background analysis, the highway volumes were increased by the same annual growth rate to obtain 2009 background volumes, and it is assumed the truck percentage does not increase in 2009 (see Section 4.8.9.1). Table 4-59 shows the 2009 background highway and intersection volumes and corresponding LOS. The intersection LOS is shown for both morning and evening peak hours. Only one LOS is shown for US 20/26/87 volume because of the assumption that all operations-generated traffic traveling on it is from Casper.

TABLE 4-59
Operations Period Peak-Hour Background Operating Conditions (Year 2009)

Transportation Facility	Average Daily Volume	Peak-Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
US 20/26/87	2680	268	6	B
WYO 95	1940	194	3	B
Intersections				
US 20/26/87 & WYO 95	*	*	*	*
Eastbound Left	*	20/20	6	A/A
Southbound Left	*	38/38	3	B/B
WYO 95 & 55 Ranch Road	*	*	*	*
Eastbound Left	N/A	3/3	5	A/A
Northbound Left	N/A	12/12	3	A/A

Source: CH2M HILL, 2007
* No data available

The transportation facilities operate at desirable LOS during the peak hours. On the highway, the average travel speed is relatively high and the percent time spent following another vehicle is correspondingly low. At the intersection, the left turning movements experience an average delay of less than 10 seconds per vehicle. The LOS is similar to the existing and construction background conditions because of the minimal volume growth over the 2-year period.

Total Analysis. Adding traffic related to operation of the Projects to the background traffic yields the volumes for the analysis of the operations period. The trip generation and distribution process used the following assumptions to calculate the additional highway and turn movement volumes due to the operation of the Projects:

- Work force will operate in one 9-hour shift.
- All personnel will travel in their own vehicles to the Project sites.
- Personnel will not leave the site during the shift.
- One truck delivery, or two truck trips, per peak hour.
- All truck trips are distributed southwest to Casper.

These assumptions result in the estimation of six additional cars and one truck traveling to the US 20/26/87 and WYO 95 intersection from the west per peak hour. From this intersection, a total of 11 additional cars and one truck travel on WYO 95 and 55 Ranch Road to access the project site per peak hour.

Table 4-60 shows the 2009 total highway and intersection volumes and corresponding LOS. The intersection LOS is shown for both morning and evening peak hours. Only one LOS is shown for US 20/26/87 volume because of the assumption that all operations generated traffic traveling on it is from Casper.

TABLE 4-60
Operations Period Peak-Hour Total Operating Conditions (Year 2009)

Transportation Facility	Average Daily Volume	Peak-Hour Volume	Percent Trucks	Peak-Hour LOS
Highways				
US 20/26/87	2750	275	6	B
WYO 95	2060	206	3	B
Intersections				
US 20/26/87 & WYO 95	*	*	*	*
Eastbound Left	*	26/21	6	A/A
Southbound Left	*	38/38	3	B/B
WYO 95 & 55 Ranch Road	*	*	*	*
Eastbound Left	N/A	3/3	5	A/A
Northbound Left	N/A	23/13	3	A/A

Source: CH2M HILL, 2007
* No data available

The transportation facilities operate at desirable LOS during the peak hours. On the highway, the average travel speed remains relatively high and the percent time spent following another vehicle is correspondingly low. At the intersection, the left turning movements experience an average delay of 10 seconds or less per vehicle. The additional volume generated by the operation of the Projects does not decrease the LOS nor degrade the operational performance of the adjacent roadway facilities.

4.3.7.1.4 Impact Analysis

The additional vehicle and truck trips generated by the construction of the Projects will have a minimal impact on the operations of the adjacent roadway network. Some of the transportation facilities will experience a temporary decrease in LOS during the peak construction period. However, the resultant increased travel times will not be a permanent condition. After the 6-month construction peak is over, the facilities will operate at desirable LOS. Thus, no roadway capacity improvements are recommended for US 20/26/87, WYO 95 or the intersections.

During construction of the Projects, 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. Due to the size and weights of the turbine components, arrangements to transport oversized loads are being preliminarily coordinated with GE and WYDOT. In addition, PacifiCorp has conducted initial coordination with Converse County to determine potential mitigation scenarios for 55 Ranch Road, which is currently in significantly

deteriorated condition. It is expected that significant additional deterioration of 55 Ranch Road will result from truck traffic at the Project sites.

4.3.8 Taxes

The benefits related to the Projects from a tax perspective would occur based primarily on the ad valorem taxes that would be collected for the life of each Project. In addition, in conjunction with associated ancillary activities (see discussion below), 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.

Appendix B provides an ISD Impact Assistance Payment Calculation.

4.3.8.1.1 Costs

Capital cost expenditures are estimated in excess of $400 million for both Projects.

4.3.8.1.2 Ad Valorem Taxes

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 annually determined on a centralized basis by the State Department of Revenue (the Department).

It is the Department's role to estimate the fair market value (FMV) of the wind farm development, which includes the value of the land and improvements (such as access roads, fences, WTGs, substations, and O&M building). It is the owner's responsibility to provide the Department with all necessary information enabling them to make this determination. Developments are taxable prior to their completion and operation, especially in the case of multi-year construction schedules. Under such circumstances, the owner provides the Department with cumulative construction costs that are then incorporated into their appraisal.

After the Department determines the FMV of the development, the assessed value is stated as 11.5 percent of this value. The assessed value is then allocated to the County within which each Project is located which 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 sites are located in rural Converse County where the 2007 tax levy is 61.87 mills. Thus for every $1,000 of assessed value of real property (land and improvements), Carbon County will levy property taxes of $61.87 annually. The property tax revenues received by the county are distributed across a number of taxing entities as shown in Table 4-61 with the majority supporting the public school districts.

TABLE 4-61
Tax Levy Distribution for Rural Glenrock, Converse County

Taxing Entity	% of Mileage
State School	19.39
County School	9.70
County General	13.84
County Airport	0.34
County Library	1.41
Hospital	1.51
Health Department	0.44
Parks and Recreation	0.29
Weed and Pest	1.58
Conservation	0.32
Special School	40.40
Co-op Ed	0.81
School Recreation	1.62
Municipalities	0.00
Pool Bond	0.00
Pool Interest	0.00
Glenrock Hospital	4.85
Glenrock Cemetery	1.94
Rural Fire	1.56

Source: Converse County, Wyoming Treasurer, 2007

4.3.8.1.3 Estimate of Ad Valorem Taxes

Based on a preliminary estimate of the FMV of each Project, the estimate of property taxes would be approximately $2.8 million annually. It is important to note this tax revenue will be collected for each Project at the State level and not the County level. Therefore, the State will distribute tax revenue to the local level.

4.3.8.1.4 Sales and Lodging Taxes

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 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.

Sales Taxes. 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 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 above, Project-related expenditures prior to commercial operation are not expected to result in sales and use taxes for either Project. The sales and use tax estimate for each calendar quarter is shown in Table 4-62.

TABLE 4-62
2008 Estimate of Sales and Use Taxes Paid Per Quarter

Operation	2008				
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Total for Wind Farm Facility	$0	$0	$0	$0	$0

Source: PacifiCorp, 2007

Lodging Taxes. Lodging tax revenues will accrue to the Counties in which Project-related construction workers temporarily reside and thus the amount will vary because the tax rate varies by county. It is not possible to estimate these potential tax revenues by county because the actual distribution of construction workers is not known at this time. Additionally, these taxes are levied on sleeping accommodations for guests staying less than 30 days. Were these taxes to be levied, they could total approximately $62,000 during the year.

4.4 Cumulative Impacts

Currently there are no other projects proposed in the area of primary impact that fall under the jurisdiction of the ISA.

4.5 Trade-Off Analysis

The proposed Projects are expected to create significant and ongoing tax benefits, and increases in employment throughout the area of primary impact. It is anticipated that Project-related impacts, especially on community services, would be potentially distributed across the estimated area of primary impact.

Implementation of the Glenrock and Rolling Hills Projects would create both primary and secondary cumulative employment opportunities, contribute significant 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- and long-term impacts associated with implementation of these projects on socioeconomic resources would depend in part on the timing of construction and mineral extraction activities occurring in the study area.

In addition to the salaries of permanent employees generated by these wind energy Projects, additional revenue would be collected at the County level 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 the coal and coal bed methane gas activities and other mineral development including uranium extraction in the region will continue to add jobs to the growing economies and generate additional tax revenues. The sustained employment and economic development resulting from these wind energy Projects can have both positive and negative impacts on the quality of life of residents and on environmental and socioeconomic resources.

4.5.1 Benefits Compared to Impacts

The proposed Projects are expected to create tax benefits, especially to Converse County, and increases in employment. Related impacts, especially on community services, would be minimal and potentially distributed across the area of primary impact.

The construction and operation of the Glenrock and Rolling Hills Projects in Converse County would have the following benefits to the local communities and counties comprising the study area and area of impact:

- The creation of about 115 full-time equivalent jobs over the 12-month construction phase or all of these jobs could be filled by local workers. For the impact assessment present in this report, a worst-case scenario regarding locally available workers is assumed (i.e., all jobs are filled by non-local workers residing temporarily in the region).
- The creation of about 15 permanent, full-time jobs during the operation phase of the Projects. It is estimated that 50 percent of these workers will come from the local workforce.
- The creation of 300 temporary secondary jobs during the 12-month construction phase. These jobs comprise 245 indirect jobs and 55 induced jobs. During the operations phase of the Projects, secondary induced employment is estimated at 35 jobs over the life of the Projects.
- Ad valorem (property) taxes accruing to Converse County would increase as a result of an increase in the fair market value (and assessed value) of the real property comprising the site applicable to the Project. Ad valorem taxes would be approximately $4.8 million annually upon completion of the Projects.
- Temporary construction workers are expected to reside in local hotels and motels. It is possible, depending on their length of stay, that the Counties could gain revenues from

the lodging tax levied on room expenditures. Based on a preliminary estimate, the amount of revenues in the single year of construction could approximate $62,000.

4.5.2 Impacts to Community Services

During the construction phase of the Projects, it is anticipated that the equivalent of about 115 full-time workers (peaking at 187 workers) would enter the area of impact on a temporary basis. Only a small proportion of these workers would be accompanied by family members or occupy permanent housing. The potential impacts this inflow of workers could have on community services in the area of primary impact would be negligible. Their short-term presence would have negligible impacts on education, law enforcement, fire protection, health care, or municipal services. With the exception of additional impacts to 55 Ranch Road, impacts to traffic levels on local and regional highways would also be small and will not result in significant impacts to operation levels.

If hotels are the primary temporary lodging choice, the most noticeable impact would be on the availability of 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 rooms.

4.6 Mitigation Measures to Offset Adverse Cumulative Impacts to Housing

Housing is a concern of communities throughout the area of primary impact. Housing costs are increasing more rapidly than at any time since the 1970s, and projections suggest future shortages of affordable housing as demand for housing increases in the face of economic expansion. As is often the case, single-family development is taking place, however, construction of rental units is not keeping pace with demand.

It is projected that the rental housing market in Converse and Natrona Counties will continue to be very tight during construction of the Projects. There are a number of potential funding scenarios to meet housing needs, including but not limited to, owning/operating a housing complex, contracting with local developers to ensure adequate housing, or developing an onsite worker camp that would be ready to meet expected employment peaks.

5.0 Public Involvement

PacifiCorp fulfilled the Industrial Siting Act (ISA) permit statute application requirements to conduct meetings with State agencies and local officials and also undertook outreach activities that went beyond the ISA requirements. A summary of these activities is detailed below.

5.1 Required Activities

Meetings were held by PacifiCorp as part of the regulatory statute requirement to meet with and receive comments from State agencies and local government officials. The impact area, as identified by the Industrial Siting Division (ISD), defined those local government officials to whom PacifiCorp sent meeting invitations and sought to engage. These are the meetings:

- Meeting with Wyoming Game and Fish Department, Wyoming State Historical Preservation Office, Wyoming Department of Transportation, Wyoming State Engineer's Office on June 19, 2007, and Wyoming Excise Tax Department on July 16, 2007, in Cheyenne, WY.
- Meeting with additional responsible state agencies on July 30, 2007, in Cheyenne, WY.
- Meeting with local government officials of City of Casper and Natrona County held on August 1, 2007, in Casper, WY.
- Meeting with local government officials of Town of Glenrock and Converse County held on August 1, 2007, in Glenrock, WY.
- Meeting with local government officials of Town of Douglas on August 2, 2007, in Douglas, WY.

The information presented in Table 5-1 is a summary list of public involvement activities/meetings.

TABLE 5-1
Local Government and State Agency Meetings

Organization	Date	General Discussion
Wyoming Department of Environmental Quality (WDEQ) - Industrial Siting Division (ISD) / Wyoming State Lands	April 11, 2007	Introduce project; discuss applicability of Projects jurisdiction under Industrial Siting Act; and State land special use permit and fee structure.
Bureau of Land Management – Casper District	April 12, 2007	Introduce project and discuss potential federal involvement if federal lands are to be used for the Projects.

TABLE 5-1
Local Government and State Agency Meetings

Organization	Date	General Discussion
WDEQ - ISD	May 23, 2007	Jurisdictional meeting that provided overview of Projects Industrial Siting Application process; Project benefits; workforce requirements; construction schedule and costs; local agency consultation and public involvement.
Wyoming State Engineer's Office	June 19, 2007	The general meeting content described above was used at all of the presentations. In addition, PacifiCorp representatives also addressed issues, concerns, and questions.
Wyoming Department of Transportation (WYDOT)	June 19, 2007	
Wyoming Game and Fish Department (WGFD)	June 19,2007	
Wyoming State Historic Preservation Office	June 19,2007	
Wyoming State Excise Tax Department	July 16, 2007	
Wyoming State Agencies Meeting	July 30, 2007	
City of Casper – Local Government	August 1, 2007	
Town of Glenrock – Local Government	August 1, 2007	
Town of Glenrock – Town Hall	August 1, 2007	
Town of Douglas – Local Government	August 2, 2007	
Wyoming Wind Working Group	August 29, 2207	
WGFD	August 31, 2007	Discussed WGFD letter dated July 5, 2007, that detailed monitoring recommendations and study protocols. In addition, presented PacifiCorp's preliminary monitoring and study protocol plan in response to WGFD letter.
U.S. Fish and Wildlife Service – Cheyenne Ecological Services	August 31, 2007	Overview of Projects; Industrial Siting Application process; address local issues, concerns, and questions.
WYDOT – Casper District Office	October 9, 2007	Overview of Project; Industrial Siting Application process; Projects benefits; truck delivery requirements: turbines, aggregate, and construction workforce; access routes; construction schedule; and address local district concerns and questions.
WGFD	October 22, 2007	Met with WGFD to further discuss PacifiCorp draft monitoring and study protocol.
WYDEQ-ISD	October 22, 2007	Pre-application meeting.

Source: PacifiCorp, 2007

5.1.1 Meeting Format/Information Provided

The meeting format and the information provided at the meetings for State agencies were generally the same as that provided at the meetings with local officials. The format and information consisted of the following:

- Informational boards were displayed around the meeting room for attendees to see and discuss with PacifiCorp planners prior to a formal presentation. These displays included the following:
  - A map of the proposed site
  - A map of the general footprint of facilities on the site
  - A schematic of the WTG
  - Information on benefits (such as jobs and tax revenue)
  - Environmental considerations
  - A tentative schedule
  - Information on the ISA permit application process
- After a period of informal mingling and review of the displays, the meeting was called to order, and PacifiCorp representatives gave a presentation and overview.
- A question-and-answer session followed the presentation.
- A representative of the ISD was on hand to answer questions and provide information.

5.1.2 Meeting Notices and Attendees

The State agencies and local entities notified of the meeting were those specified by statute in the ISA permit regulations. A letter invitation and follow-up e-mail announcement were also provided to a list of local stakeholders and local government officials. Copies of the meeting invitations, list of the names/entities, and attendee sign-in sheets from the State agencies meeting are included in Appendix C.

5.2 Additional Activities

The activities described in this section are not specifically required by the ISA permit application process. However, PacifiCorp planners undertook these additional activities as a way to better understand community perspectives.

5.2.1 Local Agency Service and Infrastructure Survey

A survey of local entities and agencies was conducted via phone and mail. The purpose of the survey was to gather general information from local agencies that could be relevant to the Projects' and ISA application. A copy of the survey questions is included in Appendix D, along with a summary listing the entities and person(s) contacted. Survey responses were shared with the ISD.

5.2.2 Newspaper Advertisements

Newspaper advertisements announcing the informational open houses were placed in the *Casper Star Tribune* approximately 14 days in advance of the open house events. The advertisements were placed in the main local newspapers serving residents of Converse County. The advertisements invited the public to come to the open house to learn more and ask questions.

5.2.3 Public Open Houses

A public town hall open house was held in Glenrock on August 1, 2007. Notification of the open house was made primarily through newspaper advertisement. The purpose of the open house was to give residents and community members an opportunity to find out more information and to give comments. Open house details are below:

- An open house was held in Glenrock (Converse County) on the evening of August 1, 2007.
- The format for the public open house held in Glenrock included informational poster board displays and questions and answers with PacifiCorp representative.
- A representative of the ISD was in attendance to answer questions, and provide additional ISA statute information.

Display board stations were provided at the public open houses, and a fact sheet was distributed. A copy of the fact sheet and the list of attendees who signed in at the open house are included in Appendix C.

5.2.4 Questions and Answers

A summary of the questions received at each meeting is included in Appendix C, organized by meeting location and date. The types and nature of the questions posed were similar across all the meetings, and included such topics as:

- The ISA process and impact assistance
- Socioeconomic issues, including jobs/employment, housing, tax revenue, and community partnerships
- Environment and safety
- Technical aspects
- Business viability and business aspects

6.0 Potential Environmental Impacts

Potential environmental impacts associated with the construction, operation, and maintenance of the Projects are discussed below. Resource data were collected for some resources and other resources relied on existing information and studies, and impact analyses were conducted to evaluate impacts on the natural environment. Methods of mitigating potential impacts will be implemented as part of the Projects and have been incorporated into the impact analysis. Unless otherwise stated, the area of analysis for the various resources evaluated consisted of both the Glenrock and Rolling Hills sites and is referred to as the Project sites in this section.

There are no anticipated chemical, physical, biological, or radiological discharges associated with operation of the Projects.

6.1 Air Quality

6.1.1 Fugitive Dust

Minimal fugitive dust from earth moving equipment during site preparation activities may occur. Fugitive dust emissions during construction will be minimized by applying water or dust suppressants to exposed soil as necessary.

6.1.2 Operation

No air emissions will be generated from operation of the WTG. The operation of the WTGs will have no effect on the air quality (visible plumes, fogging, misting, icing, or impairment of visibility, and changes in ambient levels caused by emitted pollutants). However, construction activities through increased road use and operation of an onsite concrete batch plant will result in short-term and low-level air emissions.

6.2 Noise

ISD regulations state that noise is an issue that must be taken into account in the siting process, but numeric limits are not specified at the state level in Wyoming. In addition, there are no existing Converse County regulations that directly address sound levels.

6.2.1 Construction

During construction, equipment operation may produce noise levels at or above the 85 decibels; however, these impacts will be primarily limited to 50 ft from operating equipment and are not expected to affect any local residents. Onsite noise exposures for Project personnel will be managed within Occupational Safety and Health Administration standards.

6.2.2 Operation

Based on a review of aerial photographs and the site reconnaissance, there is one residence within 1 mile of the Glenrock and Rolling Hills Project sites. PacifiCorp has scheduled a site noise survey for April 2008. However, given the residence is located approximately 0.5 mile in the prevailing upwind direction, the resulting noise levels of the Projects are not anticipated to result in a significant impact.

6.3 Soil Resources/Geologic Hazards

Data from the Wyoming State Geological Survey and the Soil Survey Geographic Database (SSURGO) were reviewed for information on soil characteristics and earthquake hazards in the vicinity of the sites. In addition, preliminary field geotechnical data were collected. Results from the field study and literature reviews are summarized below.

6.3.1 Landslides

The SSURGO for Converse County, Wyoming, was used to confirm soil characteristics on the sites. Soils present on the site include six soil complexes with mostly loam characteristics. Soils are typically well-drained and generally present on 6 to 15 percent slopes, with some slopes up to 30 percent. No soils present on the sites meet the state and federal criteria of prime farmland soils. No soils exceed the K-factor limit of 0.37 set by the Natural Resource Conservation Service (NRCS) as a limiting factor for erosion hazard. Wyoming does not maintain a list of soils of statewide concern.

There will be disturbance of soils associated with construction of the facilities at WTG locations and access roads. Mitigation measures will be implemented during construction and operation of each Project to ensure that excessive erosion and other adverse impacts on area soils will not occur.

6.3.2 Faults

No exposed faults are present within the sites. Deeply buried faults may have the potential to generate earthquakes with magnitudes anticipated to be no greater than 6.5. The nearest exposed fault system to either Project site is the North Granite Mountains fault system, located in Natrona County more than 50 miles southwest of the sites.

No impacts associated with geologic hazards are expected to occur as a result of implanting either Project. Neither Project will contribute to increased risks of seismic events, subsidence, flooding, or landslides.

6.4 Cultural Resources

Cultural resources consist of prehistoric and historic archaeological sites that are listed on, or are eligible to be listed on the National Register of Historic Places (NRHP).

- Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human

behavior. In California, the prehistoric period began over 10,000 years ago and extended until 1769, the time when the first Europeans settled the plains.

- Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state requirements, historical cultural resources must be greater than 50 years old to be considered of potential historic importance. A resource less than 50 years of age may be historically important if the resource is of exceptional importance.

The National Historic Preservation Act (NHPA) is the principal federal law with respect to the treatment of cultural, archaeological, and historic resources. Section 106 (16 United States 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 State Historical Preservation Office 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 National Register of Historic Places" (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. Development of any area that is predominantly federal surface or federal minerals requires a complete cultural resource inventory in compliance with Section 106 of the NHPA.

Multiple cultural resources surveys have been completed within the sites in the past associated with operation and reclamation of the Dave Johnston mine permit area. Specifically, a Class I file search was conducted in 1976 and 1977, and an intensive Class III survey was conducted in 1980.

Results of the Class I file research detailed that 11 prehistoric sites (48C016 through 48C026) and one historic site (48C043) were recorded in 1976, and two prehistoric sites (48C097, 48C098) were recorded in 1977. In 1977, limited test excavations were conducted at 48C017, 48C018, 48C023, 48C026, and 48C097. However, the results of this work were unpublished. Additional work at site 48C026 (Red Butte site) was conducted in 1980. The results of this effort confirmed that the site was eligible for nomination to the NRHP. Consequently, the Dave Johnston mining operations avoided this feature during active mining and reclamation activities.

An intensive on-the-ground Class III cultural resource inventory was conducted in 1980 associated with a proposed mine expansion. During the survey, 53 site locations were recorded, including 32 sites identified as open lithic scatters, 16 stone circle sites, two remains of historic farmsteads, two prehistoric and historic activities, and one with two undated cairns and no associated artifacts. Fifty-seven isolated prehistoric artifacts and one isolated historic artifact were also recorded. A review of the identified sites concluded that a majority of the cultural resources were located outside the impact zone of the proposed mine expansion. However, four prehistoric sites and two historic sites were within the impact zone of proposed mine expansions. Of these, the two historic sites and one

prehistoric site were determined ineligible for nomination to the NRHP; and a determination of no adverse effect was also recommended.

The WDEQ – Land Quality Division (LQD) issued conditions of approval for the operation of the Dave Johnston mine through 291-T2 Permit issued in 1985. A condition of the mine permit stated that prior to conducting land-disturbing activities within 300 feet of designated cultural resource sites, a plan to mitigate adverse effects must be approved by the Land Quality Division. Therefore, during active mining operations, Dave Johnston avoided all designated cultural resources during active mining operations and reclamation activities.

A recent site-specific survey was performed to establish boundaries of cultural resource site 48C0361. Turbine locations were adjusted to provide the adequate buffer distance from the established cultural resource boundary.

6.4.1 Impacts

Based on the results of previous cultural resource surveys completed at the sites, PacifiCorp designed the Project layouts to avoid impacts to known cultural resources and is not developing any features within 300 feet of cultural resources included in the 291-T2 Permit. Therefore, no cultural resource NRHP-eligible sites or sites covered by the 291-T2 Permit will be impacted by either Project.

6.5 Vegetation Resources

The sites are within the Wyoming Basin ecoregion. The Wyoming Basin ecoregion is found in portions of Colorado, Idaho, Montana, Utah, and Wyoming. This ecoregion is a broad intermontane basin dominated by arid grasslands and shrublands supporting bunchgrasses and sagebrush, interrupted by high hills and low mountains.

6.5.1 Vegetation Communities

Prior to mining activities, three dominant vegetation communities occurred in the mine permit boundary: sagebrush shrubland, sagebrush grassland, and grassland. The post-mining vegetation community consists primarily of sagebrush grassland. The Wyoming Gap Analysis Project (Merrill et al., 1996) mapped land cover on the sites as uplands, which include a mixture of the Wyoming big sagebrush-steppe and mixed-grass prairie cover-type. A segment of ponderosa pine woodland occurs west of the sites.

Most of the reclaimed areas associated with active mining have been revegetated to a sagebrush/mixed grassland vegetation type. Large stands of big sagebrush (*Artemisia tridentate ssp. wyomingensis*) are prevalent within reclaimed portions of the mine disturbance areas. Rock piles, and to a lesser extent planted trees, also are prevalent within the reclaimed mine area.

6.5.2 Federally Listed Plant Species

A search of the Wyoming Natural Diversity Heritage Database (2007) reveals that there are no known threatened or endangered plant species in the sites. The one federally listed

species that is known to occur in the region, Ute's ladies tresses orchid, is a riparian/wet meadow obligate species.

6.5.3 Rare Vegetation Communities

Rare (plant) vegetation communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants.

6.5.4 Impacts

6.5.4.1.1 Vegetation Communities

Construction of turbines and access roads will result in disturbance of soil and vegetation communities.

The construction activities and associated soil disturbances could spread noxious weeds to new sites resulting in long-term effects (e.g., loss of native plants and destruction of wildlife habitat). In addition, new noxious weed infestations could result in the displacement of native plants, causing losses of wildlife habitat and forage, and scenic and recreation values. One of the more common methods of transmission results when heavy equipment and vehicles involved with implementing soil disturbance construction activities are not cleaned before exiting infested areas. The remnant soil clinging to the heavy equipment and machinery may contain seeds of noxious weeds. If the machinery travels to uncontaminated areas prior to being cleaned, they may spread noxious weed seeds and plant parts.

To limit infestations and new populations, the disturbed sites will be monitored and any colonizing noxious weeds will be actively controlled via an approved control methodology. The primary method to control noxious weeds will be through the direct use of herbicides. Application of herbicides will be in accordance with County and agency regulations. Therefore, the Projects will not result in the uncontrolled expansion of noxious weeds and will be a less than significant impact. Overall, impacts to native vegetation communities will be negligible, and disturbances will be minimized through best management practices (BMP) to further minimize the impact area and avoid unnecessary disturbance of vegetation.

6.5.4.1.2 Federally Listed Plant Species

Due to previous mining disturbances and the lack of perennial water sources due to site topography, no riparian or wet meadow habitats are present in the area of the Projects. Therefore, the sites do not support suitable habitat for the Ute's ladies tresses orchid and construction and operation of the Projects will not result in any impacts.

6.5.4.1.3 Rare Vegetation Communities

A review of the Wyoming Natural Diversity Heritage Database (2007) did not reveal any rare vegetation communities within the proposed areas of either Project. In addition, no rare vegetation communities were identified during a site-level reconnaissance, probably as a result of previous mining operations at the site. Therefore, construction and operation of the Projects would not result in any impacts to rare vegetation communities.

6.6 Surface and Groundwater Resources

6.6.1 Surface Water

The North Platte River passes from west to east through Glenrock, 15 miles south of the sites. Streams closer to the Project sites are ephemeral, fed by spring snow melt, summer thunderstorms, and groundwater, and generally dry by late summer. The southern portion of the sites lies mainly within the drainage system of Sand Creek and Sage Creek, which are seasonal tributaries of the North Platte River. Streams on the northern portion of the site drain north, toward the Cheyenne River. The Dry Fork and South Fork of the Cheyenne River are the major tributaries of this system; however, they both occur outside of the area applicable to the Projects.

As a result of the previous mining and reclamation activities within the sites, no wetlands or waters of the United States occur within the disturbed and subsequently reclaimed portion of the mine permit area. In addition, in accordance with performance standards set by the Office of Surface Mining and LQD, the Dave Johnston mine has established and maintained numerous sedimentation ponds. However, these features do no qualify as jurisdictional wetlands.

6.6.2 Impacts

No surface water will be used for the Projects, and construction activities are not anticipated to discharge into surface waters during O&M activities. In addition, due to the lack of surface water features within the sites, no direct impacts to surface water will occur.

Potential impacts to surface water features outside of the site boundary from erosion and sedimentation will be prevented by measures to control runoff during construction and operation of the Projects. A stormwater pollution prevention plan will be developed with the Notice of Intent (NOI) for a Wyoming Pollution Discharge Elimination System (WYPDES) general permit for stormwater discharges during construction and implemented to minimize impacts on water resources during construction of the Projects.

6.6.3 Groundwater

The sites occur near the boundary between the Platte River Basin and the Northeast Wyoming River Basins. As described above, the northern portion of the Dave Johnston mine site drains to the Cheyenne River, while the southern portion of the Project area drains toward the Platte River. Average annual precipitation averages 13 to 15 inches per year.

Groundwater is used almost exclusively to provide domestic supplies to rural homes and supplies virtually all of the water used by non-community public water systems. Water supply for the nearby town of Glenrock comes from three wells installed in the Casper Formation and varies from 250 to 1,175 feet deep.

6.6.4 Impacts

Water uses at the sites will include routine low-level activities such as dust control, concrete batch plant (during construction activities), and potable water for drinking.

The O&M building(s) will each use existing groundwater wells to supply for domestic use and discharge to the existing septic system. However, impacts to water supplies are not anticipated to be significant because impacts will be short term (during construction) and water use during operations will be negligible. Therefore, operation impacts to groundwater will be less than significant.

6.7 Land Use/Recreation

The existing land uses in the vicinity of the Projects are rural. Converse County generally classifies the lands near the Projects as agricultural, with agriculture use including rangeland and livestock grazing. BLM lands adjacent to the Projects are used for mineral development. State-owned lands near the Projects are generally available for energy development, but appear to be primarily leased for livestock grazing.

6.7.1 Consistency with Land Use Plans

Much of Converse County outside of municipal boundaries is not currently zoned. Zoning districts are generally developed within the county as needed to accommodate growth. These districts include numerous subdivisions, and designated suburban and rural residential districts. There is currently no zoning district applied to the sites (Musselman, 2007). In addition, the zoning regulations do not apply to developments in un-zoned areas.

Under the "split estate" system, surface land ownership and access to subsurface mineral rights are owned separately. PacifiCorp owns all surface rights for land impacted by these Projects. Mineral rights for land in the Powder River Basin, including the proposed WTG alignment, are owned by the federal government and managed by BLM. Coal exploration is allowed by lease on all federal mineral estate, as described in the Proposed Casper Resource Management Plan (RMP) (BLM, 2007). In addition, oil and gas exploration and development, including coal-bed natural gas, are anticipated within the Powder River Basin under a federal lease system. As of February 24, 2005, 589 oil and gas wells were active in Converse County. Other leasable minerals include sodium (trona), phosphates, oil shale, and tar sands. Hardrock minerals also may be developed under a leasing system.

The WTGs will be located on land owned by PacifiCorp. Therefore, the Projects will not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over either Projects; disrupt or divide the physical arrangement of the established community; contribute to a cumulative adverse effect on land use; preclude or unduly restrict existing or planned future uses; or convert agricultural land or resources to nonagricultural uses.

6.7.1.1.1 Wyoming Department of Environmental Quality – Land Quality Division

The WDEQ-LQD administers and enforces all statutes and regulations on land disturbances dealing with mining and reclamation within the state of Wyoming. The LQD has the authority to require permitting and licensing of all operator actions of surface and underground mine facilities. The LQD's authority derives from the Federal Surface Mining Reclamation and Control Act and the Wyoming Environmental Quality Act.

6.7.2 Consistency with Land Quality Division Mine Permit

Guidelines have been established for PacifiCorp's mining subsidiary Glenrock Coal Company (GCC) as the mine operator and are intended to provide guidance in the preparation of permits and reports, and to aid in the interpretation of LQD rules, regulations, policies, and statutes.

GCC has obtained a post mining land use change to industrial/commercial on specific areas where turbines are to be located to allow disturbance of reclaimed lands governed by the GCC operator mine permit. Recent revisions to the layout and location of turbines for the Projects necessitate further application for land use changes. GCC personnel familiar with the mine permit, applicable land uses, and post-reclamation standards will ensure consistency in the dual land use and compliance with the design and implementation of monitoring programs in reclaimed areas.

6.7.3 Recreational Resources

Information from the Digital Wyoming Atlas (University of Wyoming Department of Geography, 2002) was reviewed to determine the location of recreational areas. Hunting on or adjacent to the permit area is likely the most prevalent recreational activity in the area. A review of the Atlas shows that recreational resources within and adjacent to the area of primary impact include a mixture of city, county, and state parks. Other recreational resources within the area of primary impact include numerous museums and cultural attractions, hiking, big game hunting, and various fishing opportunities at local reservoirs.

6.7.3.1.1 Local City and County Parks

Given that the workforce represents only a very small percentage of the total population of the area of primary impact, any use of local city and county parks would not result in a significant net increase in usage and visitation. Therefore, it is concluded that no significant impacts would occur to city and county recreational resources from the small incremental increase in usage by the workforce.

6.7.3.1.2 State Parks

A variety of state parks operated by the Wyoming State Parks and Historic Sites occur in the study area and may be used by construction personnel. The following provide summary details on the parks and afforded recreational activities.

Edness Kimball Wilkins State Park. Edness K. Wilkins is a 315-acre day-use state park. The North Platte River provides a natural habitat for a variety of wildlife, and for fishing, canoeing, and rafting. Visitors can use picnic tables, grills, group shelters, playgrounds and a launching ramp for canoes or rafts. A universally accessible fishing pier is available for anglers. An additional 2.8 miles of accessible hard-surfaced paths provide visitors with an opportunity view some of the area wildlife.

Glendo State Park and Reservoir. The Glendo State Park and Reservoir is located on the North Platte River, 6 miles southeast of the town of Glendo, in Platte County. Access to the park is from I-25 via County Rd. 17 (Glendo Park Road). The Glendo State Park maintains seven campgrounds, six boat ramps, and a marina concession. Available fish species for angling include walleye, yellow perch, and channel catfish. Channel catfish are stocked in

the reservoir, and brown trout, rainbow trout, and channel catfish are stocked in the river above the reservoir. Below the dam, the river is stocked with brown, rainbow, and cutthroat trout.

Recreational resources are managed for the Bureau of Reclamation by Wyoming State Parks and Historic Sites. The park contains scenic overlooks and three interpretive nature trails. The Glendo Dam Wetlands Trail, located along the river, just below the dam, features two fishing/observation piers. The Muddy Bay Wetlands Interpretive Nature Trail is located on the east side of Muddy Bay. The Glendo Dam Overlook Trail is located north of Glendo Dam. Across from the Glendo Power Plant and below the dam is a public access boat ramp providing access to the North Platte River.

Seminoe State Park. The Seminoe Dam and Power Plant are on the North Platte River about 34 miles northeast of Rawlins, Wyoming. The Seminoe Reservoir, a major feature of the Kendrick Project, provides storage capacity for water to irrigate Kendrick Project lands. The Kendrick Project conserves the waters of the North Platte River for irrigation and electric power generation. The Kendrick Project is a multi-purpose development with storage at Seminoe Reservoir and diversion at Alcova Dam to Project lands. Operation of the reservoirs and power plants is integrated with other river basin developments. Seminoe Reservoir has a total capacity of 1,017,279 acre-feet and provides storage capacity for the water to irrigate the Kendrick Project lands. The power plant generates electric power as the water is released for irrigation or stored in Pathfinder Reservoir for later release as required.

Recreational resources are managed for the Bureau of Reclamation by Wyoming State Parks and Historic Sites. The park is located on the North Platte River, 72 miles southwest of Casper, and 38 miles north of Sinclair, in Carbon County. Access to the park is from I-80 via Carbon County Rd. 351 or from U.S. 220 via Natrona County Hwy. 407 and Carbon County Roads 291 and 351. Seminoe State Park provides three campgrounds and three boat ramps. Available species include walleye, brown trout, rainbow trout, and cutthroat trout. The reservoir is stocked annually with rainbow and cutthroat trout. Adjacent to Seminoe Dam, near the north end of the reservoir, the Morgan Creek drainage area comprises approximately 4,752 acres of forested lands within the Seminoe Mountains that is administered by the Wyoming Game and Fish Department as a winter range for elk and bighorn sheep. The area is open to hunting, but closed to grazing, camping, and fires.

Pathfinder Reservoir. The North Platte Project extends 111 miles along the river valley from near Guernsey, Wyoming, to below Bridgeport, Nebraska. Pathfinder Dam and Reservoir are part of this Project. Pathfinder Dam is one of the first constructed by the Reclamation Service (now the Bureau of Reclamation). The dam is in a granite canyon on the North Platte River about 3 miles below its junction with the Sweetwater River.

Recreational resources are managed for the Bureau of Reclamation by the Bureau of Land Management and Natrona County Roads, Bridges, and Parks Department. The reservoir is located on the North Platte River 47 miles southwest of Casper, in Carbon and Natrona Counties. Parts of the reservoir are included in the Pathfinder National Wildlife Refuge. There are three campgrounds and three boat ramps. Available species include brown trout, cutthroat trout, rainbow trout, and walleye. Rainbow and cutthroat trout are stocked annually in the reservoir. The Pathfinder Interpretive Center and 1.7-mile interpretive trail

are located near the dam. The interpretive trail may be accessed across the historic suspension bridge or from the dam.

Pathfinder National Wildlife Refuge. Pathfinder National Wildlife Refuge is in an isolated area 50 miles southwest of Casper and 20 miles from the small community of Alcova, Wyoming. The refuge consists of four small units including Sweetwater Arm, Goose Bay, DeWeese Creek, and Sage Creek totaling 16,807 acres. The refuge is an important waterfowl migration stopover on the western edge of the Central Flyway. Recreational opportunities include hunting, fishing, wildlife observation, and outdoor nature photography. The refuge is managed jointly by the U.S. Fish and Wildlife Service (USFWS), the Bureau of Reclamation, the Wyoming Game and Fish Department (WGFD), the BLM, and Natrona County Parks. Grazing and water-level manipulation are the primary tools used by resource managers. A refuge overlook and interpretive site were recently developed in cooperation with Wyoming Audubon.

Ayers Natural Bridge. This geologic formation is approximately 11 miles west of Douglas on I-25. The 50-ft-high natural rock arches over LaPrele Creek. The destination consists of 12 seasonal developed campsites. The Project would temporarily increase the population in the area of primary impact. Specifically, the construction workforce would result in a maximum increase of approximately 166 people over the 9-month construction schedule. It is anticipated that a limited number of workers may visit the two state parks and refuge.

6.7.3.1.3 Impacts

For the purposes of this analysis, it is assumed that every construction employee associated with the Projects will visit all of the above detailed parks and recreational facilities once a year. Currently, visitation numbers are not available to determine incremental visitation increases. Therefore, an annual visitation rate has not been established and a threshold of significance determination can not be asserted. It is envisioned that a very small incremental increase in park and refuge visitations would not exceed the current annual visitation growth rates and would not result in a significant increase in visitor impacts to the parks or refuge.

The transportation analysis (see Section 4.3.7) concluded that the additional vehicle trips generated by the construction and operations of the Projects will have a negligible impact on the operations of the adjacent roadway network. Therefore, traffic on state roads and federal interstates is not considered further.

Based on the assumed number of workforce park visitations, the Projects will result in a very slight incremental increase in traffic on Converse County roads used to access the state parks. However, the additional traffic volume generated by the Projects does not decrease the LOS nor degrade the operational performance of the adjacent roadway facilities and will not result in any significant impacts to Converse County roadways that are used to access these state parks and wildlife refuge.

6.8 Wetland/Waters of the United States Resources

The USFWS National Wetlands Inventory (NWI) has mapped wetlands according to the classification scheme of Cowardin et al. (1979). The NWI database indicates the general

proximity of wetland habitat based on changes in vegetation patterns as observed from satellite imagery. This database is used as a preliminary indicator of wetland habitats as the aerial interpretation is not precise (e.g., wetlands identified in this database require field verification). Digital files were available in 30 x 60 minute quadrangles for the Projects.

6.8.1 Impacts

A review of the NWI did not detail any wetlands within the area of the sites. In addition, field reconnaissance of the Project sites did not identify any wetlands or waters of the United States. Therefore, no permanent or intermittent streams were identified within the Project sites. The Dave Johnston mine maintains several sedimentation ponds; however, those sedimentation ponds will be reclaimed after the mine lands reach their bond release cover requirements. Two reclaimed springs have been established to enhance the post-mining utility of the reclaimed lands. The created springs were observed in the south area of the site, and no Project impacts will occur to these features.

6.9 Visual/Scenic Resources

6.9.1 County Visual Regulations and Ordinances

Converse County was contacted to determine potential visual restrictions or height regulations that may apply to the installation of WTGs and associated facilities within the wind resource area (WRA). There are no existing county regulations that directly address building codes or standards (Musselman, 2007).

6.9.1.1.1 Impacts

Converse County does not have any ordinances regulating the aesthetics of the proposed Projects; therefore, the Projects will not cross any significance threshold and will not result in a significant visual impact.

6.10 Wildlife Resources

This section identifies wildlife species known to occur or that potentially will occur within the area of the Projects. There are no federal wildlife refuges, state wildlife areas, or conservation easements within or adjacent to the sites.

6.10.1 Big Game

Big game mammal information obtained from the WGFD and GCC indicates that mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*) inhabit the Project sites on a year-round basis. Both mule deer and pronghorn antelope are attracted to the reclamation plots, particularly in the spring when new vegetation growth is emerging. Mule deer and pronghorn antelope were observed within the area of the Projects during the reconnaissance survey.

6.10.1.1.1 Potential Impacts

There will be disturbance of soils and removal of vegetation associated with construction of the Projects at turbine sites and access roads that could impact existing habitat or forage for

big game (mule deer and antelope) and small mammals. Potential effects may include displacement from suitable habitats to potentially less suitable and less available habitats, habitat alteration, or destruction. The impacts will generally be temporary and limited in size and where feasible, disturbed areas will be revegetated, and short-term impacts will be minimized with the use of BMPs, including incorporation of WGFD guidance where appropriate. The Project sites do not have any mapped big game crucial habitats; therefore, the Projects will not result in any designated big game habitats. Appendix E contains the WGFD mapped crucial big game habitat map, which details the distances to mapped big game habitats.

6.11 Avian Resources

An estimated 100 million to 1 billion birds die annually in the United States by colliding with manmade objects (Klem, 1991). Although considered environmentally friendly, wind power, at most locations, has been associated with avian fatalities caused by collisions with turbines and other wind plant structures (e.g., Orloff, 1992; Erickson et al., 2000; Erickson et al., 2001; Johnson et al., 2002). Studies conducted to date indicate that raptors and passerines appear to be the most susceptible to turbine collisions in the United States (AWEA, 1995). Based on wind development in operation at the end of 2001, it has been estimated that WTGs cause 0.01 to 0.02 percent (1 to 2 of every 10,000 fatalities) of collision-caused bird mortality in the United States (Erickson et al., 2001).

Avian bird use data were collected on the sites during daylight hours, once per week, using point count surveys from 12 survey plots during the spring migration and early summer breeding season (WEST, 2007)(see Appendix F for the *Baseline Avian Use of the Glenrock Wind Energy Project Converse County, Wyoming Spring Migration and Early Summer Breeding Season Report*.) In addition, WEST, Inc. is currently completing fall migration surveys for both avian and bat use on the site.

6.11.1 Regulatory Background

6.11.1.1.1 Bald and Golden Eagle Protection Act of 1940

The Bald and Golden Eagle Protection act of 1940 (Eagle Act) (16 United States Code [U.S.C.] 668-668d, 54 Stat. 250) as amended, was approved June 8, 1940, and amended by P.L 86-70 (73 Stat. 143) June 25, 1959; P.L. 87-884 (76 Stat. 1346) October 24, 1962; P.L. 92-535 (86 Stat. 1064) October 23, 1972; and P.L. 95-616 (92 Stat. 3114) November 8, 1978. The Eagle Act provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Eagle Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Eagle Act. The 1978 amendment authorizes the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.

A 1994 memorandum (59 Federal Register [FR] 22953, April 29, 1994) from President William J. Clinton to the heads of executive agencies and departments sets out the policy

concerning collection and distribution of eagle feathers for Native American religious purposes.

6.11.1.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) offers protection of 836 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds in the United States, except gallinaceous (upland game) birds, rock pigeons, Eurasian collared doves, European starlings, and house sparrows.

The MBTA implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful. Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture, or kill; possess; offer to or sell, barter, purchase, deliver; or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not.

According to the MBTA, a person, association, partnership, or corporation that violates the Act or its regulations is guilty of a misdemeanor and subject to a fine of up to $500, jail up to 6 months, or both. Anyone who knowingly takes a migratory bird and intends to, offers to, or actually sells or barters the bird is guilty of a felony, with fines up to $2,000, jail up to 2 years, or both. The USFWS is responsible for implementing the provisions of the MBTA, which is enforced by the USFWS Division of Law Enforcement.

6.11.2 Avian Species of Conservation Concern

A search of the Wyoming Natural Heritage Database (2007) lists 11 avian "species of concern" that have been documented or have suitable habitat within or in proximity to the Projects. The 11 avian "species of concern" include ferruginous hawk (*Buteo regalis*), greater sage-grouse (*Centrocercus urophasianus*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*), grasshopper sparrow (*Ammodramus savannarum*), clay-colored sparrow (*Spizella pallida*), Brewer's sparrow (*Spizella breweri*), McCown's longspur (*Calcarius mccownii*), and chestnut-collared longspur (*Calcarius ornatus*).

6.11.2.1.1 Local Status of Avian Species of Concern

Population numbers are not readily available for the 11 avian species of concern. However, their recent population declines across their breeding ranges are a primary reason for their listing as species of concern. WEST, Inc. identified one active ferruginous hawk nest and inactive ferruginous hawk nest during the 2007 avian surveys.

6.11.3 Golden Eagle

The U.S. Fish and Wildlife Region 6 (Colorado, Montana, Nebraska, Utah, Wyoming, Kansas, and Dakotas) and the Bird Conservation Regions in the west-central United States list it as a species of regional concern. However, the golden eagle is not currently listed as threatened or endangered in the United States under the ESA.

6.11.3.1.1 Local Status

During active mining operations in the early 1980s, two golden eagle pairs attempted to nest along the active mine highwall (Skilbred, 2007). When the mine highwall was removed as part of the reclamation effort, the USFWS requested that artificial golden eagle nesting platforms be constructed onsite to mitigate loss of the highwall nests. Therefore, PacifiCorp was required to construct two artificial nest platforms, one in 1981 and one in 1994. According to Skilbred (2007), GCC was required by USFWS to develop a mitigation plan for each of the nest starts. The mitigation plan required construction and erection of one artificial nest structure site to mitigate each of the active highwall nests. In addition, GCC was required to monitor the nests for a period of time. Because the structures were successful in their occupancy by golden eagle pairs, during the past 20 years GCC has added additional artificial nest platform structures within the mine permit boundary. Skilbred (2007) said there are currently 10 platforms within and outside the Dave Johnston mine permit boundary.

During the spring 2007 avian baseline use surveys, three golden eagles established nests within the 10 artificial nest platforms. In addition, the highest use of Project sites was by golden eagle (0.47/survey). The high use of the Project sites by golden eagles is directly attributable to the artificial nest platforms and three active nests observed during the 2007 avian use surveys.

6.11.4 Greater Sage-Grouse

Declining numbers of greater sage-grouse over the past 3 decades, accompanied by increased habitat degradation, have resulted in the species being considered a species of concern. Between 1999 and 2004, eight petitions to list the greater sage-grouse as threatened or endangered were filed, and a species status review was initiated as a result. In 2005, a USFWS status review was completed, and it was determined that the greater sage-grouse is not warranted for listing as endangered or threatened. However, interest in greater sage-grouse and sagebrush habitats has increased because of the potential implications for land and wildlife management.

6.11.4.1.1 Local Status

The Wyoming Natural Diversity Database (WYNDD) provided occurrence data for both common wildlife species and species of state and federal concern that exist within the Project sites. These data sets were obtained in June 2004. Consultation with the WGFD indicated that the primary WGFD species of concern within Converse County is the greater sage-grouse. The greater sage-grouse was recently denied listing on the ESA. The management of this species is under jurisdiction of the state wildlife agencies. This species is of high conservation concern in Wyoming.

Surveys for greater sage-grouse were conducted concurrent with avian baseline surveys in the spring of 2007. The proposed Project sites were surveyed using roads located within the Project sites. No leks (breeding grounds) were identified, and greater sage-grouse were not seen on the property during the spring site surveys.

Because a majority of the mine is reclaimed, there is a lack of mature sagebrush and therefore suitable cover for greater sage-grouse on the majority of the Project sites. The

southeastern portion of the Project sites was surveyed on foot where sagebrush is prevalent after completion of the road survey to look for any further sign of grouse activity within these sagebrush patches. No leks were found within the Project sites. The sites have been historically grazed and were actively grazed at the time of the site visit. The proposed Project sites do not have high-quality grouse habitat due to the sparse and sporadic occurrence of sagebrush onsite.

The Project sites have been observed to contain greater sage-grouse broods. Therefore, four greater sage-grouse brood surveys were conducted in July and August 2007. Three adult males, six adult females, and 19 juvenile greater sage-grouse were classified during focused brood surveys.

6.11.5 Passerine Species

The MBTA offers protection of 836 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds in the United States except gallinaceous (upland game) birds, rock pigeons, Eurasian collared doves, European starlings, and house sparrows.

6.11.5.1.1 Local Status

Nineteen species of birds were observed during 51 point count surveys over seven visits to the Project sites. Over the course of the study, 257 groups comprised of 481 individual birds were recorded. Avian richness (defined as number of species per survey) was 2.4. The mean number of birds observed per survey of each plot was 4.2.

Passerines (song birds) were the most abundant group (2.87/survey), followed by raptors (1.08) and doves (0.22). Passerines comprised 68.6 percent of all birds observed, raptors comprised 25.9 percent, and doves comprised 5.2 percent. The most frequently occurring groups observed, regardless of the number observed, were passerines (89.3 percent of surveys), raptors (61.2 percent), and doves (6.2 percent). Species with the highest use of the Project sites were western meadowlark (1.36/survey), horned lark (0.42), northern harrier (0.38) and lark bunting (0.28). Conversely, the species of birds most frequently observed were western meadowlark (80.5 percent of surveys), horned lark (28.1 percent) and vesper sparrow (23.1 percent).

Population numbers aren't readily available for all 836 species of migratory birds that are offered protection under the MBTA. However, the three species of passerine birds most observed on the Project sites (western meadowlark, horned lark, and vesper sparrow) are both locally and regionally common species.

6.11.6 Raptor Species

Raptor species are offered protection under the MBTA including nest buffers during the breeding season. Population numbers aren't readily available for the six observed species of raptors on the Project sites.

6.11.6.1.1 Local Status

Six species of raptor (exclusive of the golden eagle) were observed during the spring 2007 surveys. The highest use of the Project sites was by northern harrier (0.38). The other five species (red-tailed hawk, ferruginous hawk, prairie falcon, American kestrel and sharp-shinned hawk) all had very low use (i.e., <0.07/survey). WEST, Inc. (2007) identified one active short-eared owl nest located on the ground in the Project sites. A red-tailed hawk nest was active earlier in the spring but was not active on June 9, 2007, and was apparently not successful.

6.11.7 Impacts to Avian Resources

6.11.7.1.1 Avian Species of Conservation Concern

Three of the 11 potential sensitive bird species were observed during the spring 2007 avian surveys, including ferruginous hawk, sage thrasher, and Brewer's sparrow. Four ferruginous hawks were observed during point count surveys, and two nests were found within the area of the Projects. Sage thrashers appear to be relatively uncommon in the sites, as only 12 were observed during 51 point count surveys. Brewer's sparrows appear to be relatively rare, as only three were observed during the spring study.

Based on the relative exposure calculations of birds to turbines (e.g., comparing flight heights and flight behavior to rotor-swept heights), sensitive bird species observed on the sites were not deemed to be within the rotor swept area. Therefore, collision mortality should be a rare event and will not result in a significant impact to sensitive avian species on the sites.

6.11.7.1.2 Golden Eagle

As stated previously, two active golden eagle nests attempted on the active highwalls during mining operations. Although only two nest structures were required for mitigation, due to the success of the artificial nests, PacifiCorp voluntarily constructed an additional 8 platforms for a total of 10 on the mine site. During the 2007 avian baseline surveys, three of the ten nest platforms structures were observed to have active golden eagle nests.

At other wind farms in the western United States, golden eagle collision fatalities have been observed to occur at operating wind farms (see Orloff and Flannery, 1992; Erickson et al., 2001; Young et al., 2003). However, at the Foote Creek Rim wind farm near Arlington, Wyoming, a golden eagle pair successfully nested 0.5-mile from the wind farm for three different years after it became operational (Johnson et al., 2000a).

Because constructing WTGs in close proximity to active golden eagle nests would put the birds at unnecessary risk of turbine collision, PacifiCorp has submitted a request for an incidental take permit with USFWS. As part of the incidental take permit application, PacifiCorp plans to move the three nest structures that had active golden eagle nests in 2007, as well as two additional structures to provide alternate nest sites. The remaining five artificial nest structures will be removed entirely from the area of the Projects.

Operation of the Projects will represent a collision hazard to local golden eagles. As stated previously, the Eagle Act prohibits the taking of bald and golden eagles including their nests, except when specifically authorized by the Department of Interior. PacifiCorp is

currently working with the USFWS to implement appropriate mitigation measures to minimize impact to eagles under the *Draft National Bald Eagle Management Guidelines*, and obtain an incidental take permit, if required.

6.11.7.1.3 Greater Sage-Grouse

Several studies have been published regarding displacement and avoidance impacts of tall structures and industrial activity such as oil and gas exploration and roads on grassland and shrub-steppe breeding birds, particularly grouse. Greater sage-grouse requires large, unfragmented tracts of big sagebrush.

Impacts on greater sage-grouse due to the Projects may include collision-related mortality, habitat loss, displacement from areas associated with construction, operation, and maintenance and possible disruption during the breeding and nesting season. Greater sage-grouse mortality due to collisions with WTGs is very unlikely and should not result in a significant cause of mortality. While the potential for impact is greatest during construction, operations and maintenance will lead to an increase in traffic on roads and human activity onsite, which may occur year round in some areas. Leks located near the Project sites may experience some disturbance from this increased activity. The amount of habitat lost will minimally affect greater sage-grouse, and all disturbed areas will be reclaimed upon completion of the Projects.

No greater sage-grouse were observed during the 2007 point count surveys. However, three adult males, six adult females, and 19 juvenile greater sage-grouse were classified during focused brood surveys conducted by WEST, Inc. in 2007. Based on minimal observations of broods during the surveys, use of the areas associated with the Projects by greater sage-grouse broods is relatively low. In addition, results of the surveys shows that the sites do not appear to represent significant or provide important brood-rearing habitat.

To monitor impacts on greater sage-grouse, PacifiCorp will monitor leks annually for 3 years following construction completion. In addition, PacifiCorp will conduct greater sage-grouse pellet counts in an effort to determine whether displacement is occurring from operation of the Projects. Surveys will be conducted twice each year, once in May and again in October. Surveys in May will document the previous winter's use of the site, while surveys in October will document the previous summer's use of the site. Surveys will begin by establishing transects and clearing in the fall of 2007, and will continue for 2 years post-construction.

6.11.7.1.4 Passerine Species

Mean flight height for all species combined was 42.9 m. For avian groups with at least five separate observations of flying birds, mean flight height was lowest for passerines (4.4 m).

For all species combined, 80.4 percent of all flying birds observed were below the rotor-swept height (<30 m), 14.1 percent were within the rotor-swept height (30 – 130 m), and 5.5 percent were observed flying above the rotor-swept height (>130 m). For groups with at least five separate observations of flying birds, those most often observed flying within the turbine rotor-swept height were eagles (43.3 percent), harriers (10.7 percent) and buteos (10.0 percent). For all flying raptors combined, 23.0 percent were observed flying within the rotor-swept height. Only four species were observed flying at turbine rotor-swept heights,

including golden eagle (43.3 percent), Brewer's blackbird (33.3 percent), northern harrier (10.7 percent) and ferruginous hawk (25.0 percent).

Relative exposure of birds to turbines is determined by comparing flight heights and flight behavior to rotor-swept heights. Based on the exposure index derived from abundance and flight behavior, the only passerine species with a potential for colliding with WTGs is the Brewer's blackbird (0.07). All other species had an index of 0 because they were never observed flying at rotor-swept heights.

This analysis may provide insight into what species might be the most likely turbine-related casualties. However, this index only considers relative probability of exposure based on abundance, proportion of daily activity budget spent flying, and flight height of each species. This analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior or abundance of nocturnal migrants. It also does not take into consideration varying ability among species to detect and avoid turbines, habitat selection, and other factors that may influence exposure to turbine collision; therefore, the actual risk may be lower or higher than indicated by these data.

6.11.7.1.5 Raptor Species

Mean raptor use at the Project sites during the early summer breeding season was 1.08/survey. Based on studies of 30 other WRAs using similar protocols, mean annual raptor/vulture use (defined as number of raptors and vultures observed per 20–minute period at a station with an 800–m radius) typically ranges from 0.10/survey to 1.3/survey. The only areas studied with higher than typical raptor use are Altamont Pass, California, where annual use averaged 2.4/survey, and the High Winds site in Solano County, California, where annual raptor use averaged 3.5/survey.

Raptor use at the Glenrock site is 31 percent of that observed at High Winds and 45 percent of that observed at Altamont. Of the 30 WRAs with similar raptor use data, only 5 have higher raptor use than that observed at the Project sites while 25 have lower use.

While the indication is that raptor use of this site is relatively high (although not on the same order of magnitude as that observed at High Winds and Altamont, California), it is highly important to note that the presence of the ten artificial nest platforms and subsequent three active golden eagle nests (on artificial platforms) biased the Project sites raptor observations during the 2007 surveys.

Using regression analysis to predict raptor collision mortality at the Project sites based on mean raptor use of 1.08/survey yields an estimated fatality rate of 0.12/MW/year, or 12 per year for each 99 MW project, which is relatively high compared to most other wind farms. A 95 percent prediction interval on this estimate is 0 to 0.24 raptor fatalities/MW/year. Raptor use at the Project sites (1.08/survey) is over twice as high as the SeaWest wind farm on Foote Creek Rim, where it averaged 0.49/survey based on several years of data (Johnson et al., 2000a). Actual raptor mortality at Foote Creek Rim was 0.05/MW/year.

Potential Project-related impacts to raptors primarily consist of raptor susceptibility to collision with turbines. For avian groups with at least five separate observations of flying birds, mean flight height was highest for buteos (228 m), and for all raptors combined, mean flight height was 67.4 m. Based on the exposure index derived from abundance and flight

behavior, the only three species with a potential for colliding with turbines including the golden eagle (index = 0.15) were the northern harrier (0.04), and ferruginous hawk (0.01). All other species had an index of 0 because they were never observed flying at rotor-swept heights (WEST, 2007).

As previously stated, this analysis may only provide insight into what species might be the most likely turbine casualties, and the index only considers relative probability of exposure based on abundance, proportion of daily activity budget spent flying, and flight height of each species. However, it is important to note that monitoring survey data for the Foote Creek Rim did not result in high mortalities to raptor species.

6.11.8 Avian Resource Conclusions

Impacts to birds at Project sites may include mortality due to WTG collisions. Other impacts to birds may include the loss of potential foraging, breeding, and/or nesting habitat, and displacement. However, these impacts will be minor because disturbances are widely scattered, and the Projects are sited in reclaimed habitats.

Relative exposure of birds to turbines is determined by comparing flight heights and flight behavior to rotor-swept heights. Only four species were observed flying at turbine rotor-swept heights, including golden eagle, Brewer's blackbird, northern harrier, and ferruginous hawk.

Based on data collected during the early summer breeding season, raptor use of the Project sites is relatively high compared to most other WRAs in the United States. As previously stated, the occurrence of the ten artificial nest platforms and three active golden eagle nests biased the data. PacifiCorp is working with the USFWS to move the artificial nest platforms to alleviate golden eagle nesting activity within the Project sites. Additional point count surveys of the Project sites were conducted in the fall 2007 migration period (mid-September through mid-November) to assess use of the Project sites by migrants. After these data become available, a final determination will be made regarding the expected level of avian impacts at this site based on both breeding season and migration data.

6.12 Bats

According to the Proposed Casper RMP and Final Environmental Impact Statement (EIS) (BLM, 2007), four bat species potentially occur on BLM-administered land in the Casper BLM District area. These include the eastern red bat, hoary bat, silver-haired bat, and the eastern pipistrelle. Habitat requirements for these species have not been well delineated.

Presently, the hoary and silver-haired bats are not listed as candidate or sensitive species.

6.12.1.1.1 Impacts

Bat casualties have been reported from most wind power facilities where post-construction fatality monitoring data are available. The majority of recorded fatalities in the west occur during the fall migration period, and the species most often found during carcass searches are the hoary bat (*Lasiurus cinereus*) and the silver-haired bat (*Lasionycteris noctivagans*). Based on a records search and site reconnaissance, there are no documented bat colonies or hibernacula within the Project sites. In an effort to document bat species composition and

general usage of the Project sites within both spring and fall migration periods, PacifiCorp is currently conducting an acoustic survey of bat activity. However, the acoustic data have not been analyzed.

6.13 Federally Listed Wildlife Species

A review of The Wyoming Natural Diversity Heritage Database and the USFWS Threatened Endangered Sensitive Species (TESS) database was conducted to identify state and federal species of concern including federally listed species that could potentially occur within the Project sites.

Several wildlife species known to occur within the region are considered threatened or endangered because of their recognized rarity or vulnerability to various causes of habitat loss or population decline.

This review identified the bald eagle as the only federally listed threatened and endangered species of concern that may potentially occur within the Project sites.

6.13.1 Regulatory Background

6.13.1.1.1 Endangered Species Act

Those species classified as threatened or endangered are protected under the ESA, enforced by USFWS. Threatened or endangered species are considered "federally listed" or "listed" after a final rule has been published in the Federal Register.

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 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. 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.

6.13.2 Bald Eagle

Bald eagles were officially declared an endangered species in 1967 in all areas of the United States south of the 40th parallel, under a law that preceded the Endangered Species Act (ESA) of 1973. Until 1995, the bald eagle was listed as endangered under the ESA in 43 of the 48 lower states, and as threatened in Wisconsin, Minnesota, Michigan, Washington, and Oregon. In July 1995, USFWS upgraded the status of bald eagles in the lower 48 states to threatened. The USFWS removed the bald eagle from the federal list of threatened and endangered species on July 7, 2007. However, it is still protected by the MBTA and the Bald and Golden Eagle Protection Act (Eagle Act). In June 2007, the USFWS issued guidelines on how the bald eagle will continue to be protected by federal law under a series of actions designed to govern management of eagles after their removal from ESA protection. The USFWS also prepared a set of National Bald Eagle Management Guidelines that provide guidance to landowners and others on how to ensure that actions they take on their property are consistent with the Eagle Act and the MBTA. In addition, USFWS has issued a

proposal to establish a permit program under the Eagle Act that would allow a limited take of bald and golden eagles while ensuring that populations are not significantly affected.

6.13.2.1.1 Local Status

Eleven bald eagle nests are known to occur within the BLM Casper Field Office District (BLM, 2003). All of these nests occur in riparian habitats associated with the North Platte River. However, none of these nests occurs on lands administered by BLM.

As reported in the Wyoming Statewide Programmatic Bald Eagle Biological Assessment (BLM, 2003), 11 communal winter roosting areas are known to occur within the Casper Field Office District. Of the 11 communal roosts, the following roosts occur near Glenrock, Wyoming.

- The Little Deer Creek Roost is located in Little Deer Creek Canyon in southwestern Converse County, approximately 8 miles southwest of Glenrock, Wyoming.
- Box Elder Creek Roost is located in Box Elder Canyon in southwestern Converse County, approximately 11 miles south of Glenrock, Wyoming.
- The Coal Creek Roost is known to occur within the North Platte River Resource Management Unit. The Coal Creek Roost occupies nearly 2 square miles along the North Platte River, and approximately 15 miles east of Casper, Wyoming.

According to Skilbred (2007), during the winter months, bald eagles have been infrequently observed within the north mine property area, foraging on roadkill carcasses adjacent to 55 Ranch Road. However, as a result of the lack of large trees and a perennial stream or river within the mine property, there is no suitable nesting or roosting habitat directly within the Project sites. Bald eagles were not observed on the Project sites during the spring 2007 avian surveys.

6.13.2.1.2 Impacts

No bald eagles were observed during the 2007 avian use surveys. In addition, the Project sites do not contain any known suitable nesting trees or roosting sites. Therefore, the Projects are not likely to affect local or regional populations of bald eagles and operation of the Projects will not result in significant impacts to the bald eagle.

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7.0 Plans for Alleviating Impacts

Various mitigation measures will be implemented to alleviate impacts related to construction and operation of the Projects. These mitigation measures are described in the following paragraphs and are organized by resource topic.

7.1 Air Quality

Construction-related dust disturbance shall be controlled by the periodic application of water to all disturbed areas along the right-of-way and access roads. Vehicles and other equipment showing excessive emission of exhaust gases due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective adjustments or repairs are made. Any stationary sources associated with construction requiring permits will be controlled in accordance with relevant regulations.

7.2 Noise

Construction vehicles and equipment shall be maintained in proper operating condition and shall be equipped with manufacturers' standard noise control devices or better (e.g., mufflers and engine enclosures).

7.3 Soil Resources/Geologic Hazards

Administered through construction specifications and job supervision, erosion control measures will be implemented to minimize the impacts to soils during and after construction.

- An erosion control plan will be prepared by the construction contractor that addresses excavation, grading, and erosion control measures during and after construction.
- Limits of construction and areas to be disturbed will be defined and managed by onsite inspectors and construction managers.
- Periodic inspection will be made of erosion control measures by project managers, especially after storms. Erosion control measures will be repaired or replaced as necessary.
- Berms and other water-channeling measures will be used to direct water to appropriate detention ponds.
- Barriers and other measures consisting of 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 characteristic limits, as prescribed by a soils engineer. As may be necessary in steep slope conditions, a retaining wall may be installed.

7.4 Cultural Resources

Known cultural resource locations will be avoided by marking them on construction drawings as "no entry" areas and by flagging them in the field, if necessary. Construction crews will 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 cultural resources.

Should any previously unknown historic/prehistoric sites or artifacts be encountered during construction, all land-altering activities at that location will be immediately suspended and the discovery left intact until such time that PacifiCorp is notified and appropriate measures are taken to ensure compliance with the NHPA and enabling legislation.

Should any additional cultural resources be discovered during construction, the Wyoming State Historic Preservation Officer will be immediately contacted at:

Wyoming State Historic Preservation Office
2301 Central Avenue, Barrett Building, Third Floor
Cheyenne, Wyoming 82002
307-777-6311

7.5 Vegetation Resources

PacifiCorp will develop a revegetation plan upon completion of construction activities and guidance from responsible agencies. Removal of vegetation will be limited to that necessary for the construction of each Project.

On completion of the work, all work areas, except any permanent access roads/trails, shall be regraded, as required, 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.

All construction materials and debris shall be removed from the construction sites in a timely manner.

It is recommended that all vegetation removal be conducted outside of the nesting season, which generally falls between April 1 and August 30; however, this may vary from year to year depending on various environmental conditions. If vegetation must be removed during the breeding season, a qualified biologist should conduct a nest survey of the potential disturbance areas immediately prior to the removal of vegetation.

7.5.1 Revegetation Plan

Revegetation will be required for temporary disturbance areas from the construction of the Projects. The following methods are recommended for all areas of temporary ground disturbances throughout the Project area.

A seed mixture has been previously developed for the mine reclamation and will be used in revegetating all temporarily disturbed areas inside the Glenrock Project and Rolling Hills Project boundary. Table 7-1 lists the developed seed mixture.

Disturbed soil surfaces will be stabilized with native seed mix immediately after construction. Areas of soil disturbance shall be seeded immediately upon completion of the Projects with native grasses or legumes, free of weed species. Landscape fabric or cellulose or straw mulch will be used according to manufacturer/supplier specifications for application for temporary erosion control.

The following planting methods should be used within the area of the Projects. The choice of methods should be based on site-specific factors such as slope, erosion potential, and the size of the area in need of revegetation. Temporary seeding should be done from March to April (for disturbance that occurs during the winter and spring), and/or in October-November (for disturbance that occurs in the summer and fall). Permanent seeding should be done from October to November following the onset of 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.

7.5.1.1.1 Broadcast Method

- Obtain the seed from a reputable seed supplier.
- Broadcast the seed mixture at the prescribed rate.
- Apply locally obtained, weed free straw at a rate of 2 tons per acre immediately after broadcasting the seed.
- Crimp straw into the ground using a tractor-mounted straw crimper.

7.5.1.1.2 Hydroseed Method

- Obtain the seed from a reputable seed supplier.
- Broadcast the seed mixture at the prescribed rate.
- Apply wood cellulose fiber mulch (mixed with a tackifier) at a rate of 1 ton per acre immediately after broadcasting the seed.

7.5.1.1.3 Drill Method

- Obtain the seed from a reputable seed supplier.
- Plant seed mixture at one-half the prescribed rate detailed in Table 7-1 using a seed drill.
- Apply locally obtained, weed free straw at a rate of 2 tons per acre immediately after broadcasting the seed.
- Crimp straw into the ground using a tractor-mounted straw crimper.

Erosion control measures may be installed after seeding and may include filter bags, sediment fences, silt curtains, sediment traps, or other similar devices; impervious materials. Erosion control measures will be implemented until soils are stabilized by a vegetation growth from seed planting.

TABLE 7-1

Glenrock and Rolling Hills Seed Mixture

Scientific Name	Variation	Common Name	PLS lb./A
Grasses			
Agropyron dasystachyum	var. Critana	Thickspike Wheatgrass	1
Agropyron riparium	var. Sodar	Stream bank wheatgrass	1
Agropyron smithii	var. Rosana	Western wheatgrass	3
Agropyron inerme	var. Whitmar	Beardless bluebunch	1
Agropyron spicatum	var. Secar	Bluebunch wheatgrass	2
Bouteloua curtipendula	var. Butte	Side oats grama	0.5
Calamovilfa longifolia	var. Goshen	Prairie sandreed	1
Elymus cinereus	var. Magnar	Great basin wildrye	1.5
Festuca ovina	var. Covar	Sheep fescue	2
Sporobolus crytandrus		Sand dropseed	1
Koeleria cristata	var. Barkoel	Prairie junegrass	1
Poa sanbergii		Sandberg bluegrass	1
Oryzopsis hymenoides	var Rimrock	Indian ricegrass	1
Stipa comata		Needle and thread	1.5
Stipa viridula	var. Lodorm	Green needlegrass	1.5
Forbs			
Achillea millefolium		White yarrow	0.5
Linum lewisii	var. Appar	Blue flax	0.5
Petalostemum purpeum		Purple prairie clover	0.25
Ratibida columnaris		Prairie cone flower	0.75
Shrubs			
Artemisia tridentata	var.Wyomingensis	Big sagebrush	1
Atriplex canescens	high elev	Fourwing saltbush	0.5

Source: PacifiCorp, 2007

7.6 Surface Water and Groundwater Resources

Construction activities shall be performed by 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.

Borrow pits shall be so excavated that water will not collect and stand therein. 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.

Waste waters from construction operations shall not enter streams, water courses, or other surface waters without the use of such turbidity control methods 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. Any such waste waters discharged into surface waters shall be essentially free of settleable material.

Settleable material is defined as that material that will settle from the water by gravity during a 1-hour quiescent period.

7.7 Land Use and Recreation

The contractor shall limit movement of crews, vehicles, and equipment on the right-of-way and approved access roads to minimize damage to property and disruption of normal land use activity.

The contractor shall maintain all fences and gates during the construction period. Any fence or gate damaged during construction will be repaired immediately by the contractor.

The contractor shall eliminate, at the earliest opportunity, all construction ruts that are hazardous to agricultural operations and/or movement of vehicles and equipment. Such ruts shall be leveled, filled and graded, or otherwise eliminated in an approved manner. Damage to ditches, tile drains, culverts, terraces, local roads, and other similar land use features shall be corrected, as necessary, by the contractor. The land and facilities shall be restored as nearly as practicable to their original condition.

7.8 Wetland/Waters of the United States Resources

Section 402 construction stormwater permitting is required for projects that will disturb more than 5 acres. A WYPDES NOI will be required to be prepared for a general construction permit for stormwater discharges. In addition to the NOI, a stormwater pollution prevention plan (SWPPP) will also be required to be prepared for the construction

phase at the Project sites. The construction SWPPP will focus on sedimentation and erosion controls during construction and set forth a schedule for regular inspections of appropriate controls at the construction site.

7.9 Visual Resources

PacifiCorp and its contractors shall exercise care to preserve the natural landscape and shall conduct construction operations (including all construction-related activities and PacifiCorp's designated access roads/trails and staging areas) to prevent any unnecessary damage to, or destruction of, natural features.

Construction trails not required for maintenance access shall be restored to the original contour and made impassable to vehicular traffic. The surfaces of such construction trails shall be scarified as needed to provide a condition that will facilitate natural revegetation, provide proper drainage, and prevent erosion.

7.10 Wildlife Resources

To reduce employee-wildlife incidents, new construction workers will receive information on wildlife awareness during their new employee orientation program. The program will include, at a minimum:

- Information regarding restrictions or the prohibiting of construction employees' access to sensitive wildlife activity areas
- Information regarding applicable wildlife laws and resident hunting requirements
- Information regarding policies and laws penalizing wildlife harassment and poaching
- Statement prohibiting the possession of firearms on the site
- Reporting procedures and requirements for vehicle collisions with wildlife

Potential impacts to wildlife through habitat alteration or destruction will be minimized by revegetating disturbed areas where possible and by efforts to minimize and mitigate damage to soils and vegetation as described in Sections 7.3 and 7.5. Appendix G contains the complete avian and wildlife monitoring protocol for the Projects.

7.11 Avian and Bat Resources

Fall surveys in 2007 to detail baseline conditions will be completed prior to construction of the Projects. Combined with the spring surveys that have already been completed, these surveys will detail baseline conditions within the area of the Projects.

To minimize potential impacts to birds at the site applicable to the Projects, no construction will be conducted within 0.5 mile of nests during breeding season, and no turbines will be constructed within 0.5 mile of nests.

Monitoring of the Projects includes estimating avian and bat collision mortality as well as estimating displacement of greater sage-grouse through lek counts and pellet surveys. The

protocol focuses on the post-construction period. It should be considered flexible in responding as issues arise that may benefit from a change in sampling or study design based on review of findings by an established Technical Advisory Committee (TAC), an advisory group composed of representatives from state/federal agencies, state/local government, and the community. The scope and duration of the monitoring program were developed to be consistent and within the range of monitoring programs that have or will be conducted at other wind projects in the Western United States with features similar to the Projects, including other wind energy projects currently owned by PacifiCorp. Appendix G contains the proposed avian and bat monitoring protocol.

7.12 Threatened and Endangered Species

No threatened or endangered species are known or suspected to be present on the sites. The measures listed above (vegetation resources, wildlife resources, and avian resources) will serve to protect species in the areas applicable to the Projects, and no additional actions are necessary.

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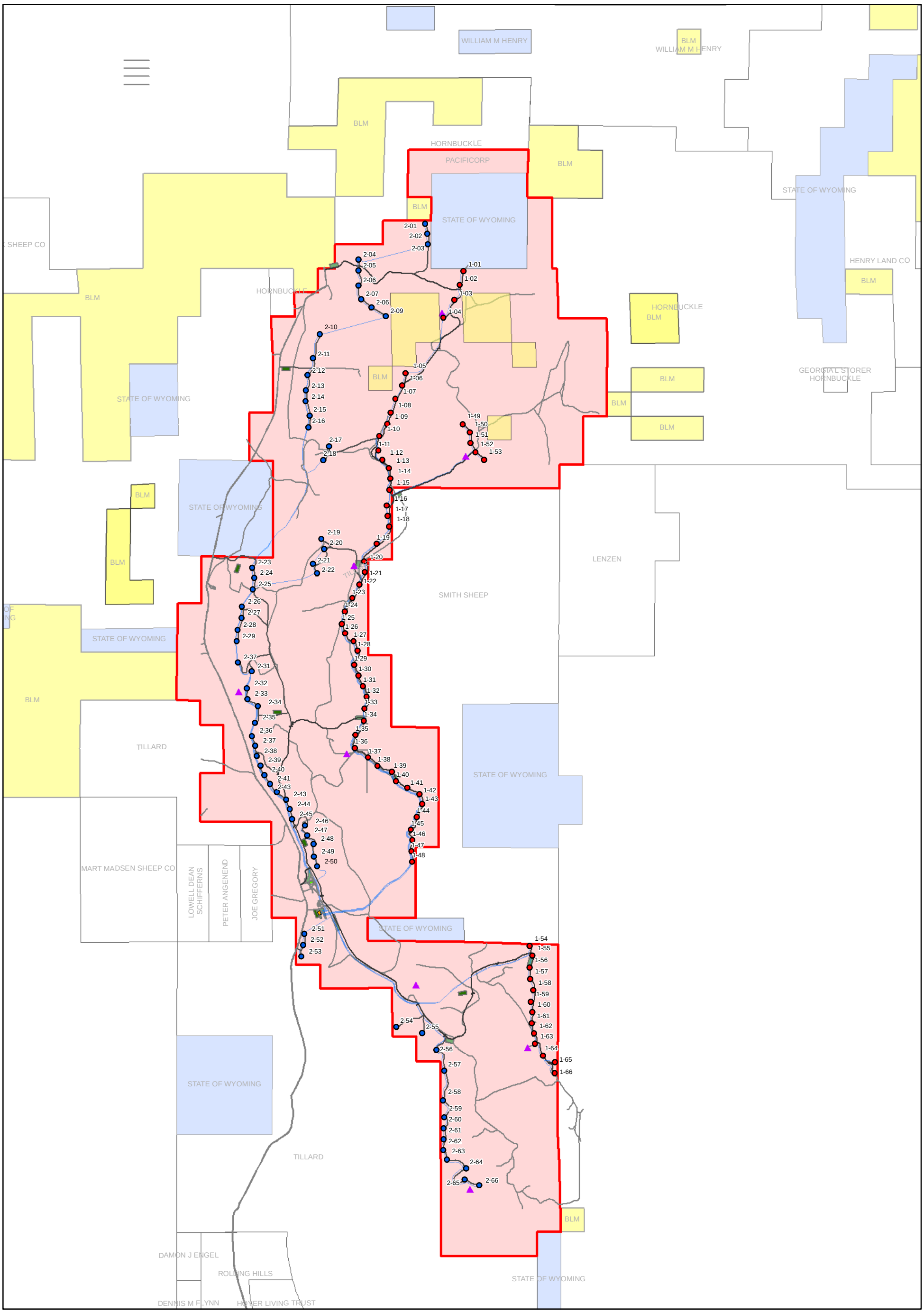
Appendices

APPENDIX A

Site Layout



Legend

- Glenrock Phase I Turbine Sites
- Rolling Hills Phase II Turbine Sites
- Met Tower
- Distribution Line
- Access Roads
- Roads
- BLM
- O & M Building
- Substations
- Staging Area
- Project Boundary
- Private
- State of Wyoming
- BLM
- PacifiCorp

N

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Site Location

PacifiCorp Wind Facility
Glenrock & Rolling Hills
Converse County, Wy

CH2MHILL

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APPENDIX B

Industrial Siting Division – Impact Assistance Calculation

Converse
IAP Estimator

History of State Sales and Use Tax Given to Converse County Governments

		State Share Given			State Share Given to Muni's			Total
Serial	Month	Sales	Use	Total	Sales	Use	Total	
1	July 04	9,013	1,069	10,082	179,819	22,467	202,286	212,368
2	Aug 04	11,747	1,456	13,203	232,371	26,150	258,521	271,724
3	Sep 04	11,858	1,272	13,130	217,584	27,779	245,363	258,493
4	Oct O4	11,730	1,323	13,053	216,870	31,534	248,404	261,457
5	Nov 04	11,874	1,429	13,303	225,314	30,209	255,523	268,826
6	Dec 04	10,906	1,414	12,320	211,474	20,248	231,722	244,042
7	Jan 05	10,205	1,210	11,415	197,055	28,899	225,954	237,369
8	Feb 05	10,801	1,164	11,965	237,083	20,412	257,495	269,460
9	Mar 05	11,722	1,353	13,075	298,119	20,244	318,363	331,438
10	Apr 05	9,633	1,333	10,966	198,027	44,799	242,826	253,792
11	May 05	10,818	1,798	12,616	250,078	33,115	283,193	295,809
12	Jun 05	11,179	1,603	12,782	371,255	61,831	**433,086**	445,868
13	Jul 05	10,850	1,553	12,403	254,645	31,306	285,951	298,354
14	Aug 05	16,058	1,720	17,778	307,790	38,813	346,603	364,381
15	Sep 05	12,303	1,576	13,879	264,299	31,050	295,349	309,228
16	Oct 05	13,709	1,616	15,325	292,779	28,402	321,181	336,506
17	Nov 05	12,372	1,565	13,937	307,171	23,791	330,962	344,899
18	Dec 05	11,859	1,605	13,464	239,603	50,423	290,026	303,490
19	Jan 06	12,164	1,355	13,519	304,252	18,475	322,727	336,246
20	Feb 06	12,941	1,611	14,552	362,942	30,215	393,157	407,709
21	Mar 06	14,205	1,461	15,666	269,566	41,269	310,835	326,501
22	Apr 06	9,970	1,434	11,404	232,365	32,696	265,061	276,465
23	May 06	13,992	2,395	16,387	290,268	68,982	359,250	375,637
24	Jun 06	13,573	2,113	15,686	363,628	25,921	389,549	405,235
25	Jul 06	12,584	1,732	14,316	248,159	35,859	284,018	298,334
26	Aug 06	17,419	2,421	19,840	335,468	30,282	365,750	385,590
27	Sep 06	14,083	2,023	16,106	294,283	28,610	322,893	338,999
28	Oct 06	14,019	2,296	16,315	273,371	30,977	304,348	320,663
29	Nov 06	16,330	2,652	18,982	447,689	35,221	**482,910**	501,892
30	Dec 06	12,899	2,215	15,114	247,261	28,462	275,723	290,837
31	Jan 07	14,353	1,977	16,330	292,607	54,601	347,208	363,538
32	Feb 07	13,590	2,180	15,770	259,118	25,923	285,041	300,811
33	Mar 07	12,859	1,868	14,727	261,358	28,788	290,146	304,873
34	Apr 07	12,036	1,682	13,718	280,800	36,288	317,088	330,806
35	May 07	14,356	2,233	16,589	334,390	56,075	390,465	407,054
36	June 07	12,166	1,885	14,051	257,986	47,482	305,468	319,519
37	July 07	14,474	2,586	17,060	280,622	103,647	384,269	401,329
38	Aug 07	16,596	2,733	19,329	329,573	53,575	383,148	402,477
								356,900 = Base Period

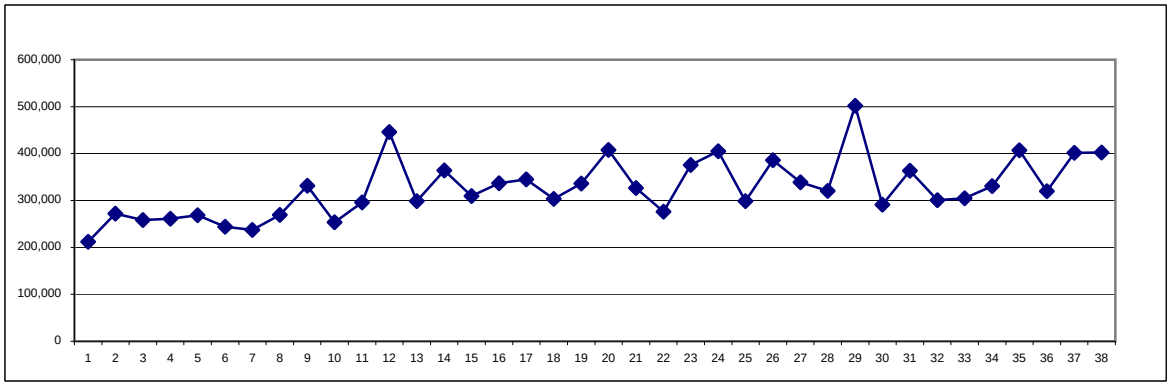


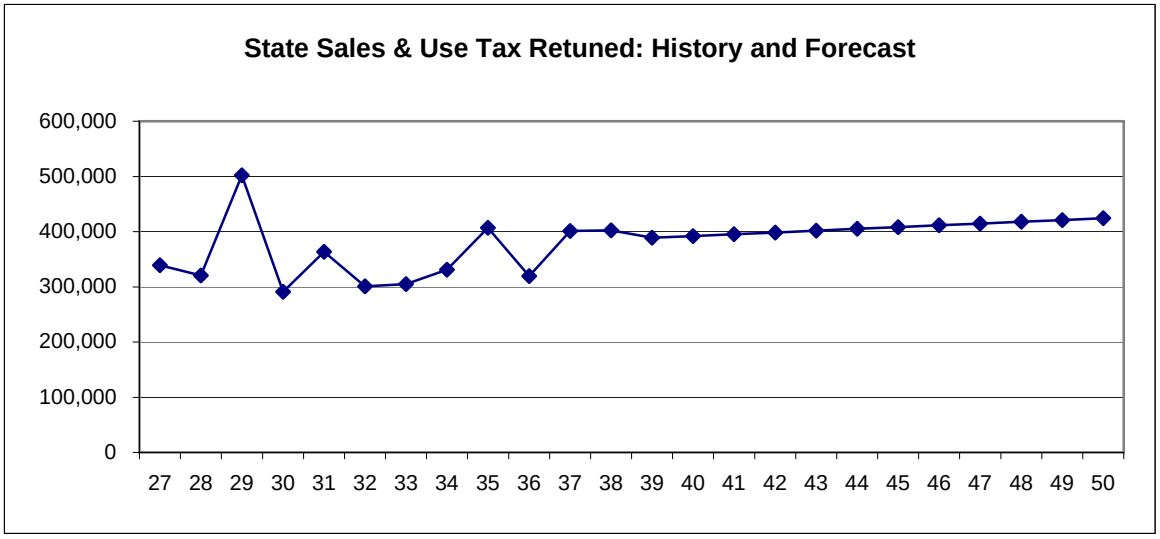
Table: Forecast of Impact Assistance Payments Starting January 2007

Serial	Month	*SLR*	BasePeriod	**Impact Assistance**
39	Aug 2007	*388,912*	356,900	***32,012***
40	Sep 2007	*392,119*	356,900	***35,220***
41	Oct 2007	*395,327*	356,900	***38,427***
42	Nov 2007	*398,534*	356,900	***41,634***
43	Dec 2007	*401,741*	356,900	***44,842***
44	Jan 2008	*404,949*	356,900	***48,049***
45	Feb 2008	*408,156*	356,900	***51,256***
46	Mar 2008	*411,363*	356,900	***54,464***
47	Apr 2008	*414,571*	356,900	***57,671***
48	May 2008	*417,778*	356,900	***60,878***
49	Jun 2008	*420,985*	356,900	***64,086***
50	July 2008	*424,193*	356,900	***67,293***

Average IAP	*49,653*
Total IAP	*595,831*
State shares forecast growth rate=	*1.091*

State Shares to Converse County
Last Year & *One Year Forecast*

27	338,999	Sept 2006
28	320,663	
29	501,892	
30	290,837	
31	363,538	
32	300,811	
33	304,873	
34	330,806	
35	407,054	
36	319,519	
37	401,329	
38	402,477	Aug 2007
39	*388,912*	*Sept 2007*
40	*392,119*	
41	*395,327*	
42	*398,534*	
43	*401,741*	
44	*404,949*	
45	*408,156*	
46	*411,363*	
47	*414,571*	
48	*417,778*	
49	*420,985*	
50	*424,193*	*Aug 2008*



APPENDIX C

Public Involvement

Glenrock Wind Energy Project

ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

- Rocky Mountain Power is developing a wind generation facility at the reclaimed Dave Johnston Coal Mine site, located about 12 miles north of Glenrock, Wyoming.
- The facility will consist of 66 General Electric 1.5 megawatt wind turbines.
- Total plant generation capacity will be 99 megawatts.
- Towers will be 80 meters high with 77-meter diameter blades.
- Towers will be connected by access roads and power lines. Most power lines will be located underground.
- Most land at the project site will remain open for existing grazing and wildlife habitat purposes.
- Construction will begin once all necessary approvals are in place. The project is expected to be completed by October 2008.
- Turbines, blades and tower sections will be manufactured and delivered to the site by General Electric.
- When completed, the plant will employ approximately 10 people. The temporary construction workforce will include approximately 150 people.
- The company owns approximately 14,000 acres of land where surface mining operations were conducted between 1958 and 2000.
- The Dave Johnston Mine supplied the primary source of fuel for the nearby Dave Johnston Power Plant.
- Approximately 104 million tons of coal was recovered from the Dave Johnston Mine between 1958 and 2000.
- Final reclamation was completed in November 2005, returning land to its original condition.
- Wind is an attractive energy source because it is a free, renewable fuel source that does not produce pollutants.
- The Glenrock Wind Energy site is attractive primarily because of wind strength and availability, proximity to existing transmission facilities and because the company already owns the land where it will be located.
- The project will provide significant tax revenue to Converse County and to the state.

For more information please contact
Merrill Brimhall – (801) 220-2034

7/07

We'd like to hear from you

Please join us to discuss Rocky Mountain Power's proposed siting of the Glenrock Wind Energy project

Rocky Mountain Power is asking for your input as part of the siting permit application process for the Glenrock Wind Energy project. We are proposing to use the reclaimed Dave Johnston Coal Mine, located approximately 12 miles north of Glenrock, as the site for a 66-turbine, 99-megawatt wind facility. Located on land entirely owned by the company, the project will include wind turbines, associated towers, foundation, roads, cables, and equipment for operation of the facility. We are hosting a public meeting to gather comments and answer questions about this proposed project.

Everyone is welcome.

Place: Glenrock Middle School
645 East 3rd Street
Glenrock, Wyoming

Date: Wednesday, August 1, 2007

Time: 7 p.m. to 9 p.m.

Light refreshments will be served.

For more information, please contact:
Leslie Blythe, Customer & Community Manager
(307) 577-6904

ROCKY MOUNTAIN POWER

© 2007 Rocky Mountain Power

Public Meeting Notice

ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Please join us at your community meeting listed below!

July 30, 2007
2:00 – 4:00 pm
Cheyenne State Agency Meeting
The Hitching Post – Best Western
1700 West Lincolnway
Cheyenne

July 31, 2007
9:00 – 11:00 am
Laramie Town/County Meeting
Wyoming Union Building
Big Horn Room
1000 East University Ave
Laramie

2:00 – 4:00 pm
Rawlins Town/County Meeting
Carbon County Courthouse
Commissioners Room
415 West Pine Street
Rawlins

7:00 – 9:00 pm
Rawlins Public Open House
The Depot – Center Room
400 West Front Street
Rawlins

August 1, 2007
11:00 – 12:00 am
Casper Town/County Meeting
Holiday Inn Express
4250 Legion Lane
Casper

2:00 - 4:00 pm
Glenrock Town/County Meeting
Town Hall – Council Chambers
219 South 3rd West
Glenrock

7:00 – 9:00 pm
Glenrock/Douglas Public Open House
Glenrock Middle School
645 East 3rd Street
Glenrock

August 2, 2007
10:00 - 12:00 am
Douglas Town/County Meeting
City Hall – Council Chambers
101 North 4th
Douglas

ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

2840 East Yellowstone Hwy.
Casper, Wyoming 82609

July 17, 2007

<<Name>>
<<Address>>
<<City, State, Zip>>

Dear <<Name>>

Wyoming is one of the nation's leading states for wind-energy production potential. Anyone who has spent time in Wyoming can attest to the fact that the wind is a great natural resource that can help meet the need the electrical loads of the state. Rocky Mountain Power has a strong commitment to environmental respect and has committed to install 2,000 megawatts of renewable resources by 2013.

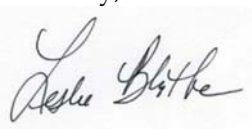
In pursuit of this goal, Rocky Mountain Power is pleased to announce the Glenrock Wind Energy Development Project. The project will be located in Converse County, near Glenrock. It will consist of 66 wind turbines that can produce up to 99 megawatts.

The Wyoming Industrial Siting Council application process is currently underway for this project. Because it requires that we solicit your input, comments and questions concerning the Glenrock Wind Project, we invite you to a project introduction meeting to be held according to the enclosed schedule.

If you cannot attend the meeting, you may provide input to windcomments@pacificorp.com. Please be sure to include your name and address with your comments. You may also contact the project technical staff at (801) 220-2034 with any questions or concerns.

We look forward to working with you on this project and we hope to see you soon at the introduction meeting.

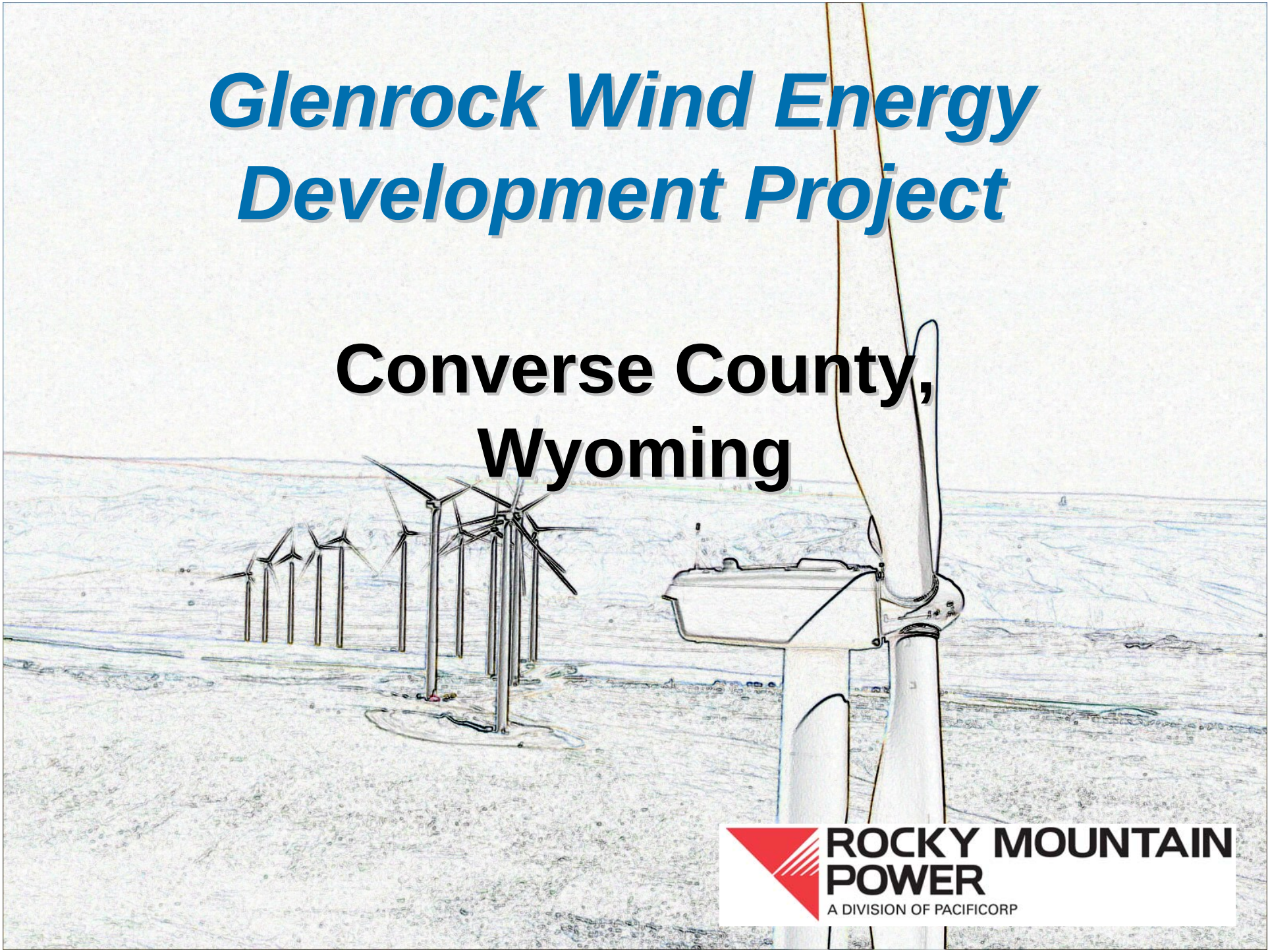
Sincerely,



Leslie Blythe
Customer & Community Manager
(307) 577-6904

Glenrock Wind Energy Development Project

Converse County, Wyoming



ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Meeting Overview:

- Rocky Mountain Power's renewable energy commitment
- Industrial Siting Act Summary
- Glenrock Project Overview & Details
- Glenrock Project Benefits
- Questions/ Comments

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Rocky Mountain Power's renewable energy commitment:

- Demand for electricity continues to grow
  - New customers
  - Existing customer use increased 25 percent in the past 20 years
- Renewable Energy Portfolio Standards, industry standard
- Rocky Mountain Power developing renewable resource portfolio

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Rocky Mountain Power's renewable energy commitment:

- Targets economical renewable resources:
  - 1,400-megawatts by 2010
  - 2,000-megawatts by 2013.
- The Glenrock project moves the company toward achieving these commitments

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Industrial Siting Act Summary:

- An Industrial Siting Permit is required for the project
  - Wyoming Industrial Development Information and Siting Act
- The permit application reviews impacts:
  - Economic
  - Social
  - Environmental
  - Other

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ROCKY MOUNTAIN POWER
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Industrial Siting Act Summary:

- Distribution of impact assistance funds
  - Industrial Siting Division.
- Input from the public
- Rocky Mountain Power plans to submit the application by October, 2007

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Project Location

ROCKY MOUNTAIN POWER
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Project Overview

- 66 wind turbines
- 99 megawatts capacity
- Construction to begin upon receipt of permits
- Operational by October 2008

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ROCKY MOUNTAIN POWER
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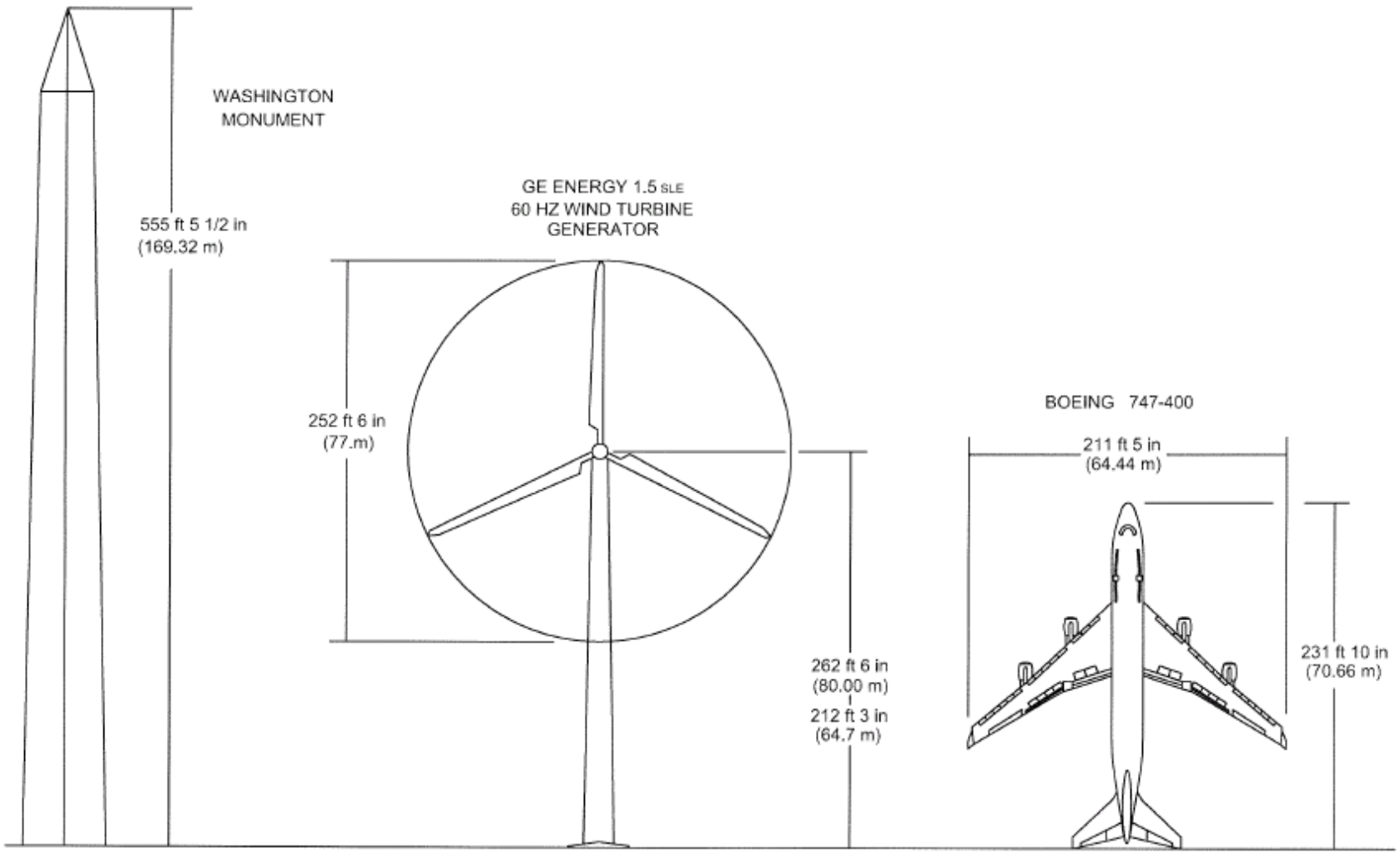
Wind Turbine Tower Height



ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Wind Turbine Generator Features

Main Shaft
Yaw Drive
Gear Box
Generator
Heat Exchanger
Control Panel
Rotor Hub
Pitch Drive

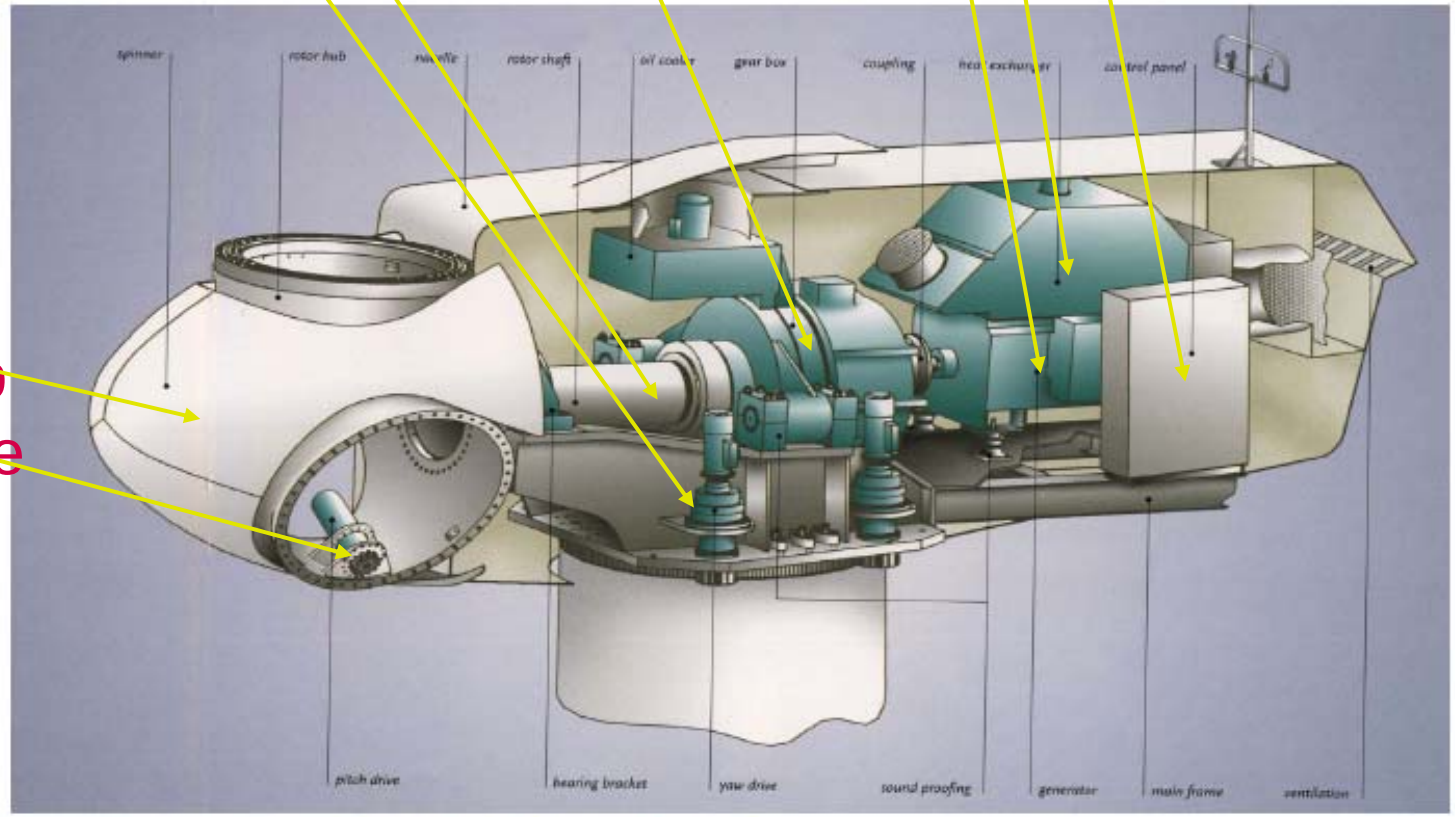
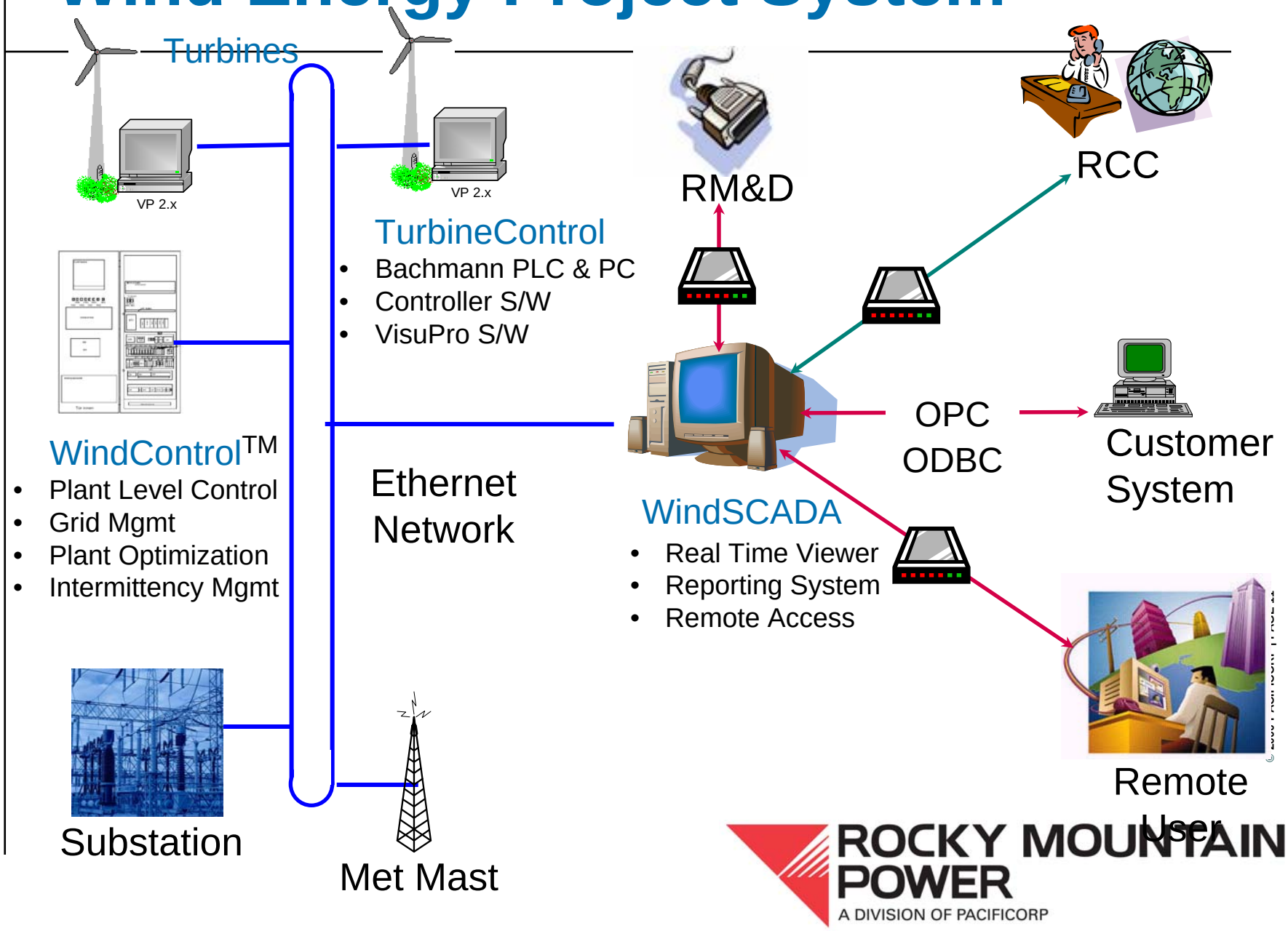


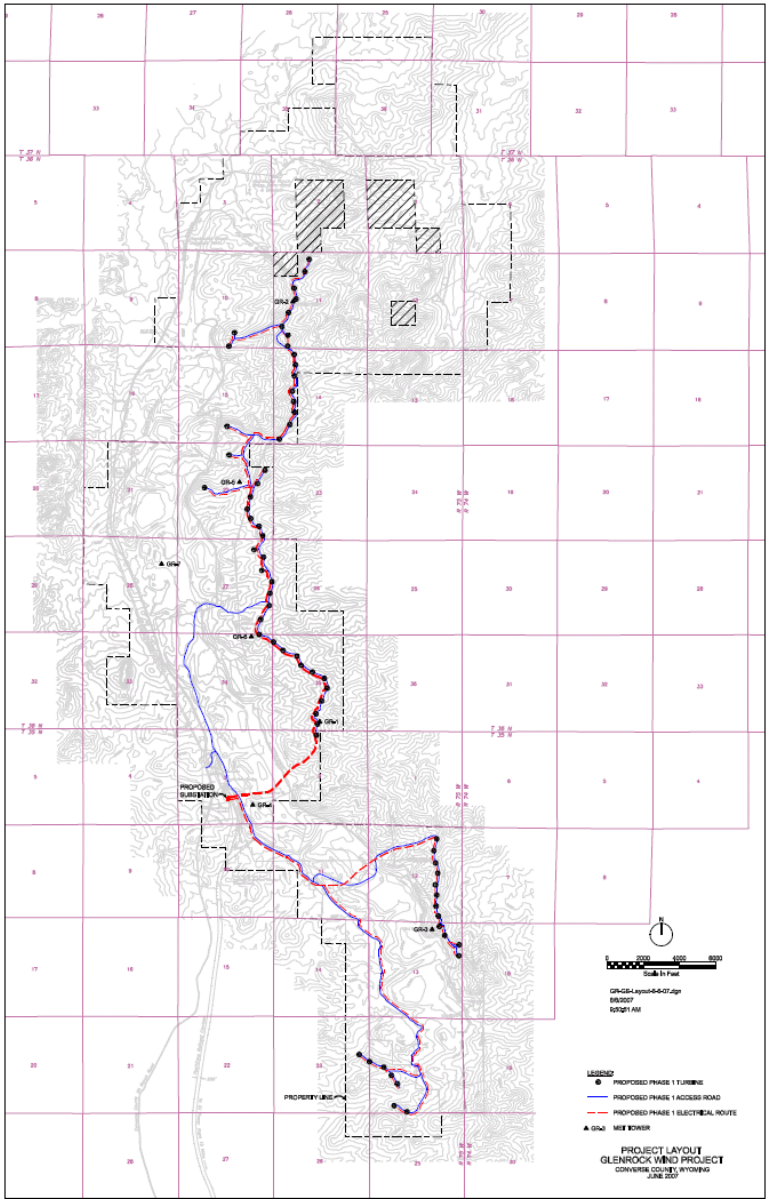
Fig. 2: GE Energy 1.5SLE 60Hz Wind Turbine Nacelle Layout

Wind Energy Project System



ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Project Layout



Preliminary layout:

- Maximize production
- Environmental, cultural considerations

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Environmental Respect

Engineering and Construction Considerations

1. Conducted seasonal surveys to determine bat and avian use
2. Inventoried
   - endangered species habitat
   - crucial winter ranges
   - raptor nesting areas

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Environmental Respect

Engineering and Construction Considerations (cont.)

3. Wetland surveys
4. Working with all state, county, and local agencies

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ROCKY MOUNTAIN POWER
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Project Benefits

- Economically stable asset within the community
- Approximately 10 full-time positions available for long-term facility operations
- Increased electrical generation
- Electricity is produced at this facility without carbon dioxide emissions

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ROCKY MOUNTAIN POWER
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Questions/ Comments

Today's meeting: to answer questions and take comments

Comments may also be submitted via email to:

- windcomments@pacificorp.com

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ROCKY MOUNTAIN POWER
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Cheyenne State Agency Meeting

July 30, 2007

In attendance:
Bob Tarantola

Casper Town/County Meeting

August 1, 2007

In attendance:

Tom Schroeder
Robert Barnes
Sandy Tinaleg
Bill Landen
Phillip Stuckert
Chuck Blackwell
Michele Volk
Linda Witko
Steve Elledge

Merrill welcomes those in attendance. Introduces the project and colleagues. Introduction of those in attendance.

Power Point Presentation

Questions:

1. Do you have sufficient transmission to existing grid?
2. What is the maximum size of construction crew?
3. What is the completion date?
4. Will that mean all 66 turbines are up and running by 2008?
5. What speed does the wind have to blow for the turbine to turn?
6. Where will the workers be housed?
7. Will Rocky Mountain Power be providing impact funds for housing?
8. Who is responsible for measuring the impact?
9. What is the budget for this project?
10. Who is the contractor?
11. How can contractors and subcontractors apply to this project?
12. Can surrounding counties apply for impact funds as well as the home county?
13. Who is Casper involved in the delivery of the turbines? What kind of road impact will there be?
14. Is the city included in the process?

Merrill turns time over to Tome Schroeder to explain the ISC Permitting process.

Glenrock Town/County Meeting

August 1, 2007

In attendance:

Norma Jean Grant
Lester Grant
Kathy Patcig
Michael Collin
Fred Steinbach
Ed Werner
Richard C Grant
Chris Lyan
K Hughes
Myrtle Fulton
Keith Lesler
Rosalie Goff
Jim Anderson
Glen Lam
Joe McCormick
Jim Wilcox
Roger Wieler
Carmen Hughes
Richard Hughes

Merrill welcomes those in attendance. Introduces project and co-workers. Introductions of those in attendance.

Power Point Presentation

Questions:

1. State impact funds – how is Rocky Mountain Power planning to help?
2. Where is the workforce coming from?
3. What about housing for those people?
4. Would the 10 permanent employees be house on site?
5. Truck traffic…will you be using county roads?
6. Suggestion – Stay off county roads – use the road that exists next to the old railroad tracks.
7. The buildings that are currently there – will that include refurbishing them? Will new buildings be built?
8. Will there be a release for business opportunities?
9. What is Rocky Mountain Powers vision for the future of Renewable Power for the coming 20 years?
10. What percentages are renewable?
11. Could land owners request a wind farm on our land?
12. Is there any intent to extend transmission lines?
13. Are the 66 Units going to be all or will there be more phases?

14. How is the reclamation process proceeding?
15. Have you had a favorable response to the release?
16. Are you willing to partner with the community for power consumption to diversify the economy?
17. How much of this energy is being used in Wyoming?
18. Doesn't mot of the power leave the community?
19. How much power is being used here?
20. How much is leaving?
21. What are the impacts on manpower with variability?
22. What is the capacity factor?
23. Road impact – the road will need to be maintained. Man Camp – We need to address both issues correctly.
24. Are impact payments paid to a town or county?
25. Who gets the money?
26. Wyoming renewed the sales tax exemption. How will this effect the impact payment?
27. What is the lifetime on the impact payments?
28. Are there any hurdles in the relemation process that will be holding this process back?
29. What is the amount of your investment?
30. Will you be able to anticipate revenue to the community – short term and long term?
31. How is this project taxed?
32. Are ranchers able to still graze their livestock around the base of the towers?
33. Due to September 11th will the property be under lock and key?

Merrill turns the time over to Tom Schroeder to explain ISC Permitting process.

Glenrock/Douglas Public Open House

August 1, 2007

In attendance:

Nayna Hilton
Rosalie Goff
Dorothy Snell
Jim Higee
Myra Graham
Edward Reynolds
Tyler Boner
Heather Jacobson
Scott Wells
Teresa True
Robert Hilton
Larry Tennant
Jim Anderson
Bob Kidd
Nancy Kidd
Bob Tarantola
Marty Tellard

David Kennan
Mary Boldt
Richard Cannarlg
Chuck Evgstrom
Nancy Eygstom
Fred Smith
Sabrina Smith
Anita Johnson
Barb Feighner
Rob Boner
Carl Lembele
Theresa Lembele
Kelly Meloney
Palmer Avst
Carolee Arundell
Brenda Hanks
Rex Hanks
Gary Boldt
Mary Carnady
Scott Kamber
Dennis Switzer
Tome Schroeder
Kathy Schroeder
Chet Skilbred
Fred Steinback
Knuth Maten
Wendy Lowe
JD Dallen
Sewire Allen

Comments:

1. An outstanding project. Most appropriately places. Over a reclaimed coal mine! At an appropriate time. Our community applauds you and welcomes the continued partnership with Rocky Mountain Power/PacifiCorp Energy.
2. Welcome! As President of the Glenrock Economic Development Corp. we wish to offer and assistance we can provide. Please contact us at any time using the Chamber of Commerce #4365652 or our PO Box 313 in Glenrock
3. As a member of the Glenrock Town Council – Welcome! This is exciting news for us!
4. Extremely great idea. Going from coal production, being reclaimed and turned to a wind farm. Awesome!
5. This project sounds great. We would be interested in your progress. Good luck!
6. I think it is time for this type of energy for this area. Good deal.
7. Excellent, informative, come again.
8. Possibly do career day at High School.
9. Talk to Cindy Crane about discussions with land owners – Smith's offer was insulting!

Douglas Town/County Meeting

August 2, 2007

In attendance:

Mark Casl
Jim Schneider
Joel Eschew
Shawn Gordon
Mike Roy
Bobbed Fit burg
Marilyn Werner
Dave Edwards
Ed Warner
Jim Wilcox
Leila Pure
Dennis Swelter

Merrill welcomes those in attendance. Introductions of co-worker and those in attendance. Gives a brief overview of the project.

Power Point Presentation

Questions:

1. Will you be able to see the turbines from Douglas or Glenrock?
2. Do they really kill a lot of birds or is that just a myth?
3. How much ground does each turbine sit on?
4. How far apart are the turbines placed?
5. Are the 10 full time positions going to be new, stand alone or will they be shared between Dave Johnston?
6. Where will transmission lines run?
7. What size will transmission lines be?
8. How far in the future are you looking to expand the project to a second phase?
9. Can you buy renewable energy off the grid?
10. What is the gross capital estimate for this project?

Merrill turns the time over to Tom Schroeder to explain the ISC Permitting process.

Casper Town/County Meeting
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Tom Schroeder	DEQ/ISD	7777369		DEQ/ISD
Robert Barnes	CAEDA	577-7011	Robert@CAEDA.net	
Sandy Tinsley	Senator Enzi	261-6572		
Bill Landen	2010 Kingsbury Dr.	259-4194	blanden@casparcollege.edu	
Philip Stuckert	200 N. David Street	235-8298		
Chuck Blackwell	851 Werner Court, Ste 120	234-4591	cblack@state.wy.us	Dept. Workforce Svcs

Casper Town/County Meeting
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Michele Volk	P.O. Box 44003 Casper	261.6596	michele.volk@mail.house.gov	U.S. Rep. Barbara Cubin
Linda Witko	200 N. David Casper	235-8236	linwco@ci.casper.wy.us	City of Casper
Steve Ellredge	300 S. Wolcott #32 82601	577.6012	Steve.ellredge@wybusiness.org	W/O Bus. Council

Glenrock/Douglas Public Open House
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Nayna Hilton	4500 So Poplar - #201	234.5608	billyella@msn.com	self
Rosalie Moffo	PO Box 1453 Glenrock	436-8845		Town Council
Dorothy Smell	P.O Box 712 Glenrock	436-8726		SELF
Jim Magee	P.O Box 644 Glenrock	436-2729		Self
Megan Graham	125 COLLEGE DR	268-2539	mgraham@caspercollege.edu	CASPER COLLEGE
Edward Reynolds	743 GRANT AVE GLENROCK	436-2259		Self
Tyler Boner	296 Hwy 18-20	358-2609		Self
Heather Jacobson	1839 Madora Ave Douglas	358-3180		
Scott Wells / Thru true.	970 PO Box, Glenrock,	503-806-4695	swells@truecos.com	self

Glenrock/Douglas Public Open House
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Bobbi J.E. Hilton	4500 So. Poplar St. Apt 201 Casper	307-234-5608	bobsj-hilton@msn.com	—
Larry W Tennant	22 Miller Rd.	259 7607		—
Tom Anderson	92 Running Dulcimer	436-9618	jamsdat@msn.com	State Senate
Pamela Anderson	" " "	" "	" "	—
Bob & Nancy Kidd	1139 S. Center St. Casper	307-235-1325		
Bob Tarantola	1021 Stafford Casper 82609	262-1404		
Marty Gilland		558 4960		
David Kennaugh	50 Lyons Blvd	436-2298	DKennaugh@msn.com	
Mary Boldt	18 Frontier Ct	436-9833	lighting4@juno.com	
Richard Cannady	Box 1597 Glenrock	436-5755		Pando
Chuck + Nancy Eugström	1044 Bonnie Brae Casper	257-2205		
Fred & Sabrina Smith	1744 Hwy 93 Douglas	358-5158	frensas@vcn.com	
Anita Johnson	PO Box 728 Wheatland	322-1340	~~Hyp 97~~ anitaj@wyominguirless.com	
Barb Feignner	PO Box 1532	436-8367	JSTnwheel@aol	Self
Rob Bonner	Box 872 Douglas	358-2609	robbonner@myway.com	Self
Carl & Theresa Lemblke	Box 1271 Glenrock	436-7105	Thelembkes@msn.com	Self.
Kelly Meloney				

Glenrock/Douglas Public Open House
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
PALMER AUST	PO Box 1826 / 615 GROVE	436-3466	ps aust@wyoming.com	
CAROLEE ARUNDELL	PO Box 643 / 82637	436-8611	—	MY SELF !
Brenda Hanks	PO BOX 934 / 82637	436-2403		
Rex Hanks	Po Box 934 / 82637	436-2403	Rex.Hanks@Pacificorp	
Gary W Boldt	Po Box 1446 Glenrock 82637	436 9833		Me
Mary Cunnady	PO BOX 1597 Glenrock	436-5305		GEDC.
Scott Kamba	605 Skyline Dr. Laramie 82070	742 3843	Skamba@trcsolutions.com	TRC
DENNIS SWITZER / KKTY	247 Russell / Douglas	358-3636	KKTY@NETCOMMANDER.com	KKTY
TOM Schroeder	PSO/ISD	777-7369		state
Kathy Schroeder	PO B 694, 82003			self
Chet Skilbred				
Fred Stanbach				—
Ruth Matter	760-579-2412	—		
Wendy Lowe	643 E. 3rd St Casper 82601		Wendyhollylow@aol.com	RMP
J D Allen				
Sonia Alom				

Douglas Town/County Meeting
August 2, 2007

Name	Address	Phone Number	E-mail Address	Representing
Mark Casl	305 S Russell	359 3048	mjc939@hotmail	Converse County
Jim Schneider	1205 Birch	558.5181	finisnthat78@hotmail	Mayor-Douglas
Joel Schell	107 N 5	3583120	joel.schell@gmail.com	Converse Co.
Shawn Gorden	101 N. 4th	358-2172		City of Douglas
Mike Roy	101 N. 4th	358-2132	mroy@cityofdouglas.org	City of Douglas
Bobbie Fitzhugh	101 N 4th PO Bx 1030	358-3462	bfitzhugh@cityofdouglas.org	City Douglas
Marilyn Werner	140 N. 9th P.O. Box 360	358-2455	marilynwerner@hotmail.com	City Douglas
DAVE EDWARDS	PO B 18 Douglas	358-1169	warpaint@wyoming.com	CC
Ed Werner	107 N 7th Suite 114 Douglas	358-2244	wernersolutions@msn.com	CC Commiss.
Jim Willox	" " " "	358-2696	jwillox@communicomm.com	" "
Leila Grie	Box 116 Lost Springs wy.	334-3268	—	Lost Springs
DENNIS SWITLER	247 Russell Ave, Douglas	358-3676	kkty@meteommander.com	KKTY RADIO

Glenrock Town/County Meeting
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Norma Jean Grant	1737 Boxelder Rte	436-2480	turtles@coffey.com	
Lester Grant	" "	" "	" "	
Kathy Potter	PO Box 417	436-9294	KATHY.GLENROCKPLANNER@G.mail	Town
Michael Collins	Po Box 577	436 9212	MFC 400 @ AOL.Com	Town
[illegible]	PO 1233	436-814	8 Fred Steinbach	Town
Ed Werner	107 N 7th Suite 114	358-2244	wernersolutions@msn.com	Converse County Comm.
Richard C Grant Jr	199 Boxelder Rd.	436-2421		
Chris Lyon	PO Box 44003	261-6585	US Rep Barbara Cubin →	
[illegible]	P.O. Box 937	436-8528	Khughes@cnv2.k12.wy.us	School Dist #2
Myrtle Fulton	P.O. Box 1843	436-5361		myself

Glenrock Town/County Meeting
August 1, 2007

Name	Address	Phone Number	E-mail Address	Representing
Keith L Pedersen	PO. Box 1955	436-9332		
Rosalie Goff.	" " 1453	436-8845	rosalie_goff@yahoo.com	Town Council
Jim Anderson	92 Running Dutchman Dr	436-9618	jamesdal@msn.com	STATE SENATE
Allen Lam	27 Boulder Road	251-6412		self
Carol Mae Cormick	PO Box 757 Glenrock	436-2651		self
Jim Willox	107 N 7th	358-2696	jwillox@communicomm.com	County
Roger Wieler	P.O. Box 392, Glenrock		WyomingSolar@Aol.com	Wyoming Solar
Carmen Hughes	P.O. Box 1255, Glenrock	505 922 2580		Self
Richard Hughes	" " " "			Self

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: Jim Anderson
Vice-Pres. Wyo. Senate

Date: Aug 1, 07

Address: 92 Running Patchman
Street Address

Phone: 307-436-9618

Glenrock, Wy.
Town/ State/ Zip Code
82637

Email:

Comments/ Questions/ Suggestions:

An outstanding project. Most appropriately placed, over a reclaimed coal mine, at an appropriate time. Our community applauds you and welcomes the continuous partnership with Rocky Mtn. Energy

Jim Anderson

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Glenrock Open House

Wind Energy Development Project Comment Form

Name: Mary Cannady Date: 8/1/07

Address: PO Box 1597 Phone: 307 436 5365
Street Address

Glenrock WY 82637 Email:
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

Welcome! As President of the Glenrock Economic Development Corp. we wish to offer any assistance we can provide. Please contact us at any time using the Chamber of Commerce # 436 5682 or our Box # 313 in Glenrock

MC

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Glenrock Open House

Wind Energy Development Project Comment Form

Name: Rosalie Goff

Date: Aug. 1, 2007

Address: PO Box 1453
Street Address

Phone: 436-8845

Glenrock WY
Town/ State/ Zip Code

Email: rosalie_goff@yahoo.com

Comments/ Questions/ Suggestions:

As a member of the Glenrock Town Council - welcome! and this is exciting news for us!

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

Glenrock Public Open house

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: Ed Reynolds Date: 8-1-07

Address: 743 Grant Ave
Street Address

Phone: 307-436-2259

Glenrock, Wy. 82637
Town/ State/ Zip Code

Email:

Comments/ Questions/ Suggestions:

Extremely great Idea.
Going from coal production, being reclaimed and
Then to a wind farm. Awsome!

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

Glenrock Open House

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: Anita Johnson/ Platte Co Planning

Date: 8/1/07

Address: PO Box 728
Street Address

Phone: 307-322-1341

Wheatland, WY 82201
Town/ State/ Zip Code

Email: anitaj@wyomingwireless.com

Comments/ Questions/ Suggestions:

This project sounds great. We would be interested in your progress.

Good Luck!

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Glenrock Open house

Wind Energy Development Project Comment Form

Name: Barb Feighner Date: 8/1/07

POB 1532

Address: 130 N 6th Phone: 436-8367
Street Address

Glenrock Wy 82637 Email:
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

I think its time for this type of energy for this area.

Good Deal.

Frank + I often talked about wind energy here.

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: _____ Date: _____

Address: _____ Phone: _____
Street Address

_____ Email: _____
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

Excellent
Informative
Come again.

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: MLB Date: _____

Address: _____ Phone: _____
Street Address

_____ Email: _____
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

Possibly DO Career TALK AT High School

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: _____ Date: _____

Address: _____ Phone: _____
Street Address

_____ Email: _____
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

TALK TO CINDY ABOUT DISCUSSIONS
WITH LAND OWNERS
— SMITHS — OFFER WAS INSULTING

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

Wind Energy Development Project Comment Form

Name: MLB Date: _____

Address: _____ Phone: _____
Street Address

_____ Email: _____
Town/ State/ Zip Code

Comments/ Questions/ Suggestions:

College WANTS US TO WORK WITH Them

LADY is Proff of electronics – controlls
– Possibly put on presentation at school

Comments may also be submitted via email at:
windcomments@PacifiCorp.com

APPENDIX D

Level of Use and Infrastructure Checklist

GLENROCK AND ROLLING HILLS PROJECTS
Local Agency Level of Use and Infrastructure Checklist Survey
Contact List and Survey Responses

Name of Agency	Contact/Address	When Delivered	When Received Back
Converse County and Incorporated Municipalities			
Converse County	Paul W Musselmann 107 North 5th, Suite 114 Douglas, WY 82633	July 15, 2007	September 9, 2007
Town of Glenrock	Steve Cielinski PO Box 417 Glenrock, WY 82637	July 15, 2007	July 20, 2007
City of Douglas	Bobbe Fitzhugh City Administrator 101 N. 4th Street P.O. Box 1030 Douglas, Wy 82633	July 15, 2007	August 29, 2007
Town of Rolling Hills	Gerry Minton 38 S. Badger Rd. Rolling Hills, Wy 82637	July 15, 2007	Not Received
City of Casper	Peter Meyers 200 North David Street Casper, Wy 82601	July 15, 2007	August 9, 2007
Town of Lost Springs	Leda Price P.O. Box 116 Lost Springs, Wy 82224	July 15, 2007	Not Received
Platte County and Incorporated Municipalities			
Town of Glendo	Brenda Hagen 204 S Yellowstone Hwy Glendo, WY 82213	July 15, 2007	July 20, 2007
Town of Wheatland	Sandy Lipps 600 9th St Wheatland, WY 82201	July 15, 2007	August 8, 2007
Platte County	Jean Dixon 800 9th Street Wheatland, WY 82201	July 15, 2007	Not Received
Natrona County and Incorporated Municipalities			
Town of Edgerton	Ellen 311 N Second St Edgerton, WY 82635	July 15, 2007	July 26, 2007
City of Casper	Mayor Kathleen Sarosy 200 N. David Casper WY 82601	July 15, 2007	August 9, 2007
Town of Mills	Pepper McClenahan Mills, WY 82604	July 15, 2007	August 8, 2007
Natrona County	Michelle Wallace-Frank 200 North Center Casper, WY 82601	July 15, 2007	Not Received
Town of Midwest	John VanderVoort P.O. Box 190 Midwest, WY 82643	July 15, 2007	Not Received
Town of Evansville	Phil Hinds P.O. Drawer 158 Evansville, WY 82636	July 15, 2007	Not Received
Town of Bar Nunn	Jerry Petty 4820 N. Wardwell Industrial Ave. Bar Nunn, WY 82601	July 15, 2007	Not Received

Level of Service and Infrastructure Checklist - Survey

Name of County/Municipality:	Survey Notes:
Date of Interview:	
Address:	
Phone Number:	
Name of Interviewee:	
Job Title:	

Demographics of the Area	Response/Comment	Department to Contact
What is the current total population count?		Planning Department
What are the future total population projections?		
Do you estimate or count residents?		
What is the estimated population commuting into the area?		

Economic Conditions of the Area	Response/Comment	Department to Contact
Do you know the past economic conditions of the area? (improving, declining)		County Assessor or Treasurer
What are the present economic conditions of the area?		
What are the current employment sectors in the area?		
What is the current wage of the area?		
What is the current labor force?		
What are the current income levels of the area?		
Do you know what the governmental revenues are?		
Ad Valorem Taxes: What is the total assessed property value of the area?		
Is there a designated sales and use tax specific for the area?		
What is the County Sales and Use Tax Revenue?		
Do you foresee changes in your property tax rates in the next two years?		

Do you foresee changes in the local option sales/use tax rates in the next two years?		
What are the enterprise funds or utility companies?		
Is local government funded by user fees or special tax levy or loans?		
What is the County Lodging and Tax Revenue?		
What is the future employment growth of the area?		
Two biggest problems or areas of concern are:		
Educational Facilities of the Area		**Department to Contact**
Location and Characteristics of Educational Facilities		
Pupil-Teacher Ratios		
What are the current plans for expansion- major capital improvement projects for the school districts?		
How many school districts in the area?		
How many educational facilities total?		
Number of Elementary Schools		
Number of junior high/middle schools		
Number of High Schools		
What is the enrollment for each school		
What are the two biggest problems?		
Housing Inventory of the Area		**Department to Contact**
Existing Housing stock		
Housing inventories past and present (shortage or surplus)		
Current number of owner occupied housing units- owner or renter occupied?		
How are the housing statistic derived? Produced by the US Census?		

Are there any housing trends or future housing projections available?		
What are the biggest problems?		
Public Safety - Location and Characteristics of Police, Fire, and Emergency Services		**Department to Contact**
Fire	**Response/Comment**	
How many fire stations are located in your area?		Local Fire Departments
Number of fire-training centers?		
How many full-time paid firefighters are on staff?		
How many volunteer firefighters are there?		
Who provides Services for your area? City or County		
If a call is made for service, what is the response time? (If not known give the miles or an estimate of time)		
Are there any isolated areas or areas that are hard to get to - don't get good coverage?		
(If local) does the function have a certification or rating?		
Two biggest problems or areas of concern are (choose):		
No local equipment, response time, personnel needed, operations budget, facilities & equipment, other_____.		
Two biggest problems or areas of concern are:		
Law Enforcement – Police	**Response/Comment**	**Department to Contact**
How many police stations are located in your area?		Local Police Departments
Number of sworn police officers		
Number of non-sworn police officers		
Total number of police employees		
Citizen to police ratio per 1000 citizens		
Number of Sworn deputies?		
Number of non-sworn deputies?		
Total number of law enforcement employees?		

Is law enforcement provided by a contract with another entity (such as the county sheriff)? Who?			
Number of County Sheriffs?			
Number of Sheriff's Stations?			
Do you have resident law enforcement for your jurisdiction? If a substation, give the hours that it is operational.			
If a call is made for service, what is the response time? (If not known give the miles or an estimate of time)			
Two biggest problems are (choose)			
No local officers, response time, sworn officers needed, operations budget, facilities & equipment, other_____.			
Emergency Medical Services			**Department to Contact**
Who provides ambulance service?			Local Fire & EMS Departments
Are they state certified?			
If an EMS call is made, where would the ambulance come from?			
If a call is made for service, what is the response time? (If not known give the miles or an estimate of time)			
Two biggest problems or areas of concern are:			
Health - Location and Characteristics of Health	**Response/Comment**		**Department to Contact**
What are the health needs of the existing population? (young adults/aging population)			
Number of hospitals in the area			
Number of acute care beds			
Average bed occupancy			
Number of acute admissions per year			
Number of long-term admissions per year			
Number of outpatient visits			
Number of inpatients			

Number of surgeries			
Number of emergency room visits per year			
Number of swing beds			
Total number of physicians			
Number of full-time physicians			
Number of part-time physicians			
Total number of medical staff			
Number of full-time medical staff			
Number of part-time medical staff			
Number of medical staff vacancies			
Number of physicians to Potpulation Ratio			
Two biggest problems or areas of concern are:			
Municipal Services - Location and Characteristics of Municipal Facilities	**Response/Comment**		**Department to Contact**
What type of municipal services are provided to citizens in your area?			Public Works or Planning Department
Does the County provide the services or are they provided by the local municalities?			
Electricity provider?			
Natural gas provider?			
Water			
Is the water system a municipal or rural system? Septic tanks, individual wells, domestic system?			Public Works or Planning Department
Water – primary water source type: Groundwater, surface or both?			
Who has the degree of control (department, utility fund, joint powers board)			

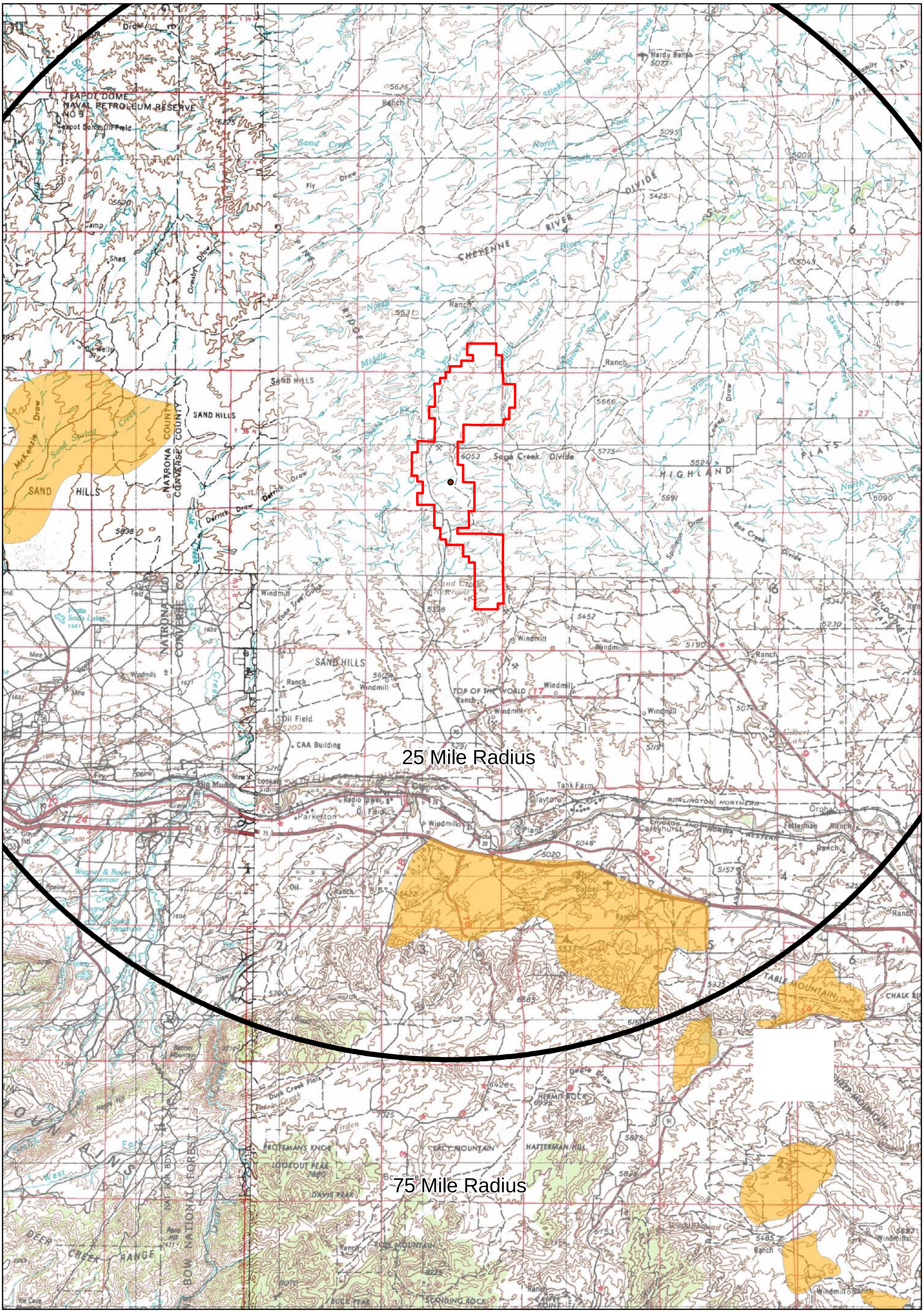
What type of treatment do you have? (ground or surface)		
What is the current water consumption within the county or city? Do you have an estimate?		
What is the current treatment capacity of the system?		
What is the current capacity of the transmission/distribution system		
Anticipated changes in next two years?		
Facing you today, what are the two biggest problems(choose):		
water source, capacity, lines(delivery), facility, treatment method, budget, regulatory other_____		
Wastewater/Sewer System		
How are residents provided wastewater services? Nearby municipality, private wastewater utility, county provider, or onsite - septic tank, or combination of the		Public Works or Planning Department
Type of facility?		
What is the wastewater flow? Estimate?		
What is the current treatment capacity of the system?		
What is the current capacity of the collection/conveyance system		
How is the treated effluent disposed?		
How is wastewater sludge handled and disposed?		
Facing you today, what are the two biggest problems are (choose):		
capacity, lines - conveyance, facility, treatment method, budget, solids handling, other_____		
Anticipated changes in next two years?		
Who receives these services? Local citizens, commercial facilities, institutional facilities		
Have any plans for improvements been identified in the CIP?		

Solid Waste Collection			
Is there a solid waste collection system such as a private or public system?			Public Works or Planning Department
Who is the managing organization/entity?			
Have any plans for improvements been identified in the CIP?			
Anticipated changes in next two years?			
Transportation - Identification of Major Facilities	**Response/Comment**		**Department to Contact**
Who takes care of the roads for county, local, jurisdicational?			Local Road and Bridge Departments
Are there any problem areas such as road segments that have high crash rates, difficult access, or poor roadway conditions?			
Two biggest problems or areas of concern are (choose):			
Budget, employee availability, equipment availability, materials availability, drainage, signage, design, overweight trucks, new roadway construction, dust due to traffic, other_____.			
Number of Miles of Roadway/Streets			
Annual maintenance budget			
Freight Rail Infrastructure			
RR Company			
Miles of Track			
Have any planned improvements been identified in the transportation plans?			
Code Enforcement (construction permits, plan review)	**Response/Comment**		**Department to Contact**
Who provides for building permits?			Planning & Zoning Department
Who provides for sewer inspections?			
Who provides for plan review?			
(If local) Does the function have a certification, or staff have a certification?)			

(For counties:) Do you have land use regulations?		
The two biggest problems or areas of concern.		
(For counties): Do you require use permits (special, conditional)?		
Recreation	**Response/Comment**	**Department to Contact**
Do you have an organized and staffed recreation programs?		Planning Department
How many acres of parks do you maintain?		
The two biggest problems or areas of concern are (choose):		
Maintenance, needed structures, staff for programs, extra budget, law enforcement, access road maintenance, other_____.		

APPENDIX E

Resource Maps



Legend

- Antelope Crucial Winter Yearlong Range
- Project Boundary
- 50 Mile Radius

N

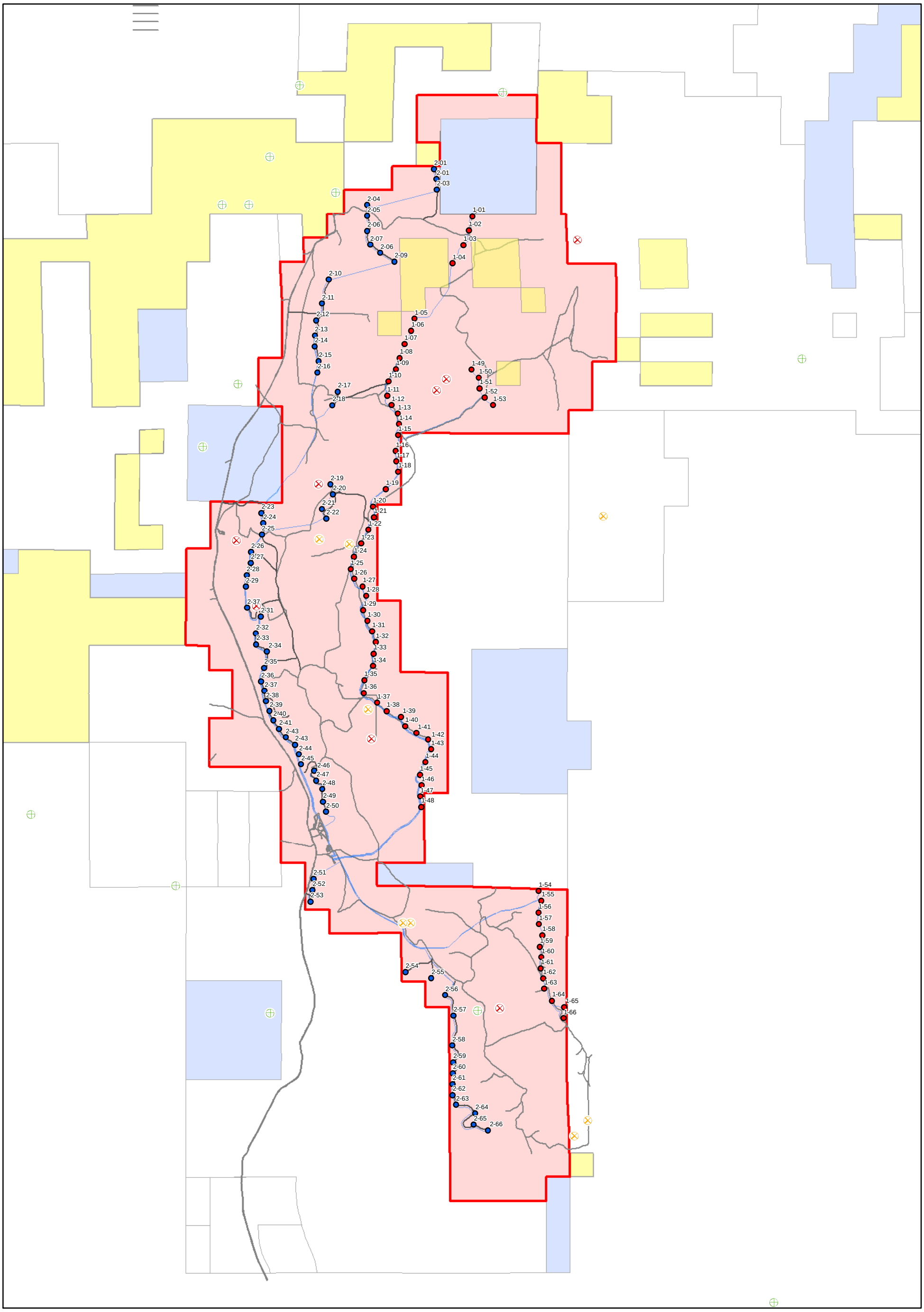
0 2.5 5 10
Miles

Antelope Range Habitat

PacifiCorp Wind Facility
Glenrock & Rolling Hills
Converse County, Wy

CH2MHILL

File Path: P:\PacifiCorp\356172\GIS\MapFiles\Figures\AntelopeRangeMaps.mxd, Date: November 20, 2007 10:23:33 AM



Legend

- Glenrock Phase I Turbine Sites
- Rolling Hills Phase II Turbine Sites
- Sage-Grouse Lek
- Raptor Nest Site
- Artifical Raptor Nest Sites
- Distribution Line
- AccessRoads
- Roads
- Project Boundary

Taxlots

- BLM
- Private
- PacifiCorp
- State of Wyoming

N

0 0.5 1 2

Miles

Raptor & Sage-Grouse Lek

PacifiCorp Wind Facility
Glenrock & Rolling Hills
Converse County, Wy

CH2MHILL

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APPENDIX F

Avian Baseline Use Report

Baseline Avian Use of the Glenrock Wind Energy Project
Converse County, Wyoming

Spring Migration and Early Summer Breeding Season

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September 6, 2007

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INTRODUCTION AND BACKGROUND

PacifiCorps is currently considering a site for potential wind power development in Converse County, located in central Wyoming (Figure 1). Principal objectives of the baseline study were to (1) obtain data on raptor and other bird use of the site during the spring migration and early summer breeding season, (2) determine the presence of active raptor nests in and near the project area, (3) determine use of the project area by sage grouse broods, (4) describe habitat in the general project area, (5) describe the occurrence of any federal and state threatened, endangered, proposed, candidate, or sensitive-status wildlife and their potential habitat that may be affected by the project, (6) estimate any potential impacts to wildlife that could result from construction and operation of the proposed wind energy project, and (7) identify potential project modifications and/or mitigation measures that could reduce negative impacts. This report provides results of avian use surveys of the project area conducted from April 18 through June 9, 2007, during the spring migration and early summer breeding season. Additional surveys will be conducted from mid September to mid November 2007 during the fall migration period. The protocol for this baseline study is similar to protocols used at numerous other wind power developments throughout the United States.

In addition to site-specific data, this report presents existing information and results of studies conducted at other wind farms. Our ability to estimate potential bird mortality at proposed wind energy projects is greatly enhanced by operational monitoring data collected at existing wind projects. For several wind energy projects, standardized baseline data on avian use, raptor nesting, and habitat information were collected in association with standardized post-construction (operational) monitoring, allowing comparisons of avian use to mortality.

STUDY AREA

The Glenrock project area is located in west-central Converse County, Wyoming north of the town of Glenrock (Figure 1). Landownership is private. The study area included the proposed wind power development site and an adjacent one-mile buffer. Elevation in the project area ranges from approximately 5700 to 5900 feet. The project area was a former open pit coal mine and the dominant habitat is reclaimed grassland with some big sagebrush.

METHODS

Avian Point Count Surveys

The principal goals of the avian baseline study were to quantitatively describe the temporal and spatial use by birds of the study area during the early breeding season using diurnal point count surveys and to determine how diurnal indices of avian use of the study area compare to other wind farm sites that have been studied in North America. Circular plots were surveyed on the project area using the method described by Reynolds et al. (1980). Twelve survey points were selected to achieve good coverage of the proposed turbine string locations (Figure 1). Because of the close proximity of points to each other, the variability of our estimates of avian use and other endpoints were based on survey to survey variability (i.e., temporal).

Each plot was an approximate 800-m radius circle centered on an observation point. Landmarks were located to identify the 800-m boundary of each observation point. Observations of birds beyond the

800-m radius were recorded, but were analyzed separately from data within the plot. All sightings of birds in and near plots during the 20-minute plot surveys were recorded. A unique observation number was assigned to each sighting. Weather information including temperature, wind speed and direction, cloud cover and precipitation was collected for each survey point. The date, start and end time of observation period, plot number, species, number of individuals, sex and age class, distance from plot center when first observed, closest distance, altitude above ground, activity, and habitat(s) were recorded.

Behavior categories recognized include perched, soaring, flapping, circle soaring, and other. Initial flight patterns and habitats were circled on the data sheet and subsequent patterns and habitats (if any) were recorded as "x". For example, if a raptor was first sighted while perched, and then left its perch and flew out of the study area, then a 1 was written in the box next to perching, and an x was written in the box for flapping. The flight direction in which the bird headed was recorded. Perched birds also were recorded. Flight altitude at first observation as well as the lowest and highest flight altitudes observed while the bird was in the plot were recorded to the nearest meter. Any comments or unusual observations were recorded in the comment section of the data form. Locations of raptors, other large birds, and any species of concern seen during plot surveys were recorded on the field maps by observation number. Locations of raptors, other large birds and any species of concern detected while in the study area were also recorded on field maps with unique observation numbers.

Observation Schedule

All 12 survey plots in the study area were surveyed once per week. Weekly surveys were conducted from April 18 through June 9, 2006, during the late migration and early breeding season. Surveys took place during daylight hours. Observation periods were divided into two periods, morning (6-12) and afternoon (12-6), with each station surveyed for 20 minutes. A pre-established schedule was developed by the study team leader prior to field work to ensure that each station was surveyed about the same number of times each period of the day during each season and to efficiently utilize personnel time.

Statistical Analysis and Report Products

The number of raptors and other species seen during each point count survey were standardized to a unit area and unit time searched. For example, if 4 raptors were seen during the 20 minutes at a point with a viewing area of 2.01 km^2, these data were standardized to 4/2.01 = 1.98 raptors/km^2 in a 20-minute survey. Data were plotted to illustrate differences in raptor and other bird use between stations and seasons. Comparisons of bird use indices were made between the Glenrock site and other wind resource areas (WRA) to aid in projecting potential impacts from this project.

A relative index to collision risk (R) was calculated for bird species observed in the project area using the following formula:

$$R = A*F*P_f*P_t$$

Where A = mean use for species i averaged across all surveys, F = frequency of occurrence for species i, P_f = 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 = proportion of all flight height observations of species i within the rotor-swept height (RSH). This index does not account for differences in behavior other than flight characteristics (i.e., flight heights and proportion of time spent flying).

Incidental Observations

Unusual concentrations of birds, birds exhibiting unusual behaviors, and rare species of birds sighted while field observers were traveling between plots were recorded on data sheets for incidental observations. The data recorded were similar to those recorded during the plot studies. The observation number, date, time, species, number, sex/age class, height above ground, and habitat were recorded. Observations of species listed as endangered, threatened, or species of concern were recorded in additional detail, mapped on a USGS quadrangle map by observation number, and digitized.

Raptor Nest Survey

The entire study site, as well as a 1-mile buffer around the study site, was searched for active and non-active raptor nests. Several golden eagle artificial nesting platforms have been constructed on the site to mitigate impacts to nesting eagles from the former coal mine. These platforms were checked and the site was also systematically searched by vehicle and by foot to locate nests on natural substrates. Trees, cliffs, rock outcrops and other potential nest structures such as wind mills and utility poles were searched. A UTM coordinate, as well as nesting substrate and current status, were recorded for each nest located.

Sage Grouse Brood Survey

No sage grouse leks are known to occur on or near the project area; however, the area is used as brood rearing habitat. Therefore, four sage grouse brood surveys were conducted in July and August 2007. Due to concerns with vehicles starting fires, brood surveys were conducted from an ATV and by foot. The entire project area was surveyed in the early morning or late evening. All sage grouse observed were classified (adult male, adult female, chick) and a GPS coordinate was obtained. Dogs were used during one survey to assist in the search and to help obtain accurate counts of chicks. Results from this study may be used to assist with siting turbines to avoid important sage grouse habitats. In addition, there is little data on actual response of sage grouse to wind turbines. The data collected during this study would provide important baseline data on sage grouse use of the project area. Similar data could be collected after the wind farm is constructed to determine how sage grouse respond to wind farm development.

Data Compilation, Storage, and Quality Assurance/Quality Control (QA/QC)

A database was established to store, retrieve and organize field observations. Data from field forms were keyed into electronic data files using a pre-defined format that made subsequent data analysis straightforward. All field data forms, field notebooks, and electronic data files were retained for ready reference. QA/QC measures were implemented at all stages of the study, including field data collection, data entry, data analysis, and report preparation. At the end of each survey day, each observer was responsible for inspecting his or her data forms for completeness, accuracy, and legibility. The study team leader periodically reviewed data forms to insure completeness and legibility, and any problems detected were corrected. Any changes made to the data forms were initialed and dated by the person making the change. Data were entered into electronic files and printouts of the data were compared to the original data sheets. Any irregular codes detected, or any data suspected as

questionable, were discussed with the observer and study team leader. All changes made to the raw data were documented for future reference.

RESULTS

Point Count Surveys

Species Abundance and Composition

Nineteen species of birds were observed during 51 point count surveys over 7 visits to the project site (Table 1). Over the course of the study, 257 groups comprised of 481 individual birds were recorded. The number of birds observed by species used to obtain use and composition estimates are presented in Appendix A. Avian richness (defined as number of species per survey) was 2.4 (Table 1). The mean number of birds observed per survey of each plot was 4.2 (Table 1).

Passerines (song birds) were the most abundant group (2.87/survey), followed by raptors (1.08) and doves (0.22) (Table 2). Passerines comprised 68.6% of all birds observed, raptors comprised 25.9%, and doves comprised 5.2%. The most frequently occurring groups observed, regardless of the number observed, were passerines (89.3% of surveys), raptors (61.2%), and doves (6.2%). Species with the highest use of the project area were western meadowlark (1.36/survey), golden eagle (0.47), horned lark (0.42), northern harrier (0.38) and lark bunting (0.28) (Table 3 & 4). The species of birds most frequently observed were western meadowlark (80.5% of surveys), golden eagle (36.2%), horned lark (28.1%) and vesper sparrow (23.1%) (Table 3 & 4).

Seven species of raptor were observed during the survey. The highest use of the study area was by golden eagle (0.47/survey) and northern harrier (0.38). The other five species (red-tailed hawk, ferruginous hawk, prairie falcon, American kestrel and sharp-shinned hawk) all had very low use (i.e., <0.07/survey) (Table 4). In addition to songbirds and raptors, the only other groups observed were shorebirds, with one observation of a killdeer, and mourning doves, with six observations totaling 18 birds (Appendix A).

Flight Behavior

During the point count surveys, 115 single birds or flocks totaling 163 individuals were observed flying (Table 5). Mean flight height for all species combined was 42.9 m. For avian groups with at least 5 separate observations of flying birds, mean flight height was lowest for passerines (4.4 m) and highest for buteos (228 m). For all raptors combined, mean flight height was 67.4 m (Table 5).

For all species combined, 80.4% of all flying birds observed were below the rotor-swept height (<30 m), 14.1% were within the rotor-swept height (30 – 130 m), and 5.5% were observed flying above the rotor-swept height (>130 m) (Table 5). For groups with at least 5 separate observations of flying birds, those most often observed flying within the turbine rotor-swept height were eagles (43.3%), harriers (10.7%) and buteos (10.0%). For all flying raptors combined, 23.0% were observed flying within the rotor-swept height. Only four species were observed flying at turbine rotor-swept heights, including golden eagle (43.3%), Brewer's blackbird (33.3%), northern harrier (10.7%) and ferruginous hawk (25.0%) (Table 6).

Turbine Exposure Index

Based on the exposure index derived from abundance and flight behavior, the only four species with a potential for colliding with turbines were golden eagle (index = 0.15), Brewer's blackbird (0.07),

northern harrier (0.04) and ferruginous hawk (0.01). All other species had an index of 0 because they were never observed flying at rotor-swept heights (Table 6). This analysis may provide insight into what species might be the most likely turbine casualties. However, this index only considers relative probability of exposure based on abundance, proportion of daily activity budget spent flying, and flight height of each species. This analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior or abundance of nocturnal migrants. It also does not take into consideration varying ability among species to detect and avoid turbines, habitat selection and other factors that may influence exposure to turbine collision; therefore, the actual risk may be lower or higher than indicated by these data. For example, in the Altamont Pass WRA in California, mortality among the five most common species was not related to their abundance. American kestrels, red-tailed hawks, and golden eagles were killed more often, and turkey vultures and common ravens were killed less often than predicted based on abundance (Orloff and Flannery 1992). Similarly, at the Tehachapi Pass WRA in California, common ravens were found to be the most common large bird in the WRA, yet no fatalities for this species were documented during intensive studies (Anderson *et al.* 2004).

Spatial Use

The highest raptor use (1.80-2.29/survey) occurred at Stations 1, 3, 4 and 5, which are all located in the northern portion of the project area (Figure 1). No raptors were observed at Station 2 and raptor use among the other 7 stations ranged from 0.14–1.00/survey (Figure 2). The highest passerine use occurred at Stations 2 (6.40/survey) and 9 (5.86/survey), but was relatively uniform across all the other 10 stations, ranging from 1.00 to 3.71 birds/survey. For all bird species combined, highest use occurred at Stations 2 (6/40/survey), 9 (6.29/survey), and 6 (6.14/survey). Use among the other nine stations ranged from 2.17–4.86/survey. The available data indicate that turbine development at the northern end of the project area would pose the greatest risk to raptors.

Raptor Nest Surveys

Three of the artificial nesting platforms had active golden eagle nests in 2007. Another golden eagle nest was located in a cottonwood tree just northeast of the project area boundary (Figure 3). One active ferruginous hawk nest and one active short-eared owl nest were located on the ground in the project area. A red-tailed hawk nest was active earlier in the spring but was not active on June 9, 2007 and was apparently not successful. One inactive ferruginous hawk nest was also located (Figure 3).

Sage Grouse Brood Surveys

Three adult males, 6 adult female and 19 juvenile sage grouse were classified during sage grouse brood surveys (Table 7). Based on results of these surveys, use of the project area by sage grouse broods is relatively low and the project area does not likely provide important brood rearing habitat.

Sensitive Species Observations

No federally listed species were observed while conducting the spring surveys. The Wyoming Game and Fish Department does not maintain a list of state-threatened, endangered, or sensitive species. However, the Casper Field Office of the Bureau of Land Management does maintain a list of sensitive species for that area. Based on this list, four sensitive bird species were observed, including ferruginous hawk, greater sage grouse, sage thrasher and Brewer's sparrow. Four ferruginous hawks were observed during point count surveys, and two nests were found in the project area. No sage grouse were

observed during point count surveys but several were observed during focused brood surveys (see above). Sage thrashers appear to be relatively uncommon in the project area, as only 12 were observed during 51 point count surveys. Brewer's sparrow appear to be relatively rare, as only 3 were observed during the spring study.

DISCUSSION

Mean raptor use at the Glenrock Project during the early summer breeding season was 1.08/survey. Based on studies of 30 other WRAs using similar protocols, mean annual raptor/vulture use (defined as number of raptors and vultures observed per 20–minute period at a station with an 800–m radius) typically ranges from 0.10/survey to 1.3/survey (Figure 6). The only areas studied with higher than typical raptor use are Altamont Pass, California, where annual use averaged 2.4/survey, and the High Winds site in Solano County, California, where annual raptor use averaged 3.5/survey. Raptor use at the Glenrock site is 31% of that observed at High Winds and 45% of that observed at Altamont. Of the 30 WRAs with similar raptor use data, only 5 have higher raptor use than that observed at the Glenrock site while 25 have lower use (Figure 6), indicating that raptor use of this site is relatively high, although not on the same order of magnitude as that observed at High Winds and Altamont, California.

The Altamont Pass, California WRA contains 5,400 turbines, most of which are small, obsolete, lattice tower, Kenetech turbines. The latest raptor fatality estimates at Altamont based on searches using 30 – 90 day search intervals indicate that annual mortality averages 1.5 to 2.2 raptor fatalities per megawatt (MW) per year when adjusted for searcher efficiency and scavenging bias. The High Winds Project is a modern wind farm with 1.8 MW turbines, and estimated mortality was 0.30 raptors per MW per year (unadjusted for scavenger removal or searcher efficiency) with searches conducted every 14 days. Most of the raptor mortality at the High Winds Project involved American kestrels, and the relative use of the High Winds site by kestrels was approximately 6 times higher than at the Altamont Pass. With the exception of American kestrels at the High Winds Project in California, raptor mortality at new-generation wind projects both within and outside California has been relatively low (Table 8).

We conducted a regression analysis of raptor use and raptor collision mortality for several new-generation wind farms where similar methods were used to obtain raptor use estimates and found that the correlation between raptor use and raptor collision mortality is highly significant (r^2 = 87.5%; Figure 7). The data are from the High Winds project in Solano County, California, Diablo Winds repowering project in Altamont Pass, Buffalo Ridge project in Minnesota, Foote Creek Rim project in Wyoming, and six projects in the Pacific Northwest, including the Stateline project on the Washington/Oregon border, the Combine Hills, Vansycle, and Klondike projects in Oregon and the Hopkins Ridge and Nine Canyon Projects in Washington. Using this regression to predict raptor collision mortality at the Glenrock site based on mean raptor use of 1.08/survey yields an estimated fatality rate of 0.12/MW/year, or 12 per year for this 99 MW project, which is relatively high compared to most other wind farms. A 95% prediction interval on this estimate is 0 to 0.24 raptor fatalities/MW/year. Raptor use at Glenrock (1.08/survey) is over twice as high as the SeaWest wind farm on Foote Creek Rim, where it averaged 0.49/survey based on several years of data (Johnson et al. 2000a). Actual raptor mortality at Foote Creek Rim was 0.05/MW/year.

Due perhaps to their abundance, passerines have been the most abundant avian fatality at other wind projects studied. Both migrant and resident passerine fatalities have been observed. Therefore, it is

expected that passerines will make up the largest proportion of fatalities at the Glenrock site. Compared to raptors, there is less correlation between total numbers of songbirds observed during pre-construction surveys and post-construction songbird mortality, presumably because many of the collision fatalities are nocturnal migrants, which are not accounted for during diurnal surveys. Therefore, use of regression models to predict songbird mortality is not practical.

When all species of birds are considered, mean use data expressed as the number of birds observed per 20 minutes per plot with an 800-m viewshed are available for 25 other WRAs in the U.S. (Figure 8). Use of the Glenrock site by all bird species combined is the lowest of any of these WRA, suggesting that non-raptor avian mortality will be low at this site.

The presence of wind turbines may alter the landscape so that wildlife habitat use patterns are altered, thereby displacing wildlife away from the project facilities. In Europe, displacement effects related to wind energy projects are considered to have a greater impact on birds than collision mortality, and several European studies have addressed this issue. Avian displacement associated with wind power development has not received as much research attention in North America. Development of wind turbines near raptor nests may result in indirect impacts to the nesting birds; however, the only published report of avoidance of wind turbines by raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density on 101 mi^2 of land surrounding a wind project was 5.94/39 mi^2 , yet no nests were present in the 12 mi^2 wind project facility itself, even though habitat was similar (Usgaard *et al.* 1997). No red-tailed hawks or golden eagles are known to nest within the Altamont Pass WRA (APWRA), suggesting that the large numbers of turbines present within that area may discourage nesting by raptors or that collision mortality prevents nesting in the APWRA. At the Foote Creek Rim wind farm in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles of the turbine strings, and seven red-tailed hawk, one great horned owl, and one golden eagle nests located within 1 mile of the wind farm successfully fledged young (Johnson *et al*. 2000a). The golden eagle pair successfully nested ½ mile from the wind farm for three different years after it became operational. A Swainson's hawk nested within 0.5 miles of the Klondike, Oregon Wind Project (Johnson *et al.* 2003). Studies at the Stateline Wind Project in Oregon and Washington have not shown any measurable short-term effects to nesting raptors (Erickson *et al.* 2004).

At a large wind project on Buffalo Ridge in Minnesota, the abundance of shorebirds, waterfowl, upland game birds, woodpeckers, and several groups of passerines was found to be statistically significantly lower at survey plots with turbines than at plots without turbines. There were fewer differences in avian use as a function of distance from turbines, however, suggesting that the area of reduced use was limited primarily to those areas within 100 meters of the turbines (Johnson *et al*. 2000b). These results are similar to those of Osborn *et al.* (1998), who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Also at Buffalo Ridge, Leddy *et al*. (1999) found that densities of male songbirds were significantly lower in Conservation Reserve Program (CRP) grasslands containing turbines than in CRP grasslands without turbines. Grasslands without turbines and portions of grasslands located at least 180 meters from turbines had bird densities four times greater than grasslands located near turbines. Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson *et al*. 2000b). Some birds apparently do become accustomed to turbines, as Osborn *et al*. (1998) reported a mallard nest within 31 m of a turbine in Minnesota.

At the Foote Creek Rim wind farm in Converse County, Wyoming, results of a long-term mountain

plover monitoring study suggest that construction of the wind farm resulted in some displacement of mountain plovers. The mountain plover population was reduced during construction but has slowly increased since, although not to the same level as it was prior to construction. It is not known if this was due to presence of the wind farm or to regional declines in mountain plover populations. Some mountain plovers have apparently become habituated to the turbines, as several mountain plover nests have been located within 75 m of turbines, many of which were successful (Young et al. 2005a).

A study of grasshopper sparrows in South Dakota conducted by the U.S. Fish & Wildlife Service found that densities of breeding birds were reduced within 600 m of wind turbines the first year after construction. By the second year, however, no reductions were documented (Shaffer and Johnson 2006). Therefore, breeding birds may habituate to turbines over time.

Preliminary results from the Stateline Wind Project in Oregon and Washington (Erickson *et al.* 2004) suggest a relatively small-scale impact of the wind facility on grassland nesting passerines. Transect surveys conducted prior to and after construction of the wind farm indicated that grassland songbird use was significantly reduced only within 50 m of turbine strings; areas further away from turbine strings did not have reduced avian use. The reduced use was attributed to temporary and permanent habitat disturbance near the turbines. Horned larks appeared least impacted. Because the Glenrock wind farm will be sited in an altered habitat (reclaimed coal mine), and undisturbed native habitats are abundant in the region, it is unlikely that displacement of birds would result in any population impacts.

CONCLUSIONS

Based on data collected during the early summer breeding season, raptor use of the Glenrock project area is relatively high compared to most other WRAs in the U.S. but total avian use is lower than that observed at all other WRAs evaluated throughout the U.S. Additional point count surveys of the project area are planned for the fall 2007 migration period (mid-September through mid-November) to assess use of the project area by migrants. Once these data become available a final determination will be made regarding the expected level of avian impacts at this site based on both breeding season and migration data.

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Table 1. Mean use, mean # species/survey, total number of species, and total number of fixed-point surveys conducted by season and overall based on stations surveyed for the Glenrock Mine Project site.

# Visits	Mean Use	#Species/Survey	# Species	# Surveys
7	4.183	2.429	19	51

Table 2. Mean use, percent composition and percent frequency of occurrence for avian groups by season based on stations surveyed for the Glenrock Mine Project site.

Groups	**Mean Use (#/20-minutes)**	**% Group Composition (#/20-minutes)**	**% Frequency of Occurrence (#/20-minutes)**
Shorebirds	0.014	0.34	1.43
Raptors	1.083	25.90	61.19
Accipiters	*0.014*	0.34	*1.43*
Buteos	*0.152*	3.64	*9.52*
Northern Harrier	*0.379*	9.05	*22.38*
Eagles	*0.471*	11.27	*36.19*
Falcons	*0.067*	1.59	*6.67*
Passerines	2.869	68.58	89.29
Doves	0.217	5.18	6.19
Overall	4.183	100.00	

Table 3. Small bird species observed within 800 m of observer and estimated mean use and percent frequency based on stations surveyed for the Glenrock Mine Project site.

Species	use	%freq
western meadowlark	1.364	80.48
horned lark	0.417	28.10
lark bunting	0.281	7.62
vesper sparrow	0.267	23.10
Brewer's blackbird	0.238	7.14
mourning dove	0.217	6.19
sage thrasher	0.169	2.62
American goldfinch	0.060	1.19
Brewer's sparrow	0.036	3.57
cliff swallow	0.026	2.62
rock wren	0.012	1.19

Table 4. Large bird species observed within 800 m of observer and estimated mean use and percent frequency based on stations surveyed for the Glenrock Mine Project site.

Species	use	%freq
golden eagle	0.471	36.19
northern harrier	0.379	22.38
red-tailed hawk	0.067	5.24
ferruginous hawk	0.057	4.29
prairie falcon	0.040	4.05
unidentified buteo	0.029	1.43
American kestrel	0.026	2.62
killdeer	0.014	1.43
sharp-shinned hawk	0.014	1.43

Table 5. Flight height characteristics by avian group during fixed-point surveys for the Glenrock Mine Project site.

Group	# flocks flying	# birds flying	Mean flight height(m)	% birds flying	Relation to rotor-swept height		
					below	within	above
Shorebirds	1	1	25.00	100.00	100.00	0.00	0.00
Raptors	70	74	67.40	84.09	64.86	22.97	12.16
Accipiters	*1*	*1*	*20.00*	*100.00*	*100.00*	*0.00*	*0.00*
Buteos	*8*	*10*	*228.00*	*90.91*	*70.00*	*10.00*	*20.00*
Northern Harrier	*27*	*28*	*38.41*	*96.55*	*75.00*	*10.71*	*14.29*
Eagles	*29*	*30*	*53.31*	*71.43*	*50.00*	*43.33*	*6.67*
Falcons	*5*	*5*	*58.20*	*100.00*	*80.00*	*0.00*	*20.00*
Passerines	40	78	4.43	34.67	92.31	7.69	0.00
Doves	4	10	2.00	55.56	100.00	0.00	0.00
Overall	115	163	42.85	49.10	80.37	14.11	5.52

Table 6. Mean exposure indices calculated by species observed during fixed-point surveys at the Glenrock Mine Project site.

Species	# flocks flying	Overall mean use	% flying	% Flying Within RSA	Exposure Index
golden eagle	29	0.471	71.43	43.33	0.146
Brewer's blackbird	6	0.238	90.00	33.33	0.071
northern harrier	27	0.379	96.55	10.71	0.039
ferruginous hawk	3	0.057	100.00	25.00	0.014
western meadowlark	11	1.364	13.33	0.00	0.000
horned lark	13	0.417	56.25	0.00	0.000
lark bunting	3	0.281	73.91	0.00	0.000
vesper sparrow	4	0.267	18.18	0.00	0.000
mourning dove	4	0.217	55.56	0.00	0.000
red-tailed hawk	3	0.067	80.00	0.00	0.000
American goldfinch	1	0.060	100.00	0.00	0.000
prairie falcon	3	0.040	100.00	0.00	0.000
unidentified buteo	2	0.029	100.00	0.00	0.000
American kestrel	2	0.026	100.00	0.00	0.000
cliff swallow	2	0.026	100.00	0.00	0.000
killdeer	1	0.014	100.00	0.00	0.000
sharp-shinned hawk	1	0.014	100.00	0.00	0.000
sage thrasher	0	0.169	0.00	N/A	N/A
Brewer's sparrow	0	0.036	0.00	N/A	N/A
rock wren	0	0.012	0.00	N/A	N/A

Table 7. Summary of sage grouse observations at the Glenrock Mine Project area

Date	Male	Female	Young
18-Jul-07	0	1	4
18-Jul-07	0	2	10
18-Jul-07	0	1	2
18-Jul-07	0	2	2
10-Aug-07	0	0	1
10-Aug-07	3	0	0
Total	3	6	19

Table 8. Regional annual fatality estimates on a Megawatt (MW) basis for existing wind farms in California and other portions of the western U.S.

	All birds	Raptors
Wind Energy Project	#/ MW	#/ MW
Altamont Pass, CA	3.0 - 8.14[a]	1.5 - 2.24[a]
High Winds, CA	0.74[b]	0.30[b]
San Gorgonio, CA	2.31	0.01
Tehachapi Pass, CA West Ridge	0.15 [b]	0.06 [b]
Tehachapi Pass, CA Middle Ridge	0.05 [b]	0.01 [b]
Tehachapi Pass, CA East Slope	0.04 [b]	0.01 [b]
Foote Creek Rim, WY	2.3	0.05
Combine Hills, OR	2.6	0
Stateline, OR/WA	2.9	0.10
Vansycle, OR	1.0	0.00
Klondike, OR	1.4	0.00
Nine Canyon, WA	2.8	0.05

[a] range provided in Smallwood and Thelander (2004)
[b] unadjusted for scavenger removal and searcher efficiency. High winds site was based on 14 day carcass search interval, Tehachapi Pass was based on approximately 90 day carcass search interval.

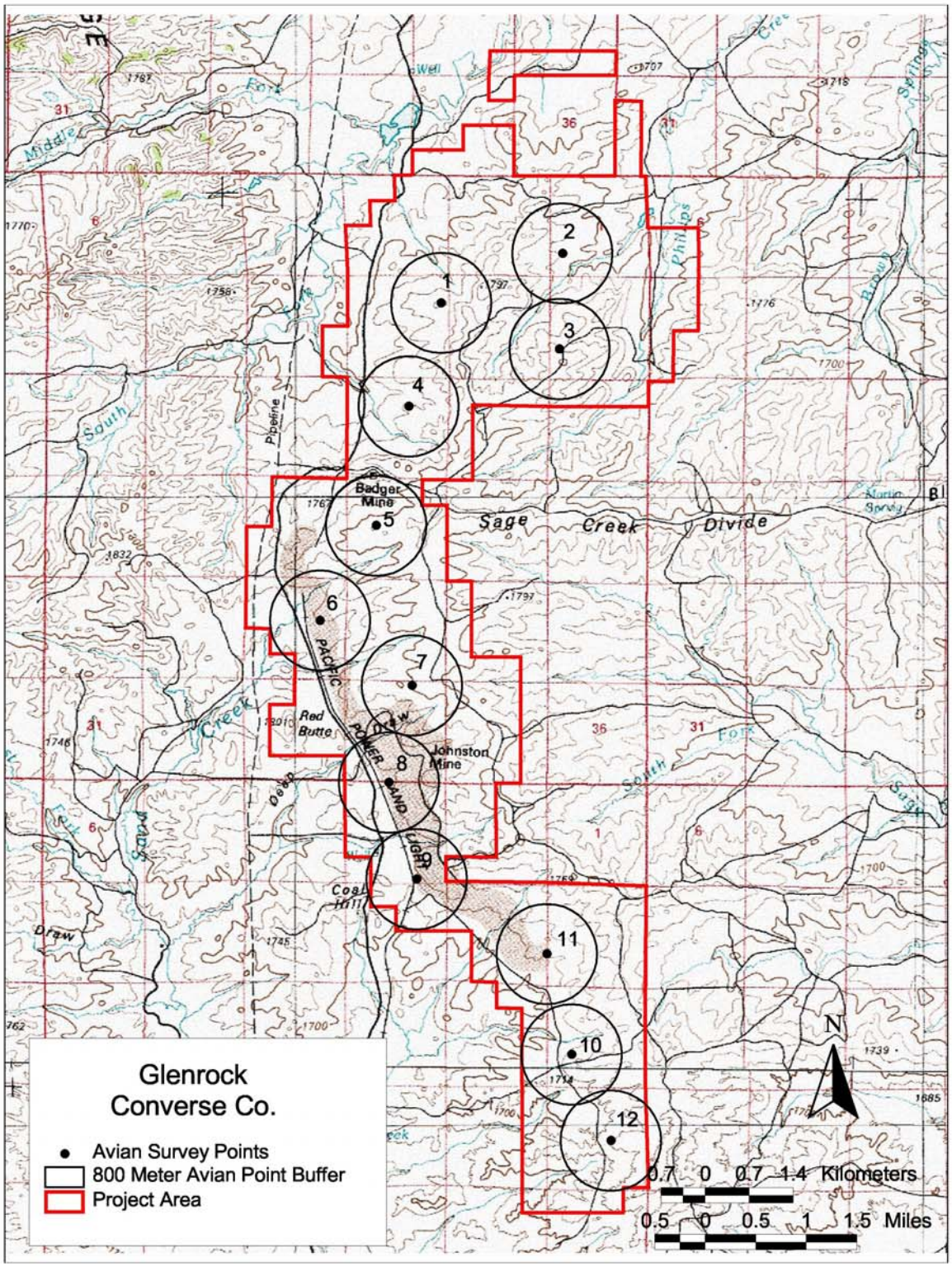
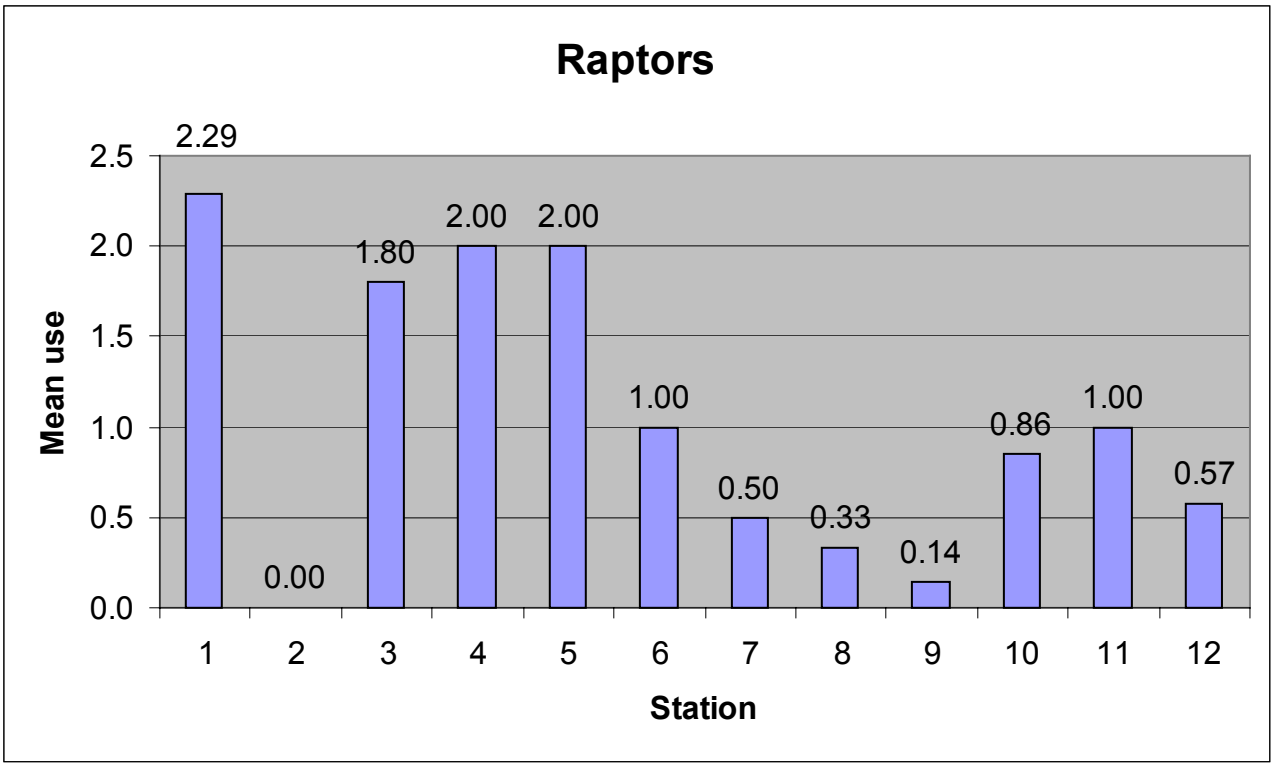


Figure 1. Location of avian survey points at the Glenrock Wind Energy Project, Converse County, Wyoming



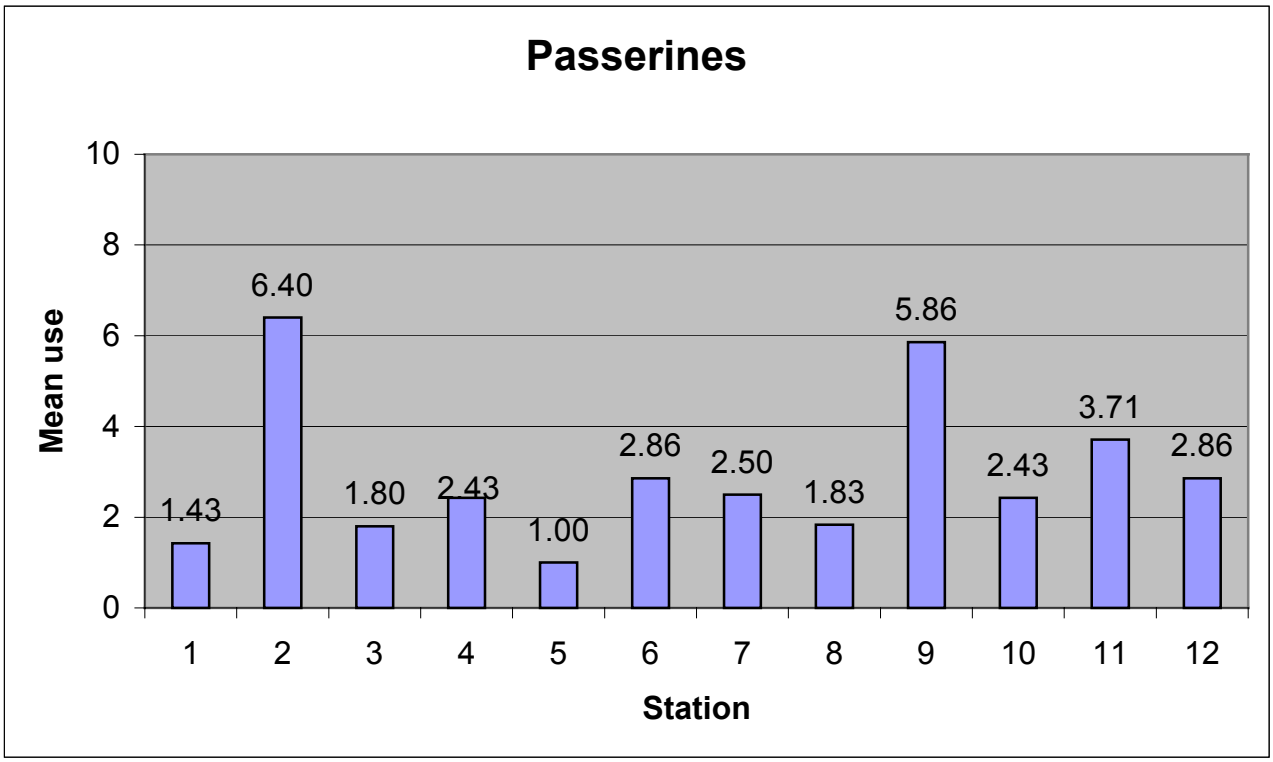


Figure 2. Avian use by survey station at the Glenrock Wind Energy Project, Converse County, Wyoming

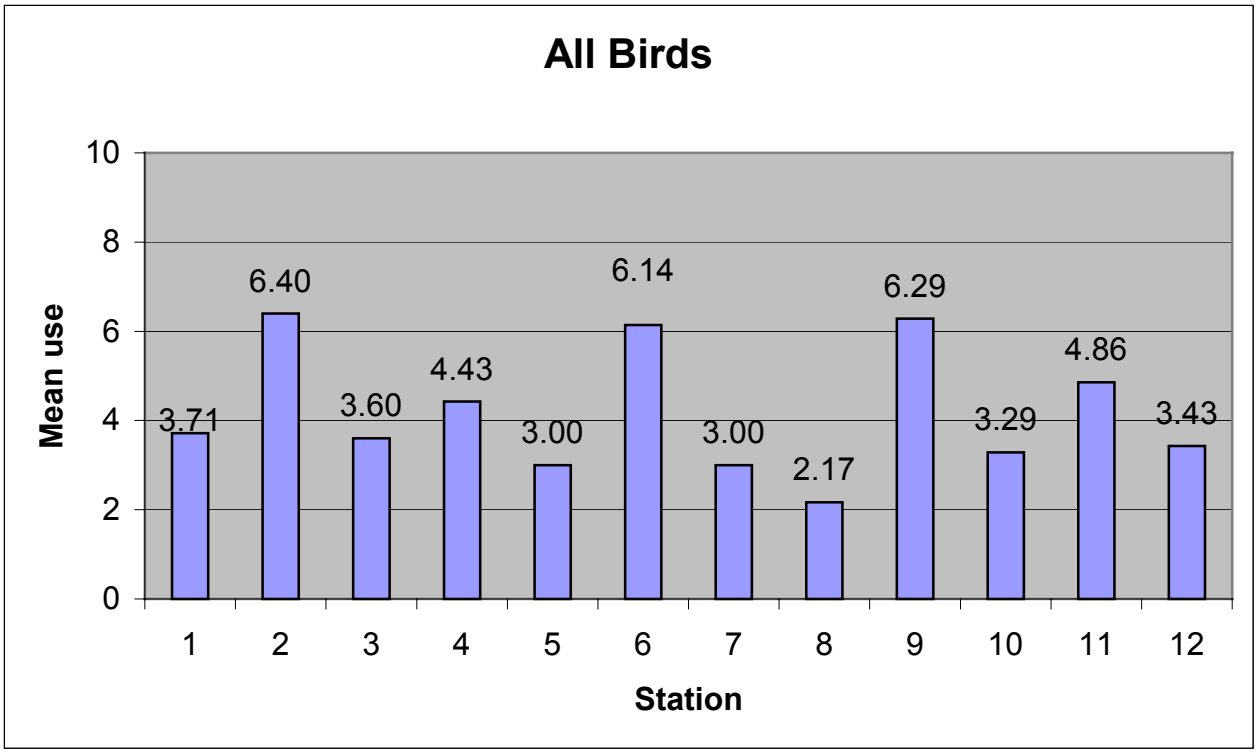


Figure 2 (continued). Avian use by survey station at the Glenrock Wind Energy Project, Converse County, Wyoming

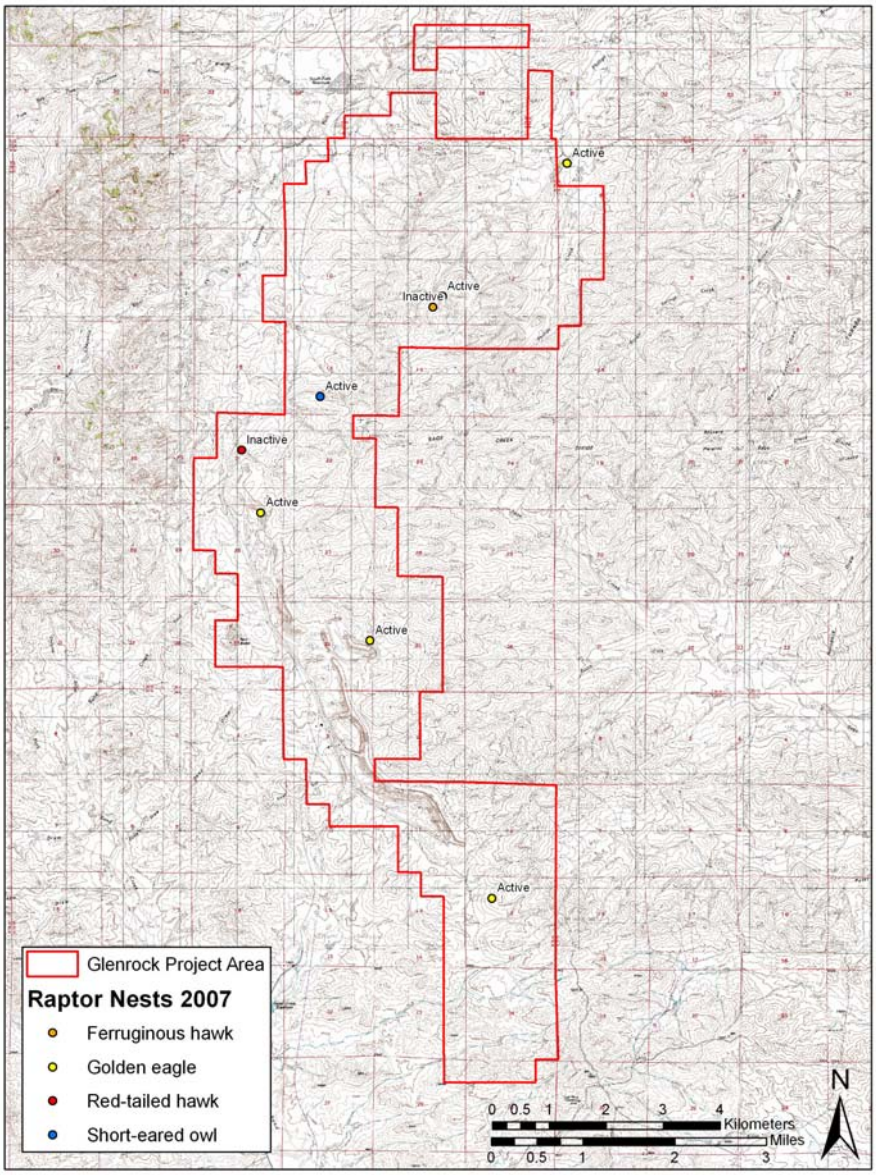


Figure 3. Location of raptor nests observed at the Glenrock wind energy project, Converse County, Wyoming

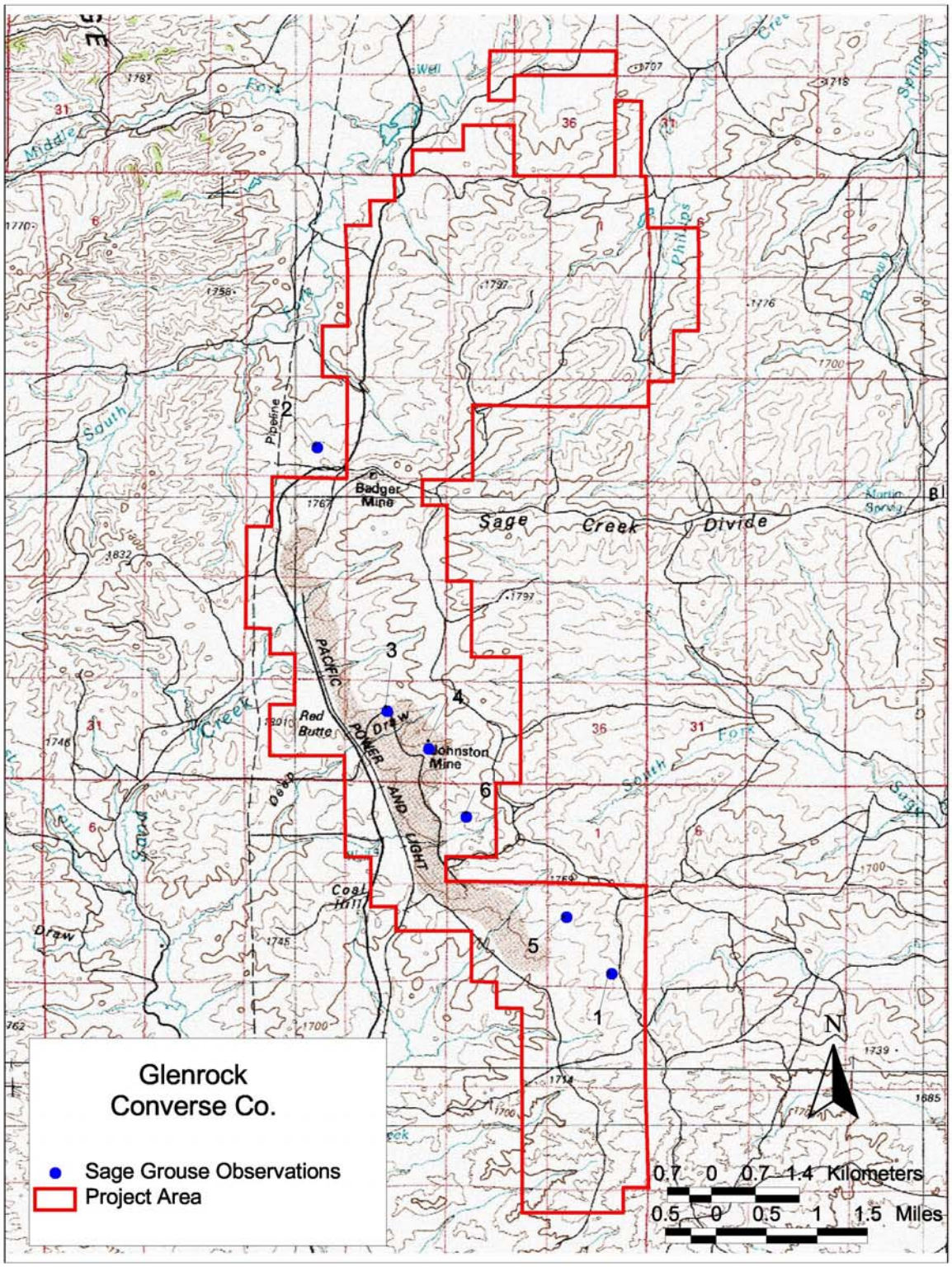


Figure 4. Location of sage grouse broods observed in or near the Glenrock wind energy project, Converse County, Wyoming

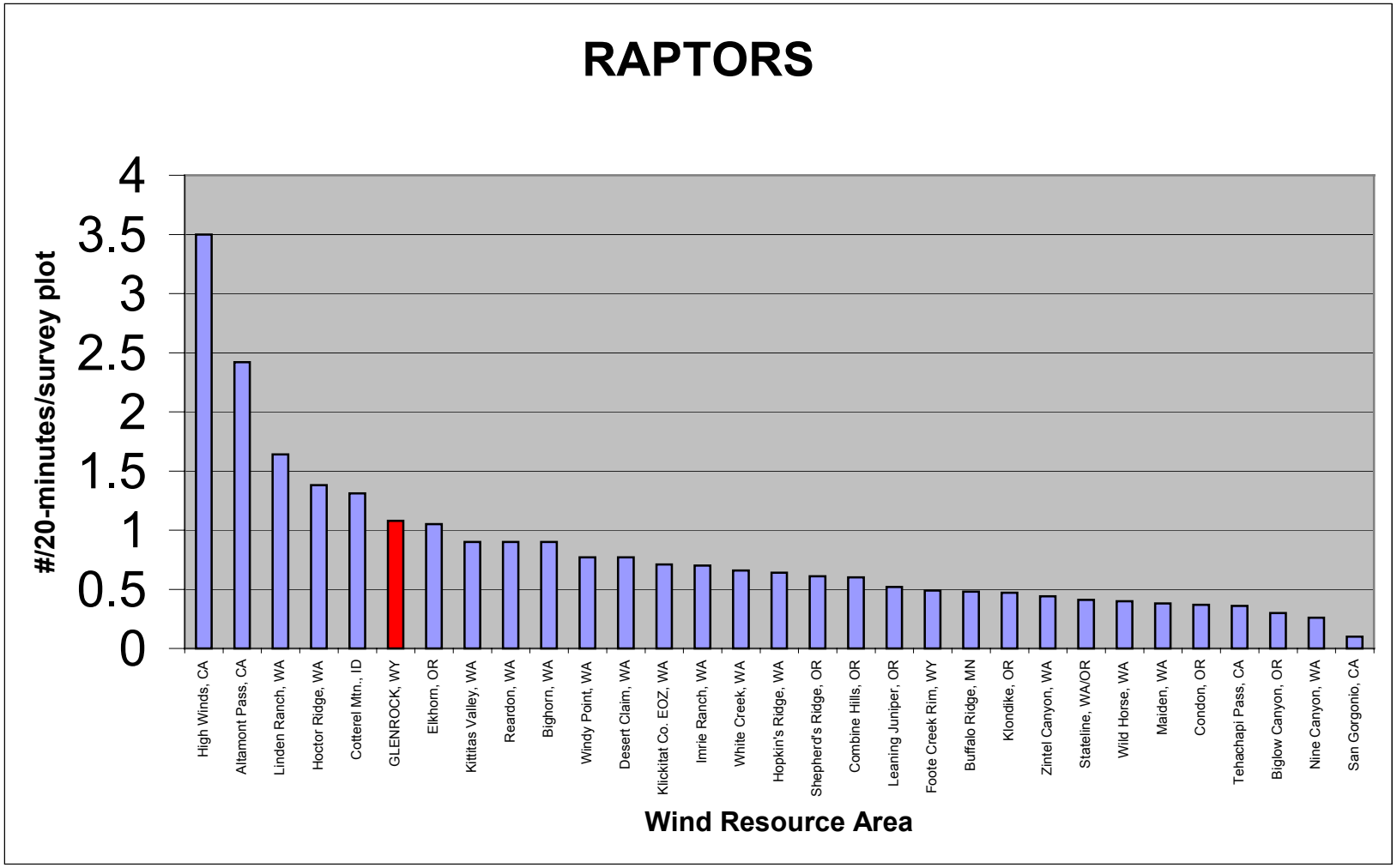


Figure 5. Raptor use estimates at several wind resource areas in the U.S. in relation to raptor use estimates at the Glenrock Project Area

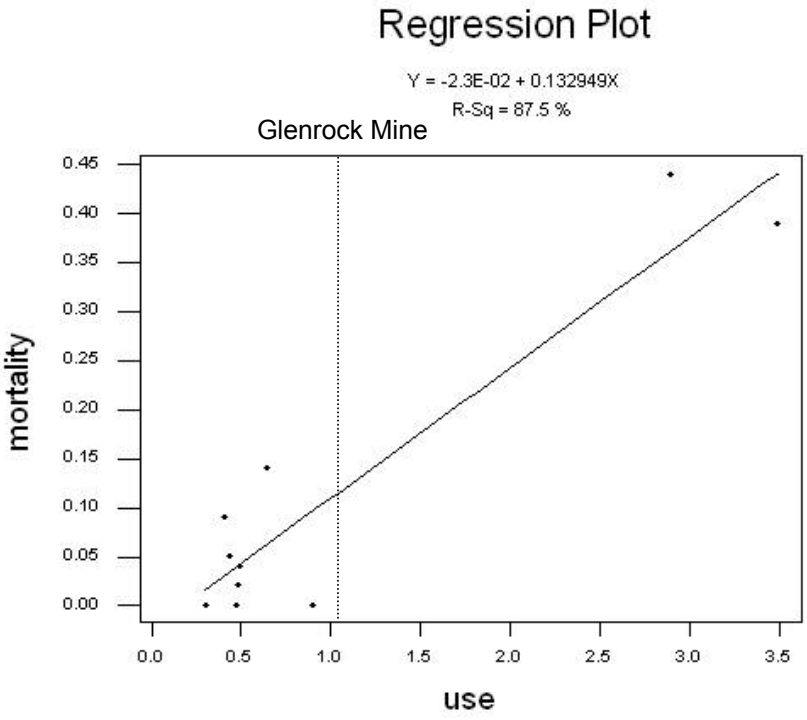


Figure 6. Relationship between raptor use and adjusted fatality rates for 10 newer generation wind energy projects.

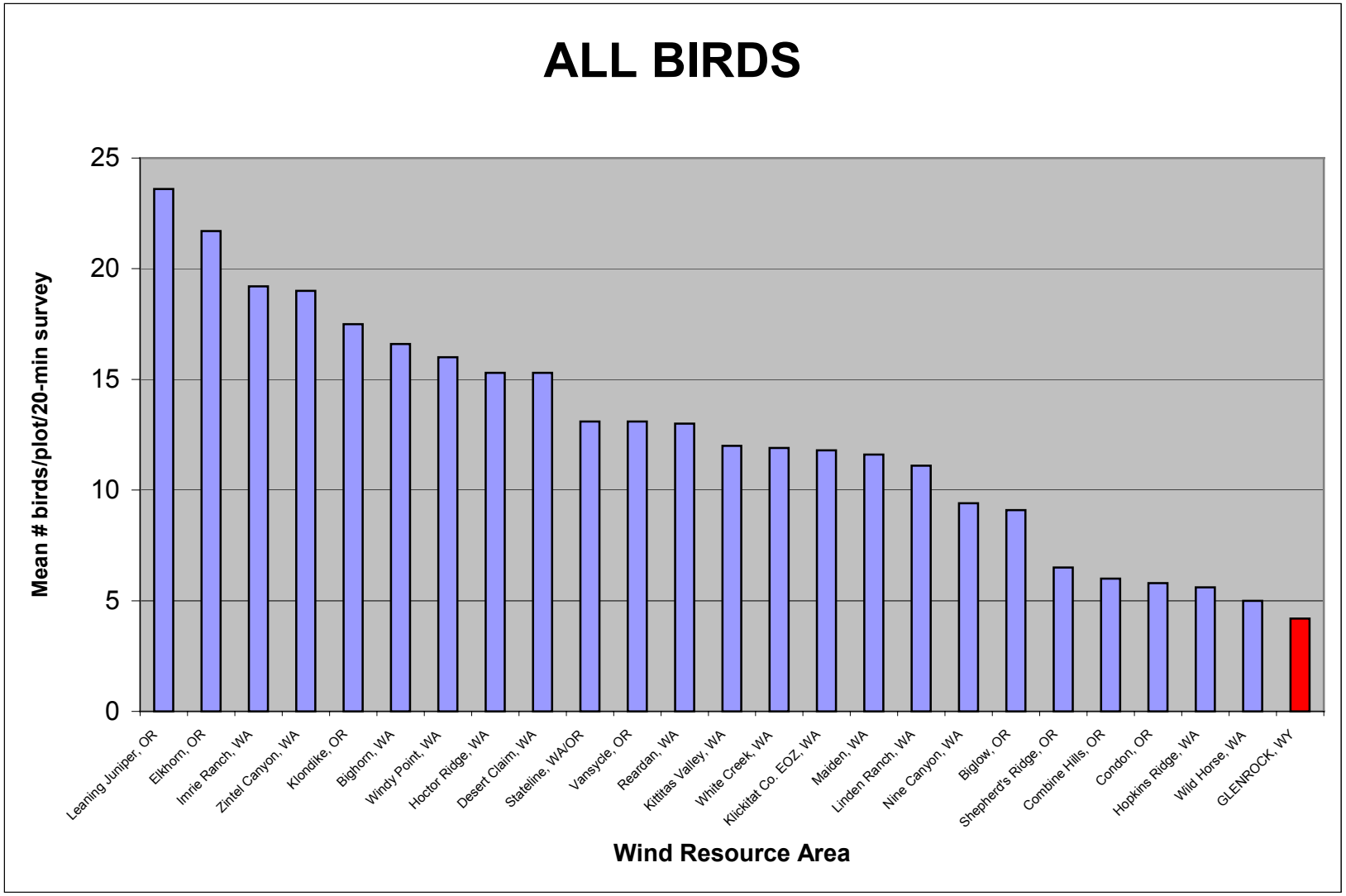


Figure 7. Avian use estimates (all species) at several wind resource areas in the U.S. compared to use estimates for the Glenrock Project

Appendix A. Number of avian groups and individuals by species observed during the avian studies associated with the Glenrock Project site.

Species	# groups	# obs.
Shorebirds		
killdeer	1	1
Raptors	**84**	**88**
Accipiters		
sharp-shinned hawk	1	1
Buteos	*9*	*11*
ferruginous hawk	3	4
red-tailed hawk	4	5
unidentified buteo	2	2
Northern Harriers		
northern harrier	28	29
Eagles		
golden eagle	41	42
Falcons		
American kestrel	2	2
prairie falcon	3	3
Passerines	**166**	**374**
American goldfinch	1	5
Brewer's blackbird	8	20
Brewer's sparrow	3	3
cliff swallow	2	2
horned lark	27	32
lark bunting	9	23
rock wren	1	1
sage thrasher	2	12
vesper sparrow	22	22
western meadowlark	91	105
Doves		
mourning dove	6	18
Overall	**257**	**481**

APPENDIX G

Monitoring Protocol

Wildlife Monitoring Plan
Glenrock and Rolling Hills Wind Energy Projects

Converse County, Wyoming

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Appendix B. Wildlife Monitoring Data Forms

INTRODUCTION AND BACKGROUND

PacifiCorp Energy (PacifiCorp) proposes to construct up to three wind generation projects in phases at the site (Figure 1), which includes privately owned fee lands in Converse County, north of Glenrock, Wyoming. The site encompasses in excess of 14,000 acres of land that extends approximately 12 miles from north to south and is approximately 2 to 3 miles wide. The wind generation projects include the Glenrock and Rolling Hills Wind Energy Projects, each rated at 99 megawatts (MW) and to be constructed in 2008, and an additional project rated at up to 99 MW to be further defined by PacifiCorp in the future and potentially constructed in 2009, 2010, or later. PacifiCorp is currently studying the potential for additional project phases at this site.

Habitat in the turbine development area is primarily grassland and sagebrush. This Wildlife Monitoring Plan outlines the protocols to monitor wildlife impacts and the measures to meet compliance requirements during operations of the Project. Monitoring of the Project includes estimating avian and bat collision mortality as well as estimating displacement of greater sage-grouse through lek counts and pellet surveys. The protocol focuses on the post-construction period. It should be considered flexible responding as issues arise that may benefit from a change in sampling or study design based on review of findings by the Technical Advisory Committee (TAC), an advisory group composed of representatives from state/federal agencies, state/local government, and the community. The scope and duration of the monitoring program were developed to be consistent and within the range of monitoring programs that have or will be conducted at other wind projects in the western United States, including other wind energy projects owned by PacifiCorp.

The scope and need for further standardized fatality monitoring beyond the first year of monitoring will be based on a review by the TAC of the results of the first year of monitoring, results from other regional projects, and other relevant information. For example, if the overall raptor fatality rates are within the range of mortality observed at projects considered relatively low and not at levels of concern, limited or no additional fatality monitoring may be considered (Figure 2), unless mortality of a sensitive species is considered high. The TAC may determine, however, that mortality during a specific season is still a concern based on the results of the first year study and from other relevant information, so the second year of monitoring may focus only on the season and taxa of interest.

As part of the overall Project monitoring effort, wildlife casualties (fatalities or injured wildlife) found incidentally to the monitoring study by wind Project personnel or others will be handled under the Wildlife Incident Reporting and Handling System (WIRHS) manual described in this protocol (Appendix A). Casualties found by wind project personnel will be included in the overall dataset, and a fatality incident monitoring program will be ongoing for the life of the Project.

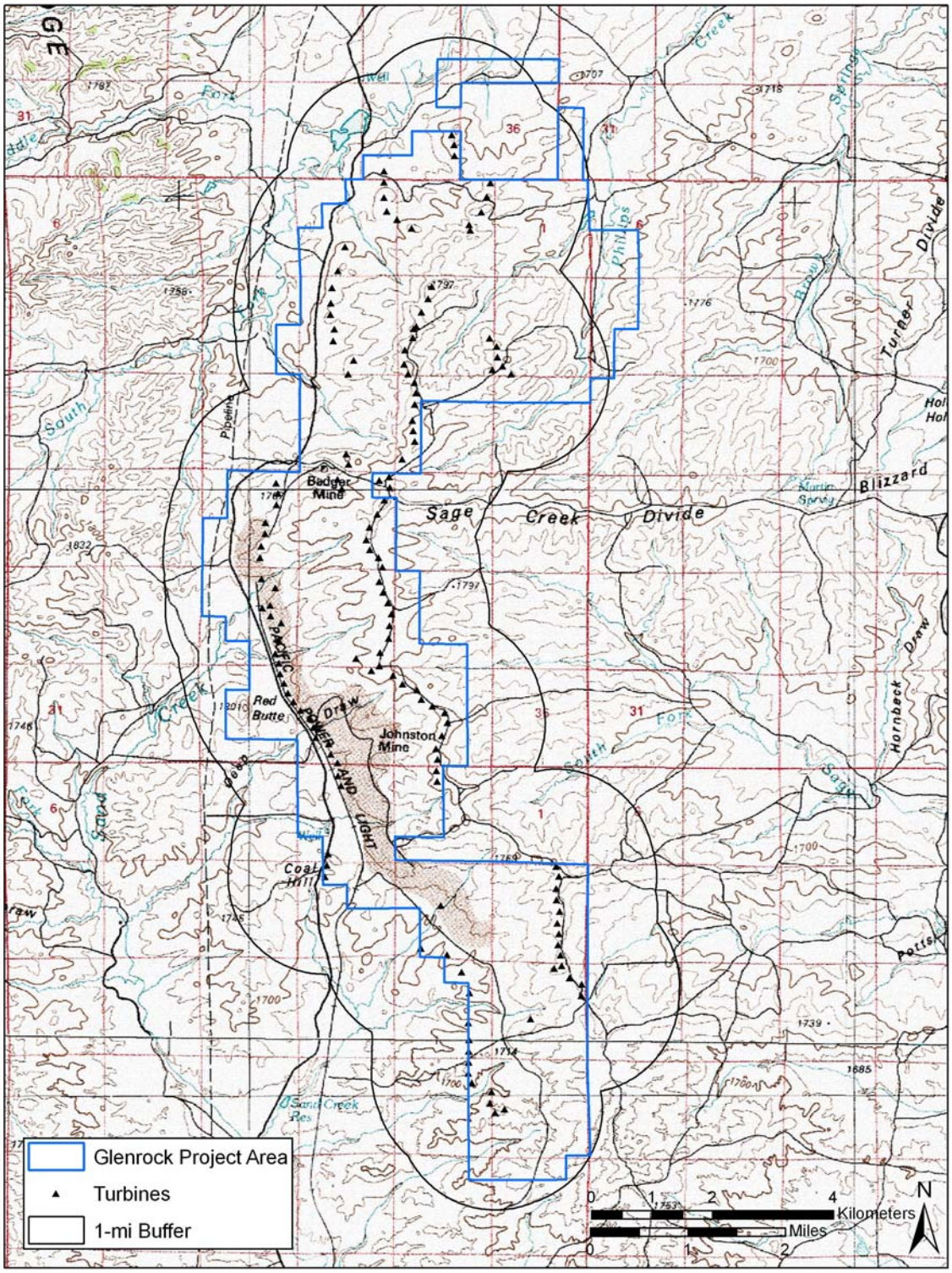

Figure 1. Location of the Glenrock and Rolling Hills Wind Energy Projects in Converse County, Wyoming

Project Overview

The Projects consist of installation of 132 (66 each at Glenrock and Rolling Hills) GE 1.5 sle 1.5-MW wind turbine generators with 80 meter (m) tubular towers. Facilities will also include transformers, an operation and maintenance (O&M) building, underground electric cable, fiber optic communication cable, turbine access roads, four necessary permanent 80-meter meteorological towers, and a supervisory control and data acquisition (SCADA) system. Output from the Project wind turbines will be delivered to a collector substation on the Project site where it will be stepped up to 230 kilovolts (kV) at a new 34.5-/230-kV substation and interconnect to the existing Dave Johnston 230-kV transmission line.

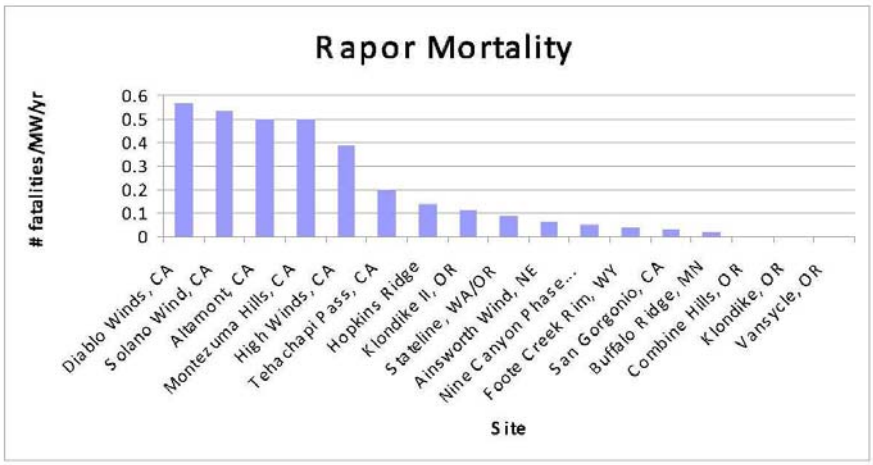

Figure 2. Raptor Fatality Rates at Several Wind Farms in the Western United States

Scope

The scope of the Wildlife Monitoring Plan includes:

- Avian and Bat Fatality Monitoring –The monitoring study will estimate the annual number of avian and bat fatalities attributable to wind turbine collisions from Project operations throughout the Year 1 operation. This information will be used to determine whether projected impact levels for the Project are within acceptable ranges and are consistent with reported data from other wind projects in the region. The proposed monitoring study conforms with industry standard in the western U.S. and provides WGFD with good baseline data on avian and bat fatality rates at wind energy facilities in Wyoming.

- Greater Sage-Grouse Displacement Study: Pellet Surveys – This monitoring will focus on determining whether turbines displace greater sage-grouse by comparing greater sage-grouse pellet densities near turbines with a suitable reference area before and after construction of the Project. The greater sage-grouse pellet study will be conducted for a minimum of one winter pre-construction, and 2 years post-construction. This is consistent with recommendations of WGFD with adjustments in sampling that are

statistically valid using smaller sample sizes.

- Technical Advisory Committee (TAC) – The TAC will review the monitoring protocol, assess study results, and prepare recommendations for PacifiCorp at the completion of the Year 1 monitoring studies. It is composed of representatives from state/federal agencies, state/local government, and the community.

AVIAN AND BAT FATALITY STUDY

The primary objective of the fatality monitoring study is to estimate avian and bat mortality at the site and determine whether the estimated mortality is lower, similar, or higher than the average mortality observed at other regional projects. The monitoring study will begin after all the turbines in each phase are fully operational. The study will be conducted for 1 year followed by a TAC review of findings and recommendations on additional monitoring.

Wind Industry Standards for Avian and Bat Mortality Monitoring

Several states have written guidelines regarding the recommended level of effort for post-construction fatality monitoring. In California's recently released statewide guidelines, 2 years of fatality monitoring with a search interval of 14 days has been recommended. In Washington, 1 year of fatality monitoring is recommended, but the search intervals have not been explicitly determined. However, most studies conducted to date in Washington used 14-28-day search intervals at a sample of turbines for a period of 1 year. In Arizona's guidelines, 3 years of post-construction monitoring is recommended, but details regarding search interval and sample sizes are not given. In Michigan, it is recommended that an analysis be conducted to indicate "whether a post construction wildlife mortality study will be conducted and, if not, the reasons why such a study does not need to be conducted." In Pennsylvania, it is recommended that daily searches be conducted at a minimum of 10 turbines from April 1 to November 15 for 2 years. In Vermont's draft guidelines, it is recommended a minimum of 3 years of rigorous post-construction bird and bat mortality surveys be conducted, but the guidelines do not specify sample sizes or search intervals.

In some other cases where there are no guidelines, state permitting agencies have typically required a certain level of monitoring. For example, in all projects permitted under the Oregon Energy Facility Siting Council, and most permitted at the County level, 1 to 2 years of standardized fatality monitoring has been required, at a sample of anywhere from 25 percent to 100 percent of the turbines, depending on project size, with search intervals typically in the 14- to 28-day range. In most guidelines, there is a qualifier that reduced effort may be justified if there is sufficient existing information from nearby projects to justify the reduction.

Wyoming does not have state-specific guidelines or rules specifically addressing post-construction avian and wildlife mortality monitoring at wind energy facilities. However, if a project is under the statutory jurisdiction of the Wyoming Industrial Siting and Information Act (ISA), the Wyoming Game and Fish Department is allowed to provide comment on the ISA

application. The scope and duration of this monitoring program was developed to be consistent and within the range of monitoring programs that have or will be conducted at other wind projects in the western United States, including other wind energy projects owned by PacifiCorp (e.g., Erickson et al., 2000, 2005; Johnson et al. 2002, 2003; Young et al. 2005, 2007). For example, at the PacifiCorp Leaning Juniper Wind Energy Project in Oregon, 25 percent of the turbines are being searched over a 2-year period using search intervals of 14 days during migration and 28 days in summer and winter. At the PacifiCorp Marengo Wind Energy Project in Washington, 40% of the turbines are being sampled for one year using 14-day search intervals during migration and 28-day search intervals the remainder of the year.

The methods for estimating avian and bat mortality from the Project conforms with industry standard in the western U.S., provides much more accurate and less variable estimates of avian and bat mortality, especially during migration seasons, due to increased frequency of surveys, and will provide the WGFD with good baseline data on avian and bat fatality rates at wind energy facilities in Wyoming.

Definitions and Field Methods

All casualties located within areas surveyed, regardless of species, will be recorded and a cause of death determined, if possible, based on field inspection of the carcass. Total number of avian and bat carcasses will be estimated by adjusting for search frequency, removal bias (length of stay in the field), and searcher efficiency bias (percent found). For carcasses where the cause of death is not apparent, the assumption that the fatality is a wind turbine or met tower collision casualty will be made for the analysis. This approach may lead to an overestimate of the true number of wind farm-related fatalities. Most wind farm monitoring studies have used this conservative approach because of the relative high costs associated with obtaining accurate estimates of natural or reference mortality (Johnson et al., 2000). A second low-range estimate will be calculated by eliminating fatalities where cause of death is not considered trauma due to collision.

Seasons

Seasons will be based roughly on the calendar seasons. For analysis purposes and to help with categorizing impacts (e.g., migratory birds) a spring and fall migration period and summer breeding season are also defined.

The following dates will be used for defining seasons in the study:

Season	Dates
Spring	March 16 – June 15
Spring Migration	March 16 – May 15
Summer	June 16 - September 15
Breeding Season	May 15 – August 15
Fall	September 15 – December 15
Fall Migration	August 1 - October 31
Winter	December 16 - March 15

These dates are used for analysis purposes only and may not cover all potential migrants or breeding residents in the Project area.

Search Plot and Sample Size

The Project will have 132 turbines and several permanent met towers. One-third (44) of the turbines and all met towers will be sampled during the study. The 44 turbines will be searched year-round every 28 days, and half of those (22) will be searched every 7 days during the spring and fall migration periods. Turbines will be selected for sampling using a systematic design with a random start. In this fashion, the search effort is spread throughout the entire Project.

Turbine search plots will be 160 m on a side (80 m from the turbine) and centered on the turbine. The survey plot of the met towers will be 120 m on a side (60 m from the tower), also roughly equivalent to the height of the tower.

Scheduling/Timing

Standardized searches of 44 selected turbines and the met towers will be conducted once every 4-week (28 day) period. During the spring and fall migration periods, 22 of the 44 turbines will be selected for searching, and the search effort will be increased to once a week at these 22 turbines. There will be eight searches for the 44 turbine plots (plus met towers) and 21 searches of the additional 22 turbines (Table 1).

Table 1. Monitoring Search Schedule Assuming All Searches Beginning in April

Search	Dates	Number of Plots	Interval
1	April 7 -11	44	28 days
2	April 14-18	22	7 days
3	April 21-24	22	7 day
4	May 1-5	44	28 days
5	May 8-12	22	7 days
6	May 15-19	22	7 days
7	May 29-June 2	44	28 days
8	June 26-30	44	28 days
9	July 24-28	44	28 days
10	August 1-5	22	7 days
11	August 14-18	22	7 days
12	August 21-25	44	28 days

13	August 28-September 1	22	7 days
14	September 4-8	22	7 days
15	September 11-15	22	7 days
16	September 18-22	44	28 days
17	September 25-29	22	7 days
18	October 2-6	22	7 days
19	October 9-13	22	7 days
20	October 16-20	44	28 days
21	October 23-27	22	7 days

Standardized Carcass Searches

The objective of the standardized carcasses searches is to search the wind Project systematically for avian and bat casualties that are attributable to collision with project facilities. Personnel trained in proper search techniques will conduct the carcass searches. A searcher will walk at a rate of approximately 45 to 60 m a minute along each transect. Transects will be spaced 6 to 10 m apart, and searchers will scan the area on both side sides to approximately 3 to 5 m for casualties as they walk each transect. Search area and speed may be adjusted after evaluation of the first searcher efficiency trial.

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

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

In addition to carcasses, all injured bats and birds observed in search plots will be recorded and treated as a fatality. All carcasses found will be labeled with a unique number and bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be maintained, bagged, and frozen with the carcass at all times. For all casualties found, data recorded will include species, sex and age when possible, date and time collected, global positioning system (GPS) location, condition (intact, scavenged, feather spot), and any comments that may indicate cause of death (Appendix B). All casualties located will be photographed as found and plotted on a detailed map of the study area showing the location of the wind turbines and associated facilities such as overhead power lines and met towers.

Casualties found outside the formal search area by carcass searchers will be treated following the above protocol as closely as possible. Casualties found in non-search areas (e.g., near a turbine not included in the search area) will be coded as incidental discoveries and will be documented in a similar fashion as those found during standard searches.

Any injured native birds found during standard searches will be carefully captured by the observer and transported to the nearest wildlife rehabilitation center or veterinary clinic before close of business that day. Appropriate wildlife salvage/collection permits will be obtained from the Wyoming Game and Fish Department (WGFD) and the U.S. Fish and Wildlife Service

(USFWS). Dissemination of data (e.g., to the USFWS Special Agent and other agency representatives) is discussed in the Disposition of Data section below.

Searcher Efficiency Trials

The objective of the searcher efficiency trials is to estimate the percentage of casualties which are found by searchers. Searcher efficiency trials will be conducted in the same areas carcass searches occur. Trials will be conducted by season. Searcher efficiency will be estimated by major habitat type (e.g., cultivated agriculture, grassland), size of carcass, and season. Estimates of searcher efficiency will be used to adjust the total number of carcasses found for those missed by searchers, correcting for detection bias.

Searcher efficiency trials will begin when carcass search studies begin. Personnel conducting carcass searches will not know when trials are conducted or the location of the detection carcasses. During each season and within each major habitat type, approximately eight carcasses of birds of two different size classes will be placed in the search area during the search period, for a total of approximately 64 searcher efficiency trial carcasses for the entire year. Carcasses will consist of non-native/non-protected or commercially available species such as house sparrows, European starlings, rock pigeons, bobwhite quail, and hen mallards or hen pheasants. Other salvaged birds may be used if they are collected under a valid salvage permit. A minimum of two dates will be used each season for a minimum total of eight trial dates. An attempt will be made to use several small brown birds (house sparrows) during the late summer and fall seasons to simulate bat carcasses. Legally obtained bat carcasses will also be used, if available.

All carcasses will be placed at random locations within areas being searched prior to the carcass search on the same day. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (tossed randomly to one side), 2) hidden to simulate a crippled bird, and 3) partially hidden.

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

Carcass Removal Trials

The objective of carcass removal trials is to estimate the likelihood a carcass is removed by scavengers as a function of the day since the trial carcasses are placed in the field. Carcass removal includes removal by predation or scavenging. Carcass removal studies will be conducted during each season near the carcass search plots (e.g., near a turbine that is not included in the standard search plots). Estimates of carcass removal will be used to adjust the total number of carcasses found for those removed from the study area, correcting for removal bias.

Carcass removal trials will begin when carcass search studies begin. During each season and within two major habitat types, approximately eight carcasses of birds of two different size classes (same as searcher efficiency birds) will be placed in the study plots, for a total of approximately 64 removal trial carcasses for the entire year. Legally obtained fresh carcasses that have never been

frozen such as waterfowl from game farms or raptors obtained from rehabilitation centers or agencies will be used if available. Carcasses will be placed on a minimum of three dates during each season for a minimum total of 12 trial initiation dates, spreading the trials throughout the year to incorporate the effects of varying weather, climatic conditions, and scavenger densities. Legally obtained fresh bat carcasses will also be used, if available.

Removal trial birds will not be placed in the standardized search plots to minimize the chance of confusing a trial bird with a true casualty. Turbines not included in the standardized searches will be randomly selected for inclusion in the removal trials and trial carcasses will be randomly located in a similar-sized plot as used to search turbines. Trial carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (tossed randomly to one side), 2) hidden to simulate a crippled bird (e.g., placed beneath a shrub or bunch grass), and 3) partially hidden.

Personnel conducting carcass searches will monitor the trial birds over a 40-day period according to the following schedule as closely as possible. Carcasses will be checked every day for the first 4 days, and then on day 7, day 10, day 14, day 20, day 30, and day 40. This schedule may vary depending on weather and coordination with the other survey work. Experimental carcasses will be marked discreetly (for example with dark electrical tape around one or both legs) for recognition by searchers and other personnel. Experimental carcasses will be left at the location until the end of the carcass removal trial. At the end of the 40-day period any evidence of the carcasses that remains will be removed.

Statistical Methods for Fatality Estimates

Estimates of facility-related fatalities are based on:

(1) Observed number of carcasses found during standardized searches during the monitoring year for which the cause of death is either unknown or is probably facility-related.
(2) Non-removal rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during removal trials.
(3) Searcher efficiency expressed as the proportion of planted carcasses found by searchers during searcher efficiency trials.

Fatality estimates will be provided for six categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors, 5) likely nocturnal migrants, and 6) bats. The number of avian and bat fatalities attributable to operation of the facility based on the number of avian and bat fatalities found at the facility site whose death appears related to facility operation will be reported. All carcasses located within areas surveyed, regardless of species, will be recorded and, if possible, a cause of death determined based on a cursory field necropsy. Total number of avian and bat carcasses will be estimated by adjusting for removal and searcher efficiency bias. If the cause of death is not apparent, a worst-case estimate will be made by attributing the mortality to facility operation.

Definition of Variables

The following variables are used in the equations below:

- c_i the number of carcasses detected at plot *i* for the study period of interest (e.g., 1 monitoring year) for which the cause of death is either unknown or is attributed to the facility
- n the number of search plots
- k the number of turbines searched (including the turbines centered within each search plot)
- $\bar{c}$ the average number of carcasses observed per turbine per monitoring year
- s the number of carcasses used in removal trials
- s_c the number of carcasses in removal trials that remain in the study area after 30 days
- se standard error (square of the sample variance of the mean)
- t_i the time (in days) a carcass remains in the study area before it is removed, as determined by the removal trials
- $\bar{t}$ the average time (in days) a carcass remains in the study area before it is removed, as determined by the removal trials
- d the total number of carcasses placed in searcher efficiency trials
- p the estimated proportion of detectable carcasses found by searchers, as determined by the searcher efficiency trials
- I the average interval between standardized carcass searches, in days
- A proportion of the search area of a turbine actually searched
- $\hat{\pi}$ the estimated probability that a carcass is both available to be found during a search and is found, as determined by the removal trials and the searcher efficiency trials
- m the estimated annual average number of fatalities per turbine per year, adjusted for removal and searcher efficiency bias

Observed Number of Carcasses

The estimated average number of carcasses ($\bar{c}$) observed per turbine per monitoring year is:

$$\bar{c} = \frac{\sum_{i=1}^{n} c_i}{k \cdot A} \qquad (1)$$

Estimation of Carcass Non-Removal Rates

Estimates of carcass non-removal rates are used to adjust carcass counts for removal bias. Mean carcass removal time ($\bar{t}$) is the average length of time a carcass remains in the study area before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^{s} t_i}{s - s_c} \qquad (2)$$

Estimation of Searcher Efficiency Rates
Searcher efficiency rates are expressed as *p*, the proportion of trial carcasses that are detected by searchers in the searcher efficiency trials. These rates will be estimated by carcass size and season.

Estimation of Facility-Related Fatality Rates
The estimated per turbine annual fatality rate (*m*) is calculated by:

$$m = \frac{\bar{c}}{\hat{\pi}} \qquad (3)$$

where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and searcher efficiency bias. Data for carcass removal and searcher efficiency bias will be pooled across the study to estimate $\hat{\pi}$.

$\hat{\pi}$ is calculated as follows:

$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(I / \bar{t} \right) - 1}{\exp\left(I / \bar{t} \right) - 1 + p} \right].$$

This formula has been independently verified by Shoenfeld (2004). The final reported estimates of *m* and associated standard errors and 90 percent confidence intervals will be calculated using bootstrapping (Manly, 1997).

Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. For each bootstrap sample, $\bar{c}$, $\bar{t}$, p, $\hat{\pi}$, and m are calculated. A total of 5,000 bootstrap samples will be used. The reported estimates are the mathematical means of the 5,000 bootstrap estimates. The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 5,000 bootstrap estimates are estimates of the lower limit and upper limit of 90 percent confidence intervals.

GREATER SAGE-GROUSE DISPLACEMENT STUDY

The objective of the displacement studies for greater sage-grouse is to determine the level of impact from avoidance or reduction in habitat use due to the presence of the operating turbines. The displacement studies include pellet counts. No lek surveys will be conducted as there are no greater sage-grouse leks within a mile of project facilities.

Pellet Counts

The pellet count study will consist of establishing six plots at up to 66 turbines located within suitable habitat resulting in a total of 396 plots for greater sage-grouse pellet counts. Based on habitat mapping of the Project area greater sage-grouse pellet plots will be placed along transects

at turbines with tall or dense stands of sagebrush that provide greater sage-grouse nesting, brood rearing, or winter habitat.. Turbines located in areas devoid of sagebrush or with low densities of sagebrush will not be sampled. At each turbine selected for sampling, the six plots will be established using a systematic sample of plots between 10 and 100 m away from the turbine, perpendicular to the access road. Each plot with be approximately 15 m apart. Each plot will be marked with a 12-inch piece of rebar, and the location will be recorded using a GPS. All pellet groups within a 2-m radius of each point will be enumerated and then removed from the plot. Surveys will be conducted twice each year, once in May and again in late October or early November. Surveys in May will document the previous winter's use of the site by greater sage-grouse, while surveys in October/November will document the previous summer's use of the site. Surveys will begin 1 year prior to construction and will continue for 3 years post-construction. The initial clearing survey will be conducted prior to November 15, 2007.

For reference data, six plots will also be established at up to 66 random points located in an area of similar topography and vegetation as the turbines, but at least 1 mile from the nearest turbine. Methods will be identical to those at the turbine plots. The same number of reference plots will be sampled as the number of turbines sampled based on presence of adjacent suitable greater sage-grouse habitat.

A summary report will be prepared following the fall 2007 survey, which will describe the methods in detail, contain a map showing the locations of all plots, and summarize the mean number of pellet groups per plot for each season.

A before-after control impact analysis will be conducted. Differences in pellet density from the post-construction period to the pre-construction period will be compared between the wind turbine site and the reference site. Statistical comparisons of 95 percent confidence limits of these differences will be used to determine displacement effects. The TAC will review the findings and address recommendations on additional monitoring or mitigation.

TECHNICAL ADVISORY COMMITTEE

This monitoring plan is designed as a dynamic process that uses an accumulation of data to detect impacts and to direct further study. PacifiCorp is proposing to form a TAC to review the wildlife post-construction monitoring studies for the Project. The TAC membership may include WGFD, USFWS, Industrial Siting/state government, landowner, local/county government, Non-governmental organization (NGO), and PacifiCorp.

The TAC will act as an advisory group on the wildlife post-construction monitoring studies. The TAC will review the technical procedures of the monitoring studies, assess the scientific findings, and recommend various practices or measures, as necessary, to PacifiCorp. The TAC's responsibilities include the following:

- Reviewing and commenting on the post-construction (Operations Phase) avian and bat fatality monitoring study.
- Reviewing greater sage-grouse displacement study (pellet count procedures and

findings).
- Providing input to PacifiCorp on monitoring and mitigation, based on the post-construction monitoring results and final fatality estimates.

The TAC will use a collaborative process to reach understanding and consensus on reviews and recommendations. The TAC does not replace regulatory authority or responsibility of the various agencies or groups. A third-party coordinator may assist PacifiCorp with planning and arrangements for meetings and with briefing and reporting to TAC members.

PacifiCorp will submit progress reports to the TAC every six months. In addition, an annual report of findings will be prepared at the end of the first year of monitoring and will be distributed to the members of the TAC at least 2 weeks prior to the annual meeting. The TAC will meet after the first monitoring report is submitted to discuss the results. The need for further study (beyond 2008) or changes to the current protocol will be based on reasonable criteria proposed by the TAC. A final report on study results will be submitted to the TAC as appropriate for review and subsequent discussion on mitigation recommendations.

Draft meeting minutes will be completed within 2 weeks of each meeting. Minutes will be forwarded to TAC members for review and comment. Minutes will be approved and finalized at the subsequent meeting. Depending on the group's preferences, meetings may be in person or by conference call. Monitoring findings (summarized per season or semi-annually) and other pertinent information (unusual findings or events) will be transmitted via hard copy, e-mail, or phone call, as necessary.

DISPOSITION OF DATA AND REPORTING STANDARDS

This monitoring study will provide information on fatalities and total mortality associated with development of the Project as well as the potential displacement effects of turbines on greater sage-grouse. The data will be used to evaluate the overall impacts of the Project on wildlife. The final disposition of data from the study will be with PacifiCorp, the Project owner, and will include the data forms and electronic data files. During the study, the raw data forms will be housed with the contractor conducting the study, and individual carcasses collected during the study will be housed in a freezer. Individual carcasses will be maintained until after the final analysis and report are prepared in case questions about identity or cause of death should arise. The final disposition of individual casualties will be based on direction from the appropriate salvage permits (WGFD and USFWS), the legal status of individual casualties, and direction of the USFWS Law Enforcement Agent in Charge. It is anticipated that bird carcasses will be donated to a local museum or disposed of by burying except for raptors and any threatened or endangered species found. Bat carcass will also be donated to a local museum or disposed of by burying unless their condition is intact and fresh in which case they may be saved for future searcher efficiency and carcass removal trials.

Interim progress reports will be prepared every 6 months to provide an update about the Project and results to date. A first year annual report will include data pertaining to avian and bat fatalities discovered during the study, as well as other information relevant to monitoring the

Project. The USFWS will be notified (email and phone) within 24 hours if any eagles or federally threatened or endangered species are discovered. All reports will be distributed to TAC representatives for review and comment.

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Appendix A. Wildlife Incident Reporting and Handling System

PACIFICORP
GLENROCK WIND FARM

WILDLIFE INCIDENT
REPORTING AND HANDLING SYSTEM

November 2007

BACKGROUND AND INTRODUCTION

The US Fish and Wildlife Service (USFWS) requests that casualties of birds protected under the Bald and Golden Eagle Protection Act, the Endangered Species Act, and the Migratory Bird Treaty Act be reported. PacifiCorp intends to report all dead birds found in the Glenrock Wind Farm (GWF) over the entire life of the project as part of the project operations and monitoring efforts. The purpose of this Wildlife Incident Reporting and Handling System (WIRHS) manual is to standardize and describe the actions taken by Glenrock Wind Farm personnel in response to wildlife incidents found in the wind project. The manual is intended to be working directions for personnel encountering a wildlife incident to fulfill the obligations of PacifiCorp in reporting bird incidents.

PACIFICORP POLICY

Employees or subcontractors of PacifiCorp have a responsibility to comply with all environmental laws and regulations. Most birds that occur in the GWF are protected by the federal Migratory Bird Treaty Act and eagles are further protected by the Bald and Golden Eagle Protection Act. Under these federal statutes it is illegal to take or collect birds that may be found in the wind project.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute wherein proof of intent is not an element of a "taking" violation. Wording is clear that most actions resulting in a taking or possession (permanent or temporary) of a protected species can be a violation regardless of intent.

Statutory Prohibition:

> Specifically, the MBTA states: “Unless and except as permitted by regulations...it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill,

> attempt to take, capture or kill, possess…any migratory bird, any part, nest, or egg of any such bird…(The Act) prohibits the taking, killing possession, transportation, and importation of migratory birds, their eggs, parts, and nests, expect when specifically authorized by the Department of the Interior." The word "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

The MBTA offers protection of 836 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds in the U.S. except gallinaceous (upland game) birds, rock pigeons, Eurasian collared doves, European starlings, and house sparrows.

Bald and Golden Eagle Protection Act

In June 1940, Congress signed into law the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-688d). This law afforded additional protection to the bald and golden eagle. Penalties for violations of the BGEPA are up to $250,000 and/or 2 years imprisonment for a felony (violations are defined as a felony), with fines doubled for organizations.

Statutory Prohibition:

> Specifically, the BGEPA states: “Whoever, with the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided…shall knowingly or with wanton disregard for the consequences of his act take, possess, transport…at any time or in any manner, any bald or golden eagle, alive or dead, or any part, nest or egg thereof shall be fined…that the commission of each taking or other act prohibited by this section, with respect to a bald or golden eagle, shall constitute a separate violation of this section."

Endangered Species Act

In 1973 the Endangered Species Act (ESA) (16 USC 1513-1543) was passed to protect endangered and threatened species and to provide a means to conserve their ecosystems. Under the ESA, Federal agencies are directed to utilize their authorities to conserve listed species, as well as "Candidate" species that may be listed in the near future, and make sure that federal agencies' actions do not jeopardize the continued existence of these species. As with the MBTA and the BGEPA, the

ESA as amended prohibits the taking of species listed under the act as threatened or endangered.

PacifiCorp's WIRHS will be active for the life of the wind project. It is recognized that bats are generally not protected by federal law unless listed as a threatened or endangered species; however, it is the policy of PacifiCorp to treat bat incidences the same as avian incidences and include them in the WIRHS. Further, it is the policy of PacifiCorp to comply with all conditions of the Industrial Siting Council permit for the GWF including implementing a monitoring study of the wind project and convening a Technical Advisory Committee (TAC) that will oversee the monitoring study. The objective of this policy is to insure that the best available information about avian and bat incidents found in the wind project is recorded and the proper authorities are notified.

PacifiCorp is committed to providing a secure environment for all natural inhabitants of wind project sites. The possession, transfer or tampering with any avian or bat species (alive or dead) at any time is strictly prohibited. The WIRHS is designed to provide a means of recording and collecting avian and bat species found in the wind project to increase the understanding of wind turbine and wildlife interactions. PacifiCorp maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to prevent and mitigate future bird and wildlife fatalities. It is the responsibility of PacifiCorp employees and subcontractors to report all avian and wildlife incidents to your immediate supervisor.

WILDLIFE INCIDENT REPORTING
WIND PROJECT PERSONNEL PROCEDURES

The following procedures are to be followed when wind project personnel or others discover an avian or bat fatality or injury while on site. These procedures are intended to be in place for the life of the GWF and are independent of any monitoring studies. Implementation of this WIRHS will be part of the GWF staff training program.

WHEN TO USE THE WIRHS - WHAT CONSTITUTES A REPORTABLE INCIDENT?

For the purposes of this reporting system, *incident* is a general term that refers to any bird or bat, or evidence thereof, that is found either dead or injured within the wind project. Note that an incident may include an injured animal and does not necessary indicate death as in a carcass or fatality.

An intact carcass, carcass parts, bones, or scattered feathers or an injured bird or bat are all considered reportable incidences. Report all such discoveries even if you are uncertain if the carcass or parts are associated with a wind project structure.

A *fatality* is any find where death occurred, such as a carcass, carcass parts, bones, or feather spot. An *injury* or injured animal is any bird or bat with an apparent injury, or that exhibits signs of distress to the point where it can not move under normal means or does not display normal escape or defense behavior.

Prior to assuming a bird or bat is injured, it should be observed to determine if it can not or does not display normal behaviors. For example, raptors will occasionally walk on the ground, especially if they have captured a prey item. Raptors also "mantle" or hold their wings out and down covering a prey item. These types of behaviors may make the wings appear broken or the animal injured. Identification of specific behaviors typical to bird life cycles and distress behaviors will be part of the GWF staff training program.

Note: Any incident involving a threatened or endangered species or a bald or golden eagle must be

reported to USFWS within 24 hours of identification. See project personnel listing for contact information.

MATERIALS NEEDED TO RECOVER/REPORT AN INCIDENT

The supplies needed for this WIRHS will be contained in a "run-kit" available on site at the Operations and Maintenance Office. The run-kit includes the following items:

A copy of this WIRHS

Wildlife Incident Report Forms

Project Personnel Listing and Contact Information

Sharpie, Pencils, Pens

3x5 cards

Ziploc freezer storage bags – quart size, gallon size

Zip ties

Garbage bags

Disposable gloves

Camera

Large forceps

Flagging

Dark cloth bag or towel

Leather gloves for handling injured large birds

Animal carrier suitable for transporting injured birds

Shoebox with a soft cloth and air holes punched for transporting injured bats

INCIDENT RECOVERY AND REPORTING PROCEDURES:

If an animal is found or if you determine a bird/bat is injured, the following procedures should be followed:

1. If the incident discovered is an injured bird, initially move to a distance far enough away that it is not visibly disturbed or uneasy due to your presence. Follow the procedures for reporting and care of injured wildlife found below.

   If the incident discovered is a fatality or injured bat the following procedures apply.

2. Initially, leave the subject animal in place. A flag may be used to mark it's location for easy finding while specific data are being recorded. If it is a fatality, it is best to leave the subject animal in place until all the data are recorded. It is recommended that any flagging be marked with the date, time and initials of the recorder.

3. Prepare a Wildlife Incident Report Form. The form and instructions for filling out the form are provided below.

4. Prepare a 3x5 card label that includes the exact date and time of the find and the observer's initials that are recorded on the Wildlife Incident Report Form. Use a Sharpie to record information on the label and write in large letters. This label is critical to correlating the carcass and photographs back to the data forms in the future and will be bagged and stored with the carcass.

5. Photograph the incident as it was found in the field. Take at least two pictures: a close up shot of the animal as it lays in the field and a broader view of the animal (marked by a flag) with the road, turbines, or other local features in the view. For the close up picture lay the 3x5 card label marked with the date, time and initials of the recorder facing up next to the carcass so that it appears in the picture.

6. Following completion of the report form and photographs, the fatality should be collected. In the case of a scavenged mortality or feather spot it is important to collect all parts so that it is not encountered and counted again at a later date. The fatality or parts should be bagged in a Ziploc freezer bag or garbage bag in the case of large birds. The 3x5 card label should be included in a second Ziploc bag with the bag holding the actual animal (double bagged). It is advisable to use plastic disposable gloves to collect casualties for hygiene and potential disease considerations.

   Injured bats (that can not fly) are also to be collected. Due to disease considerations and safety, injured bats should be collected with long forceps using disposable gloves. Confine the injured bat in a shoebox with a lid, punched air holds, and a soft cloth. The monitoring study Field Coordinator (see list of contacts) should be notified immediately and will be responsible for euthanizing injured bats.

7. Report the find to the GWF Environmental Program Manager or in their absence the monitoring study Field Coordinator within 24 hours. As soon as possible after the fatality is collected it should be stored in the site freezer and an entry completed in the freezer log book. Follow the instructions on the freezer log book for logging fatalities into the freezer. Include the 3x5 card label double bagged with the fatality in the freezer.

   Any incident involving a State or Federally listed threatened or endangered species or

a bald or golden eagle must be reported to the USFWS within 24 hours of identification. These finds will be reported to the agency verbally by the Program Manager or the PacifiCorp Avian Protection Manager. See project personnel listing for contact information.

WILDLIFE INCIDENT REPORT FORM INSTRUCTIONS

SECTION 1 – DISCOVERY DATA

Date and Time: Record the date and time when the incident was found and the report is completed.

Name(s): Record the name(s) of the person(s) who made the discovery and filled out the report form.

SECTION 2 – INCIDENT INFORMATION & OBSERVATIONAL DATA

Fatality/Injury: Circle the appropriate choice.

Condition: Circle appropriate description. *Complete* is an intact carcass or carcass that appears complete with no obvious signs of scavenging. *Dismembered* is a carcass with appendages missing or amputated from body. *Feathers* is an incident where only feathers were found, a feather spot.

Field Notes and Physical condition: This section is for recording any field notes or observations specific to the incident. For example, describe observations about the incident at the time it was found. Some good observations to include are whether the carcass appears fresh or is old and desiccated, whether it was infested with insects, whether maggots were present, the condition of the eyes – dried and sunken versus moist and round, whether all appendages were present or if one or more were missing (e.g., missing right wing). Notes recorded in this section are helpful in estimating the time since death.

Estimated Time Since Death: Indicate the approximate number of days since the time of death based on your best judgment. Very fresh carcasses which may be only a few hours old will generally have no insect infestations and eyes may be round and wet appearing. Insect infestations can occur relatively quickly, especially in warm weather, and even carcasses less

than 24 hours old may have flies or beetles on them. The presence of fly larvae (maggots) would indicate a carcass is a few days (generally >24 hours) to a week old. A dried carcass with all the flesh removed is likely to be greater than 14 days and if bones are visible it could be over 30 days old. In cold weather, carcasses will appear fresh for longer time periods and may not experience insect scavenging.

SECTION 3 – WILDLIFE IDENTIFICATION

Species: If known, record the species. If unknown, record "unidentified" or "unknown".

Field Marks used: Include in this section any notes or information such as identification marks that helped you determine the species of the bird or bat. If the species was unknown but you have an educated guess, or you know the bird was a raptor for example but don't know the species, include it here.

Photos: Indicate whether photos were taken and if so how many.

SECTION 4 – LOCATION OF FIND

Structure: Record the nearest turbine or met tower number. If no wind project facility is nearby indicate that the incident was found on site and the approximate location.

Distance from Structure: Record the approximate distance to the structure from where the incident was found. Pacing is a good means of estimating distance.

Direction from Structure: Record the general direction such as N (north), NE (northeast), E (east) etc. from the structure to where the incident was found. If the direction is unknown indicate in the Location Remarks (below) if the incident was on the road side or non-road side from the turbine.

Location Remarks: Include in this section any other information about the incident location that might be helpful such as found on the road, found on the turbine pad, found directly under guy wires, power lines overhead, etc.

SECTION 5 – DISPOSITION AND PERSONNEL CONTACT

Disposition of the Incident: For this study, incidences located by wind project personnel are to be collected. The disposition of the find in most cases will be that it is stored in the site freezer. In cases of injured birds (see procedure below) the disposition may be the wildlife rehabilitator or if an eagle or threatened or endangered species is found, the incident will be turned over to the USFWS.

Name of Field Personnel/Manager Notified: Record the name, date and time that the GWF Environmental Program Manager or the monitoring study Field Coordinator was notified about the find.

WILDLIFE INCIDENT REPORT FORM

SECTION 1 - DISCOVERY DATA

Date: _____ Time: _____

Name(s): _____

SECTION 2 - INCIDENT INFORMATION & OBSERVATIONAL DATA

Fatality / Injury Condition: Complete / Dismembered / Feathers

Field Notes and physical condition of the incident at time of discovery:

_____

_____

_____

Estimated Time Since Death or Injury (days): _____ (<1, <4, <7, <14, <30, >30)

SECTION 3 - WILDLIFE IDENTIFICATION

Species: _____ Field marks used:_____

_____

Photos: _____

SECTION 4 - LOCATION OF FIND

Structure: _____

Approximate Distance from Structure: _____

Approximate Direction from Structure: _____ (N, NE, E, SE, etc.)

Location **Remarks**:

_____

_____

_____

SECTION 5 - DISPOSITION AND PERSONNEL CONTACT

Disposition of the Incident: _____

Name of Field Personnel/Manager(s) notified: _____

Date and Time of Call: _____

INJURED WILDLIFE –
PROCEDURES FOR REPORTING AND CARE

The following procedures apply to injured birds:

Fill out a Wildlife Incident Report Form as for a fatality, but first, the primary objective is to provide immediate care for the injured animal. Capture the injured bird by placing a dark cloth or towel over the animal. By removing its ability to see, birds generally calm down and are more easily handled. Place the bird in a box that has a towel or other material for the animal to hide under or grasp on to.

While capturing the animal, assess the injury so you'll know what to report to the Program Manager or a Project Biologist or the wildlife rehabilitator – Frank and Lois Layton in Casper (see contact list below). As soon as possible after capture, contact the GWF Environmental Program Manager or the PacifiCorp Avian Protection Manager (see contact list) about the find and for further instruction.

Minimize additional stress to the animal by keeping it cool if it is a hot day or keeping it slightly warm if it is a cool day. Placing the box in a darkened room with closed doors may be helpful in minimizing stress while the appropriate arrangements are made for care.

If the injured bird is a Federally listed species, the GWF Environmental Program Manager or PacifiCorp Avian Protection Program Manager will notify the appropriate U.S. Fish and Wildlife representative (see contact list). If the injured animal is found after normal weekday office hours, leave a message (if possible) and report it again the next available working day.

If you can't reach the Program Manager or a project biologist, phone the Laramie Raptor Refuge and request further instruction (see contact list). The rehabilitation center is required to report any injured raptor to the USFWS within 24 hours. If the injured bird is an eagle or has been gun shot, it should also be reported to the Wyoming Game and Fish Department and U.S. Fish & Wildlife Service law enforcement. Describe the injury to the rehabilitation center and they will

determine if it should go directly to a veterinary clinic.

Deliver the animal to the specified location. If applicable, request that the veterinary clinic make arrangements to deliver the bird to the designated rehabilitation center following treatment. PacifiCorp will pay for all veterinary bills.

PROJECT PERSONNEL LISTING AND CONTACT INFORMATION

PacifiCorp Program Manager - TBA

Project Manager – Monitoring Studies

Greg Johnson, WEST, Inc., 2003 Central Avenue, Cheyenne, WY 82001

ph: 307-634-1756; email gjohnson@west-inc.com

PacifiCorp Avian Protection Manager - TBA

WEST Project Biologists - TBA

WEST Field Coordinator – Monitoring Studies

TBA

Wildlife Rehabilitation Center

Frank and Lois Layton

6520 W. Riverside Terrace

Casper, WY 82601

(307) 472-7009

Agencies

U.S. Fish and Wildlife Service

Dominic Domenici, Resident Agent in Charge
P.O. Box 113
Casper, WY 82602

Phone: 307-261-6365

Wyoming Game and Fish Department

3030 Energy Lane

Casper, WY 82604
Phone: 307-745-4046

Appendix B. Wildlife Monitoring Data Forms

CASUALTY SEARCH FORM **Glenrock Wind Energy Project**

DATE:_____ OBSERVER:_____

PLOT TYPE (circle one): turbine met tower PLOT NO.:_____

TIME BEGIN: _____ TIME END: _____

CASUALTIES FOUND:

SPECIES	SAMPLE NO.	HABITAT
_____	_____	_____
_____	_____	_____
_____	_____	_____

SEARCHER EFFICIENCY CARCASSES FOUND:

SPECIES	ID TAG	HABITAT
_____	_____	_____
_____	_____	_____

CASUALTY INFORMATION FORM - FIELD FORM **Glenrock Wind Energy Project**

DATE:_____ TIME: _____ OBSERVER:_____

FOUND DURING (check one): SCHEDULED CARCASS SEARCH_____INCIDENTAL FIND _____

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

PLOT TYPE (circle one): turbine met tower PLOT NO.:_____

LOCATION IF NOT ON PLOT _____

UTM COORDINATES (NAD 27) _____ _____

HABITAT: _____

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

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

DISTANCE & BEARING FROM NEAREST TOWER/POLE:

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

Comments:

ESTIMATED TIME SINCE DEATH/INJURY: _____

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

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

WEATHER NOTES:

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

Agency Contact

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

Contact Person(s):

Comments:

Disposition of Find _____

Transported to freezer _____ Date: _____ Time: _____

Release to USFWS: Person: _____ Date: _____ Time: _____

Comments:

Searcher Efficiency Trials: Carcass Placement Log **Glenrock Wind Energy Project**

General Information: Season_____ Month_____ Other_____

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

Weather notes for days that carcasses are placed:

Date_____ Time_____ Temp_____ Wind Dir._____ Wind Speed_____ Precip_____

Date_____ Time_____ Temp_____ Wind Dir._____ Wind Speed_____ Precip_____

Date_____ Time_____ Temp_____ Wind Dir._____ Wind Speed_____ Precip_____

Date_____ Time_____ Temp_____ Wind Dir._____ Wind Speed_____ Precip_____

Carcass Removal Trials Form **Glenrock Wind Energy Project**

General Information: Season_____ Month_____ Other_____

Information Regarding Carcass When Placed								Condition[1] of Carcass on Days Checked											Possible Scavenger	Notes
No.	Species /Age		Plot & Location	Expos.[2]	Placed By	Date	Time	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day		
1																				(1)
2																				(2)
3																				(3)
4																				(4)
5																				(5)
6																				(6)
7																				(7)
8																				(8)
9																				(9)
10																				(10)
						Checked by:														

[1] Condition: **I** = intact, no evidence of scavenging, **S** = evidence of scavenging, **FS** = feather spot, **0** = carcass not present or <10 feathers

[2] Exposure: **1** = exposed position, **2** = hidden, **3** = partially hidden

General Comments:

Notes about location of each carcass and other carcass specific comments:

(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)

Glenrock Pellet Count Form

Date: _____ Observer: _____

Turbine	Plot/Dir	Distance (m)	UTM	# pellet groups	
				pronghorn	sage grouse
1	1N	19			
	2N	44			
	3N	69			
	4S	14			
	5S	38			
	6S	64			
2	1N	19			
	2N	44			
	3N	69			
	4S	35			
	5S	60			
	6S	85			
3	1N	29			
	2N	54			
	3N	79			
	4S	23			
	5S	48			
	6S	73			
4	1N	34			
	2N	59			
	3N	84			
	4S	23			
	5S	48			
	6S	73			
5	1N	21			
	2N	46			
	3N	71			
	4S	29			
	5S	54			
	6S	79			
6	1N	17			
	2N	42			
	3N	67			
	4S	11			
	5S	36			
	6S	61			