# APPENDIX A

# SOUTH DAKOTA

# ENVIRONMENTAL IMPACT STATEMENT

# ENVIRONMENTAL IMPACT STATEMENT
# FOR THE
# STATE OF SOUTH DAKOTA

## BASIN ELECTRIC POWER COOPERATIVE
## GROTON GENERATION STATION 2 PROJECT

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| $\mu g/m^3$ | Micrograms per cubic meter |
| ACR | ACR Consultants Inc. |
| Basin Electric | Basin Electric Power Cooperative |
| BMP | Best Management Practice |
| CFR | Code of Federal Regulations |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| CPWC | Cumulative Present Worth Cost |
| dB | Decibels |
| dBA | A-weighted decibels |
| DC | Direct current |
| DOE | Department of Energy |
| EMF | Electric and magnetic fields |
| EO | Executive Order |
| EPA | U.S. Environmental Protection Agency |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Maps |
| GE | General Electric |
| GGS1 | Groton Generating Station Unit1 |
| GGS2 | Groton Generating Station Unit 2 |
| HPRCC | High Plains Regional Climate Center |
| kV | Kilovolt |
| LRFF | Long Range Financial Forecast |
| MAPP | Mid-Continent Area Power Pool |
| MW | Megawatt |
| NA | Not applicable |
| NAAQS | National Ambient Air Quality Standards |
| NESC | National Electrical Safety Code |
| NBPL | Northern Border Pipeline |
| NEPA | National Environmental Policy Act |
| $N_2$ | Nitrogen |
| $NO_x$ | Nitrogen oxides |
| NRC | National Research Council |
| NRHP | National Register of Historic Places |
| NWI | National Wetland Inventory |
| $O_2$ | Oxygen |
| O&M | Operation and Maintenance |
| PLSS | Public Land Survey System |
| $PM_{10}$ | Particulate matter with a diameter of 10 micrometers or less |
| ppm | Parts per million |
| ROW | Right-of-way |
| RUS | Rural Utilities Service |
| SDDENR | South Dakota Department of Environment and Natural Resources |
| SDDGFP | South Dakota Department of Game, Fish and Parks |
| SDNH | South Dakota Natural Heritage |
| SDNHD | South Dakota Natural Heritage Database |
| SDGOED | South Dakota Governor's Office of Economic Development |
| SDSU | South Dakota State University |
| SHPO | State Historic Preservation Officer |
| $SO_2$ | Sulfur dioxide |
| T&E | Threatened and endangered |

## ACRONYMS AND ABBREVIATIONS (Cont.)

| | |
|---|---|
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VOC | Volatile organic compound |
| Western | Western Area Power Administration |

## EXECUTIVE SUMMARY

Basin Electric Power Cooperative (Basin Electric) is a consumer-owned, regional cooperative, headquartered in Bismarck, North Dakota. Basin Electric generates and transmits wholesale electricity to 125 member rural electric systems in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. These member systems, in turn, distribute electricity to more than 1.8 million customers.

Basin Electric has established the need to add a peaking resource to serve projected member load growth. An 80 - 100 Megawatt (MW) simple-cycle, natural gas-fired turbine operated at less than 50 average MW was determined to be the least-cost, self-build resource option to provide for future peaking requirements. Load growth is expected to be greatest in Basin Electric's membership areas in eastern South Dakota and northwestern Iowa (East Side). A new Basin Electric peaking resource located in this region is needed to serve member loads.

Basin Electric is proposing to construct an additional new 80 - 100 MW simple cycle gas turbine in eastern South Dakota. The Groton Generation Station 2 (GGS2) Project would include a gas-fired combustion turbine normally using natural gas for a fuel. Fuel oil is not planned as a "back-up" fuel at this time but if required, the gas-fired turbine is capable of being modified to use fuel oil at a later date. Firm gas supply and firm gas transportation agreements are in place and satisfy Mid-Continent Area Power Pool (MAPP) accreditation requirements. Power from the facility would be supplied to Basin Electric's customers through an interconnection with Western Area Power Administration's (Western) transmission system. Western is a Federal power marketing agency with the U.S. Department of Energy (DOE).

The evaluated plant design was based on a General Electric (GE) LMS100 gas turbine. The LMS100 gas turbine is the newest machine offered by GE in this size range, and offers the advantage of high efficiency. The high efficiency design of this turbine results in exhaust temperatures below 800 ºF (427 ºC).

The preferred site for the location of the turbine is near Groton, South Dakota. A small modification to an existing substation at the Groton site would be necessary to accommodate the second turbine. The proposed project would also require modifications to Western substation(s) and/or transmission system.

No additional new transmission lines would be constructed, and no new gas supply pipelines would be constructed to supply the natural gas to the gas turbine.

The evaluation of proposed action and the no action alternative revealed that the proposed project best addresses the needs of Basin Electric and its consumers while minimizing impacts to the environment, existing land uses, concerns of land owners, and regulatory requirements.

Construction of the GGS2 Project is required to meet the growing needs for power of Basin Electric's membership in its service territory. The need for additional capacity is driven by anticipated general member load growth and anticipated commercial load growth throughout the Basin Electric member service area. Based on the analysis of loads and resources, Basin Electric will be deficit in 2008 and is in need of an additional peaking type resource. The capacity situation shows that Basin Electric is deficit (80 to 100 MW) in the summer season, while the energy situation shows that peaking is the type of energy (resource) needed. With consideration of a variety of constructed and purchased options, the lowest total system cost evaluated alternative for the next resource for Basin Electric is the development of an additional 80 - 100 MW simple cycle gas turbine located at an existing turbine and substation site near Groton, South Dakota.

This South Dakota Environmental Impact Statement (SDEIS) was developed to assess the potential environmental consequences of the Proposed Action. The East Side Peaking Project Environmental Assessment ( EA; 2005) was used as guide in preparation of this SDEIS.

The following conclusions are based on an assessment of direct, indirect, and cumulative environmental impacts of the proposed project. This assessment indicates that the GGS2 Project would not result in any significant environmental impacts and any environmental impacts would be easily mitigated.

**Land Use:** The primary land use in this project area is agriculture consisting of ranching and farming. No prime farmland would be affected by the proposed project. The proposed project should have minimal environmental impacts on land use.

**Floodplains:** The proposed project is not located in a 100-year floodplain and therefore is expected to have no significant impact on floodplains.

**Wetlands:** The proposed project would not result in the destruction of significant amounts of wetland areas and project activities are not expected to have a negative impact on water quality. As a result, the proposed project is expected to have no significant impact on wetlands.

**Cultural Resources:** No sites of archeological, tribal or historical value, that are listed or eligible for listing on the National Register of Historic Places (NRHP), would be impacted by the proposed project. Therefore, the proposed project is not expected to have impacts on cultural resources.

**Threatened and Endangered Species (T&E):** The proposed project would not jeopardize the continued existence of any federal or state listed or T&E species or result in the destruction or adverse modification of a critical habitat. As a result, the proposed project is expected to have no significant impact on federal and state protected species.

**Fish and Wildlife Resources:** The proposed project is not likely to result in the destruction or adverse modification of a critical habitat or increased mortality of any wildlife population. Since the proposed project would not destroy or modify critical habitat, no significant impacts to fish and wildlife resources are anticipated. The proposed project would have minor direct, indirect, or cumulative impacts on wildlife. Short-term construction noise and activities could affect wildlife by temporarily displacing them from the area. Less than 5 acres area that was previously disturbed during the construction of the East Side Peaking Project would be affected and no new areas would be disturbed by construction of the additional combustion turbine. The increase in human activity in the proposed project area during construction would only temporarily disturb wildlife.

**Vegetation:** The proposed project is not likely to result in the destruction or adverse modification of plant species or T & E plant population. Therefore, no significant impacts to vegetation as a result of the proposed project are anticipated. Direct, indirect, and cumulative environmental impacts to vegetation would not be anticipated; and therefore would be minor and only include the effects from farming and ranching, the primary land uses in the project area. Topsoil removed during construction would be stored and replaced after the project is complete. A revegetation plan would be developed, in compliance with applicable federal, state, and local regulations and ordinances. This and future projects should have an insignificant impact on vegetation, as most areas have been altered from their natural state. The proposed project would not contribute to any cumulative impacts to vegetation as most areas have been altered from their natural state.

**Geology, Topography, and Soils:** No potentially hazardous geological areas, such as slumps or landslides, would be affected by construction of the combustion turbine and installation of the gas pipeline. As a result, no direct, indirect, or cumulative impacts to geological resources are anticipated by the proposed project.

**Air Quality and Climatology:** Federal or state air quality standards would not be exceeded during project construction and operation, and as a result would not result in significant impacts. Construction would have no significant long-term direct, indirect, or cumulative impacts on air quality from the proposed project. Because construction activities and the combustion turbine would not measurably increase background values, the direct, indirect, and cumulative impacts on air quality from the proposed project would be negligible. The gas turbine facility would be operated in accordance with conditions outlined in an air quality permit issued by the South Dakota Department of Environment and Natural Resources (SDDENR).

**Water Quality:** No significant water resources are associated with the gas turbine or the gas pipeline in the proposed project area. Controls to manage stormwater such as Best Management Practices (BMP) would be used to prevent erosion and sedimentation of nearby ephemeral drainages. Impacts to surface water from the proposed project would be insignificant and groundwater resources would not be depleted. Any potential wastes would be handled properly.

**Aesthetics:** The proposed project would not obscure an important landscape, would not interrupt a scenic view, would not be visible from an important cultural resource, and would not be located in the immediate foreground observed by the public at-large. The proposed project would have an insignificant impact on aesthetic resources. The project area is characterized by rolling hills of agricultural lands. No scenic viewpoints or scenic roads are in the proposed project area. The additional gas turbine generation station would be located near an existing turbine and associated electrical transmission lines to minimize the need for additional power poles and lines. The addition of another combustion turbine would have minimal direct or indirect impacts on the already linear features of the landscape, as existing roads, fencing, pipelines, substations, and transmission lines transect the area.

**Transportation:** The proposed project would have no significant direct, indirect, or cumulative impacts to the transportation systems of local cities and counties, and the state. Short-term impacts would include minor traffic delays caused by construction activities. Any such short-term roadway closings would be scheduled with appropriate authorities, marked clearly, and detour routes would be provided as necessary.

Construction of the proposed project would be expected to cause only insignificant adverse transportation effects to public access as a result of minor roadway congestion from workers vehicles.

**Noise:** Project-related noise is not likely to exceed local, state or Federal guidelines at sensitive receptors such as residences. Noise associated with construction of the proposed project would be intermittent and of relatively short duration. The proposed project would be located in rural, unpopulated areas. Noise impacts from construction would be expected to be short term. Components would be assembled off site and construction would be limited to daytime hours to mitigate any noise generated. The gas turbine would be located near existing roadways and away from existing dwellings to minimize noise impacts to the area. In addition, the proposed project would not be expected to contribute significantly to cumulative noise impacts within the project area.

**Radio and Television Interference:** The proposed project would be constructed according to current standards and would not result in long-term or widespread interference with radio and television signals; therefore, impacts to radio and television signals would be insignificant.

**Human Health and Safety:** The GGS2 Project has been designed with attention to the reduction of hazards associated with its operation and would meet or exceed state and Federal safety standards in all its components.

**Socioeconomic Conditions and Community Resources:** The proposed project would not pose disproportionate environmental effects to minority and low-income populations. In addition, no measurable impacts to the local communities would be anticipated; therefore, no significant impacts would be expected to occur.

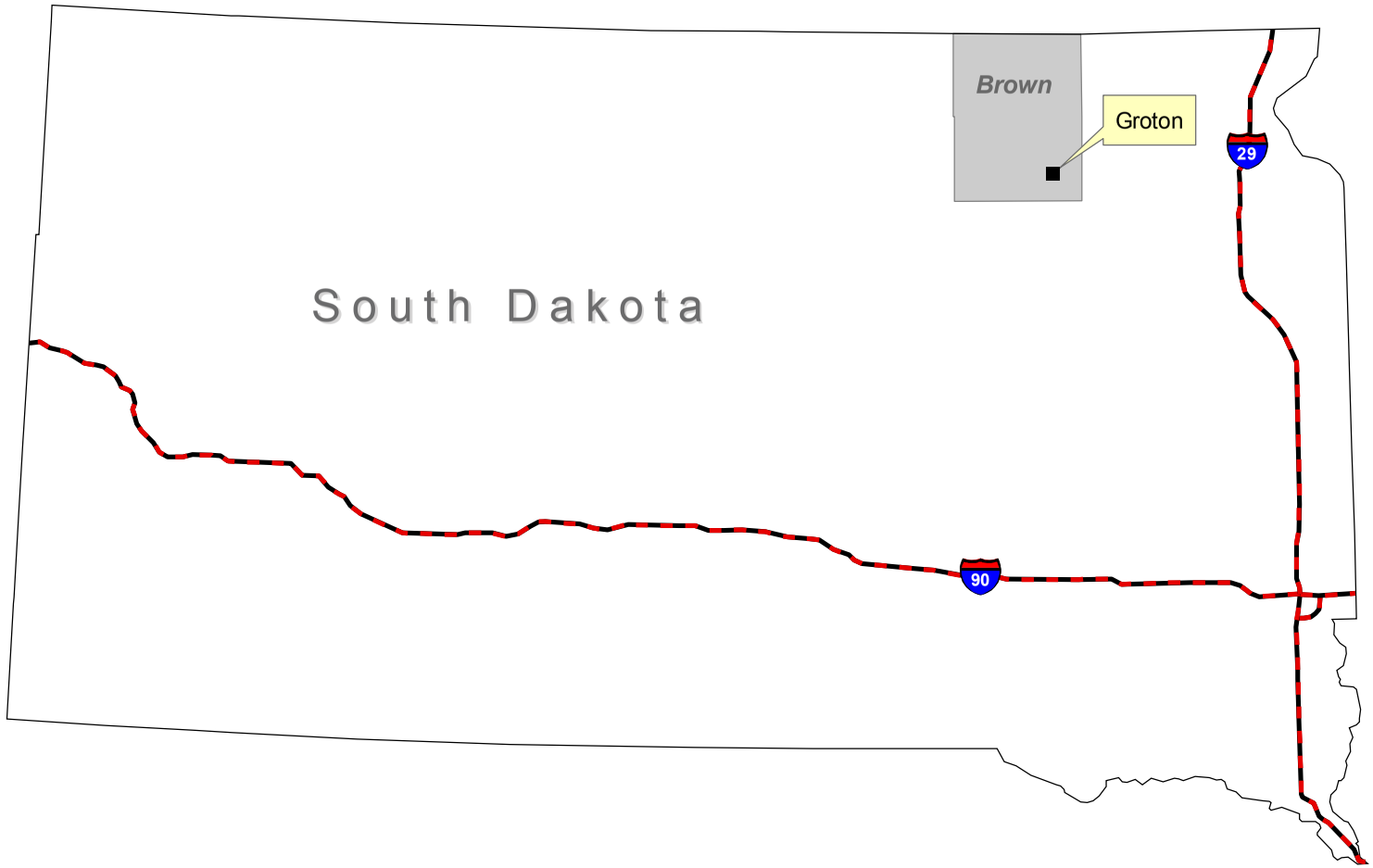
# 1.0 INTRODUCTION

Basin Electric Power Cooperative (Basin Electric) is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota. Basin Electric operates a total of 3,407 megawatts (MW) of electric generating capacity of which 953 MW is for participants in the Missouri Basin Power Project, a group of six consumer-owned utilities, including the Missouri River Energy Services and Heartland Consumers Power District. Basin Electric also has 73 MW of ownership rights in two projects which it does not operate, and has 85 MW of wind energy. Basin Electric also manages and maintains 2,424 miles of high-voltage transmission lines; 40 switchyards and substations, and 58 microwave installations used for communications and system protection.

Basin Electric Power Cooperative (Basin Electric) is proposing to construct an additional new 80 - 100 MW simple cycle gas turbine in eastern South Dakota (Figures 1-1 and 1-2) to meet member load growth during increasingly heavy electrical use times in every consumer class, primarily during summer months and in anticipation of additional growth in commercial load throughout Basin Electric's service area. The project, the GGS2, would include a gas-fired combustion turbine using natural gas for fuel (Figure 1-3). The firm gas supply and firm gas transportation agreements are in place and satisfy the MAPP accreditation requirements. If required, the gas-fired turbine is capable of being modified to use fuel oil at a later date.

The preferred site for the proposed gas turbine is near Groton in Brown County South Dakota (Groton) (Figures 1-1 and 1-2). The total area of the proposed project site would be less than 5 acres in size, and occurs adjacent and immediately south of the new Groton Generation Station 1 site (GGS1), and adjacent and east of Basin Electric's 345 kilovolt (kV) substation (Figure 1-4). Western Area Power Authority (Western) also operates a 115kV substation adjacent and south of the Basin Electric's Groton substation.

The gas turbine would be identical to the GGS1, which is sized to best match project loads, environmental requirements, and overall economics. Both gas turbines are capable of operating at all loads from 3 percent to 100 percent of rated capacity, but would normally operate between 50 percent and 100 percent of rated capacity. The combined yearly output of the turbines would be less than 50 average MW.

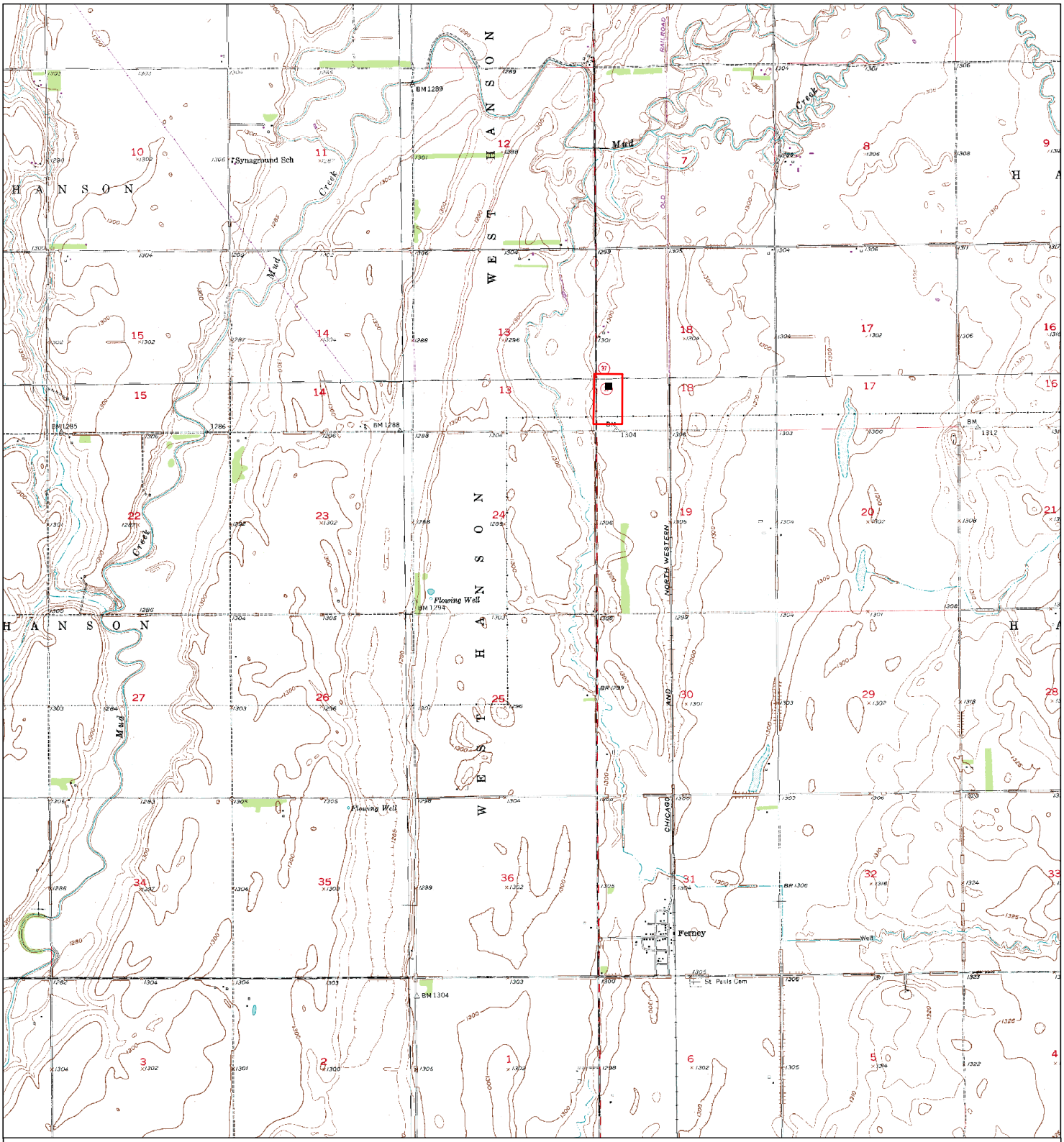



**Legend**

- Proposed Gas Turbine Location
- Interstate Highway
- Proposed Project County

FIGURE 1-1
PROJECT REGION
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

0 15 30 60
Miles




Proposed Project Area

Proposed Gas Turbine Site

FIGURE 1-2
PROJECT SITE LOCATION
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

N

0 2,000 4,000 8,000 Feet

U.S. Geological Survey (USGS).

14-NOV-2006 N:\ARCPRJ\2010321\PROJECT\SDEIS\FIG1-2_TOPO.MXD

Example Gas Turbine Site

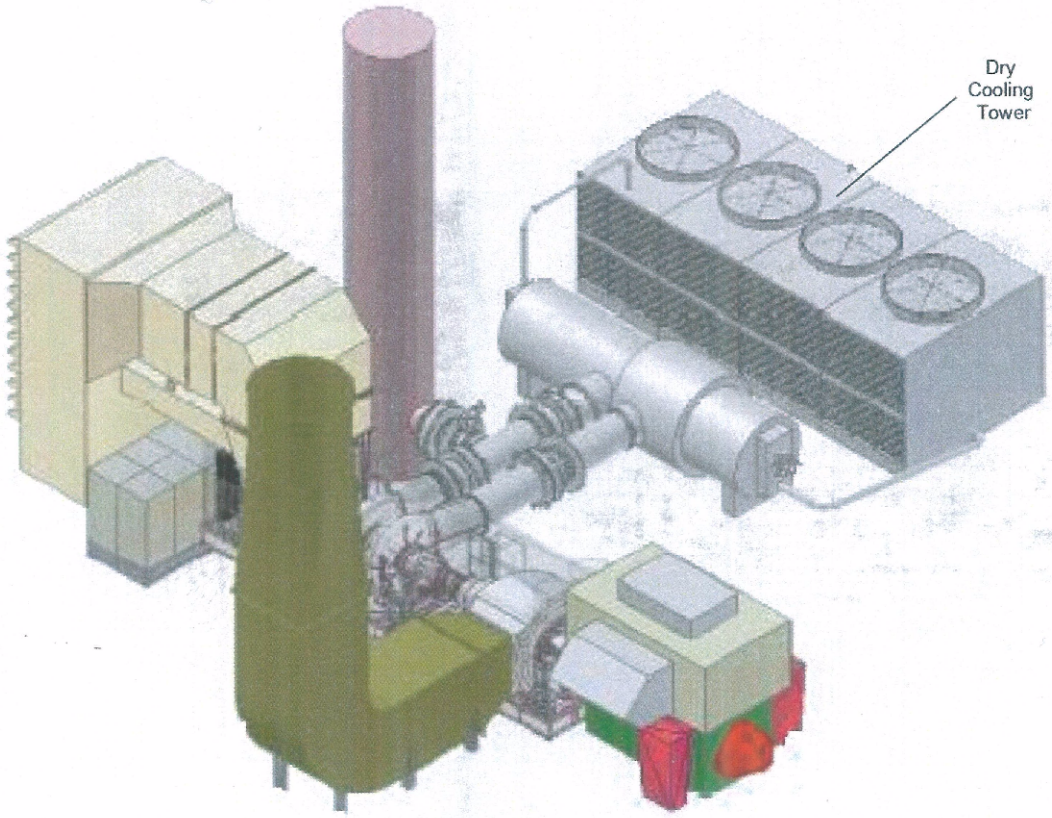



FIGURE 1-3
GENERAL ELECTRIC LMS100
CONCEPTUAL CONFIGURATION
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

Source: General Electric

14-NOV-2006 N:\ARCPRJ\20103211\PROJECT\SDEIS\FIG1-3_LMS100.MXD


250 125 0 250

Feet

FIGURE 1-4
SITE LAYOUT ON AERIAL PHOTO
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

26-OCT-2006 N:\ARCPRJ2\0103211\PROJECT\BASIN_GIS\PROJECTS\PUC\PUC061000\EX10_AIR_PHOTO.MXD

Basin Electric would provide the design and equipment for the GGS2 gas turbine, plant equipment, generator breaker, site station service transformer, and associated ancillary equipment and systems. Basin Electric would also provide project design and the equipment needed for connections at the substation and for the existing 115 kV transmission line to the Western substation. Western would provide the design-build for the transmission line connection in Western's substation.

**Project Mitigation.** Mitigation measures for the proposed project were considered in the impacts analysis. Basin Electric maintains standard mitigative practices for construction activities.

Section 3.0 of this document outlines the mitigation measures that would be implemented to reduce any potential project impacts to less than significant levels.

**Document Components.** This Environmental Impact Statement (EIS) describes the components of, reasonable alternatives to, and environmental consequences of the GGS2, and connection to the existing 115-kV transmission system. This EIS is divided into several sections, the contents of which are summarized below.

Section 1 describes:

- Purpose of and need for the action
- The role of Basin Electric as the project proponent and lead Federal agency
- Roles and responsibilities of other participating agencies

Section 2 provides:

- Description of the proposed action
- Alternatives to the proposed action including no action.
- Environmental protection measures (best management practices) that would be followed during construction of the proposed project.

Section 3 describes:

- Existing or potentially affected environment in the project area
- Potential direct, indirect, and cumulative impacts to the affected environment associated with the proposed action

Section 4 provides a list of the document's preparers.

Section 5 provides a list of references cited in developing the EIS.

### 1.1 Purpose and Need For Action

Basin Electric was formed in 1961 by 67 member cooperatives after the U.S. Department of the Interior announced that the Federal hydropower system would not be able to meet additional energy requirements of the region's rural electric cooperatives and other preference consumers of the U.S. Bureau of Reclamation beyond the winter of 1965. Basin Electric was formed as a wholesale power supplier to plan, design, construct, and operate generating facilities necessary to meet the growing electrical demands of its member systems.

Construction of the East Side Peaking Project, which included the recently constructed GGS1, associated pipeline and transmission line, was initially required to meet the growing need for power of Basin Electric's membership in its service territory. Basin Electric has reevaluated this need and has currently established the need for an additional peaking resource to serve projected additional member load growth.

Even though the most rural areas are experiencing a loss in population, many areas served by Basin Electric are experiencing population growth. Basin Electric has established the need to add an additional peaking resource to serve member load growth during increasingly heavy electrical use times in every consumer class, primarily during summer months and anticipation of anticipated growth in commercial load throughout Basin Electric's service area. This project was also established on the basis of an ongoing need to address reliability and to supply low-cost power to Basin Electric members.

Load growth is expected to be greatest in Basin Electric's membership areas in eastern South Dakota and northwestern Iowa (East Side). A new peak demand delivery to members was reached in 2002. A new Basin Electric peaking resource in this region was initially needed to serve member loads and will be partially met with the construction and operation of the GGS2. The yearly output of the GGS2 turbine would be less than 50 average MW.

Table 1-1a and Table 1-1b compare the total summer system load projections for Basin Electric's east side calculated in 2005 to new calculations in 2006. Figure 1-5 presents the load and capability surplus/deficit for the total Basin Electric system for the 2007-2019. Negative numbers indicate a deficit. The calculation includes projects currently under construction, as well as projects committed to or under

consideration, and thus included in Basin Electric's current board-approved Long Range Financial Forecast (LRFF). Some of the main projects include the Dry Fork Station in 2011 and an east side coal plant in 2014.

**Table 1-1a**
**Basin Electric Eastern System Projected Summer Loads and Resources, 2004-2016**

| Year | Summer Seasonal Demand | Net Generation Owned | Firm & Participation Purchases | Firm & Participation Sales | Net Reserve Capacity | Basin Electric Surplus/ Deficit |
|---|---|---|---|---|---|---|
| 2004 | 1502 | 1759 | 121 | 229 | 223 | (74) |
| 2005 | 1507 | 1790 | 117 | 253 | 224 | (77) |
| 2006 | 1527 | 1790 | 117 | 186 | 227 | (33) |
| 2007 | 1570 | 1790 | 117 | 107 | 232 | (2) |
| 2008 | 1588 | 1790 | 117 | 103 | 234 | (18) |
| 2009 | 1610 | 1791 | 117 | 98 | 238 | (38) |
| 2010 | 1627 | 1790 | 116 | 105 | 240 | (67) |
| 2011 | 1661 | 1790 | 116 | 55 | 237 | (47) |
| 2012 | 1679 | 1790 | 116 | 61 | 239 | (73) |
| 2013 | 1696 | 1790 | 116 | 64 | 242 | (96) |
| 2014 | 1715 | 1790 | 116 | 67 | 245 | (121) |
| 2015 | 1739 | 1790 | 115 | 70 | 249 | (152) |
| 2016 | 1761 | 1790 | 115 | 73 | 252 | (181) |
| 2017 | 1781 | 1790 | 115 | 77 | 255 | (208) |
| 2018 | 1803 | 1790 | 115 | 82 | 259 | (239) |
| 2019 | 1826 | 1790 | 115 | 88 | 262 | (271) |
| 2020 | 1849 | 1790 | 115 | 91 | 266 | (301) |

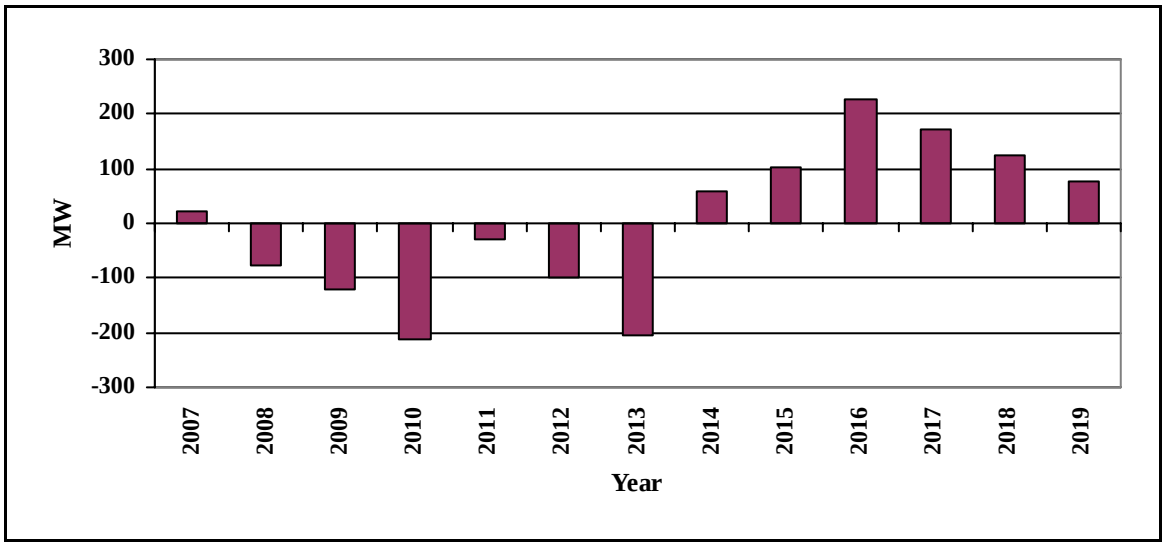
**Table 1-1b**
**Revised Estimate for the Basin Electric Eastern System Projected Summer Loads and Resources, 2007 – 2020**

| Year | Summer Season Demand | Net Generation Owned | Firm & Participation Purchases | Firm & Participation Sales | Net Reserve Capacity | Basin Electric Surplus / (Deficit) |
|---|---|---|---|---|---|---|
| 2007 | 1,650 | 1,882 | 157 | 164 | 233 | (8) |
| 2008 | 1,717 | 1,890 | 157 | 194 | 243 | (107) |
| 2009 | 1,747 | 1,898 | 157 | 164 | 248 | (104) |
| 2010 | 1,832 | 1,892 | 157 | 165 | 261 | (208) |
| 2011 | 1,874 | 1,889 | 157 | 36 | 267 | (131) |
| 2012 | 1,914 | 1,889 | 157 | 38 | 273 | (179) |
| 2013 | 1,944 | 1,889 | 157 | 65 | 278 | (241) |
| 2014 | 1,981 | 2,239 | 127 | 81 | 283 | 21 |
| 2015 | 2,014 | 2,339 | 127 | 100 | 288 | 63 |
| 2016 | 2,054 | 2,339 | 127 | 37 | 294 | 82 |
| 2017 | 2,093 | 2,339 | 127 | 37 | 300 | 35 |
| 2018 | 2,130 | 2,339 | 127 | 38 | 305 | (7) |
| 2019 | 2,165 | 2,339 | 127 | 38 | 311 | (48) |

Forecasted Basin Electric system capacity requirements for the 2004 through 2027 planning horizon were contained in the 2003 Power Supply Analysis Study (Basin Electric 2003, 2004b). The study was

prepared in accordance with Rural Utilities Service (RUS) General and Pre-Loan Policies and Procedures Common to Electric Loans and Guarantees published in 7 Code of Federal Regulations (CFR) 1710 Subpart F. The purpose of the study was to determine the best capacity additions for Basin Electric's service area. The study evaluated which candidate capacity options would satisfy the currently forecasted Basin Electric System capacity requirements in the least-cost manner, defined as the expansion plan having the lowest cumulative present worth cost (CPWC) over the 2004 through 2027 planning horizon. Included in CPWC are all incremental capital and fixed Operating and Maintenance (O&M) costs, plus all system variable (fuel plus variable O&M) costs incurred to meet all system capacity requirements. The system planning process requires the development of capital cost and performance parameters for all candidate-generating units to be evaluated. For this study, Basin Electric developed conceptual level cost and performance information for a number of solid fuel and gas-fired units.

**Figure 1-5**
**Basin Electric Total System Summer Surplus/ (Deficit)**




Based on additional analysis of loads and resources, Basin Electric in total anticipates a capacity deficit in 2008 and, therefore, requires an additional peaking-type resource to fulfill capacity. Figure 1-6 presents the load & capability surplus/deficit calculation for the total Basin Electric system with the addition of an 80 - 100 MW turbine. The capacity situation shows that Basin Electric would continue to be deficit in the summer season, at least until 2014, while the energy situation shows that peaking is the type of energy (resource) needed. With consideration of a variety of constructed and purchased options, the lowest total system cost evaluated alternative for the next resource for Basin Electric is the development of an

additional 80 - 100 MW simple cycle gas turbine located adjacent to the GGS1 in Brown County, South Dakota.

Figure 1-6 below, presents the load and capability surplus/deficit for the total Basin Electric system for the 2007-2019 including GGS2. Figure 1-7 shows Basin Electric's forecasted 2008 hourly energy situation on the West (with no transfers to the west across Rapid City), Figure 1-8 shows Basin Electric's forecasted 2008 hourly energy situation on the East (with no transfers to the west across Rapid City), Figure 1-9 shows Basin Electric's forecasted 2012 hourly energy situation on the East (with no transfers to the west across Rapid City) and Figure 1-10 shows Basin Electric's forecasted 2012 hourly energy situation in total.

**Figure 1-6**
**Basin Electric Total System Summer Surplus/(Deficit) with GGS2**


As can be seen from Figures 1-7, 1-8, and 1-9, Basin Electric needs base load energy on the west which can be transferred from the east to solve the west side short fall. By transferring power to the west all hours of the year, it pushes the east into additional peaking during the summer months.

**Figure 1-7**
**2008 West Hourly Energy (No Rapid City DC Tie Transfers)**

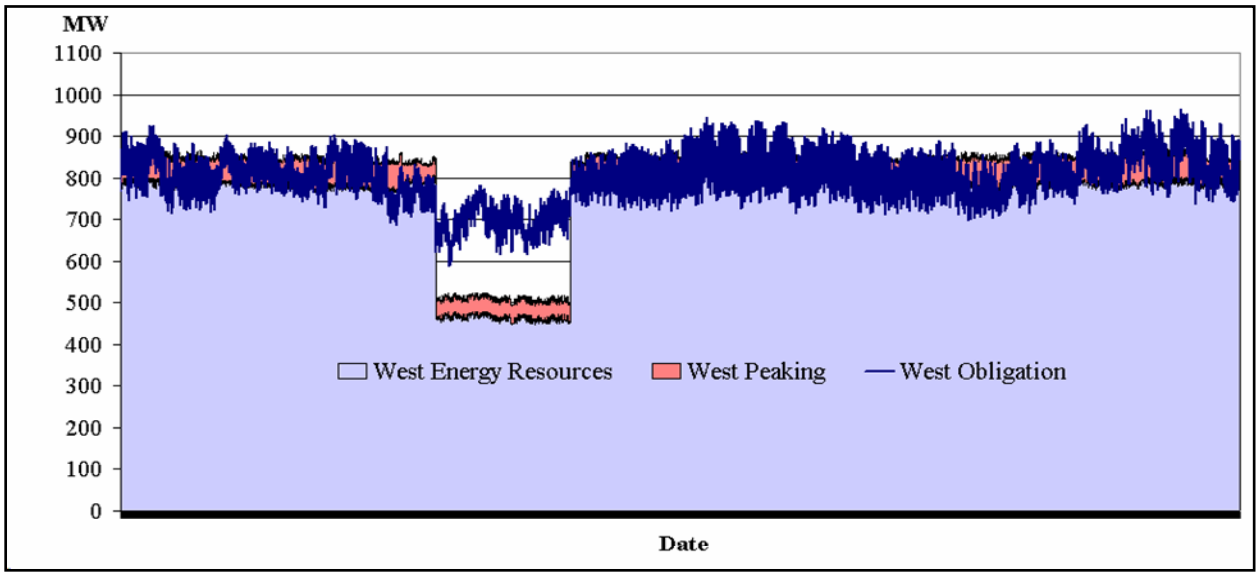



**Figure 1-8**
**2008 East Hourly Energy (No Rapid City DC Tie Transfers)**

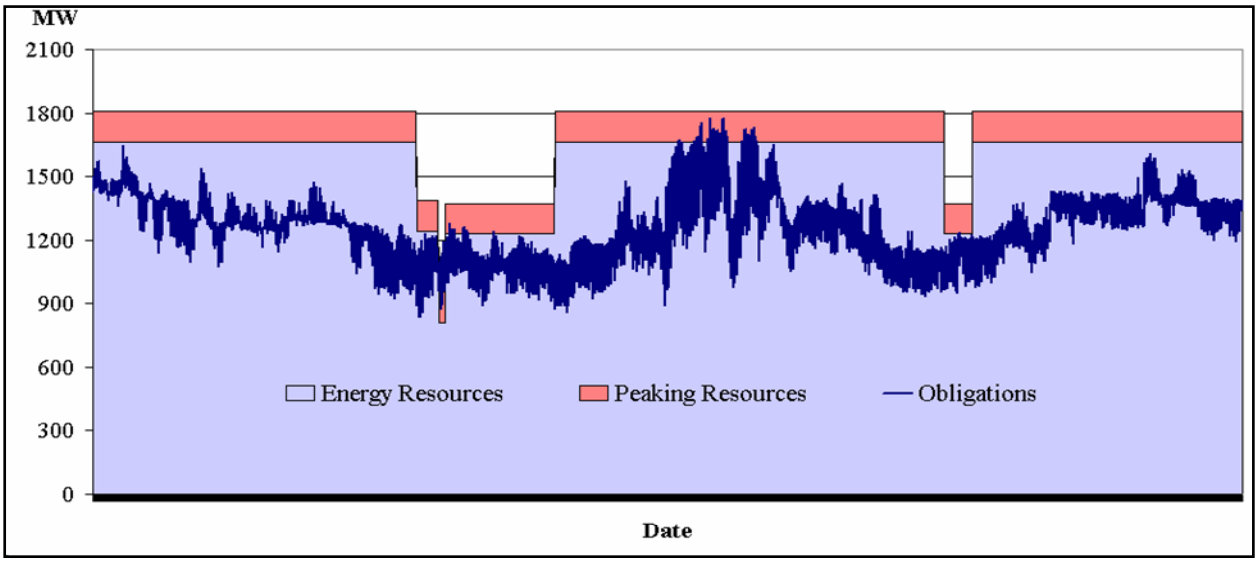


**Figure 1-9**
**2012 East Hourly Energy (No Rapid City DC Tie Transfers)**

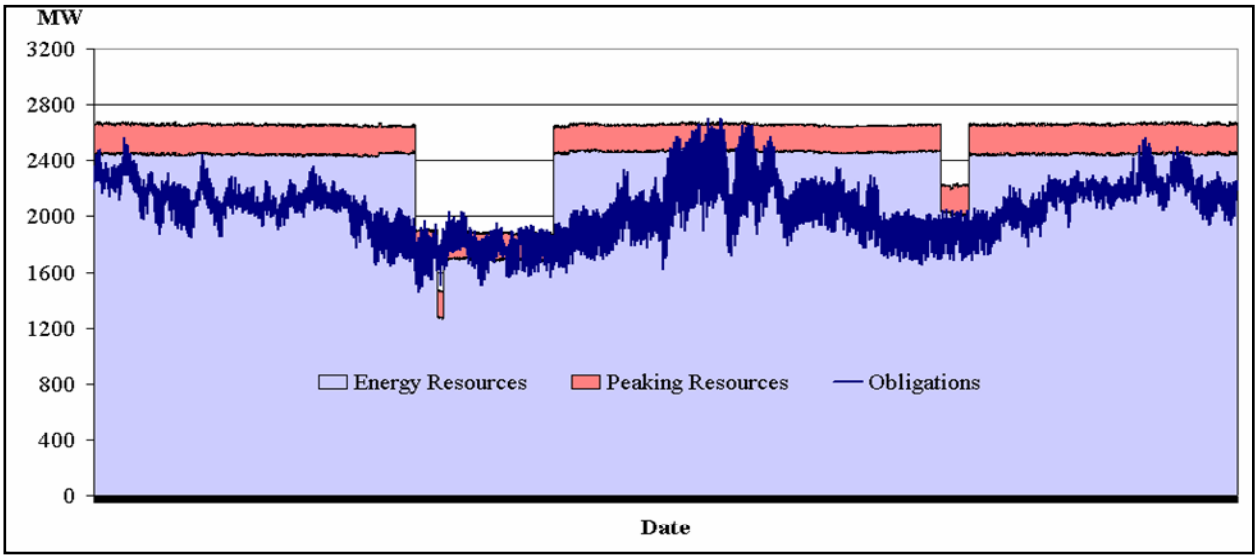
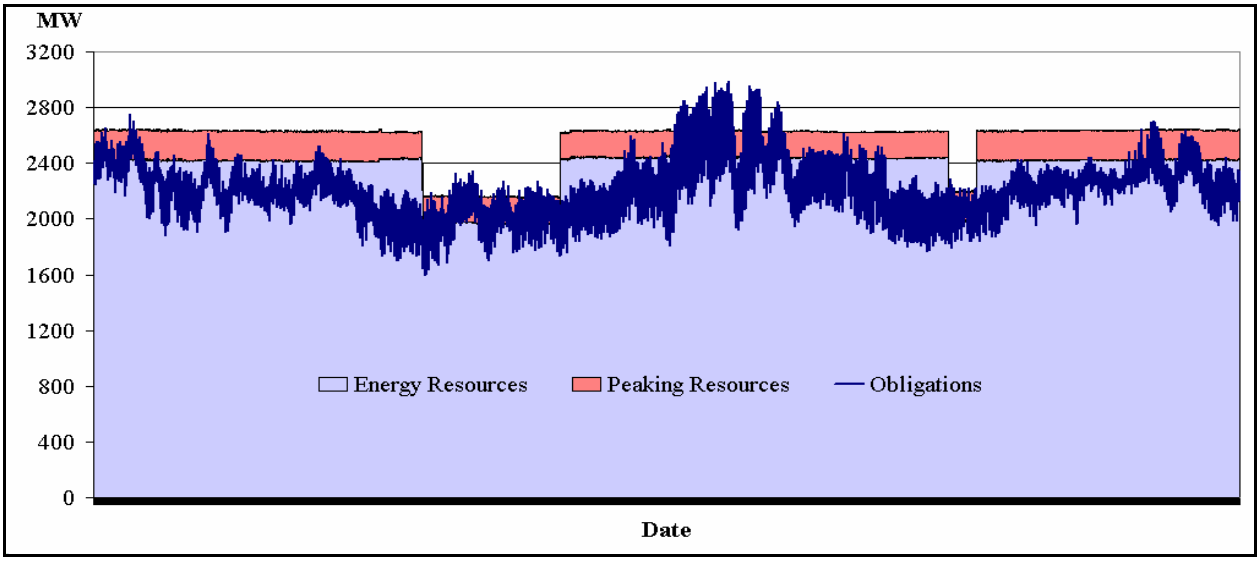



Figure 1-10 below, shows Basin Electric's forecasted 2012 hourly energy situation in total. The load profile is based on actual 2005 loads. The available energy is based on Basin Electric's existing resources, scheduled maintenance outages for existing resources, and contract purchases. The load pattern is the Basin Electric member load, diversity, losses and contracted non-member sales.

**Figure 1-10**
**2012 Total System Hourly Energy**



Looking at the possible short-term proposals (under five years), Basin Electric could postpone the construction of the self-build for a couple years and purchase in the market. Basin Electric would be exposed to market fluctuation with this approach. Also, the cost of gas turbines is very uncertain in the future and the ability of transmission would be significantly more difficult to obtain if Basin Electric waited a couple of years. Based on these risks, Basin Electric proposes to move forward with the construction of an additional simple cycle gas turbine at this time.

# 2.0 PROPOSED ACTION

## 2.1 Project Components

The proposed project involves the construction of a gas turbine for the purpose of generating electricity. In addition to the proposed generation, this project would involve transmission interconnection with the Western 115-kV substation adjacent to the proposed site (Figure 1-2).

**Gas Turbine.** The proposed GGS2 gas turbine is a natural gas-fired, turbine-powered electricity generation station, located approximately 5 miles south of the town of Groton, in Brown County, South Dakota. The elevation of the site is approximately 1,300 feet above mean sea level (msl). The terrain in the region is relatively flat with some rolling hills. The area surrounding the GGS2 site is well-drained, although there is little topographic relief throughout the site.

The GGS2 gas turbine would be powered by one GE LMS100 gas turbine, fired by natural gas. The site would be enclosed in a secure fenced area. The turbine would be situated on a concrete pad and enclosed in a structure (Figures 1-1 and 1-2). The proposed site would be located on property owned by Basin Electric. A 345-kV Basin Electric substation and a constructed drainage pond exist at the proposed site (Appendix A). A Western 115-kV substation is adjacent to the proposed site.

**Transmission Interconnection.** Interconnection to the substation would utilize the current interconnection for the GGS1 gas turbine. No specific modifications would be necessary for Western's Groton substation, down-line substations, transmission system, and communication systems. Preliminary studies indicate that modifications to Western's substation will not be required to accommodate an additional transformer for the proposed project. Additional modifications may include existing system upgrades.

## 2.2 Project Implementation

Several project phases, including construction, operation, maintenance, and abandonment would be required to fully implement the proposed 230-kV project. These are discussed below.

## 2.3 Construction

Basin staff from the Montana maintenance office would rebuild any necessary modifications to the transmission line. Private contractors would likely construct and install the new turbine. Construction tasks would include the following:

**Pre-Construction.** Includes environmental permitting, final transmission structure siting, engineering, design, land procurement, various utility studies, and major procurement.

**Access Planning and Preparation.** Crews would gain access from public roads as well as within existing GGS1 site for constructing, operating, and maintaining the additional turbine. No additional graded surfaces are planned or anticipated. Existing roads would be left in a comparable or better condition than what existed before construction.

A fence with accompanying gates and locks would be installed around the project site.

**Personnel and Equipment.** Table 2-1 presents the estimated number of jobs for the construction phase of the gas turbine, while Table 2-2 below presents the estimated personnel and equipment for transmission interconnection construction activities.

**Table 2-1**

**Personnel for Gas Turbine Construction**

| Activity | Personnel | Duration |
|---|---|---|
| **General Contractor** | | |
| Civil Discipline – with carpenters, apprentices and laborers | 35 to 45 persons | 3 to 5 months |
| Structural Discipline – with iron workers, welders, apprentices and laborers | 15 to 20 persons | 3 to 4 months |
| Mechanical Discipline – with millwrights, mechanics, apprentices and laborers | 15 to 25 persons | 3 to 5 months |
| Electrical Discipline – with electricians, apprentices and laborers | 25 to 35 persons | 6 to 8 months |
| Indirect Support | 15 to 20 persons | |
| Clerical and Material Management | 4 to 5 persons | |
| **Subcontractor** | | |
| Civil Discipline | 6 persons | 1 month |
| Iron Workers | 6 persons | 1 month |
| Electrical Discipline | 10 persons | 2 months |

Note:

Local hires for all disciplines are estimated at 40 to 60 percent of total employment.

**Table 2-2**

**Personnel and Equipment Required for Transmission Interconnection Construction**

| Activity | Personnel | Equipment |
|---|---|---|
| Clearing and Grubbing | 3-4 persons | Bucket truck, pickup truck |
| Gate Installation | 2-3 persons | 1½-ton truck |
| Material Haul-out | 5 persons | Truck tractor with flatbed trailer, digger derek, skid steer loader |
| Framing | 4-6 persons | Crane, 1½-ton truck, pickup truck, 2 skid-steer loaders, track and wheel |
| Auger | 4 persons | 2 trailers with pressure diggers, 2 pickup trucks |
| Erection | 6-8 persons | Crane/Rough Terrain Grove 35-ton truck, air compressor, pickup trucks |
| Stringing | 15-25 persons | Reel trailer, tensioner, puller, pickup trucks, digger, aerial man-lift, dozer with winch, winch truck, skid-steer loader |
| Cleanup | 3 persons | 1½-ton truck, utility tractor with various attachments |

**Plant Decommissioning.** The plant would be decommissioned at the end of the useful life of the proposed project. Decommissioning would include removal and disposal of plant equipment and buildings, and disconnection with Western's 115-kV transmission line. The underground gas and water pipelines would be disconnected, capped below grade, and abandoned in place. This facility would not produce any hazardous material that would be stored or disposed of on site. Thus, no hazardous material would require removal at decommissioning.

Similar to construction, short-term fugitive air emissions in the form of dust generated from decommissioning equipment and associated vehicle exhaust would be generated. These emissions would be of short duration and would not be significant. Storm water controls would remain in place during the decommissioning period; therefore, no significant impacts would be expected to occur to local drainages. After the plant had been decommissioned, the ground surface will be returned to its original contour quality and usage and any disturbed areas would be reseeded.

**Environmental Protection Measures.** Several documents would provide environmental protection guidance to Basin during project construction and operation. These documents include SDDENR, Summaries and/or applicable parts of each of these documents follow. Additional environmental protection would be provided through implementing project specific resource protection measures, which are summarized below.

**State and Federal Permits.** The proposed project's construction would require several permits. Terms and conditions of these permits would require Basin to minimize erosion, conduct reclamation, and maintain air and water quality standards.

**Resource Protection Measures.** The following resource protection measures are designed to avoid potential impacts to environmental resources in the project area.

**Soil**. Silt fencing, straw bales, and culverts would be used to ensure proper drainage and prevent erosion. Construction activities that would result in soil disturbance would not occur during periods of inclement weather or during high wind events. Surface disturbance would also be limited to the areas adjacent to and previously disturbed for the construction of the GGS1 gas turbine.

**Water**. Employees would be trained in proper fuel handling practices to minimize the potential for spills. Refueling would take place at secure areas, away from drainages. Appropriate federal, state, tribal, or local regulatory agencies would be notified of any spills. If necessary, soil impacted by fuel would be removed in accordance with a remediation plan approved by the regulatory agencies.

**Vegetation**. Any sensitive areas near construction sites would be designated as avoidance areas that would be marked on the ground. Construction personnel would receive training to avoid sensitive areas. Disturbed areas would be reclaimed to pre-construction conditions as site work is complete. Any disturbed native prairie would be re-seeded with a native seed mix appropriate for the soil type. Revegetation monitoring would be performed for two years to verify the success of revegetation efforts. Noxious weeds would be controlled through implementation of noxious weed control plans approved by appropriate county agencies.

**Wetlands.** No wetlands would be directly or indirectly affected by project activities. Consequently, no additional mitigation measures would be required.

**Wildlife.** No impacts to wildlife would occur that would require additional mitigation measures.

**Federal Threatened, Endangered, and Proposed Species, and State Rare Species.** No impacts to federal threatened and/or endangered species, or state rare species would occur that would require additional mitigation measures.

**Land Use.** Western would notify the Federal Aviation Administration of changes in line location, height, and addition of guy wires to new angle structures prior to segments being reconstructed.

**Visual Quality**. Structures would be placed to avoid or span sensitive features whenever possible.

**Worker Safety.** Preparation of work plans and specifications would include appropriate performance provisions for worker protection as is required under the OSHA with emphasis on 29 CFR part 1926 Safety and Health Regulations for Construction.

**Traffic.** Traffic management and control of the local roadways would be considered in the forward planning and implementation of the proposed project.

**Health.** Design requirements to reduce or eliminate induced current and voltages would be used to avoid steady-state current shocks.

**Cultural Resources.** If a previously unknown site is discovered, any required mitigations would be developed and implemented in consultation with the appropriate state and/or Tribal agency(s). Sites subject to damage from construction activities would be avoided during construction to avoid potential impacts.

### 2.4 No Action Alternative

Under the no action alternative, the proposed action would not be implemented. The existing GGS1 would be maintained and operated at its current level. Because the proposed action is needed to allow Basin Electric to effectively respond to the increased demand for power, the no action alternative would require the construction, operation, maintenance, and future abandonment of a similar facility in another location. The development of a similar facility in another area would like have similar resource requirements and emissions. The no action alternative could ultimately result in higher-cost electricity if another facility needed to be planned, permitted, and constructed to meet increasing demands in Basin Electric's East Side member area.

# 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## 3.1 Introduction

This section describes the existing environment and potential impacts on resources resulting from construction, operation, and maintenance of the GGS2 gas turbine. The baseline information provided in this section supports the evaluation of potential direct, indirect, and cumulative environmental impacts that could result from the proposed project. The proposed project is located in rural, agricultural areas of eastern South Dakota. On-the-ground environmental resource surveys were conducted at the proposed project site in October 2003.

Each potentially affected environmental resource is addressed in terms of a study area for the proposed project. Appendix A presents photographs of the study area. Generally, the study area for all resources is defined as the area surrounding the gas turbine and gas pipeline and access to these sites. However, the study area is defined for each resource by the physical extent that could be affected by the proposed project. The study areas for certain resources vary based on the prevalence or scarcity of the resource in the region, its size and dispersion, its sensitivity to local disturbance, and the nature and amount of information available on the resource. The study areas for each resource and the reasoning used in the selection process are presented in Table 3-1.

An environmental impact is a change in the status of the existing environment as direct or indirect result of the proposed action. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later or are farther removed in distance, but are still reasonably foreseeable. Impacts can be positive (beneficial) or negative (adverse) and permanent or long-lasting (long-term) or temporary (short-term). Short-term impacts are generally associated with the construction phase of the project while long-term impacts remain for the project life and beyond. Measures that would be implemented to reduce, minimize, or eliminate potential impacts are presented in Section 2 under Environmental Protection Measures.

**Table 3-1**
**Basin Electric Study Area by Environmental Resource**

| Environmental Resource | Study Area |
|---|---|
| Land Use | Proposed Groton combustion turbine facility (160 acres) |
| Floodplains | Proposed Groton combustion turbine facility (160 acres) |
| Wetlands | Proposed Groton combustion turbine facility (160 acres) |
| Cultural Resources | Brown County, South Dakota Proposed Groton combustion turbine facility (160 acres) |
| Threatened and Endangered Species | Brown County, South Dakota |
| Fish and Wildlife Resources | Brown County, South Dakota |
| Vegetation | Proposed Groton combustion turbine facility (160 acres) |
| Geology, Topography, and Soils | Proposed Groton combustion turbine facility (160 acres) |
| Coastal Areas | Not applicable to this project |
| Air Quality and Climatology | Brown County, South Dakota |
| Water Resources | Proposed Groton combustion turbine facility (160 acres) |
| Aesthetics | Area within which the proposed facilities may be visible |
| Transportation | Brown County, South Dakota<br>Nearby streets, railroads, and airports |
| Noise and Radio and Television Interference | Proposed Groton combustion turbine facility (160 acres) |
| Human Health and Safety | Proposed Groton combustion turbine facility (160 acres) |
| Socioeconomic Conditions and Community Resources | Brown County, South Dakota |

Figures 1-1 and 1-2 show the project location and the general study area for most environmental resource investigations. Study areas for each environmental resource are based on potential direct and indirect impacts from the proposed action. Critical elements of the human environment subject to statutes or executive orders that must be considered in an SDEIS include:

- Access and Land Use
- Air Quality
- Cultural Resources
- Farmland (prime or unique)
- Floodplains
- Migratory Birds
- Invasive, Nonnative Species
- Threatened, Endangered, Proposed, and Special Status Species
- Water Quality (Surface/Ground)
- Wetlands/Riparian Zones

- Native American Religious Concerns
- Recreation

Basin has analyzed the following critical elements which would not be affected by the proposed action or are not present in the proposed project area:

- Areas of Critical Environmental Concern
- Paleontology
- Wild and Scenic Rivers
- Wilderness

Basin has determined that the following elements of the human environment although present in the study area do not need to be analyzed because implementation is regulated to minimize impacts:

- Worker Safety - Safety of workers is regulated by the U.S. Department of Labor, Occupational Safety and Health Administration-with emphasis on 29 CFR Part 1926Safety and Health Regulations for Construction, and Western's Power System Safety Manual.
- Safety Issues Related to Increased Traffic During Construction - During the transmission line rebuild, worker and public safety due to vehicle traffic would be protected by following the U.S. Department of Transportation, Federal Highway Administration's Manual on Uniform Traffic Control Devices.

## 3.2 Physical Resources

### 3.2.1 Air Resources and Climate

The following section discusses air resources in the project area and the regulatory status of actions that may affect air resources.

#### 3.2.1.1 Existing Environment

**Air Quality.** The project area is in Brown County, which is rural in nature and air quality is primarily affected by agricultural activities and transportation corridors (i.e., road and rail traffic). Brown County is classified as an attainment area for all regulated pollutants by the U.S. Environmental Protection Agency (EPA). The title "attainment area" indicates that all National Ambient Air Quality Standards (NAAQS) are being met.

Table 3-2 lists the applicable NAAQS that must be maintained. High concentrations of total suspended particulates (dust) occur occasionally during springtime due primarily to wind erosion of tilled land. However, these concentrations are below NAAQS standards (citation). Local traffic also produces road dust during dry weather. Other emission sources affecting air quality in the area include agricultural equipment, and motorized vehicles due to the sparse human development in the area, these sources are dispersed and have minimal effect on air quality.

**Table 3-2**
**National Ambient Air Quality Standards**
**for the Basin Electric Groton Generation Station 2 Project**

| Pollutant | Averaging Time | NAAQS ($\mu g/m^3$) |
|---|---|---|
| $PM_{10}$ | 24-hour[1] | 150 |
| | Annual[2] | 50 |
| $NO_2$ | Annual[2] | 100 |
| $SO_2$ | 3-hour[1] | 1300 |
| | 24-hour[1] | 365 |
| | Annual[2] | 80 |
| CO | 1-hour[1] | 40,000 |
| | 8-hour[1] | 10,000 |
| Ozone | 1-hour[3] | 235 |
| | 8-hour[4] | 157 |
| Lead | Quarterly | 1.5 |

**Notes:**:

$\mu g/m^3$ Micrograms per cubic meter
$PM_{10}$ Particulate matter with an aerodynamic diameter of 10 microns or less
$NO_2$ Oxide of nitrogen
$SO_2$ Sulfur dioxide
CO Carbon monoxide

1 – THIS STANDARD IS NOT TO BE EXCEEDED MORE THAN ONCE PER YEAR
2 – Arithmetic mean
3 - The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 157 $g/m^3$ (0.12 part per million) is <= 1. (b) The 1-hour standard is applicable to all areas notwithstanding the promulgation of 8-hour ozone standards under Sec. 50.10. On June 2, 2003, (68 FR 32802) EPA proposed several options for when the 1-hour standard would no longer apply to an area.
4 - The 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 235 $g/m^3$ (0.08 parts per million).

The portion of the project area in South Dakota is within a Class II air quality attainment area, which allows for some alteration of air quality for industrial growth. The South Dakota Department of Environment and Natural Resources (SDDENR) indicated the proposed action requires an air quality permit.

Published concentrations for nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), carbon monoxide (CO), volatile organic compounds (VOCs), or lead near the study area are not available because there are no nearby monitoring stations for these criteria pollutants. Data for particulate matter ($PM_{10}$) with an

aerodynamic diameter of ten microns or less ($PM_{10}$) are, however, available for 2000 and 2001 from a monitoring station at 111 2nd Avenue SE in Aberdeen, South Dakota (Table 3-3). $PM_{10}$ data from another station, at 500 South Phillips in Sioux Falls, South Dakota, were available from 1998 through 2001 (Table 3-4). The Sioux Falls station is not as representative of the local conditions as the proposed Groton site since it is located in a more populated area and is farther away. Data from both stations was used to approximate concentrations that may be found in the area of the proposed project site since no other monitoring stations are nearby.

**Table 3-3**
**$PM_{10}$ Monitored Values - Aberdeen Monitoring Station, South Dakota**

| Year | Annual Number of Data Collection Days | 1st Max 24-hour Value ($\mu g/m^3$) [1] | 2nd Max 24-hour Value ($\mu g/m^3$) [1] | Annual Mean ($\mu g/m^3$) [1] |
|---|---|---|---|---|
| 2000 | 100 | 56 | 50 | 19.7 |
| 2001 | 61 | 56 | 53 | 20.4 |

**Note:**
[1]Micrograms per cubic meter

Source: South Dakota Department of Environment and Natural Resources, Aberdeen Air Quality Monitoring Site online at http://www.state.sd.us/denr/DES/AirQuality/

**Table 3-4**
**$PM_{10}$ Monitored Values – Sioux Falls Monitoring Station, South Dakota**

| Year | Annual Number of Data Collection Days | 1st Max 24-hour Value ($\mu g/m^3$) [1] | 2nd Max 24-hour Value ($\mu g/m^3$) [1] | Annual Mean ($\mu g/m^3$) [1] |
|---|---|---|---|---|
| 1998 | 98 | 54 | 52 | 21.9 |
| 1999 | 112 | 74 | 43 | 22 |
| 2000 | 110 | 50 | 50 | 19.6 |
| 2001 | 60 | 60 | 54 | 22.6 |

**Note:**
[1]Micrograms per cubic meter

Source: South Dakota Department of Environment and Natural Resources, Sioux Falls Air Quality Monitoring Site online at http://www.state.sd.us/denr/DES/AirQuality/

**Climatology**. The semiarid climate of the project region is characterized by cold, dry winters and moderately hot, moister summers. Annually, temperatures in nearby Aberdeen, South Dakota range from minus 45° to 115° F. The average annual temperature for the study area is 43.5° F. According to the High Plains Regional Climate Center (HPRCC) the highest mean monthly temperature occurs in July and is 72.7° F, while the lowest occurs in January and is 10.4° F (HPRCC, 2004).

The study area is subject to these large variations in annual temperature because it is in the center of the North American land mass. Arctic air moves into the region from the north and northwest during the winter, causing periods of extreme cold that alternate with milder temperatures. Summer temperatures are usually warm, but hot spells and cool days can be expected.

Table 3-5 lists the average monthly and annual temperatures and precipitation for the study area. The table shows the annual average total precipitation is 19.5 inches, with the highest levels of precipitation occurring from May through July (HPRCC 2004). The driest months are December, January, and February.

**Table 3-5**
**Mean Monthly Temperature and Precipitation, Aberdeen, South Dakota**

| Month | Temperature (°F) | Precipitation (inches) |
|---|---|---|
| January | 10.4 | 0.54 |
| February | 16.3 | 0.56 |
| March | 28.9 | 1.14 |
| April | 44.8 | 1.99 |
| May | 57.1 | 2.55 |
| June | 66.5 | 3.53 |
| July | 72.7 | 2.76 |
| August | 70.7 | 2.19 |
| September | 59.8 | 1.67 |
| October | 47.4 | 1.38 |
| November | 29.9 | 0.71 |
| December | 16.9 | 0.46 |
| **Annual** | 43.5 | 19.5 |

Data Source: High Plains Regional Climate Center, Watertown meteorological monitoring station online at www.hprcc.unl.edu..

#### 3.2.1.2 Environmental Consequences – Direct and Indirect Effects

Potential impacts from the project on air quality and climate could result from construction, installation, and operation of the 80- to 100 MW natural gas-fired electric turbine and associated equipment.

A significant impact on air quality could result if state and federal air quality standards were exceeded during project construction, installation, and operation. Impacts on air quality resulting from the

proposed action would include increased total suspended particulates due to fugitive dust from vehicle movement and soil disturbance during construction, installation, and maintenance activities, and emissions of nitrogen oxides ($NO_x$), hydrocarbons (HC), carbon monoxide (CO), volatile organic compounds (VOCs), and $SO_2$ would be emitted from tailpipe emissions of internal combustion construction and maintenance vehicles These vehicles would primarily include a small bulldozer, tractor, backhoe, maintainer, fuel trucks, maintenance trucks, hydraulic lift truck, construction worker vehicle, and supply trucks traveling to and from the project site. These impacts would have minor and short-term impacts on air quality, and no impacts to climate would occur from these activities.

Potential fugitive dust emissions ($PM_{10}$ emissions) involve both land disturbance emissions from construction of gas turbine site and tailpipe emissions from construction vehicles. Fugitive dust could be generated during construction from soil disturbed during clearing, grading, trenching, backfilling, and moving construction vehicles. Fugitive dust would also be generated by wind erosion of disturbed areas before the area is revegetated.

Fugitive dust caused by vehicle movement during construction, installation, and maintenance would be very localized and short term. Vehicles and machinery would be equipped with air emission control devices required by federal, state, or local regulations or ordinances. The limited construction time is expected to reduce air quality effects to levels below federal and state air quality standards. As a result, no significant impacts on air resources and climate would occur.

Construction would have no significant long-term direct, indirect, or cumulative impacts on air quality at the combustion turbine generation stations. Monitored background values for $PM_{10}$ concentrations near the construction areas do not currently exceed NAAQS, and short-term construction would not cause these background values to exceed NAAQS in the future. The cumulative effect on air quality and climate from construction would be insignificant because construction would not measurably increase background values.

Emission rates for the operation of the GGS2 gas turbine are provided in Table 3-6 and were based on turbine specifications and emission factors and on criteria established by EPA (USEPA 2003). Worst-case emissions were estimated based on an evaluation of various load and temperature screening scenarios provided by the manufacturer for the LMS100 turbine, without the CO reactor, which will be installed with the proposed turbine. A ratio of worst-case emissions to "Guarantee" condition emissions

(100 percent load and 78o F) was calculated for CO and $NO_x$, and subsequently applied to the emissions calculated for the "Guarantee" emissions for the LMS100 with the CO reactor.

**Table 3-6**
**Basin Electric GE LMS100 Turbine Emissions Summary For Criteria Pollutants**

| **Emission Unit:** | **GE LMS100 Natural Gas Combustion Turbine Generator** | | |
|---|---|---|---|
| **Fuel Flow:** | **793.5** | | |
| **Control Equipment:** | **Dry Low $NO_x$** | | |
| Criteria Pollutant | Emission Factor[a] (lb/MMBtu)[c] | Emission Rate[b] (lb/hr)[d] | Emission Rate (tons/yr)[e] |
| TSP | 6.60E-03 | 5.24 | 15.2 |
| $PM_{10}$ | 6.60E-03 | 5.24 | 15.2 |
| $SO_2$ | 3.40E-03 | 2.70 | 7.82 |
| $NO_x$ | NA | 84.6 | 245 |
| CO | NA | 79.0 | 229 |
| VOC | NA | 15.5 | 44.9 |
| Lead | 4.90E-07 | 3.89E-04 | 1.13E-03 |

Notes:

NA = Not applicable.

[a]The emisison factors for TSP, $PM_{10}$, and $SO_2$ were obtained from AP-42, Table 3.1-2a (dated 4/00). An emission factor for lead was not available from AP-42, 3.1-2a, and was obtained from AP-42, Table 1.4-2 (dated 7/98). (The emission factor for lead was calculated by dividing 0.0005 lb/$10^6$scf by 1,020 MMBtu/$10^6$scf).

[b] The $NO_x$, CO and VOC emisison rates were provided by the manufacturer in units of lb/MMBtu and converted to pounds per hour or tons per year based on fuel flow data at 78$^o$F under 100 percent load conditions. A safety factor was applied to the $NO_x$ and CO emission rates to account for variable temperature conditions, creating maximum emissions.

[c]lb/MMBtu = pounds per million British thermal units

[d]lb/hr = pounds per hour

[e]tons/yr = tons per year; assuming operation of 4,000 hours per year

Basin Electric presented these emission rates to the SDDENR as part of the state air permit application for the GGS1 gas turbine. No additional direct, indirect, or cumulative impacts from operation of the GGS2 gas turbine would be anticipated because the turbine would be operated according to similar permit conditions, and it would be located in a remote area.

### 3.2.1.3 Mitigation and Monitoring.

Implementation of the mitigation measures discussed below would reduce particulate emissions. Operation of the gas turbine requires a permit from South Dakota. The turbine will operate under

permitted conditions and will not exceed the emissions thresholds outlined in the operating permit or NAAQS. Discussions of mitigation measures for air quality are also divided into two categories: construction of the gas turbine and operation.

**Operational Mitigation.** Particulate emissions from the GE LMS100 result from the incomplete combustion of noncombustible trace constituents in the fuel. The particulate emissions are expected to be negligible, however, because the GE LMS100 will be fired exclusively on natural gas, which contains only trace quantities of non-combustible material.

In addition, combustion turbines typically operate at 99 percent or greater combustion efficiency at full load. The NSPS for combustions turbines (40 CFR 60 Subpart GG) does not establish a limit for particulate emissions because EPA recognized that particulate emissions from stationary gas turbines are extremely low. Therefore, firing of natural gas in the GE LMS100 is considered the most stringent level of control for $PM_{10}$.

**Sulfur Dioxide ($SO_2$).** $SO_2$ is formed in the gas turbine combustion process and is completely dependent on the sulfur content of the fuel since virtually all fuel sulfur is converted to $SO_2$. Pipeline-quality natural gas is a relatively clean fuel with negligible amount of sulfur. The firing of only pipeline-quality natural gas in simple-cycle combustion turbines is the most stringent method demonstrated for controlling $SO_2$ emissions. Since the GE LMS100 will be fired exclusively on pipeline-quality natural gas, this level of control is considered the most stringent for $SO_2$ emissions.

**Carbon Monoxide (CO).** CO emissions from turbines are a function of oxygen ($O_2$) availability or excess air, flame temperature, residence time at flame temperature, combustion zone design, and turbulence. Combustion turbines are designed for maximum conversion of fuel to energy at full load conditions, resulting in comparatively low levels of incomplete combustion, and consequently low CO emissions when they are fired at full load. At lower loads, however, the fuel-to-energy conversion can be less efficient, resulting in incomplete combustion and formation of CO.

Catalytic oxidation removes CO from the turbine exhaust gas rather than limiting pollutant formation at its source. The oxidation of CO to $CO_2$ and water uses the excess air in the turbine exhaust and the catalyst lowers the activation energy for the oxidation reaction to proceed. The turbine manufacturer has provided a guarantee that the operation of the GE LMS100 with the supplied catalyst, underspecified conditions, will limit CO emissions to 28 parts per million (ppm).

**Volatile Organic Compounds (VOCs)**. VOCs are formed during the combustion process as a result of the incomplete oxidation of the carbon contained in the fuel. Commonly classified VOC pollutants can encompass a wide spectrum and may include some hazardous air pollutants. With natural gas combustion, some of the VOCs are unreacted trace constituents of the gas, while others are formed in the combustion of the heavier hydrocarbons. VOC formation is limited by ensuring complete and efficient combustion of the fuel in the combustion turbine. Maximized operating loads, high combustion temperatures, adequate excess air, and sufficient air/fuel mixing during combustion will minimize VOC emissions.

Catalytic oxidation is the post-combustion method for controlling VOC emissions in the GE LMS100. The oxidation catalyst promotes the oxidation of VOC to $CO_2$ and water. No reagent injection is necessary for the reaction to occur. The temperature of the flue gas as it passes through the catalyst and the VOC species present in the flue gas are the two factors that affect VOC oxidation. Higher temperatures promote more efficient oxidation of VOCs because long-chain hydrocarbons are easier to oxidize than are short-chain hydrocarbons.

**Nitrogen Oxide ($NO_x$)**. $NO_x$ is the number-one pollutant in terms of quantity of emissions the combustion of natural gas in the simple-cycle turbine. $NO_x$ are formed in the gas turbine combustion process by the dissociation of nitrogen ($N_2$) and $O_2$. Reactions after this dissociation result in seven known oxides of $N_2$. Of these, nitric oxide (NO) and $NO_2$ are the pollutants of interest and are referred to as $NO_x$. $NO_x$ are formed in turbine combustors by two mechanisms: (1) from the burning of fuel containing $N_2$, and (2) through the thermal oxidation of atmospheric nitrogen found in the combustion air. The GE LMS100 will be fueled by natural gas that contains little or no fuel that burns $N_2$. Therefore, the majority of $NO_x$ emissions will be a result of thermal oxidation. The primary factors that influence the amount of NO generated are the turbine combustor design, the type of fuel burned, ambient conditions, operating cycles, and the power output level as a percentage of the rated full power output of the turbine (USEPA 1993).

$NO_x$ emissions from the turbine will be controlled by wet injection. The wet injection control reduces the formation of thermal $NO_x$ with the injection of water or steam directly into the primary combustion zone with the fuel. The injected water or steam creates a heat sink that lowers the flame temperature and reduces the thermal $NO_x$ formation. The water-to-fuel ratio is the most important factor that affects the performance of wet controls. $NO_x$ emissions decrease with higher water-to-fuel ratios (USEPA 1993).

**Construction Mitigation.** Particulate emissions associated with construction of the generation station would be mitigated using dust-suppression techniques. Examples of measures for control of particulates are, if necessary:

- Applying water or dust palliatives, such as magnesium chloride, to disturbed areas, as necessary, to reduce dust when vehicle traffic is present.

Construction mitigation measures include:

- Covering open haul trucks, topsoil and subsoil piles with tarps both on site and off site.
- Limiting vehicle speeds on unpaved roads and in the construction right-of-way (ROW), as required, to control dust
- Removing any soil or mud deposited by construction equipment on paved roads near the egress from unpaved areas, when required.
- Stabilizing disturbed areas in compliance with the revegetation plan after construction is complete.

### 3.2.2 Geology and Soil

#### 3.2.2.1 Existing Environment

Glaciation has affected the physiography of the Northern Great Plains. Glaciers have retreated and advanced several times in the past two million years. The geology of the GGS2 site is a level to nearly level glacial lake plain associated with the James River lowland physiographic unit. There are no known or anticipated paleontological resources at or near the project site.

Brown County, in the northeastern part of South Dakota, comprises an area of about 1,728 square miles. Major topographic features include the James River, Lake Dakota plain, and till highlands east and west of the Lake Dakota plain.

Pre-Pleistocene rocks range in age from the Precambrian basement rocks to the cretaceous Pierre Shale. Only the latter crops out at the surface. The Niobrara Marl subcrops beneath glacial drift in isolated areas.

Between the Precambrian rocks and the Pierre Shale are formations representing the Cambrian, Ordovician, Devonian, Mississippian, Pennsylvanian, Jurassic, and Cretaceous periods.

With the exception of a few scattered outcrops of Pierre Shale, and small areas of recent stream alluvium and lake silt, the entire county is covered by Pleistocene glacial drift. This drift includes till, outwash, lake silt, and sand. Lacustrine deposits and sand are found in greatest quantity in the bed of Ancient Lake Dakota.

Major geomorphic features include large areas of recessional moraine, the Lake Dakota plain, small areas of stagnation drift and sand dunes.

Evidence indicates Brown County has been glaciated only once; the James Lobe of late Wisconsin age advanced southward through the James Basin and spread out onto the highlands east and west of the basin. There may have been at least two rapid advances and withdrawals of the ice. During the final retreat, Ancient Lake Dakota formed between the retreating ice front and a morinal dam at the Beadle-Spink County boundary.

Mineral resources of value include large amounts of ground and surface water and sand and gravel. No significant metallic or fossil fuel reserves have been located.

Elevations in the project area are relatively flat along the James River valley with the site at about 1,300 above mean sea level (AMSL) with local relief generally less than 200 feet. Most of the area consists of upland glaciated plains, which are primarily level with some moderate slopes. Slopes range from 0 to 2 percent and cultivation and increased erosion and deposition have caused additional filling of low areas. The general area slopes westward toward the James River, which is located ten miles west of the project site.

Soils at the project site are described as Aberdeen (silty clay loam), Nahon (silty clay loam), and Exline (silt loam) series. Aberdeen soils consist of deep, moderately well drained soils formed in clayey glacio-lacustrine sediments. Nahon soils are similar to Aberdeen but can be somewhat poorly drained. The Exline soils are also similar to the Aberdeen and Nahon soils in depth and drainage but have a silt-loam surface texture. Aberdeen soils are located on the upper foot slopes; Nahon soils are located on the lower foot slopes and in micro-low areas; and Exline soils are located on the toe of slopes.

These silty clay and silt loam soils have moderate organic matter content, and their available water capacity is moderately high. The permeability in the upper soil horizons is moderately low (0.2 to 0.6

inches per hour) to low (0.06 to 0.2 inches per hour). These soils are easily eroded by wind and water (USDA 1994).

#### 3.2.2.2 Environmental Consequences – Direct and Indirect Effects

Potential impacts from the proposed action on geology and soils would include:

- Loss of soil due to wind and water erosion
- Spills of hazardous materials of sufficient quantity were left unmitigated.

**Geology.** No potentially hazardous geological areas, such as slumps or landslides, would be affected by construction of the gas turbine. There are no known or anticipated paleontological resources at or near the project site. Furthermore, there are no known significant geologic resources such as metallic mineral deposits or sand and gravel deposits. As a result, no direct, indirect, or cumulative impacts to geological resources are anticipated by the proposed action.

**Topography.** The proposed action would make use of existing level to nearly level terrain for construction of the gas turbine and associated facilities (access road, storage building, and substation). The grading and earthmoving required are not significant because the sites are nearly level and are not located in areas that would be susceptible to flooding. As a result, no direct, indirect, or cumulative impacts to topography would be anticipated by the proposed action.

**Soils.** Impacts to soils from the proposed action would be insignificant. Direct impacts to soils within the gas turbine site and proposed pipeline corridor could include localized short-term increases in the potential for erosion from wind and water runoff, compaction, and rutting.

Areas that are cleared or disturbed by construction of the gas turbine could be susceptible to erosion. The impacts from erosion are a function of the local soil type and the amount of surface disturbance and vegetation clearing required. Reduced absorption caused by heavy construction equipment that could compact the soils can also aggravate erosion in work areas.

Risk of soil erosion due to runoff is low to moderate in most of the project area because of gentle slopes. As a result of measures to prevent, minimize, and/or reclaim potential soil erosion and compaction, no loss of highly productive soil would result from implementing the proposed action. Thus, there would be no significant impact on soil resources.

#### 3.2.2.3 Mitigation and Monitoring

Erosion of soil at the gas turbine plant site would be managed by implementing a county- or state-approved soil erosion and sediment control plan until vegetation is re-established naturally or through seeding. The following practices would be adopted for construction practices to minimize impacts to geological and soil resources:

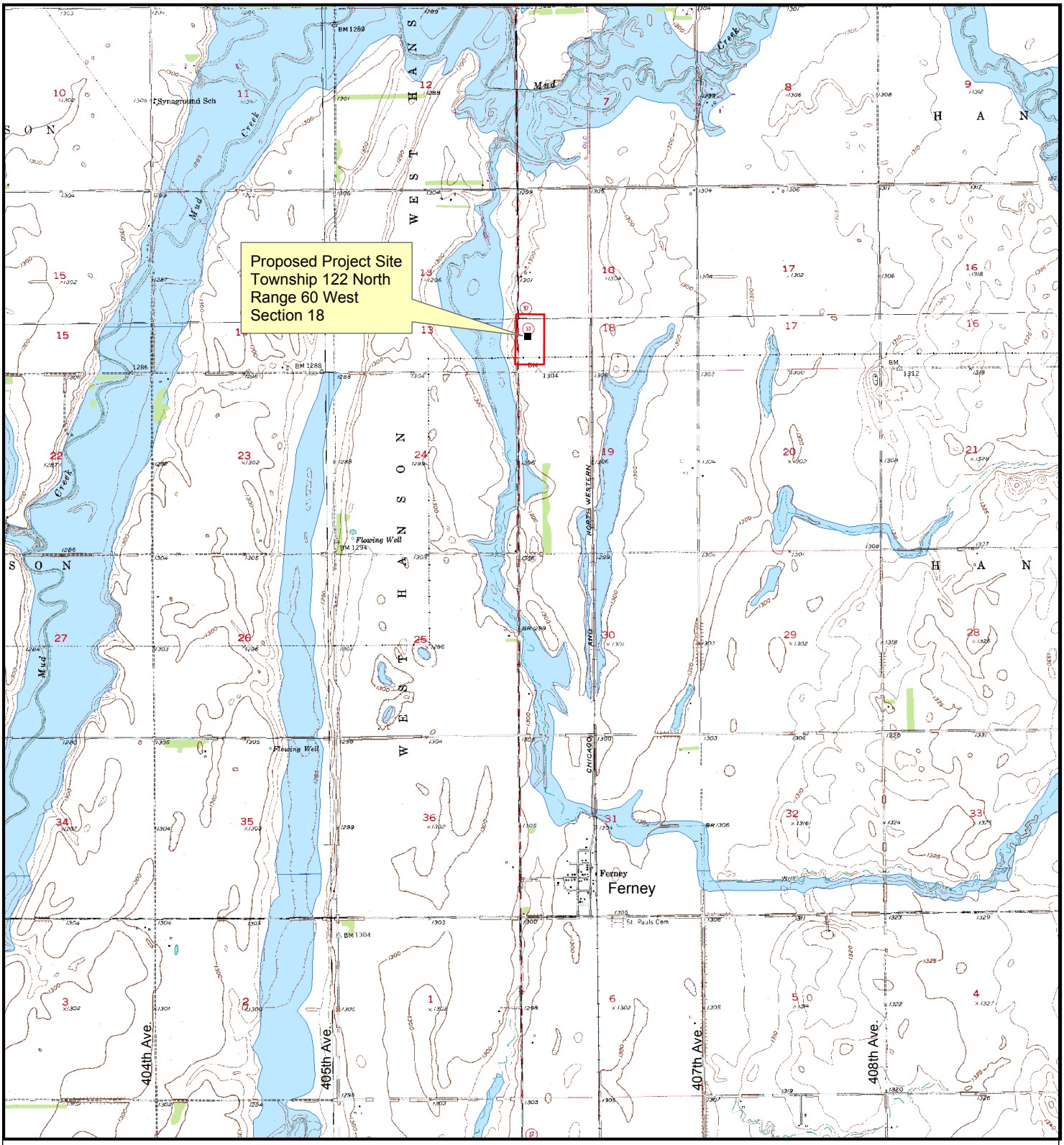
- Land cleared at any time would be limited to the amount required to complete the next phase of the generator.
- Natural ground cover would be retained to the extent possible.
- Any topsoil removed during construction would be stockpiled for use during reclamation.
- Excavated topsoil would not be stockpiled or deposited near or on drainage features.
- Disturbed areas would be reclaimed as soon as practicable after construction ends in those areas.
- Areas where cover is removed would be seeded with native plant species.
- Reasonable steps would be taken to ensure that any fill material used during construction is free of contaminants.
- BMPs for spill prevention would minimize impacts to subsurface soils. Spills would be cleaned up according to state and federal regulations.

### 3.2.3 Water Resources

#### 3.2.3.1 Existing Environment

**Surface Water.** The project area lies within the James River drainage basin. The James River flows generally north and south and is located 10 miles west of the project area at the closest point. Mud Creek, a tributary of the James River, is located 1 mile north. The area surrounding the site is well-drained, although there is little topographic relief throughout the site.

No mapped surface water bodies are within the proposed area of the GGS2 gas turbine site (USGS 2000) Floodplains. Figure 3-1 identifies the general floodplains located in and around the proposed project area. A floodplain is the level ground bordering a stream channel or river that carries overbank flow during flood events. According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for the proposed action, the site would not cross into, or be located within, a 100-year floodplain (FEMA 1998). However, the site is within a 500-year floodplain associated with a tributary of Mud Creek.




Legend

- Proposed Project Area
- Proposed Project Site
- 100-yr Floodplain

FIGURE 3-1
FLOODPLAINS
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

0 2,000 4,000 8,000 Feet

14-NOV-2006 N:\ARCPRJ\2010321\PROJECTSDEIS\FIG3-2_FLOOD.MXD

Flood damage prevention ordinances for Brown County require a description of any potential alteration in flood watercourses. These same ordinances also require certification that the flood-carrying capacity of the watercourse will not be diminished if an alteration in a watercourse is anticipated.

**Wetlands.** Wetlands are intrinsically important because they can provide important wildlife habitat, and perform hydrologic (e.g., flood attenuation, surface water, groundwater recharge) and water quality (sediment retention, pollution control) functions (Novitzki et al., 1996). National Wetland Inventory (NWI) maps were obtained for the site in Groton, South Dakota. Figure 3-2 identifies wetlands located in and around the proposed project area (USFWS 2003c).

Small, isolated inland herbaceous wetland areas are shown for the GGS2 site. Most of these wetland areas no longer support hydrophytic vegetation because the area near the Gorton site is currently cultivated. A small, two- to three-acre, entirely bermed pond has been constructed between two existing electric substations located on this site. This pond was dry during the field reconnaissance.

Before the early 20$^{th}$ century, the Lake Dakota plain consisted of wetlands located on soil with poor drainage and flat ground surfaces. Because of the vast network of man-made drainage ditches that was constructed over the first half of the 20$^{th}$ century, wetland conditions generally no longer exist in the project vicinity (Koch 1986).

**Groundwater.** The principle sources of water for domestic use and for livestock in the study area are glacial deposit aquifers. The glacial deposit aquifers are in the glacial outwash valleys and alluvium, in sand and gravel lenses, and in subsurface gravel and silt. Aquifers in Brown County, South Dakota, are divided into two classifications: aquifers above the bedrock surface, and bedrock aquifers.

Brown County aquifers above the bedrock surface consist of three main systems: the Deep James Aquifer, the Middle James Aquifer, and the Elm Aquifer. In addition to these three aquifers, the Lake Dakota plain is a source of groundwater in eastern Brown County. The project site is located within the Lake Dakota plain, which consists primarily of silt, fine sand, and clay soils.

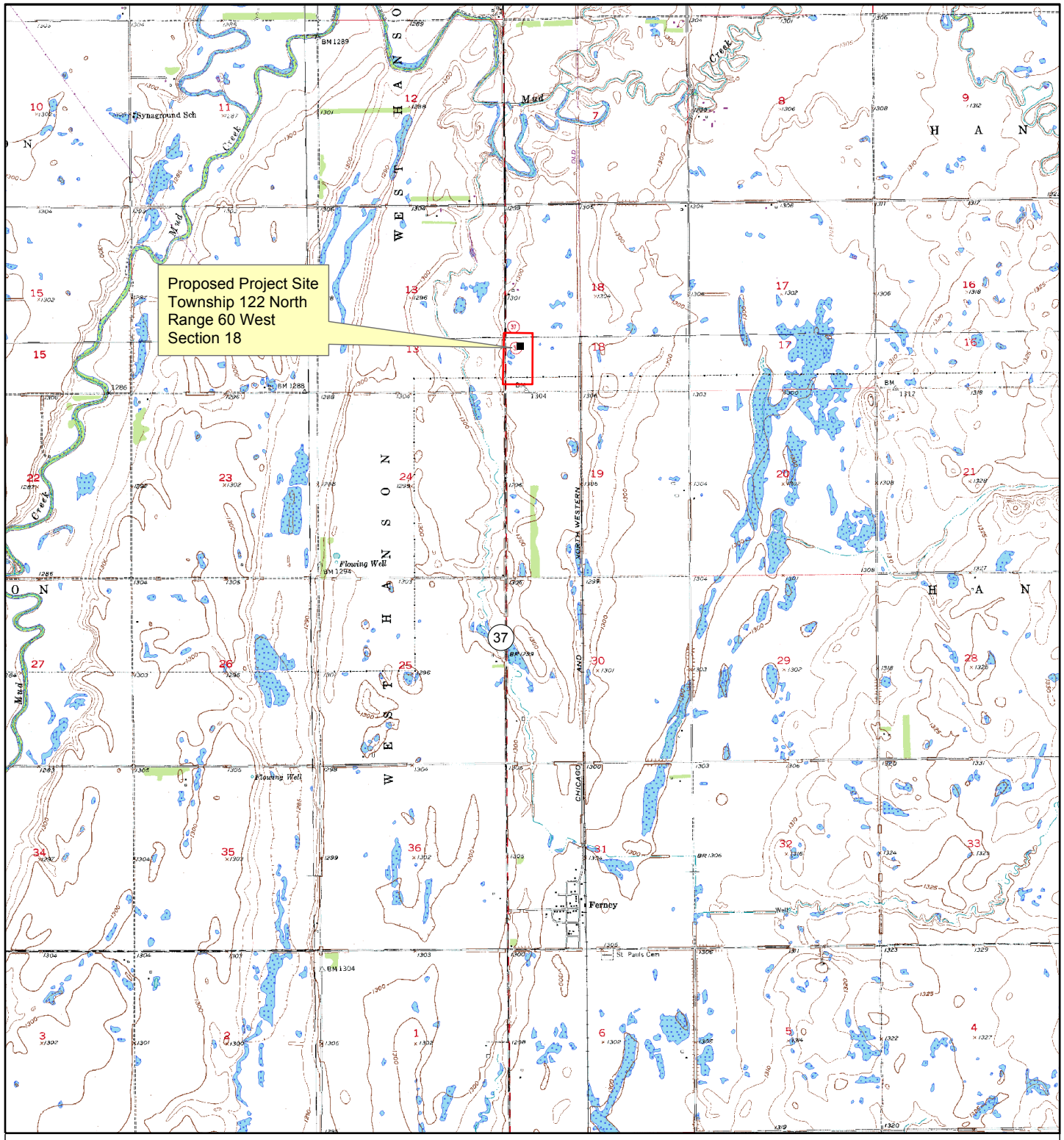



FIGURE 3-2
WETLANDS
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

14-NOV-2006 N:\ARCPRJ2\0103211\PROJECT\SDE\SVFIG3-3_WETLAND.MXD

The most readily available groundwater occurs in sand and gravel of the alluvium. Alluvial groundwater levels fluctuate seasonally and can be within several feet of the land surface. The groundwater level in the Lake Dakota plain fluctuates between three and 17 feet, depending on the specific location. The water levels in most location within the Lake Dakota plain fluctuate less than six feet. The depth to ground water ranges from ground surface to 27 feet below ground surface.

**Water Quality.** Groundwater quality within the same aquifer can vary from location to location. Groundwater in northeastern South Dakota commonly exhibits high to very high salinity and often cannot be used for irrigation. However, many local aquifers do yield water suitable for irrigation. High capacity wells have been developed in alluvial aquifers along the James River for municipal supply. Concentrations of iron, sulfate, and total dissolved solids adversely affect the suitability for domestic use in some areas (USGS 1966).

#### 3.2.3.2 Environmental Consequences – Direct and Indirect Effects

Potential impacts from the proposed action on water resources could include:

- Surface runoff from failure to implement or properly control storm water from construction and operation of the proposed action,
- Exceedance of acceptable water quality limits,
- Spills of hazardous materials of sufficient quantity were left unmitigated,
- Depletion of aquifers used by nearby residents from improper handling of wastes.

**Surface Water.** Because no mapped surface water bodies, wetlands, and floodplains are within the proposed area of the gas turbine site, impacts to surface water would not occur. To protect against any effects from run-off and erosion during construction, sediment and erosion control measures would be implemented in accordance with project specific environmental protection measures described in Section 2 and the mitigation and monitoring measures described below.

**Groundwater.** Potential impacts on groundwater would be minimized with spill prevention and remediation measures described in Section 2. Therefore, no significant impact on groundwater resources would occur during construction and operation.

#### 3.2.3.3 Mitigation and Monitoring.

Permits for stormwater discharges associated with construction activities would be obtained as required. Inadequate implementation of permit requirements could degrade surface water quality and significantly impact surface water resources. Unmitigated soil disturbances during construction could lead to increased soil erosion and sediment transport. Surface water quality could be affected by increasing sediment load if sediment is allowed to reach streams.

Potential impacts on surface water would be minimized and/or avoided according to storm water discharge permits and water pollution prevention standards. Impacts on surface water due to sediment loading would be short-term and would decrease to pre-construction levels after reclamation and revegetation efforts are completed. Since stormwater discharge permit requirements would be implemented, environmental protection measures followed, and streams and wetlands avoided, no significant impacts on surface water quality would occur.

## 3.3 Biological Resources

### 3.3.1 Vegetation

The principal natural vegetation communities in the regions of South Dakota that were surveyed represent mixed-grass prairie habitat. Forbs and shrubs occur as small, patchy communities with trees found sporadically throughout the prairie community in small hardwood stands along drainages, around homesteads, and in windrows in agricultural areas. Other communities include flora adapted to riparian and emergent wetlands and floodplains in the project vicinity. Section 3.2.3 discusses specific wetland areas. Table 3-7 presents a list of plant species occurrence in the study area.

#### 3.3.1.1 Existing Environment

Approximately 75 percent of the land in the project area is cropland, primarily corn, soybeans, small grains, and alfalfa. The remaining land is composed of existing electrical substations, roadside borrow ditches, mixed-grass prairie, and occasional isolated windrows and other sparse stands of trees (Tetra Tech 2003c).

**Table 3-7**
**East side Peaking Project**
**Basin Electric Power Cooperative**
**Plant Species List and Occurrence at Two Potential South Dakota Generator Sites (October 2003)**

| Scientific Name | Common Name | Groton Site | Watertown SE Site |
|---|---|---|---|
| **Grasses and Grasslike Plants** | | | |
| *Agropyron cristatum* | Crested wheatgrass | X | |
| *Agropyron intermedium* | Intermediate wheatgrass | X | |
| *Agropyron smithii* | Western wheatgrass | X | X |
| *Andropogon gerardii* | Big bluestem | X | |
| *Andropogon scoparius* | Little bluestem | X | |
| *Bromus inermis* | Smooth brome | X | X |
| *Bromus tectorum* | Cheatgrass | X | X |
| *Carex spp.* | Sedges | X | X |
| *Districlis stricta* | Inland saltgrass | X | |
| *Eragrostic cilianensis* | Stinkgrass | X | |
| *Festuca octoflora* | Sixweeks fescue | X | |
| *Hordeum jubatum* | Foxtail barley | X | X |
| *Koleria cristata* | Junegrass | X | X |
| *Panicum capillare* | Witchgrass | X | |
| *Phalaris arundinacea* | Reed canarygrass | X | X |
| *Phleum pratense* | Timothy | X | |
| *Poa compressa* | Canada bluegrass | X | |
| *Poa pratensis* | Kentucky bluegrass | X | X |
| *Setaria glauca* | Yellow bristlegrass | X | |
| **Forbs, Shrubs, Trees** | | | |
| *Achillea millefolium* | Western yarrow | X | X |
| *Amaranthus hybridus* | Smooth pigweed | | X |
| *Asclepias speciosa* | Showy milkweed | X | X |
| *Cirsium arvense* | Canada thistle | X | X |
| *Convolvulus arvensis* | Field bindweed | X | X |
| *Eupatorium purpureum* | Sweet Joepyeweed | X | X |
| *Gentiana* spp. | Gentian species | | X |
| *Glycyrrhiza lepidota* | American licorice | | X |
| *Grindelia squarrosa* | Curlycup gumweed | X | |
| *Helianthus annuus* | Common sunflower | X | X |
| *Iva xanthifolia* | Marshelder | | X |
| *Kochia scoparia* | Kochia | X | |
| *Kuhnia eupatorioides* | False boneset | X | |
| *Melilotus officinalis* | Yellow sweetclover | X | X |
| *Prunus virginiana* | Chokecherry | | X |
| *Rosa arkansana* | Arkansas rose | X | X |
| *Rumex altissimus* | Pale dock | X | X |
| *Taraxacum officinale* | Common dandelion | X | X |
| *Thlaspi arvense* | Field pennycress | | X |
| *Tragopogon dubius* | Western salsify | | X |
| *Trifolium repens* | White clover | X | |
| *Xanthium strumarium* | Cocklebur | X | X |

### 3.3.1.2 Environmental Consequences – Direct and Indirect Effects

Significant impacts could occur to vegetation resources if a project is likely to result in destruction or adverse modification of vegetative communities. Potential impacts from the proposed action on vegetation could result in short- (one year or less) and long-term direct impacts from surface disturbance, vegetation removal and soil compaction from:

- Equipment and material storage and staging areas near the gas turbine site,
- Performing geotechnical investigations,
- Clearing, grubbing, grading, and constructing the buildings and associated facilities for the natural gas-fired generator,
- Loss of vegetated acreage,
- Establishment of invasive and noxious plant species, and
- Increased erosion and sedimentation that results in runoff and gullies on bare and compacted soils.

Soil disturbance would be insignificant however, as the proposed site is located on level to nearly level terrain that is not subject to flooding. Although surface disturbance would occur at the GGS2 gas turbine site, it would primarily be limited to the area previously disturbed during construction of the GGS1 gas turbine.

Cumulative impacts to vegetation are anticipated to be insignificant and include effects from existing farming and ranching. The primary land use in the project area consists of cultivated fields of corn, soybeans, small grains, and alfalfa, practices that have been changing the landscape for many years. In addition, future agricultural use of the area may continue to cause significant changes to the landscape. 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.

### 3.3.1.3 Mitigation and Monitoring

Construction disturbances would be reclaimed soon after construction is completed. After construction is complete, any compacted soil would be tilled, and the area would be reseeded with native grasses and forbs. Most areas affected by short-term disturbances would be returned to cropland or seeded grass pasture within one growing season. Any off-road activity would be avoided when the soil is saturated to avoid excessive disturbance and soil compaction.

### 3.3.2 Fish and Wildlife

Although the evaluation of wildlife resources focused on the project area (Figure 1-2), some regional discussion is included. This is necessary because of the greater mobility of wildlife and the importance of habitat resources outside of the project area to wildlife. Table 3-8 lists mammals, birds, and other animals observed in the project vicinity.

**Table 3-8**
**Animal Species Observed At The Basin Electric Existing Groton Generation Station**

| Common Name | Scientific Name | Groton Generation Station | Groton Gas Pipeline |
|---|---|---|---|
| **BIRDS** | | | |
| Red-Tailed Hawk | *Buteo jamaicensis* | | D |
| Ring-Necked Pheasant | *Phasianus colchicus* | D | D |
| Mourning Dove | *Zenaida macroura* | D | |
| Song Sparrow | *Melospiza melodia* | D | |
| American Tree Sparrow | *Spizella arborea* | D | |
| Dark-Eyed Junco | *Junco hyemalis* | D | |
| Western Meadowlark | *Sturnella neglecta* | | D |
| Yellow-Headed Blackbird | *Xanthocephalus xanthocephalus* | | D |
| Brewer's Blackbird | *Euphagus cyanocephalus* | D | |
| Snow Goose | *Chen caerulescens* | D | |
| **MAMMALS** | | | |
| American Badger | *Taxidea taxus* | I | |
| White-Tailed Deer | *Odocoileus virginianus* | D | |
| Eastern cottontail | *Sylvilagus floridanus* | D | |
| Common Raccoon | *Procyon lotor* | I | |

**Notes:**
D = Direct Observation I = Indirect Observation (tracks, scat, burrow)
Numerous rodent burrows were evident at each site. Although only one rodent was directly observed, burrows were consistent with unidentified species of ground squirrel, pocket gopher, and mice.

#### 3.3.2.1 Existing Environment

Land use in the proposed project area is row crop agriculture crossed by 69-kV, 115-kV, and 345-kV transmission lines. The area also includes an electric power substation, a constructed pond (dry at the time of the field survey), and small, scattered patches of mixed-grass prairie around the substation and tower bases. Although there are no streams at the proposed gas turbine site, the pond may provide seasonal aquatic habitat. Wildlife in these habitats consists of species adapted to agricultural and grassland areas. Seven common bird species were observed in the proposed project area, including the ring-necked pheasant (*Phasianus colchicus*), dark-eyed junco (*Junco hyemalis*), song sparrow, American tree sparrow (*Spizella arborea*), mourning dove (*Zenaida macroura*), Brewer's blackbird (*Euphagus*

*cyanocephalus*), and snow goose (*Chen caerulescens*). The last three species were not present on the site but were observed migrating through the general area. No nests were observed, although it is likely that several bird species use the undisturbed grassland as nesting sites. Two mammal species, white-tailed deer (*Odocoileus virginianus*) and Eastern cottontail rabbit (*Sylvilagus floridanus*), were observed directly, while two others were identified indirectly: American badger (*Taxidea taxus*) and common raccoon (*Procyon lotor*). A variety of mammal burrows indicate the presence of an unidentified species of ground squirrel and pocket gopher. Because of the weather during the survey, no reptile, amphibian, or insect species were observed in the study area (Tetra Tech 2003b).

#### 3.3.2.2 Environmental Consequences – Direct and Indirect Effects

Significant impacts that could potentially occur to fish and wildlife resources from:

- Alteration and/or fragmentation of important habitat and cover used by fish and wildlife for breeding, foraging, and refuge;
- A major loss of economically important wildlife populations; and
- Loss to any population of wildlife that would require the species to become listed as endangered or threatened.

Short-term direct impacts would include loss of individuals during construction or direct disturbance of species during critical periods in their life cycle. Long-term direct impacts would include alteration and/or removal of habitat. Indirect impacts would include access to areas not previously accessible. Because the proposed action is expanding an existing facility, there would not be any indirect impacts. Birds that use the James River valley as a flyway may also utilize the 2-acre retention pond during spring and fall migration. Assuming that construction would occur during summer, impacts to migratory birds would be insignificant. If construction were to occur in either spring or fall, birds would temporarily disperse to other areas due to the presence of noise and human activity. Birds would return to utilize the areas following the completion of construction, and would not be adversely affected by project operations.

In general, because the area in and around the existing 345 kV Groton substation is dominated by croplands, wildlife have adapted to existing conditions.

There is a possibility for collisions with the transmission lines at the project site, although they are not expected to increase over any potential line collisions with the existing transmission line. No collisions

have been documented by Basin Electric or state wildlife personnel to date (Tetra Tech, 2006).

Construction of the additional GGS2 gas turbine would displace certain small mammal, bird, reptile and amphibian species that may utilize the previously disturbed habitats resulting from the construction and operation of the Groton substation and GGS1 gas turbine. However, there is suitable habitat in the area to support any wildlife displaced by the new construction of the GGS2 gas turbine.

#### 3.3.2.3 Mitigation and Monitoring

Construction would be located within the existing Groton substation area where previous surface disturbance occurred during construction of the GGS1 gas turbine. Construction would be limited to this previously disturbed area and would avoid any additional new disturbance to primary areas of wildlife habitat.

Vegetation would be replanted in all areas disturbed by construction to limit displacement of wildlife and their food sources and to mitigate the cumulative impacts of regional habitat loss.

### 3.3.3 Threatened, Endangered, Proposed and Sensitive Species

The area of study for special status species was essentially the same as that for wildlife resources with focus on the project area (Figure 1-2).

Federally listed threatened, endangered, and proposed species in northeastern South Dakota are listed in Table 3-9. Life history and distribution of species that could occur near the project area are discussed below.

**Table 3-9**
**Federal Threatened, Endangered And Candidate Species and South Dakota Rare Species In the Basin Electric Groton Generation Station 2 Study Area.**

| Common Name | Scientific Name | Status | | County |
|---|---|---|---|---|
| | | Federal | State | |
| **BIRDS** | | | | |
| Least Bittern | *Ixobrychus exilis* | G5 | S2B | D |
| Great Blue Heron | *Ardea herodias* | G5 | S4B | B, S, D |
| Great Egret | *Casmerodius albus* | G5 | S3B | B, D |
| Snowy Egret | *Egretta thula* | G5 | S2B | B |
| Little Blue Heron | *Egretta caerulea* | G5 | S2B | B |

| Common Name | Scientific Name | Status | | County |
|---|---|---|---|---|
| | | Federal | State | |
| Green-backed Heron | *Butorides virescens* | G5 | S4B | D |
| Black-Crowned Night Heron | *Nycticorax nycticorax* | G5 | S4B | B, D |
| Yellow-Crowned Night Heron | *Nyctanassa violacea* | G5 | SUB | B |
| White-Face Ibis | *Plegadis chihi* | G5 | S2B | B |
| Bald Eagle | *Haliaeetus leucocephalus* | LT | ST | B, S |
| Cooper's Hawk | *Accipiter cooperii* | G5 | S3B | B, D |
| Swainson's Hawk | *Buteo swainsoni* | G5 | S4B | D |
| Ferruginous Hawk | *Buteo regalis* | G4 | S4B | B |
| Whooping Crane | *Grus Americana* | LE | SE | S |
| Black-Necked Stilt | *Himantopus mexicanus* | G5 | S1B | B |
| Eskimo Curlew | *Numenius borealis* | LE | SE | S |
| American Woodcock | *Scolopax minor* | G5 | S3B | D |
| Black Tern | *Chilodonias niger* | G4 | S3B | D, S |
| Burrowing Owl | *Athene cunicularia* | G4 | S4B | D |
| Henslow's Sparrow | *Ammodramus henslowii* | G4 | SUB | D |
| **FISH** | | | | |
| Central Mudminnow | *Umbra limi* | G5 | SE | D |
| Hornyhead Chub | *Nocomis biguttatus* | G5 | S3 | D |
| Topeka Shiner | *Notropis Topeka* | LE | S2 | B, D |
| Northern Redbelly Dace | *Phoxinus eos* | G5 | ST | D |
| Banded Killifish | *Fundulus diaphanus* | G5 | SE | D |
| Logperch | *Percina caprodes* | G5 | S3 | D |
| Blackside Darter | *Percina maculata* | G5 | S2 | D |
| **MAMMALS** | | | | |
| Swift Fox | *Vulpes velox* | G3 | ST | S |
| Plains Spotted Skunk | *Spilogale putorius interrupta* | G4 | S3 | B |
| **MOLLUSCS – BIVALVES** | | | | |
| Yellow Sandshell | *Lampsilis teres* | G5 | S1 | B |
| Creek Heelsplitter | *Lasmigona compressa* | G5 | S1 | D |
| Creeper | *Strophitus undulates* | G5 | S3 | D |
| Deertoe | *Truncilla truncata* | G5 | S2 | S |
| **INSECTS (All are butterflies)** | | | | |
| Powesheik Skipperling | *Oarisma powesheik* | G3 | S2 | D |
| Ottoe Skipper | *Hesperia ottoe* | G4 | S2 | D |
| Dakota Skipper | *Hesperia dacotae* | C | S2 | B, D |
| Iowa Skipper | *Atrytone arogos iowa* | G4 | S2 | D |
| Broad-Winged Skipper | *Poanes viator* | G5 | S2 | D |
| Regal Fritillary | *Speyeria idalia* | G3 | S3 | B, D |
| **PLANTS** | | | | |
| Riddell's Goldenrod | *Solidago riddellii* | G5 | S1 | D |
| Flattop Aster | *Aster pubentior* | G5 | S2 | D |
| Blue Cohosh | *Caulophyllum thalictroides* | G5 | S3 | D |
| Kalm's Lobelia | *Lobelia kalmii* | G5 | S1 | D |
| Beckwith Clover | *Trifolium beckwithii* | G5 | S2 | ***D*** |
| Downy Gentian | *Gentiana puberulenta* | G5 | S4 | B, D |
| Small-Fringed Gentian | *Gentianopsis procera* | G5 | S2 | ***D*** |
| Purple Giant Hyssop | *Agastache scrophulariifolia* | G4 | S? | D |
| Prairie Loosestrife | *Lysimachia quadriflora* | G5 | S1 | B |
| Meadowsweet | *Spirea alba* | G5 | S3 | B |
| Sage Willow | *Salix candida* | G5 | S1 | D |

| Common Name | Scientific Name | Status | | County |
|---|---|---|---|---|
| | | Federal | State | |
| Prairie Willow | *Salix humilis* | G5 | S1 | B |
| Waxy Bogstar | *Parnassia glauca* | G5 | S1 | D |
| Lake Sedge | *Carex lacustris* | G5 | S4 | D |
| Tall Cottongrass | *Eriophorum polystachion* | G5 | S3 | D |
| Slender Beakrush | *Rhynchospora capillacea* | G5 | S1 | D |
| Turk's Cap Lilly | *Lillium canadense* | G5 | S1 | D |
| Snow Trillium | *Trillium nivale* | G4 | S2 | D |
| Small White Lady's Slipper | *Cypripedium candidum* | G4 | S1 | D |
| Nodding Ladies' Tresses | *Spiranthes cernua* | G5 | S2 | D |
| Great Plains Ladies' Tresses | *Spiranthes magnicamporum* | G4 | S? | B, D |
| Alpine Rush | *Juncus alpinus* | G5 | S3 | B |
| Least Grape-Fern | *Botrychium simplex* | G5 | S? | B |
| Prairie Moonwort | *Botrychium campestre* | G4 | S? | B |
| Large-Leaf Pondweed | *Potamogeton amplifolius* | G5 | S3 | ***D*** |

**Notes:**

B – Brown County (***B*** indicates occurrence within a 10-mile radius of the proposed site.)
D – Deuel County (***D*** indicates occurrence within a 10-mile radius of the proposed site.)
S – Spink County

FC - Federal – Candidate
LE - Federal – Endangered
LT - Federal – Threatened
G5 - Global – Demonstrably Secure
G4 - Global – Apparently Secure
G3 - Globally – Rare or Restricted
ST - State – Threatened
S4 - State – Apparently Secure
SU - State – Uncertain Status
S? - State – Not Yet Ranked
SB - State – Bird Breeding Season Status
SE - State – Endangered
S1 - State – Critically Imperiled
S2 - State – Imperiled
S3 - State – Rare or Restricted

Information from the U.S. Fish and Wildlife Service (USFWS), the South Dakota Department of Game, Fish, and Parks (SDDGFP), and South Dakota State University (SDSU) was evaluated to identify suitable habitat for Federal and state listed T&E, candidate, and species of special concern within the proposed project areas (USFWS 2003a, SDDGFP 2003a, b; SDSU 2003). In addition, database records from the South Dakota Natural Heritage Database (SDNHD) were reviewed and field investigations were conducted to identify the physical habitat and biological community of the proposed project areas (SDNHD 2003).

Although several federal- and state-listed species of concern are known to occur in the project area, agency resources and the field reconnaissance indicate that little habitat is available for T&E species within the area of the proposed project. Table 3-9 presents a list of all rare, threatened, endangered, and candidate species for Brown County.

#### 3.3.3.1 Federal–Listed Sensitive Species

USFWS has identified five federally listed T&E wildlife and plant species that could inhabit Brown County of the two counties (USFWS 2003a). These species include the bald eagle (*Haliaeetus leucocephalus*, threatened), Topeka shiner (*Notropis topeka*, endangered), Western prairie fringed orchid (*Platanthera praeclara*, threatened), whooping crane (*Grus americana*, endangered), and the Eskimo curlew (*Numenius borealis*, endangered). One additional species, the Dakota skipper (*Hesperia dacotae*), has been identified as a candidate for eventual listing and is known to occur in Brown County (USFWS 2003b).

Records of rare and T&E species tracked through the SDNHD were reviewed for Brown County to further refine the potential for occurrence in the project area. Only four species, the bald eagle, Topeka shiner, whooping crane, and Dakota skipper have been documented within a ten-mile radius of the proposed project site; however, none have been documented to occur at the proposed project site or within a five-mile radius. More detail on these four species is provided below.

**Topeka Shiner.** The Topeka shiner is a stout-bodied minnow that occurs primarily in small prairie streams or pools that contain clean gravel, rock, or sand bottoms. In South Dakota, the Topeka shiner is found in scattered tributaries of the James, Vermillion, and Big Sioux Rivers (Shearer 2003). Although it is federally listed as endangered, recent studies in South Dakota have documented the Topeka shiner in 80 percent of historically known streams, along with many streams where the species was not previously reported (Shearer 2003). The species was recently documented in Elm Creek in Brown County (Shearer 2003). No occurrence is within a five-mile radius of the proposed project (SDNHD 2003).

**Dakota Skipper.** The Dakota skipper is a small butterfly that feeds on the nectar of a variety of flowers associated with native tallgrass prairie habitat formerly found in the rolling hills and prairies in South Dakota. Conversion of tallgrass prairie to agricultural use has eliminated most of the habitat of the Dakota skipper (NPWRC 2003). The Dakota skipper is known to occur in native prairies of Brown County (USFWS 2003b). The SDNHD documents one occurrence in Brown County in 1969; approximately 39 miles north and six miles east of the proposed project (SDNHD 2003).

**Bald Eagle.** The Bald eagle has historically wintered throughout North and South Dakota (Grondahl and Martin 2003). The decline in bald eagle numbers is the result primarily of loss of habitat, shooting, trapping, and the use of pesticides such as DDT. The bald eagle has been identified as a threatened

(Federal) or endangered (state) species in Brown County (USFWS 2003a). The SDNHD documents eight occurrences within Brown and Spink Counties. Nearby records show a 1998 sighting of the species approximately ten miles west and a 2002 occurrence approximately eight miles west and six miles north of the proposed project area (SDNHD 2003).

**Whooping Crane.** The whooping crane population currently totals 260 and exists in three wild populations and four captive locations. The migration route of the whooping crane passes through western North Dakota and South Dakota in the Missouri River basin (Grondahl and Martin 2003). The whooping crane is known to occur as an occasional migrant through Spink County (SDDGFP 2003b; USFWS 2003a). Three juvenile female whooping cranes were observed one mile east and two miles north of Brentwood, South Dakota, approximately ten miles from the southern terminus of the recently constructed underground pipeline. These birds, vagrants from the reintroduced Wisconsin-Florida Migratory population, were ultimately captured and transported back to Wisconsin by the USFWS (Tetra Tech 2005a).

**Eskimo curlew.** Eskimo curlew was formerly abundant but is now thought to be nearly extinct or perhaps extinct, with no reliable North American sightings since 1987 (NatureServe 2003a). USFWS considers the species an extremely rare migrant through Spink County (USFWS 2003a).

**Western Prairie Fringed Orchid.** Western prairie fringed orchid was historically found throughout the tallgrass prairie regions of North America. The major cause of the species decline has been conversion of prairie habitat to cropland. Although suitable habitat for the species may exist in Brown County, there are no known populations of this species in SD (SDNHD 2003; USFWS 2003a).

#### 3.3.3.2 State-Listed Sensitive Species

In addition to the federally listed species, inventories or listings provided by other organizations or agencies were evaluated to ensure that no additional species of concern were identified for the two counties that surround the proposed project location. As noted, the SDDGFP, through its Natural Heritage Program, provided a database of all known occurrences of Federal and state listed T&E species, candidates, and species of special concern in Brown County (SDNHD 2003). State-listed rare and T&E species identified by the SDDGFP are also included in Table 3-9. There were no records of any rare, threatened, or endangered species within the boundaries of the proposed project; however, there were four

records within a ten-mile radius of the proposed project. These four records include three birds and one freshwater mussel. Additional detail on each of these species is provided below.

**Great blue heron.** Great blue heron is a large, gray-blue wading bird that hunts fish and other animals in shallow, quiet water (Sibley 2000). Although it is globally secure, populations of this species are considered rare or of restricted range in South Dakota (SDDGFP 2003b). The SDNHD (2003) documents a 1992 occurrence of the species ten miles west of the proposed project.

**Great egret.** Great egret is a tall, slender, white bird that feeds primarily on fish captured in open water (Sibley 2000). It is found in permanently flooded lakes surrounded by cottonwoods, sugar maples, and green ash (SDSU 2003). Although it is globally secure, populations of this species are considered rare or of restricted range in South Dakota (SDDGFP 2003b). The SDNHD documents a 1992 occurrence of the species ten miles west of the proposed project (SDNHD 2003).

**Yellow-crowned Night Heron.** Yellow-crowned night heron is a stocky, nocturnal bird that forages in shallow ponds and marshes (Sibley 2000). The species is considered globally secure but of uncertain status in South Dakota (SDDGFP 2003b). The SDNHD documents a 1992 occurrence of the species ten miles west of the proposed project (SDNHD 2003).

**Yellow Sandshell.** Yellow sandshell is a freshwater mussel that occurs primarily in medium-sized sand or mud- and sand-bottomed streams and rivers. Globally, it is considered one of the most wide-ranging, common, and successful *Lampsilis* species in the Mississippi River drainage (NatureServe 2003b). Although it is not listed as a state T&E species, it is considered critically imperiled in South Dakota (SDDGFP 2003b). The SDNHD documents a 1985 occurrence of the species nine miles west and one mile north of the proposed project site (SDNHD 2003).

#### 3.3.3.3 Site Surveys

Field surveys were completed at the proposed project site and along the pipeline corridor between October 27, 2003, and October 29, 2003. The study area was delineated as the Southeast 1/4 of Section 18, Township 122 North, Range 60 West, Brown County, the location of the proposed gas turbine facility. Wildlife surveys included a walk-through of the site with visual observation of individual species or evidence of their existence such as tracks, stems, or habitat characteristics. The time of year and weather conditions during the surveys inhibited direct visual observations of most individual wildlife species.

However, evidence of animal use (burrows, tracks, and scat) and the current physical habitat at each project location were noted for consideration of the presence of T&E species. Based on information provided through the SDNHD and the current habitat, it is unlikely that additional surveys would be successful in verifying the presence of any listed species within the proposed project areas (Tetra Tech 2003b). Table 3-9 presents a list of rare, threatened, endangered, and candidate species within the study area.

Based on the above and a letter from the SDDGFP dated July 8, 2004 the proposed project would not affect federally threatened, endangered, or candidate species (bald eagle, Eskimo curlew, whooping crane, Topeka shiner, Dakota skipper, and Western fringed orchic). Because no rare South Dakota species of concern would be affected by the proposed action, there would be no significant impacts to state rare species.

#### 3.3.3.4 Environmental Consequences – Direct and Indirect Effects

Significant impacts that could potentially affect threatened and endangered species include:

- Alteration and/or fragmentation of critical habitat and cover used by threatened and endangered species for breeding, foraging, and refuge; and
- Loss of any population of individuals that would likely to jeopardize the continued existence of any species listed as threatened or endangered.

Short- and long-term impacts would be similar to those described for fish and wildlife species above. However, no threatened, endangered, or candidate animal or plant species were observed within or around the proposed project study areas. Although seasonal weather conditions precluded comprehensive direct observation of wildlife, the existing habitats within the project area were unsuitable for federally threatened and endangered species or other sensitive species. Information provided through the SDNHD does not indicate use of the proposed project areas by any state or federal listed species.

#### 3.3.3.5 Mitigation and Monitoring

No specific mitigation measures are applicable because the proposed project would not pose negative ecological impacts to threatened, endangered, or candidate species or other sensitive species. If an issue were to arise that impacted current federal listed threatened and endangered or newly listed species during construction or operation, Basin Electric would cooperate with USFWS and SDDGFP to comply with

applicable Federal and state regulations to avoid impacts. Pre-construction spring season surveys would be conducted to verify the presence or absence of federal threatened, endangered, and candidate species.

## 3.4 Social Resources

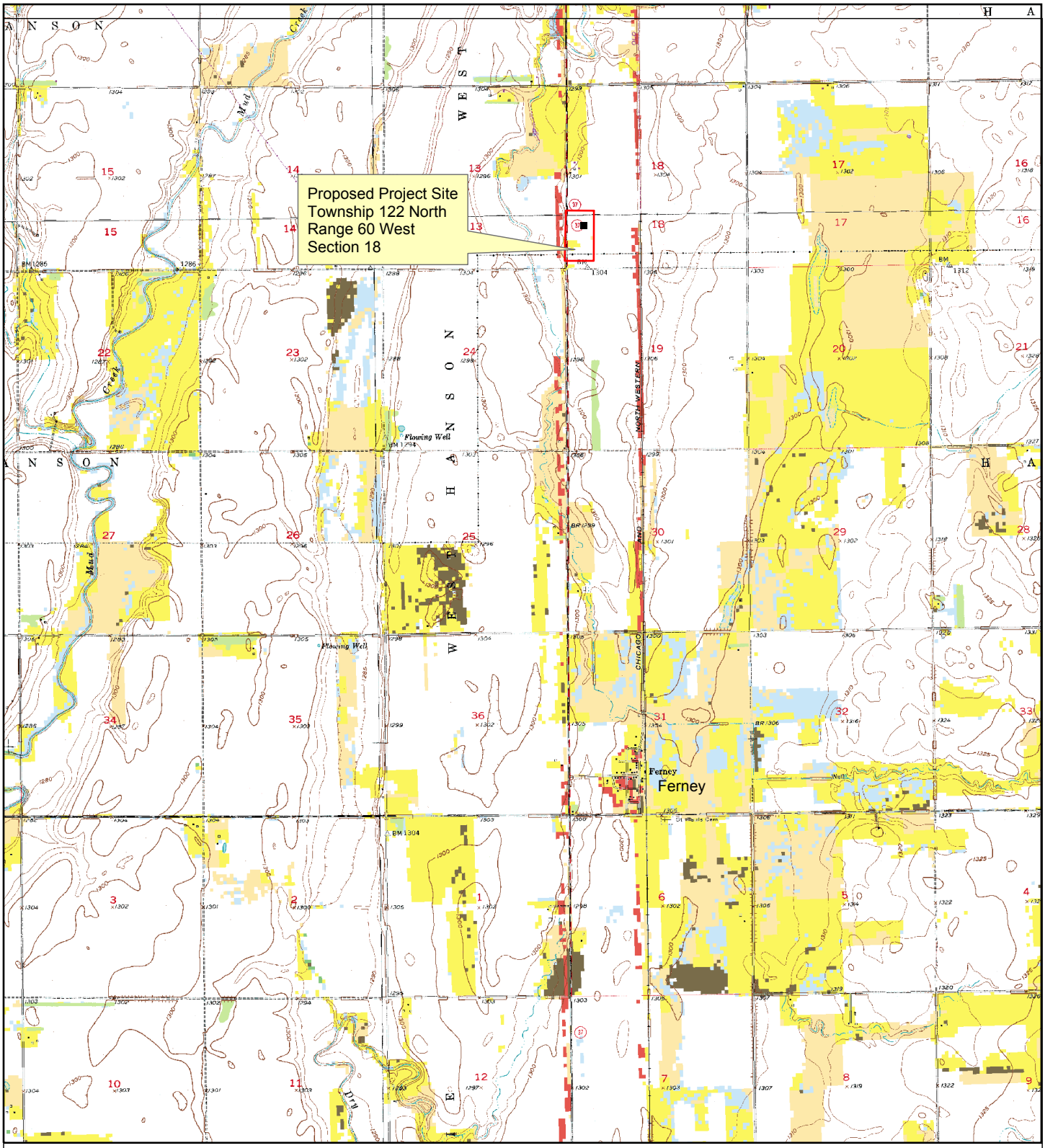
### 3.4.1 Land Use

This section describes the land use in the affected environment and the environmental consequences of the project on land use, including general and agricultural land use and formally classified lands. The land use study area is defined as the proposed site for the GGS1 and GGS2 gas turbine facility in Brown County.

Figure 3-3 shows current land use in and around the proposed GGS2 gas turbine facility. The GGS2 gas turbine facility would encompass less than 5 acres of land. This acreage includes the entire proposed combustion turbine facility with on-site natural gas supply and the associated equipment. The proposed combustion turbine facility would be adjacent to the existing Basin Electric and Western substations and the Basin GGS1.

#### 3.4.1.1 Affected Environment

**General Land Use**. The proposed GGS2 gas turbine facility would occupy a landscape with a mixture of land uses, including row crops, some hay or pasture land, and a small amount of commercial, industrial, and transportation land. The proposed gas turbine facility would occupy 100 percent private land that is zoned agricultural and is regulated by Brown County land use plans and ordinances. The proposed GGS2 gas turbine facility would not affect any transportation corridors and would be located west of State Highway 37.




Legend

- Proposed Project Area
- Proposed Project Site
- Wetlands
- Commercial/Industrial/Transportation
- Shrubland
- Grasslands/Herbaceous
- Pasture/Hay
- Row Crops
- Small Grains
- Fallow
- Urban/Recreational Grasses

FIGURE 3-3
LAND USE
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

Feet
0 2,000 4,000 8,000

6/21/04 b:\projectbasin_gis\projects\SDPeaking_GrotonLine_LandUse.mxd HP

**Agriculture.** Farming is the principal enterprise in Brown County near the proposed GGS2 gas turbine facility (Table 3-10). Approximately 40 percent of farm income is derived from the sale of livestock and livestock products, with the remaining 60 percent derived mainly from the sale of corn, soybeans, and small grain (USDA 2003b). Some of the crops are used as feed for livestock. About 87 percent of the acreage is used for cultivated crops (such as corn, soybeans, wheat, oats, and barley), and 13 percent is used for tame pasture or hay. In 2001, farmers made more money selling crops than by selling livestock, livestock products, and poultry (USDA 2003b).

Table 3-10 provides agricultural statistics for Brown and Spink Counties. This table shows that the number of farms decreased in Brown County between 1987 and 1997. During the same years, the number of acres of farmland, as well as the average size per farm in Brown County, increased (USDA 2003a, b). Conversely, in Spink County, the number of farms, as well as the number of acres of farmland, decreased between 1987 and 1997, while farm size increased (USDA 2003a, b). However, no prime farmland exists in the study area (USDA 1994).

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed forage, fiber, and oilseed crops and that is available for these uses (USDA 2003c). It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, few or no rocks, and its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods, and it either does not flood frequently during the growing season or is protected from flooding.

**Table 3-10**
**Agricultural Statistics in Brown County, South Dakota, 1987, 1992, and 1997**

| Brown County [a,b] | 1987 | 1992 | 1997 | From USDA |
|---|---|---|---|---|
| Number of Farms | 1183 | 1089 | 1006 | |
| Land in Farms (acres) | 992,938 | 1,026,353 | 1,069,597 | |
| Average Farm Size (acres) | 839 | 942 | 1,063 | |
| Prime Farmland (acres) | | | | 686,287 |

**Source:** [a] USDA 2003a, [b] USDA 2003b, [c] USDA 2005

Other considerations in classifying areas as prime farmland include:

- Land use. Prime farmland is designated independently of current land use, but it cannot be areas of water or urban or built-up land as defined for the National Resource Inventories. Map units that are complexes or associations containing components of urban land or miscellaneous areas as part of the map unit name cannot be designated as prime farmland. The soil survey memorandum of understanding determines the scale of mapping and should reflect local land use interests in designing of map units.
- Frequency of flooding. Some map units may include both prime farmland and land not prime farmland because of variations in flooding frequency.
- Irrigation. Some map units include areas that have a developed irrigation water supply that is dependable and of adequate quality and areas that do not have such a supply. In these units, only the irrigated areas meet the prime farmland criteria.
- Water table. Some map units include both drained and undrained areas. Only the drained areas meet the criteria for prime farmland.
- Wind erodibility. The product of I (soil erodibility) times C (climate factor cannot exceed 60 to meet prime farmland criteria. A map unit may be considered prime farmland in one part of a survey area buy not in another where the climate factor is different.

**Formally Classified Lands.** The project area of the proposed combustion turbine facility does not contain any land that is formally classified, or administered by Federal or state governments.

#### 3.4.1.2 Environmental Consequences – Direct and Indirect Effects

This section discusses the direct, indirect, and cumulative environmental impacts associated with land uses as a result of the proposed project. Land use impacts are controlled by the amount of land displaced by the various attributes of the project and their compatibility with adjacent land uses.

A significant impact to land use could occur if the proposed action:

- Consumed substantial portions of land,
- Long-term use of the land was permanently taken out of its current agricultural use or any planned future use, or
- Substantial amounts of prime farmland were taken out of production.

The proposed GGS2 gas turbine facility would have a minimal impact on land use. The majority of the proposed gas turbine facility would occupy private land that is zoned agricultural and is regulated by land use plans and ordinances in Brown County. The GGS2 site would be located on land owned and operated by Basin Electric for existing electrical facilities.

No direct impacts from construction and operation of the GGS2 gas turbine would affect vegetation and farming.

There would be no significant direct, indirect, or cumulative impacts to individual farming operations because the proposed gas turbine would not result in the loss of any prime farmland.

Implementation of mitigation measures to reduce soil erosion, revegetation, and coordination of farming and construction will minimize any direct impacts from the proposed project.

The proposed project is to meet anticipated peaking load growth for Basin Electric's customers. Indirect impacts to land use could occur from induced growth resulting from the availability of peaking power in Basin Electric's service territory. However, the availability of sufficient peaking power is a minimal contributing factor in regional growth patterns; therefore, the indirect impacts from the proposed project would be negligible.

#### 3.4.1.3 Mitigation and Monitoring

The proposed project would occupy existing Basin Electric property adjacent to land zoned agricultural and is regulated local land use plans and ordinances, or as described in above. Specific measures that would be adopted to protect land use in the proposed project area include:

- Implementing construction measures to protect soil resources from erosion during surface disturbing activities during construction;
- Disturbed areas would be reclaimed soon after construction is completed; and
- Adherence to local land use plans established for future uses.

### 3.4.2 Recreation

#### 3.4.2.1 Affected Environment

General dispersed recreational opportunities exist within the project area, such as hunting, driving for pleasure, and recreational shooting. There are no developed recreational sites in the project area.

#### 3.4.2.2 Environmental Consequences – Direct and Indirect Effects

Significant impacts would occur if developed recreational opportunities suffered long-term disruption or displacement.

Effects on dispersed recreational opportunities in the project area would be minor and short-term, due to project length and area. No significant impact on recreation resources in the project area would occur.
Mitigation and Monitoring

Because none of the dispersed recreation opportunities would be significantly impacted, no additional mitigation measures to protection recreation are proposed beyond those proposed for other resources.

### 3.4.3 Aesthetics

#### 3.4.3.1 Affected Environment

The region that encompasses the existing substation and GGS1 gas turbine is primarily used as agricultural land. The GGS1 and GGS2 site is located five miles south of the town of Groton, in Brown County. The site is located in relatively level terrain adjacent to a Western 115-kV substation and a Basin Electric 345-kV substation. An existing 345-kV transmission line owned by Basin Electric and a 115-kV line owned and operated by Western currently pass within 1/4 mile of the site. .

The original prairie landscape exists in an altered agricultural state. Linear features of highways, paved roads, gravel roads, two-track roads, electric transmission lines, and fencing transect each project area. Evidence of a buried gas pipeline also transects the project area in a general northwest to southeast direction. Vegetation in these areas consists primarily of mixed grass-pasture land and planted corn, oats, and soybeans. The land is primarily used agriculturally for crops and livestock grazing.

#### 3.4.3.2 Environmental Consequences – Direct and Indirect Effects

A significant visual impact could result if the proposed project was located in a distinctive or important landscape, interrupted a scenic view, was observed from an important cultural resource, or if the project was in the immediate foreground of a public viewshed.

The addition of a gas turbine to the area would have no significant direct, indirect, or cumulative impacts on the already linear features of the landscape, such as existing roads, fencing, subsurface gas lines, existing power lines transect the area, and scattered farmsteads and agricultural areas are scattered throughout the region. The existing landscape has been modified by human activity in the past, and conversion of native grassland to rangeland and cropland and removal of shrubs along drainages have altered the landscape and viewshed. No scenic drives, trails, or viewpoints exist in the area.

The proposed project turbine would be constructed on an approximately 4-acre plot of land at adjacent to the existing GGS1 turbine site. An existing underground gas pipeline would be used to fuel the turbine. Existing security fencing and gates would be expanded to limit access to the site. Short-term direct impacts from construction would be visible during the project from highways and minor roads in the area. Equipment, traffic, signs, and raw earth would also be visible and would create a temporary direct impact during construction.

The proposed project would have an insignificant long-term impact on the other development of land in the region would contribute to cumulative impacts by changing the landscape and viewshed. Recent developments such as highway construction, roads, substations, and transmission lines add to the permanent linear change in the landscape.

#### 3.4.3.3 Mitigation and Monitoring

Because the gas turbine would be located in a rural agricultural area, the addition of a gas turbine facility would have minimal impact on the area, as existing power lines, fencing, and roads already create a linear appearance in the area. Trees and shrubs planted near the gas turbine can conceal it from nearby roads. Construction debris and equipment would be removed from the view of residences and highways to minimize any temporary aesthetic impacts. Construction trash would be removed daily, and revegetation of the area would occur shortly after construction.

Visual aesthetics of the area, as existing transmission lines, substations, and roadways already appear in the viewshed of the area. The incremental increase for this project would have an insignificant cumulative impact on aesthetics in the area. Since the visual impacts caused by the facility would be viewed by a limited number of people and the scenic quality is not unique, unusual, or specially designated, visual impacts would be negligible.

### 3.4.4 Transportation

#### 3.4.4.1 Affected Environment

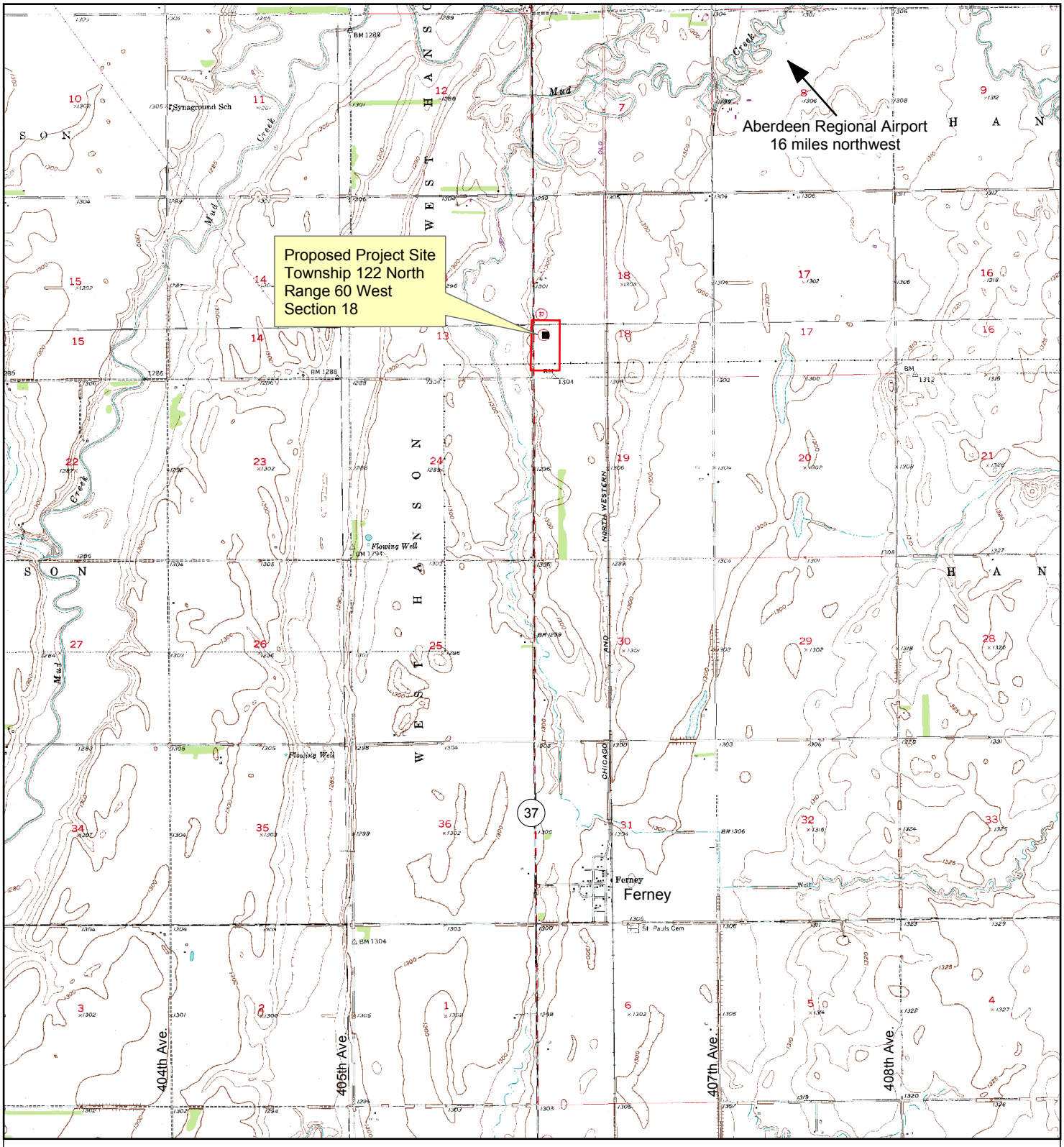
The study area for transportation resources is defined as a 15-mile radius around the proposed GGS2 gas turbine site. As shown in Figure 3-4, there are no active railroad lines within five miles or major international or regional airports within 15 miles of the proposed gas turbine site or pipeline (Delorme 2001; Census Bureau 2000). The following sections describe the various transportation features in the vicinity of the proposed GGS2 gas turbine site. Figure 4-4 also presents the names and locations of transportation routes within the vicinity of the proposed GGS2 gas turbine facility and pipeline (Delorme 2001 and Census Bureau 2000).

**Highways.** As shown in Figure 3-4, the proposed project site is immediately adjacent to South Dakota State Highway3, and access to the site would be directly from this highway. State Route 37 interconnects with US Route 12, located five miles north of the site at Groton, South Dakota.

**Roads**. Gravel roads located on Public Land Survey System (PLSS) section lines are common in the area.

**Railroad Lines.** An abandoned segment of railroad is located adjacent and east of the proposed gas turbine site. There are no other railroad lines (active or abandoned) within five miles of the proposed GGS2 gas turbine facility.

**Airports.** The Aberdeen Regional Airport is located 16 miles northwest of the proposed GGS2 gas turbine site. No major international or regional airports exist within 15 miles of the proposed site.




Legend

- Proposed Project Area
- Water

FIGURE 3-4
TRANSPORTATION
PROPOSED GROTON SITE
BASIN ELECTRIC POWER COOPERATIVE
GROTON GENERATION STATION UNIT 2

0 2,000 4,000 8,000 Feet

14-NOV-2006 N:\ARCPRJ\2010321\PROJECT\SDEIS\FIG3-4_TRANSP.MXD

#### 3.4.4.2 Mitigation and Monitoring

No airports are located in the immediate vicinity of the proposed project, and so no mitigation to aircraft or airfields are necessary. Basin Electric and its contractors would implement the following mitigation measures to avoid or minimize any potential impacts to transportation routes associated with the project area:

- Construction vehicles would not exceed the posted weight limit of bridges;
- Construction along or across roads and highways would incorporate an appropriate traffic control plan in accordance with the Manual of Uniform Traffic Control Devices;
- Permits would be obtained from the South Dakota Department of Transportation for encroachment across highways;
- No permanent access roads would be installed without securing an agreement from the landowner;
- Any short-term roadway closings would be scheduled with appropriate authorities and clearly marked, and detour routes would be provided as necessary;
- Any unanticipated road damage resulting from construction or operation of the proposed project would be repaired in a timely manner; and

All access would be from the nearest existing public roadway and would avoid or minimize intrusion into off-site areas.

### 3.4.5 Noise and Radio and Television Interference

#### 3.4.5.1 Affected Environment

This section presents the existing conditions for ambient noise and radio and television interference.

**Ambient Noise.** The study area is predominantly rural. As a result, existing ambient noise levels in the vicinity of the proposed project are generally low because the land is used for agriculture. The study area consists of large tracts of pasture, crops, rangeland, and undeveloped grassland, with unpaved and infrequently traveled roads, typically constructed along section lines. Sources of noise in the study area include wind, livestock, wildlife, farm equipment, farm truck traffic, and adjacent substations. Elevated levels of noise occur in the portion of the project area near transportation corridors and are generally associated with automobile and truck traffic and farm equipment. One residence is located 1,700 feet north of the proposed facility, adjacent to State Highway 37. Evergreen and deciduous trees are planted

along the southern side of the house. Other residences in the region are 4,400 feet to the northwest and 5,700 feet to the southeast.

Sound or noise levels are measured in A-weighted decibels (dBA), a unit of sound pressure adjusted to the range of human hearing, with intensity greater than the ambient or background sound pressures. Background noise level results obtained at the GGS2 site demonstrate that the location is relatively unaffected by any activity other than traffic noise. As directed by 23 CFR Part 772, the Federal Highway Administration has developed specific noise abatement criteria that serve as the upper limit of acceptable traffic noise levels for various types of land use. 57 dBA (exterior) is the upper limit of acceptable traffic noise for lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve the intended purpose (ADOT 2005). The Public Utilities Commission (PUC) has set daytime and nighttime noise limits on this facility of 60 dBA and 55 dBA respectively.

An operational noise compliance assessment study was conducted in August 2006 to determine ambient noise levels and measured daytime and nighttime noise levels at the residence nearest the GGS1 (Burns and McDonnell 2006). This study reported $L_{eq}$ and $L_{10}$ noise levels 100 feet from the nearest residence, between the GGS1 and the residence. $L_{eq}$ is the weighted one minute average noise levels while $L_{10}$ is the sound level exceeded 10 percent of the time during the sampling period. This study found that the $L_{eq}$ ambient noise level while the GGS1 was not running was 42.1 dBA, with an $L_{10}$ of 44.0 dBA, while daytime values with the GGS1 running at full load ranged from an $L_{eq}$ of 42.6 dBA to 48.7 dBA, with an $L_{10}$ of 50.4 dBA. Nighttime noise levels ranged from an $L_{eq}$ of 47.8 dBA to 49.8 dBA, with an $L_{10}$ of 50.7 dBA. These levels of noise are below the limits specified by the PUC for the facility.

An analysis conducted on low frequency noise generated by the GGS1 determined that low frequency noise from the GGS1 was below the level necessary to create vibrations.

Topography within the study corridor is mostly open, gently rolling agricultural land with scattered woodlands. This terrain is unlikely to have any noticeable effect on propagation of noise from sources within the corridor.

**Radio and Television Interference.** The proposed project area is located in an agricultural area with a very low population density. The only issues within the proposed project area where television or radio interference would be of concern are along roadways, nearby residences, or facilities that receive radio or

television signals via antennas, where radio or television signals may be temporarily influenced or disrupted. A few existing power transmission lines are the primary sources of electric and magnetic fields (EMF) in the project areas, although other electrical equipment produces low levels of EMF.

#### 3.4.5.2 Environmental Consequences – Direct and Indirect Effects

The following section discusses potential impacts from noise and radio and television interference. Significant impacts from project-related noise could result if local, state, or federal guidelines were exceeded at sensitive receptors such as residences. Significant impacts to radio and television signals could result if the proposed project was not constructed to current standards or if the interference was widespread and long-term.

**Audible Noise.** Noise associated with the proposed project would originate from the construction and operation of the GGS2 gas turbine. Noise impacts associated with the gas turbine would be limited to the vicinity of the gas turbine facility. Impacts caused by construction of the gas turbines are expected to be minimal and to have only a temporary impact. Short-term noise associated with vehicular traffic for deliveries of equipment and during equipment off-loading would be created during the normal workday.

The approximate noise level for existing vehicular traffic is 78 decibels (dBA). Noise from vehicular traffic involved in construction of the site would not differ significantly from existing traffic-related noise. A significant portion of existing traffic on major regional thoroughfares is heavy trucks associated with agricultural operations.

Other construction noises, including drilling, pounding, and air compressors, would contribute noise to the areas over a relatively short period, stopping when construction is complete. Nighttime disturbance would not be significant because most equipment would be installed during daylight hours. Noise levels are expected to reach 85 to 105 dBA during construction of the gas turbine facility. Construction would have little cumulative effect on the area.

Operation of the combustion turbine would result in slightly increased noise levels near the gas turbine. Data provided by GE guarantee that the noise level created by the turbine would be 65 dBA at a distance of 400 feet from the source. This guaranteed noise level may be used to calculate the expected sound level at the nearest residential dwelling. Sound pressure falls inversely with distance. Doubling the

distance from a point source reduces the sound by 6 dBA. The equation to calculate the noise levels some distance away from a point or industrial source is:

**SPL2 = SPL1 – 20log(R2/R1)**

Where: SPL2 = sound pressure level in dB at distance R2

SPL1 = sound pressure level in dB at distance R1

The residence north of the existing substation is located 1,700 feet from the planned location of the existing power generation system, and GE guarantees a noise level of 65 dB at 400 feet. Using the sound calculation equation above; the reduction in noise should be 12.57 dB from the guaranteed level at 400 feet.

**SPL2 = 65 - 20log (1700/400)**

SPL2 = 65 - 12.57

SPL2 = 52.43

Where: 65 = SPL1 or guaranteed sound level

1700 = R2 or distance from turbine to nearest residence

400 = R1 or distance to guaranteed sound level.

Therefore, the estimated noise level at the nearest residential location resulting from turbine operation would be 52 to 54 dBA, depending on the exact configuration of the equipment, weather, air absorption, ground attenuation effects, and barriers and reflections. The residence is protected by rows of trees, so the actual sound level at the residence would probably be less. This noise level at the residence is below the limits specified by the PUC for this facility.

**Radio and Television Interference.** Interference with radio and television signals could occur in vehicles driving in the vicinity, or homes located near the transmission lines. However, interference is expected to be limited, since radio and television interference generally occurs in older transmission lines with loose or dirty insulators and spark gaps. In addition, transmission lines already exist in the project area. In addition, the gas turbine will be constructed in accordance with the standards and guidelines published by the National Electric Safety Code (NESC), and would be expected to have no significant impacts to radio and television signals.

### 3.4.5.3 Mitigation and Monitoring

Impacts related to radio and television interference are expected to be negligible based on calculations presented in the electrical effects analysis (Burns & McDonnell 2001). Basin Electric's policy is to investigate and correct problems with television and radio interference associated with its facilities. Construction would be scheduled and conducted to minimize annoyances to nearby residences. Construction and operation of the proposed project would probably increase the perceived noise levels at the nearby residence. The magnitude of the increase would be managed to adhere to noise abatement criteria values using simple and inexpensive noise control techniques. Operation of the turbine would conform to South Dakota Public Utilities Commission permitted noise levels and would comply with noise standards established by many regulatory agencies.

### 3.4.6 Human Health and Safety

#### 3.4.6.1 Affected Environment

This section summarizes the human health and safety conditions that exist within the study area for the GGS2 project (citation). Table 3-1 defines the human health and safety study area. Topics reviewed in this section include electrical effects, schools, and health facilities

**Electrical Effects.** The GGS2 turbine would be connected to transmission lines in the study area. Direct contact with electric conductors from transmission lines and generating facilities is commonly referred to as shock hazard. The flow of electricity produces electric and magnetic fields (EMF). Magnetic fields and electric fields are strongest at the source of the flow of electrical power and drop off markedly as the distance from the source of the current increases. In many cases, people are exposed to higher EMF levels from household appliances than from transmission lines as a result of the proximity of the source.

Numerous sources of EMF exist in nature and in the occupational and residential environments. In nearly all instances, these fields pose no obvious threat to human health or safety. However, public awareness of the ubiquitous nature of these fields, and the historical controversy over their potential effects on living systems, have stimulated the research community to define more precisely the physical properties of these fields and to delineate the thresholds for their possible effects on human health and the environment.
Certain epidemiological investigations have indicated potential risk factors in a number of residential and occupational studies for exposure to EMF. However, many studies report no statistically significant correlation. A recent Danish residential study reported that while consumption of electricity in Denmark has increased by 30 times since 1945, incidence rates of cancer had changed little (Guenel et al. 1993). In 1996, the National Research Council (NRC) completed a study of research on EMF that had been

ongoing since 1979 and concluded that the evidence so far "does not show that exposure to these fields presents a human health hazard" (NRC 1996).

Although a substantial amount of research on EMFs has been completed and is continuing, the body of research on health effects is still preliminary and inconclusive. The emerging evidence no longer allows the assertion that there are no risks; however, there likewise is no basis for arguing that there is a significant risk.

**Schools and Health Facilities.** A records review of the state database did not identify any potentially affected schools and health facilities within a 0.5-mile range of the proposed turbine location.

#### 3.4.6.2 Environmental Consequences – Direct and Indirect Effects

This section discusses the potential impacts of the proposed project on human health and safety. Significant impacts to human health and safety could result if the proposed project was not constructed to current industry standards, if access to the facility was not restricted, or if the pipeline was not clearly marked. The proposed project would not present significant direct, indirect, or cumulative impacts posed by safety or electrical hazard to the public. The proposed project would be constructed to NESC standards.

General operation of the gas turbine would not present a safety or electric hazard to the public, since Basin Electric's standard grounding policies effectively mitigate the possibility of nuisance shocks caused by induced currents from stationary objects. The facility would be fenced to prevent unauthorized access to the gas turbine and related equipment.

Numerous sources of EMF exist in nature and in the occupational and residential environments and, in nearly all instances, pose no obvious threat to human health or safety. Certain epidemiological investigations have suggested potential risks to residential and occupational populations from exposure to EMF. However, many studies report no statistically significant correlation. A recent Danish residential study, already cited in this document, reported that while consumption of electricity in Denmark has increased by 30 times since 1945, incidence rates of cancer had changed little (Guenel and others 1993). In October 1996, NRC completed a study of research on EMF that had been ongoing since 1979 and concluded that the evidence so far "does not show that exposure to these fields presents a human health hazard" (NRC 1996). Laboratory studies have also been predominantly inconclusive. The potential for

effects is further diminished and direct, indirect, and cumulative impacts are not anticipated to be significant because the majority of the proposed alignment would be located in rural, undeveloped areas.

#### 3.4.6.3 Mitigation and Monitoring

Construction of the proposed project would comply with all NESC standards to ensure minimal safety and electrical hazards. The turbine would be connected to transmission lines in the project area. Direct contact with electric conductors from transmission lines and generating facilities is commonly referred to as shock hazard. Direct contact, as with household electrical wiring, can inflict serious electric shocks if precautions are not taken to minimize the hazard. Avoidance of objects, such as antennas and irrigation equipment, near transmission lines or gas tie-ins to the transmission lines is a proper precaution that should be observed. All of Basin Electric's and Western's transmission lines are designed and constructed in accordance with NESC standards to minimize shock hazard.

Specific measures that would be taken to protect human health and safety in the proposed project area include:

- Standard grounding policies would be implemented to minimize the possibility of nuisance shocks caused by induced currents from stationary objects.
- A fence and posted warning signs would be constructed to minimize the possible hazard of the gas turbine;

### 3.4.7 Cultural Resources

#### 3.4.7.1 Affected Environment

This section presents the results of the cultural resources records search and field inspection conducted for the East Side Peaking project (citation). ACR Consultants, Inc. (ACR) conducted the Class I cultural resources surveys during October 2003 and September 2004.

ACR conducted a resources inventory a of the proposed project site on October 16, 2003, from the South Dakota State Historical Society's Archaeological Research Center in Rapid City, South Dakota. The inventory collected information on projects conducted previously and previously recorded historical and cultural sites in the proposed project area. An additional file search was requested and received on October 23, 2003, for the entire length of the previously proposed and now existing underground gas pipeline corridor.

The 2003 field work consisted of a Class I block survey of the proposed project site and the 11.5 miles of linear survey of the east side of the ROW for State Highway 37. The 2004 field work consisted of a Class I linear survey of 11.5 miles of the west side of the ROW for State Highway 37 plus about two miles across agricultural fields to the NBPL. The ROW surveys used a 100-foot corridor. The two-mile survey used a 300-foot corridor (150 feet each side of an existing pipeline).

The resources inventory showed that no previous cultural resource surveys have been conducted within the project area. However, three surveys have been conducted within a 1-mile radius of the project area including:

- South Dakota State University (SDSU) completed a survey for the Northern Border Pipeline (NBPL) project in McPherson, Edmunds, Brown, Spink, Clark, Codington, Hamlin, Deuel, and Brookings Counties in 1982.
- Dakota Research Services completed a survey of portions of a rural water distribution system in Brown, Edmunds, and Spink Counties in 1987.
- The Archaeology Laboratory, Augustana College, completed a survey of three proposed pipeline projects in eastern South Dakota in 1990.

The file search listed one site within the block survey project area and approximately 0.3 miles east of the linear project area. Site 39BN2003/39SP2003 E is the abandoned Chicago & North Western Railroad grade. The State Historic Preservation Office (SHPO) has determined that all railroads are eligible for the NRHP. Background research was conducted on October 28, 2003, at the Brown County Courthouse in Aberdeen, South Dakota, for information on two new sites identified during field surveys. The Verndon Cemetery (BN-000-01226) is located one mile north of Verndon on Highway 37, and the Bloedell/Hoops Farmstead (BN-000-00001/00002/00003) is located two miles south of the proposed project site.

Additional research was conducted on October 29, 2003, at the Aberdeen Library in Aberdeen. Plat maps for multiple years were consulted, and information on construction dates of the farm buildings was requested.

Based on the file search information for this project and professional experience, ACR anticipated finding few cultural resource sites within the current project area.

### 3.4.7.2 Environmental Consequences – Direct and Indirect Effects

This section discusses impacts on cultural resources from construction and operation of the proposed project. Significant impacts to cultural resources could occur if:

- A site of archeological, Tribal, or historical value that is listed, or is eligible for listing, on the NRHP could not be avoided or mitigated during construction of the proposed project.

The potential effects of the construction and operation of the proposed project on cultural resources were assessed by evaluating the results of cultural resources surveys that were conducted 2003 and 2004. Specifically, no cultural properties or archaeological sites that are listed or that are potentially eligible to be included in the NRHP were identified in the proposed project's area of potential effect; therefore, no impacts to cultural resources are anticipated from construction or operation of the proposed project (USDA and DOE 2005). Should cultural, archaeological, or historic resources be discovered during construction, work would cease and the South Dakota SHPO would be contacted to assess the find and potential mitigation before construction resumed. No significant impact to cultural resources would occur because cultural resources potentially identified during construction would be mitigated.

Effects determinations are a Federal agency's responsibility. Basin initially considered the cultural nature and value of the adjacent GGS1 gas turbine by evaluating the presence of historic properties that possess the qualities of integrity and other criteria necessary to be considered for inclusion in the NRHP. Based on the results of the archaeological study for the GGS1, which also encompassed the area that includes the GGS2 gas turbine area, no historic properties would be affected by the proposed project (USDA and DOE 2005).

Consultation with the SHPO is in the initial stages using procedures provided in Section 106 of the National Historic Preservation Act (NHPA). Copies of the cultural resource survey and letter and determinations of effect will be forwarded to the SHPO.

### 3.4.7.3 Mitigation Measures

The proposed gas turbine facility would not affect any known significant cultural resources (USDA and DOE 2005). However, work should cease immediately should cultural resources be uncovered during excavation at any of these sites. The South Dakota SHPO should then be contacted to assess the find and potential mitigation before construction resumes.

### 3.4.8 Socioeconomics and Community Resources

This section summarizes the socioeconomic conditions and community resources in Brown County where the proposed project would be located. Specifically, this section addresses population, economic conditions, income, employment, housing, local government facilities and services, and utilities.

#### 3.4.8.1 Affected Environment.

**Population**. The proposed project is located in Brown County, South Dakota, which has a population of 35,460, which decreased between 1990 and 2000 (Census 2003). The town nearest the gas turbine site is Groton, which is five miles north. The nearest urban area is Aberdeen, South Dakota. Table 3-11 lists the associated population of Brown County in 1990 and 2000 that could be affected by construction of the GGS2 gas turbine. Table 3-12 lists the 2004 Brown County Employment by industry.

**Table 3-11**
**Potentially Affected Populations in Brown County**

| Area | 1990 | 2000 | 2005 |
|---|---|---|---|
| **State of South Dakota** | 696,004 | 754,844 | 775,933 |
| Brown County | 35,580 | 35,460 | 34,706 |

Source: Census 2006.

**Table 3-12**
**2004 Brown County Employment By Industry Or Employer**
**Combustion Turbine Site: Brown County, South Dakota**

| | Natural Resources/ Mining | Construction | Manufacturing | Trade/Transportation/ Utilities | Information | Financial Activities | Professional/ Business Services | Education/ Health Services | Leisure/Hospitality | Other Services | Government | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Employees | 147 | 922 | 1,967 | 4,237 | 367 | 1,072 | 1,748 | 3,163 | 1,969 | 640 | 2,817 | 19,049 |
| Percentage of Employees | 0.77 % | 4.84 % | 10.33 % | 22.24 % | 1.93 % | 5.63 % | 9.18 % | 16.60 % | 10.34 % | 3.36 % | 14.79 % | 100 % |

Source: South Dakota Governor's Office of Economic Development (SDGOED)2006, www.SDreadytowork.com

**Environmental Justice.** Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was issued by the White House in February 1994.

The Executive Order seeks to focus federal agency attention on the human health and environmental conditions in minority and low-income communities. It also seeks to ensure that any adverse human health and environmental effect of agency actions that may disproportionately impact minority and low-income populations, including Native American Indian Tribes, are identified and addressed.

Existing laws such as National Environmental Policy Act (NEPA) provide the context and opportunity for federal agencies to identify, address, and consider in decisions any potentially hazardous impacts. The goal of Environmental Justice is to ensure all people are treated fairly and have opportunities to be involved with respect to developing, implementing, and enforcing environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group should bear a disproportionate share of potentially adverse human health and environmental effects of a federal agency action, operation, or program. Meaningful involvement means that potentially affected populations can participate in the decision process, and any concerns are considered in the agency's decision.

In accordance with Executive Order 12898, an evaluation of the proposed project must include an assessment of effects on minority and low-income populations, and an alternative location or action must be considered if the proposed project discriminates against a minority or low-income population. The race and sex of the rural population in the two counties where the combustion turbines are located is presented in Table 3-13.

**Table 3-13**
**Basin Electric Power Cooperative 2000 County Population Data By Race And Sex.**

| | Total Population | Caucasian | African-American | American Indian and Alaska Native | Asian | Native Hawaiian and other Pacific Islander | Other (single race) | Other (two or more races) | Total Minority |
|---|---|---|---|---|---|---|---|---|---|
| **STATE OF SOUTH DAKOTA** | | | | | | | | | |
| Total Population | 754,844 (100%) | 669,404 (88.7%) | 4,685 (0.62%) | 62,283 (8.3%) | 4,378 (0.6%) | 261 (0.03%) | 3,677 (0.49%) | 10,156 (1.3%) | 90,259 (11.9%) |
| Female Population | 380,286 (50.3%) | 335,697 (50.1%) | 1,649 (35.2%) | 31,569 (50.7%) | 2,329 (53.2%) | 122 (46.7%) | 1,561 (42.5%) | 5,054 (49.8%) | 44,589 (49.4%) |
| Male Population | 374,558 (49.7%) | 328,888 (49.9%) | 3,036 (64.8%) | 30,714 (49.3%) | 2,049 (46.8%) | 139 (53.3%) | 2,116 (57.5%) | 5,102 (50.2%) | 45,670 (50.6%) |
| **Combustion Turbine Site: Brown County, South Dakota** | | | | | | | | | |
| Total Population | 35,460 (100%) | 33,715 (95%) | 100 (0.3%) | 964 (2.7%) | 142 (0.4%) | 31 (.09%) | 63 (0.2%) | 306 (0.9%) | 1745 (4.9%) |
| Female Population | 18,343 (51.7%) | 17,439 (51.7%) | 33 (33%) | 507 (52.6%) | 83 (58.5%) | 12 (38.7%) | 32 (50.8%) | 165 (53.9%) | 904 (51.8%) |
| Male Population | 17,117 (48.3%) | 16,276 (48.3%) | 67 (67%) | 457 (47.4%) | 59 (41.5%) | 19 (61.3%) | 31 (49.2%) | 141 (46.1%) | 841 (48.2%) |

Source: Census 2000

**Non-White Populations.** Native American tribes known to have ancestral, aboriginal, or ceded land ties to the project area were identified. Tribes were identified through contact with the SHPO, through direct contact with Tribes, and through other sources. Contacted and consulted tribes include:

- Cheyenne River
- Flandreau Santee
- Lower Sioux
- Prairie Island Indian Community
- Santee Sioux
- Sisseton Wahpeton
- Spirit Lake Nation
- Standing Rock
- Upper Sioux

The percentage of all minorities in Brown County was 4.9 percent in the census taken in the year 2000 (Census 2003). By contrast, the percentage of all minorities in the State of South Dakota was 11.9 percent. The largest minority population is Native Americans, who make up 8.3 percent of the total population in South Dakota and 2.7 percent in Brown County. Approximately 9.9 percent of the population of Brown County was below the poverty level. This level compares to 13.2 percent of the total population of South Dakota that is below the poverty level (Census 2003).

**Local Facilities, Services, and Utilities.** Areas that are relatively close to towns may offer full-service law enforcement and fire districts, schools, hospitals, emergency response services, water and sewer services, road and bridge departments, solid waste disposal, recreation programs, library systems, zoning ordinances, land use planning, and social services. However, it is unlikely that any of the specific project areas near the GGS2 turbine site would offer the types of services that are associated with larger urban areas. Instead, rural communities typically offer fewer services and facilities because of the more dispersed and limited populations and limited revenues for these services.

Costs for energy in South Dakota are among the lowest in the nation. Groton Municipal Electric supplies electricity for the Groton community in Brown County, according to the South Dakota Governor's Office of Economic Development (SDGOED 2003). Northwestern Public Service provides natural gas (SDGOED 2003). WEB Water is the water provider in the Groton area. James Valley

Telecommunications provides all of the telecommunication needs for the Groton community (SDGOED 2003).

#### 3.4.8.2 Environmental Consequences – Direct and Indirect Effects

This section evaluates the potential impacts of the proposed project in the context of social and economic changes in Brown County. Impacts would be considered significant if construction and operation of the GGS2 turbine resulted in:

- Long-term effects on the area's population, housing, and local services; or
- Environmental justice issues that resulted in a disproportionate effect on minority or low-income populations in the area.

In general, socioeconomic impacts from installation of the GGS2 natural gas turbine would be insignificant or negligible. Construction and operation of the gas turbine would have a positive direct socioeconomic impact on local communities. The increased taxable value of the turbine site property after construction would provide additional tax revenue to the county. Increased tax revenue would be realized without significant increase in the demand for county services.

**Population.** The proposed project would have an insignificant impact on population resources, primarily because of the relatively short construction period and the relatively rapid rate the construction crews would pass through the area. It is not anticipated that the population of the area would be affected, as the number of workers required for construction of the gas turbine would be relatively small. It is expected that a portion of the construction work force will be native to Brown County. Additional construction personnel from outside of the project area would usually include construction specialists and supervisory personnel who would temporarily relocate to the project area. This temporary workforce would be accommodated within existing temporary housing in the project area, such as motels and hotels.

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

In addition to local expenditures by construction workers, other income generated by construction of the gas turbine and would include local purchases of material. It is likely that Basin Electric would acquire a variety of construction materials, supplies, and fuel in the project area. Construction materials could include fencing, concrete, tools, fuels, and a variety of other construction-related materials. Local suppliers of these materials could expect increases in sales during the construction period. The impact on housing would be negligible because some of the work force would be local.

**Environmental Justice.** The proposed project would not have a significant impact on environmental justice. Pursuant to Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, the proposed project has been evaluated to assess whether it would result in any disproportionately high and adverse human health or environmental effects on minority and low-income populations. The percentage of minorities in the two counties is low (Table 3-13). In addition, the percentage of the population below poverty level in the project area was comparable to the percentages identified on a statewide basis.

Construction of the project would not present a disproportionate impact to human health or the environment on minorities or low-income populations. No additional burdens would be imposed on local minority or low-income services as a result of the proposed construction.

**Local Facilities, Services, and Utilities.** The anticipated workforce is not large, and a portion of the work force proposed for construction of the project would be local; therefore, there should be 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. No significant cumulative impacts on the existing infrastructure are expected to occur as a result of the proposed project.

#### 3.4.8.3 Mitigation Measures

The proposed project would have a positive impact on socioeconomic and community resources. Mitigation is therefore NA to this project.

### 3.4.9 Cumulative Effects

Cumulative impacts could result if impacts of the proposed action added to other past, present, and reasonably foreseeable future actions occurring in the region. Significant cumulative impacts would result

if impacts from the proposed project when added to other actions in the region resulted in one or more significant impacts as defined for each resource area analyzed in this SDEIS.

Construction and operation of the additional gas turbine would be consistent with the existing land use of the property and the associated agricultural practices in the area, and is not expected to result in significant environmental impacts, whether alone or in combination with the proposed action. No other new major surface-disturbing developments are planned for the one-mile study area that could interact with the proposed action in a cumulative manner.

Impacts on wildlife from project implementation would be in addition to all other impacts on wildlife, including predation, hunting, disease, human disturbance, and vehicle collisions. Direct mortality to waterfowl, shorebirds, and raptors from collisions with the transmission line would be additive (in addition to other causes of mortality). However, impacts associated with the proposed project are expected to be minor and, due to mitigation measures, less than that already occurring.

Direct and indirect mortality to other groups of wildlife, such as small mammals, songbirds, big game, predators, reptiles, and amphibians from project implementation is expected to be minimal or non-existent, and would not contribute to adverse cumulative impacts on wildlife from other sources.

The impacts of past, present or reasonably foreseeable activities combined with the impacts from the proposed action would not have a significant impact on any of the resources discussed using the significance measurements included in each section.

# 4.0 CONSULTATION, COORDINATION AND PREPARATION

## LIST OF PREPARERS AND REVIEWERS

### TETRA TECH, INC.

| | |
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# APPENDIX A

# PHOTOGRAPHS – GROTON GENERATION STATION

**Photograph Groton-1** **October 2003**
Looking North into Section 18 (on right), Township 122 North, Range 60 West (Photo taken from Southwest corner of ¼ Section, Section 18, Township 122 North, Range 60 West, WAPA substation visible in foreground)

**Photograph Groton-2** **October 2003**
Looking North into Section 18, Township 122 North, Range 60 West (Photo taken from Southwest corner of ¼ Section, Section 18, Township 122 North, Range 60 West, WAPA substation visible in foreground Basin Electric Substation visible in background)

**Photograph Groton-3** **October 2003**
Looking West-Southwest into Section 18, Township 122 North, Range 60 West (Photo taken from Southwest ¼ of ¼ Section, Section 18, Township 122 North, Range 60 West) at pond between substations (WAPA substation visible in photo)

**Photograph Groton-4** **October 2003**
Looking Southwest into Section 18, Township 122 North, Range 60 West (Photo taken from East of substations, Section 18, Township 122 North, Range 60 West) (Basin Electric Substation visible in photo)

**Photograph Groton-5** **October 2003**
Looking West into Section 18, Township 122 North, Range 60 West (Photo taken from East of substations, Section 18, Township 122 North, Range 60 West) (Substation visible in photo)

**Photograph Groton-6** **October 2003**
Looking West into Section 18, Township 122 North, Range 60 West (Photo taken from East of substations, Section 18, Township 122 North, Range 60 West) (WAPA Substation and retention pond visible in photo)


**Photograph Groton-7** **June 2006**
Looking East–Southeast into Section 18, Township 122 North, Range 60 West (Photo taken from the plant entrance at Highway 37, showing Groton Generating Station Unit 1)

**Photograph Groton-8** **September 2006**
Aerial photo looking Northwest into Section 18, Township 122 North, Range 60 West (Photo shows Groton Generating Station Unit 1)


**Photograph Groton-9** **September 2006**
Looking Southeast into Section 18, Township 122 North, Range 60 West (Photo taken from the plant entrance road, showing Groton Generating station Unit 1)


**Photograph Groton-10** **January 2007**
Looking Northeast into Section 18, Township 122 North, Range 60 West (Photo taken from Southwest corner of ¼ Section, Section 18, Township 122 North, Range 60 West showing Groton Generating Station Unit 1)