BASIN ELECTRIC POWER COOPERATIVE

1717 EAST INTERSTATE AVENUE
BISMARCK, NORTH DAKOTA 58503-0564
PHONE: 701-223-0441
FAX: 701-557-5336

July 21, 2009

Ms. Patricia Van Gerpen
Executive Director
South Dakota Public Utilities Commission
500 East Capitol
Pierre, SD 57504-5070

Re: Basin Electric Power Cooperative – Deer Creek Station
Docket: EL08-034

Dear Ms. Van Gerpen:

Basin Electric Power Cooperative (Basin Electric) is pleased to provide submittal of an Application for an Energy Conversion Facility Siting Permit for the Deer Creek Station project combined-cycle natural gas energy conversion facility and associated infrastructure including a water supply system and electric transmission system. A natural gas pipeline to support the project will be permitted via the South Dakota Public Utilities Commission (SD PUC) in a separate application.

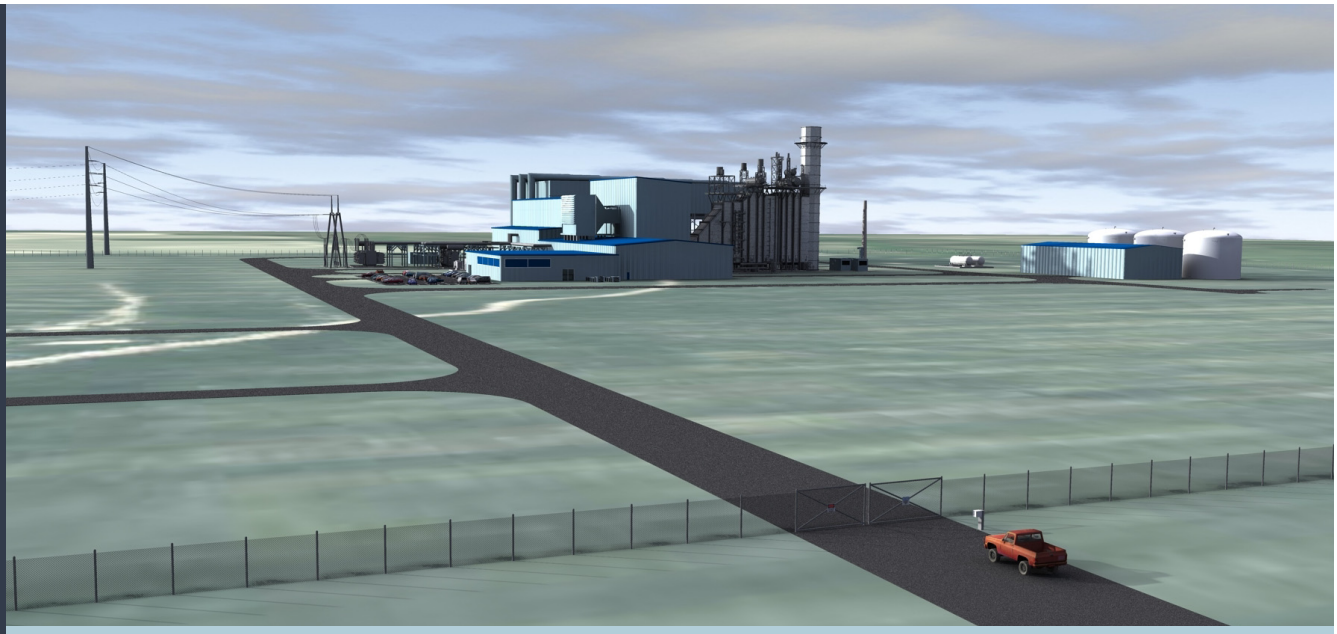
The Application for an Energy Conversion Facility Siting Permit submittal consists of the application and five appendices. Enclosed are two hard copies of the entire submittal and eight additional hard copy sets of all graphic exhibits sized 11"x17" that are part of the application. Basin Electric is concurrently posting this submittal electronically on the SD PUC file transfer portal (ftp) site.

Basin Electric requests that SD PUC make complete findings and render a decision to grant permit to construct the energy conversion facility and associated water wells and pipeline and transmission system on such terms, conditions, or modification of construction and operation or maintenance as the SD PUC may deem appropriate.

Sincerely,

Gavin McCollam, P.E.
Project Manager

/gmj
Enclosures



Basin Electric Power Cooperative's Application to the South Dakota Public Utilities Commission

Deer Creek Station Project

Volume I of II — Application

July 2009

Docket # EL08-034

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

EDAW | AECOM

Deer Creek Station Project

South Dakota Public Utilities Commission Application

Final

July 2009

Prepared for:

Basin Electric Power Cooperative

Prepared by:
EDAW | AECOM

Executive Summary

Table ES-1:
Regulatory Requirements/Application Section Cross-Reference Tables

Document Heading Number	Section Name	PUC Siting Rule Section
	Introduction	
2.1	Names of Participants	ARSD 20:10:22:06
2.2	Name of Owner and Manager	ARSD 20:10:22:07
	Energy Conversion Facility, Water Pipeline and Transmission Siting Permit	
3.1	Purpose of the Project	ARSD 20:10:22:08
3.2	Estimated Project Costs	ARSD 20:10:22:09
3.3	Demand for the Project	ARSD 20:10:22:10
3.4	Site Description	ARSD 20:10:22:11
3.5	Alternative Sites and Routes	ARSD 20:10:22:12
3.6	Environmental Information and Effect on Physical Environment	ARSD 20:10:22:13
3.6.5	Physical Environment	ARSD 20:10:22:14
3.6.6	Hydrology	ARSD 20:10:22:15
3.6.7	Terrestrial Ecosystems	ARSD 20:10:22:16
3.6.8	Aquatic Ecosystems	ARSD 20:10:22:17
3.6.9	Land Use and Local Land Controls	ARSD 20:10:22:18 ARSD 20:10:22:19
3.6.10	Water Quality	ARSD 20:10:22:20
3.6.11	Air Quality	ARSD 20:10:22:21
3.7	Time Schedule	ARSD 20:10:22:22
3.8	Community Impact	ARSD 20:10:22:23
3.8.2	Employment Estimates	ARSD 20:10:22:24
3.9	Liquid Transmission Line Standards of Construction for the Water Pipeline	ARSD 20:10:22:37
	Nature of Proposed Project	
4.0	Nature of Proposed Project	ARSD 20:10:22:26
	Products to be Produced	ARSD 20:10:22:27
4.2	Transmission Line Description	ARSD 20:10:22:35
4.3	Water Pipeline Description	ARSD 20:10:22:38
4.5	Fuel Type Used	ARSD 20:10:22:28
4.6	Primary and Secondary Fuel Sources and Transportation	ARSD 20:10:22:29
4.9	Alternate Energy Sources	ARSD 20:10:22:30
4.10	Solid Waste	ARSD 20:10:22:31
4.11	Estimate of Expected Efficiency	ARSD 20:10:22:32
4.12	Future Additions and Modifications	ARSD 20:10:22:25
4.13	Decommissioning	ARSD 20:10:22:33
4.1.4	Transmission Facility Layout and Construction	ARSD 20:10:22:34
Not Applicable	Statement Required Describing Gas or Liquid Transmission Line Standards of Construction	ARSD 20:10:22:37

Document Heading Number	Section Name	PUC Siting Rule Section
	Additional Information in Application	
5.0	Additional Information in Application	ARSD 20:10:22:36
	Testimony and Exhibits	
6.0	Testimony and Exhibits	ARSD 20:10:22:39
	Application for Party Status	
7.0	Application for Party Status	No information requested by rule

Table of Contents

Section Page

Appendices

Exhibits

Tables

List of Acronyms and Abbreviations

°F	Fahrenheit
ARSD	Administrative Rules South Dakota
AWWA	American Water Works Association
BACT	Best Available Control Technology
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
Btu	British thermal unit
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CT	combustion turbine
CWA	Clean Water Act
dB	decibel
dBA	decibels A-weighted
EDG	emergency diesel generator
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
FAA	Federal Aviation Administration
GIS	geographic information system
gpm	gallons per minute
H_2	hydrogen
H_2SO_4	sulfuric acid
HRSG	heat recovery steam generator stack
HUD	Housing and Urban Development
I-29	Interstate 29
km	kilometer
KOPs	key observation points
kV	kilovolt
L_{DN}	day-night noise levels
L_{EQ}	hypothetical number "equivalent" in energy to the actual fluctuating noise for any given measurement period
LHV	lower heating value
LNB	low-nitrogen burners
MAPP	Mid-Continent Area Power Pool
MBTA	Migratory Bird Treaty Act
MLRA	Major Land Resource Area
MSDS	Material Safety Data Sheets
msl	mean sea level
MW	megawatt
MWh	megawatt hour
NAAQS	National Ambient Air Quality Standards
NBPL	Northern Border Pipeline
NEPA	National Environmental Policy Act
NO_x	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System

NSPS	New Source Performance Standards
OSHA	Occupational Safety and Health Administration
PM_{10}	particulate matter with mean aerometric diameter smaller than 10 microns
$PM_{2.5}$	particulate matter with mean aerometric diameter smaller than 25 microns
PSA	Power Supply Analysis
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psig	pound force per square inch gauge
PVC	polyvinyl chloride
ROW	right-of-way
RUS	Rural Utilities Service
SD PUC	South Dakota Public Utility Commission
SDCL	South Dakota Codified Law
SDDENR	South Dakota Department of Environment and Natural Resources
SDGFP	South Dakota Game, Fish and Parks
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
Western	Western Area Power Administration

1.0 Introduction

1.1 Project Overview

Basin Electric Power Cooperative is proposing to construct, own, and operate a 300-megawatt (MW) (net) combined-cycle natural gas energy conversion facility and associated linear facilities referred to as the Deer Creek Station Project (project). Basin Electric has identified a location approximately 12 miles northeast of Brookings, South Dakota, for the project. A vicinity map and overview of the project area and major project components associated with the project is provided in Exhibit 1.1-1.

Main components of the project will include a combined-cycle natural gas energy conversion facility, a water pipeline approximately 1.25 miles long connecting to two wells, a 0.75-mile-long electric transmission line, and a 13.2-mile-long natural gas pipeline. The natural gas pipeline will be permitted via the South Dakota Public Utilities Commission (SD PUC) in a separate application. It is expected that final engineering design data will be provided to support this application in the first quarter of 2010. Information herein is based on preliminary engineering design efforts that are typical for this stage of project development. The material contents of this application will remain representative of the project, although any delay in starting the construction will likely affect the overall cost of the project and the corresponding economic impacts attributed to the project.

1.2 Organization of Application

This application has been organized in the sequential order of the Administrative Rules of South Dakota (ARSD) 20:10:22 and follows the major headings and information groupings outlined below:

- Section 1, Introduction: project overview, project schedule, and other required permits and approvals.
- Section 2, Project Participants: names and contact information for the participants, owner, and manager.
- Section 3, Energy Conversion Facility, Water Pipeline, and Transmission Line Siting Permit: purpose of the project, estimated cost, demand, site description, alternative site evaluation, environmental information, time schedule, and community impacts.
- Section 4, Nature of the Proposed Project: on-line life and projected operating capacity of the proposed project, major components, materials flowing into and out of the energy conversion facility, mitigation measures, products to be produced, fuel type used, primary and secondary fuel sources and transportation, alternate energy sources evaluation, solid waste management, estimate of expected efficiency, future additions and modifications, and decommissioning.
- Section 5, Additional Information in Application: information necessary for the review committee to assess the effects of the energy conversion facility.
- Section 6, Testimony and Exhibits: information necessary for the review committee to assess the effects of the energy conversion facility.
- Section 7, Application for Party Status: information necessary for the review committee to assess the effects of the energy conversion facility.
- Section 8, References, a list of references cited in the application.

- Appendix A: Prevention of Significant Deterioration Air Quality Construction Permit Application
- Appendix B: Resolutions of Community Support
- Appendix C: Deer Creek Station Social and Economic Impact Study and Deer Creek Power Project Economic Impact Analysis
- Appendix D: Traffic and Transportation Technical Memorandum for the Deer Creek Station Project
- Appendix E: Noise Technical Memorandum for the Deer Creek Station Project

1.3 Project Schedule

Basin Electric has conducted agency coordination and is in the process of submitting, or has submitted, documents to obtain all appropriate environmental, construction, and operation permits, approvals, clearances, and authorizations from federal, state, and local agencies to allow construction of the project, which is anticipated to begin in July 2010 and continue for approximately 1.5 years. Startup and commissioning is expected to take 9 months and commercial operation of the energy conversion facility is anticipated in June 2012. The schedule for the major activities associated with the energy conversion facility, water wells and water pipeline, and transmission line construction is included in section 3.7.

1.4 Other Required Permits and Approvals

Table 1.4-1 shows the federal, state, and local permits required for construction and operation of the project.

Table 1.4-1
Required Permits, Approvals, and Consultations

Federal/State/ Local	Agency	Permits/Approvals/Consultations	Timing
Federal	Western Area Power Administration	Approval through a Record of Decision on an Environmental Impact Statement	Prior to Construction
	U.S. Fish and Wildlife Service	Threatened and Endangered Species, Section 7(Biological Assessment)	Prior to Construction
	U.S. Environmental Protection Agency	Spill Prevention, Control and Countermeasure Plan	Prior to Operation
	U.S. Army Corps of Engineers	Section 404 compliance for impacts to jurisdictional “Waters of the United States”	Prior to Construction
State	Public Utilities Commission	Energy Conversion Facility Siting, Transmission Siting, and Water Pipeline Siting Permit	Prior to Construction
	South Dakota Department of Environment and Natural Resources	Water Appropriation for Non-Irrigation Uses	Prior to Construction
	South Dakota Game, Fish and Parks	State-listed Endangered Fish and Wildlife	Prior to Construction

Federal/State/ Local	Agency	Permits/Approvals/Consultations	Timing
	South Dakota State Historical Society, State Historical Preservation Officer	Cultural and Historic Resources Review	Prior to Construction
	South Dakota Department of Environment and Natural Resources	Title V Operating Air Permit	Prior to Operation
	South Dakota Department of Environment and Natural Resources	Sewage Disposal Permit	Prior to Construction
	South Dakota Department of Environment and Natural Resources	Construction Stormwater Discharge Permit	Prior to Construction
	South Dakota Department of Environment and Natural Resources	National Pollution Discharge Elimination System Operational Stormwater Discharge Permit	Prior to Operation
	South Dakota Department of Environment and Natural Resources	Registration of Aboveground Tanks	Prior to Operation
	South Dakota Department of Environment and Natural Resources	No Exposure Certification (for exclusion from Stormwater Discharges associated with Industrial Activities)	Prior to Construction
	South Dakota Department of Environment and Natural Resources	Temporary Water Use Permit for Construction Activities, Drilling or Testing Purposes	Prior to Construction
Local	Brookings County	Conditional Use Permit	Prior to Construction
	Brookings County	County building permits, County Permissions to Occupy Right-of-Way Permits, County Road Crossing Permits	Prior to Construction
	Sherman, Richland, and Lake Hendricks Townships	Board Approvals	Prior to Construction

This page intentionally left blank.

2.0 Project Participants

Basin Electric is a regional wholesale electric generation and transmission cooperative owned and controlled by the member cooperatives it serves. It was created in May 1961 as a result of regional efforts by electric distribution cooperatives and the Rural Electrification Administration, now the Rural Utilities Service (RUS), an agency in the U.S. Department of Agriculture (USDA), which is located in Washington, D.C. Basin Electric includes 126 rural electric systems operated by member cooperatives and is one of the largest electric generation and transmission cooperatives in the U.S. Basin Electric serves approximately 2.6 million customers in 430,000 square miles covering portions of nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming.

2.1 Names of Participants

The applicant's name, address, and telephone number is printed below:

Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, North Dakota 58503-0564
(701) 223-0441

The individuals authorized to receive communications about the application on behalf of Basin Electric are:

Cris Miller
Senior Environmental Project Administrator
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, North Dakota 58503-0564
(701) 223-0441

Gavin McCollam
Project Manager
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, North Dakota 58503-0564
(701) 223-0441

2.2 Name of Owner and Manager

The energy conversion facility and associated facilities are to be owned by Basin Electric. The chief executive officer and general manger is listed below:

Ronald R. Harper
CEO and General Manager
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, North Dakota 58503-0564
(701) 223-0441

This page intentionally left blank.

3.0 Energy Conversion Facility, Water Pipeline and Transmission Siting Permit

3.1 Purpose of the Project

Basin Electric's primary mission is to provide electrical power to its member owners. The projection of future electrical requirements serves as one of the main planning tools in determining the cooperative's future operating strategy.

The energy conversion facility will help serve the increased intermediate generation demand for electric power in the eastern portion of Basin Electric's nine-state service area as identified in the *2007 Power Supply Analysis* (PSA) (Basin Electric 2007). The need for additional generating capacity is being driven by the increasing use of electricity given three factors:

- Industrial growth
- Energy-sector (coal, oil, and gas) development
- New rural residential development

3.2 Estimated Project Costs

The estimated total construction cost of the energy conversion facility, transmission line, and process water system is $393 million. The major components of this estimate are presented in Table 3.2-1:

Table 3.2-1:
Estimated Total Construction Cost

Component	Cost
Combined cycle plant	$388 MM
345-kilovolt transmission line	$4 MM
Water pipeline and wells	$1 MM

3.3 Demand for the Project

3.3.1 Present and Estimated Consumer Demand

Much of the increased demand for generation capacity in Basin Electric's service territory is being driven by development of oil, natural gas, renewable sources of energy such as ethanol, and other energy resources in the Upper Great Plains region, as well as increased demand in the residential sector, which is mainly located on the outskirts of larger cities within the entire service territory.

In 2007, Basin Electric developed the PSA to assess projected need for more electric power generation in its eastern service territory (Basin Electric 2007) The PSA was prepared in accordance with RUS regulations published in 7 Code of Federal Regulations (CFR) 1710 Subpart F. The PSA provides an in-depth examination of Basin Electric's current operating system, future load growth, and the framework for future expansion, including both supply-side and demand-side resource expansion.

The following points are a summary of the energy generation needs for Basin Electric's entire service territory as presented in the PSA:

- Between 1999 and 2006, Basin Electric system demand increased 752 MW from 1,195 to 1,947 MW, or approximately 107 MW per year.
- Between 1999 and 2006, Basin Electric system energy sales increased 5.3 million megawatt hours (MWh) from 6.5 million MWh to 11.8 million MWh, or approximately 760,000 MWh per year.
- Between 2006 and 2021, Basin Electric forecasts demand on its system to grow by 1,834 MW, or approximately 122 MW per year.
- Between 2006 and 2021, Basin Electric forecasts energy consumption on its system to grow by approximately 12,000,000 MWh, or approximately 800,000 MWh per year.

The projections shown in Exhibit 3.3-1 illustrate peak summer demand estimates. Basin Electric's obligation to its member cooperatives, both demand and energy, is forecast to double in the next 15 years. For power supply planning purposes, it is appropriate to evaluate the peak system demands because of requirements for maintaining system integrity.

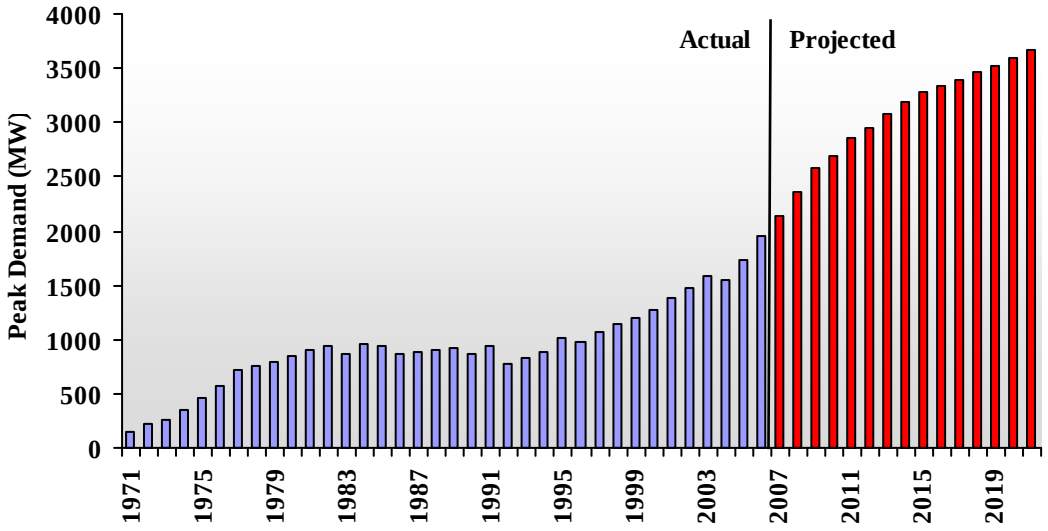


Exhibit 3.3-1: Basin Electric's Obligation to its Members' Summer System Demand

Basin Electric's eastern service territory is projected to have a load deficit that continues to grow over time (Exhibit 3.3-2). By 2014, Basin Electric is projected to need 800–900 MW of additional generation capacity to meet its obligations and an additional 450–500 MW by the end of the forecast period for a total of 1,350 MW by 2021 (Exhibit 3.3-2).

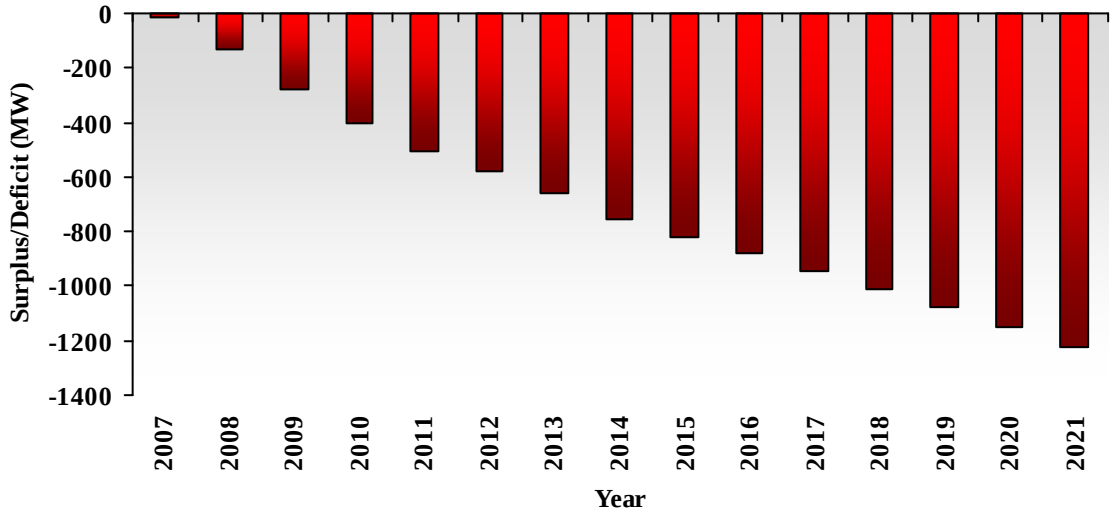
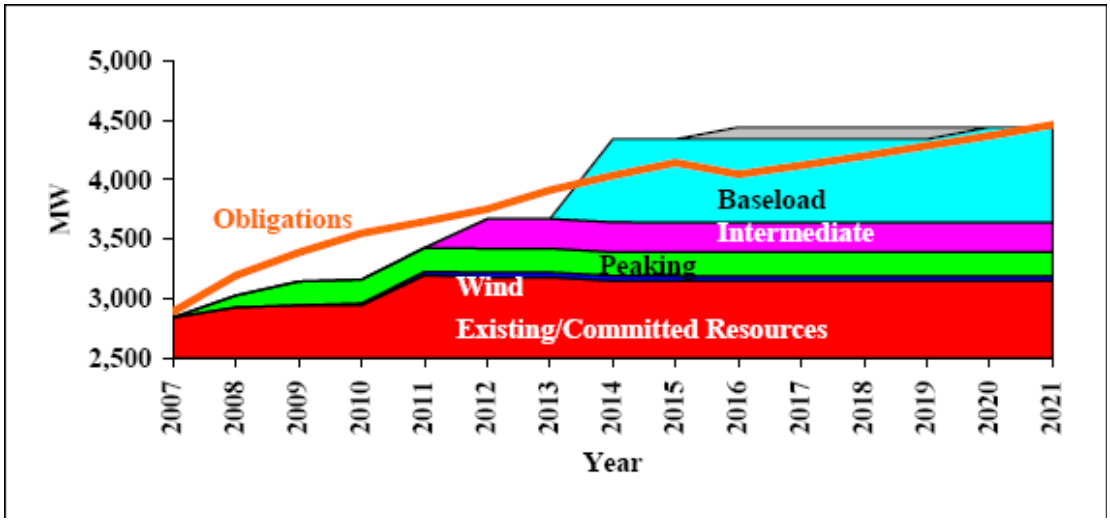


Exhibit 3.3-2: Eastern System Load and Capability

Ultimately, the preferred option identified by the PSA to address future demand projections consisted of the most diversified portfolio that minimized risk with respect market/natural gas prices, uncertainties of load growth, and capital cost sensitivities. This portfolio included 300 MW of wind developed by 2011, 200 MW of peaking generation by 2009, 250 MW of intermediate generation by 2012, and 600 MW of baseload generation by 2016. Upon presentation of this preferred portfolio expansion, Basin Electric's Board of Directors directed staff to plan for some amount of surplus generation that Basin Electric could grow into over the next 5 years. With this direction from the Board of Directors, Basin Electric's preferred resource expansion plan currently includes:

- 250 MW of intermediate generation (2012)
- 300 MW of wind generation (2010, 2011, and 2012)
- 200 MW of peaking generation (2008 and 2009)
- 800 MW of baseload generation (2014 and 2016)

Exhibit 3.3-3 shows Basin Electric's need for new generation and how this resource expansion plan meets that need. The term "obligations" refers to Basin Electric's total obligation, which includes obligations to members, non-member contracts, losses, and reserves.



Note: The top 100 MW of baseload generation (shaded grey) could include participation in another entity's project, which is to be online during the 2016 to 2020 time period (Exhibit 2).

Exhibit 3.3-3: Basin Electric's Preferred Resource Expansion Plan

The PSA specifically recommended that Basin Electric move ahead with development of 250 MW of intermediate generation (Exhibit 3.3-3) such as a combined-cycle combustion turbine within Basin Electric's eastern system. The Deer Creek Station Project will be capable of producing 250 MW of electric generation in normal operating mode starting in 2012. The project has incorporated duct-firing into the heat recovery process that provides additional steam generation to produce an additional 50 MW of production when system demand justifies the additional operational cost of production. This project has been identified as a means to meet the determined need for 250 MW of intermediate generation with some amount of surplus generation to meet expected future system load.

3.3.2 Estimated Future Energy Needs of Customers Served Directly by the Energy Conversion Facility

The purpose of the project is to help meet Basin Electric's intermediate generation needs relative to increased demand for electric power in the eastern portion of its nine-state service area that is required by 2012. Power from the energy conversion facility will be used throughout the eastern portion of Basin Electric's service territory.

3.3.3 Consequences of Delay or Termination of Energy Conversion Facility

Without the additional source of intermediate generation in its eastern service territory by 2012, Basin Electric will need to purchase power to meet its member obligations. Purchasing power from another provider may result in an increased cost to Basin Electric member cooperative customers within the eastern service territory. Moreover, if not enough power is available for purchase, Basin Electric will be unable to meet expected demand for power.

3.4 Site Description

The energy conversion facility, water wells and water pipeline, and transmission line will be located in Brookings County, South Dakota. The natural gas pipeline that will provide the fuel supply for the project, discussed in a separate siting application, will extend from Valve Site 42 of the Northern Border Pipeline in Deuel County into Brookings County to the energy conversion facility site. The project location within South Dakota is shown on Exhibit 3.4-1 and the Affected Area for the project as determined by the SD PUC is shown on Exhibit 3.4-2. The SD PUC determined that the Affected Area would consist of a radius of 12 miles from the Deer Creek Station site and would include all school districts that intersect or are within the 12-mile radius. An aerial photographic view is shown on Exhibit 3.4.3, and a topographic view is shown on Exhibit 3.4.4 of the components associated with this application, including the energy conversion facility, wells and water pipeline, and transmission line.

The energy conversion facility is accessible via 484th Avenue and is located in the NE Quarter of T111N R48W, Section 25 on property owned by Basin Electric. The town of White is located approximately 6 miles west and 2 miles north of the energy conversion facility site.

The climate in the project area is characterized by pronounced daily and seasonal changes in temperature and variations in seasonal and annual rainfall. In winter, the average temperature is 14^{o}Fahrenheit (F) and the average daily minimum temperature is 3^{o}F. In summer, the average temperature is 68^{o}F. Total annual precipitation is approximately 23 inches, with about 78 percent of the total precipitation falling in April through September.

3.4.1 Description of the Energy Conversion Facility Site

The energy conversion facility is sited within the Deer Creek Station site and is located approximately 12 miles east of Brookings City and 60 miles northeast of Sioux Falls in east-central South Dakota near the Minnesota border. The Deer Creek Station site is accessible via 484th Avenue on property owned by Basin Electric that is currently mainly used for crop cultivation. As shown in Exhibit 3.4-3, the Deer Creek Station site consists of an area of approximately 160 acres. The energy conversion facility site will occupy approximately 100 acres within the Deer Creek Station site with facility components occupying approximately 40 of the acres. The energy conversion facility and associated site components are shown on the general arrangement, Exhibit 3.4-5.

A temporary construction laydown and staging area to support construction of the energy conversion facility, transmission line, water pipeline, and wells will be located within the Deer Creek Station site. A chain link fence with lock and gate and posted warning signs will be constructed around the energy conversion facility site to minimize a possible hazard related to the gas turbine. The terrain is relatively flat and slopes from the northwest to the southeast; the site elevation is approximately 1,850 feet above mean sea level (msl). The Deer Creek Station site is well drained and is agricultural, consisting primarily of farmland. More details regarding the fuel supply, land use and terrain, water supply, transmission access, and proximity to residences are discussed in Section 3.5.

3.4.2 Description of the Well Site and the Water Pipeline

The Brookings-Deuel rural water supply will deliver potable water from its existing potable water line presently located on the back slope of 484th Avenue. Potable water will be piped to support 25 to 30 on-site permanent staff during operation. The potable water use rate is estimated at 1 gallon per minute (gpm) on an annual average.

Groundwater will be used for process water; two wells and a water pipeline will be developed for this use. Exhibit 3.4-3 shows the location of the well siting area, the preliminary well site and water pipeline route.

Process water usage for the energy conversion facility will be minimal since an air-cooled condenser, rather than a water-cooled condenser and cooling tower combination, will be used to condense steam that will exit the steam turbine. The energy conversion facility will use water for control of nitrogen oxide (NO_x) emissions, evaporative cooling, and for makeup water needs. It is anticipated that the single-unit energy conversion facility will normally consume 25 gallons of treated water per minute; the maximum consumption will be 60 gallons of treated water per minute. The estimated annual average use is anticipated to be 6 million gallons.

The proposed well siting area is currently used for crop cultivation and pastureland; the well site and water pipeline will occupy areas used for cropland within the siting area. Once construction and revegetation has been completed, the siting area can continue to be used for this purpose. Fencing may be erected at the well site.

Well site components will include pitless well units, meter pits, a power supply transformer, and a control shelter. An existing well site that is representative of the proposed wells is illustrated in Exhibit 3.4-6, and Exhibit 3.4-7 depicts a typical site layout for the proposed wells. The area of development will be within a 200-foot-by-200-foot area. The control building will have a 10-foot-by-8-foot footprint. The access road, wells, meter pits, and control building will be contoured to an elevation 1 foot above the 100-year flood elevation.

The well siting area is located in the NE quarter of Section 36, Township 111 North, and Range 48 West. A 6-inch-diameter water pipeline will be approximately 1.25 miles to 1.5 miles long from the water supply wells to the site tie-in point. The locations of the two wells and exact distance of the water pipeline have not yet been finalized; analysis in this application assumes a 1.25 mile-long water pipeline. Within the siting area, the water pipeline leaves the well site and parallels the eastern border of the siting area and then exits the siting area to cross 207th Street via horizontal directional drilling. On the northern side of 207th Street, the water pipeline heads north, paralleling the road within property currently owned by Basin Electric. Via lease agreement with Basin Electric, Xcel Energy maintains an existing substation on part of this property. Within this reach, the water pipeline will occupy grassland and herbaceous land as well as wetland areas. The water pipeline continues to parallel 484th Avenue for approximately 0.75 mile. The water pipeline then heads to its tie in point in the energy conversion facility.

3.4.3 Description of the Transmission Corridor

The proposed transmission corridor is situated within the SE Quarter of T111N R48W, Section 25. The corridor parallels the western edge of the energy facility conversion site. The corridor is approximately 0.75 mile long and ends at the existing White substation. The corridor will have 150-foot permanent right-of-way (ROW); additional temporary construction ROW is not anticipated. White Substation is a 345/115-kilovolt (kV) substation owned by Western Area Power Administration (Western).

Land in the corridor is primarily currently used for crop cultivation, although herbaceous grassland communities, wetlands, and forested shelterbelt are present. Once construction and revegetation has been completed, the transmission corridor can continue to be used for crop cultivation.

Existing transmission lines in the vicinity of Deer Creek Station include a Western 345-kV transmission line just west of the site. There are currently two 115-kV transmission lines (one owned by Western and one owned by East River Electric Power Cooperative) tied into White Substation. A 345/115-kV substation owned by Xcel is located about 0.3 mile south of the Deer Creek Station site. A portion of the proposed transmission corridor is owned by Basin Electric and easements will be acquired for the remainder. The terrain is relatively flat, well-drained agricultural land on a topographic incline.

3.5 Alternative Sites and Routes

This section presents the general criteria used to select the Deer Creek Station site and describes how alternative siting areas for the energy conversion facility were evaluated. Well siting areas and transmission corridor alternatives were considered following the selection of Deer Creek Station location as described in the *Deer Creek Station Alternative Evaluation Analysis and Site Selection Study* (Basin Electric 2008). This document referred to what is now the Deer Creek Station site as White Site I. Exhibit 3.5-1 shows the site and corridor alternatives considered for the project.

3.5.1 Energy Conversion Facility

Basin Electric selected the Deer Creek Station siting location because of its proximity to the fuel delivery source (i.e., gas pipeline), available water source, and the existing transmission system for the delivery of the power to its members (Basin Electric 2008).

Initially, five potential energy conversion facility sites were identified in eastern South Dakota in Basin Electric membership areas as shown in Exhibit 3.5-1. The Groton Site is located near Aberdeen; the Watertown Site is about halfway between Watertown and Brookings; and the White Sites I, II, and III are located near Brookings.

Basin Electric staff completed an initial field review of the five sites in 2007; this review verified the accuracy of databases used to locate existing natural gas pipelines, transmission lines and substations, and the spatial relationship of these resources to each other in the area surrounding the potential sites. Existing water supplies and transportation access were documented and potential constraints were noted. Regional air quality constraints, land use compatibility, geologic hazards, potential biological or cultural resource constraints, wetlands, and any potential for hazardous waste or spill sites in the general area were considered.

Following a preliminary review of environmental constraints, including obvious exclusion or avoidance areas and existence of required factors such as fuel supply and transmission lines, three sites were excluded from further analysis and two candidate sites, White Site I and White Site II were further considered. The Groton Site was eliminated based on property and transmission constraints: two simple-cycle peaking facilities have already been installed. The Watertown Site was eliminated based on its distance from the nearest substation. White Site III was eliminated because it is not large enough use as a site for a combined-cycle combustion turbine energy conversion facility.

3.5.1.1 White Site I and White Site II Comparison

White Site I and White Site II were further analyzed based on the following criteria:

- Fuel Supply
- Land Use/Terrain
- Water Supply
- Transmission Access
- Proximity to Residences

The results of the analysis between the two sites are discussed in detail below and illustrate why White Site I is the preferred site for the project. The sites and areas that were examined for comparing White Site I and White Site II are shown in Exhibit 3.5-2.

3.5.1.2 Fuel Supply

White Site I and White Site II are located near the Northern Border Pipeline (NBPL). Firm gas supply and transportation agreements are available with NBPL that meet Mid-Continent Area Power Pool (MAPP) accreditation requirements, making it a reliable source of fuel. The compressor station locations are favorable; aboveground pipeline taps are present. White Site I is located further from the NBPL than White Site II, although the rugged topography of the area near White Site II suggests that the pipeline to either site would be nearly the same length. Neither site has an advantage over the other with respect to fuel supply.

3.5.1.3 Land Use/Terrain

The terrain in the White Site I study area is relatively flat and slopes from the northwest to the southeast; the area surrounding the site is well drained. The elevation of White Site I is approximately 1,850 feet msl. The terrain around the White Site II study area is flat farmland. The elevation of White Site II is approximately 1,935 feet msl. Because both sites are relatively flat, neither site has an advantage over the other with respect to constructability. White Site I terrain would allow better drainage than White Site II. The lower elevation of White Site I would yield slightly better gas turbine performance.

Following selection of White Site I as the preferred site, alternative Well Sites A and B were evaluated for White Site I. The location of Well Site B was preferred and a water pipeline route was developed to connect Well Site B to the White Site I. The water pipeline route was routed to provide as direct of route as practicable while staying within property currently owned by Basin Electric.

3.5.1.4 Water Supply

In the *Deer Creek Station Alternative Evaluation Analysis and Site Selection Study* (Basin Electric 2008), both White Site I and White Site II were to use groundwater supply as process water and neither was thought to have a significant advantage over the other in terms of water supply. Two potential well sites for each energy conversion facility site were considered are shown in Exhibit 3.5-2. Upon further consideration, it was determined that while White Site I would use groundwater for process water; White Site II would use rural water supply for process water.

3.5.1.5 Transmission Access

Power from White Site I or White Site II would be interconnected into the existing 345-kV bus in the White Substation via a new 345-kV transmission line. White Site I would require a 0.75-mile-long transmission line and White Site II would require a 4.75-mile-long transmission line. The shorter transmission line associated with White Site I would cause less land disturbance and would cost less.

Following the selection of White Site I as the preferred site, T111N R48W Section 25 in its entirety was considered as a potential area for the White Site I transmission corridor. Following environmental surveys and engineering analysis, the proposed transmission corridor was located to provide as direct route as possible to the existing White Substation while also avoiding environmentally sensitive areas.

3.5.1.6 Proximity to Residences

A facility on White Site I would be located approximately 1 mile away from the nearest occupied residence, while on White Site II it would be located approximately 0.5 mile away from the nearest occupied residence. Therefore, White Site I has an advantage over White Site II because it is located farther away from the nearest occupied residence. Potential reliance on eminent domain powers would not be anticipated at either White Site I or White Site II.

3.5.1.7 Summary

Given the lower elevation of White Site I, the shorter transmission corridor that would be required, and the further distance from the nearest occupied residence, White Site I was selected as the preferred alternative for the project. This site is now referred to as the Deer Creek Station site.

3.5.2 Evaluation of Sites Considering Reliance upon Eminent Domain

Basin Electric currently owns the NE ¼ section of T111N R48W Section 25, the location of the Deer Creek Station site. Basin Electric will attempt to acquire easements on the adjacent affected parcels associated with the project. There are four landowners along the water well site and water pipeline and transmission corridor. Basin Electric representatives gathered information from landowners during informational meetings held regarding the project and through individual

landowner discussions. Easements for the water pipeline and transmission ROW, as well as extra temporary workspace, are being negotiated with landowners and a mutually agreed upon dollar amount will be paid to landowners for use of this land. Formal option easement negotiations are expected to be complete by this year.

While it does provide a direct route to the Deer Creek Station, the water pipeline was routed to remain primarily within existing property owned by Basin Electric to minimize the need for Basin Electric to acquire ROW from other properties not owned by Basin Electric.

The 345-kV transmission route was selected to facilitate a route from the Deer Creek Station to the existing Western's electrical substation. The transmission route was determined so that it would not interfere with the existing transmission and substation facilities and pre-existing wind and transmission easements in the immediate area.

Basin Electric representatives will work with the landowners to minimize impacts to their operations and will reimburse landowners for crop damages. During construction and maintenance, landowners may be occasionally inconvenienced by equipment transport along roads within the vicinity of the project and alongside or near field approaches. Every effort will be made to minimize inconveniences to landowners.

3.6 Environmental Information and Effect on Physical Environment

3.6.1 Introduction and Description of Environmental Assessments Conducted for the Energy Conversion Facility, Transmission Corridor and Water Pipeline

This section describes the existing environment of the project area and the anticipated effect on the physical environment. Basin Electric has evaluated, and in some cases is finalizing, evaluations of environmental impact to be supplied to SD PUC and has designed its project to minimize those impacts to the extent practicable.

Basin Electric has applied to Western for transmission interconnection of the project. Interconnection to Western transmission systems requires Western to follow Department of Energy and Council of Environmental Quality National Environmental Policy Act (NEPA) implementing procedures. Western will prepare an Environmental Impact Statement (EIS) according to NEPA procedures as lead federal agency for the Deer Creek Station Project. All requirements of the EIS will be followed. A copy of the EIS will be provided to SD PUC upon completion and in accordance with South Dakota Codified Law (SDCL) 34A-9-9, as follows:

> The environmental impact statement, prepared pursuant to SDCL 34A-9-4, together with the comments of public and federal agencies and members of the public, shall be filed with the office of the secretary and made available to the public at least thirty days prior to taking agency action on the proposal which is the subject of the environmental impact statement. Such a statement shall also include copies or a summary of the substantive comments received by the agency pursuant to SDCL 34A- 9-8, and the agency response to such comments.

3.6.2 Other Major Industrial Facilities under Regulation

Table 3.6-1 provides a summary of major industrial facilities under regulation in South Dakota. Table 3.6-2 lists the proposed industrial projects in South Dakota that are planned to be under construction by 2013. The Buffalo Ridge I and MinnDakota Wind Farms are existing energy conversion facilities in Brookings County; White Wind Farm is under construction and Buffalo Ridge II has been approved by SD PUC for Brookings County.

Table 3.6-1:
Major Industrial Facilities in South Dakota

Project Name	Fuel	Owner	Capacity (MW)	Location
Spirit Mound	Fuel Oil	Basin Electric	67.5	Clay County
Chamberlain	Wind	Basin Electric	1.3	Brule County
City of Fort Pierre	Fuel Oil	city of Fort Pierre	2	Stanley County
Watertown Power Plant	Diesel	Missouri Basin Municipal Power Agency	67.5	Codington County
Pathfinder	Natural Gas	Northern States Power Company	75	Minnehaha County
Angus Anson	Natural Gas	Northern States Power Company	105	Minnehaha County
Aberdeen Combustion Turbine	Fuel Oil	Northwestern Energy	28.8	Brown County
Clark	Fuel Oil	Northwestern Energy	2.7	Clark County
Faulkton	Fuel Oil	Northwestern Energy	2.7	Faulk County
Highmore	Fuel Oil	Northwestern Energy	0.6	Hyde County
Huron	Natural Gas	Northwestern Energy	15	Beadle County
Mobile Unit	Fuel Oil	Northwestern Energy	0.5	Beadle County
Redfield	Natural Gas	Northwestern Energy	1.3	Spink County
Webster	Fuel Oil	Northwestern Energy	0.7	Day County
Yankton	Natural Gas	Northwestern Energy	2.2	Yankton County
Lake Preston	Fuel Oil	Otter Tail Power Company	24.1	Kingsbury County
Big Stone	Sub-Bituminous Coal	Otter Tail Power Company	456	Grant County
Ben French	Fuel Oil	Black Hills Corporation	2.0	Pennington County
Lange Gas Turbines	Natural Gas	Black Hills Corporation	40	Pennington County
Oahe	Water	U.S. Army Corps of Engineers	782	Hughes County
Fort Randall	Water	U.S. Army Corps of Engineers	320	Charles Mix
Big Bend	Water	U.S. Army Corps of Engineers	488	Buffalo County
South Dakota Wind Energy Center	Wind	FPL Energy South Dakota Wind LLC	40.5	Hyde County
Valley Queen Cheese	Fuel Oil	Valley Queen Cheese Factory, Inc.	1.5	Grant County
State Auto Insurance	Fuel Oil	State Auto Insurance, Inc.	1.7	Grant County

Project Name	Fuel	Owner	Capacity (MW)	Location
Highmore	Wind	FPL Energy	40.5	Hyde County
Gavins Point	Water	U.S. Army Corps of Engineers	132	Yankton County
Groton Generation Station I & II	Natural Gas	Basin Electric	93.5	Brown County
MinnDakota Wind Farm	Wind	Iberdrola Renewables	54	Brookings County
Buffalo Ridge I Wind Farm	Wind	Iberdrola Renewables	50.4	Brookings County
Tatanka Wind Farm	Wind	Acciona S.A.	88.5	McPherson County
Wessington Springs Wind Project	Wind	Babcock and Brown	51	Jerauld County

Source: SD PUC (2009a, 2009b)

Table 3.6-2:
Planned or Industrial Projects under Construction in South Dakota by 2013

Plant Name	Fuel	Owner	Status	Capacity (MW)	Location
Big Stone II Generation Station	Coal	Otter Tail Power Company	Construction begins 2010	650	Grant County
Hyperion-Elk Point Refinery	Oil Refinery	Hyperion Resources	Construction begins 2013	N/A	Hyperion-Elk Point Refinery, Union County
Keystone Pipeline Project	Crude Oil Pipeline	TransCanada	Under Construction	N/A	Keystone Pipeline Project, Eastern South Dakota
White Wind Farm	Wind	Navitas Energy, Inc.	Construction begins 2013	200 MW	Brookings County
Buffalo Ridge II Wind Farm	Wind	Iberdrola Renewables	Construction begins 2009	306	Brookings County

Source: SD PUC (2009a, 2009b)

3.6.3 Summary of Environmental Impacts

Project impacts are predominantly short-term and are associated with the construction phase of the project; construction is anticipated to be completed within approximately 1.5 years as described in Section 1.3. Marginal visual, air quality, and noise impacts will occur during the operational phase of the project. Table 3.6-3 provides a summary of impacts that are expected to remain after implementation of mitigation measures and best management practices (BMPs), the Stormwater Pollution Prevention Plan (SWPPP), and the Erosion and Sediment Control Plan (ESCP) measures. These impacts include short-term changes as well as long-term changes in land use.

Table 3.6-3:
Summary of Environmental Impacts

Environmental Resource	Potential Impact Summary Table
Physical Environment	Landforms and Topography
	The topography of the energy conversion facility site would be permanently altered by construction of the energy conversion facility. Landforms and topographic conditions will not be affected as a result of water wells and water pipeline and transmission line construction because surface disturbance areas will be reclaimed to approximate pre-disturbance conditions (e.g., slopes, contours, vegetative cover).
	Landforms and topographic conditions will not be affected during project operations.
	Geology and Paleontology
	No unique geological or paleontological resources will be affected during construction and operation of the energy conversion facility, water wells and pipeline, and transmission line.
	Any Pleistocene-era mammalian fossils excavated during construction would not be studied or retrieved.
	Economic Mineral Deposits
	There are no substantial mineral resources within the project area.
	Soils
	Soil disturbance from project construction activities resulting in accelerated erosion and compaction may occur.
	During construction, contamination may occur from spills of petroleum products, solvents, lubricants, or other chemical substances.
	Approximately 100 acres of cropland on the energy conversion facility site would be removed from agricultural production (cropland and pastureland) for the long term.
	Construction of the wells and water pipeline and transmission line would temporarily disturb approximately 54 acres of land.
	During operation of the energy conversion facility, water pipeline and transmission line, minimal soil disturbance from access and maintenance activities may occur.
	Erosion or Sedimentation
	Soil disturbance from project construction activities may temporarily result in accelerated erosion and compaction.
	Seismic, Subsidence, and Slope Instability Risks
	There are no concerns regarding seismicity or subsidence for the project.
Hydrology	Surface Water Drainage
	Once the water wells and water pipeline and transmission line have been constructed, the surface topography and drainage within ROWs will be returned to pre-construction conditions. There should be no long-term alteration to existing drainage features, direction, or rates within these ROWs.
	Perennial and intermittent flowing surface waters within the water pipeline ROW will be directionally drilled to avoid and minimize direct and indirect impacts to surface waters. If directional drilling is not feasible, the water pipeline will be trenched. If trenching is required; the surface topography and drainage along the water pipeline ROW would be returned to pre-construction conditions. Construction will occur to the greatest extent feasible, during drier periods.
	Surface waters within the transmission ROW will be avoided via spanning wetlands or surface waters and placing transmission structures outside of sensitive areas.

Environmental Resource	Potential Impact Summary Table
	Temporary impacts from construction may include increased sediment into the intermittent drainages on the property. However, the project will develop and implement a construction SWPPP and an ESCP to minimize the transport of suspended solids into nearby drainages and prevent the exposure of chemicals and oils to stormwater or surface water.
	Alteration of existing drainages on the energy conversion facility site may occur; current drainage patters will be maintained to the extent possible. The operating areas of the energy conversion facility will be graded so that stormwater will be directed to drainage ditches and swales and then to an on-site stormwater retention pond located immediately southeast of the energy conversion facility. After the completion of construction of the energy conversion facility, all process water and stormwater exposed to facility operation would be collected, stored, and managed according to the NPDES permit. No process water or potentially contaminated stormwater would be discharged to surface water. No direct, indirect or cumulative impacts to surface water quality from project construction or operation would be expected.
	Floodplains
	The energy conversion facility or transmission corridor will not be located in a 100-year floodplain. The proposed groundwater well site and pipeline interconnection would be located in the 100-year floodplain of Deer Creek. Potential direct or indirect impacts to the floodplain near the project are expected to be insignificant.
	Groundwater
	No impacts from the energy conversion facility are expected due to implementation of BMPs.
	Reductions in groundwater quality from spills, leaks, or disposal practices are not anticipated during construction.
	Water Use and Sources
	Project use of potable water would have no impacts on planned water uses by communities, agriculture, recreation, fish, or wildlife. Long-term effects from the water supply wells on groundwater quality are being analyzed in the EIS. Appropriate mitigation measures to minimize potential impacts associated with groundwater withdrawal will be discussed in the EIS.
	Water Quality
	The design of energy conversion facility components, mitigation measures, and ongoing monitoring of water withdrawal effects by permitting agencies would minimize the potential for negative effects on water quality or availability and would not cause an adverse impact.
	Water quality degradation from construction is not anticipated to occur in streams and other water bodies from spills or leaks of fuel, lubricants, or hazardous materials.
Terrestrial Ecosystems	Vegetation Communities
	General impacts to vegetation from construction of any of the proposed project may include direct removal and increased trampling of vegetation, erosion, soil compaction, and sedimentation, fugitive dust impacts, and propagation of noxious weeds. These impacts would result in adverse effects to vegetation communities within the energy conversion facility site and project ROWs. All areas where temporary impacts may occur will be revegetated and restored to pre-construction conditions. Fugitive dust would pose a potential short-term impact to local plant communities during project construction and future maintenance resulting from dust collecting on plants and reducing their photosynthetic efficiency.
	Construction of the energy conversion facility, water wells, water pipeline, and transmission line would directly affect vegetation within the ROW. Construction of the energy conversion facility would result in the long-term removal of approximately 100 acres of cropland and pastureland. Construction of the water well site would result in permanent impacts to cropland, pastureland, and possibly wetland communities. Permanent construction related impacts to vegetation associated with the transmission line would be limited to the footprint of the transmission structures. The areas temporarily disturbed around the structures would be restored to pre-construction condition. Construction impacts associated with the water pipeline would be temporary in nature because the pipeline ROW would be revegetated and restored to pre-construction conditions.

Environmental Resource	Potential Impact Summary Table
	A noxious weed management plan would be implemented to mitigate the potential for noxious weed propagation in the energy conversion site, the water well site, water pipeline and transmission ROWs (included as part of the ESCP).
	Alteration of existing drainages within the energy conversion facility site and at the water well site may adversely impact native vegetative communities by reducing water availability within the site boundaries. However, given the limited extent of native vegetation within the energy conversion facility site boundaries, significant impacts are not anticipated.
	Impacts to vegetation communities may also result in indirect adverse impacts to terrestrial and aquatic species that rely on these communities for forage, cover, and nesting habitats.
	Emissions from the energy conversion facility are not expected to result in adverse impacts to vegetation communities and crops within the site boundaries or adjacent to the site boundaries. Air emission controls would minimize emission impacts to vegetation resources.
	Operation of the energy conversion facility, water well site and water pipeline may result in groundwater pumping, which could result in impacts to vegetation communities and associated wildlife.
	Wildlife
	Wildlife species may temporarily avoid areas during project construction, which would alter movement patterns during the construction period. Noise and human disturbance during operation could cause mobile wildlife to disperse into adjacent areas and avoid the energy conversion facility site boundaries permanently.
	Construction of all proposed project facilities would result in both short- and long-term loss of foraging and cover habitats within the project boundaries.
	The majority of the energy conversion facility is currently being used for agricultural purposes. Loss of nesting habitat and other important wildlife habitats in this area is expected to be minor. Construction of the energy conversion facility is not expected to lower overall productivity within the energy conversion facility site or affect the viability of wildlife populations in Brookings County, in the state, or on a regional scale. The water wells, water pipeline and transmission line are primarily located adjacent to existing road ROWs in order to minimize and mitigate impacts to wildlife and wildlife habitats.
	Possible indirect effects to wildlife habitat from ground-disturbing activities include the risk of further propagation of noxious weeds. Noxious weeds can adversely affect wildlife habitats by reducing foraging opportunities for terrestrial wildlife and game species. Operation and maintenance activities may also result in the introduction or further spread of noxious weeds within the site boundaries. This would adversely affect native foraging opportunities for terrestrial wildlife and game species, such as ring-necked pheasants, sharp-tailed grouse, pronghorn, white-tailed deer, and others.
	Loss of wildlife habitat within the project site is not expected to affect the viability of wildlife species on a county, state, or regional level. Operation of the project would not result in fragmentation of wetland and riparian habitats and pasturelands that provide forage, cover, and breeding habitat for a variety of wildlife species in eastern South Dakota.
	Contamination of surface waters and wetlands in the project area, although unlikely, could lead to acute and chronic impacts to waterfowl, waterbirds, fish, amphibians, reptiles, and aquatic invertebrates and could also result in adverse effects on aquatic and terrestrial species that could affect various levels of the food chain.
	Construction of any of the proposed facilities may result in mortality for smaller, less mobile, ground-dwelling species, including amphibians and reptiles.
	The water pipeline would be buried, so day-to-day operation of the water pipeline is not expected to result in any impacts to wildlife within the ROW. The water pipeline ROW would be restored to pre-construction conditions to minimize and mitigate any long-term impacts to wildlife habitats. If maintenance is required on the water pipeline or transmission line, short-term impacts to vegetation are expected, and wildlife in the area may avoid the ROW until maintenance is completed.
	Construction could result in the direct loss or degradation (from sedimentation) of some ephemeral aquatic habitats used by breeding amphibians.
	Raptor nests were documented in proximity to the water pipeline and energy conversion facility and other avian species may be found nesting in the project area. If construction occurs during the avian breeding season (March 15–September 1), surveys would be conducted prior to construction to ensure the project does not “take” a nest or bird protected under the Migratory Bird Treaty Act.

Environmental Resource	Potential Impact Summary Table
	Threatened and Endangered Terrestrial Species
	Construction and operation of the energy conversion facility, water wells and water pipeline, and transmission line is not expected to result in adverse impacts to terrestrial special status species. Surveys for the federally listed Western prairie fringed orchid and the Dakota skipper (a candidate species) were conducted in summer 2009. No suitable habitat for Dakota Skippers or Western prairie fringed orchid was found on the Deer Creek Station site, the water well siting area or water pipeline, or the transmission corridor.
Aquatic Ecosystems	Wetlands
	Construction may result in short- or long-term effects on surface waters and/or groundwater from erosion of exposed sediments during construction or accidental hazardous spills from construction equipment.
	Construction would result in removal of wetland vegetation, short-term alteration of surface hydrology, and increased risk for spread of noxious weeds.
	Pavement of energy conversion facility access roads increases the impervious surface of a given area and can result in increased runoff, erosion, and sedimentation into adjacent waterways and wetlands.
	Fisheries
	Operation of the energy conversion facility, water well site, and water pipeline would result in groundwater pumping, which could result in impacts to aquatic habitats and the species associated with those habitats. Operation of the energy conversion facility, water wells and water pipeline, and transmission line is not expected to have any adverse effects on aquatic habitats, associated aquatic organisms, wetlands, or riparian communities. Long-term effects from the water supply wells on groundwater quality are being analyzed in the EIS. Appropriate mitigation measures to minimize potential impacts associated with groundwater withdrawal will be discussed in the EIS.
	Construction may result in short- or long-term impacts to surface waters and/or groundwater from erosion of exposed sediments during construction or accidental hazardous spills from construction equipment.
	Paved surfaces, including roads, parking lots, and operational areas associated with the energy conversion facility and the water well site, may result in increased precipitation runoff that may carry higher concentrations of total dissolved solids and hydrocarbons.
	Threatened and Endangered Aquatic Species
	USFWS has requested that Basin Electric move forward with the proposed project with the assumption that Topeka shiners may be found in the project area in Deer Creek and its associated tributaries. Basin Electric will work with USFWS to implement BMPs and mitigation measures to mitigate impacts to the Topeka shiner. Basin Electric will comply with the mitigation requirements that are required and specified in the Biological Assessment.
Land Use	Project construction would have a long-term effect on the existing, mainly agricultural land use of the approximate 100 acres within the energy conversion facility site, because this area will be converted to land used for the energy conversion facility. Construction would have a short-term effect on the current, mainly agricultural land use within the water well and water pipeline, transmission line ROW, and remainder of the Deer Creek Station site. This may result in the seasonal loss of crop productivity. While construction will temporarily disturb agricultural lands, there would be no long-term impacts to agriculture after construction within the water wells and water pipeline or transmission ROWs or the remainder of the Deer Creek Station site as agricultural uses (cropland) will be allowed to continue after construction has been completed. Maintenance and monitoring will occur during the operational phase and may cause minimal disruption to agricultural practices located adjacent or within the ROW.
	Public facilities will not be adversely affected by operations.
	Approximately 154 acres would not be permitted to be occupied by residential or other structures within the water well site and water pipeline ROW, the transmission ROW, and within the energy conversion facility site.

Environmental Resource	Potential Impact Summary Table
Air Quality	Construction of the project has the potential for short-term adverse affects on air quality in the immediate area around the construction sites. While measures such as watering would reduce the amount of emissions from earthmoving hauling and other construction activities, some level of fugitive dust emissions would be unavoidable given the nature of the work. Although some impacts on air quality would inevitably occur during construction would be transitory and short term, limited in duration, and would end at the completion of that particular phase of the work, impacts would be limited to the local area and would end once construction has been completed.
	Vehicle exhaust emissions would be generated during construction and operations, but would not affect regional air quality.
	A detailed analysis of operations emissions forecasts and regulatory review will be provided in the Deer Creek Station PSD Air Quality Construction Permit Application (Basin Electric 2009a). Basin Electric will be compliant with the PSD permit that is issued by SDDENR. The energy conversion facility will use BACT to control air emissions.
Community Impacts	Economic Impacts
	There would be short term economic benefits to the service industries such as hotels, restaurants, and gas stations. It is expected that any impacts would be positive to the local community.
	Purchases, equipment rental leases, equipment maintenance and repairs, storage areas, fuel for construction vehicles and associated equipment, licensing and permitting fees would all provide additional economic prosperity to the state during construction.
	Commercial and Industrial
	The increase in consumer demand from temporary hiring of local and non-local workforce, increased income tax revenue, and increases in sales of food, goods, services, and lodging will be generated by the temporary workforce. These and local purchases could boost the local economies.
	No impacts to the industrial sector are anticipated.
	Taxes
	Taxes would be of greater economic significance to state and local revenues. Based on current tax rates and prior to the application of the discretionary formula, the energy conversion facility is estimated to generate approximately $3.2 M in property tax in the first taxable year after operation. State sales/use tax will also apply to the materials and services used in the operations of the energy conversion facility.
	Housing
	It is expected that most non-local project workers will use temporary housing, such as hotels/motels, recreational vehicle parks, and campgrounds. There are more than enough existing housing resources in the 12-mile PUC-defined affected area as well as within a one hour commuting radius from the project site to meet the housing needs of the temporary construction staff and the anticipated 30 operational staff members.
	Land Values
	Existing land uses will be converted to long-term utility use for the duration of the project's operation. Land values are not expected to be impacted by the energy conversion facility, water wells and water pipeline, or transmission line.
	Agriculture
	Project construction would have a long-term effect on the existing, mainly agricultural land use of the approximate 100 acres within the energy conversion facility site, as this area will be converted to land used for the energy conversion facility. Construction would have a short-term effect on the current, mainly agricultural land use within the water well and water pipeline, transmission line ROW, and remainder of the Deer Creek Station site. This may result in the seasonal loss of crop productivity. While construction will temporarily disturb agricultural lands, there would be no long-term impacts to agriculture after construction within the water wells and water pipeline or transmission ROWs or the remainder of the Deer Creek Station site because agricultural uses (cropland) will be allowed to continue after construction has been completed. Maintenance and monitoring will occur during the operational phase and may cause minimal disruption to agricultural practices located adjacent or within the ROW.

Environmental Resource	Potential Impact Summary Table
Employment/Labor Market	An estimated peak 360 energy conversion facility, water well and water pipeline, and transmission line workers are expected on site in June 2011. The large percentage of the temporary workforce would consist of non-local personnel. A small portion is expected to be from local communities where possible.
	Thirty-one permanent employees will maintain and operate the energy conversion facility; these employees would consist of local personnel. No permanent operational employment is expected for the transmission line or well and water pipeline, although some temporary maintenance work on these facilities may generate minimal employment during the operational phase of the project.
Infrastructure Impacts	Energy
	Temporary short-term use of power during the construction phase is expected to be minimal.
	Long-term power supply is expected to be provided by existing utility providers making use of their existing power generation capacity.
	Sewer and Water
	There will be increased utilization of water and sewage facilities because of the project construction and an influx of temporary construction workers utilizing local lodging. The increased demand resulting from the Deer Creek Station construction and/or operational workforce would have no significant impact to the municipalities within the study area.
	Solid Waste Management
	An increased utilization of solid waste management facilities will occur as a result of construction and the influx of temporary construction workers utilizing local lodging and services and solid wastes from construction. The estimated peak construction force of 360 employees would represent an increase to the service area of approximately 1% and would not significantly impact the operations or capacity of the Brookings Regional Landfill.
	Solid waste generated during construction would be handled by an approved waste hauler who would collect and dispose of construction debris and general trash at an approved landfill.
	Transportation
	The greatest impact of construction traffic will be experienced on Brookings County roads because they are simply not designed for the amount of heavy traffic that will occur during the construction of the Deer Creek Station. This issue will be addressed in the Brookings County Haul Road Agreement and will require a post construction inspection to be completed to determine what must be done to return the haul roads to preconstruction conditions.
	The impact of operational traffic will be minimal as it will consist largely of motor vehicle traffic to and from the facility. Thirty employees will have no significant impact on traffic patterns or traffic safety.
	During the operational phase of the project, the water pipeline and transmission line will require periodic maintenance that may involve short-term localized traffic delays.
	No significant direct, indirect, or cumulative impacts are expected to the transportation systems of cities, counties, or the state.
Community Services	Health Services, Facilities, and Public Safety
	The risk of fire or explosion during construction is considered to be extremely low. Potential health impacts to the public from construction include fugitive dust, noise, and traffic injuries.
	The potential for worker-related adverse health and safety-related effects to occur during operations would be low and would occur over the long term, lasting for the duration of the project. Worker injury/illness rates are likely to be the same, if not lower, as those for the occupation nationwide.
	The potential for resident-related adverse health and safety-related effects to occur would be low and exposure would occur in the short term, occurring only during specific energy conversion facility site construction activities. Potential risks to public health and safety from water pipeline and transmission line construction would be short term, lasting only for the duration of the construction timeframe and would include fugitive dust, noise, and traffic injuries.
	Potential health impacts to construction workers would include fugitive dust and noise levels typical of construction of an energy conversion facility, well, water pipeline, and transmission line.

Environmental Resource	Potential Impact Summary Table
	Exposure to risks will vary depending on the number of construction workers performing any particular construction-related task and the length of time that task takes to complete. Total risks associated with construction will be limited to the length of the construction phase, an estimated 1 year. Generally, the potential for worker-related injuries or illnesses will likely be the same as those for the occupation nationwide, if not lower.
	Little additional demand on local services such as police, medical facilities, fire, or educational services, and there should be no detrimental impact to the community.
	Schools
	Most workers do not travel with their families or enroll their children in the local schools. Because of this limited potential for new students, local schools should be capable of providing more than adequate opportunities and accommodations for any new students.
	Recreation
	There should be limited recreational impacts from the project and it is not expected that workers will overtax the many recreational opportunities in the area of the project.
	Government Facilities and Services
	No impacts on the existing government facilities or services are expected to occur as a result of the proposed project.
Other Impacts	Population and Demographics
	Approximately 360 workers are expected during peak construction in June 2011.
	The limited number of permanent employees associated with the proposed project will not significantly affect local populations or demographics.
	Noise
	While construction noise may occasionally be discernable, it is not expected to increase ambient noise levels significantly for any appreciable period.
	Residences within 500 feet of the ROW would experience short-term increased noise from construction equipment and operations. The maximum increase in noise levels at the sensitive noise receivers during operations is projected to increase by no more than 6 dBA over the background noise levels. This noise level is considered noticeable, but is not perceived as a doubling of the sound level at the receiver. Because the greatest contribution to noise levels in the area at any residence is modeled to be at 45 dBA, the Deer Creek Station Project will be within the Housing and Urban Development guideline noise levels.
	The primary sources of noise associated with the project would be construction activities during construction of the facility and the operation of the facility, once it has been constructed. Once the construction of the energy conversion facility nears completion, a short-term occurrence of loud steam blows will likely impact nearby neighbors. Noise levels during operations will not significantly impact the nearby residences.
	No significant noise impact resulting from water pipeline and transmission line construction or operation is expected.
	Visual
	During construction, off-site vehicular traffic from maintenance and employee vehicles would occur along major roads and in nearby populated areas. Short-term components and activities that would contrast with the existing landscape character during construction include an increase in employee and construction traffic, site clearing and associated dust, borrow pit excavation and reclamation, lighting, commissioning (steam blowout), and well drilling.
	On-site construction activities and traffic would be visible from adjacent roads.
	In the rolling hills of the South Dakota landscape, the height, form, and lighting of the project's components would create the greatest contrast against the existing landscape character in the immediate foreground (up to 0.5 mile) of unobstructed view from county roads. Contrasts will be moderate in middleground views up to 4 miles with form and color or the largest structures still visible at 4 miles, depending on atmospheric conditions and viewing location.

Environmental Resource	Potential Impact Summary Table
	The exhaust stack would be visible to viewers on nearby roads and in residential areas; exhaust stack is lower than nearby wind turbines.
	Construction of the water wells and water pipeline and transmission line would cause short-term adverse visual effects because of construction activity and soil disturbance.
	Small, aboveground facilities, such as the well house, drain, and vent valves, etc. associated with the water pipeline would be visible within or immediately adjacent to roadways.
	Cultural
	No impacts to cultural resources are anticipated from construction, operation, and decommissioning of the energy conversion facility, water wells and water pipeline, or transmission line.

3.6.4 Physical Environment

3.6.4.1 Landforms and Topography

Brookings County, South Dakota, is characterized by nearly level to gently rolling plains. Brookings County is entirely on the Coteau des Prairies, a high land plateau that extends across the county in a southeasterly direction (NRCS 2004). The county is divided into four geographic parts, with the floodplain and outwash plain along the Big Sioux River separating the western one-third of the county from the eastern two-thirds. The project is located east of the Big Sioux River. The area east of the Big Sioux River is characterized by a till plain consisting of loamy glacial till. The till plain is nearly level to gently rolling with well-defined drainage patterns. Exhibit 3.6-1 is a digital elevation map, and Exhibit 3.4-4 is a contour map, respectively, of the energy conversion facility site and associated features.

3.6.4.2 Geology and Paleontology

The dominant landforms in this area are stagnation moraines, end moraines, glacial outwash plains, terraces, and floodplains. The Major Land Resource Area (MLRA) is dominated by till-covered moraines. The stagnation moraines are gently undulating to steep and have many depressions and poorly defined drainages. The steepest slopes are on escarpments adjacent to some of the larger tributaries. Small outwash areas are adjacent to the watercourses. The Cretaceous Pierre Shale underlies the till in most of the area. Precambrian rocks also occur at depth. Granite is quarried at Milbank, South Dakota, and outcrops of Sioux Quartzite are common. Layers of silt in the quartzite near Pipestone, Minnesota, were quarried by Native Americans, and the stone was carved into pipe bowls.

The project area sits in the Coteau des Prairies, a plateau approximately 200 miles in length and 100 miles in width, rising from the prairie flatlands in eastern South Dakota, southwestern Minnesota, and northwestern Iowa in the United States.

The plateau is composed of thick glacial deposits, the remnants of many repeated glaciations, reaching a composite thickness of approximately 900 feet. They are underlain by a small ridge of resistant Cretaceous shale. During the last Pleistocene Ice Age, two lobes of the glacier appear to have parted around the pre-existing plateau and further deepened the lowlands flanking the plateau.

No unique geological features that have state or federal protection will be disturbed by the project. There is the potential for discovery of Pleistocene-era mammal fossils during site excavation and water pipeline grading and trenching where the proposed route crosses continental glacial drift in South Dakota. Any mammalian fossils incidentally excavated during construction will not be recovered or studied for the scientific record.

No additional disturbance or loss of unique geological features, mineral resources, or scientifically important fossils will occur during operation of the project because there will be no additional surface disturbance required. Exhibit 3.6-2 provides a map of bedrock geology in the project area and Exhibit 3.6-3 provides a map of surficial geology of the project area.

3.6.4.3 Economic Mineral Deposits

Within the project area there are no substantial mineral resources. Sand and gravel deposits exist within pockets that have been utilized for construction and road base and concrete aggregates.

There are no oil or gas wells in the project area (SDDENR 2008). In addition, the energy conversion facility site, water well and water pipeline, and transmission line routes as planned do not occupy or cross any active quarries or mines.

3.6.4.4 Soils

3.6.4.4.1 Existing Conditions

The dominant soil order in this MLRA is Mollisols. The soils in the area have a frigid soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They generally are very deep, well drained to very poorly drained, and loamy. All of the soils listed in the project area are considered hydric.

Prime farmland, as defined by USDA, is land that has been determined to have the best combination of physical and chemical properties for agricultural production and is available for farming (NRCS 2009). In addition to prime farmland, land may be classified as farmland of statewide importance, as determined by the state.

In Brookings County, 51 soils are classified as prime farmland, 18 soils are prime farmland if drained, 5 soils are prime farmland if irrigated, and 18 soils are classified as farmland of statewide importance.

In the portion of the project area (the area including the Deer Creek Station site, transmission line ROW, water wells, and water pipeline ROW) within Brookings County, 44 of the soils found in this area are listed as prime or statewide important farmland. According to the Natural Resources Conservation Service (NRCS), project area contains 52 acres of prime and unique farmland and 104 acres of important farmland. However, this is a small percentage of the 441,708 acres of farmland in Brookings County.

The soils in the project area consist of three main groups of deposition: loess that lies on the ridge-tops, residual material that formed in glacial plains and moraines, and alluvial material that lies in stream terraces and glacial outwash plains.

According to NRCS, more than two-thirds of the project area is in farm production. Major soil resource concerns are wind erosion, water erosion, maintenance of the content of organic matter and productivity of the soils, soil wetness, and management of soil moisture.

Conservation practices on cropland generally include systems of crop residue management, especially no-till or other conservation tillage systems that conserve moisture and contribute to soil quality. Other practices include terraces, vegetative wind barriers, grassed waterways, and nutrient management.

3.6.4.4.2 Potential Impacts and Mitigation

Grading and excavating for the energy conversion site, transmission line, and water wells and water pipeline will disturb agricultural, rangeland, wetland, and forestland soils. Soils may be altered temporarily following construction because of soil compaction caused by equipment traffic, excavation, and handling. Both compaction-prone and hydric soils are especially prone to structural and aeration damage when trafficked or excavated. Soil compaction that occurs to a degree that will adversely affect backfilling and restoration efforts will be most likely to occur during wet conditions. In some of these areas, drain tile systems may exist that could be disturbed by project construction. Acceptable clay texture soil replacement may be more difficult if there are large clods or blocks of the same type of soils present. Droughty soils will be prone to wind erosion during construction and will be more difficult to stabilize and revegetate successfully following construction. Saline and/or sodic soils often have drainage limitations and may undergo compaction impacts similar to the hydric or compaction-prone soils. In addition, the success of stabilization and restoration efforts in these areas may be limited unless additional treatments and practices are employed to offset the adverse physical and chemical characteristics of the soils.

Potential impacts to soils will be minimized or mitigated by the soil protection measures identified in the ESCP under the National Pollutant Discharge Elimination System (NPDES) program. BMPs are described in Section 3.6.5. The measures include procedures for segregating and replacing topsoil, trench backfilling, relieving areas compacted by heavy equipment, removing surface rock fragments, and implementing water and wind erosion control practices. In addition, Basin Electric will work closely with landowners and soil conservation agencies to identify and implement recommended soil conservation practices in specific areas where they are needed. If damage to irrigation and tile drainage systems occurs, these systems will be repaired in accordance with the ESCP.

Topsoil will be segregated during excavation procedures as described in Section 3.9.1.2. No off-site soils or mud will be tracked onto public paved roads, and excavated material will be backfilled and compacted, and any excess materials will be spread across the ROWs or, in the case of the energy conversion facility, stockpiled on the energy conversion facility site for future reclamation at final decommissioning. Soils compacted by movement of construction vehicles and equipment will be loosened and leveled by harrowing or disking to approximate pre-construction contours at the discretion of the landowner and then reseeded with certified weed-free native grasses and mulched (except in cultivated fields). The specific seed mix and rate of application is included in Section 3.9.2.2.

A formal Spill Prevention Control and Countermeasure (SPCC) Plan for prevention and control of oil spills will also be implemented prior to operation. If hydrocarbon-contaminated soils are encountered during trench excavation, the South Dakota Department of Environment and Natural Resources (SDDENR), which is responsible for emergency response and site remediation, will be contacted immediately. A remediation plan of action will be developed in consultation with SDDENR. Depending on the level of contamination found, affected soil may be replaced in the trench or removed to an approved landfill for disposal. If construction is curtailed for any reason and for any appreciable length of time, temporary erosion control measures should be employed.

During operations, very small-scale, isolated surface disturbance impacts resulting in accelerated erosion, soil compaction, spills, and related reductions in the productivity of desirable vegetation or crops could result from maintenance traffic and incidental repairs. Impacts related to excavation and topsoil handlings are not likely to occur. If they do occur, they will be limited to small areas where certain maintenance activities take place. Exhibit 3.6-4 provides a soil map of the project area.

3.6.4.5 Erosion or Sedimentation

A SWPPP and ESCP will be required for construction activities under the NPDES program and will be provided after submittal of the application. Potential impacts to soils during construction will be minimized or mitigated by the soil protection measures that will be identified in the ESCP and as described in the Section 3.6.5. The measures include procedures for implementing water and wind erosion control practices. Prevailing winds in the area are from the south. Average wind speed is highest in May, averaging approximately 12 miles per hour. Exhibits 3.6-5 and 3.6-6 provide mapped water and wind erosion zones in the project area.

3.6.4.6 Seismic, Subsidence, and Slope Instability Risks

The energy conversion facility site, transmission line, and water pipeline are located mostly on relatively level terrain in South Dakota. Grading may be required in areas of the site that have moderate slope. Moderate slopes may need to be graded down to a gentler slope for safe operation of construction equipment. In such areas, the slopes will be excavated prior to construction. Changes in topography at the energy conversion facility site will be permanent.

In areas where project features cross laterally along the side of a slope, cut-and-fill grading may be required to obtain a safe, flat work terrace. Topsoil will be stripped from the entire area of disturbance and stockpiled before cut-and-fill grading is performed on steeper terrain. Generally, on steeper side slopes, soil from the high side will be excavated and moved to the low side to create a safe and level work terrace.

After installation of the linear facilities, the soil from the low side of the disturbed area will be returned to the high side and the original contours will be restored. Topsoil from the stockpile will be spread over the surface, erosion control features installed, and seeding implemented. Where necessary, temporary sediment barriers such as silt fence and straw bales will be installed during clearing to prevent the movement of disturbed soil into wetland, water body, or other environmentally sensitive areas. Temporary slope breakers consisting of mounded and compacted soil will be installed during grading and permanent slope breakers will be installed during cleanup. South Dakota lies within an area considered to be at the lowest possible risk for earthquakes in the U.S. There have been no earthquakes of a magnitude capable of damaging welded steel pipelines within South Dakota during historical times. The risk of significant seismic risk in South Dakota is extremely low.

3.6.4.7 Hydrology

3.6.4.8 Surface Water Drainage

The project will be located approximately 1 mile north and 0.5 mile west of Deer Creek, which is an intermittent tributary of the Big Sioux River. The segment of Deer Creek nearest the project is located approximately 10 miles northeast of the confluence with the Big Sioux River. Exhibit 3.6-7 shows surface waters in the project vicinity.

The energy conversion facility will occupy approximately 100 acres of the 160-acre Deer Creek Station site, with facility components to occupy approximately 40 acres. The energy conversion facility will be located primarily in the northwestern portion, which is relatively flat; the remainder of the property slopes to the southeast with approximately 50 feet of elevation change. The operating areas of the energy conversion facility will be graded so that stormwater will be directed to drainage ditches and swales and then to an on-site stormwater retention pond located immediately southeast of the energy conversion facility. The unlined retention pond will be sized to receive a 10-year, 24-hour storm event and a controlled release for a 100-year 24-hour rainfall event. Design considerations have taken into account 2 feet of sediment storage and 3 feet of freeboard above the 100 year event water surface elevation. Accumulated stormwater will be discharged off-site after meeting the requirements of the NPDES permit.

The Deer Creek Station site has two primary intermittent drainages that flow southeast toward Deer Creek. The eastern drainage is characterized by several areas of palustrine emergent wetlands; however, this drainage will have minimal impact from the project. When surveyed, the more western drainage, which will be directly impacted by plant construction and operation, did not have any significant wetlands characteristics. The defined drainage of Deer Creek is located approximately 1 mile south of the energy conversion facility and approximately 4,500 feet south of the property boundary.

Process water will be collected in sumps and either re-used or piped to aboveground tanks or to a lined on-site retention pond. Accumulated process water will be transported to the City of Brookings wastewater treatment facility.

The well siting area slopes to the south toward Deer Creek. The well site will be situated in the alluvium of Deer Creek, which is connected to the Big Sioux Aquifer.

Impacts to surface water from the energy conversion facility, transmission line, water wells, and water pipeline would be insignificant. Temporary impacts from construction may include increased sediment into the intermittent drainages on the property. However, the project will develop and implement a construction SWPPP and an ESCP to minimize the transport of suspended solids into nearby drainages and prevent the exposure of chemicals and oils to stormwater or surface water. After the completion of construction, all process water and stormwater exposed to facility operation will be collected, stored, and managed accordingly. No process water or potentially contaminated stormwater will be discharged to surface water. No direct, indirect, or cumulative impacts to surface water quality from project construction or operation are expected.

3.6.4.9 Floodplains

The energy conversion facility or transmission corridor will not be located in a 100-year floodplain. The proposed groundwater well site and water pipeline interconnection will be located in the 100-year floodplain of Deer Creek. However, the relatively small size of the well site will not have a significant effect on the ability of the floodplain to channel or accommodate flood waters. In addition, the energy conversion facility will have raw water storage capacity that will allow the facility to continue operating in the event the groundwater wells were inoperable because of a flood event. Potential direct or indirect impacts to the floodplain near the project are expected to be insignificant. Exhibit 3.6-8 provides a map of floodplains in the project area.

3.6.4.10 Groundwater

The field portion of the site-specific geotechnical investigations at the energy conversion site have been completed, but not fully evaluated. According to available technical sources, groundwater will occur at a depth of greater than 100 feet at the facility and transmission line locations (Schulz 2004). Subsurface activity for the energy conversion facility will consist primarily of foundation construction for plant components, structural supports for the transmission line towers, and construction of the water wells and water pipeline. The proposed water pipeline will be buried to approximately 6 feet and will be approximately 1.25 miles in length. No significant direct, indirect or cumulative impacts to groundwater quality are expected from construction or operation of the energy conversion facility, transmission line, or water wells and water pipeline. Long-term effects from the water supply wells on groundwater quality are being analyzed in the EIS. Appropriate mitigation measures to minimize potential impacts associated with groundwater withdrawal will be discussed in the EIS.

The potential water supply well site is located in the alluvium of Deer Creek, which is connected to the Big Sioux Aquifer. The substrate at the well locations consists primarily of sand and gravel. Water is expected at a depth of approximately 5 feet. The water supply wells will be constructed and completed to prevent any contamination of groundwater. Exhibit 3.6-9 provides a map of groundwater resources in the project area.

3.6.4.11 Water Use and Sources

Potable water will be delivered to the energy conversion facility site by the Brookings-Deuel Rural Water Supply from an existing adjacent water pipeline. Potable water use is estimated at 1 gpm. Project use of potable water will have no impacts on planned water uses by communities, agriculture, recreation, fish, or wildlife.

Groundwater will be used for process water supply to the energy conversion facility. The energy conversion facility has been designed to make use of an air-cooled condenser that reduces the volume of water required by the energy conversion facility by 80 to 90 percent compared with a water-cooled condenser. It is anticipated that the single-unit energy conversion facility will normally consume 25 gallons of treated water per minute; the maximum consumption will be 60 gallons of treated water per minute. The estimated annual average use is anticipated to be 6 million gallons or 18 acre-feet. The project will acquire water rights under a water appropriation permit for the use required by the energy conversion facility.

3.6.4.12 Water Storage, Reprocessing, and Cooling

Process water generated by the energy conversion facility will be reused when possible or will be piped to the on-site aboveground tank and/or a lined retention pond. The average flow rate to the pond will be 12 gpm, or 17,280 gallons per day. Accumulated process water will be transported to the City of Brookings wastewater treatment facility.

Sanitary sewage generated by the 30 employees during operation will be collected and treated with an on-site septic system and drainfield. The septic system will be permitted by the county and will be constructed and operated according to good engineering practices. Sanitary sewage generated during construction will be collected in portable toilets and will be hauled off site for proper disposal.

As described previously, stormwater that contacts energy conversion facility operations will be collected and piped to the on-site stormwater retention pond, where it will be discharged after all applicable permit conditions have been met. Because this energy conversion facility is planned as a zero discharge facility, there will be no impacts to surface water or groundwater from energy conversion facility, transmission line or wells, and water pipeline operation.

3.6.5 Water Quality

Before the start of construction, an NPDES permit application will be submitted to SDDENR for construction stormwater discharges. Prior to application submittal, a SWPPP will be developed and implemented; this SWPPP will include site-specific BMPs to minimize the potential for stormwater contamination. BMPs will be maintained until final stabilization of the disturbed construction areas occurs. Construction of the energy conversion facility site, transmission, and water pipeline will comply with all applicable federal, state, and local permits required for alteration of wetlands, streams, or rivers, from the project.

The U.S. Army Corps of Engineers (USACE) will require the project to obtain a Clean Water Act 404 Nationwide 12 Permit prior to construction. The Deer Creek Project will comply with all requirements of the permits and terms of approval from USACE. Long-term effects from the water supply wells on groundwater quality are being analyzed in the EIS. Appropriate mitigation measures to minimize potential impacts associated with groundwater withdrawal will be discussed in the EIS.

Construction of the facility, transmission line and water pipeline will comply with all applicable federal, state and local permits and requirements for protection of water quality. The project will also apply for the required state permits for retention ponds. These applications will require submittal of engineering drawings and specifications along with operating parameters. Construction of the ponds will not be initiated until agency approval is received.

After the completion of construction and permanent stabilization of the energy conversion facility site, the project will terminate the construction stormwater permit and apply for a stormwater permit for industrial activities as required by SDDENR. A SWPPP for the operational phase will be developed and implemented prior to the start of plant operation. The SWPPP will include site-specific BMPS to minimize exposure of stormwater to industrial activities. All stormwater that potentially comes into contact with plant operations will flow to the stormwater retention pond.

Installation and operation of the water supply wells will be conducted to prevent contamination of groundwater. Groundwater quality will be frequently evaluated once plant operation begins; water quality is critical to the proper operation of plant water systems. Any significant change in water quality will be promptly investigated. Construction and operation of the project is not expected to impact quality of surface water or groundwater.

During energy conversion facility operations, sanitary waste will flow to an on-site drain field and septic tank. Operation of the energy conversion facility will produce approximately 12 gpm of process wastewater discharge. Any contaminated industrial wastewater from operation of the energy conversion facility will be collected in an aboveground storage vessel or lined retention pond and transferred off site for treatment by an authorized treatment facility. The on-site drain field, water processing tanks and ponds will be permitted by SDDENR. The permit application process will include submittal of engineering drawings and specifications to SDDENR for review and approval prior to construction. Pond design and operation will comply with all SDDENR requirements and sound engineering practices.

Construction will be conducted to minimize disturbances around surface water bodies to the extent possible. Procedures will be implemented for limiting the extent of disturbance within wetland areas and will employ efforts to maximize restoration of disturbed areas. Procedures to minimize disturbance will include backfilling the spoils to minimize placement of removed material in close proximity of the stream bank and wetlands. Construction activity in sensitive areas will be planned to occur when there is minimal surface water present, and, if appropriate, a trench box will be used to minimize the amount of material that is required to be excavated from the sensitive area. Tunneling beneath wetland areas may occur along the water pipeline as required by the USACE.

BMPs will be implemented to minimize erosion and sedimentation, runoff, and surface instability during construction. Construction will be conducted to minimize disturbances around surface water bodies to the extent possible. Staging areas for the project-related construction equipment will be located within the energy conversion facility site in areas that are not environmentally sensitive. Current drainage patterns will be maintained to the extent possible. Staging areas for construction equipment will be located in areas that are not environmentally sensitive and will be established at least 50 feet from water ways or wetlands if permitted by topography. Construction equipment will not be serviced within 25 feet of waterways or wetlands and will not be fueled within 100 feet of waterways or wetlands. Any spills of fuels or hazardous materials will be contained and cleaned up in accordance with protocols as outlined in a SWPPP. Any herbicides used in ROW maintenance will be approved by the U.S. Environmental Protection Agency (EPA) and applied by licensed professionals. Application of herbicides will be limited to the extent necessary for regular maintenance of the site and ROW.

Stormwater management and environmental controls will be described in detail in the SWPPP and ESCP. Basin Electric will implement measures, as specified in the SWPPP, to manage stormwater and minimize soil erosion within the surface disturbance areas. Specific erosion and sedimentation control measures, as described in the ESCP, will be implemented by Basin Electric to minimize soil erosion and facilitate reclamation of surface disturbance areas.

In addition, the project will implement specific measures to protect water quality in the area, including the following:

- BMPs will be implemented to minimize erosion, sedimentation, runoff, and surface instability during construction.
- A formal SPCC Plan for prevention and control of oil spills will be developed and implemented prior to operation.
- Construction will be planned and conducted to minimize disturbance near surface water and wetlands as much as possible.
- Current drainage patterns in areas affected by construction will be maintained during construction and will be restored after construction as much as practicable.
- Staging and laydown areas for construction will be located at least 50 feet from waterways or wetlands.
- Construction equipment will not be serviced within 25 feet or fueled within 100 feet of waterways or wetlands.
- Any spills of fuels, chemicals or other hazardous materials will be promptly contained and cleaned up.
- Exposed soils will be stabilized following grading or filling.
- Silt fencing and other structural devices will be implemented as appropriate to prevent sediment transport.
- The energy conversion facility will be designed as a zero process-water discharge plant. Holding tanks will accumulate plant wastewaters that can be no longer used in the plant water systems. These waters will be transferred to a publically owned treatment works system for disposal.

3.6.6 Terrestrial Ecosystems

3.6.6.1 Existing Environment

Biological resource data were obtained from the U.S. Fish and Wildlife Service (USFWS), South Dakota Game Fish and Parks (SDGFP), and the National Wetland Inventory. Field surveys were conducted between October 29 and November 6, 2008, and between May 4 and May 8, 2009, to collect site-specific data terrestrial vegetation, wildlife, and special status species. A detailed biological resources report was prepared to document the project area's existing environment and anticipate potential impacts from the project (EDAW 2009).

3.6.6.1.1 Vegetation Communities

3.6.6.1.1.1 Deer Creek Station Site and Transmission Corridor

Exhibit 3.6-10 provides an overview of the vegetation communities present on Deer Creek Station site, the well siting area and water pipeline, and the transmission corridor. Based on field investigations, it is estimated that the Deer Creek Station site and the transmission corridor are comprised of cultivated corn (90 percent), herbaceous grassland communities (5 percent), and a forested shelterbelt (5 percent). Both native and introduced species are present in the non-cultivated (eastern) portion of the site. A swale on the Deer Creek Station site is dominated by reed canary grass (*Phalaris arundinacea*), yellow foxtail (*Setaria glauca*), and Nebraska sedge (*Carex nebrascensis*). A wetland community on the Deer Creek Station site is discussed in more detail in Section 3.6.7.1.1. Smooth brome (*Bromus inermis*), creeping bentgrass (*Agrostis*

stolonifera), and Kentucky bluegrass (*Poa pratensis*) are common in upland communities. The forested shelterbelts contains tree species including green ash (*Fraxinus pennsylvanica*) and choke cherry (*Prunus virginiana*) and has a herbaceous understory of strawberry (*Fragaria virginiana*) and stinging nettle (*Urtica dioica*). A state-listed noxious weed, Canada thistle (*Cirsium arvense*), was observed in low densities in the eastern portion of the Deer Creek Station site. Populations were isolated and fewer than 20 stems were counted. Plant communities consist of mixed native and introduced species, and no contiguous native prairie communities were identified within the Deer Creek Station site. A complete list of plant species observed during the field investigations is provided in the project's biological resources report (EDAW 2009).

3.6.6.1.1.2 Well Siting Area and Water Pipeline

Based on field investigations, it is estimated that the well siting area includes cultivated corn and soybean crops (40 percent), pasture (15 percent), a young forested shelter belt (5 percent), and open water (5 percent). The croplands are located in the northern portion of the siting area. The pasturelands, which include upland and wetland mixed-grass prairies, are located throughout the siting area, and consist of both native and introduced species. The upland prairie communities are dominated by smooth brome, Kentucky bluegrass, and timothy (*Phleum pratense*). Wetland communities within the siting are associated with the Deer Creek and its tributaries. Deer Creek is a perennial surface water. Wetlands are centrally located in the siting area and are dominated by reed canary grass, creeping foxtail, and sedges. Wetland communities are discussed in detail in Section 3.6.7.1. No state or locally listed noxious weeds were observed within the well siting area. As the water pipeline exits the well siting area, cultivated cropland is predominant until the pipeline enters the Deer Creek Station site. Here, the pipeline traverses primarily deciduous shelterbelt vegetation and cultivated cropland.

3.6.6.1.2 Wildlife

3.6.6.1.2.1 Deer Creek Station Site and Transmission Corridor

Habitats observed on the Deer Creek Station site and transmission corridor are dominated by agricultural cropland, but also include mixed to tall-grass prairie communities, wetlands, and forested habitats associated with hedgerows. These communities provide habitat for various wildlife species including big game, small mammals, reptiles and amphibians, and bat and avian species.

Eastern South Dakota is located in a major migratory path for avian species known as the Central Flyway. Migratory and resident avian species are found in great numbers during spring and fall migration in eastern South Dakota because there are numerous and extensive wetlands in the area. Several small mammal burrows were also observed during field investigations. Smaller mammals provide a prey base for foraging raptors.

3.6.6.1.2.2 Well Siting Area and Water Pipeline

Vegetation communities that provide habitat for wildlife within the well siting area and water pipeline include cropland, native and non-native tall and mixed-grass prairie, wetland communities, and a small forested shelterbelt. The northern portion of the siting area is in agricultural production for corn and soybeans. The well siting area contains palustrine emergent wetlands, located primarily on the southern half of the siting area, that total approximately 20 acres. Wetlands are associated with Deer Creek, an unnamed ephemeral tributary to Deer Creek,

and topographic depressions adjacent to the creek. These surface waters provide aquatic habitat for fish, amphibians, and other aquatic organisms. Surface waters in the well siting area provide foraging habitat for bats. Within the well siting area, the Deer Creek tributaries have been heavily disturbed by livestock grazing, which has likely reduced the habitat suitability for some fish species. Deer Creek appears to have the highest quality aquatic habitat, but it also has been impacted by livestock grazing. The siting area provides habitat for a variety of wildlife including fox, raccoon, white-tailed deer, shorebirds, waterfowl, and other avian species. No raptor nests were observed within the well siting area or water pipeline rights-of-way. Habitat is present for ground-nesting songbirds within the grassland and wetland communities. Killdeer were observed in the prairie potholes found in the corn and soybean fields.

3.6.6.1.3 Threatened and Endangered Terrestrial Species

State and federally listed threatened and endangered species potentially associated with the project are discussed in this section except for the federally sensitive aquatic species, the Topeka Shiner, which is discussed in Section 3.6.7.1.4.

State listed terrestrial species that have the potential to occur in the project area include two reptilian species, the eastern hognose snake (*Heterodon platirhinos)* and the lined snake (*Tropidoclonion lineatum*), and two avian species, the osprey (*Pandion haliaetus*), and the bald eagle (*Haliaeetus leucocephalus*). There are no known documented occurrences of the eastern hognose snake, lined snake, or osprey in the project area. No known bald eagle nesting or roosting sites occur within the project area, although a bald eagle was observed during field surveys in October 2008 near the Lac qui Parle River. Details of the state threatened and endangered species are provided in the project's detailed biological resources report (EDAW 2009).

The following federally listed species were identified that could potentially occur within the project area based on preliminary data collected from the threatened and endangered species list for Brookings County (USFWS 2008a) and South Dakota's Wildlife Diversity Program (SDGFPb): the whooping crane *(Grus americana*); American burying beetle (*Nicrophorus americanus)*; Dakota skipper (*Hesperia dacotae, a* candidate species); and Western prairie fringed orchid (*Platanthera praeclara*). USFWS provided guidance regarding survey requirements for the project. Habitat surveys for the Western Prairie fringed orchid and the candidate species Dakota skipper occurred in the June 2009. No suitable habitat was present for the Dakota Skipper or Western Prairie fringed orchid within the energy conversion facility site, transmission corridor, or well siting area. If any federally listed or candidate species is found within the construction areas, USFWS will be notified and consulted on the appropriate avoidance or mitigation measures to minimize impacts to special status species. A Biological Assessment will be prepared for the project and thoroughly address impacts and mitigation measures for federally listed species.

Federal protection is also given to nesting avian species listed under the Migratory Bird Treaty Act (MBTA). The Bald and Golden Eagle Protection Act (BGEPA) provides additional protection to bald and golden eagles. Exhibit 3.6-11 shows the occurrence of threatened and endangered species in the project vicinity.

3.6.6.1.3.1 Whooping Crane

The whooping crane is federally listed as an endangered species that migrates through South Dakota and other parts of the Central Flyway on its way to northern breeding grounds and southern wintering areas. The whooping crane can occupy numerous habitats, including cropland and pastures, wet meadows, shallow marshes, shallow portions of rivers, lakes, reservoirs, and stock ponds (Canadian Wildlife Service and USFWS 2005). Overnight roosting sites frequently require shallow water in which the bird stands and rests (Canadian Wildlife Service and USFWS 2005). Whooping cranes may be present in or near the project area for a few weeks of the year during spring and fall migrations. In spring, the whooping crane migrates through South Dakota in mid-March through mid-April, and in fall, migrates mid-September through mid-November. Some stragglers can be observed migrating through early December. According to the database maintained by USFWS for whooping crane sightings (USFWS 2008a) and review of elemental occurrence records from the South Dakota Wildlife Diversity Program (SDGFP 2008b), there are no recent or historical occurrences of whooping cranes in the project area. Surveys for whooping cranes are not required by USFWS for this project.

3.6.6.1.3.2 Western Prairie Fringed Orchid

The Western prairie fringed orchid was listed as federally threatened in the United States in 1989. The western prairie fringed orchid is not known to occur in Brookings County (USFWS 2008b).

Western prairie fringed orchids occur most often in remnant native prairies and meadows, but have also been observed at disturbed sites (USFWS 2008b). The orchid is associated with native tallgrass prairie species including big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). In hydric habitats, the orchid is associated with communities dominated by sedges (*Carex* spp.) and spikerushes (*Eleocharis* spp.) (USFWS 1996). Potential habitat in the project area is limited to herbaceous wetlands. Because the orchid has been found in disturbed wetland communities, USFWS recommended that surveys be conducted in 2009 in areas of suitable habitat. Habitat surveys were performed in June 2009 in the project area. No suitable habitat for the Western prairie fringed orchid was identified.

3.6.6.1.3.3 American Burying Beetle

The American burying beetle is federally listed as an endangered species in South Dakota. This beetle is not presently known to occur in the project area, but is known to occur in Bennett, Gregory, Hakkan, Tripp, and Todd counties (SDGFP 2008a). Suitable habitat is considered to be any site with significant humus or topsoil suitable for burying carrion. American burying beetles appear to be largely restricted to areas mostly undisturbed by human influence (SDGFP 2008a). Conversations with USFWS and SDGFP (Schriner 2009) indicated there are historical records for beetle sightings within the project area, but recent survey work has yielded no occurrences. USFWS believes that there is very limited habitat in the project area and, therefore no surveys will be required for the Deer Creek Station Project.

3.6.6.1.3.4 Dakota Skipper

The Dakota skipper is a candidate for listing under the Endangered Species Act (ESA). The skipper is a small butterfly with a 1-inch wingspan that requires tracts of native prairie consisting of bunchgrasses and forbs for nectar sources. Dakota skippers have not been found in habitats heavily overrun with exotic species, but can occur in transition zones of mixed and tallgrass prairie in South Dakota. Wet Dakota skipper habitat typically consists of relatively flat native bluestem prairie containing flowering wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*), and smooth camas (*Zygadenus elegans*) (USFWS 2007a). Dry Dakota skipper habitat typically consists of upland prairie areas on ridges and hillsides dominated by bluestem grasses and needlegrasses containing abundant pale purple coneflower (*Echinacea pallida*), upright coneflower (*E. angustifolia*), and blanketflower (*Gaillardia* sp.) as nectar sources (USFWS 2007a).

The Dakota skipper has been documented at Oak Lake (SDGFP 2008b). Preferred habitat for the species is limited in the project area because of the prominence of agricultural activities.
A specialist trained in conducting Dakota skipper surveys conducted a habitat assessment for this species within the project area. Surveys were conducted in the summer of 2009. No suitable habitat was identified within the energy conversion facility site, transmission corridor, and well siting area or water pipeline ROW.

3.6.6.1.3.5 Bald and Golden Eagles

The bald eagle was recently de-listed from the ESA, but it is still protected under the MBTA and BGEPA. Bald eagles occur throughout South Dakota and new nests appear every year (USFWS 2007b). These birds are associated with large trees, such as cottonwoods, and large lake or river systems. Small mammals such as prairie dogs provide foraging opportunities for many raptors, including bald eagles. The SDDFP sensitive species database (SDGFP 2008b) indicated and field observations confirmed that no active eagle nests of roosts were present on the energy conversion facility site as of October 2008 (EDAW 2009), though bald eagles may travel through the site to forage or travel to nearby nests or roosts.

Golden eagles may occur in eastern South Dakota during the winter months, but are primarily found in the western part of the state. There are no golden eagle nests within the project vicinity.

3.6.6.1.3.6 Migratory Birds

Deer Creek Station contains nesting and stop-over habitat for a number of migratory birds and contains habitat for ground- and tree-nesting avian species protected under the MBTA. Under the authority of the MBTA, federal projects are reviewed for impacts on migratory birds. Section 703 of the MBTA states that adverse impacts to migratory birds are to be avoided: "Unless and except as permitted by regulations... it shall be unlawful at any time, by any means, or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, possess... any migratory bird, any part, nest, or eggs of any such bird."

One inactive nest and one active raptor nest were identified within the vicinity of the Deer Creek Station site during field surveys. An active great horned owl nest was documented on the east side of the Deer Creek Station site approximately 0.4 mile east of the Deer Creek Station site

boundary. A pair of owls was observed nesting in a plains cottonwood community near an abandoned homestead.

One inactive raptor nest was documented in the south east corner of the Deer Creek Station site. The nest was situated approximately 40 feet above ground in a cottonwood tree. There were no signs of nesting activity (raptors in the area, whitewash, fresh vegetation lining the nest) at the time site visits were conducted in May 2009. Given the size and location of the nest, it is assumed the nest previously was used by a *Buteo* species such as a red-tailed hawk, Swainson's hawk or an owl.

3.6.6.2 Environmental Effects

3.6.6.2.1 Vegetation Communities

Impacts to vegetation in the project area are expected to be insignificant since the majority of the acreage for the project is agricultural land. Cultivated cropland and pasture comprise the principal land use in all of the project areas and regions. Short-term direct impacts that will affect vegetation for approximately 1 year or less could include disturbance, removal, and soil compaction. These short-term disturbances will be reclaimed soon after construction is completed. Most areas affected by short-term disturbances will be returned to cropland or seeded grass pasture within one growing season, with the exception of the energy conversion facility site.

Long-term direct impacts could be caused by losing vegetated areas from clearing and constructing the project buildings and facilities. Disturbed soil creates a hospitable environment for invasion of weeds, and project-related traffic may provide a transport mechanism for seeds of noxious weeds to the area. Removal of vegetation may increase erosion and sedimentation. Increased runoff on bare and compacted soils could create gullies and change the overall landscape. The energy conversion facility site is located on nearly level terrain that is not subject to flooding.

Cumulative impacts to vegetation are anticipated to be insignificant and include the effects from existing farming and ranching. Future agricultural use of the area may continue to cause significant changes to the landscape as well. Based on current land use regimes, this and future projects should have an insignificant impact on vegetation, as most areas have been altered from their natural state.

Resource protection measures for vegetation resources include the following:

- An integrated weed management plan for the project will be developed prior to construction.
- All construction materials and debris will be removed from the work area in a timely manner.
- Construction vehicles and equipment will be maintained in proper operating condition and will be cleaned to prevent the spread of noxious weeds.
- Forested habitat (shelterbelts), especially those bordering wetlands, will be avoided wherever possible.
- If native prairie is disturbed during construction, existing topsoil will be carefully salvaged and replanted with native grasses. Planting will be conducted in a timely manner to minimize invasion of noxious or undesirable weed species.
- Noxious weeds will be controlled during construction and operation.

- Noxious weeds can be spread from unwashed construction equipment, vehicles transporting noxious weed-inoculated soil or plant materials into previously un-infested areas, or from transfer of topsoil inoculated with noxious weeds. Noxious weeds typically are fast-growing and can displace native species or inhibit reestablishment of native grasses, forbs, and shrubs. Caution will be exercised as part of the mitigation measures to avoid the introduction or spread of noxious weeds by requiring that construction equipment and vehicles are free of soil and debris prior to entering the construction area. Vehicle cleanings will be employed to prevent the spread of noxious weeds.
- Fugitive dust poses a potential impact to local plant communities during proposed project construction, operation and future maintenance. Fugitive dust is defined as dust that is not emitted from a definable point source, such as industrial smokestacks. Construction equipment, travel on existing and newly constructed gravel access roads, and soil disturbance are all sources of fugitive dust. Fugitive dust can interfere with plant growth by clogging stomata (i.e., pores), thereby reducing gas exchange with the environment, and reducing light interception. To minimize fugitive dust impacts from construction on vegetation, Basin Electric will ensure the projects comply with BMPs such as road watering, revegetation of disturbed soils, placement of non-dusting granular material for driving surfaces, installation of windbreak fencing or tree plantings, etc.

Vegetation communities such as forested communities, wetlands, and native grassland will be avoided to the greatest extent feasible. Minimal tree clearing or removal within forested shelterbelts will occur during the construction.

If native prairie is disturbed during water pipeline construction, existing topsoil will be carefully salvaged and replanted with native grasses. A revegetation plan that includes a recommended seed mix for the water pipeline ROW is described in Section 3.9.2.

Through the implementation of resource protection measures and the revegetation plan for the proposed project, impacts to vegetation within the energy conversion facility site, and along the water pipeline and transmission line ROWs are expected to be short-term in nature. Areas that are disturbed by construction equipment are expected to recover naturally with vegetative reestablishment or will be reseeded after the construction equipment is permanently removed.

3.6.6.2.2 Wildlife

Construction of the project will not have significant direct and indirect impacts on wildlife in the project area. Short-term construction noise and activities could affect wildlife by temporarily frightening them from the area. Installation of an underground water pipeline could temporarily displace wildlife through short-term loss of habitat. However, habitat in the area is suitable to support any wildlife displaced by construction of the project. The increase in human activity in the project area might also temporarily disrupt wildlife use, resulting in an insignificant indirect impact.

If construction occurs during the raptor breeding season (time dependant on species), surveys will be conducted to ensure the project does not affect breeding raptors in the area. If construction occurs at any time between March 15 and September 1, avian nesting surveys will be conducted by a qualified specialist to avoid the take of nesting avian species. If special status or migratory species were found nesting within the energy conversion facility site, transmission line ROW, water pipeline ROW, or water well site, USFWS will be consulted to identify measures

to minimize impacts and avoid the take of breeding birds. The majority of the resident and migratory bird species that may be found within the project area are protected under the MBTA.

The majority of jurisdictional wetlands and surface waters within project ROW and site will be directionally drilled to avoid long- and short-term impacts to wetlands and the species associated with them. Trenching, along with appropriate mitigation measures, may also be used. Basin Electric will minimize direct and indirect impacts to fish and other aquatic species in the project area. If a particular area is not directionally drilled, and the crossings are trenched, construction may result in short-term impacts to fish, reptiles, amphibians, and aquatic invertebrates that may occur in the area. Most of the impacts to aquatic resources will occur as a result of the construction process. Sedimentation in aquatic ecosystems can have adverse impacts as it may cover strategic feeding, resting, and breeding habitats. Sediment and turbidity can also be directly toxic to some aquatic species either through physical actions (e.g., abrasion and clogging of respiratory structures) or via chemical interactions. Erosion of exposed sediments or accidental hazardous spills from equipment may result in short- or long-term impacts. However, the project ESCP and SWPPP will help prevent impacts to aquatic habitats during construction.

Through implementation of resource protection measures, standard design measures (horizontal directional drilling under wetland and surface waters) construction of the project is not likely to have long-term, adverse impacts to wildlife species.

3.6.6.2.3 Threatened and Endangered Species

Impacts to threatened and endangered species are unknown at this time, but are not anticipated. Impacts and mitigation measures for potential impacts will be addressed in the project EIS.

3.6.7 Aquatic Ecosystems

Resource protection measures for threatened and endangered species include the following:

- USFWS and SDGFP have been consulted to identify known locations of any rare, threatened, or endangered species in the project area. If any unanticipated threatened or endangered species are encountered during construction, all ground-disturbing activities in the immediate area will be stopped immediately until consultation with the appropriate resource agency can occur.
- If any federally listed or candidate species is found within the construction areas, USFWS will be notified and consulted on the appropriate avoidance or mitigation measures to minimize impacts to special status species. A Biological Assessment will be prepared for the project and thoroughly address impacts and mitigation measures for federally listed species.
- Basin Electric will also conduct nesting surveys during if construction occurs during the avian breeding season, to avoid the “take” of a nest or bird protected under the MBTA.
- Basin Electric will comply with all stipulations provided by USFWS in the Biological Assessment and ensure compliance with the ESA and MBTA.
- Construction activities will comply with the SWPPP, ESCP, and SPCC Plan.
- SDGFP has been consulted for known locations of any rare, threatened, or endangered aquatic species in the proposed project area. If any unanticipated threatened or endangered species are encountered during construction, all ground-disturbing activities in the immediate area will be stopped immediately until consultation with the appropriate resource agency can occur.

3.6.7.1 Existing Environment

3.6.7.1.1 Wetlands

Four palustrine emergent wetlands were delineated within the Deer Creek Station site totaling approximately 3.24 acres (Exhibit 3.6-12). These wetlands are associated with a drainage that is likely inundated during a portion of the growing season. The unnamed drainage is a tributary to another unnamed drainage that is a tributary to Deer Creek; the Deer Creek confluence is downstream, approximately 1 mile south of the Deer Creek Station site. Deer Creek is a tributary to the Big Sioux River; the confluence is located approximately 20 miles southwest of Deer Creek Station site. A small freshwater emergent wetland area was delineated within the transmission corridor.

The well siting area contains palustrine emergent wetlands that total 20.42 acres. These wetlands are associated with the perennial Deer Creek and adjacent topographic depressions that are primarily located on the southern half of the siting area. Deer Creek flows through the center of the well siting area flowing from east to west. Wetland vegetation includes bog yellowcress (*Rorippa palustris*), creeping foxtail (*Alopecurus pratensis*), barnyardgrass, and reed canarygrass.

Deer Creek is a perennial drainage that flows east to west through the well siting area and is a tributary to the Big Sioux River. The confluence of Deer Creek and the Big Sioux River is located approximately 19 miles southwest of the well siting area.

3.6.7.1.2 Fisheries

Aquatic habitats are not present on the Deer Creek Station Site, transmission corridor, or well siting and water pipeline area.

3.6.7.1.3 Sensitive Aquatic Species

State listed aquatic species that could potentially occur in eastern South Dakota include the northern red belly dace (*Phoxinus eos*), banded killfish (*Fundulus diaphanous*), blacknose shiner (*Notropis heterolepis*), Sturgeon chub (Macrhybopsis gelida), and Topeka shiner (*Notropis topeka)*. The northern red belly dace has been recorded west of the project area in unnamed drainages potentially connected to Deer Creek. There are no known documented occurrences of the banded killfish, blacknose shiner, or sturgeon chub within the project area. Surveys will be conducted for the Topeka shiner, which is also protected as a federally threatened species.

3.6.7.1.4 Topeka Shiner

USFWS listed the Topeka shiner (*Notropis Topeka)* as federally endangered in January 1999. This species generally occupies small, prairie streams with groundwater inputs, high water quality, and sand or gravel substrates (SDGFP 2003). Some Topeka shiner habitats in South Dakota include streams with silt substrates, off-channel backwater areas, borrow pits, and sloughs connected to occupied streams. Topeka shiners have been collected in varying abundance from streams with incised channels, high bank erosion, and intensive grazing pressure along the riparian zone. No Topeka shiner critical habitat is designated in South Dakota. This species is known to occupy tributaries of the James, Vermillion, and Big Sioux rivers in South Dakota. Surface waters in the project area, including Deer Creek (and its tributaries), are tributaries to the Big Sioux River.

According to the South Dakota Wildlife Diversity Program Sensitive Species database (SDGFP 2008b), Topeka shiners were recorded in an unnamed tributary to Deer Creek in 2000, approximately 1.5 to 2 miles north (and upstream) of the project location. Suitable habitat does not occur at the Deer Creek Station Site for this species.

Deer Creek, a perennial surface water with a sand-and-gravel substrate flows through the well site. On average, the creek is approximately 5 to 10 feet wide and 1 to 3 feet deep. Deer Creek and its tributaries provide potential habitat for Topeka shiners. USFWS has requested that Basin Electric move forward with the project with the assumption that Topeka shiners do occur in the project area and implement and/or mitigation measures to protect its stream habitat.

3.6.7.2 Environmental Effects on Aquatic Ecosystems

Construction of the energy conversion facility and water pipeline are anticipated to have short-term direct impacts to wetlands. Construction of the well site is anticipated to result in the permanent loss of wetland area as the wells may be built in or adjacent to wetland area. The wetland within the transmission corridor will be avoided via spanning transmission structures outside of the wetland area. Construction impacts are not expected to cause significant impacts on wetlands. The jurisdictional status of wetlands in the project area will be determined by USACE and wetland mitigation will be done in compliance with direction from USACE. Basin Electric will obtain and adhere to permit(s) required by USACE. A thorough assessment of impacts will be discussed in the EIS for the project.

Trees are uncommon in the grasslands of eastern South Dakota and there are trees within the Deer Creek Station site that may need to be removed during energy conversion facility or water pipeline construction. To minimize impacts to riparian species, Basin Electric will construct around riparian and wetland communities to the greatest extent feasible.

The general arrangement of the energy conversion facility components was designed to minimize impacts to wetlands to the greatest extent feasible. Construction may result in short- or long-term effects on surface waters and/or groundwater from erosion of exposed sediments during construction or accidental hazardous spills from construction equipment. Construction-related impacts to water quality will be minimized or avoided with the implementation of mitigation measures and as stipulated under Section 404 of the Clean Water Act (CWA). To reduce the potential for a hazardous materials release during the construction phase, work will be planned and performed in accordance with Occupational Safety and Health Administration (OSHA) standards and protocols addressing the use of potentially hazardous materials and applicable federal and state environmental regulations. If a release occurred, cleanup, management, and disposal of contaminated soils will be conducted according to EPA and state standards, including following contingency planning as established in the SPCC Plan for the energy conversion facility site and site-specific emergency response procedures. Silt fencing and other mitigation measures will be implemented to mitigate sedimentation and erosion from construction activities in proximity to wetlands.

Construction could result in the direct loss or degradation (from sedimentation) of some ephemeral aquatic habitats used by breeding amphibians in surface waters within the energy conversion facility site or project ROW areas. If contamination of surface water occurred, it could lead to acute and chronic impacts to waterfowl, waterbirds, fish, amphibians, reptiles, and aquatic invertebrates. The risk of contamination impacts will be minimized through implementation of mitigation measures including an SPCC Plan, SWPPP, and the ESCP.

Operational impacts will occur throughout the planned life of the energy conversion facility. The majority of the direct impacts to wetlands and riparian communities within the energy conversion facility site will result from the construction process. Buffers created during energy conversion facility construction will be maintained after the energy conversion facility and associated facilities are developed to continue to minimize the effects of erosion, sedimentation, and soil compaction that may result from ongoing vehicle access within the site boundaries. Major access roads will be surfaced with asphalt pavement. Pavement of access roads increases the impervious surface of a given area and can result in increased runoff, erosion, and sedimentation into adjacent waterways. The roads will be engineered to minimize these impacts to reduce indirect impacts to vegetation, wetlands, riparian communities, and surface waters within the road ROWs.

Water needed for operation of the energy conversion facility will come from the Big Sioux Aquifer. Wetlands and riparian communities should not be affected by a reduction in groundwater during operation. Possible impacts to surface waters, wetlands, and riparian communities from contamination will be mitigated through energy conversion facility design, mitigation measures, and in accordance with the South Dakota Pollutant Discharge Elimination System General Industrial Stormwater Permit, and the CWA, and Section 404.

3.6.8 Land Use and Local Land Controls

The land use area for the project is defined as the energy conversion facility site and the associated features including the wells and water pipeline and transmission line. The energy conversion facility site, the water wells and water pipeline and transmission line are located in Brookings County in Sherman and Richland townships.

The project is compatible with the present land uses of the surrounding area. Basin Electric currently owns the Deer Creek Station site land and the project will be in the vicinity of an existing substation. The addition of the project will have minimal direct or indirect impacts on existing features of the landscape, though construction will temporarily be more visible in the area. The depth of cover over the buried water pipeline will be at least 72 inches, and will allow normal agricultural operations to occur after construction is completed. The energy conversion facility site is currently under crop cultivation and the well siting area is cultivated crop and pastureland area.

Brookings County has an adopted zoning ordinance, and a comprehensive plan. The project is located within the Agricultural (A) zoning district. The agricultural zoning district is designated “to maintain and promote farming and related activities within an environment which is generally free of other land use activities. Residential development will be discouraged to minimize conflicts with farming activities and reduce the demand for expanded public services and facilities” (Brookings County 2007). Re-zoning will not be required and the Deer Creek Station site will remain zoned as Agricultural.

According to the Brookings County Comprehensive Land Use Plan (Brookings County Planning Commission 2000), and Sherman and Richland Township development maps, Deer Creek Station is located within an Area of Development Stability. Although the primary focus of the Area of Development Stability is intended as agricultural, the use allows industrial site construction; the project will be a compatible land use. Basin Electric is in the process of obtaining approval of a Conditional Use Permit application with Brookings County for construction of the project. There are no ordinances in place known to restrict development of an energy conversion facility and it is not anticipated that there will be future ordinances that might restrict the project. Basin Electric will secure all required planning and construction permits from authorizing jurisdictions. All of the appropriate county codes and regulations will be followed. Exhibit 3.6-13 shows the land uses within the project area.

3.6.8.1 Measures to Ameliorate Adverse Impacts

The project has been sited within agricultural areas. During construction, vehicular and emergency access to all separately owned land will be controlled at all times. No off-site soils or mud will be tracked onto public paved roads. Construction hours for the project will be limited to daytime hours as required by local county permitting to limit noise impacts to adjacent residences. Measures to ameliorate adverse economic land use impacts in agricultural areas are described in Section 3.8.1.5.

3.6.9 Air Quality

3.6.9.1 Existing Conditions and Project Overview

All counties in the affected area surrounding the proposed site have been designated as attainment areas (or unclassifiable) for all existing national ambient air quality standards (NAAQS), including the 8-hour ozone and fine particulate matter with mean aerodynamic diameter smaller than 2.5 microns ($PM_{2.5}$) standards. Restrictions associated with Class I Areas are not applicable to the project area. Certain national parks, wilderness areas, and national wildlife refuges are designated federal Class I Areas. In general, allowable ambient air quality impacts within and near Class I Areas are more restrictive than allowable impacts within attainment areas. If a proposed new major source of emissions is located within approximately 300 kilometers (km) of a Class I Area, the applicant is required to demonstrate, through air quality modeling, that emissions from the proposed project will not cause or contribute to any violations of allowable increments within the affected Class I Area. Applicants are also required to evaluate potential impacts to air quality related values within the Class I Area, including visibility. There are no Class I Areas within 300 km; the nearest Class I Area to the Deer Creek Station Energy Conversion Facility is the Badlands National Park located approximately 420 km (260 miles) west-southwest of the facility. All other Class I Areas are located more than 450 km from the facility.

Emission units at Deer Creek include the combustion turbine (CT) heat recovery steam generator stack (HRSG), emergency diesel generator, and emergency diesel fire-water pump. These units have the potential to emit the following Prevention of Significant Deterioration (PSD) pollutants (i.e., pollutants for which PSD significance levels have been established in 40 CFR 52.21):

- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Volatile organic compounds (VOC)
- Sulfur dioxide (SO_2)
- Particulate matter (PM)
- PM with an aerodynamic diameter less than 10 microns (PM_{10})
- PM with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$)
- Sulfuric Acid Mist (H_2SO_4)

The energy conversion facility will also have an emergency diesel generator (EDG) and emergency diesel fire-water pump (FWP). The EDG will supply power to the essential service motor control centers during an interruption of the electrical power supply to the energy conversion facility site, including building heat and fuel supply systems, plant communication systems, and essential emergency lighting. Based on preliminary design calculations, the EDG will be designed to provide 2,000 kilowatts of power during emergency situations, and the FWP will be designed at 577 horsepower to provide water at a rate of 3,000 gpm. The diesel engines will be designed to fire low-sulfur diesel fuel. Both engines will be used only in case of an emergency and for periodic testing.

3.6.9.2 Potential Effects

The energy conversion facility meets the definition of a major stationary source, so all regulated air pollutants emitted at a rate above the "significant" rate are subject to PSD review. The PSD significant emission rates are included in 40 CFR 52.21(b)(23) a, and are summarized Table 3.6-3 along with potential emissions from the Deer Creek Station. Based on emission calculations, the energy conversion facility will be subject to PSD review for CO, NO_x, and PM (including PM_{10} and $PM_{2.5}$).

Table 3.6-3:
Comparison of PSD Significant Levels and Expected Annual Emissions

NSR Regulated Pollutants	PSD Significant Level (tpy)	Deer Creek Station Potential-to-Emit (tpy)	Does PTE Exceed the Significant Level? (Yes/No)
Carbon Monoxide	100	256.0	Yes
Nitrogen Oxides	40	119.1	Yes
Sulfur Dioxide	40	11.7	No
PM (total)	25	80.1	Yes
PM_{10} (total)	15	80.1	Yes
$PM_{2.5}$ (total)	10	80.1	Yes
Ozone (VOC)	40	28.8	No
Lead	0.6	3.60×10^{-4}	No
Sulfuric Acid Mist	7	2.21	No

Results of the air quality impact modeling will be summarized in PSD Air Quality Construction Permit Application and the EIS. Detailed impact modeling, including a description of the methodology used to conduct the impact modeling will be included in appendices to the PSD. In accordance with the May 16, 2008, New Source Review implementation rule, PM_{10} emissions were used as a surrogate for $PM_{2.5}$ to demonstrate that emissions from the energy conversion facility will not exceed the applicable significant impact level or PSD increment, and to demonstrate compliance with the PM_{10} and $PM_{2.5}$ NAAQS.

Based on emission calculations, NO_x and SO_2 emissions from the energy conversion facility CT/HRSG will meet the applicable 40 CFR Part 60 Subpart KKKK New Source Performance Standards (NSPS) requirements. In addition, to the NSPS emission standards, Subpart KKKK requires initial performance tests be conducted to demonstrate compliance with the emission standards, as well as emissions monitoring, record keeping, and reporting requirements.

Short-term impacts from construction activities can be expected. These include fugitive dust from off-road travel and exhaust from contractor vehicles and construction equipment. Significant impacts associated with vehicle emissions operations from employees commuting to the Deer Creek Station are not anticipated.

No significant project-related industrial growth is expected to accompany the Deer Creek Station project.

3.6.9.3 Proposed Mitigation

To ensure compliance with the applicable stationary compression ignition internal combustion engines (Federal Register 71 FR 39154) NSPS emission standards and South Dakota air quality regulations at Chapter 74:36:07:88, Basin Electric will utilize emission control technologies including combustion controls and selective catalytic reduction and will utilize engines that meet applicable air standards. Emissions from the CT/HRSG will be controlled using Best Available Control Technologies (BACT). The complete BACT analysis for Deer Creek is included in the PSD Air Quality Construction Permit Application, provided in Appendix A. Based on the BACT analysis, emissions from the CT/HRSG will be controlled using dry low-NO_x burners and selective catalytic reduction. The exhaust gas will be ducted through a 150-foot stack.

Construction impacts will be mitigated by limiting off road vehicle speed to less than 25 miles per hour when traveling off-road and shutting off motors when not in use.

A detailed analysis of emissions forecasts and regulatory review can be found in the Deer Creek Station PSD Air Quality Construction Permit Application, provided in Appendix A (Basin Electric 2009a). Basin Electric will be compliant with the PSD permit that is issued by SDDENR. The energy conversion facility will use BACT to control air emissions.

3.7 Time Schedule

Deer Creek Station Project construction is anticipated to start in July 2010 and continue for approximately 1.5 years. Startup and commissioning is expected to take 9 months and commercial operation of the energy conversion facility is anticipated in June 2012. Startup and commissioning is expected to take 9 months and commercial operation is anticipated in

June 2012. The operational life of the energy conversion facility, water wells and water pipeline, and transmission line is anticipated for an average of approximately 42 years.

The major milestones for the energy conversion facility, transmission line, and water wells and water pipeline are listed in Table 3.7-1.

Table 3.7-1:
Major Schedule Milestones

Activity	Schedule
Start Construction	July 2010
Sitework/Excavation/Grading/Piling	July 2010 through Oct 2010
Construct Water Supply Wells and Pipeline	Aug 2010 through Nov 2010
Transmission Line	April 2011 through May 2011
Foundation Construction	Sept 2010 through June 2011
Steel Erection	Jan 2011 through Sept 2011
Boiler HRSG Erection	Jan 2011 through Jan 2012
Energy Conversion Facility Mechanical and Electrical Construction	Sept 2010 through Jan 2012
Gas Turbine Erection	Dec 2010 through June 2011
Steam Turbine Erection	Dec 2010 through Aug 2011
First Fire	Jan 2012
Steam to Turbine	Mar 2012
Commercial Operation Date	June 2012

3.8 Community Impacts

This section identifies and analyzes the effects of construction, operation, and maintenance of the energy conversion facility, water wells and water pipeline, and transmission system on economic, employment/labor market, infrastructure, community services, taxation, housing, agricultural production, and transportation within the designated affected area. Under SDCL 49-41 B-6, the SD PUC is required to designate the affected area relative to this filing and also to designate a local review committee within 30 days after the filing of the notification of intent. In ARSD 20:10:22:01 (1), "affected area" is defined as "that area which may be affected environmentally, socially, aesthetically, or economically by the location of a facility at a proposed site."

At its January 27, 2009, meeting, the SD PUC considered the request for waiver of the 30-day requirement of designation of the affected area and the local review committee and discussed the designation of the affected area and the local review committee. The SD PUC unanimously voted to grant the request for waiver of the 30-day requirement of designation of the affected area and the local review committee.

After discussion, the SD PUC determined that the affected area for the project is an area within 12 miles of the site of the facility located entirely within Brookings and Deuel Counties, Brookings School District 051, Deubrook School District 05-6 and Elkton School District 05-3, and the cities of Astoria, Aurora, Brookings, Bushnell, Elkton, and White. The affected area does not include any tribal lands. Exhibit 3.4-2 shows the designated affected area for the project.

In accordance with SDCL 49-41 B-6, the SD PUC designated the local review committee, which will be comprised of the following individuals, ex officio:

- The Presidents of the Boards of Education of Brookings School
- District 05-1, Deubrook School District 05-6 and Elkton School District 05-3
- The chairs of the Brookings and Deuel County Commissions
- The mayors of the cities of Astoria, Aurora, Brookings, Bushnell
- The communities of Elkton and White
- A representative of Basin Electric Power Cooperative, Inc.

Basin Electric is in the process of garnering support for the project from local communities. Resolutions of community support from the Brookings County Commission, Brookings City Council, Deuel County Commission, Elkton City Council, and Hendricks, Minnesota Economic Development Authority are provided in Appendix B. More community visits are planned in July 2009; future resolutions of support will be submitted as supplemental information as it is obtained.

The project is not expected to substantially affect the population, income, occupational distribution, or the integration and cohesion of the adjacent communities. The estimated population of Brookings County 25,931 (Basin Electric 2009c) and is not expected to change on a short-term basis as a result of this project. It is not anticipated that the population of the area will be affected by this project.

3.8.1 Economic Impacts

No adverse impacts to the local communities and governmental facilities or services are anticipated as a result of construction and maintenance of the energy conversion facility and associated water wells and water pipeline and transmission line. It is expected that the project will provide economic benefit by creating employment opportunities, increased demand for locally supplied construction equipment, increased reliability of available electrical power, and additional power for a rapidly expanding area of the region.

The project may have a positive direct impact on economic conditions for the area. Labor expenditures will be spread over time and will include equipment rental, salaries and overtime hours, and benefits for contract supervisors and skilled and unskilled labor. It is expected that construction and operation of the project will result in increased sales tax receipts, both locally and state wide.

In addition to local expenditures by construction workers, other income generated by construction of the project will include local purchases of material. It is likely that Basin Electric will acquire a variety of construction materials, supplies, and fuel in the project area. Construction materials could include fencing, concrete, tools, and other construction-related supplies. Local suppliers of these materials could expect increases in sales during the construction period.

No significant immediate or long-term impact on land values, property taxes, and other taxes of the affected taxing jurisdictions are anticipated as a result of construction and maintenance of the energy conversion facility, water wells and water pipeline, and transmission line. No impacts on

commercial and industrial sectors are anticipated. The impact on housing will be negligible because some of the work force will be local.

Short-term impacts to agriculture within the affected area are expected and will primarily affect 1 year of crop production within project ROW areas. The conversion of agricultural land to the energy conversion facility site area (approximately 100 acres) is expected to have minimal impact on overall crop production within the project area.

3.8.1.1 Commercial and Industrial Sectors

The local economy could benefit from temporary hiring of local and non-local workforce. Payroll taxes will increase income tax revenue. Economic benefits to nearby businesses (in White and Brookings) will likely be increased through the sales of food, goods, services, and lodging that will be generated by the temporary non-local workforce. Some project materials and supplies will be purchased from local businesses. Local purchases could include consumables, fuel, and equipment rental. The increase in consumer demand could boost the local economies. No impacts to the industrial sector are anticipated.

3.8.1.2 Taxes

Taxes will be of greater economic significance to state and local revenues. Based on current tax rates and prior to the application of the discretionary formula, the energy conversion facility is estimated to generate approximately $3.2 million in property tax in the first taxable year after operation. State sales/use tax will also apply to the materials and services used in the operations of the facility.

3.8.1.3 Housing

Table 3.8-1 shows the predicted distribution of construction workers at the peak estimated employment rate of 360 workers. This estimate is based upon the assumption that 250 workers will live within the 12-mile PUC-defined affected area and 110 workers will live outside of the 12-mile PUC-defined affected area. Worker distribution estimates were made based upon the existing available housing stock within each municipality. It is estimated that 30 staff will be needed during the operational phase of the project.

While it is reasonable to assume that most of the operational staff will seek housing within the 12-mile PUC-defined affected area, it is highly unlikely that the estimated 360 workers needed during peak construction will seek housing only within the 12-mile area. According to the U.S. Census, 2,195 of the 16,371 employees working in Brookings County commute to work, and a 1-hour-long commute distance is not uncommon (U.S. Census Bureau 2000). It is expected that most non-local project workers will use temporary housing, such as hotels/motels, recreational vehicle parks, and campgrounds. Most of the temporary workers will likely seek housing in the more populated, service-oriented towns located within a reasonable commuting distance to the energy conversion facility site.

Table 3.8-1:
Total Construction Worker Distribution

City/Town	Number of Workers
Astoria[1]	3
Aurora[1]	9
Brookings[1]	218
Bushnell[1]	1
Elkton[1]	12
White[1]	7
Clear Lake	1
DeSmet	2
Flandreau	3
Lake Benton, MN	1
Lake Norden	1
Madison	4
Pipestone, MN	6
Sioux Falls	64
Watertown	28
Total	360

* Municipality lies within the 12-mile PUC-defined affected area.

The six municipalities within the 12-mile PUC-defined affected area have 448 vacant housing units—more than enough to meet the housing needs of the anticipated 30 operational staff members. There are an additional 3,327 vacant housing units within a one hour commuting radius from the project site (Basin Electric 2009c). The Deer Creek Station social and economic impact study is included as Appendix C.

3.8.1.4 Land Values

The project will be constructed entirely within rural, agricultural areas. Existing land uses will be converted to long-term utility use for the duration of the project's operation. Land values are not expected to be impacted by the project.

3.8.1.5 Agriculture

As depicted in Exhibit 3.4-3, the Deer Creek Station site consists of an area of approximately 160 acres. The energy conversion facility site will occupy approximately 100 acres within the Deer Creek Station site with facility components occupying approximately 40 of the acres. Agriculture within the Deer Creek Station site will temporarily be disrupted during construction, but agriculture in the area outside of the 100 acre energy conversion facility site could be instigated during the operational phase of the project. Agricultural land use along the water pipeline ROW will be disrupted during construction, but will return to agricultural use following construction completion.

Minimal permanent impacts will occur to farmland within the transmission corridor. These impacts will occur primarily due to pole placement. During construction, temporary impacts such as soil compaction and crop damages within the ROW are likely to occur. The permanent impacts to agricultural lands will result in areas where poles are placed. Impacts will be minimized by using

single, steel pole transmission structures which will minimize the area of impact to agricultural areas in comparison to using other transmission structures.

Vegetation within the project ROW will be preserved and protected from damage that may result from construction operations to the extent practicable with adherence to the following mitigation practices:

- To minimize the spread of noxious weeds, construction crews will clean all equipment and vehicles (power or high pressure) of all mud, dirt, and plant parts before entering and leaving the construction area. Basin Electric will be responsible for control of noxious weeds in the area proposed for construction. Suppliers will ensure that gravel and fill imported to the site come from weed-free sources.
- Upon completion of the work, all work areas, except any permanent access roads, will be re-graded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation. Vegetation will also be reestablished by seeding with an approved seed mixture compatible with local soils. These practices will provide proper drainage and prevent erosion. The approved seed mixture can be found in Section 3.9.2.
- After construction, tillable agricultural land will be deeply tilled to alleviate compaction.
- Construction will be delayed after heavy rains to avoid impacts to the soil including compaction.

3.8.1.6 Other Economic Benefits

Licensing and permitting fees as well as purchases of equipment rental leases, equipment maintenance and repairs and storage areas will provide additional economic benefit to the state during construction.

3.8.2 Employment/Labor Market

3.8.2.1 Construction

Project construction will require a workforce with a variety of skills including, but not limited to, general carpenters, iron workers, millwrights, and electricians. Construction is anticipated to begin in July 2010 and continue for approximately 1.5 years. Startup and commissioning is expected to take 9 months and commercial operation of the energy conversion facility is anticipated in June 2012. As reported in the project social and economic impact analysis (Basin Electric 2009c), a labor study for the project was completed by Schumacher Consulting LLC in October 2008. This labor study estimates peak manpower of 360 workers on site in June 2011. The Deer Creek Station social and economic impact study (Basin Electric 2009c) and the Deer Creek Power Project economic impact analysis (Basin Electric 2009b) are included as Appendix C.

It is expected that a portion of the construction work force will be hired locally from Brookings and Deuel County as well as the greater Brookings area. Recruitment of additional construction personnel from outside the affected area will usually include specialists and supervisory personnel who will temporarily relocate to the affected area. Existing temporary housing in the affected area, such as motels and hotels will accommodate this temporary workforce. Table 3.8-2 lists estimated number of jobs during construction of the energy conversion facility, water wells and water pipeline, and transmission line.

Table 3.8-2:
Estimated Number of Jobs during Construction

Date	Number of Jobs	Date	Number of Jobs
July 2010	70	August 2011	273
August 2010	70	September 2011	276
September 2010	70	October 2011	251
October 2010	26	November 2011	208
November 2010	26	December 2011	158
December 2010	108	January 2012	158
January 2011	148	February 2012	158
February 2011	179	March 2012	179
March 2011	161	April 2012	175
April 2011	187	May 2012	112
May 2011	193	June 2012	56
June 2011	289	July 2012	50
July 2011	280	August 2012	48

1 Peak craft manpower was calculated based off of estimated number of jobs by Schumacher Consulting LLC utilizing a 1.25 factor that considers the average manpower loading on large man-hour activities. Peak craft manpower is approximately: (287 x 1.25 factor) = approximately 360.

2 Peak craft manpower was calculated based off of estimated number of jobs by Schumacher Consulting LLC utilizing a 1.25 factor that considers the average manpower loading on large man-hour activities. Peak craft manpower is approximately: (287 x 1.25 factor) = approximately 360.

3.8.2.2 Operation

Once the project is operational, 30 local employees will maintain and operate the Deer Creek Station. No permanent operational employment is expected for the transmission line or water wells and water pipeline, although some temporary maintenance work on these facilities may generate minimal employment during the operational phase of the project.

3.8.3 Infrastructure Impacts

3.8.3.1 Energy

Short-term use of power during the construction phase will be temporary and is expected to have minimal impact on existing power supply. It is anticipated that existing utility providers will provide energy necessary for the operational phase of the project. This energy will be provided utilizing exiting power generation capacity and will not require development of new facilities.

3.8.3.2 Sewer and Water

There will be increased utilization of water and sewage facilities because of the project construction and influx of temporary construction workers utilizing local lodging. The communities of Astoria, Bushnell, Elkton, and White receive their water supply from the Brookings-Deuel Rural Water System. The city of Brookings receives its water supply from underground aquifers and operates two treatment plants. The city of Aurora receives its water supply from the city of Brookings.

The increased demand resulting from the Deer Creek Station construction and/or operational workforce will have no significant impact to the municipalities within the study area. An

engineering report completed by Banner Associates, Inc. in December 2008 articulates water needs, alternatives for meeting water needs, cost estimates, and an implementation plan for the design and construction of the water supply system. In-house potable water for consumption and use in sinks, restrooms, bathrooms, showers, etc. will be provided through a connection to a service line from the Brookings-Deuel Rural Water System.

3.8.3.3 Solid Waste Management

Commercial, industrial, residential, and rural waste generated within the affected area is handled by private contractors. Several private contractors provide garbage and rubbish collection services and must deliver the materials that they collect to a state permitted and approved landfill or rubble site.

Increased utilization of solid waste management facilities will occur as a result of construction and the influx of temporary construction workers utilizing local lodging and services.

The Brookings Regional landfill serves approximately 35,000 people spread out over portions of seven counties. The counties involved are Brookings, Deuel, Hamlin, Kingsbury, Lake, Miner, and Moody. Some of the major cities are Arlington, Brookings, Colman, DeSmet, Estelline, Flandreau, Howard, Toronto, and Volga. The city of Madison is in the Sioux Falls landfill region, although the smaller towns in Lake County are in the Brookings region. The landfill usually handles approximately 32,000 tons of municipal solid waste per year, plus varying amounts of compost trees, scrap metals and petroleum-contaminated soil.

The estimated peak construction force of 360 employees will represent an increase to the service area of approximately 1 percent and will not significantly impact the operations or capacity of the Brookings Regional Landfill. Solid waste generated by construction activities will be managed according to applicable federal, state, and local regulations. Local waste disposal transporters and landfills will be utilized where appropriate. Hazardous wastes, which will be limited to very small volumes, will be transported to permitted hazardous waste disposal facilities by licensed transporters. Basin Electric will be compliant with the SDDENR Storage Tank Section and Water Management Program during construction and operation of the project.

3.8.3.4 Transportation

3.8.3.4.1 Existing Conditions

The project is locally served by a well-defined system of low-volume paved and gravel roadways, essentially located on the grid line defined by the land section lines. Interstate I-29 (I-29) runs north-south and is located 11.5 miles west of the site, and is expected to carry regional traffic generated from southwest and northwest origins. Major east-west highways are South Dakota (SD) Highway 30 about 2.5 miles north of the site and U.S. Highway 14 about 6 miles to the south. The roadways expected to serve the site are shown in Exhibit 3.8-1, which includes year 2008 daily traffic volumes from the 2008 South Dakota Traffic Flow Map. Local roadways that are likely to carry project generated traffic are generally located along the legal land section lines and fall within the jurisdiction of Brookings County, Richland Township, or Sherman Township as listed in Table 3.8-3.

Table 3.8-3:
County and Township Roadways

Roadway	Jurisdiction	Surface
207th Street to 478th Avenue to 482nd Avenue	Brookings County	Gravel
207th Street to 482nd Avenue to 484th Avenue	Sherman Township	Gravel
207th Street to 484th Avenue to MN state line	Brookings County	Gravel
482nd Avenue to U.S. 14 to 207th Street	Brookings County	Asphalt
482nd Avenue to 207th Street to SD 30	Brookings County	Gravel
484th Avenue to U.S. 14 to 207th Street	Richland Township	Gravel
486th Avenue to U.S. 14 to 207th Street	Brookings County	Asphalt
478th Avenue to SD 30 to U.S. 14	Brookings County	Asphalt

There are several bridges that span Deer Creek or its tributaries with posted load restrictions in the affected area at the locations listed in Table 3.8-4.

Table 3.8-4:
County and Township Bridges in Study Area

Location	Jurisdiction	Posted Limits
207th Street to 0.5 mile east of 484th	Brookings County	17T/28T/32T
207th Street to 0.2 mile east of 484th	Brookings County	No Posted Limits-
484th Avenue to 0.2 mile south of 207th	Richland Township	9T/14T/16T

In addition, there are several creek crossings on the county and township road system consisting of single and multi-culvert combinations, comprised of either corrugated metal or reinforced concrete pipe. Routine maintenance of the Brookings County roads and bridges are generally maintained by county forces. The townships contract for their respective maintenance activities.

3.8.3.4.2 Construction Impacts

Two primary modes of transportation will be used to bring shipments of construction equipment and materials into the 12-mile PUC defined study area: rail and truck. Rail shipments on the Dakota, Minnesota, and Eastern (DM&E) Railroad coming into the study area will be offloaded in Aurora and trucked to the project site. Shipments will travel on interstate highways, U.S. highways, and gravel roads maintained by Brookings County and, to a lesser degree, Deuel County.

Heavy haul roads will be utilized to haul construction materials that require precautions beyond normal deliveries to the project site. Construction/operational worker commuting roads will be utilized by construction workers, operational workers, and normal freight deliveries. Heavy haul and commuting routes have been analyzed and are described in the social and economic impact study (Basin Electric 2009c) and the traffic and transportation technical memorandum developed for the Deer Creek Station Project (Basin Electric 2009e); these reports are presented in Appendices C and D, respectively.

South Dakota Department of Motor Carrier Services Permits will be obtained and complied with for the project. Brookings County haul road agreements will be executed prior to construction.

The impact of construction traffic will be addressed in permits issued by the state of South Dakota and by haul road agreements issued by Brookings County. The greatest impact of construction traffic will be experienced on Brookings County Roads because they are not designed for the amount of heavy traffic that will occur during the construction of the project. This issue will be addressed in the Brookings County Haul Road Agreement and will require a post construction inspection to be completed to determine what must be done to return the haul roads to preconstruction conditions. Dusts will be controlled by applying water to gravel road surfaces. Dust control will be addressed regularly during construction.

The Deer Creek Station Project is expected to require up to 360 workers on site at the peak of construction. The majority of the workers are expected to originate from Brookings with others to be in adjacent communities. The distribution of the 360 project-generated trips is summarized in Table 3.8-5, based upon the assumption that 250 workers will live within the 12-mile affected area defined by the SD PUC. The other 110 workers are anticipated to originate from outside of the study area. Worker distribution estimates were made based upon the existing available housing stock within each municipality and to present a worst case scenario, no car-pooling is projected.

Table 3.8-5:
Geographic Distribution of Construction Work Force

City/Town	Workers	City/Town	Workers
Astoria[1]	3	Flandreau	3
Aurora[1]	9	Lake Benton, MN	1
Brookings[1]	218	Lake Norden	1
Bushnell[1]	1	Madison	4
Elkton[1]	12	Pipestone, MN	6
White[1]	7	Sioux Falls	64
Clear Lake	1	Watertown	28
DeSmet	2	Total	360

1 The municipality lies within the 12-mile PUC-defined affected area.

Based on the assumed anticipated geographic distribution of the construction work force, traffic is conservatively estimated to increase on the regional roadway network as shown in Table 3.8-6. These values are based on single vehicular occupancy for all workers, and no consideration for regular absenteeism, which provides a worst-case scenario for traffic flow on local roads.

Table 3.8-6:
Projected Roadway Assignment of Construction Traffic

Route	Traffic Increase (One-Way Trips)
I-29 north of Brookings	29
I-29 south of Brookings	71
U.S. Highway 14 east of I-29	221
U.S. Highway 14 east of 484th Avenue	19
U.S. Highway 14 at Aurora	9
SD Highway 30 from I-29 east	11
Total	360

The impact of operational traffic will be minimal because it will consist largely of motor vehicle traffic to and from the facility. Thirty employees will have no significant impact on traffic patterns or traffic safety. No mitigation is recommended for operational traffic.

3.8.3.4.3 Mitigation

Certain signage and roadway improvements will be provided to allow an adequate roadway network to serve the transportation needs for the Deer Creek Station Project during its construction and operational life.

A comprehensive signing plan, as depicted in Exhibit 3.8-2, will be implemented to route construction and truck delivery traffic along the desired street system as previously discussed and coordinated between Basin Electric and Brookings County. Additional signage will be included in the area as described in the traffic and transportation memorandum (Basin Electric 2009e), which is presented as Appendix D.

Gravel surfaces at approaches to intersections along the designated access routes will be paved for an approximate distance of 300 feet to eliminate washboarding and rutting that occur from deceleration, acceleration, and turning movements. The intersection segments should be paved to the extent necessary to provide the adequate tapers and radii for semi-trailer movements, which may require local ditch grading and location adjustment. The 1-mile segment of 484th Avenue from 207th Street north to the project entrance will also be paved. The improved paved roadway section will consist of 4 inches of asphalt surface course on a minimum of 6 inches of aggregate base underlain by a reinforcement fabric separator. The existing gravel surface could be used as the aggregate base course, but should be inspected and measured to ensure the minimum 6 inches is available or whether additional base will be required. If necessary, the gravel areas will be over-excavated to accommodate the minimum base requirements prior to placement of the reinforcement fabric. In addition to its primary function as a separator, the fabric also provides strength if placed properly.

In an effort to control dust along the gravel section of 207th Street, an appropriate treatment program will be developed in coordination with the county and township. Because the local roadways and bridge structures that will be used fall under several different jurisdictions (Brookings County, Sherman Township, and Richland Township), a multi-party agreement will be developed that clearly defines limits of maintenance responsibility throughout the project. No significant direct, indirect, or cumulative impacts are expected to the transportation systems of cities, counties, or the state.

Transmission line and water pipeline ROW surveying and staking, vegetation clearing, construction, and operation and maintenance of the energy conversion facility will comply with all applicable state and local regulations and permit requirements. Basin Electric will make all necessary provisions for conformance with federal, state, and local traffic safety standards and will conduct construction operations to offer the least possible obstruction and inconvenience to public traffic. No airports are located in the immediate vicinity of the project, and no mitigation to aircraft or airfields is necessary. Basin Electric and its contractors will implement the following mitigation measures to avoid or minimize any potential impacts to transportation routes within the study area:

- Construction vehicles will not exceed the posted weight limit of bridges.
- Construction along or across roads and highways will incorporate an appropriate traffic control plan in accordance with the federal Manual of Uniform Traffic Control Devices (Basin Electric 2009e).
- Permits will be obtained from the South Dakota Department of Transportation for encroachment across highways and from Brookings County and townships for encroachment across local roadways.
- No permanent access roads will be installed without securing an agreement from the landowner.
- All access will be from the nearest existing public roadway and will avoid or minimize intrusion into off-site areas.

3.8.4 Community Services

3.8.4.1 Health Services, Facilities, and Public Safety (Fire Protection and Law Enforcement)

Local health facilities will provide health services to workers during the construction and operation phases of the project. Five health providers—Brookings Avera Clinic, Brookings Sanford Clinic, Brookings Health System (hospital), White Family Clinic, and Elkton/Avera Clinic—provide medical personnel and care.

Health facilities provide a network of outreach and technology programs that augment on-site facilities. During the month of February 2009, representatives from Basin Electric's consultant, First District Association, conducted a survey and weighted questionnaire. Six communities were surveyed, all within the 12-mile radius of the Deer Creek Station site. The survey indicated that there will be no real or perceived health facilities impacts anticipated from the construction or operation of the project.

Law enforcement agencies in the communities adjacent to the project should not experience a significant impact from the presence of the temporary or permanent workforce. Local law enforcement agencies should have adequate full and part-time law enforcement officers to accommodate the additional labor personnel as a result of the project although the project could result in a minor, short-term increase in workloads for those agencies. Little additional demand on local services such as police, medical facilities, fire, or educational services, is expected and there should be no detrimental impact to the community. Basin Electric will work with the local law enforcement, fire departments, and emergency medical services to determine the best course of action and coordinate for effective emergency response.

3.8.4.2 Schools

While it is difficult to determine the specific demographic and "family unit" data on the projected increased labor force, depending on geographical distribution and location, the number of new students wanting to enroll in the local schools as a result of the project will be minimal. Most temporary construction workers do not travel with their families or enroll their children in the local schools. Because of this limited potential for new students, local schools should be capable of providing more than adequate opportunities and accommodations for any new students.

3.8.4.3 Recreation

Recreational opportunities in proximity to the project include swimming, boating, hunting, and photography. The area lakes provide yearly recreational opportunities to residents and visitors.

Some temporary workers may choose to buy hunting and fishing licenses and utilize them during the project construction period. There should be no significant recreational impacts from the project and it is not expected that workers will overtax the many recreational opportunities in the project area.

3.8.4.4 Government Facilities or Services

Local law enforcement agencies should have adequate full and part-time law enforcement officers to accommodate the additional labor personnel as a result of construction. Basin Electric will work with the local law enforcement, fire departments, and emergency medical services to determine the best course of action and coordinate for effective emergency response.

During peak construction, approximately 252 non-local workers are anticipated. No impacts on the existing government facilities or services are expected to occur as a result of the project.

3.8.5 Other Impacts

3.8.5.1 Population and Demographics

Construction on the project is expected to begin in July 2010 and end in January 2012. Approximately 360 workers are expected during peak construction in June 2011. Much of the required Deer Creek Station workforce will consist of workers that must be imported from outside of the state (Basin Electric 2009c). The workforce, peaking at 360 on-site workers, will be made up of approximately 50 percent union and 50 percent non-union labor. Fifty to 60 percent of union workers and 10–20 percent of non-union workers will be from South Dakota. The balance of the workforce will have to be imported from outside the state (Basin Electric 2009c). The Deer Creek Station social and economic impact study and the economic impact analysis are included as Appendix C.

The project construction period will be relatively short in any given area and most non-local workers will not be accompanied by their families during their work tenure. The limited number of permanent employees associated with the project will not significantly affect local populations or demographics.

3.8.5.2 Protection of Human Health and Safety

OSHA and South Dakota's Department of Health have jurisdiction over most occupational safety and health issues within South Dakota. Industrial construction and routine workplace operations are governed by the Occupational Safety and Health Act of 1970, in particular 29 CFR 1910 (general industry standards) and 29 CFR 1926 (construction industry standards). South Dakota's supplemental worker safety and public health standards are codified under Title 34, Public Health and Safety. Public health risks discussed in this section include general construction and operation risks associated with project components.

All construction will be conducted following OSHA and South Dakota Department of Health safety standards and procedures to reduce the potential occurrence of injury to workers. Potential health

impacts to construction workers will include fugitive dust and noise levels typical of construction of an energy conversion facility and associated facilities. Construction workers may be exposed to airborne emissions from routine activities, such as welding, soldering, painting, and cleaning operations. While measures such as watering will reduce the amount of emissions from such activities, some level of fugitive dust emissions will be unavoidable given the nature of the work. Construction work will follow standard best practices including minimizing disturbance areas, minimizing storage piles, applying water or surfactants to exposed areas. In addition, construction-related dust disturbance will be controlled by using paved roads where possible and by limiting vehicle speeds on unpaved roads.

Heavy equipment operations and activities such as cutting metal or grinding operations may pose higher noise levels to workers. These exposures will be intermittent but intense. Construction workers will also be at risk for typical construction site injuries such as trips and falls. Construction workers will be required to wear appropriate personal protective equipment.

OSHA standards will be followed for safe excavation and trenching. An excavation safety program will be developed to protect employees from safety hazards that may be encountered during work in trenches and excavations. This excavation safety program will ensure compliance with the requirements of OSHA's Excavation Standard, 29 CFR 1926, Subpart P. Local jurisdictions will be consulted to identify potential buried hazards within the water pipeline ROW prior to construction.

Two hospitals are located near the Deer Creek Station site: Brookings Health System in Brookings City and Deuel County Memorial Hospital in Clear Lake. Emergency services available to support the energy conversion facility consist of the Brookings and Deuel County Sheriff's Departments. Brookings City has fire department, police department, and ambulance service.

The risk of fire or explosion during construction at the energy conversion facility site is considered to be extremely low. Flammable liquids may include construction equipment fuels, paints, and cleaning solvents. Compressed gases may include acetylene, oxygen, and hydrogen for welding. Hazards associated with these materials will be minimized by following OSHA's construction safety requirements. OSHA requirements will be included in a facility health and safety program. Exposure to risks will vary depending on the number of construction workers performing any particular construction-related task and the length of time that task takes to complete. Total risks associated with construction will be limited to the length of the construction phase, an estimated 1.5 years. Generally, the potential for worker-related injuries or illnesses will likely be the same as those for the occupation nationwide, if not lower. Adherence to OSHA guidelines, utilization of appropriate personal protective equipment, and other exposure-limiting practices will promote illness/injury rates below national averages.

Workers will receive 10 hours of safety training and be required to follow safety procedures and OSHA regulations during workplace operations. The risk to workers or the public from damage to energy conversion facility facilities as a result of accidental or intentional actions by outside parties is low because public access will be controlled. The contractor will maintain in all construction and operations vehicles a current list of local emergency response providers and methods of contact/communication.

The influx of workers during construction, combined with risk associated with construction activities, are factors that may affect local emergency services. Local emergency services can become stressed by the additional workload, interfering with their capabilities to respond or dedicate resources towards the general public. Following OSHA guidelines on safe construction practices and implementing mitigation measures should minimize effects on local emergency services and, therefore, risk to the public.

The construction contractor will establish a health and safety program, including a drug- and alcohol-free workplace that includes pre-employment screening, testing for cause, and random testing and incorporates OSHA standards such as requirements for hearing protection, personal protective equipment, site access, chemical exposure limits, safe work practices, fire prevention plan, and emergency response procedures, including training. The program will be reviewed with plant officials, fire department personnel, and emergency services personnel to ensure emergency response or evacuation plans and procedures are part of construction and operation activities and planning.

Designated construction and operations personnel will be trained in first aid and will provide adequate materials and resources for on-site treatment, first aid, or stabilization. At the end of every workday, contractors will secure all construction areas to protect equipment and materials and discourage public access. Fueling of vehicles will be conducted in compliance with established procedures designed to minimize the risk of fire and fuel spills. Visitors will be required to complete a site-specific safety orientation before entering the energy conversion facility construction site.

The potential for worker-related adverse health and safety-related effects to occur during operations will be low and will occur over the long term, lasting for the duration of the project. Worker injury/illness rates are likely to be the same, if not lower, as those for the occupation nationwide. Adherence to OSHA guidelines, use of appropriate personal protective equipment, and other exposure-limiting practices will promote illness/injury rates below national averages. Potential health impacts to the public from operation at the energy conversion facility site and associated facilities include fugitive dust, noise, and traffic injuries. Dust controls will be implemented during construction. Any fugitive dust and noise impacts will be short term and minor to negligible. Water pipeline design will include reasonable mitigation measures to reduce problems of induced currents into conductive objects within the ROW. Problems of induced currents during operation will be resolved to the mutual satisfaction of the parties involved.

3.8.5.3 Noise Impacts

3.8.5.3.1 Existing conditions

There are minimal noise sources in the study area, with vehicular traffic and farming equipment being the primary sources of existing noise. Accordingly, the background noise levels vary by time of day.

There are two electric substations located to the south of the energy conversion facility site that will contribute to ambient noise especially to residences located close to the substations, located to the south of the energy conversion facility site. Additionally, an existing wind farm is located approximately 3 miles east of the energy conversion facility site and a proposed wind farm may be

constructed to the west of the energy conversion facility site in the future. Because of the distance of the wind farms to the energy conversion facility site, noise associated with the wind farms is not expected to contribute to ambient noise near the site.

An ambient noise survey was conducted in the vicinity surrounding the energy conversion facility site. Background sound level measurements were taken during several time periods on May 19, 2009, and May 20, 2009, to capture the ambient sound levels near the energy conversion facility site. Measurements were made using a Larson-Davis Model 824 sound level meter (Type I sound level meter as specified in American National Standards Institute S1.4-1984/85A). The sound level meter was calibrated before and after each set of measurements. None of the calibration level changes exceeded ± 0.3 decibels (dB). A windscreen was used at all times on the meter, and the meter was mounted on a tripod, approximately 5 feet above ground, with the microphone directed toward the energy conversion facility site.

Strong winds were present during each of the noise survey periods. High wind speeds generate higher noise levels as winds interact with vegetation and other nearby objects and therefore tend to increase ambient noise level readings over times when light wind or still conditions exist.

Sound level measurements were made at seven locations (Exhibit 3.8-3). The Noise Technical Report is included as Appendix E.

3.8.5.3.2 Potential Impacts

Potential noise impacts resulting from implementation of the Deer Creek Station Project include increased noise levels near sensitive noise receivers, such as residences. The closest occupied residence to the Deer Creek Station site is approximately 1 mile away. Eighteen residential structures, both occupied and unoccupied, are located within 2 miles of the site. There are no schools, campgrounds, or commercial buildings within 2 miles of the site. There are several farm buildings and out buildings within 2 miles of the site as well as one mining site.

An analysis was completed to ensure that the energy conversion facility is located and designed appropriately from a noise perspective and to evaluate the noise impact on the surrounding community. The primary sources of noise associated with the project will be construction activities during construction of the facility and the operation of the facility, once it has been constructed.

The project has the potential to cause a localized and temporary increase in ambient noise levels near roadways used for transporting equipment and materials; and around the construction of pipelines, transmission lines, and the energy conversion facility. There will also be an increase in traffic in the area during the construction of the energy conversion facility, water wells and water pipeline, and transmission line that will also temporarily increase noise levels in the area. The actual noise levels generated by construction will vary on a daily and hourly basis, depending on the activity that is occurring and the types and number of pieces of equipment that are operating. EPA has compiled data regarding the noise generating characteristics of specific types of construction equipment and typical construction activities. These data are summarized in Tables 3.8-7 and 3.8-8.

Table 3.8-7:
Noise Ranges of Typical Construction Equipment

Equipment	Noise Levels at 50 feet (Leq, dBA)[1]
Back Hoe	73–95
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Front Loader	73–86
Generators	71–83
Jackhammers	81–98
Paver	85–88
Pile Driving (peaks)	95–107
Pneumatic Impact Equipment	83–88
Pumps	68–72
Saws	72–82
Scraper/Grader	80–93
Tractor	77–98
Trucks	82–95
Vibrator	68–82

[1] Machinery equipped with noise control devices or other noise-reducing design features do not generate the same level of noise emissions as shown in this table.

Source: (Basin Electric 2009d)

Table 3.8-8:
Typical Outdoor Construction Noise Levels

Construction Phase	Noise Level at 50 feet (L_{eq}, dBA)	Noise Level at 50 feet with Mufflers (L_{eq}, dBA)
Ground Clearing	84	82
Excavation, Grading	89	86
Foundations	78	77
Structural	85	83
External Finishing	89	86

(Basin Electric 2009d)

Noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 decibels on the A-weighted scale (dBA) per doubling of distance (Exhibit 3.8-4). For example, a noise level of 84 dBA measured at 50 feet from the noise source to the receptor will reduce to 78 dBA at 100 feet from the source to the receptor, and reduce to 72 dBA at 200 feet from the source to the receptor.

Once the construction of the energy conversion facility nears completion, a short-term occurrence of loud steam blows will likely impact nearby neighbors. The steam blows are necessary to remove debris in the steam turbine prior to initial startup of the units. The steam blows will occur during the daytime for approximately two to four weeks depending on the number of blows that are required to meet the cleanliness requirements of the steam turbine vendor. The typical sequence time is 5 minutes per blow and 30–60 minutes between blows to re-fill the drums, heat the water, and re-pressurize.

The steam blows are expected to be near 115 dBA at 3 feet from the steam vents. This noise level will be approximately 55 dBA at the nearest residence when it occurs.[1] Because this is a short-term event, this noise level will not significantly impact the nearby residences. Construction vehicles and equipment will be maintained in proper operating condition and equipped with manufacturers' standard noise control devices or better (e.g., mufflers and engine enclosures). Construction hours for the installation of the water pipeline and transmission line will be limited to between the hours of 7:30 a.m. and 7:30 p.m. to limit noise impacts to adjacent residences.

To evaluate expected noise levels from the operation of the project, noise data for sources (such as the combustion turbines, steam turbines, cooling systems, and various other lesser sources) from the project were modeled. In the model, attenuation was included for sound propagation over vegetation, terrain, barriers, and shielding. The maximum increase in noise levels at the sensitive noise receivers is projected to increase by no more than 6 dBA over the background noise levels. This noise level is considered noticeable, but is not perceived as a doubling of the sound level at the receiver.

The Department of Housing and Urban Development (HUD) has development guideline noise levels for HUD housing. This level is 65 dBA L_{dn}, where L_{dn} is a day-night average noise level in which a 10-dB penalty is applied to the nighttime noise levels. Essentially, the nighttime noise level should be below 55 dBA and the daytime noise level should be below 65 dBA. Since the greatest contribution to noise levels in the area at any residence is modeled to be 45 dBA, the Deer Creek Station Project will be within the HUD guideline noise levels.

The project lies within Brookings County and Deuel County agricultural zoning areas. There are no specific noise-sensitive areas or restrictions articulated by county code except in relation to wind farm operations; wind farms are required to operate facilities below a 50 dBA. There are no designated noise-sensitive areas within the PUC-defined affected area.

An adequate buffer will be maintained around the energy conversion facility, transmission line, and wells and water pipeline to minimize operational noise impacts on area residents. Equipment design will also be incorporated to minimize noise at the source. Audible noise and the generation of electric and magnetic fields during operation of the project will be addressed as necessary on a case-by-case basis.

During construction and operation, Basin Electric will comply with any applicable noise guidelines. Equipment design will be incorporated to minimize noise at the source.

[1] For reference, 60 dBA generates sound levels similar to an air-conditioner condenser at 15 feet or nearby highway traffic.

3.8.5.4 Visual Impacts

Visual or aesthetic resources include the natural and man-made features of a landscape. This section describes the landscape character and built facilities in the project area. Landscape character is defined as the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique (USDA 1995).

Visual resource specialists reviewed maps and geographic information system (GIS) data of the affected area to determine the most appropriate places to survey key observation points (KOPs) to assess the visual resources of the affected area and the energy conversion facility would have on those resources. KOPs are defined by the U.S. Bureau of Land Management (BLM) as (1) critical viewpoints along travel routes or use areas where the view of the project will be most revealing and (2) typical views encountered in representative landscapes (BLM 2006). Field reconnaissance conducted in early December 2008 included touring and photographing both potential energy conversion facility sites and their respective transmission corridors. The most critical KOPs were selected to create photographic simulations of the visual effects of the energy conversion facility site. The impacts to visual resources were assessed using a combination of the photographic simulations, KOP photography, field observations, and GIS data.

3.8.5.4.1 Existing Environment

The landscape around the Deer Creek Station site is characterized by gently rolling agricultural fields broken up by deciduous windbreaks. The dominant features on the landscape are associated with electrical utilities, including two electrical substations, the 345-kV transmission line mentioned above, and other smaller 115-kV transmission lines. The 345-kV line forms the western border of the site. A large, utility-scale wind farm consisting of more than 200 wind turbines approximately 5 miles southeast of the site can be clearly seen on the horizon. Each wind turbine is estimated to be more than 300 feet tall from the ground to the tip of the blade. Within 1 mile of the site, an additional 15 turbines are approved for construction in association with the White Wind Farm. Once constructed, they will be the most visible objects on the landscape in views towards the north and west. Exhibits 3.8-5 and 3.8-6 illustrate both the agricultural and industrial land uses of the site.

Given the overall landscape characteristics, the Deer Creek Station site does not qualify as being especially scenic. The site is dominated by agriculture and has existing utility infrastructure associated with it. The future White Wind Farm, which will be constructed in close proximity to the site, also takes away from the area's natural scenic quality.

While the presence of rolling hills and several creek drainages near the site may create a more aesthetically interesting physical landscape, the dominating presence of two substations and a large transmission line detract from the scenic quality. Given these sets of circumstances, the scenic quality at the site can be classified as low.

Exhibit 3.8-5: KOP-02, Looking Northeast

Exhibit 3.8-6: KOP-03, Looking Northwest

3.8.5.4.2 Potential Impacts

The project, specifically the energy conversion facility and transmission line will introduce new or different elements into the predominantly gently rolling terrain of eastern South Dakota and will alter the existing form, line, color and texture that characterize the existing landscape.

Impacts to the visual resources of the project area will include increased off-site vehicular traffic from maintenance and employee vehicles along major roads in and around the area during the construction phase. Site clearing and associated dust, borrow pit excavation, commissioning (steam blowout), and well drilling will also contribute to the visual impacts on the existing landscape. The presence of one or more large cranes will represent the most visible equipment or facilities used during the construction phase. In general, construction activities will create high visual contrasts during a short period of time in areas within 4 miles of the site, depending on the phase of construction and the location of the viewer.

Most of the project's components will be level with or slightly above the horizon once constructed. These components' blocky, angular forms and smooth-textured, engineered appearance contrast with the forms, lines, colors, and textures of the existing landscape character. Such components include the following:

- Internal paved roads
- Local road modifications and primary access points
- Stormwater channels
- Onsite parking

- Water and natural gas supply system, including underground pipelines
- Evaporation pond
- Security fencing
- Water wells control building and associated transformer
- Pitless water well units
- Off- and on-site signage

Contrasting components with moderate height include the following:

- Air cooled condenser (100 feet)
- Turbine building (93 feet)
- Administration building (22 feet)
- Ammonia storage tanks (18 feet)
- Water and wastewater treatment buildings (34 feet)
- Transformers (10 feet)
- Switchyard (75 feet)
- Water storage tanks (48 feet)

The tallest structures and equipment associated with the project include the following:

- HRSG (150 feet)
- Transmission line structures (120 feet)

Buildings on the energy conversion facility site will be constructed with a light blue metal siding, dark windows, and a dark blue metal roof. Storage tanks will be painted white. The HRSG and associated structures will be constructed with a light gray/silver metal. The transmission structures and associated switchyard equipment will be constructed using light gray galvanized steel. A chain link fence with lock and gate and posted warning signs will be constructed around the energy conversion facility to minimize a possible hazard of the gas turbine.

Several effects to visual resources will result from the introduction of the project once constructed. The transmission structures and HRSG equipment will introduce prominent vertical lines perpendicular to the landscape that will create a moderate to strong contrast with the horizontal to generally horizontal plane of the surrounding landscape. The air-cooled condenser and turbine building will introduce large, angular block forms to the horizontal landscape. The light blue metal siding of buildings will introduce a color contrast to the landscape, because there may be a glare from the buildings when sunlight is reflected off the metal siding.

The Federal Aviation Administration (FAA) does not require notification for the construction of facilities that are less than 200 feet in height (FAA 2007), so it is not anticipated that FAA will require fitting of either daytime or nighttime indicator lights for the Deer Creek Station. However, there will be some general facility lighting that will be installed to provide safe and effective operation of the facility at all hours. These lights will introduce a new visual element to the landscape. During daylight hours the lights may be visible, but they will not be intrusive to viewers in the affected area and are unlikely to create a high visual impact. The lights will be most noticeable during nighttime hours from residential properties within 1 mile of the energy conversion facility. Although visual resources from some vantage points will be affected because

of the facility lighting, impacts at the community level are expected to be less significant because it is a sparsely populated rural area.

The degree of contrast between the energy conversion facility and the surrounding landscape will depend on the distance of the facility from an individual viewpoint. The strong vertical lines of the transmission structures and the HRSG, together with the angular block forms of the air cooled condenser and turbine building, will dominate the landscape in the immediate foreground (up to 0.5 mile) of unobstructed views from individual viewpoints located on county roads and residences. The contrasts will be moderate in middleground views up to 4 miles, because the tallest structures will still be visible, but these structures will not be the dominant features on the landscape. Some structures of moderate height and most structures of low height will be screened by rolling topography and standing crops from some views. The textures of structures on the energy conversion facility site will be indiscernible from distances of more than 4 miles. However, the form and color of the largest structures (transmission structures, HRSG, air-cooled condenser, turbine building) may still be visible depending on atmospheric conditions, and may create a low to moderate contrast with the surrounding landscape.

As described above and shown in Exhibit 3.8-7, the turbine building, transmission structures, and the HRSG will be highly visible in views to the north, west, and south from the county roads near the Deer Creek Station site. These tall vertical structures will create a high degree of contrast with the surrounding landscape. The existing 345-kV transmission line can be clearly seen on the horizon. Several turbines of the White Wind Farm will also be visible in the view. These turbines will be the tallest and most visible objects on the landscape, with a ground-to-nacelle height of approximately 300 feet. The presence of the 345-kV transmission line, together with the future presence of the wind turbines of the White Wind Farm, create a situation where the visual impacts of the project will be reduced from a high degree of contrast to only a moderate degree of contrast. The angular block form and light blue color of the turbine building will create some degree of visual contrast, but its impacts will be lessened when compared to a site that was completely free from industrial or utility development. When viewed from longer distances of up to 4 miles, the visual impacts of the energy conversion facility will be further reduced from moderate to low, because dozens of turbines from the existing wind farm southeast of the site and the proposed White Wind Farm will be visually dominant on the landscape. The turbines will appear almost twice as tall as the HRSG on the energy conversion facility site when viewed from distances of more than 4 miles, creating a situation where the visual impacts of the energy conversion facility site will be insignificant.

3.8.5.4.3 Proposed Mitigation

During construction and operation of the energy conversion facility, water wells and water pipeline, and transmission line, the contractor will exercise care to preserve the natural landscape and will conduct construction operations to prevent any unnecessary damage to or destruction of natural features. Project components (e.g., fencing, signage, equipment, etc.) will be painted to blend into the surrounding environment or be constructed of non-reflective materials to reduce glare where appropriate to do so. To reduce off-site impacts, lighting will be minimized to areas required for safety and security to the extent practical. Lights will be shielded to minimize output to the surrounding environment and impacts to the night sky. Switches or motion-detectors will be used as appropriate to allow use of night lighting only when needed. To the extent practicable, all temporary maintenance yards, field offices, and staging areas will be sited and arranged to preserve trees, shrubs, and other native vegetation. The width of all new permanent access roads will be kept to the minimum needed for safe operation. The applicable county agency will be consulted to determine the appropriate height and type of vegetative screening and fencing materials. During construction of the water pipeline and transmission line, the owner will exercise care to preserve the natural landscape by restricting equipment to designated roads, trails, and staging areas to minimize disturbance to the extent practicable.

3.8.5.5 Cultural Resources and Landmarks

In November 2008, a Class I records search was completed for the project area and a Class III pedestrian survey was conducted by staff from Ethnoscience, Inc. and tribal representatives for the well siting area and the Deer Creek Station site. No eligible cultural features were identified via the Class I survey for the transmission corridor, well siting area and water pipeline or the Deer Creek Station site. Furthermore, no cultural features or materials were observed during the pedestrian inventory of the well siting area or the energy conversion facility site. In the event that prehistoric or historic cultural resources are discovered during construction or operation of the proposed project, a discovery protocol will be followed. Class I and Class III reports have been submitted to the State Historic Preservation Officer and to Western to support the project EIS.

3.9 Liquid Transmission Line Standards of Construction for the Water Pipeline

The water supply system for the Deer Creek Station includes installation of wells, submersible pumps, electrical and control facilities, and the raw water pipeline necessary to transfer raw water from the well site to the water treatment facility located on the energy conversion facility site.

The construction of the water supply wells consists of drilling the production wells, the installation of the submersible pump and motor, stainless steel screen, column pipe and fittings, pitless adaptor unit, instrumentation and telemetry, electrical equipment, and the meter pit, including the flow meter valves and necessary fittings. The control and telemetry panel, as well as the electrical disconnect for the well heads will be located inside a small walk-in enclosure near the well heads. The water supply wells will be installed in accordance with the South Dakota Well Construction Standard (ARSD 74:02:04).

Work area activities include clearing the ROW, trenching and backfill, pipe and appurtenance assembly and construction, pipe and materials staging, topsoil stockpile, and reclamation and

reseeding. Prior to any trenching activities, notification will be provided to the South Dakota One Call, as required, to ensure all utilities are properly identified.

Before starting construction, Basin Electric will finalize engineering surveys of the ROW centerline and extra workspaces and substantially complete the acquisition of ROW easements and any necessary acquisitions of property in fee. Exhibit 3.9-1 provides a typical pipeline ROW cross section.

3.9.1.1 Route Planning and Right-of-Way Staking

ROW limits are staked prior to construction. All work will take place between those limits. Additional ROW access will be gained by using existing approaches or the construction of temporary approaches where required. Permanent approaches may be constructed per landowner requests and inspector approval. All approaches will be constructed in a location and manner as to minimize vegetation and land owner disturbances.

3.9.1.2 Clearing and Topsoil Separation

Preparation of the ROW is the initial step in the construction of the proposed water pipeline. After the completion of the survey and staking of the proposed line, the construction ROW will be cleared of any surface obstructions. Following clearing, a minimum or 12 inches of topsoil will be removed over the trench line and deposited along the working side of the trench utilizing double ditching. Following the topsoil removal, subsequent subsoil down to trench depth will be removed and deposited on the non-working side of the trench from the topsoil to avoid contamination. During backfilling operations, the subsoil will be deposited into the trench first, followed by the topsoil. The backfilled trench will be wheel compacted and graded to existing contours. A slight crown will be placed over the area of the trench to allow for any slight settling that may occur. When necessary, in areas of unstable working conditions, topsoil may also be separated over the working side and/or the subsoil storage areas to allow for safe working conditions. Conventional double-ditching techniques will be used in designated wetland areas where water is not flowing and the soil is adequately dry. In those wetland areas where water is not flowing but soil conditions do not allow for conventional double-ditching techniques, directional drilling will be utilized to minimize impacts on the wetland area. Adequate erosion control and silt fencing will be implemented to minimize possible erosion and sedimentation issues.

Fences encountered along the proposed route will be cut and braced on each side of the ROW to prevent damage to the remaining fence, unless the landowner requests otherwise. Temporary gates will be installed where needed to contain livestock or prohibit public access to the ROW during construction.

3.9.1.3 Trenching

Prior to any trenching activities, notification will be provided to the South Dakota One Call, as required, to ensure all utilities are properly identified. Trenching involves excavating a trench for the pipe and is typically accomplished using a crawler-mounted, wheel-type or rubber-tired wheel-type ditch digging machine or track type excavators. Areas that show signs of unstable soil conditions or require larger excavations, typically at tie-ins and line crossings, will be excavated using a backhoe. The trench will accommodate a 4-inch- to 6-inch-diameter pipe as well as 6 feet of cover once the water pipeline trench has been backfilled.

3.9.1.4 Directional Drilling

Directional drilling consists of drilling a tunnel underground so as not to disturb surficial features. Surficial features that will be avoided via directional drilling if required include 207th Street and surface waters. Exhibit 3.9-2 provides a plan of a typical horizontal directional drilling beneath roadways. Additional workspace will be acquired to facilitate tunneling construction.

The directional drill will be set up in-line with the pipeline route and directionally drill under the roadway, waterway or sensitive area from bell hole (tunnel shaft) to bell hole. Bell holes will be excavated using backhoes and will require acquired additional workspace outside of the standard 60 foot construction area. The horizontal directional drill pipe, typically strung along the ROW, is connected to the drill and pulled back towards the machine. Bell holes typically will be located a minimum of 20 to 25 feet outside of the road ROW where feasible.

Horizontal directional drill equipment and bell holes will be placed a minimum of 60 feet away from the edge of any waterway for waterway and wetland directional drillings. Exhibit 3.9-3 provides a plan view of a typical horizontal directional drilling plan beneath waterways and Exhibit3.9-4 provides a diagram of a directional drill operation. Identified wetlands without flowing water at the time of construction may also be directionally drilled if soil conditions are unstable or surrounding areas do not allow for conventional trenching techniques. Those areas where the wetlands have adequately dried will be trenched using typical procedures with special attention being paid to erosion and sedimentation control. Where feasible, wetlands areas that are open cut will utilize narrower temporary construction easement to minimize surface impacts during construction. All work in wetland areas will comply with a Nationwide 12 Permit from USACE.

3.9.1.5 Pipe Stringing

Pipe stringing activities will involve the transportation and placement of pipe along the ROW. Pipe will be loaded onto trucks, transported to the ROW, and unloaded by construction crews. Polyvinyl chloride (PVC) pipe typically comes in 20-foot sections from bell to spigot. The pipe will be strung parallel to the trench in preparation for subsequent installation. To save extra effort, it is recommended that the bell ends of the PVC pipe point towards the direction of work progress. Caution needs to be taken when stringing PVC pipe during very cold weather.

3.9.1.6 Line-Up

The 20-foot sections of pipe will be lowered into the trench, one piece at a time. Installation of the pipe will commence after the pipe ends are sufficiently cleaned. It is important to remove any mud, sand, or other foreign material from the bell interior and spigot exterior that could prevent an effective seal between the bell and spigot. Without removing the gasket from the bell, it is important to carefully clean the gasket area and make sure it is uniformly seated in the groove. After the pipe is cleaned, a lubricant is applied to the bevel of the spigot end approximately half-way back to the insertion line, and to the gasket surface. The lubricated ends are then pushed together until the insertion line on the spigot is even with the edge of the bell.

3.9.1.7 Initial Backfill

After the pipe has been installed in the trench, the trench will be backfilled. The initial backfill should be free from rocks which could damage the pipe during the final backfill. Depth of the initial backfill should be at least 6 inches over the top of the pipe.

3.9.1.8 Backfilling

The final backfill of the trench will be completed in accordance to regulations with all impacted areas being reseeded with the designated seed mix. Impacts from construction of the water pipeline will be limited to the vegetation within the existing utility and road ROW. The contractor will be responsible for vegetation of the impacted areas to 80 percent of pre-project levels within 12 months of completion of the contract. Large rocks (over 8 inches in diameter) and construction debris that can interfere with soil cultivation and damage tillage equipment will be removed from the ROW. Smaller rocks or pieces of debris on the soil surface that can be picked up by and cause damage to harvesting equipment will also be removed. After construction, all foreign materials will be picked up and rock conditions can be no worse than the native condition of adjacent areas. Careful attention will be paid during backfilling to avoid the mixing of topsoil and subsoil.

3.9.1.9 Testing

The water pipeline will be pressure tested once backfilling has been completed to ensure that the system is capable of withstanding the designed operating pressure. Pressure testing will be conducted using water delivered from the water supply well. A SDDENR permit for stormwater will be acquired. The hydrostatic testing will use approximately 10,000 gallons of test water. After the test, the water will be discharged on the energy conversion facility using a filter bag and/or a straw bale dewatering structure. The test water will be discharged into an unnamed tributary to Deer Creek located in the northeastern area of the energy conversion facility.

3.9.1.10 Cleanup and Restoration

Cleanup and restoration of the ROW will be the final phase of construction and typically begins immediately after backfilling or as soon as weather and soil conditions permit. Cleanup in the ROW will consist of removing and disposing of the construction debris and surplus materials. Construction debris will be taken to a licensed landfill. The purpose of restoration is to return the ROW as close as possible to pre-construction conditions.

3.9.2 Revegetation

The purpose of revegetation will be to reestablish existing soil contours and to replace vegetation that is removed during well and water pipeline construction to the extent possible. By reestablishing vegetation, the potential for soil erosion will be reduced and current land uses may continue. The revegetation work will be primarily on rangelands (native pasture) and roadside ditch locations. This revegetation plan does not cover wetlands, intermittent creek banks, and active crop production areas. It is anticipated that crop production areas will be revegetated by the landowner following the completion of the project's clean-up and grading process. Revegetation on private property will comply with landowner specifications.

3.9.2.1 Surface Conditions after Construction

After construction and prior to seeding, in level or gently sloping areas, trenched areas will have no residual vegetative cover. The vegetation on the remainder of the disturbed construction areas will incur varying amounts of disturbance from vehicular traffic, backfill operations, material storage, and associated activities. Where the construction area includes steeper slopes, varying amounts of land grading activities to enable the operation of equipment and installation of plant components are expected. Graded and recontoured areas will have no residual vegetative cover. Natural native seed, rhizomes, and viable root materials may be present throughout the disturbed area.

3.9.2.2 Seeding

Some degree of natural vegetation recovery will occur from existing seedbed and vegetative propagules (e.g., rhizomes, bulbs) in the soil and from the presence of native seed sources adjacent to construction areas. To complement the natural tendency for vegetation to reoccupy a site, seeding will be conducted as needed. Two seed mixes are recommended. The first is a rangeland mix that features species that are common on range sites in this area of South Dakota. Table 3.9-1 recommends the species composition and seeding rates. Table 3.9-2 provides a regional species mix and seeding rates for roadside ditches. Both seed mixes should work well with the ambient precipitation, temperatures, and soil conditions in the construction areas. The rangeland seed mix also includes several native forbs that will enhance community diversity and will improve forage habitat. The addition of milkvetches to the seed mix will facilitate fixation of nitrogen in the reclaimed soils.

Table 3.9-1:
Reclamation Seed Mix (Rangeland Areas)

Species	Pure Live Seed (Pounds/Acre)
Western wheatgrass (Rodan, Walsh, Flintlock, or Rosana)	5.8
Switchgrass (Dacotah, Forestburg, Sunburst, Nebraska-28, Pathfinder, Summer, Trailblazer, or Bonanza)	1.8
Sideoats grama (Killdeer, Pierre, Butte, or Trailway)	4.4
Green needlegrass (Lodorm)	4.4
Big bluestem (Sunnyview, Bison, Bonilla, Champ, Pawnee, or Rountree)	4.5
Blue grama (Bad River or Willis)	0.6
Little bluestem	3.7
Indiangrass (Holt, Tomahawk)	2.7
Purple prairie clover (Bismarck)	0.8
Total	28.7

Source: NRCS (2009)

Table 3.9-2:
Reclamation Seed Mix for Roadside Ditches

Species	Pure Live Seed (Pounds/Acre)
Western Wheatgrass (Flintlock, Rodan, Rosana)	7
Switchgrass (Dacotah, Forestburg, Nebraska-28, Pathfinder, Summer, Sunburst, Trailblazer)	3
Indiangrass (Holt, Tomahawk)	2.7
Big Bluestem (Bison, Bonilla, Champ, Pawnee, Sunnyview)	3
Canada Wildrye (Mandan)	2
Total	17.7

Source: SDDOT (2008)

3.9.2.3 Timing

The preferred seeding times are in the spring (April 1 through May 15) or fall (October 1 through November 15). Actual seeding dates will depend on soil conditions, because planting should not occur when equipment will significantly compact or otherwise disturb the soil because of excessive soil moisture. Although these are the recommended times for seeding, it is important to establish a desirable vegetation cover as soon as possible after construction is complete to prevent establishment and spread of noxious weeds.

3.9.2.4 Seedbed Preparation

The seedbed will be prepared using appropriate equipment and will be scarified. To relieve compaction, one or more passes with a chisel, disc, or other appropriate equipment will be made in travel areas that have been compacted by heavy equipment passage. Fertilizers may be added in accordance with recommendations obtained from the local soil conservation authority. It is not anticipated that fertilizers will be used at wetland crossings.

3.9.2.5 Drill Seeding

Drill seeding is the recommended seeding method. Any seed drill used will be fitted with seed boxes that can accommodate the chosen species. This is particularly important for fluffy or irregular seed shapes, or when a wide variety of seed sizes are included in the seed mix. This is not generally expected to be a problem for the seed mixes designated in Tables 3.9-1 and 3.9-2. To the extent possible, drill seeding will be along the contour.

3.9.2.6 Broadcast Seeding

Broadcast seeding may also be used, although the seeding rate will need to be doubled to account for seed loss and poorer soil-seed contact. Broadcast seeding may be accomplished with hand-held or vehicle-mounted equipment. Any site where broadcast seeding is used will be dragged or raked to improve contact between the seed and soil.

3.9.2.7 Cover Crop

Where permanent reseeding is delayed by weather or other factors, a temporary cover crop (e.g., winter wheat, rye, barley, oats) may be planted to control wind and water erosion over one or multiple sites.

3.9.2.8 Mulching

To prevent potential wind and water erosion, mulch will be applied to all sandy soils and on all slopes of 2:1 or steeper. Vegetative, commercial mulches, or other methods may be used on areas with slopes ranging from level to 2:1 as follows:

- Wheat, oat, or barley straw, from which grain has been removed, may be used.
- Commercial mulches including excelsior erosion control blankets, wood cellulose fiber mulches, asphalt, asphalt emulsion, and resin emulsion may be used.
- The application rate will be 4,000 pounds per acre when anchored with mulch tiller equipment. When anchored with emulsion tack, netting, or hand methods, the rate will be 3,000 pounds per acre.

3.9.2.9 Fertilizer

The use of fertilizer before, during, or after planting and seeding is not recommended, except in cases where little or no topsoil is available as a planting medium. The use of fertilizer tends to favor growth and spread of non-native plant species and noxious weeds over native species. The native plant species recommended for use in reclamation are adapted to natural levels of soil nutrients. Even when topsoil is sparse or lacking, the preferred action will be to bring topsoil in, rather than trying to amend the soil on site with fertilizers.

3.9.2.10 Irrigation

Irrigation will generally not be used on sites that are seeded. The native plant species selected for use on this project are adapted to the natural precipitation regime. In the event of a prolonged drought, Basin Electric will consider the use of supplemental irrigation to aid plant establishment and survival in seeded areas.

3.9.2.11 Post-Construction Weed Survey and Control

After construction and reclamation is complete, the area will be monitored to identify any infestations of noxious weeds. Appropriate control methods will then be used to control these weeds.

3.9.2.12 Monitoring

For a 2-year period after reclamation is completed, the area will be monitored to ensure that reclamation efforts have been successful. The general goal for reclamation will be to establish 80-percent ground cover on rangeland or grassland areas within two years after the end of construction. If monitoring identifies any situations that are preventing attainment of this goal, such as weed infestations, poor plant survival, or other factors, corrective actions will be developed and implemented.

3.9.2.13 Maintenance

Basin Electric will maintain vegetation in the ROW, including reclaimed areas to accomplish several goals, including (1) control of noxious weeds; (2) prevention of soil erosion; and (3) allowance for safe and effective use of the ROW. As necessary, Basin Electric will conduct various activities, such as weed control and mowing or trimming of vegetation, to meet these goals.

3.9.3 Construction Spill Prevention and Response

This section describes measures to prevent, control, and minimize impacts from a hazardous, toxic, or petroleum substances spill during construction. The SPCC Plan will identify the handling, transportation, storage, and disposal procedures for these products and outline procedures in the event of a spill.

3.9.3.1 Material Management Practices

Properly managing materials during construction activities will greatly reduce the potential for stormwater pollution. Good housekeeping along with proper use and storage of construction materials form the basis for proper management.

3.9.3.2 Good Housekeeping

The proper use of materials and equipment, along with the use of general common sense, greatly reduces the potential for contaminating stormwater runoff. The following list of good housekeeping practices used during the construction of the Deer Creek Station Project:

- Storage of hazardous materials, chemicals, fuels, and oils and fueling of construction equipment will not be performed within 150 feet of definitive stormwater drainages.
- An effort will be made to store only enough products required.
- Materials will be stored in a neat, orderly manner, in appropriate closed containers, in secondary containment and, if practical, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever practical, all of the product will be used before the container is disposed.
- Manufacturer's recommendations for proper use of a product will be followed.
- If surplus product must be disposed of, local and state recommended methods for proper disposal will be followed.

3.9.3.3 Product-Specific Practices

Due to the chemical makeup of specific products, certain handling and storage procedures are necessary to promote the safety of personnel and prevent the possibility of pollution. Care will be taken to follow all directions and warnings for products used on site. All pertinent information is in the Material Safety Data Sheet (MSDS) for each product. The MSDS will be collocated with each product container it represents or in a readily accessible central location. Several product-specific practices are listed in the following sections.

3.9.3.4 Flammable and Combustible Liquids and Hazardous Materials

All products will be stored in tightly sealed containers that are clearly labeled. The containers will be stored in secondary containment, which will be of sufficient size to contain the entire contents of the primary container plus a sufficient quantity for precipitation (a total of approximately 110 percent of the volume of the primary container). The secondary containment will be an impermeable containment basin to prevent any spills or leaks from reaching the ground. The containment may be one of the following or other means that meets the definition of impermeable: (1) a temporary earthen berm lined with 20-milliliter-thick plastic, (2) a portable tank or basin, or (3) a galvanized steel or plastic trough.

After each rain event, the contractor will inspect the contents of all secondary containment areas. If there is no visible sheen on the collected water, it can be pumped or drained to the ground in a manner that does not cause scouring. If a sheen is present, it must be cleaned using absorbent materials prior to discharging or disposing of the water. The absorbent material will be disposed of properly.

3.9.3.5 Petroleum Products

In addition to the requirements above, petroleum products have additional procedures for handling and storage to prevent the possibility of pollution. On-site vehicles will be monitored for leaks and receive regular maintenance to reduce the potential for leakage.

Bulk fuel or lubricating oil dispensers will have a valve that must be manually held open to allow the flow of fuel. When not in use, the fuel dispensing nozzles and/or associated hoses will be kept inside the containment basin. During fueling operations, the contractor will have personnel present at all times to detect and contain spills. If any spills or leaks occur, the activity will stop immediately, and the containment and cleanup will begin.

Refueling and lubricating of most construction equipment will be restricted to upland areas at least 100 feet away from the edge of any streams, wetlands, ditches, and other water bodies and at least 150 feet away from known groundwater wells. Wheeled and tracked construction equipment will be moved to an upland area more than 100 feet away from streams, wetlands, ditches, and other water bodies for refueling when necessary. Fuels and lubricants will be stored in designated areas and in appropriate service vehicles. Whenever practical, storage sites for fuels, other petroleum products, chemicals, and hazardous materials, including wastes will be located in uplands or at least 100 feet from water bodies and wetlands.

3.9.3.5.1 Spill Control and Cleanup

In addition to the material management practices discussed previously, the following spill control and cleanup practices will be followed to prevent stormwater pollution in the event of a spill:

- Spills will be contained and cleaned up immediately after discovery.
- Manufacturer’s methods for spill cleanup of a material will be followed as described on the material’s MSDS.
- Materials and equipment needed for cleanup procedures will be kept readily available in construction areas, either at an equipment storage area or on contractor’s trucks. Equipment may include, but is not be limited to, brooms, dust pans, shovels, granular absorbents, sand, sawdust, absorbent pads and socks, plastic and metal trash containers, gloves, and goggles.
- Drums containing used cleanup materials will be labeled with the contents and date.
- Personnel will be made aware of cleanup procedures and the location of spill cleanup equipment.
- The contractor will be responsible for all cleanup activities in accordance with applicable local, state, and federal regulations.

3.10 Standards of Construction for the Transmission Line

3.10.1 Route Clearing

The contractor will accomplish transmission corridor clearing using brush hogs and mowers to the extent feasible. When necessary, the contractor will level the corridor structure sites to facilitate structure assembly. Tree removal will not be required because the transmission corridor only contains cropland and herbaceous vegetation.

3.10.2 Construction

Steel pole transmission structures typically require a single augured hole with a diameter between 4 and 8 feet and a depth between 6 and 30 feet depending on the transmission structure type and soil conditions. These holes will accommodate direct-embedment of pole structures or concrete foundations. The contractor will directly embed single-pole tangent structures and build concrete foundations for single-pole angle and dead-end structures. The contractor will locate materials for foundations in the vicinity of each transmission structure. The contractor will assemble reinforcing bar cages, anchor bolts, templates, stub angles, and formwork for each foundation. The contractor then will use excavation equipment, such as auger trucks, backhoes, and cranes to excavate the foundation, place and set the reinforcements and anchors in the excavation, and pour concrete into the foundation. The finished and cured concrete will be allowed to cure for a period of up to 1 week and then the concrete forms and any support structures removed. The contractor will assemble structures at the structure sites and place them in the foundation holes using cranes or large boom trucks. First, the contractor will attach the arms, braces, insulators, and other appurtenances to the poles while the poles were on the ground, then the contractor will use cranes and boom trucks will to set the structure in the ground. Finally, the contractor will plumb and backfill the hole.

Major equipment required for tension stringing includes reel stands, tensioner, puller, reel winder, pilot line winder, splicing cart, and helicopter or pulling vehicle. The tension method is the conventional method that will be used to construct transmission lines of the size proposed for the project. Using this method, the conductor is kept under tension during the stringing process. Normally, the contractor uses this method to keep the conductor clear of energized circuits and the ground and obstacles that might cause conductor surface damage. It requires the pulling of a light pilot line into the sheaves, which in turn is used to pull a heavier pulling line. The pulling line is then used to pull in the conductors from the reel stands using specially designed tensioners and pullers.

ROW surveying and staking, vegetation clearing, construction, and operation and maintenance of the energy conversion facilities will comply with all applicable state and local regulations and permit requirements.

3.10.3 Right-of-Way Maintenance

Maintenance and monitoring will occur during the operations phase and may cause minimal disruption to agricultural practices located within the ROW. Maintenance activities will potentially include routine inspection or emergency repairs.

3.10.4 Reliability and Safety

Risks to reliability or safety are minimal, given the limited distance of the transmission line. However, some risks are inherent with transmission line operation. Ground fires near transmission lines present a potential electrical hazard. The hot gases and smoke can create a conductive path to the ground. If a flashover occurs along this path, individuals near the fire could experience dangerous shocks. Flashover also causes outages and jeopardizes the reliability of the transmission system. Because of the hazards associated with fires, storing flammables, constructing flammable structures, or performing other activities that have the potential to cause or provide fuel for fires on ROWs will be prohibited. In the event that a fire was ignited from transmission lines, the closest fire department would respond.

Transmission line structures, wires, and other tall objects are the most likely points to be struck by lightning. The system will be designed to be protected from lightning. If an overhead ground wire or structure were hit, the lightning strike would be conducted to the ground at the structure. Because of the hazard of being in an area where lightning enters the ground, individuals should stay away from the transmission line structures during electrical storms.

The potential for resident-related adverse health and safety-related effects from fire, shock, or lightning to occur is low because no residences are located within the transmission corridor. Outside the ROW, risks are negligible.

3.10.5 Revegetation

The ROW will be restored to its original contour and will be revegetated at the direction of the landowner. The purpose of revegetation will be to reestablish existing soil contours and to replace vegetation that is removed during transmission line construction to the extent possible. By reestablishing vegetation, the potential for soil erosion will be reduced and current land uses may continue. The revegetation work will be primarily on areas where crop production will not be re-established. This revegetation plan does not cover active crop production areas. It is anticipated that crop production areas will be revegetated by the landowner following the completion of the project's clean-up and grading process. Revegetation on private property will comply with landowner specifications.

3.10.5.1 Surface Conditions after Construction

After construction and prior to seeding, transmission corridor disturbance areas will incur varying amounts of disturbance from vehicular traffic, backfill operations, material storage, and associated activities.

3.10.5.2 Seeding

Some degree of natural vegetation recovery will occur from existing seedbed and vegetative propagules (e.g., rhizomes, bulbs) in the soil and from the presence of native seed sources adjacent to construction areas. To complement the natural tendency for vegetation to reoccupy a site, seeding will be conducted as needed. The transmission corridor will be reseeded with the rangeland seed mix as described in Section 3.9.2.2.

3.10.5.3 Timing

The preferred seeding times are the same as described in Section 3.9.2.3.

3.10.5.4 Seedbed Preparation

The seedbed will be prepared as described in Section 3.9.2.4.

3.10.5.5 Drill Seeding

Drill seeding for the rangeland seed mix will be completed as described in Section 3.9.2.5.

3.10.5.6 Broadcast Seeding

Broadcast seeding for the rangeland seed mix will be completed as described in Section 3.9.2.6.

3.10.5.7 Cover Crop

Utilization of cover crop will be completed as described in Section 3.9.2.7.

3.10.5.8 Mulching

Mulching will be completed as described in Section 3.9.2.8.

3.10.5.9 Fertilizer

Fertilizer application will be completed as described in Section 3.9.2.9.

3.10.5.10 Irrigation

Irrigation may be employed as described in Section 3.9.2.10.

3.10.5.11 Post-Construction Weed Survey and Control

After construction and reclamation is complete, the area will be monitored as described in Section 3.9.2.11.

3.10.5.12 Monitoring

Monitoring will be completed as described in Section 3.9.2.12.

3.10.5.13 Maintenance

Basin Electric will maintain vegetation in the ROW as described in Section 3.9.2.13.

4.0 Nature of Proposed Project

4.1 Energy Conversion Facility

The energy conversion facility will be a natural gas-fired combined cycle electric generating facility. Major components of the facility include the CT/HRSG, and ST generator. The term combined cycle defines when a power-producing engine or plant employs more than one thermodynamic cycle. For the energy conversion facility, a gas turbine generator produces electricity and the waste heat from the gas turbine is used to make steam to generate additional electricity via a steam turbine. This last step enhances the efficiency of the electrical generation. Other potential emissions sources at the facility include a diesel-fired emergency generator and diesel-fired fire-water pump. The general arrangement of the energy conversion facility, including the location of major pieces of equipment and the location of all emission sources, is shown in Exhibit 3.4-5. Exhibits 4.1-1 and 4.1-2 show elevation views of the general arrangement.

The energy conversion facility includes one F-class (or the equivalent) natural gas-fired combustion turbine CT/HRSG. The proposed CT includes an air compressor section, advanced natural gas combustion section, power turbine, and an electrical generator. Ambient air is drawn through an inlet air filter on the CT and compressed in a multiple-stage axial flow compressor. Compressed air and natural-gas are mixed and combusted in the CT combustion chamber. Dry low-NO_x combustors will be used to minimize NO_x formation during combustion. Exhaust gas from the combustion chamber is expanded through a multi-stage power turbine, which drives both the air compressor and an electric power generator.

Hot exhaust gas from the CT is directed through the HRSG, where excess heat is used to generate steam. The HRSG will be equipped with natural gas-fired duct burners. The duct burners are used to generate additional steam during periods of peak electrical demand. Steam from the HRSG is used to drive a single steam turbine connected to an electrical generator. Exhaust gas from the HRSG passes through additional emission control equipment prior to being discharged to the atmosphere through a single stack.

The CT is designed to produce a nominal 166 MW of gross electrical power at full load and an average annual ambient temperature of 43°Fahrenheit (F). The CT power output will decrease somewhat as the ambient air temperature increases, and output will increase as ambient temperatures decrease. This change in power output is related to the mass flow of combustion air through the turbine. The CT power output at full load will be in the range of 150 MW at a summer ambient temperature of 93°F, and increase to approximately 180 MW at a winter extreme ambient temperature of -41°F.

The HRSG used for the energy conversion facility will be equipped with natural gas-fired duct burners. Heat input to the duct burners will depend on steam requirements and ambient conditions. Based on heat balance performance calculations, heat input to the duct burners will be has high as 610 million British thermal units/hour during summer ambient conditions. Based on heat balances prepared for the project, steam production at average annual ambient conditions from the HRSG is estimated to be approximately 419,500 pounds/hour without duct firing and 792,700 pounds/hour without duct firing. Steam from the HRSG will drive a single steam turbine-generator with a nominal power output of 143 MW with duct firing and 84 MW

without duct firing at the average annual ambient temperature of 43°F. Steam turbine exhaust will be directed to an air cooled condenser, and the condensate will be re-used. Table 4.1-1 provides the heat balance performance averages.

Table 4.1-1:
Heat Balance Performance Averages

	Generation Average Ambient (MW)	Generation Winter (MW)	Generation Summer (MW)
Combustion Turbine	166	185	151
Steam Turbine with HRSG Duct Burners	143	122	153
Steam Turbine without HRSG Duct Burners	84	85	80

4.1.1.1 Associated Facilities

Electric power generated by the energy conversion facility steam and combustion turbine generators will require the construction of an associated electric transmission line so that power generated could be transmitted to Western's existing White Substation. The transmission line is described in detail in Section 4.2.

Construction of the water wells and water pipeline will be necessary to provide water to the energy conversion facility for process water and safety needs. The water wells and water pipeline are described in detail in Section 4.3.

A potable water delivery system will be installed to deliver potable water from the existing Brooking Deuel rural water supply as described in Section 3.4.2.

4.1.2 Materials Flowing into the Energy Conversion Facility

The materials flowing into this facility will be natural gas, water, and air. The facility will consume a maximum of 100 gpm of process water and an estimated 1 gpm of potable water. The process water will be provided by the water wells to be constructed for the project. The potable water will be provided by Brookings Duel Rural Water Association, located in Brookings, South Dakota.

The CT will include an inlet air filter system capable of removing air born dust and a short exhaust gas stack. The gas turbine will have fast-start capability and will be fueled by locally available natural gas. The natural gas delivery capacity will be 94.8 million standard cubic feet per day. The minimum required gas flow for the initial facility is 47.4 million standard cubic feet per day. Basin Electric currently has in place firm contracts for gas supply and transportation required for MAPP accreditation.

4.1.3 Materials Flowing out of the Energy Conversion Facility

Stormwater will be collected on site and routed to stormwater runoff ponds. The collected water will be discharged to existing on-site drainage channels once it meets requirements of the stormwater discharge permit that will be obtained prior to operations.

Process water will require water treatment to remove the mineral and dissolved solids. The water treatment will consist of carbon filtration, cation-anion exchange, and reverse osmosis. Reject water will be generated during backwash cycles and through periodic cleaning operations. The reject water will be transferred to on-site aboveground holding tanks and/or holding ponds then will be transported by truck to the existing city of Brookings wastewater treatment system.

Wastewater generated from potable water use including water from lunchroom sinks, showers, and lavatories, etc. will be directed to an on-site septic tank and drainfield.

4.1.4 Products to be Produced

The CT/HRSG will use natural gas as fuel to produce electricity. The electricity will be provided to the transmission and distribution system operated by Western.

4.1.5 Fuel Type Used

The primary proposed fuel type is natural gas. Firm contracts for gas supply and transportation are in place to satisfy MAPP accreditation requirements. The natural gas to be used for the combined-cycle electricity generation will be sourced from the Northern Boundary Pipeline via a 10 inch nominal pipeline. The operating pressure for the pipeline will range between 1,435 psig) (NBPL maximum operating pressure) and 795 psig (minimum operating pressure).

The anticipated yield is anticipated to be 1,006 British thermal units (Btu) per cubic foot for natural gas. The quality analysis of the proposed fuel is shown in Table 4.1-2.

4.1.6 Primary and Secondary Fuel Sources and Transportation

A natural gas pipeline will be constructed underground for the project, and surface reclamation will occur concurrently with construction and site development. Although diesel fuel will be utilized for emergency use as described in Section 3.6.9.1, secondary fuel sources are not applicable. Exhibit 1.1-1 shows the proposed natural gas pipeline route from NBPL to the energy conversion facility; the gas pipeline is being applied for in a separate application to the SD PUC.

Two proposed off-site water supply wells will pump water through an underground water pipeline to the on-site raw water storage tank. The raw water storage tank will hold approximately 500,000 gallons. The wells will supply adequate capacity to the energy conversion facility with treatment equipment, surge tanks, and storage tanks as required to implement the water balance strategy. Expected water usage for the energy conversion facility, operating at full load under average ambient conditions is approximately 25 gpm on an annual average. The usage can increase to 60 gpm at the maximum ambient conditions during the summer. Water treatment necessary for energy conversion facility processes will likely consist of pressure filters, followed by a multiple pass reverse osmosis system and a mixed bed reactor for generation of ultra pure water.

Fire protection and service water supply from the process water well will be stored on site in a 550,000 gallon tank. There will be a pressure booster pump to provide adequate water supply pressure in the boiler area. A large diesel-driven pump will be provided to supply emergency fire water in the event of power failure. Potable water for drinking fountains, washrooms, showers, and toilet facilities will be supplied from Brookings-Deuel Rural Water System and stored on-site inside a 1,500-gallon storage tank.

Water disposal is discussed in Section 4.1.3 and solid waste disposal is discussed in Section 4.5.

4.1.7 Vegetation Plan

The purpose of the vegetation plan will be to establish vegetation within undeveloped areas within the energy conversion facility. By establishing permanent vegetative cover, the potential for soil erosion will be reduced. The vegetation work will be primarily completed on land previously used for crop production. It is anticipated that crop production areas outside the energy conversion facility fence line on the Deer Creek Station site will resume current agricultural practices.

4.1.7.1 Surface Conditions after Construction

Prior to construction, a site grading plan will be prepared and implemented. Following construction, graded areas will have no residual vegetative cover.

4.1.7.2 Seeding

Prior to construction, a site seeding plan will be prepared and will be implemented after construction.

4.1.7.3 Timing

The seedbed will be prepared as described in Section 3.9.2.4.

4.1.7.4 Drill Seeding

Drill seeding for the rangeland seed mix will be completed as described in Section 3.9.2.5.

4.1.7.5 Broadcast Seeding

Broadcast seeding for the rangeland seed mix will be completed as described in Section 3.9.2.6.

4.1.7.6 Cover Crop

Utilization of cover crop will be completed as described in Section 3.9.2.7.

4.1.7.7 Mulching

Mulching will be completed as described in Section 3.9.2.8.

4.1.7.8 Fertilizer

Fertilizer application will be completed as described in Section 3.9.2.9.

4.1.7.9 Irrigation

Irrigation may be employed as described in Section 3.9.2.10.

Table 4.1-2:
Northern Border Pipeline Quality Estimates 2006-2007

	Methane C_1 (mole %)	Ethane C_2 (mole %)	Propane C_3 (mole %)	Normal Butane NC_4 (mole %)	Iso Butane IC_4 (mole %)	Normal Pentane NC_5 (mole %)	Iso Pentane IC_5 (mole %)	Hexane plus C_6 (mole %)	Hydrogen H_2 (mole %)	Nitrogen N_2 (mole %)	Carbon Dioxide CO_2 (mole %)	Helium He (mole %)	Total (mole %)	Heating Value (Btu)	Total Sulfur (grains/ 100 scf)
Aug-06	95.4996	1.9118	0.1096	0.0063	0.0057	0.0007	0.0011	0.0016	0.2393	1.4479	0.743	0.0335	100	1006.83	0.094
Sep-06	95.3468	1.9569	0.1279	0.0102	0.0085	0.0016	0.0022	0.0028	0.2324	1.5269	0.7493	0.0346	100	1006.88	0.126
Oct-06	95.5675	1.8401	0.0744	0.0019	0.0021	0.0001	0.0002	0.0002	0.2439	1.5118	0.7238	0.0341	100	1004.96	0.090
Nov-06	95.1800	2.0195	0.1116	0.0062	0.0054	0.0004	0.0011	0.0009	0.2997	1.5594	0.782	0.0336	99.9998	1005.69	0.103
Dec-06	95.1034	1.957	0.0996	0.0053	0.0049	0.0003	0.0009	0.0006	0.3375	1.6032	0.853	0.0341	99.9998	1003.54	0.075
Jan-07	95.2002	1.9222	0.0903	0.0043	0.0039	0.0001	0.0006	0.0003	0.3353	1.6297	0.7793	0.034	100	1003.55	0.073
Feb-07	95.2459	2.0528	0.0911	0.0034	0.0033	0.0000	0.0002	0.0001	0.3000	1.5542	0.7153	0.0337	100.0000	1006.17	0.080
Mar-07	95.1521	2.1104	0.1004	0.0043	0.0040	0.0000	0.0006	0.0004	0.3499	1.5116	0.7334	0.0329	100.0000	1006.73	0.069
Apr-07	95.1211	2.1909	0.1047	0.0050	0.0049	0.0002	0.0008	0.0005	0.2801	1.5272	0.7324	0.0323	100	1007.13	0.084
May-07	95.2170	2.2059	0.1051	0.0044	0.0051	0.0003	0.0012	0.0014	0.1234	1.6321	0.671	0.0331	100.000	1008.6	0.090
Jun-07	95.2966	2.2049	0.1081	0.0044	0.0050	0.0001	0.001	0.0012	0.1790	1.4738	0.6945	0.0312	99.9998	1009.63	0.069
Jul-07	95.3492	2.1134	0.1148	0.0039	0.0044	0.0001	0.0004	0.0004	0.1482	1.5567	0.6761	0.0325	100.0001	1008.49	0.096
Aug-07	95.368	2.173	0.1087	0.0033	0.0035	0.0001	0.0003	0.0002	0.1299	1.4691	0.7109	0.0328	100.000	1009.474	0.061
Sep-07	95.4787	2.0028	0.1184	0.0070	0.0061	0.0007	0.0011	0.0011	0.1219	1.5665	0.6613	0.0343	100.000	1008.09	0.060
Average	95.2947	2.04725	0.10462	0.00499	0.00477	0.00034	0.00084	0.00084	0.23718	1.54072	0.73038	0.03334	100.000	1006.840	0.083

This page intentionally left blank.

4.1.7.10 Post-Construction Weed Survey and Control

After construction and reclamation is complete, the area will be monitored as described in Section 3.9.2.12.

4.1.7.11 Monitoring

Monitoring will be completed as described in Section 3.9.2.12.

4.1.7.12 Maintenance

Basin Electric will maintain vegetation in the ROW as described in Section 3.9.2.13.

4.2 Transmission Line Description

The transmission line will be a 345-kV single circuit transmission line, approximately 0.75 mile in length. The temporary construction easement and permanent easement will be 150 feet wide. The 345-kV single-circuit transmission line structures will be constructed of a single-pole steel configuration and will be approximately 135 feet tall. The arms on each side of each structure will be 20 feet long. These structures will have a circular concrete foundation base of 6 to 8 feet in diameter. The typical span between structures will be approximately 800 to 900 feet. Exhibit 4.2-1 provides a diagram a proposed transmission structure.

The energy conversion facility will have a 345-kV switchyard that has metering transformers, switching equipment and station Generator Step-up Transformer (GSU). At the existing Western's White Substation, the project's 345-kV transmission line will tie into a bay that will be installed to facilitate this interconnection. The transmission line ROW terrain is relatively flat, well-drained, and located on a topographic incline. The area is agricultural, consisting primarily of farmland and the site elevation is approximately 1,850 feet msl.

4.3 Water Pipeline Description

The raw water pipeline will consist of the installation of approximately 8,000 feet of 6-inch American Water Works Association (AWWA), C900 PVC pipe and all necessary fittings and valves. The C900 PVC pipe will be class 150, which is capable of operating at design pressure not to exceed 157 pounds per square inch (psi). The installation of the water pipeline will conform to applicable sections of the AWWA manual number 23 titled *PVC Pipe—Design and Installation* and the manufacturer's recommendations (AWWA 2002). Air release valves may need to be installed to prevent air-lock due to changes in elevation. The temporary construction easement will be 60 foot wide, while the permanent easement will be 30 feet wide.

Process water for the project will be supplied from the water well site. There will be two permanent water supply wells, one primary and one alternate, each designed for a maximum capacity of 100 gpm. An exploration well has been installed and pumping tests are being performed on the Big Sioux Aquifer to verify and aid in the design of the system to meet the maximum capacity while not impacting Deer Creek water levels. Water balances have been evaluated. Water will supply adequate capacity to the energy conversion facility, with treatment equipment, surge tanks, and storage tanks, as required to implement the water balance strategy. Exhibit 4.3-1 is a flow diagram of daily capacity for the water pipeline.

4.3.1.1 Changes in Flow in the Transmission Facilities Connected to the Proposed Facility

With the minor amount quantity of potable water being delivered to the project, no changes in flow will be anticipated to any significant degree to the existing Brookings-Deuel Rural Water Supply System.

4.4 Alternate Energy Sources

Various alternative energy sources were examined in the PSA. This study compared energy fuel sources and technologies to determine the best solution to meet the requirements of the anticipated generation needs. Renewable energy sources (wind, solar, hydropower, geothermal, and biomass), fossil fuel generation (natural gas and coal), and nuclear generation were all evaluated. These energy sources, described in detail in Portfolio K of the PSA, did not meet the need for reliable and cost-effective intermediate generation to meet timely need for generation. Use of coal and nuclear generation were eliminated since these are considered baseload energy sources. Summaries of the evaluation of other energy sources are provided below.

4.4.1 Wind

The upper Great Plains has significant potential for wind energy development, including areas in this region that are some of the best for wind development in the nation. Several advantages of wind power are that it can generate electricity without generating emissions and it is an economically stable technology because there are no fuel-price increases or volatility. These are among the reasons why Basin Electric is in the process of developing approximately 300 MW of wind generation capacity by 2011 and becoming a leader among cooperatives in developing this resource.

Because of the intermittent nature of wind, however, a wind power plant's economic feasibility strongly depends on the amount of energy it produces. Wind generation can offer energy, but not an on-demand capacity. During the summertime peak periods, Basin Electric has historically observed that nameplate capacity operates at about 12 to 15 percent, so 300 MW of wind generation will only provide 30 to 45 MW of capacity. Wind cannot fulfill the long-term capacity need for Basin Electric because the supply is unreliable and therefore difficult to schedule.

4.4.2 Solar

Current technologies allow the sun's energy to be converted directly through photovoltaic cells (solar cells) to provide heating, lighting, and cooling. Several advantages of solar energy include its electricity generation without local air emissions and its cost stability because of its renewable energy source. While the sun is an infinite source of energy, its energy varies by location and time of year. For this reason, solar power cannot fulfill Basin Electric's long-term capacity need for reliable generation to meet the supply needs of the members. Intermittent power is not consistent and it has a high cost of generation. Because solar power generally has an annual capacity factor of 20 to 35 percent, it could help Basin Electric fulfill its need for intermediate generation. It is possible this capacity could be integrated with natural gas generation in the future to provide a more stable product during cloudy or inclement weather. Basin Electric is working with other utility and industry groups on an initiative aimed at reducing the cost of electricity generated from solar photovoltaic technologies and increasing market penetration of such technologies.

4.4.3 Hydroelectric

Similar to wind and solar power, hydroelectric power has no air emissions and provides cost stability because of its renewable energy source. Hydroelectric power (hydropower) is the kinetic energy converted from the gravitational potential of flowing water. Hydropower plants will typically dam a river or stream to store water in a reservoir. The water is released from the reservoir and it flows through a turbine causing it to spin and activates a generator to produce electricity.

The weather and seasonal variation in a river's water level can result in significant fluctuations in power production. Given the seasonal nature of hydropower, the average annual capacity factor for most facilities is approximately 40 to 50 percent. Another major issue regarding hydropower is its variability year to year based on actual amounts of precipitation. For these reasons, and given the limited number of locations within the region, hydropower cannot meet Basin Electric's need for reliable generation.

4.4.4 Geothermal

Geothermal energy is thermal energy from the Earth's interior where temperatures reach greater than 7,000°F. The heat is brought to the surface as steam or hot water and used to produce electricity or applied directly for space heating and industrial processes. Given the limited number of locations that can generate geothermal energy within Basin Electric's service territory, this alternative could not meet the Basin Electric's need for generation.

4.4.5 Biomass Power

Biomass power (biopower) is the generation of electric power from biomass resources; these resources include urban waste, wood, crop, and forest residues, and, in the future, crops grown specifically for energy production. Biomass reduces most emissions compared with fossil fuel-based electricity. Biomass results in very low carbon dioxide (CO_2) addition to the biosphere because CO_2 is absorbed during the biomass cycle of growth. Biomass power plants range in size from 1 MW to 30 MW. Given the limited availability of biomass resources in Basin Electric's service territory and the amount of power produced at a biomass power plant, this alternative could not meet the Basin Electric's need for reliable generation.

4.5 Solid Waste

4.5.1 Generation, Treatment, Storage, Transport, and Disposal

The environmental factors in the process design, in addition to air quality, include waste management. Waste management associated with the gas turbine will be minimal. No hazardous wastes will be generated by process operations. Industrial wastes will consist of waste fluids and detergents from turbine maintenance and miscellaneous other materials. All industrial wastes will be removed from the energy conversion facility site and held for disposal in a licensed and permitted commercial waste disposal facility.

Office and lunchroom-type waste will be disposed of on site in dumpsters and then hauled away by local waste management services for placement in permitted facilities. Construction debris will be removed and taken to the nearest permitted landfill in South Dakota; Brookings Landfill is the closest to the affected area and Watertown Landfill is also nearby.

4.5.2 Compliance with Federal and State Regulations and Standards

Solid waste disposal from project construction and operation will comply with federal and state regulations and standards.

4.6 Estimate of Expected Efficiency

Expected efficiency is based on and in agreement with the manufacturer's specifications for the energy conversion facility equipment. Data used to calculate efficiency and heat consumption included the lower heating value (LHV) for the natural gas supply that will be used to fuel the CT/HRSG, the power output capability of the generator set, and the fuel feed rate. In addition, an efficiency calculation of percent heat recovery using the heat consumption rate for the combination system. Based on these calculations, the proposed facility will meet the parameters presented in Table 4.6-1:

Table 4.6-1:
Deer Creek Station Energy Conversion Facility Basin Electric Power Cooperative Combined Cycle Efficiency

	Calculated Average
% Heat Recovery (Power Output/ Heat Input)	54.14
Net Plant Heat Consumption (Btu/hr per KW-hr), LHV	6,337

4.7 Future Additions and Modifications

While Basin Electric desires to keep open opportunities for future modification or expansion of the energy conversion facility, or for construction of additional facilities, there are no current or pending specific generation expansions or modifications planned. The general arrangement, water supply, and natural gas supply designs take into account additional capacity to accommodate additional generation units at the Deer Creek Station site.

4.8 Decommissioning

All equipment and buildings will be removed from site and disposed of appropriately. Concrete will be buried on site as appropriate and the ground surface will be returned to its original contour quality and usage. The energy conversion facility will not produce any hazardous material that will be stored or disposed of on site, requiring no hazardous removal at decommissioning. The underground gas and water pipelines will be capped below grade and abandoned in place.

4.8.1 Decommissioning Action Plan

At the time of decommissioning, the energy conversion facility will be evaluated for other site-compatible beneficial uses. In absence of such uses for portions or all of the facility, the site will be decommissioned based on the applicable regulatory requirements or public policy that is in effect at that time. The following decommissioning measures assume that there is no alternative use for the energy conversion facility and that the facility will be rendered unusable for any future purpose:

- Equipment and Buildings—All equipment and buildings will be removed from site and either offered for recycling or disposed of in accordance with applicable regulations. All structures will be cleared to 4 feet below the finished intended ground level on the site. Concrete

elements will be buried on site as appropriate, and the ground surface will be returned to its original contour quality and usage other than the landfill.

- Fuel Tanks/Fuel Pipelines—An environmental site assessment will be conducted prior to the demolition of fuel tanks and pipelines to determine whether any fuel-related spills or leakage has occurred on site. If required, soil sampling may occur to determine whether any soil contamination occurred and, if so, determine whether the contamination exceeds the action level for cleanup in accordance with South Dakota regulations at the time of decommissioning.
- Other Miscellaneous Materials—As appropriate, buildings will be inventoried and hazardous materials will be removed to other operating facilities for use or disposed in a landfill that is permitted to accept such waste. Other non-hazardous materials located on site will also be identified for use at other operating facilities or disposed in permitted facilities as required.

The ground surface will be returned to its original contour quality and usage. The estimated cost of decommissioning is $10 million.

This page intentionally left blank.