HUGHES TRANSMISSION PROJECT

MACRO CORRIDOR STUDY

DRAFT

OCTOBER 2005

BASIN ELECTRIC POWER COOPERATIVE
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Section 1. Introduction

Basin Electric Power Cooperative (Basin Electric) is planning construction of a 230 kilovolt (kV) transmission line in Campbell and Sheridan counties in northeastern Wyoming, referred to as the Hughes Transmission Project. Basin Electric is seeking financial support from the Wyoming Infrastructure Authority (WIA) for the project.

In accordance with the U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS), Basin Electric has prepared a Macro Corridor Study to evaluate potential routes and alternatives for transmission lines. Although Basin Electric is not seeking financial assistance from RUS, they have complied with RUS Bulletin 1794A-603 identifying preliminary alternative corridors based on environmental, engineering, economic, land use and permitting constraints within a delineated study area.

Project Description

The project consists of approximately 130 miles of 230 kV transmission line that will connect the Hughes Substation east of Gillette to the Carr Draw Substation west of Gillette and a proposed substation north of Sheridan. The project study area encompasses 2,468 square miles and is shown on **Figure 1-1 Project Study Area**. The project is planned to be operational by the end of 2008 pending permitting activities.

The project will include substation modifications within the boundaries of the existing Hughes and Carr Draw substations, and a new substation is planned to be constructed northeast of Sheridan. The Hughes Substation is owned by Powder River Energy Corporation (PRECorp), and the Carr Draw Substation is jointly owned by PRECorp, Basin Electric and PacifiCorp.

The new transmission line will be constructed with 2-pole wood H-frame structures on the tangent or straight line sections. The structure poles will be spaced approximately 20 feet apart and are typically between 60 and 90 feet in height. The wood crossarm is approximately 40 feet end to end. Where the line changes direction, special three-pole structures will be used. The typical physical design characteristics for the alternative structure types are described in **Table 1-1 Transmission Line Characteristics**.

Basin Electric Power Cooperative

Basin Electric, established in 1961 and headquartered in Bismarck, North Dakota, is one of the largest electric generation and transmission cooperatives in the United States. Basin Electric owns and maintains 2,424 miles of high-voltage transmission lines and 40 switchyards and substations and employs approximately 1,800 staff.

Table 1-1 Transmission Line Characteristics (Approximate Figures)

Description of Design Component	Wood/Steel H-frame Structures
Voltage (kV)	230 kV
Right-of-Way Width (feet)	125
Average Span (feet)	800
Average Height of Structures (feet)	60-90
Average No. of Structures (per mile)	6-7
Minimum Ground Clearance Beneath Conductor (feet)	23
Maximum Height of Machinery that can be Operated Safely Under Line (feet)	14
Circuit Configuration	Horizontal

Basin Electric's core business is wholesale generation and transmission of electricity, on a not-for-profit basis, to their 121 member cooperatives in nine states. The service territory spans 430,000 square miles in the central United States from the Canadian border to Mexico, including parts of North Dakota, South Dakota, Wyoming, Colorado, Minnesota, Iowa, Nebraska, Montana and New Mexico. Basin Electric's member cooperatives distribute electricity from baseload power plants and other facilities to about 1.8 million consumers. **Figure 1-2 Basin Electric Service Territory** illustrates Basin Electric's service territory.

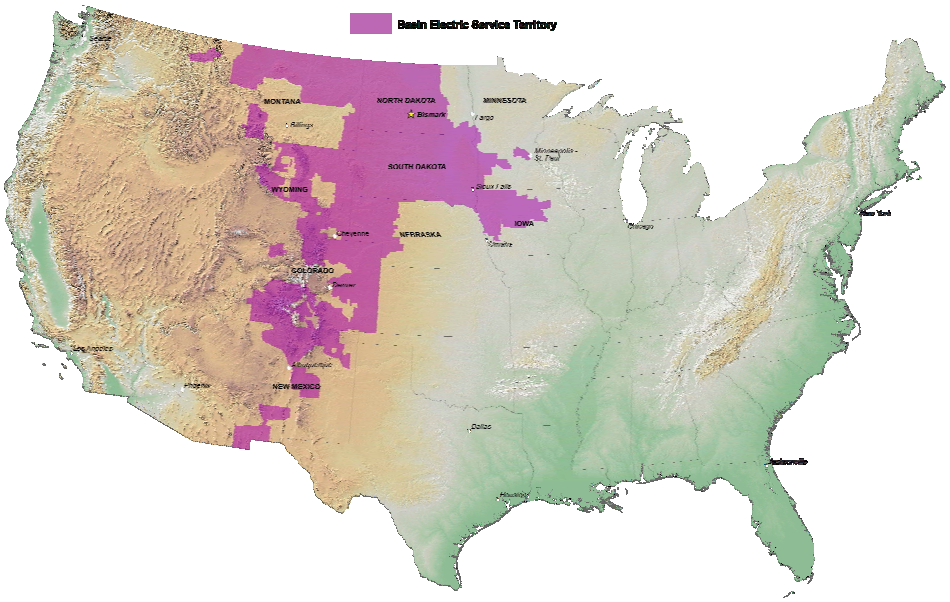

Figure 1-2 Basin Electric Service Territory

Figure 1-1 Project Study Area

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Required Permits/Approvals

Several jurisdictions are involved with the required permits and necessary approvals for the project including compliance with the National Environmental Policy Act (NEPA). Based on a preliminary assessment of the project, **Table 1-2 Project Compliance** identifies the permits or approvals that may be required.

Section 1 W.S. 35-12-119 (c)(i) of the Wyoming Statutes states that electric transmission lines not exceeding five-hundred thousand (500,000) volts are exempt from the requirements of the Wyoming Industrial Development and Siting Act (Title 35: Chapter 12). The transmission line proposed for this project is 230,000 volts (230kV). In addition, an "Industrial Facility" or "Facility" as defined in Section 1 W.S. 35-12-102(a)(vii) is a business having a final construction cost of $143.1 million dollars, not including exempt activities. The proposed substation associated with the project does not meet or exceed this monetary requirement to be defined as an "Industrial Facility" or "Facility." Based on these statues, a permit is not required for this project from the Wyoming Industrial Siting Division of the Wyoming Department of Environmental Quality (WDEQ).

Table 1-2 Project Compliance

Jurisdiction	Permit/Decision/Action
Federal	
U.S. Department of Agriculture – Rural Utilities Service	7 CFR 1794 and NEPA
Federal Aviation Administration	Title 14 Code of Federal Regulations, Part 77, Objects Affecting Navigable Airspace
U.S. Army Corp of Engineers	Section 404/Nationwide Permit 12
U.S. Fish and Wildlife Service	Section 7 Consultation
Wyoming	
Wyoming Department of Environmental Quality	NPDES Temporary Construction Permit Large Construction General Stormwater Permit (WYR10-0000) and Stormwater Pollution Prevention Plan (SWPPP) Section 401 Water Quality Certification
Wyoming Department of Transportation	Access Permit
Wyoming State Historic Preservation Office	Determination of Compliance with National Historic Preservation Act (NHPA) Section 106

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Section 2. Purpose and Need

Electrical energy has made a vast improvement in the quality of life in rural areas. An insufficient supply of electrical energy to rural consumers would require them to use on-site, small scale electrical generators and residential scale electric power generators, to meet their energy demand.

Project Purpose

The purpose of this project is:

- to meet increased demand for electric power in northeastern Wyoming and western South Dakota; and
- to improve regional power grid stability.

Completion of this project will enable PRECorp to serve the additional power requirements of new rural housing and commercial development and production of coal bed methane (CBM) resources as well as other load growth in the region. PRECorp is a member cooperative of Basin Electric. Completion of the project will also enhance the regional transmission system as depicted on **Figure 2-1 Transmission in Northeastern Wyoming**, which will benefit cooperatives in western South Dakota.

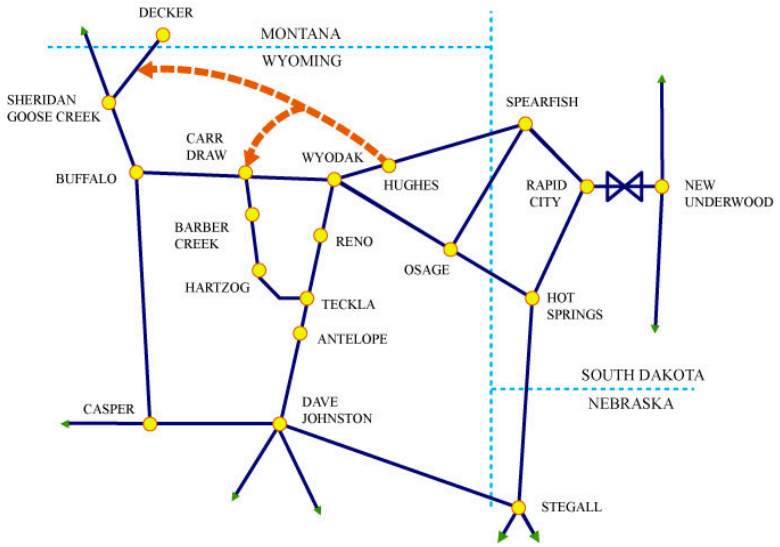

Figure 2-1 Transmission in Northeastern Wyoming

Project Need

The need for this project is to meet increasing demand for electricity and to maintain the reliability of the electrical delivery system in northeastern Wyoming and western South Dakota. In addition, the proposed project is needed:

- to maintain adequate voltage levels;
- to improve Basin Electric member system reliability and continuity of service in the region; and
- to reinforce the existing transmission system.

This project best addresses and meets the needs of Basin Electric member systems and their customers while minimizing adverse impacts to the environment. Existing land use and land owner concerns are being considered and a transmission line route will be selected that addresses these concerns, minimizes impacts, meets the project purpose and need and complies with all regulatory requirements.

Load Growth

The transmission system requirements are based on existing and projected Basin Electric member systems' performance needs. A substantial portion of the load growth in northeastern Wyoming is associated with energy sales to commercial and residential customers. The power required by commercial customers is growing, particularly for coal production facilities and developers of CBM production wells. Growth is also being experienced in the residential sector. The latest load forecast projects an increase of 2,138,000 megawatt hours in annual requirements from 2003 through 2019, an average annual increase of 4.7 percent. In the short term, an average annual increase of 11.1 percent is projected for the years 2003 to 2008. **Figure 2-2 Cooperative Annual Peak Load** identifies the existing load and projected load growth for Basin Electric cooperatives. Significant load growth is also being realized in Black Hills Corporation's service territory in northeastern Wyoming and western South Dakota. To maintain the reliability of the Basin Electric member system and to accommodate projected load growth, additional transmission support in the region is essential.

Coal & Coal Bed Methane Production

Coal production in the Powder River Basin of northeastern Wyoming is also projected to increase with as much as 175 million tons of sub-bituminous coal through 2019 requiring additional electric power. In addition, over 30,000 CBM wells are expected in the Powder River Basin in the next 10 years. The Bureau of Land Management is considering 51,000 CBM wells including those currently drilled. CBM development started in eastern and central Campbell County and is progressing westward as illustrated on **Figure 2-3 Coal Bed Methane Production**. The increase in CBM well development will spur an increase in population growth, creating additional demands for power.

Figure 2-3 Coal Bed Methane Production

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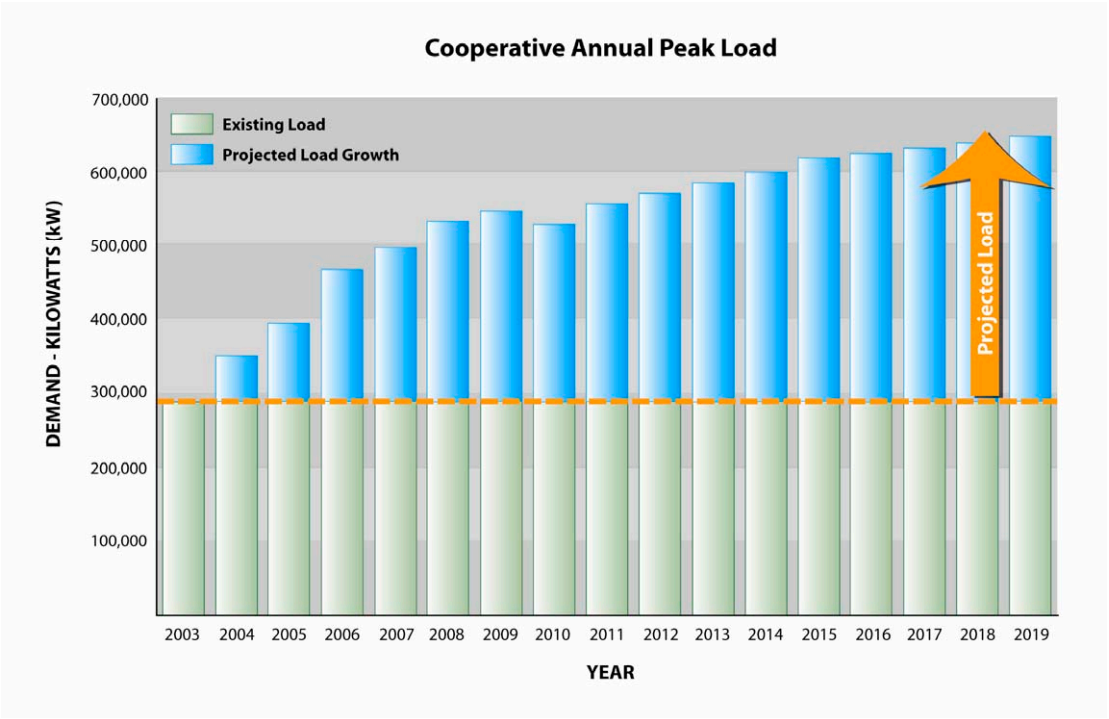

Figure 2-2 Cooperative Annual Peak Load

Performance Needs

Performance needs include not only accommodation of future growth, but also enhancement of overall system reliability in northeastern Wyoming and western South Dakota. PRECorp has built a 69 kV system to deliver power to its distribution substations. This 69 kV system is not, however, adequate to serve the projected load to the area west of Gillette. PRECorp is already hard-pressed to maintain voltage in the western edge of the existing 69 kV systems. As a result, a 230 kV source is needed in this western region of the Basin Electric member system.

Generation

The Hughes Transmission Project will provide a transmission interconnection to the Basin Electric grid for the concurrently proposed Northeastern Wyoming Generation Project now referred to as Dry Fork Station. The Dry Fork Station consists of building a new base load coal-fired power plant with a maximum net rating of 385 megawatt (422 maximum gross) in northeast Wyoming within the Powder River Basin. The proposed site that best meets the electric system requirements is within approximately 10 miles of Gillette, Wyoming. Power plant construction is scheduled to begin in 2007 and be operational in 2011, pending the result of the permitting activities.

The Dry Fork Station is a separate project from the Hughes Transmission Project. The power plant will need to be connected to the transmission grid when it becomes

operational in 2011 and the intent is to tap the proposed 230kV line that is planned to be in service by 2008. Based on system studies in this region, the Hughes Transmission Project is necessary to meet current and forecasted demand, and will be constructed prior to and whether or not the Dry Fork Station is constructed.

Section 3. Macro Corridor Study

The Macro Corridor Study as required by RUS has been completed to identify potential transmission line corridors for the proposed interconnection between the following delivery points:

- Hughes Substation,
- Carr Draw Substation; and
- Proposed Substation north of Sheridan.

The purpose of this Macro Corridor Study was to identify potential transmission line corridors that utilize linear features such as existing utility rights-of-way while avoiding sensitive areas. The Macro Corridor Study consisted of an opportunity and constraints analysis and a field reconnaissance to identify preliminary alternative transmission line corridors.

Siting Process Methodology

Siting a transmission line requires a comprehensive approach that identifies and integrates environmental, economic, engineering, land use, system planning and social criteria. A preferred transmission line route will be chosen from a number of alternatives. A preferred route will be selected after assessing each alternative based on a series of project-specific siting criteria. These criteria typically include the following:

- Length of transmission line
- Right-of-way requirements and availability
- Land use considerations such as visual impacts, proximity to residences, and impact on agricultural activities as well as existing and future land use
- Environmental resource considerations such as impacts on cultural or biological resources such as wildlife, plants and wetlands
- Jurisdiction and regulatory considerations
- Conflicts with airport height restrictions
- Cost

In addition to these criteria, public and stakeholder involvement is viewed as critical to a successful project built in a timely and efficient manner with minimal impacts to the community and environment. **Figure 3-1 Siting Wheel** below illustrates the various sources of input considered during this siting process. Each of these sources of input is discussed below.

Environmental

The environmental impacts of new electric facilities are assessed in great detail as part of the siting process. This involves collecting resource data for the project study area and identifying the characteristics of the biological, physical and human environment; identifying environmental opportunities and constraints; and assessing the relative environmental impact of different alternatives.

Economics

Basin Electric has an obligation to its shareholders and customers to operate in a financially responsible way. Because the need for new infrastructure was identified, the relative cost of alternatives is an important consideration. Basin Electric works hard to keep the cost of the electricity it provides to its member systems as low as possible. As with all products and services, however, there is a constant upward pressure on costs, due to the rising cost of fuel and transportation as well as the cost of interest on borrowed money. In addition to initial capital costs, the ongoing operational and maintenance costs are assessed. The likelihood of additional infrastructure being required in the future is also assessed for each alternative. An alternative with less expensive construction costs that may require additional infrastructure in several years time or has significant ongoing operational costs may not be the most economical solution.

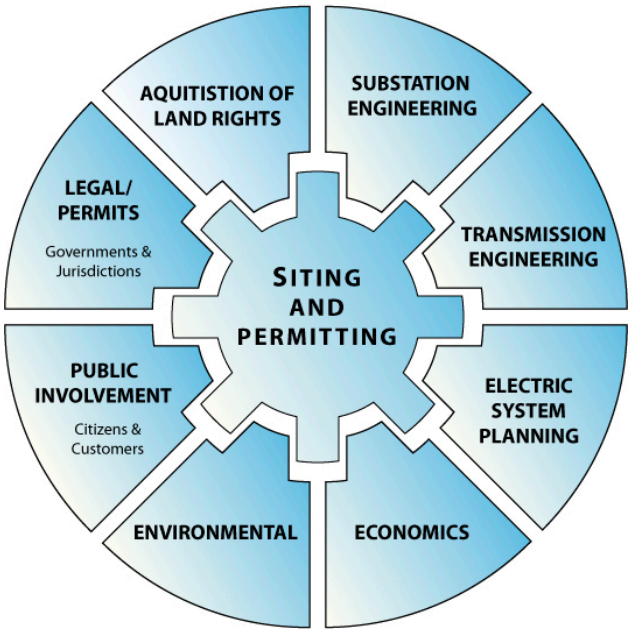

Figure 3-1 Siting Wheel

Transmission and Substation Engineering

Basin Electric's transmission and substation engineers are responsible for the design of new facilities and the project requirements and objectives. This includes the project purpose and need, cost, schedule and conforming to standards such as the RUS and National Electrical Safety Code (NESC). The engineering input is vital to ensure that construction and operation of a given alternative is reliable, safe and able to be maintained effectively. Engineering input is also important with respect to the approach to construction and maintenance in minimizing environmental impacts.

Electric System Planning

Basin Electric's system planners are responsible for continually evaluating the performance of the electric system and identifying the need for new capacity. Addressing a need for greater capacity or a second source of power for reliability invariably involves new infrastructure. Electric system planning for this project includes consideration of reliability, potential impacts to other system components, how the system is protected and maintaining continuity of service under potential outage conditions.

Legal and Permitting

Permitting aspects are important to address necessary jurisdictions and departments requiring construction permit approvals, and time lines to keep the project on schedule and to meet the in-service date. Construction permits will be required from local and state governments for the construction of new electric infrastructure.

Acquisition of Land Rights

Siting of a new transmission line requires that necessary land rights be obtained for the project facilities including access, construction, operation and maintenance. These land rights are generally fee ownership of substation sites and easements for transmission lines where the fee ownership remains with the landowners. The potential impact of a right-of-way on land uses can influence the location of new facilities. Opportunities for locating new facilities within or adjacent to existing rights-of-way are being investigated to minimize impacts. The costs of obtaining new rights-of-way contribute to the economic input of the siting process.

Public Involvement

Public involvement is perhaps the most important input in the siting process. Basin Electric identified the values, concerns and interests of the community. The value of public involvement is for interested parties to understand the project and accept the process that is undertaken to identify alternatives, assess impacts and consider the other sources of input into the siting process in selecting a preferred location for the proposed facilities. Obtaining public input early in the siting process has proven to be an effective

means of sharing important information, minimizing impacts to landowners and land use, and receiving necessary project approvals.

Approach to Siting Study Process

The approach to the siting study process includes data collection, contacting various agencies, the general public and stakeholders as well as revision and refinements based on the comments, input and shared information received.

The first step in the corridor identification process involved identifying the extent of the study area in which the proposed project would be located. The location and extent of the project study area was determined by the need for the project and the electric system alternative and components that are required to best meet that need. The electric system alternative selected determines the general orientation of the project study area. Another factor shaping the extent of the project study area is land use and surface ownership (i.e., special districts, jurisdiction, urban areas, unincorporated communities, intense agriculture, airports, recreation and land management areas, etc.).

Data Acquisition

After the project study area was identified, resource information within this area was collected from relevant management agencies and state and local governments. A site reconnaissance was also conducted via driving, by fixed-wing aircraft and by helicopter to identify visible route opportunities that avoid land use conflicts.

Resource data was obtained from municipalities, counties, state agencies and utilities to prepare GIS resource maps to illustrate land use, surface ownership, transportation and utility corridors, geology, water resources, cultural resources and wildlife habitat. In addition, engineering criteria was identified and incorporated into the data collection process. All data obtained reflects existing conditions, and no new field data was collected to evaluate the existing conditions associated with the project study area.

Opportunities and Constraints Analysis

The resource data was combined with aerial photography to enable the analysis of opportunity and constraints within the project study area. Suitable areas for routing the new 230kV transmission line were identified by assessing the environmental and physical resources within the project study area. Criteria were also assessed based on how they could be impacted by construction and operation of the project within each resource. Opportunities and constraints are non-weighted attributes. The degree of opportunity and constraint is based on the character of the resource (i.e., linear or site specific, natural or human, native or disturbed) and the proximity of the transmission line to the resource. The criteria for opportunity or constraint classification included opportunity, avoidance and exclusion areas associated with each resource. A list of preliminary routing criteria was established and an Opportunity and Constraints Analysis

map prepared for siting the proposed transmission line based on the resource data collected. **Table 3-1 Project Opportunity and Constraint Criteria** lists the opportunity and constraint criteria.

Existing linear facilities and rights-of-way provide suitable access for project construction and maintenance and are compatible to the project's land use. Opportunities for this project include linear facilities and rights-of-way associated with existing:

- transmission lines;
- natural gas pipelines;
- railroads; and
- roads.

In general, locating a transmission line in these areas tends to result in less environmental impacts because of existing disturbances, access and unnatural linear features.

Opportunities for substation siting are largely determined by the locations of the load center, proximity of existing distribution feeders and available rights-of-way for new feeders. Other considerations include existing and future land uses, zoning, geologic hazards (i.e., slope, subsidence), floodplains, wetlands, riparian areas, critical wildlife habitat and cost.

Avoidance areas included sensitive areas that were likely to incur environmental impacts or result in land use conflicts if directly affected by the project. It is preferable to avoid these areas if opportunity areas are available for locating the transmission line. Avoidance also applied to areas where potential impacts from the project could have resulted in seasonal construction restrictions (i.e., to avoid sensitive wildlife nesting and breeding periods). If avoidance was not possible, minimization of impacts was accomplished to the degree feasible through route refinement, careful placement of the transmission structures and access, and/or other mitigation measures.

Exclusion areas include areas with the highest level of sensitivity, including those areas with regulatory or legislative designations, or extreme physical constraints not compatible with transmission line construction and/or operation. In general, locating a transmission line in these areas would result in increased environmental impacts, higher costs and additional regulatory approvals.

Table 3-1 Project Opportunity and Constraint Criteria

Resource	Opportunity Area	Avoidance Area	Exclusion Area
Land Use and Ownership			
Land Use	Rangeland or agriculture	NA	Residential areas and subdivisions
Airports	NA	NA	Within 10,000 feet of a public airport and 5,000 feet of a private airport
Recreation and Land Mgmt Areas	NA		Within boundary of Wilderness Study Area
Existing Transportation and Utility Corridors			
Roads (interstate, state, county)	Within 1.5 miles	NA	NA
Railroads	Within 1.5 miles	NA	NA
Transmission Lines	230kV (within 0.25-2 miles); 69kV (within 0 - ½ mile)	NA	NA
Geology and Soils			
Slope	Slope <10%	Steep slopes 10-15%	Slope >15%
Soils	NA	Within soil types characterized as highly erodible	NA
Water Resources			
Surface Water	NA	Within 1/8 mile of lakes and perennial streams	NA
Wetlands	NA	No Data Available at this Time – will be based on pre-construction surveys	NA
Floodplains	NA	No Data Available at this Time – will be based on pre-construction surveys	NA
Cultural Resources			
National Registered Historic Places, Landmarks and Monuments	NA	Within area	NA
Wildlife Habitat			
Game Species Habitat	NA	NA	Within crucial winter habitat
Threatened and Endangered Species (TES)	NA	NA	NA

Opportunity and Constraint Areas by Resource

This section of the Macro Corridor Study describes the opportunities and constraints of each resource evaluated.

Land Use and Ownership

Land Use/Land Cover

Land use/land cover data was obtained from the USGS, National Land Cover Dataset (1992), the Natural Resource Conservation Service (NRCS), and State Soil Geographic data (STATSGO) (1996). Darrell Schroeder of the NRCS was also consulted via email. Land cover describes land uses in general rather than in specific delineations. For instance, the term *developed* is used to describe residential and commercial uses. **Figure 3-2 Land Use/Land Cover** shows the distribution of land cover in the project study area.

Shrubland/grassland covers a significant portion of the project study area. Agricultural land use and deciduous forest is also present though sporadic. No intensive agricultural land use, however, or pivot irrigation fields occur within the project study area. Residential areas and subdivisions are primarily associated with Gillette, near the southeastern border of the project study area, and Sheridan, near the northwestern border.

Airports

The Federal Aviation Administration regulates the proximity of tall structures to approach and departure zones associated with airport runways. Therefore, areas within 10,000 feet of a public airport and 5,000 feet of a private airport were excluded from potential locations for the Project for the purpose of maintaining ample clearance for aircraft.

Airports were located in July 2004 using the 5010Web: Airport Summary and Activity Data website (http://www.gcr1.com/5010web/). Two public and three private airports exist within the project study area. The Gillette-Campbell County Airport, the Madsen Airport and the Campbell County Memorial Hospital helipad are located near Gillette. The Sheridan County Airport and the Symons Airport are located near Sheridan (see **Figure 3-3 Public and Private Airports**).

Recreation and Land Management Areas

In July 2004, data concerning recreation and land management areas was gathered from the Wyoming Geographic Information Science Center website, http://www.wygisc.uwyo.edu/clearinghouse/ and the Bureau of Land Management website, http://www.wy.blm.gov/gis/datagis.html.

The Fortification Creek Wilderness Study Area, which was excluded from potential locations for siting the transmission line, straddles the Johnson-Campbell county line between Powder River and Wild Horse Creek (see **Figure 3-4 Recreation and Land Management Areas** map). No other significant recreation and land management areas exist within the project study area.

Existing Transportation and Utility Corridors

Roads

Road data was obtained from the Bureau of Transportation Statistics (BTS), National Transportation Atlas Data (2003). In July 2004, Campbell County road data was obtained from Cathy Raney, Campbell County GIS program coordinator, and Johnson County road data was obtained from Rande Money, Johnson County GIS/IT.

There are three opportunities for locating the project within 1.5 miles of an interstate, state highway, or county road and these opportunities are listed below.

- Interstate 90 travels in an east-west orientation through the southeastern portion of the project study area near Gillette, and it also crosses the western edge of the project study area near Sheridan.
- U.S. Highway 14 travels through the project study area connecting Gillette and Sheridan.
- State Highway 59 links to U.S. Highway 14 north of Gillette and continues traveling north, northeast until it exits the project study area near the Thunder Basin National Grasslands.

It should also be noted that U.S. Highway 87 enters the project study area near Interstate 90 and Sheridan, but its distance within the project study area is insufficient to be considered an opportunity.

Railroads

The BTS National Transportation Atlas Data (2003) was used to identify railroads in the project study area. Burlington Northern, which traverses the project study area from southeast to northwest, provides the main opportunity for locating the project within 1.5 miles of a railroad. About seven miles northeast of Sheridan, the Burlington Northern Railroad splits and one branch travels to Sheridan while the other heads north. A railroad spur approximately 15 miles long branches off the Burlington Northern Railroad about nine miles east of Gillette and heads northwest.

Figure 3-2 Land Use/Land Cover

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Figure 3-3 Public and Private Airports

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Figure 3-4 Recreation and Land Management Areas

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Transmission Lines

Transmission lines were identified and mapped using service territory CAD data obtained from Todd Seeley of PRECorp in July 2004 and DOQQs from 2002.

Locating the project within 0.25 to 2 miles of existing 230kV transmission lines and within 0 to ½ mile of existing 69kV transmission lines provides an opportunity due to the compatible land use, potentially existing access for construction, operation and maintenance, and minimized cumulative impacts. The higher voltage of existing 230kV transmission lines compared to existing 69kV transmission lines requires a greater degree of separation for purposes of reliability. These are general guidelines only, and specific assessment should be conducted to determine if the reliability of the electric system would be jeopardized by placing transmission lines in proximity where both could be taken out of service by an accident or inclement weather.

There are a few opportunities for locating the project near existing transmission lines in the project study area. Existing transmission in the project study area includes the Hughes to Adon 69kV, the Hughes to Kitty 69kV, the Wyodak to Recluse 69kV, a 69kV segment from Wyodak, the Hughes to Carr Draw 230kV and Buffalo to Sheridan 69/230kV transmission lines.

Geology and Soils

Slope

Slope was identified and mapped using the USGS National Elevation Dataset 10 meter Data and the spatial analyst extension in ArcGIS 9.0.

Slope is classified as an opportunity or constraint depending on its degree and orientation. Opportunities associated with slope exist where landforms provide visual screening of the transmission line. In contrast, steep terrain is avoided or excluded from siting since constructing a transmission line and access roads upon extreme slope could require complex engineering and may result in potential environmental impacts.

Slope in the project study area ranges from 0 to 15+ percent. The project study area is generally hilly with steep slopes throughout. U.S. Highway 14 generally follows the mildest terrain in the project study area from Gillette to Clearmont and Buffalo Creek road from Clearmont to the Wyarno area (see **Figure 3-5 Slope**).

Soils

Soil data was obtained from STATSGO data (1996).

Wind Erosion Potential of Soils

Areas where soil is highly susceptible to wind erosion were avoided. Susceptibility was partly determined by soil texture, soil moisture, and soil cover. The soils susceptible to

wind erosion found in the project study area include hiland - vonalee – maysdorf, draknab - arvada – bidman, riverwash - haverdad – clarkelen, and haverdad - havre – zigweit.

Soils that are severely susceptible to wind erosion occur primarily along waterways, such as the Powder River and Clear Creek within the project study area (see **Figure 3-6 Wind Erosion Potential of Soils**). Soils that are severely susceptible to wind erosion are also mapped beneath the Hughes Substation, as well as along U.S. Highway 14, Wildcat Creek, and Little Powder River, in the eastern portion of the project study area. In addition, soils that are severely susceptible to wind erosion occur along the western border of the project study area and a few miles east of the western border. Soils that are moderately susceptible to wind erosion cover the rest of the project study area, with the exception of an area in the southwest, which contains soils that are slightly susceptible to wind erosion.

Water Erosion Potential of Soils

Areas where soil is highly susceptible to water erosion were avoided. Susceptibility was partly determined by soil type, surface cover, and slope. The soils susceptible to water erosion found in the project study area include haverdad - havre – zigweid, baux - bauxson – harlan, shingle - renohill – forkwood, shingle - taluce – kishona, renohill - bidman – ulm, kishona - shingle – theedle, hiland - vonalee – maysdorf, bidman - parmleed – renohill, and shingle - cushman – taluce.

Soils that are severely susceptible to water erosion cover most of the project study area, and cannot be avoided (see **Figure 3-7 Water Erosion Potential of Soils**). Soils that are moderately susceptible to water erosion are mapped beneath the Hughes Substation and along U.S. Highway 14 in the same areas as soils that are severely susceptible to wind erosion. In addition, soils that are moderately susceptible to water erosion occur in small area in the middle of the project study area, as well as a couple sections near the western border. Soils that are slightly susceptible to water erosion occur along Powder River, Crazy Woman Creek, Clear Creek, and Piney Creek in the middle of the project study area, and along portions of Wildcat Creek and Little Powder River in the east.

Water Resources

Surface Water

Wyoming Gap Analysis, Hydrography for Wyoming (1994) was used to identify and map surface water.

Areas within 1/8 mile of lakes and perennial streams were avoided to prevent construction-related disturbance, such as erosion, sedimentation and potential water quality impacts. Transmission line structures often can be located so that they span various water bodies.

Figure 3-5 Slope

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Figure 3-6 Wind Erosion Potential of Soils

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Figure 3-7 Water Erosion Potential of Soils

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The project study area contains two lakes and ten perennial streams (see **Figure 3-8 Surface Water**). Ditto Lake and Garner Lake are both located in the southeast portion of the project study area. Ditto Lake sits between Gillette and Wyodak, and Garner Lake is about six miles north. The perennial streams include:

- Donkey Creek, which flows along Interstate 90 in the southeastern portion of the project study area, near Gillette.
- Powder River, which is generally oriented north-south and splits the project study area in half.
- Crazy Woman Creek, which joins Powder River about 2 miles north of the southern boundary of the project study area.
- Clear Creek, which is located west of Powder River and transects the project study area with a southwest to northeast orientation.
- Piney Creek, which enters Clear Creek at the junction of U.S. Highways 14 and 16.
- Tongue River, which flows through the northwestern corner of the project study area.
- Goose Creek, which joins the Tongue River near Acme.
- Little Goose Creek, which flows along the western edge of the project study area until it meets Goose Creek near Sheridan.
- Big Goose Creek, which flows into the project study area from the west and also joins Goose Creek near Sheridan.
- Soldier Creek, which is located north of Big Goose Creek and also joins Goose Creek near Sheridan.

Wetlands

Digital wetland data does not exist for the entire project study area. Once an alignment and alternatives are chosen, hardcopy National Wetlands Inventory (NWI) maps and aerial photography can be analyzed to determine if wetland areas will need to be spanned.

At this time, the locations of wetlands in the project study area have not been incorporated into the opportunities and constraints analysis due to a lack of digital wetland data. Wetlands surveys will be conducted prior to construction. Generally, wetlands can be avoided through careful pole placement and spanning the transmission line across wetland areas. The maximum distance that can be spanned is approximately 1,100 feet.

Floodplains

Digital floodplain data does not exist for the project study area. Once an alignment and alternatives are chosen, hardcopy Federal Emergency Management Agency (FEMA) floodplain maps can be analyzed to determine if floodplains will be impacted.

At this time, the extent of floodplains in the project study area has not been incorporated into the opportunities and constraints analysis due to a lack of digital floodplain data. Floodplain surveys will be conducted prior to construction. The 100-year floodplain delineation is typically used to define floodplain hazard areas. Local and state governments, as well as FEMA, strongly discourage floodplain development. Floodplains generally can be avoided through careful pole placement and spanning the transmission line across floodplain areas.

Cultural Resources

Historic Resources

In July 2004, data pertaining to historic resources was obtained from the National Park Service, the National Register of Historic Places (2003) and the Wyoming Geographic Information Science Center, http://www.wygisc.uwyo.edu/clearinghouse/.

Areas designated as historic national resources, including those structures or places listed on the National Register of Historic Places, were avoided. The project study area contains nine historic national resources. The CKW Bridge over Powder River is located on U.S. Highway 14 north of Arvada near the center of the project study area. The EAU Arvada Bridge is located on the Burlington Northern Railroad near Arvada. The Clearmont Jail is in Clearmont near the center of the project study area. Fort Phil Kearney crosses the southwestern boundary of the project study area near Interstate 90. The Sheridan Flouring Mills, Inc., Mount View, the Sheridan County Courthouse, the Sheridan Inn and Fort MacKenzie are all located around Sheridan (see **Figure 3-9 Historic Resources**).

Wildlife Habitat

Game Species Habitat

The Wyoming Game and Fish Department (WGFD) was consulted in July 2004 to determine big game habitat and sage grouse lek locations. Crucial game habitat within the project study area includes crucial winter habitat for elk and 55 lek locations for the Wyoming greater sage grouse, a state species of special concern (see **Figure 3-10 Important Habitat Areas**). Leks act as the primary breeding grounds for the sage grouse and are therefore considered crucial habitat according to WGFD. Crucial habitat is the area that a species requires to maintain itself at a certain level over the long term. Winter habitat refers to the area that experiences a significant influx of additional animals between December 1 and April 30. If the project cannot avoid crucial winter habitat, construction within this habitat will be scheduled between May 1 and November 30 to avoid impacting this resource.

Figure 3-8 Surface Water

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Figure 3-9 Historic Resources

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Figure 3-10 Important Habitat Areas

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Threatened, Endangered and Special Status Species

In the summer of 2004, the location of rare plants and animals was identified and mapped using the Wyoming Natural Diversity Database and the WGFD Wildlife Observation System Data.

Areas with identified locations of threatened, endangered and candidate species were excluded from consideration for siting the project. Federally threatened species are those species, subspecies, or varieties likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federally endangered species are those species, subspecies, or varieties already in danger of extinction throughout all or a significant portion of their range. Federally threatened and endangered species are listed in the Federal Register. Federal Candidate species, subspecies, or varieties are those species being considered for listing as endangered or threatened, but for which a proposed regulation has not yet been published in the Federal Register.

Threatened and endangered wildlife species within Campbell and Sheridan counties include the bald eagle, threatened, and the black-footed ferret, endangered. Sheridan County is also home to the Canada lynx, threatened. Known locations of these species are not mapped as Wyoming does not keep track of this data. The black-tailed prairie dog, a candidate species, also inhabits Campbell County; however, known habitat locations are, as of yet, undetermined.

Opportunities and Constraints Summary

Numerous opportunities of varying degree provide flexibility for locating the project despite the occurrence of avoidance and exclusion areas. Areas of high opportunity identified include county roads and highways, the Burlington Northern Railroad and existing transmission lines (see **Figure 1-1 Project Study Area**). Other areas of lesser opportunity occur throughout the project study area, which is predominantly covered by shrubland/grassland.

Avoidance areas included historic places/regions, areas coinciding with land highly susceptible to erosion and steep slopes, and areas adjacent to lakes and streams. Urban areas and airports associated with the cities of Gillette and Sheridan and areas of slope greater than 10 percent were excluded, as were the elk crucial winter habitat and the Fortification Creek Wilderness Study Area in the south-central portion of the project study area. **Figure 3-11 Opportunities and Constraints Analysis** illustrates those areas identified as opportunities, avoidance and exclusions based on the siting criteria.

Preliminary Alternative Corridors

Potential alternatives were analyzed for their technical, economic and environmental feasibility. The intent of the Macro Corridor Study process was to identify preliminary routes within three-mile wide corridors to meet the project objectives. Identification of the

alternative corridors involves a comprehensive process including review of resource data, identifying siting opportunities and constraints, public and agency consultation, analysis of public input, and then refinement of alternative corridors. The siting opportunities and constraints analysis map was used to identify preliminary alternative corridors. This process resulted in the identification of several preliminary alternative corridors as indicated on **Figure 3-12 Preliminary Alternative Corridors.**

This information was presented to the general public and agency personnel at an initial series of public workshops. Comments from the general public and the agency representatives were collected and analyzed for consideration in revising and refining alternative corridors to assist with selection of a preferred corridor.

Additional Analysis of Alternatives

To determine a suitable route for the proposed project, additional analysis is still required. Based on the comments received from the public meetings, revisions will be made to the preliminary corridors and routes identified within the corridors. Some of the alternative corridors will be dropped from consideration due to the presence of sensitive land uses or other input from stakeholders and/or the public. Basin Electric is also remaining flexible to discuss and negotiate alternative alignments with landowners.

The feedback received from the stakeholder and public meetings was just one input to the siting process and is still ongoing. Many other factors are being considered, such as legal/permitting issues, engineering, environmental impacts, electric system planning and economics. The selection of the preferred corridor will represent the optimum balance of these factors and interests and ensures that project objectives will be met. The project objectives for siting require that the alternatives:

- are reliable and do not interfere with or strain the existing electric systems;
- meet the current and forecast system demand;
- minimize environmental impacts; and
- are cost effective.

The preferred corridor will balance the need for reliable electric service, potential environmental impacts, public acceptance, engineering, economics, regulatory requirements and the acquisition of land rights. Input from a broad cross section of individuals and groups is helping to determine that the alternative meets Basin Electric's current and forecast demand for electricity. The preferred corridor will be the result of

Figure 3-11 Opportunities and Constraints Analysis

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Figure 3-12 Preliminary Alternative Corridors

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additional detailed siting studies and further consultation with the public, landowners and authorities.

Route Refinement and Quantification of Impacts

The route refinement process will involve assessing the environmental consequences that are expected as a result of implementation of the project. In addition to the resource impacts, route alternatives within the preferred corridor will be analyzed on a segment-by-segment basis using routing criteria developed through the public/agency consultation process. A second field reconnaissance will be conducted at this stage, on the ground and by helicopter, in order to identify route specific circumstances and assist in route refinement based on input received from the public.

For each of these criteria, segment impacts will be quantified to allow for easy comparison. Impacts associated with each of the route alternatives will then be quantified by using the results from the segment-by-segment comparative analysis. Each route alternative will be ranked within each criterion. Based on the quantified impacts for each criterion, a rank will be assigned to each route alternative with 1 representing the least impact and a higher number (depending on the number of alternatives considered) representing the most impact. This rank order will reflect the relative impact that a given route alternative has on resources compared to the impacts of the other alternatives. The total gives a relative indication of the overall impact each route alternative would have to the surrounding environment.

The preferred corridor and route alternatives will then be presented in a second series of public meetings to the affected landowners. Based on the comments received from these meetings, final refinements to the routes will be made and a preferred and alternative route selected.

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Section 4. Public Involvement Program

Basin Electric believes effective communication with the public, agencies and jurisdictions is fundamental to planning the location and construction of the new transmission lines. Basin Electric representatives are committed to gathering and considering the input of affected stakeholders before determining where to locate these facilities. Basin Electric also seeks to balance the interests of all affected landowners and other stakeholders in a manner that minimizes potential impacts and meets project objectives. The objectives for this project consist of the following:

- Ensure a sufficient supply of electrical energy to residential, commercial and agricultural consumers, whose energy demand is increasing
- Reinforce the existing transmission system to maintain its reliability in northeastern Wyoming and western South Dakota
- Minimize adverse impacts to the environment
- Comply with all federal, state and local regulatory requirements

Identification of Stakeholders

Stakeholders are those people and organizations that may be affected or have some interest in the project. Probable stakeholders for this project were identified as:

- City of Gillette
- City of Sheridan
- Campbell and Sheridan Counties, Wyoming
- Wyoming Department of Environmental Quality
- Wyoming Game and Fish Department
- Wyoming Department of Transportation
- Federal Aviation Administration
- Businesses, residents and property owners
- Homeowners Associations

Public Participation

Agency and Jurisdiction Meetings

Basin Electric has used a public participation process as an integral part of this project. This has involved meeting with various stakeholders including agencies such as the U.S. Army Corp of Engineers, Bureau of Land Management and telephone contact with the WGFD and U.S. Fish and Wildlife Service. Local jurisdictions including Campbell and

Sheridan County departments have been contacted in addition to the City of Sheridan and City of Gillette. These meetings have provided opportunities to exchange information, help to determine the level of analysis needed to address concerns and contribute to the identification of project alternatives that meet objectives while minimizing potential impacts. This process has also provided opportunities to discuss the purpose and need for the project and other details.

There are no Tribal lands within the project study area or the preliminary alternative corridors. However, Basin Electric will conduct appropriate coordination as formal public scoping begins regarding traditional cultural properties with neighboring Tribes including the Wind River Reservation in Wyoming, the Northern Cheyenne Reservation in Montana and the Pine Ridge Reservation in South Dakota.

Public Meetings

The first series of public meetings were held June 21, 22, and 23, 2005, in Sheridan, Clearmont and Gillette, Wyoming respectively, to promote public participation, encourage information sharing and identify potential concerns and issues outside of a permitting process. Approximately 375 landowners and affected agencies were invited to meetings and the invitation is included as **Appendix A Public Meeting Invitation**. The meetings were conducted in an “open house” format that enables stakeholders to talk one-on-one with project representatives about particular issues or concerns associated with specific alternatives. The information gained during this process is being used for additional data collection and analyses to help Basin Electric identify a preferred route for the transmission line.

Stakeholders, including landowners and government agencies, were notified of the date and location of the public meetings through an invitation mailed approximately ten days in most cases prior to the meetings. Comment forms were available at the meetings to record input.

Meeting Summary

A total of 91 people signed in at the public meetings in June. Landowners with agricultural and/or residential land were the primary attendees. In addition, a representative of the U.S. Fish and Wildlife Service attended the meeting in Sheridan, and several local government officials attended the meeting in Gillette.

Basin Electric received 21 comment forms as part of the public involvement process. The individuals who submitted comment forms primarily addressed the following issues:

- Visual impacts
- Loss of irrigated agricultural land
- Loss of land and affect on property value

- Proximity of transmission line to residences
- Impacts to bird and wildlife habitat
- Proposed transmission line corridors and structure locations
- Promotion of economic development

A project update letter was mailed to the original list of landowners and agencies that received the invitation, in addition to those that signed in at the meeting in late July 2005. It is included as **Appendix B Project Update Mailer**.

As the siting study progresses, Basin Electric is considering all issues and concerns presented by the public and is incorporating comments into the analysis of a preferred corridor. Basin Electric seeks to balance the interests of all affected landowners and other stakeholders in a manner that minimizes potential impacts and meets project objectives.

Basin Electric is continuing to incorporate public comments into the siting study to determine a preferred transmission line corridor. Landowners will be contacted to obtain permission for additional on-the-ground surveys to assess the preliminary alternative corridors. When a preferred corridor has been identified, all affected landowners within that corridor will be contacted directly by Basin Electric to discuss the alignment and initiate negotiations to acquire the necessary easements. A second series of meetings with the affected landowners along the preferred corridor is planned to be held as small group discussions or as individual meetings.

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Appendix A
Public Meeting Invitation

Appendix B
Project Update Mailer