DOE/EIS-0377

Final Environmental Impact Statement

Volume I

June 2009

Big Stone II Power Plant and Transmission Project

Prepared for:

Lead Agency:
Western Area Power Administration

Cooperating Agency:
U.S. Army Corps of Engineers

DOE/EIS-0377

Final Environmental Impact Statement

Volume I

June 2009

Big Stone II Power Plant and Transmission Project

Prepared for:

Lead Agency:
Western Area Power Administration

Cooperating Agency:
U.S. Army Corps of Engineers

COVER SHEET

***Lead Agency*:** U.S. Department of Energy, Western Area Power Administration

***Cooperating Agency*:** U.S. Department of Defense, Army Corps of Engineers

***Title*:** Big Stone II Power Plant and Transmission Project Final Environmental Impact Statement

***Location*:** Proposed Big Stone II Plant: Big Stone City, Grant County, South Dakota
Proposed Transmission Facilities: Northeastern South Dakota and Southwestern Minnesota

***Contacts*:** For additional information on this Final Environmental Impact Statement, contact:

Mr. Matt Blevins
Western Area Power Administration
P.O. Box 281213
Lakewood, CO 80228
Telephone: (800) 336-7288
Fax: (720) 962-7263
E-mail: BigStoneEIS@wapa.gov

For general information on the DOE National Environmental Policy Act process, write or call:

Ms. Carol M. Borgstrom, Director
Office of NEPA Policy and Compliance
Environment, Safety and Health, GC-20
U.S. Department of Energy
Washington, DC 20585-0119
Telephone: (202) 586-4600 or
(800) 472-2756

Abstract: Otter Tail Power Company, Central Minnesota Municipal Power Agency, Heartland Consumers Power District (HCPD), Montana-Dakota Utilities Co., and Western Minnesota Municipal Power Agency (dba Missouri River Energy Services (MRES)) (collectively referred to as the project Co-owners) propose to construct a 600-megawatt net capability coal-fired electric power generating station named Big Stone II. The proposed Big Stone II plant would be located adjacent to the existing Big Stone plant in Grant County, South Dakota, about eight miles northeast of Milbank and two miles northwest of Big Stone City, South Dakota. MRES, on behalf of the Co-owners, applied to interconnect the proposed Project to Western Area Power Administration's (Western) power transmission system at its Morris and Granite Falls substations. Western must consider approving the interconnection request. MRES and HCPD also requested transmission service contract modifications to deliver power from the proposed Big Stone II plant to their service territories on Western's transmission system. The Co-owners would construct transmission lines in South Dakota and Minnesota to interconnect the proposed Big Stone II plant with Western substations. The U.S. Army Corps of Engineers must consider issuing a permit under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act to the Co-owners to construct the proposed transmission lines and water pipelines within or across navigable waters and waters of the United States. The Co-owners have proposed revisions to the proposed Big Stone II plant subsequent to review of the Draft environmental impact statement (EIS), including elimination of a 450-acre make-up water storage pond, elimination of a 25-acre cooling tower blowdown pond, elimination of a new brine concentrator, elimination of three coal-storage silos, relocation of the cooling tower, a new water pretreatment building, and changes to the plant's water supply and usage, and wastewater management. The proposed Project would use a wet cooling system using surface water as the primary water supply and groundwater as the back-up water supply. The Final EIS merges the Supplemental Draft EIS with the Draft EIS and addresses comments received on the Draft EIS and Supplemental Draft EIS. A summary of those comments and Western's responses to them are included in Volume II of the Final EIS. Western's Record of Decision will be published no sooner than 30 days from date the U.S. Environmental Protection Agency publishes its Notice of Availability for this Final EIS in the *Federal Register*.

ES.0 Summary

Otter Tail Corporation (dba Otter Tail Power Company (OTP)), Central Minnesota Municipal Power Agency (CMMPA), Heartland Consumers Power District (HCPD), Montana-Dakota Utilities Co. (MDU), and Western Minnesota Municipal Power Agency (WMMPA), dba Missouri River Energy Services (MRES), collectively referred to as the Co-owners, propose to construct a 600-megawatt (MW) net capability coal-fired electric power generating station named Big Stone II. Substation modifications and associated transmission lines would also be constructed in South Dakota and Minnesota and would interconnect the new generating station to the southwestern Minnesota utility grid. MRES, on behalf of the Co-owners, has applied to interconnect the proposed Project to the integrated transmission system at the Granite Falls and Morris substations owned and operated by Western Area Power Administration (Western). MRES and HCPD have also requested transmission service contract modifications to deliver power from the proposed Big Stone II plant to their service territories on Western's transmission system. The proposed Big Stone II plant would be constructed over five years with an initial mobilization construction date of August 2010 and commercial operation date of July 2015. The proposed Project location is shown on Figure ES-1.

In September 2007, two of the original participants, Great River Energy and Southern Minnesota Municipal Power Agency withdrew from the proposed Project based on company business decisions. As a result of this change, the five Co-owners (OTP, CMMPA, HCPD, MDU, and MRES) are evaluating additional parties as possible participants in the proposed Project.

The proposed Big Stone II plant would be located adjacent to the existing Big Stone plant (constructed in the mid-1970s) in Grant County, South Dakota, about eight miles northeast of Milbank and two miles northwest of Big Stone City, South Dakota. Existing Big Stone plant infrastructure, such as the cooling water intake structure, pumping system and water delivery pipelines, coal delivery and handling facilities, solid waste disposal facilities, and water storage ponds would be used for the proposed Big Stone II plant. Major new construction would include the proposed plant (and ancillary facilities), cooling tower, pretreatment water building, and a groundwater supply system. The proposed Big Stone II plant would use pulverized-coal-fired, super-critical boiler technology and would burn low-sulfur, Powder River Basin (PRB) coal. The proposed plant would include a new wet flue gas desulfurization (WFGD) system to control sulfur dioxide (SO_2) emissions for both the proposed Big Stone II plant and the existing Big Stone plant. A fabric filter would control particulates, and nitrogen oxide (NO_X) emission control would be achieved through boiler design and selective catalytic reduction (SCR) treatment. Emissions of organic hazardous air pollutants (HAPs) would be reduced through the application of Best Available Control Technology (BACT) for volatile organic compounds (VOCs), which was determined to be good combustion practices. Mercury emissions for both the proposed Big Stone II plant and the existing plant would be controlled by ducting the exhaust from the existing plant to the new WFGD scrubber and by the fabric filters. The Co-owners have committed to install control equipment that is most likely to result in removal of at least 90 percent of the mercury emitted from both the existing plant and the proposed Big Stone II plant.[1] This would

[1] Assuming a mercury content of 0.0715 parts per million by weight (typical PRB coal) and a combined consumption of approximately 5.7 million tons per year from the existing and proposed plants, approximately 0.40755 tons (approximately 815.1 lb) of mercury would be present in uncontrolled emissions. With a 90 percent removal efficiency, the combined plants would emit approximately 81.5 lb of mercury per year.

result in mercury emissions of approximately 81.5 pounds (lb) per year from the combined plants, which is lower than the 189.6 lb of mercury emitted from the existing plant alone in 2004.

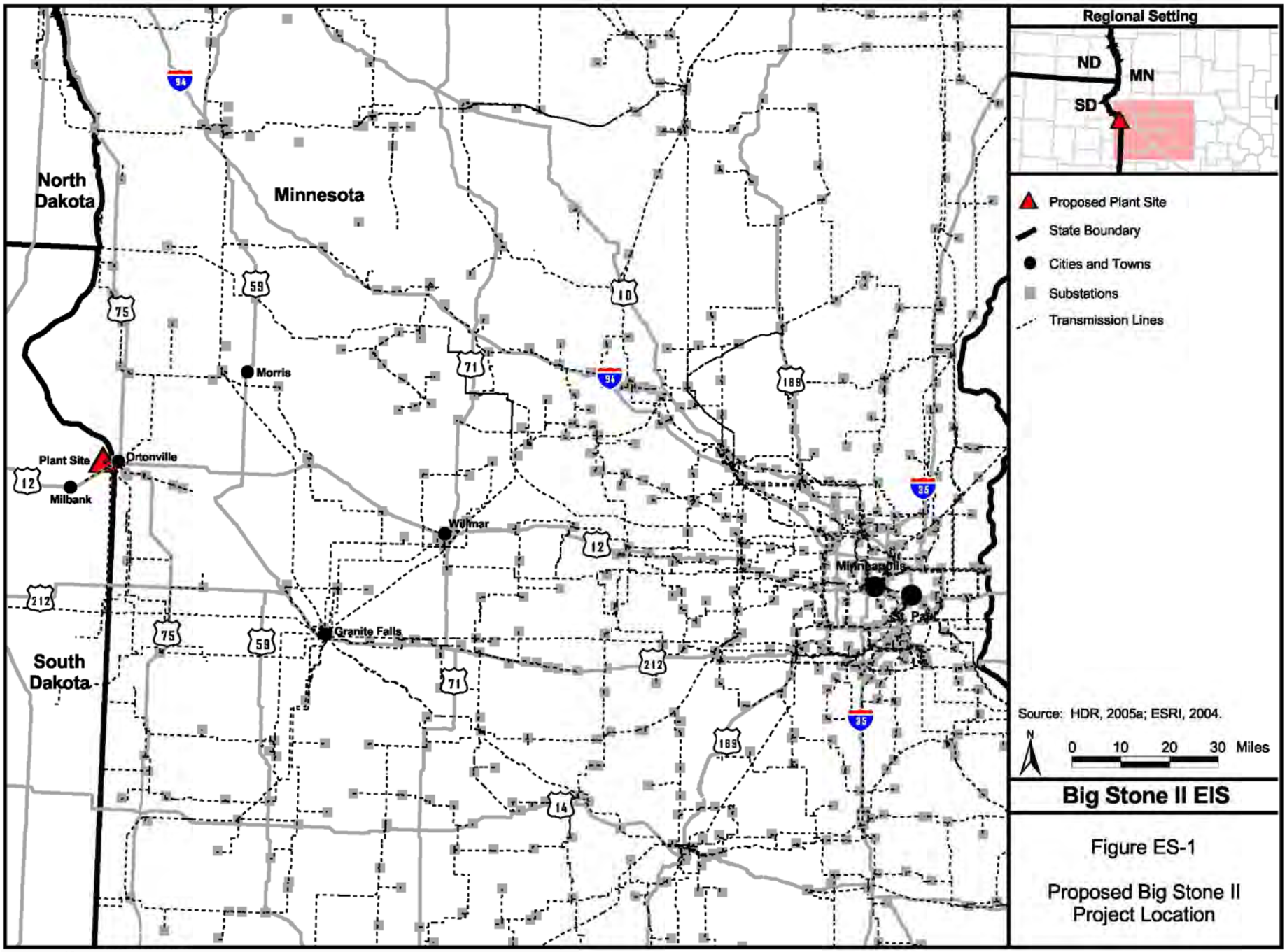
Two transmission alternatives have been identified for the proposed Project. Alternative A would require construction and operation of a 230-kilovolt (kV) transmission line from Big Stone to Western's substation near Morris, Minnesota, and a 230-kV transmission line from Big Stone to Western's substation at Granite Falls, Minnesota. Alternative B would require construction and operation of a 230-kV transmission line from Big Stone to a substation at Willmar, Minnesota, and the previously referenced substation at Granite Falls. These alternatives would require modifications of existing transmission lines and/or construction of new transmission lines, and modification of existing substations.

Western's action is to decide whether to grant the Co-owner's request to interconnect with Western's transmission system at its Morris and Granite Falls substations and to decide whether to modify delivery contracts with MRES and HCPD. Thus, Western must consider allowing the Co-owners an interconnection to Western's transmission system at the Morris and Granite Falls substations, including required modifications to these substations. Western has completed a facility study based on the application for interconnections and has defined the substation upgrades needed to accommodate the interconnection requests. Other existing substations owned and operated by one or more of the Co-owners would require modification or reconstruction to accept the interconnections to transfer the power from the proposed plant to the transmission system. Facility studies to determine specific equipment modifications will be performed at a future date and will determine design parameters for electrical system modifications. The substations that would require modification include the Big Stone, Morris, Willmar, and Granite Falls substations, and the Johnson Junction Switching Station. The existing Canby Substation would be relocated to a new location, since the existing Canby Substation is within a 100-year floodplain.

Approval of the interconnection of the proposed Project at Western's substations and contract modifications requires compliance with the National Environmental Policy Act (NEPA) and the preparation of an Environmental Impact Statement (EIS). The U.S. Army Corps of Engineers (USACE) is a regulatory agency with responsibilities under the Rivers and Harbors Act of 1899 and the Clean Water Act (CWA). The USACE has agreed to participate as a cooperating agency because of the proposed Project's potential to cross navigable water, as well as potential impact to watercourses and wetlands that may be subject to the USACE's jurisdiction. The decisions to be made by Western and USACE regarding the proposed Project will be issued following the Final EIS in the form of separate records of decision for each agency.

Under the No Action Alternative, Western would reject the application to interconnect to Western's transmission system, and the proposed Big Stone II plant and associated transmission facilities, if constructed, would not be interconnected to Western's transmission system. Additionally, the USACE would not issue any permits to the Co-owners (see discussion in Section ES.5).

Input to the EIS includes consideration of issues and concerns that have been identified by the public and agencies as part of the scoping process and those that pertain to regulatory requirements.


Regional Setting
ND
MN
SD
North Dakota
Minnesota
South Dakota
Proposed Plant Site
State Boundary
Cities and Towns
Substations
Transmission Lines
Plant Site
Ortonville
Milbank
Morris
Willmar
Granite Falls
Minneapolis
St. Paul
94
75
59
10
71
12
212
14
189
35
Source: HDR, 2005a; ESRI, 2004.
N
0 10 20 30 Miles
Big Stone II EIS
Figure ES-1
Proposed Big Stone II Project Location

ES.1 Purpose and Need for Agency Action

NEPA requires Federal agencies to consider the environmental effects of their decisions. Preparation of an EIS provides the framework for the agency decision-making processes. The purpose and need for the decisions of the Federal agencies regarding the proposed Project are discussed below.

ES.1.1 Western Area Power Administration

Western is a Federal power-marketing agency under the U.S. Department of Energy (DOE) that sells and delivers Federal electric power to municipalities, electric cooperatives, public utility and irrigation districts, Federal and State agencies, and Native American tribes in 15 western and central States. The proposed Big Stone II Project is located within Western's Upper Great Plains Region, which operates and maintains nearly 90 substations and more than 8,000 miles of Federal transmission lines in Minnesota, South Dakota, North Dakota, Montana, Nebraska, and Iowa.

Western's Open Access Transmission Service Tariff (Tariff) provides open access to its transmission system. Western provides these services through an interconnection if there is available capacity in the transmission system.

The proposed Big Stone II Project would incorporate a major new generation resource into Western's power transmission system and would require upgrades to existing substations on Western's system and the construction of new transmission lines in the region. According to DOE NEPA Implementing Procedures, the proposed Federal action requires an EIS.

In response to the Need for Agency Action, Western must adhere to the following guidelines:

- **Provide Transmission Service.** Western offers capacity on its transmission system to deliver electricity when such capacity is available, under Western's Tariff. The Tariff complies with the Federal Energy Regulatory Commission's (FERC) Final Orders No. 888, 888A, 888B, and 888C, which are intended to ensure non-discriminatory transmission system access. Following FERC's Orders No. 2003, 2003-A, and 2003-B, Western submitted revisions to its non-jurisdictional Tariff on January 25, 2005, to FERC. The purpose of the filing was to revise certain terms of Western's original Tariff and to incorporate the Large Generator Interconnection Procedures (LGIP) and a Large Generator Interconnection Agreement (LGIA). Western received final approval on that filing from FERC on September 6, 2007. On March 1, 2007, Western submitted revisions to its Tariff to FERC pursuant to FERC Orders No. 2003-C, 661, 661-A, 676, 676-A, 2006, 2006-A, and 2006-B. The main purpose of this filing was to incorporate FERC's Small Generator Interconnection Procedures and Small Generator Interconnection Agreement, and also to include revisions of certain terms relating to the LGIP and the LGIA. Western needs to respond to the interconnection and transmission service requests under the provisions of its Tariff.
- **Protect Transmission System Reliability and Service to Existing Customers.** Western's purpose is to ensure that existing transmission system reliability and service are not degraded. Western's LGIP provides for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections.

- **Consider the Co-owners' Objectives.** Since the statement of Purpose and Need affects the extent to which alternatives are considered reasonable, it is important to understand both Western's Purpose and Need and that of the Co-owners.

ES.1.2 U.S. Army Corps of Engineers

The USACE is a regulatory agency with responsibilities under the Rivers and Harbors Act of 1899 and the CWA. Section 10 of the Rivers and Harbors Act of 1899 gave the USACE authority over navigable waters of the United States (WUS). Projects that involve navigable waters of the U.S. require authorization by a Department of the Army Section 10 permit. In addition, one of the major responsibilities of the USACE is administering the permitting program under Section 404 of the CWA if a project involves deposition of dredge or fill material into WUS.

The proposed Project would require both types of permits because of the proposed Project's potential to cross navigable water, as well as the potential to impact watercourses and wetlands that may be subject to the USACE's jurisdiction. The USACE will use the EIS to support its decisions whether to issue permits to the Co-owners.

ES.2 Applicant's Purpose and Need

ES.2.1 Regional Power Requirements

Power generation is generally expressed in terms of supply and demand. Supply refers to the capacity or ability of generators to provide necessary power to end-users and frequently includes a percentage for reserve margins. Demand is the amount of power that is required by the end-users and is also referred to as "load."

The proposed Project is needed to meet the additional regional power requirements of the five Co-owners. The Co-owners are members of the Mid-Continent Area Power Pool (MAPP), an association of electric utilities and other electric industry participants, who have interests in the upper midwest electrical industry. A 2007 MAPP Load and Capability study (MAPP, 2007) forecasts that utilities within the region would become capacity deficit for summer peak load conditions beginning in 2010. The MAPP capacity surplus/deficit forecast for the region from 2007 through 2016 shows a deficit of approximately 5,500 MW by 2016 (for summer peak load conditions). The proposed Big Stone II power plant would produce approximately 600 MW of power (net) and would offset a portion of the MAPP capacity deficit.

ES.2.2 Market Factors Affecting Demand

Open access transmission service created new markets for low-cost energy generated in the MAPP, which has changed the regional power market. Increasing amounts of energy from within MAPP are being sold at higher prices to markets to the south and southeast of MAPP, resulting in increased energy and capacity prices and increased price volatility. Utilities that rely on spot market purchases for a portion of their energy requirements can experience price increases and exposure to market volatility. Many utilities are now looking for opportunities to lower their exposure to the volatile market prices.

Transmission constraints in MAPP have severely limited many utilities' access to any surplus power that may be available for purchase. Some utilities have experienced situations where they have identified an economic purchase, only to find that they cannot secure transmission service to deliver the energy from the seller's system to the buyer's system. Transmission system improvements proposed for the Big Stone II Project would be integrated into the transmission system, would help MAPP to address its transmission constraints, and would reduce risks of energy delivery shortfalls within central Minnesota.

ES.2.3 Co-owner Utility Power Requirements

Each of the Co-owners performed analyses to determine its future resource needs. Although methodologies differed among the Co-owners, their analyses consistently forecasted increased capacity and energy requirements and identified available resource technologies to produce a plan to satisfy future needs. Econometric models were used to estimate future energy needs of the majority of the Co-owners.

Load growth projections and the need to satisfy energy requirements are different among each of the Co-owners; however, goals of the Co-owners include a combination of the following:

- Satisfy load growth.
- Replace current capacity and energy contracts that expire.
- Reduce reliance on energy production from existing oil- and gas-fired generating capacity and the associated higher costs and volatility of fuel costs.
- Reduce reliance on and exposure to power market prices.
- Address the limited deliverability of future capacity and energy purchases due to transmission constraints.

The following paragraphs provide a general description of the Co-owners and their baseload capacity and energy needs.

Central Minnesota Municipal Power Agency. CMMPA is composed of 12 municipal utility member organizations that individually are responsible for providing adequate, economical, and reliable supply of electric energy to meet customer needs. When operational, the proposed Big Stone II plant would supply approximately 40 percent of CMMPA's energy requirements, reducing heavy dependence on contract energy purchases and spot market purchases and existing member capacity that is predominately oil- and natural gas-fired.

Heartland Consumers Power District. HCPD currently serves 19 municipal customers, six State institutions, and a portion of one rural electric cooperative in eastern South Dakota. HCPD also serves six municipal customers in Minnesota and one municipal customer in northwest Iowa. Load growth has increased by an average of 9.7 percent per year from 2005 to 2008 and is expected to increase by 7.9 percent per year from 2008 to 2010, with most of the growth primarily due to new customers. From 2009 through 2015, demand requirements and energy requirements are expected to increase an average of one percent and 2.2 percent per year, respectively. HCPD currently purchases more than 50 percent of its capacity and energy resources from other utilities. The proposed Big Stone II plant would supply 30 MW to the HCPD system, thus reducing its dependency on power purchases.

Montana-Dakota Utilities, Co. MDU's Integrated System comprises service territories in Montana, North Dakota, and South Dakota. For the Integrated System, MDU expected a 72-MW capacity deficit for the summer of 2008 without its short term seasonal capacity purchases, and forecasts a 105 MW capacity deficit for the summer of 2013. That deficit would increase to 152 MW for the summer of 2020. Consequently, MDU would need its 131-MW share of the proposed Big Stone II plant to replace purchased power and cover load growth.

Otter Tail Power Company. OTP serves eastern North Dakota, northeastern South Dakota, and western Minnesota. OTP is already purchasing short term capacity to meet both summer and winter season deficits. A 50-MW capacity and energy contract will expire in 2010. The net effect of the current capacity deficits and the expiration of the 2010 contract, coupled with the ensuing years of increased load growth, would result in a deficit of approximately 164 MW in the 2010 summer season. Continued forecasted load growth results in a capacity deficit of 237 MW in 2014. OTP's share of the proposed Big Stone II plant of up to 170 MW is expected to replace expiring purchases as well as cover some of the forecasted load growth.

Western Minnesota Municipal Power Agency. WMMPA's resource need is driven by a contractual need to provide power to MRES. MRES is in turn responsible for providing power to 58 of its member utilities and for providing all of the increased future electrical power needs for 57 of its members. The load growth of its members is the predominate reason that MRES needs additional generating capacity. Additional resource requirements are driven by the 2016 expiration of the 60 MW of power that is currently provided by another supplier. MRES has one baseload resource, which can only supply half of the capacity requirements by 2010. Natural gas and other peaking resources supply the remainder. Based on MRES' calculations, the lowest-cost method to meet this shortfall is through a combination of 150 MW of the proposed Big Stone II plant baseload capacity and for later peaking resource additions.

Based on the Co-owner's needs described above, Table ES-1 summarizes the Co-owner's ownership share of the proposed Big Stone II plant. The Co-owners are evaluating additional parties as possible Project participants who would join the proposed Project and accept a capacity share of the remaining available megawatts (noted as Additional Participants in the table below).

Table ES-1. Summary of Proposed Big Stone II Ownership by Co-owner

Co-Owner	Capacity Share (MW)
Central Minnesota Municipal Power Agency	50
Heartland Consumers Power District	30
Montana-Dakota Utilities Co.	131
Otter Tail Power Company	170
Western Minnesota Municipal Power Agency	150
Additional Participants	69
Total	600

ES.3 Public Participation

Public participation is an integral part of the EIS process and is conducted to help determine issues to be addressed and identify significant issues related to the Proposed Action.

ES.3.1 Notice of Intent

A Notice of Intent for the Big Stone II EIS was published in the Federal Register (FR) on May 27, 2005. Western mailed scoping meeting notices directly to Federal and State agencies, Native American Tribes, special interest groups, and landowners to gain information regarding environmental impact that could potentially occur as a result of the proposed Project. Additionally, Western announced the scoping meetings by placing display advertisements in 14 local newspapers throughout the affected region. The display advertisements were published once per week for two weeks, with the exception of once per week for three weeks in the communities of Morris and Granite Falls, Minnesota.

ES.3.2 Public Meetings

ES.3.2.1 Federal Scoping

Public scoping meetings were held in Milbank, South Dakota, and Morris and Granite Falls, Minnesota, on June14, 15, and 16, 2005, respectively. The scoping meetings were conducted in an open house format. Western provided information and gave attendees the opportunity to ask resource specialists questions and to express their concerns about the proposed Project. Display boards showing proposed Project location, resource information, the NEPA process, and the Minnesota and South Dakota State permitting process aided in the information exchange with meeting attendees. Several handouts, including the first issue of Western's Big Stone II Power Plant and Transmission Project Newsletter, were available at the meetings.

The public scoping period for the proposed Big Stone II Project was originally scheduled to end on July 26, 2005; however, Western extended the scoping comment period to incorporate public comments received during the landowner formal meetings required for the Minnesota permitting process. On July 26, 2005, Western placed a notice in the FR extending the scoping comment period to August 29, 2005. All comments received during the entire scoping period were compiled into a scoping report document and incorporated into the EIS analyses.

ES.3.2.2 Minnesota State Landowner Meetings

Five landowner meetings were held as part of the Minnesota State permitting process for the transmission line portion of the proposed Project. Meetings were held in Granite Falls, Benson, Willmar, Canby, and Ortonville, Minnesota, on August 1, 2, 3, 8, and 9, 2005, respectively. The meetings were conducted in an open house format similar to the Federal public scoping meetings previously described. Comments received from the public during the State permitting process meetings were included in the compilation of comments received during the Federal scoping process.

ES.3.2.3 South Dakota Public Utilities Commission Hearing

The South Dakota Public Utilities Commission (SDPUC) held a public hearing on September 13, 2005, in Milbank, South Dakota, for the application submitted by OTP on behalf of the Co-owners for

an energy conversion facility permit for the construction of the proposed Big Stone II Project. Public notice for the meeting was provided on August 11, 2005. Three SDPUC commissioners, six commission staff, and 50 individuals attended the hearing. The Co-owners presented information on the proposed Project to the SDPUC and members of the public. Following the presentation, the SDPUC began receiving public testimony.

ES.3.2.4 Draft EIS

Western issued the Draft EIS for the proposed Project in May 2006. Public hearings were held in Big Stone City, South Dakota, and Morris, Granite Falls, and Benson, Minnesota, on June 13, 14, 15, and 16, 2006, respectively. The public hearings included informal question and answer periods where representatives of Western, USACE, and the Co-owners were available to answer questions. The formal portion of the public hearing included a presentation by Western and receipt of public comments from participants who desired to speak. A transcript of each public hearing was prepared.

ES.3.2.5 Supplemental Draft EIS

As a result of changes to the proposed Project, Western issued the Supplemental Draft EIS in October 2007, and held one public hearing in Milbank, South Dakota on November 13, 2007. The public hearing included an informal question and answer period where representatives of Western and the Co-owners were available to answer questions. The formal portion of the public hearing included a presentation by Western and receipt of public comments from participants who desired to speak. A transcript of the public hearing was prepared

ES.3.3 Comments

ES.3.3.1 Scoping Comments

Public comments were received during the public scoping period from the Federal scoping meetings and the State permitting process meetings verbally or in writing by e-mail, mail, and/or on comment forms/cards provided at the meetings. Verbal comments were recorded as notes during the scoping meetings and submitted to Western. During the entire public comment period, Western received e-mails, faxes, and comments by mail. A total of 445 separate comments were identified during the scoping period.

ES.3.3.2 Draft EIS Comments

The public comment period for the Draft EIS originally ended on July 3, 2006; however, Western received several requests to extend the comment period. Western placed a notice in the FR extending the comment period to July 24, 2006. Numerous comments on the Draft EIS were received from Federal and State agencies, Tribes, municipalities, private organizations, businesses, and individuals. During the entire public comment period, Western received e-mails, faxes, and comments by mail.

ES.3.3.3 Supplemental Draft EIS Comments

The public comment period for the Supplemental Draft EIS originally ended on December 10, 2007; however, Western received several requests to extend the comment period. Western placed a notice in the FR extending the comment period to February 28, 2008. By the end of the public comment period on February 28, 2008, Western had received comments from Federal and State agencies, Tribes, non-governmental organizations, and individuals. During the entire public comment period, Western received e-mails, faxes, and comments by mail.

ES.3.4 Native American Tribal Coordination

Western initially contacted the following potentially interested Native American Tribes by letter about the proposed Project: Upper Sioux Indian Community, Prairie Island Indian Community, Lower Sioux Indian Community, Spirit Lake Tribal Council, Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, Flandreau Santee Sioux Tribe, Santee Sioux Nation, Yankton Sioux Tribe, Rosebud Sioux Tribe, Crow Creek Sioux Tribe, Cheyenne River Sioux Tribe, Lower Brule Sioux Tribe, Shakopee Midewakanton Sioux Community, Leech Lake Tribe of Ojibwe, Mille Lacs Band of Ojibwe, and the Standing Rock Sioux Tribe. During the Draft EIS, the Fort Peck Assiniboine & Sioux Tribes of Montana were added to the consultation list. Formal consultation with interested Native American Tribes is ongoing.

ES.4 Proposed Project, Proposed Federal Actions, and Alternatives

ES.4.1 Proposed Federal Actions

The proposed Federal actions evaluated in this EIS by each of the involved Federal agencies are specific and limited and are based on the purpose and need for agency action as described in Section 1.3. The Federal agencies[2] need to make decisions as follows:

Western: Western's proposed action is to consider whether to allow the Co-owners' interconnections to Western's transmission system at Morris and Granite Falls substations, an action that requires Western to complete modifications to these substations to support the interconnections.

USACE: The USACE's proposed action is to consider whether to issue a permit for Section 10 of the Rivers and Harbors Act and for Section 404 of the Clean Water Act to the Co-owners for construction of the proposed Project within or across navigable waters and WUS.

Western proposes to modify its transmission system based on the transmission system studies completed by Midwest Independent System Operator (MISO) and Western. Both proposed Big Stone II transmission alternatives (see ES.4.3.3 below) would require modifications to Western's Morris and Granite Falls substations. Additional electrical equipment would be needed at Granite Falls Substation, and would include installing new concrete foundations, substation bus work, cable trenches, buried cable-grounding grid; and replacing existing equipment and/or conductors to accommodate the interconnection. Morris Substation would be expanded to accommodate a new 230-kV bay, which would include adding new electrical equipment, new concrete foundations, substation bus work, cable trenches, buried cable-grounding grid; and replacing existing equipment and/or conductors with new equipment and/or conductors and replacing an existing transformer with a larger transformer to accommodate the interconnection. Western would design, own, construct, and operate any additions and modifications at these substations. Because Western is a Federal agency,

[2] The Rural Utilities Service (RUS) was identified in the Draft EIS as a cooperating agency for their action to provide funding to Great River Energy (GRE) for their participation in the proposed Project. Because GRE is no longer a participant in the proposed Project, RUS has withdrawn as a cooperating agency in the EIS process.

Western is not ceding any jurisdictional authority over Federal facilities to the State of Minnesota for the interconnection.

If Western decides to modify its delivery service contracts with MRES and HCPD and determines that transmission system modifications are needed to accommodate new delivery service, Western would address the environmental impacts of these modifications in accordance with regulatory requirements.

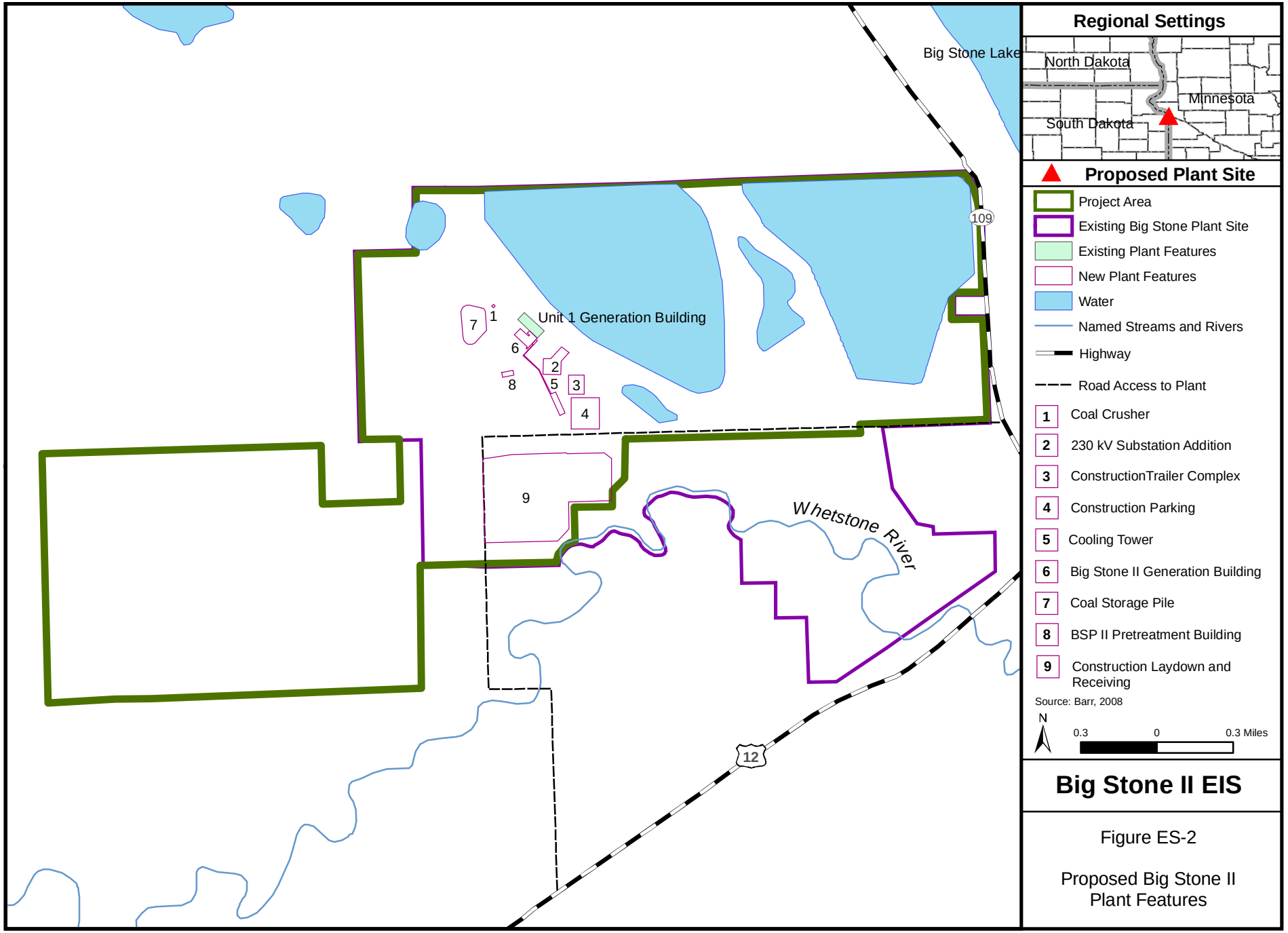
ES.4.2 Proposed Project

The Applicant's revised proposed Project includes constructing and operating the proposed Big Stone II coal-fired power plant, groundwater system, transmission additions and modifications, and substation additions and modifications.

The Co-owners propose to construct a 600-MW net (power remaining available for delivery to the transmission system after power for internal plant operations is consumed) capability coal-fired electric power generating station named Big Stone II. The proposed Big Stone II plant would be located adjacent to the existing Big Stone plant in Grant County, South Dakota. Existing plant infrastructure, such as the cooling water intake structure, surface water pumping system, and delivery pipelines (from Big Stone Lake), coal delivery and handling facilities, solid waste disposal facilities, and water storage ponds would be used for the proposed Big Stone II plant. The existing rail and road facilities would be used for access to the property and proposed plant site. New construction would include the proposed plant, a wet cooling tower system (as the Co-owners' proposed cooling system technology, with surface water as the primary water supply and groundwater as the back-up water supply), additions to the existing 230-kV substation, and water treatment facility (BSP II Pretreatment Building). The proposed Project would also include installation of groundwater wells and a pipeline system to convey groundwater to the proposed plant site. In addition, certain electrical system changes identified during systems analysis are proposed that were not identified in either the Draft EIS or Supplement Draft EIS, including relocation of the Canby Substation and upgrades to the existing 68-mile Big Stone-to-Hankinson 230-kV transmission line.

The proposed Big Stone II plant would use pulverized-coal-fired, super-critical boiler technology and would burn low-sulfur, PRB coal. The proposed plant would include a new WFGD system to control air emissions from both the proposed Big Stone II plant and the existing Big Stone plant. Figure ES-2 shows the proposed plant features.

Power from the proposed Big Stone II plant would be supplied to the regional interconnected transmission system. Study results identified that the proposed Big Stone II plant can be reliably interconnected to Western's transmission system. The Co-owners propose to route the transmission lines to Western's substation facilities located at Morris, Minnesota and Granite Falls, Minnesota, and MRES, on behalf of the Co-owners, submitted an interconnection request to Western for the proposed Big Stone II transmission lines at Morris and Granite Falls substations. The Co-owners' proposed transmission route and the other transmission alternatives are briefly described in Section ES.4.3.3.



Big Stone II EIS

Figure ES-2

Proposed Big Stone II Plant Features

The SDPUC approved the Route Permit for the South Dakota portion of the lines at their January 2, 2007, hearing and issued their Final Decision and Order on January 16, 2007 (SDPUC, 2007). In their approval of the Certificate of Need and the Route Permit, the MnPUC authorized the transmission line route for the Minnesota portion of the proposed Project on January 15, 2009, by approving the Co-owners' preferred route: Alternative A (Corridor A to Morris and Corridor C to Granite Falls). The MnPUC issued their final written order granting the Certificate of Need and the Route Permit on March 17, 2009. The Co-owners would identify a transmission line centerline and acquire an easement from the landowners for the transmission rights-of-way (ROW) within the designated route approved by the MnPUC. Since Western does not have jurisdiction over the siting of the specific route, the EIS focused on corridor alternatives and the analysis of the impacts from constructing and operating of the transmission lines on a corridor basis.

ES.4.3 Proposed Project Alternatives

ES.4.3.1 Plant Site Alternatives

The Co-owners conducted an analysis of alternative power plant locations. The existing Big Stone plant site was one of 38 potential sites identified within South Dakota, North Dakota, and Minnesota. Criteria, which included impacts to Class I air quality sites, proximity to the regional power grid, proximity to reliable water sources, proximity to populated areas, and availability of coal transportation, were applied to the 38 sites. Thirty of the sites were eliminated primarily due to limited water supply potential or nearby residential development. A field reconnaissance for the remaining eight sites was conducted; two sites were eliminated due to nearby residential development. The six remaining sites were further screened using 17 criteria and then ranked against the criteria. Sensitivity of the evaluation scores to varying weights was also tested. The Big Stone site resulted in the highest ranked site. The Co-owners determined that, based on the power plant selection process, the Big Stone site was the best site to meet the objectives of the Co-owners, would minimize construction costs, and would reduce environmental disruption by using the existing infrastructure.

The Big Stone site is located at an existing power plant site that was originally configured to accommodate a second generating unit. Use of existing infrastructure would be cost effective. Operational costs would be reduced due to shared resources. Additionally, the Big Stone site provides an opportunity to reduce air emissions from an older existing plant. Retrofitting the existing plant would be very costly if done independently. Furthermore, retrofitting would not be required, as the existing plant is currently operating under an approved air permit.

The Big Stone site is centrally located within the geographic service territory of the Big Stone II Co-owners, thus allowing an opportunity to minimize transmission line losses and reduce costs for delivery for some of the smaller Co-owners.

ES.4.3.2 Cooling Alternatives

After receiving new cost information on the make-up water storage pond and reviewing comments on the Draft EIS, the Co-owners decided to evaluate alternatives that would use groundwater as a source for cooling and make-up water during periods when withdrawals from Big Stone Lake are not permitted. In addition to the original Proposed Action described in the Draft EIS, the Co-owners developed three new alternatives. These alternatives were then evaluated with respect to operational and economic factors and environmental impacts. The cooling alternatives eliminated are discussed in Section ES.6.2, below. The cooling alternatives carried forward for further analysis included:

Alternative 2: Proposed Project: Wet Cooling with Groundwater Back-Up Water Supply. Alternative 2 is the Co-owners' proposed cooling system alternative. This alternative (described in Section 2.2) would use groundwater as the sole back-up water supply in the event that pumping water from Big Stone Lake was not permitted, while retaining the original wet cooling system technology identified in Alternative 1. However, the chemical treatment systems would be changed to treat the make-up water, (Big Stone Lake water or groundwater back-up) rather than the wastewater.

Alternative 3: Wet/Dry Cooling with Groundwater Back-Up Water Supply. Alternative 3 (described in Section 2.3.1) is designed to utilize a wet/dry cooling system to reduce evaporative water consumption coupled with groundwater back-up water supply in the event that pumping water from Big Stone Lake was not permitted. The make-up water pretreatment system would be the same as described for Alternative 2. However, water consumption would be reduced since there would be less water loss due to evaporation.

Alternative Comparison

Alternative 2 and Alternative 3 cooling alternatives were compared using operating, economic, and environmental screening criteria. In summary, Alternative 2 (i.e., the proposed Project) has the highest efficiency (i.e., less fuel is burned per kilowatt-hour produced), and therefore has the lowest overall operating cost (including fuel). Alternative 3 would have higher auxiliary power requirements and thus more non-fuel operating costs due to the size and number of fans that are associated with dry cooling. Alternative 3 would require less surface and groundwater (about 6,000 afy less) compared to Alternative 2. This reduction is the result of the inclusion of the dry cooling concept into Alternative 3. Air emission impacts would be highest for Alternative 3 due to the lower efficiency associated with this alternative compared to Alternative 2. No wetlands would be lost from construction of the proposed plant facilities under Alternative 2 or Alternative 3. Based on the evaluation of the alternatives carried forward for additional analysis, the Co-owners selected Alternative 2 (i.e., Wet Cooling with Groundwater Back-Up Water Supply) as the preferred cooling alternative for the proposed Project. However, Alternative 3 may be selected if the projected groundwater supplies prove to be inadequate following completion of all hydrogeological investigations. Other cooling technologies considered and not carried forward for detailed analysis are discussed in Section 2.5.2.

ES.4.3.3 Transmission Corridor Alternatives

Several levels of alternative analyses were conducted for the transmission component of the proposed Project. Initial studies were carried out to determine if the existing transmission lines could carry additional generation from the proposed Big Stone II plant. The Co-owners initially proposed interconnections to Morris Substation and Granite Falls Substation. Subsequently, interconnection to Willmar Substation was identified as another viable alternative. Initial corridor analysis conducted by the Co-owners identified three alternative transmission corridors to interconnect the three endpoints. These corridors were identified as Corridors A, B, and C. Western included these three corridors in its Notice of Intent to Prepare an EIS and in the EIS scoping process. Alternatives A and B each incorporate two of the three alternative corridors and interconnection points to reliably deliver power generated by the proposed Big Stone II plant to the regional transmission grid.

Subsequent to Western's Federal EIS scoping period and based on public comments, additional corridor alternative analyses were conducted through field analyses and review of area maps. Potential alternative transmission corridors were identified using existing linear features, environmental constraints, and input received during the scoping process. Screening criteria were applied to each

corridor to determine which alternatives or segments to carry forward for further analysis in the EIS. The analyses resulted in two additional corridors carried forward for further detailed analysis in the EIS and are identified as Corridors B1 and C1.

Based on the evaluations and studies summarized above, Western determined that two transmission alternatives would be carried forward for further detailed analysis in the EIS. Alternative corridors for each alternative were analyzed. These corridors are illustrated in Figure ES-3 and include:

- Alternative A - Corridor A to Morris, Minnesota and Corridor C or C1 to Granite Falls, Minnesota. The Co-owners propose to route the transmission lines to Western's substation facilities located at Morris and Granite Falls.
- Alternative B – Corridor B or B1 to Willmar, Minnesota and Corridor C or C1 to Granite Falls.

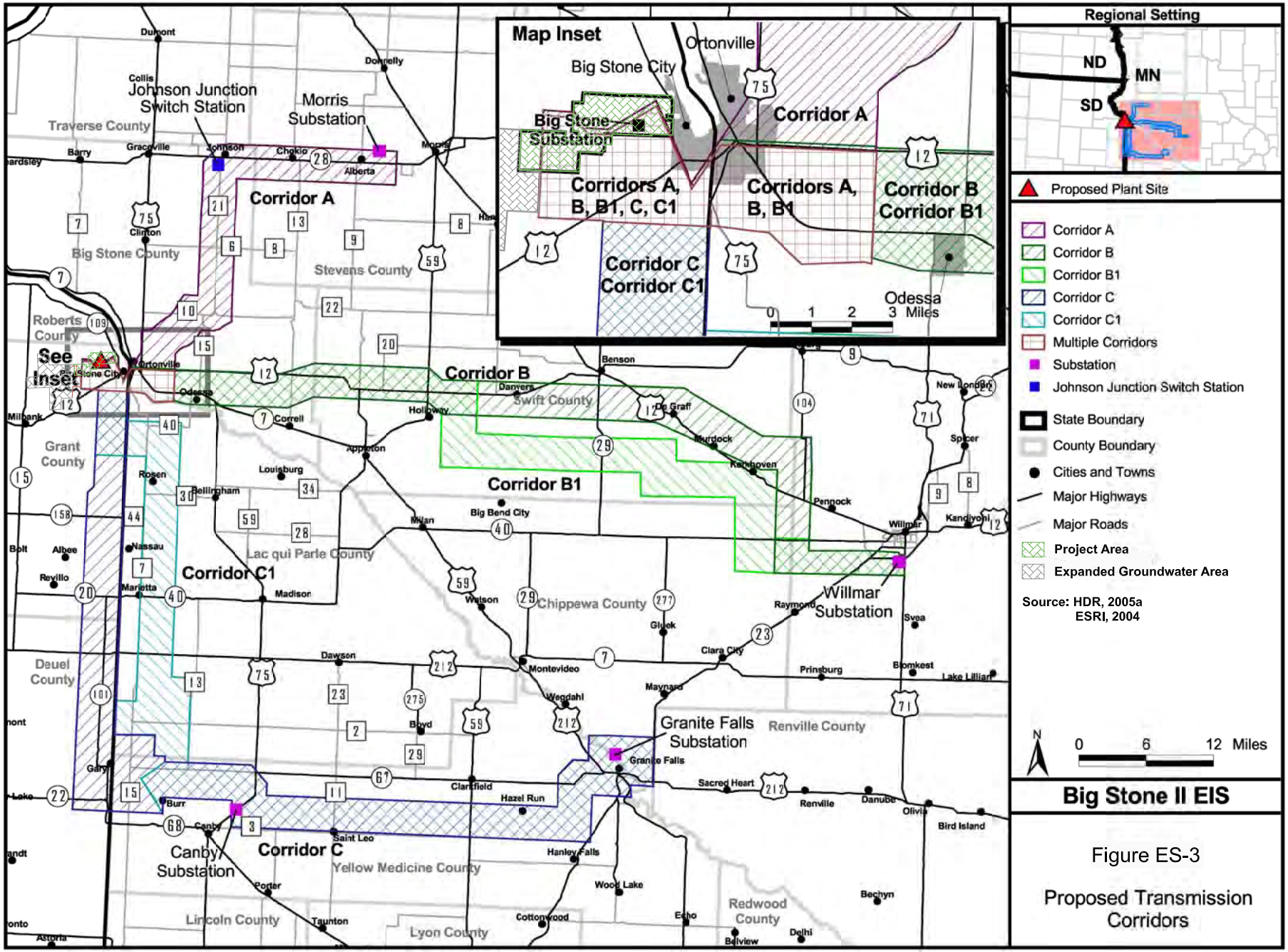
Transmission Alternative A

Transmission Alternative A would total approximately 136 linear miles and consists of Corridor A in combination with Corridors C or C1.

Corridor A begins at the existing Big Stone Substation, located at the existing Big Stone plant, and ends at Western's Morris Substation near Morris, Minnesota. Segments of Corridor A include: a new 230-kV line from the existing Big Stone plant to Ortonville Substation in Ortonville, Minnesota; an upgrade of the existing 115-kV transmission line to 230 kV from Ortonville Substation to Johnson Junction Switching Station located near Johnson, Minnesota; and an upgrade of the existing 115-kV transmission line from Johnson Junction Switching Station to a final termination at Western's Morris Substation.

Corridor C includes a new 230-kV line from the existing Big Stone Substation to the proposed relocated Canby Substation (the existing Canby Substation would need to be relocated out of a floodplain zone) near Canby, Minnesota, and the conversion of an existing 115-kV transmission line to 230-kV service from Canby to Western's Granite Falls Substation near Granite Falls, Minnesota. Corridor C is located within South Dakota and Minnesota and is approximately 92 linear miles.

Corridor C1 is an alternate route for connecting the existing Big Stone Substation to proposed relocated Canby Substation, with the majority of the corridor located within Minnesota. The corridor segment would extend south of Ortonville to Canby Substation east of the South Dakota/Minnesota State line in Minnesota. The corridor was identified in response to scoping comments that expressed concern regarding environmentally sensitive resources near Gary, South Dakota. Similar to Corridor C, this corridor includes a new 230-kV line from the existing Big Stone Substation to Canby and the conversion of an existing 115-kV transmission line to 230-kV service from Canby to Western's Granite Falls Substation. This 92-mile-long corridor includes existing transmission lines and local county roads throughout much of its length. The existing lines could be paralleled. Use of the corridor would provide opportunities to route transmission lines around environmentally sensitive resources in the vicinity of Gary.


Map Inset
Ortonville
Big Stone City
Big Stone Substation
Corridor A
Corridors A, B, B1, C, C1
Corridors A, B, B1
Corridor B Corridor B1
Corridor C Corridor C1
Odessa
0 1 2 3 Miles
Johnson Junction Switch Station
Morris Substation
Traverse County
Big Stone County
Stevens County
Roberts County
See Inset
Corridor A
Corridor B
Corridor B1
Corridor C1
Corridor C
Swift County
Grant County
Lac qui Parle County
Chippewa County
Deuel County
Yellow Medicine County
Lincoln County
Lyon County
Redwood County
Renville County
Granite Falls Substation
Willmar Substation
Canby Substation
Regional Setting
ND
MN
SD
Proposed Plant Site
Corridor A
Corridor B
Corridor B1
Corridor C
Corridor C1
Multiple Corridors
Substation
Johnson Junction Switch Station
State Boundary
County Boundary
Cities and Towns
Major Highways
Major Roads
Project Area
Expanded Groundwater Area
Source: HDR, 2005a
ESRI, 2004
N
0 6 12 Miles
Big Stone II EIS
Figure ES-3
Proposed Transmission Corridors

For both Corridors C and C1, the proposed line from Big Stone Substation to a location east of Hazel Run, Minnesota would be designed and constructed at 345-kV capability rather than 230-kV capability to increase transmission line capacity consistent with regional transmission plans. Additionally, a portion of relocated Canby Substation may be built to accommodate future 345-kV operation rather than 230-kV operation. The Hazel Run-to-Granite Falls segment would be constructed at 230-kV service. Substation site expansions may be required at all locations. Additions to the existing Big Stone 230-kV Substation would be required to accommodate the two new 230-kV lines and a new connection to the proposed Big Stone II plant. Within Corridor A, a new substation would be constructed at the site of Johnson Junction Switching Station. Substation changes would also be required to accommodate the upgraded line and the need for additional 230/115-kV transformer capacity at Western's Morris Substation. In Corridor C and Corridor C1, substation modifications to accommodate the upgraded line at Western's Granite Falls Substation would be required. Additionally, the existing Canby Substation would need to be relocated out of a floodplain zone and the relocated substation would incorporate a new 230/115/41.6-kV transformer and required new 230-kV line interconnections.

An option under consideration for Alternative A is to bypass the interconnection to Ortonville Substation. Rather than building a new 230-kV line from Big Stone Substation to Ortonville Substation, two new 230-kV transmission lines would be built to a location approximately 1.25 miles south of Big Stone Substation. One of the two lines would continue from this location to the relocated Canby Substation. The second line would continue to a location approximately 1.25 miles from Ortonville Substation where it would connect with the upgraded 230-kV line to Johnson Junction Switching Station. Eliminating the Ortonville Substation connection for Alternative A would reduce transmission line congestion in the corridor leading to and from Ortonville Substation, and would allow for removal of about 1.25-miles of an existing 115-kV line. Also, Ortonville Substation would not need to be expanded to accommodate a new 230/115-kV transformer that would have otherwise been needed.

Transmission Alternative B

Transmission Alternative B would total approximately 177 linear miles and consists of Corridors B or B1 in combination with Corridors C or C1. Corridor B, proposed by the Co-owners, includes a new 230-kV line from the existing Big Stone Substation to Willmar Substation, approximately 84 linear miles.

Corridor B1 is an alternate route from Big Stone to Willmar. The corridor was identified in response to scoping comments that expressed concern regarding the location of transmission lines along U.S. Highway 12 and in the Danvers area. Similar to Corridor B, this corridor also includes a new 230-kV line from the existing Big Stone Substation to Willmar Substation. A portion of Corridor B1 avoids U.S. Highway 12 and the Danvers area by extending the corridor from Holloway to an area west of Willmar. Corridor B1 would provide transmission line route flexibility to parallel existing rural roads along section lines and construction within mid-section lines. The corridor includes 69-kV transmission lines from the vicinity of Benson to Kerkhoven and from Kerkhoven to Willmar Substation. Use of this corridor would reduce potential impacts to population centers within the Co-owners' proposed corridor.

As identified for Alternative A, Alternative B also includes Corridors C and C1 (a new 230-kV line from the existing Big Stone Substation to Canby and conversion of an existing 115-kV transmission

line to 230-kV service from Canby to Granite Falls). Corridors C and C1 would be the same as described for Alternative A.

The following transmission system improvements and modifications are included for Alternative B:

- Rebuild the Ortonville-to-Johnson Junction-to-Morris 115-kV lines to remedy line overload.
- Install a capacitor bank in Willmar Substation.
- Remove an existing 115/69-kV transformer, possible upgrade of an existing 230/69-kV transformer, and the addition of a new 230/69-kV transformer at Willmar Substation.
- De-energize the existing Willmar-to-Kerkhoven Tap 115-kV transmission line and the Granite Falls-to-Willmar 69-kV transmission line.

The 115-kV transmission line from Ortonville-to-Johnson Junction-to-Morris would be totally rebuilt with new structures and heavier conductor in its existing right of way at the same voltage level (115-kV) to increase the capability of the line. The existing Willmar-to-Kerkhoven Tap 115-kV and the Granite Falls-to-Willmar 69-kV transmission lines would be de-energized and left in place.

ES.5 No Action Alternative

CEQ NEPA regulations (40 CFR 1502.14) require evaluation of the No Action Alternative as part of the analyses. The No Action Alternative differs from baseline analyses that describe the affected environment because it addresses conditions that would exist without the proposed Project. Under the No Action Alternative, Western would reject the application to interconnect to Western's transmission system. However, the existing Ortonville-Johnson Junction-Morris 115-kV transmission line to Morris Substation would need to be re-built to meet existing and future power delivery needs. Rebuilding the existing transmission line would have similar impacts to those described in Chapter 4. Additionally, the USACE would not issue any permits to the Co-owners related to the proposed Big Stone II Project. Three foreseeable courses of action that would be available to the Co-owners are described below. Each of these actions would include the rebuild of the Ortonville-Johnson Junction-Morris 115-kV transmission line.

No-Build Alternative:

Under this scenario, the Co-owners would not proceed with the proposed Big Stone II Project. The Co-owners would not secure alternate baseload generation and would not seek alternate transmission configurations. Under these circumstances, the Co-owners would not fulfill their purpose and need for the proposed Project, and the potential impacts (positive or negative) of the proposed Project would not occur.

Sub-alternative 1:

Under this scenario, the Co-owners would not proceed with the proposed Big Stone II Project. The Co-owners would likely fulfill their generation and transmission needs individually or cooperatively through alternative arrangements by seeking generation capacity and energy from other sources, if available. Under this No Action Alternative, beneficial and adverse impacts associated with constructing and/or operating the proposed Project would not be realized and existing conditions would continue during the foreseeable future. An additional source of electrical energy would not be available to the Co-owners from the proposed Big Stone II Project (refer to Section 1.2). The

Co-owners would need to develop or secure alternate baseload generation to meet their customers' needs. Any new development of baseload generation would produce environmental impacts similar to the proposed plant, but at different locations. The decisions and determinations would be subject to the discretion and business decisions of each participating Co-owner, and Western is not in a position to evaluate the individual needs of each Co-owner to determine their potential courses of action with any certainty. For this reason, describing the potential impacts of this alternative is speculative; therefore, the Final EIS does not attempt to describe any potential impacts associated with this subset of the No Action Alternative. The emissions reductions contemplated for the existing plant as part of the proposed Project would not occur under this scenario.

Sub-alternative 2:

Under this scenario, the Co-owners would likely proceed with the construction and operation of the proposed Big Stone II plant in order to fulfill their purpose and need of meeting baseload requirements. Instead of obtaining the existing transmission interconnections on the Federal transmission system, the Co-owners would be required to seek an alternative transmission configuration that would provide firm transmission service on the MISO system. Another option would be to purchase non-firm transmission rights from MISO over the MISO system. Using non-firm transmission for a baseload generation resource is contrary to generally accepted industry standards. Under this sub-alternative, the environmental consequences for the proposed Big Stone II plant would likely be similar under this scenario to those described in this EIS. The environmental consequences associated with obtaining transmission capacity would likely be similar to those described in the Final EIS for the proposed Project, though those impacts may occur at different locations. Because the Co-owners have not explored the possibility of proceeding with the construction of the proposed plant without the interconnection to Western's transmission system, the locations of those potential transmission impacts are unknown.

ES.6 Other Alternatives Considered but Eliminated from Detailed Analysis

Alternatives considered but eliminated from detailed analysis in the EIS include alternatives in power generation technologies, power plant locations, transmission line technologies, and transmission line corridors.

ES.6.1 Power Generation Technology Alternatives Eliminated

Analysis conducted by the Co-owners considered alternative power generation technologies including sub-critical coal technology, wind energy, solar power, biomass, atmospheric circulating fluidized bed, Integrated (Coal) Gasification Combined Cycle, combined cycle gas turbine (CCGT), wind plus CCGT, coal plus wind, and demand side management.

The Co-owners also analyzed carbon capture and sequestration (CCS) technologies. Results of the alternatives analysis determined that there are currently no commercial CCS technologies available.

Western considered the generation alternatives suggested to the Co-owners' generation plans and has determined that the EIS will not fully analyze them for the following interrelated reasons:

- The alternatives to the Co-owners' generation plan fall outside of Western's purpose and need (see Section 1.3.1). An analysis of alternatives to the Co-owners' generation plan is unreasonable because such alternatives do not fall within Western's purpose and need and have not been presented to Western in the application for interconnections.
- Western's decision is limited to whether to grant the interconnections at its Granite Falls and Morris substations. Any analysis of alternatives to generation lies outside the scope of Western's decision. Western has no discretion or approval authority over the Co-owners' planned generation facility. Western's sole decision is whether to interconnect the Co-owners' proposed Project. Thus, consideration of alternatives to the Co-owners generation is unreasonable and infeasible.
- Absent specific legislation, Western has no Congressional authority to participate in construction of a power generation project such as the proposed Big Stone II Project. Western's mission is to market and deliver reliable, cost-based hydroelectric power within a 15-State region of the central and western United States. Western provides transmission service and processes an Applicant's Interconnection request under its Open Access Transmission Service Tariff. Western's statutory authorization and Congressional directives are limited to marketing and delivering power. Western has no authority to participate in the design, construction, and operation of a power plant.
- The generation alternatives suggested by others are speculative. It is speculative and infeasible for Western to consider alternatives to generation that have not been proposed to Western and do not even exist. For example, addressing generation alternatives would require Western, a Federal agency that operates no generation facilities, to design an alternative generation facility and then evaluate the impacts of this hypothetical facility. Not only would the design be speculative, but also the impacts would be speculative. All the generation alternatives raised in the comments suffer this same flaw.

ES.6.2 Cooling Technology Alternatives Eliminated

The Co-owners also considered two alternative cooling technologies:

Alternative 1: Wet Cooling with Surface Water Storage Pond for Back-Up Water Supply. Alternative 1 is the original cooling option described in the Draft EIS. Big Stone Lake would be the only source of make-up water for the proposed plant and would require construction of a new 450-acre cooling pond. Alternative 1 has been eliminated from full analysis and is addressed in Section 2.5.2.1.

Alternative 4: Dry Cooling with Groundwater Back-Up Water Supply. This alternative was considered, but has been eliminated from full analysis and is addressed in Section 2.5.2.2.

Results of the alternatives analysis determined that the surface storage pond necessary for this wet cooling technology was high cost and raised environmental concerns for impacts to wetlands and other surface water resources. Analysis determined that the costs of dry cooling with groundwater back-up water supply are higher than costs of the proposed Project. Additionally, the lower efficiency of dry cooling process requires higher energy use to meet the same energy output, resulting in greater air pollution impacts.

ES.6.3 Power Plant Location Alternatives Eliminated

A total of 38 potential power plant site locations were identified by applying criteria that included consideration of potential impacts to Class I air quality sites, proximity to the regional power grid, proximity to reliable water sources, proximity to populated areas, and availability of coal transportation. A secondary screening analysis further evaluated six locations. Based on the secondary screening analysis, the Big Stone site was determined to be the best site for the proposed new plant and the remaining five alternatives were eliminated since none offered environmental and/or economic benefits that warranted more detailed evaluation. Alternative plant sites eliminated from further consideration are summarized in Table ES-2.

ES.6.4 Alternative Transmission Line Technologies Eliminated

Underground transmission was eliminated from detailed consideration because it is impractical at higher voltages, costly to install, and difficult to maintain. Alternative transmission structures were limited to H-frame and single-pole; lattice structures were eliminated from consideration because they are costly to install and typically require larger land areas.

ES.6.5 Alternative Transmission Line Corridors Eliminated

Potential alternatives to corridors were developed during scoping. Alternative transmission line corridors were identified using linear features, environmental constraints, and input received during the scoping process. Screening criteria were applied to each corridor to determine which corridors or segments were reasonable to carry forward for further analysis in the EIS and which to drop from further consideration. Alternative transmission line corridors eliminated from detailed analysis are summarized in Table ES-3.

ES.7 Impacts

Table ES-4 summarizes the environmental impacts of the proposed Project, Alternative 3, and the No Action Alternative based on the analysis in Chapter 4. The table includes both the potential benefits and potential adverse impacts to each resource or environmental component.

A number of mitigation measures and standard mitigation measures (SMMs) are proposed in Section 2.2.4 by the Co-owners as part of the proposed Project and by Western for the proposed interconnections. Additional mitigation measures proposed in Chapter 4 to further reduce impacts are listed in Table 2.6-2 and, if adopted by the Co-owners or enforced by other regulatory agencies, would further mitigate adverse environmental impacts. However, despite application of all mitigation measures, some adverse impacts may still occur.

Table ES-2. Plant Site Alternatives Eliminated From Further Consideration

Plant Site Location	Reasons for Eliminating
Coyote, Mercer County, North Dakota	Air quality permitting is expected to be more difficult due to the proximity of this site in combination with six other existing lignite-fired power plants to Class I areas. Upgrading the existing transmission system is expected to cost more than for the proposed Big Stone site.
Dickinson, Wright County, Minnesota	Substantial new transmission investments would be required. Population densities near the site are the highest of all the locations.
Fargo, Cass County, North Dakota	The major disadvantage is the lack of potential water supply. This site ranked the lowest.
Glenham, Walworth County, South Dakota	The main concern is existing transmission capacity constraints from this region. In addition to extensive transmission costs, it is a greenfield site that would require development and construction of all supporting infrastructure. The site is also closer to sensitive air quality areas (Class I areas).
Utica Junction, Yankton County, South Dakota	The main concern is transmission capacity that would make the site economically infeasible. This is also a greenfield site that would require development and construction of all supporting infrastructure.

Source: Burns & McDonnell 2005a

Table ES-3. Alternative Transmission Line Corridors Eliminated From Further Consideration

Alternative	Reasons for Eliminating
Alternatives to Corridor A – Big Stone to Morris	
Bypass Route Northwest of Ortonville	Although a transmission line through the area could be constructed, avoiding the area was determined to be preferable for environmental and engineering reasons.
Route to the East Alternative Corridor	This alternative would require constructing more than 20 miles of new transmission lines through an area presently without transmission lines.
Alternatives to Corridor B – Big Stone to Willmar	
Big Stone to Spicer	Corridor B originally extended from Big Stone to the Spicer area. The corridor was eliminated due to comments received during scoping concerning a high number of wetlands in the area, which are high bird-use areas.
Big Stone to Ortonville to Appleton to Willmar	A portion of this alternative from Ortonville to Holloway was eliminated due to a high concentration of pivot irrigation systems in the area and the potential conflicts with an airport north of Appleton.
Alternatives to Corridor C – Big Stone to Granite Falls	
Big Stone to Ortonville to Granite Falls	The corridor would extend from Ortonville to Granite Falls along the Minnesota River. The corridor has limited transmission line routing opportunities due to the presence of population centers and constraint to locating the transmission line parallel to an existing highway and railroad.
Big Stone to Bellingham to Hazel Run to Granite Falls	Transmission line routing opportunities would be limited within the corridor due to existing rural road orientation and numerous population centers.
Big Stone to Benson to Granite Falls	This alternative required a new transmission corridor from Big Stone to Benson-Danvers, presented reliability issues from the Benson-Danvers area to Granite Falls and did not offer advantages over the corridors proposed by the Co-owners.
Big Stone to Western's Corridor to Canby to Granite Falls	This alternative avoided the environmentally sensitive areas in the southwestern portion of Corridor C. It was eliminated because, with the presence of three existing transmission lines in the corridor, it would not meet reliability requirements.
Big Stone to Western's Corridor to Granite Falls	This alternative was eliminated primarily due to reliability concerns.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Air Quality	▪ Operation of the proposed Big Stone II plant would release an estimated 4.7 million tons of CO_2 into the atmosphere each year, which could have an undetermined effect on local, regional, or global climate change. The equivalent CO_2 emissions from the proposed Big Stone II plant would be on the order of 0.54 tons/MWh, which is lower than the 2005 U.S. average for power generation of approximately 0.68 tons/MWh. If Federal or State regulations are not promulgated and the conditions of the Settlement Agreement expire, the emissions of the proposed Big Stone II plant would be about 0.98 tons CO_2/MWh, which is lower than the national average for coal-fired plants of 1.18 tons CO_2/MWh. Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on human health and the environment. ▪ The annual projected actual emissions of SO_2 and NO_X from the existing and proposed plants would be approximately 2,000 tons of SO_2 and 16,448 tons of NO_X. SO_2 emissions would be reduced and NOx emissions would not increase compared to the annual average 2003 and 2004 SO_2 and NO_X emissions from the existing plant. ▪ To the extent that emissions of SO_2 would be less and emissions of NO_X would not increase, impacts to the environment due to acid deposition would be less if the proposed Big Stone II plant were constructed. ▪ The Co-owners have committed to install technologies that are most likely to result in removal of at least 90 percent of the mercury emitted from the existing plant and the proposed Big Stone II plant. This would result in mercury emissions of approximately 81.5 lb per year from the combined plants (compared to approximately 189.6 lb from the existing plant alone in 2004), which would contribute mercury to the environment. Although the combined plants would continue to emit mercury, the decrease in mercury emissions compared to the emissions of the existing plant would result in reduced impacts to the environment. ▪ Although PM_{10} would increase due to increased coal combustion, dispersion modeling shows that there would be no exceedances of the PSD Increment for PM_{10} or the NAAQS for PM_{10} and $PM_{2.5}$ for the proposed Big Stone II plant. ▪ The projected total emissions of all HAPs from the existing and proposed plants' boilers is projected to be approximately 63,460 lb per year, a reduction of approximately 61,848 lb per year from current emission levels for the existing Big Stone plant. This reduction of approximately 49 percent in total HAPs emissions would proportionately decrease any impacts attributable to HAPs emissions, and impacts to the environment would be less compared to emissions from the existing plant alone.	▪ The projected air emissions for SO_2, NOx, CO, PM, mercury, HAPs, and CO_2 would be increased by approximately 2.28 percent more than the proposed plant.	▪ Under the No-Build Alternative and Sub-alternative 1, none of the air impacts associated with the proposed plant site or the groundwater areas would be realized. The reduction of certain emissions (mercury, SO_2, and total HAPs) at the existing plant would not occur, and emission levels at the existing plant would continue at current levels. No CO_2 would be produced by the proposed plant. ▪ Under Sub-alternative 2, the air impacts would likely be identical to those presented for the proposed plant.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Air Quality	• Short-term construction impacts resulting from increased vehicle emissions and dust would be localized and would be less than significant. • There are no Class I areas within 186 miles of the proposed plant. Therefore, no Class I visibility analysis was required or conducted. Visibility impacts were examined at the Pipestone National Monument (approximately 90 miles from the proposed plant), a Class II area. The results of modeling show that the proposed plant's emissions pass the Class I screening criteria at Pipestone National Monument. ▪ The proposed Big Stone II plant would operate under an air emission permit from the SDDENR and would comply with NAAQS and PSD increments. Any short-term and long-term residual impacts would meet regulatory requirements and would be less than significant.		
Groundwater Resources	▪ Up to 14 permanent wells would be constructed in the groundwater areas. Average annual groundwater production would be approximately 3,720 af. ▪ The predicted maximum drawdown of the Veblen Aquifer would be approximately 37 feet.	▪ Up to 14 permanent wells would be constructed in the groundwater areas. Average annual groundwater production would be approximately 2,036 af. ▪ The predicted maximum drawdown of the Veblen Aquifer would be approximately 24 feet.	▪ Under the No Build Alternative, and Sub-alternative 1, groundwater pumping associated with the proposed plant would not occur. ▪ Under Sub-alternative 2, groundwater impacts would likely be identical to those presented for the proposed plant.
	▪ In addition to the maximum annual groundwater withdrawal of 10,000 afy, the Water Appropriation Permit authorizes a total beneficial use not to exceed 4,700 afy, averaged on a rolling 20-year period. Groundwater pumping from the Veblen Aquifer would not cause significant impacts to beneficial uses of the aquifer. ▪ The greatest drawdown of the Veblen Aquifer from groundwater pumping would occur on the south side of the expanded groundwater area. ▪ Groundwater modeling indicates that predicted drawdown of the Veblen Aquifer would not cause reductions in yield for wells near Milbank and areas to the south. ▪ Groundwater pumping would not impact the aquifers within the Lake Traverse Indian Reservation of the Sisseton-Wahpeton Oyate. ▪ Impacts to groundwater from construction and operation of the proposed plant, wells, and pipeline facilities would be less than significant.		
Floodplains	▪ Small isolated flood hazard zones at the proposed plant site would be eliminated due to construction activities. ▪ Construction and operation of the proposed plant facilities would not constrict or modify flow conveyances, or measurably add to flood flows. ▪ Impacts to floodplains from construction or operation of the proposed plant, groundwater wells, and pipelines would be less than significant.		▪ Under the No Build Alternative and Sub-alternative 1, impacts to floodplains and isolated flood hazard zones would not occur at the proposed plant site or the groundwater areas. ▪ Under Sub-alternative 2, impacts to floodplains would likely be identical to those presented for the proposed plant.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Surface Water Resources	▪ The existing plant and proposed Big Stone II plant combined annual consumptive water use would be about 13,000 af, which includes an annual average surface water appropriation of about 9,300 af from Big Stone Lake. ▪ Big Stone Lake's elevation would decrease by 0.15 feet on average. The worst effect would be a lake elevation reduction of 0.83 feet in two non-consecutive weeks. ▪ Minor episodic decreases in base flow to the Whetstone River would occur due to groundwater pumping. However, the pumping would not cause a substantial extension in the period of naturally occurring seasonal reduction of flow in surface water that results in insufficient quantities of water for downstream users. These impacts would be less than significant.	▪ The existing plant and proposed Big Stone II plant combined annual consumptive water use would be about 7,300 af, which includes an average annual surface water appropriation of about 5,236 af from Big Stone Lake. ▪ Big Stone Lake elevation would decrease by 0.14 feet on average. The worst effect would be a lake elevation reduction of 0.58 feet in two non-consecutive weeks. ▪ The impacts to surface water from operation of the groundwater wells would be less than those described for the proposed plant, since less water would be required.	▪ Under the No Build Alternative none of the surface water impacts associated with the proposed plant or groundwater areas would occur. The existing plant would continue to operate under current or renewed environmental permits as a zero wastewater discharge facility. Impacts to surface water resources would continue to occur, such as water withdrawals from Big Stone Lake for the existing plant and the ethanol plant. Additional surface water withdrawals associated with the proposed plant would not occur. ▪ Under Sub-alternative 2, surface water impacts would likely be identical to those presented for the proposed plant.
	▪ Short-term impacts to water quality could result from spills, leaks, or improper disposal of construction materials or sediment and other contaminants carried in downstream runoff. ▪ Short-term runoff and erosion impacts would occur during construction. ▪ The existing and proposed Big Stone II plants' combined surface water usage would reduce flows out of Big Stone Lake into the Minnesota River. These reductions would occur for short durations and would not significantly impact fisheries and water quality in the Minnesota River. ▪ Surface water quality impacts from acid rain or acid runoff caused by additional plant emissions from the proposed plant would not occur. ▪ Mercury would still be emitted from the existing and proposed plants and could cause mercury deposition. However, given the reduced mercury emissions owing to new emissions controls, it is expected that the combined plants would emit less mercury than the existing plant. ▪ Impacts to surface water resources from constructing or operating the proposed plant would be less than significant.		
Geology and Minerals	▪ No unique geologic features are located within the proposed plant or groundwater areas. Potential geologic hazards such as seismicity, landslides, and sinkhole development associated with karst formation are not present within the proposed plant or groundwater areas. Therefore, there would be no significant impacts to unique geological features or impacts associated with geologic hazards as a result of construction or operation of the proposed plant.		▪ Under the No-Build Alternative and Sub-alternative 1, none of the impacts to geological, mineral, paleontological, and soils resources would occur at the

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
	▪ Mineral resources would not be precluded from development. Therefore, there would be no significant impacts to mineral resources from constructing or operating the proposed plant.		proposed plant site or groundwater areas. Existing resources would continue to be lost as a result of other activities in the region where land uses would change from agricultural to urban/industrial. ▪ Under Sub-alternative 2, the impacts would likely be identical to those presented for the proposed plant.
Paleontological Resources	▪ Paleontological resources are either not exposed or do not exist beneath surficial glacial deposits at the proposed plant or groundwater areas. There would be no significant impacts to paleontological resources from the construction or operation of the proposed plant.		
Soils	▪ 150.1 acres of soils would be temporarily disturbed during construction activities. ▪ Proposed plant and groundwater system components would disturb a total of 189.4 acres of soils, of which 2.4 acres would be permanently removed from potential agricultural use. ▪ The long-term loss of soils would not be a significant impact, due to the stockpiling of topsoil and the extensive similar resources present in the vicinity of the proposed plant.		
Vegetation Resources	▪ Following implementation of standard and additional mitigation measures, no significant impacts to rare plants, native plant communities, or other sensitive features identified by a State or Federal resource agency are expected as a result of construction and operation activities. Residual impacts would include the long-term net loss of approximately 4.4 acres of forest and prairie type vegetation. There would be no losses of wetland/riparian areas. ▪ Although the existing and proposed plants would continue to emit mercury, the decrease in mercury emissions would result in reduced impacts to vegetation communities in the area. ▪ Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on vegetation. ▪ Mitigation measures would be implemented to prevent the introduction and spread of noxious weeds.		▪ Under the No Build Alternative and Sub-alternative 1, no additional disturbance or impacts would occur to vegetation, wildlife, or fisheries at the proposed plant site or groundwater areas. Ongoing emergency and routine maintenance activities would continue. Impacts to vegetation, wildlife, and fisheries, would continue to occur at current rates. ▪ Under Sub-alternative 2, impacts to vegetation, wildlife, and fisheries would likely be identical to those presented for the proposed plant.
Wildlife	▪ Direct impacts to wildlife would include limited direct mortality from construction activities, habitat loss, alteration or fragmentation, animal displacement, and disturbance of breeding, nesting, and foraging habitat for small game and birds. These impacts would not be sufficient to cause a species to become listed or proposed for listing as threatened or endangered. Since species compatible with the existing use would likely be compatible with the proposed use, there would not be a significant long-term impact to wildlife due to habitat alteration. ▪ Although the combined plants would continue to emit mercury, the decrease in mercury emissions (and a corresponding decrease in methylmercury) would result in reduced impacts to the wildlife of the area. ▪ Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on wildlife. ▪ Residual impacts would include the long-term net loss of approximately 6.8 acres of wildlife habitat.		
Fisheries	▪ There would not be a loss of a population of aquatic species that would result in the species being listed or proposed for listing as threatened or endangered. Water intake would not result in a significant impact on fish populations. ▪ The proposed plant would not cause an increase in the rate of accumulation of methylmercury concentrations in fish, although bioaccumulation of methylmercury would continue at a reduced rate. The reduced rate of bioaccumulation suggests that the lower mercury emissions from the existing and proposed plant could contribute to lower mercury concentrations in fish over time.		

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Fisheries	▪ Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on fisheries. ▪ No long-term impacts to fisheries are expected.		
Special Status Species	▪ Habitat for special status species has been identified on the proposed plant site; however, no individuals were present during surveys. ▪ Impacts to special status plants would include the long-term net loss of approximately 4.4 acres of suitable special status plant species habitat (prairie and forest). Following the implementation of standard and additional mitigation measures, no significant residual impacts to special status plant species are expected as a result of construction and operational activities. ▪ Sixteen terrestrial wildlife species (six special status species and 10 species of concern) may inhabit the proposed plant site and groundwater areas. Direct impacts from constructing and operating the proposed plant would include the loss or alteration of breeding and foraging habitats and increased habitat fragmentation. Mortality could also occur to less mobile or burrowing species. Abandonment of a nest site and the loss of eggs and/or young may also occur. ▪ One Federal special status bird species, the bald eagle, is known to occur in the vicinity of the proposed plant site and groundwater areas. Bald eagles remain a federally-protected species under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. There would be no direct impacts to bald eagle foraging habitat, since there would be no loss of wetland/riparian areas. Through implementation of SMM Bio-3, impacts to bald eagles in the proposed Project vicinity would not be significant. Western's Biological Assessment included a Bald Eagle Mercury Exposure Assessment that assessed the potential impact of mercury exposure on eagles. Based on the assessment, Western determined that the proposed Project may affect, but is not likely to adversely affect, the bald eagle. ▪ No federally-listed aquatic species or designated critical habitat occur in water bodies within or downstream of the proposed plant site. ▪ Special status species that use the Whetstone River would not be adversely affected by minor episodic flow reductions caused by groundwater pumping. ▪ None of the anticipated impacts to special status species would result in an unpermitted violation of statutes or regulations pertaining to special status fish or mussel species. No impacts to special status fish and mussel species would occur. ▪ Western completed Endangered Species Act (ESA) Section 7 informal consultation with the USFWS for the proposed plant site and groundwater areas. The USFWS concurred with Western's determination of no affect on listed species. Western will complete its obligations under the ESA for the transmission components for the proposed Project prior to authorizing interconnections with its system. ▪ Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on special status species.		▪ Under the No Build Alternative and Sub-alternative 1, no impacts to special status species related to the proposed plant or groundwater areas would occur. ▪ Under Sub-alternative 2, impacts to special status species would likely be identical to those presented for the proposed plant.
Wetlands	▪ Wetlands would not be lost or permanently de-watered by groundwater pumping. There are no anticipated losses of wetlands, no loss of riparian areas, and no degradation or loss of any Federal- or State-protected wetlands as defined by Section 404 of the CWA or other applicable regulations. ▪ By implementing the SMMs, no significant impacts to wetlands or riparian areas are expected as a result of construction and operation activities from the proposed plant. Short-term impacts could occur associated with groundwater activities; however, these impacts would be mitigated under a CWA Section 404 permit. Impacts to non-jurisdictional wetlands would be mitigated in accordance with applicable State or Federal requirements.		▪ Under the No Build Alternative and Sub-alternative 1, no additional disturbance to wetland/riparian areas would occur at the proposed plant site or groundwater areas. Ongoing emergency and routine maintenance activities would continue.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Wetlands	▪ Although the combined plants would continue to emit mercury, the decrease in mercury emissions would result in reduced impacts to wetland/riparian areas in the vicinity.		Impacts to wetland/riparian areas would continue to occur at current rates. ▪ Under Sub-alternative 2, impacts to wetland/riparian areas would likely be identical to those presented for the proposed plant.
Cultural Resources	▪ It is anticipated that by following the procedures outlined in Section 106 of the NHPA and the PA, adverse impacts to archaeological and historic resources eligible for inclusion to the NRHP would be avoided or mitigated. Unavoidable impacts to NRHP-eligible sites would be mitigated through implementation of a treatment plan in accordance with the PA. ▪ Impacts to NRHP-eligible sites would not be significant with implementation of the PA and SMMs. ▪ The proposed plant and groundwater areas are not located on any Native American lands. Any cultural and historic resources identified within the proposed plant and groundwater areas would receive the appropriate level of protection or recovery by implementing mitigation measures, treatment plans, or compliance actions (e.g., protection of burial sites) in accordance with the PA. Impacts to these resources would not be significant with implementation of the PA.		▪ Under the No Build Alternative and Sub-alternative 1, no cultural or historical resources would be affected at the proposed plant site or the groundwater areas. ▪ Under Sub-alternative 2, the cultural resource impacts would likely be identical to those presented for the proposed plant.
Land Use Resources	▪ The proposed plant would require various permits or land use approvals for construction and operation. With permits and land use approvals, there would be no conflicts with land use plans, zoning, or with special use areas. ▪ Increased growth and temporary increase in workforce would not overburden existing recreation resources nor would air pollutant emissions reduce recreational opportunities. No significant impacts from the construction and operation of the proposed plant are anticipated in terms of increased demand for recreation. ▪ Based on the modeled lake levels with proposed Big Stone II water withdrawals, essentially no change in the relative frequency of attaining the target recreational season pool elevation is expected for Big Stone Lake. ▪ The currently observed flows in the Whetstone River over the course of the recreation season (late spring-early fall) would not be noticeably altered by the proposed groundwater pumping. ▪ Total new land required for construction of the proposed plant would be 189.4 acres, of which 150.1 acres is a short-term impact due to construction. ▪ Total long-term impacts to land use from the proposed power plant construction and operation would be 39.3 acres.		▪ Under the No-Build Alternative and Sub-alternative 1, none of the land use impacts (including recreation and agricultural practices) associated with the proposed plant and groundwater areas would occur. In the short term, land uses would be likely to remain as they currently are in the absence of the proposed plant. In the long term, certain land uses unrelated to the existing plant would change with time (e.g., from agricultural to urban or commercial/industrial). ▪ Under Sub-alternative 2, the land use impacts would likely be identical to those presented for the proposed plant.
Agricultural Practices	▪ The permanent disturbance of 63.9 acres of prime farmland for the proposed plant site (61.8 acres) and groundwater areas (2.1 acres) would be a long-term and residual impact. This amount is only a small portion of the prime farmland in Grant County, and there would be no adverse affect on agriculture in the region. Therefore, it would not be a significant impact to prime farmland in the region. ▪ No pivot irrigation facilities would be affected by constructing the proposed plant.		
Public Facilities	▪ No public facilities would be affected by construction of the proposed plant or the installation of wells, pipelines or electrical distribution lines.		

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Infrastructure, Public Health and Safety, and Waste Management	▪ Construction of the proposed plant would occur over four years and would require approximately 1,400 workers at the peak of construction, causing a short-term increase in daily traffic counts. ▪ The existing local roads and rail system would be able to handle the increase in road traffic and train numbers during operation of the existing plant and the proposed Big Stone II plant. Damage to roads due to construction activities would be repaired. ▪ The existing and proposed plants would still have emissions, but not at levels expected to exceed thresholds established by the State and USEPA for protection of human health and the environment. ▪ The proposed plant would not cause an increase in the rate of accumulation of methylmercury concentrations in fish, although bioaccumulation of methylmercury would continue at a reduced rate. The reduced rate of bioaccumulation suggests that the lower mercury emissions from the existing and proposed plant could contribute to lower mercury concentrations in fish over time. ▪ Numerous models produce widely divergent results, and there is insufficient information to be able to identify the specific impacts of the proposed plant's CO_2 emissions on human health and the environment. ▪ Construction and operation of the proposed plant would not cause a significant impact to public health and safety. Implementing a facility health and safety plan would ensure there would be no interference with local emergency response capabilities or resources and prevent serious injuries to workers. Controlling access to the proposed plant facilities and construction sites would prevent injury to the public and local land users. ▪ Modification of the existing plant's emergency response plan and site security plan minimizes the impacts of any reasonably foreseeable accidents, natural disasters, or intentionally destructive acts. ▪ Since no sensitive receptors or land use are located near the proposed plant site, there would be no impacts from electric and magnetic fields from the proposed plant. Because the plant is isolated, there would be no substantial interference or disruption of any emergency or health and safety communication system. ▪ By implementing standard and additional mitigation measures, impacts from hazardous materials and waste management during construction and operation of the proposed plant would not be significant. Disposal of wastes would be conducted following State and Federal regulations and would not impact public health. Procedures to control spills or releases of hazardous materials or regulated substances would be established in the Co-owners' health and safety program, and the program would not interfere with any locally adopted emergency or response plan. Impacts from hazardous materials and waste management activities for constructing and operating the proposed Big Stone II plant would be less than significant.		▪ Under the No Build Alternative and Sub-alternative 1, none of the impacts associated with the proposed plant and groundwater areas would be realized. Traffic would continue to change according to population trends. Emission controls for the existing plant included as part of the proposed plant would not be installed, and certain emissions (such as SO_2, HAPs, and mercury) that could affect public health would not be reduced. The existing plant would continue to use hazardous materials and generate solid waste. ▪ Under Sub-alternative 2, the impacts to infrastructure, public health and safety, and waste management would likely be identical to those presented for the proposed plant.
Visual Resources	▪ Construction activities would result in temporary, short-term impacts from lighting. ▪ Constructing and operating the proposed plant would result in additive long-term low to moderate visual impacts due to the addition of a stack, a water pretreatment building, and power plant building. ▪ No significant long-term additive impacts would result from the proposed well installations, pipelines, pumphouse buildings, fences, and electrical distribution lines. ▪ Additive sources of light or glare are expected as a result of operation of the proposed plant structures. ▪ Residual visual impacts would be less than significant due to the influence of the existing Big Stone plant.		▪ The No-Build Alternative and Sub-alternative 1would result in no additional visual impacts to existing visual resources at the proposed plant site and groundwater areas. ▪ Under Sub-alternative 2, the visual resources impacts would likely be identical to those presented for the proposed plant.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Noise	▪ Noise levels would increase during construction of the proposed plant, but would be considered short-term impacts. ▪ The addition of the proposed plant would result in a slightly noticeable increase over existing nighttime noise levels that are generated from the existing plant. There would be no incremental noise increases above five decibels on the A-weighted scale (dBA). Minnesota residential noise standards may be exceeded at one residence due to increased construction traffic. By implementing the additional mitigation measure for construction noise impacts to the nearest residence, this impact would be less than significant.		▪ Under the No Build Alternative and Sub-alternative 1, short-term noise that would be associated with the proposed plant and groundwater areas,-would not occur. Noise levels and related activities associated with the existing plant, such as rail operations and the existing substations would continue at the current frequency into the foreseeable future. ▪ Under Sub-alternative 2, noise impacts would likely be identical to those presented for the proposed plant.
Social and Economic Values, and Environmental Justice	▪ The proposed Big Stone II plant would permanently displace three occupied residences on or near the proposed plant site. OTP has purchased these residences as voluntary/sale transactions. ▪ The short-term impacts on housing and public services would be significant. The direct and indirect economic benefits from construction-related expenditures to the surrounding four-county region and the State of South Dakota would be a significant beneficial impact. The creation of temporary and permanent jobs in the community would also be a beneficial impact. ▪ While approximately 2.4 acres of farmland would be used for the groundwater system, this would not create a long-term loss of economic viability of a farm or business. ▪ Based on the social and economic analysis, no significant short-term or long-term negative impacts are anticipated from uncompensated losses to existing businesses or residences, loss of economic viability of a farm or other business, permanent and irreversible loss of work for a major sector of the community, or the physical division of an established community. ▪ The existing and proposed plants would continue to emit mercury (although at a decreased rate); however, since the mercury emissions from the operation of the combined plants would be less than current mercury emissions from the existing plant alone, the proposed plant-would not produce any incrementally greater adverse economic effects on property values, lakes, or health. ▪ Since the rate of mercury deposition due to emissions from the combined existing and proposed plants would decrease (compared to the existing plant alone), declines in mercury emission and deposition suggests that the lower bioaccumulation rates of methylmercury in fish could contribute to lower methylmercury concentrations in fish over time. Therefore, it is reasonable to assume that the mercury impacts on minority and low income populations (who consume quantities of fish greater than advised in the consumption advisories) would also decrease over time. ▪ The poverty rate for the census tracts affected by the proposed plant site is 10.4 percent, while minorities comprise 1.2 percent of the population in the census block groups in which the proposed plant site is located. This poverty rate is less than the State of South Dakota's poverty rate of 13.2 percent and comparable to Grant County's poverty rate of 9.9 percent. The minority population for the affected area is lower than the State of South Dakota (11.3 percent) and comparable to Grant County (1.4 percent). The proposed plant		▪ Under the No-Build Alternative and Sub-alternative 1, none of the impacts associated with the proposed plant and groundwater areas would be realized. Growth in population and housing would likely continue along present trends. The increase in jobs and revenue to the local economy would not occur. ▪ Under Sub-alternative 2, social, economic, and environmental justice would likely be identical to those presented for the proposed plant.

Table ES-4. Summary of Impacts

Resource	Proposed Project Alternative 2 – Wet Cooling with Groundwater Supply Back-Up	Alternative 3 – Wet/Dry Cooling with Groundwater Supply Back-Up	No Action Alternative
Social and Economic Values, and Environmental Justice	would not have a disproportionate negative effect on minority or low-income populations in the area. No impacts to environmental justice communities would occur as a result of constructing the proposed plant or groundwater areas.		

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	Corridors A and C1	Corridors B and C	Corridors B and C1	Corridors B1 and C	Corridors B1 and C1
Air Quality	▪ Construction of the transmission lines, modification of substations, relocation of the Canby Substation, and upgrades to the Hankinson line would result in short-term impacts (diesel fumes from construction vehicles and dust from corridor activities and vehicle operation). Impacts to air quality would not occur after initial construction activities. Short- and long-term impacts to air quality from constructing transmission lines within the proposed corridors, modifying substations, relocating the Canby Substation, and upgrading the Hankinson line would be less than significant. ▪ Western evaluates equipment annually to locate sulfur hexafluoride (SF_6) leaks, and either immediately repairs them, or schedules repairs or replacement. An annual SF_6 emissions reduction report is prepared and reported to the USEPA. ▪ OTP participates in USEPA's SF_6 Emission Reduction Partnership for Electric Power Systems and also has plans in place for handling SF_6, with a goal of maintaining annual losses at less than two percent of system capacity. A written policy specifies procedures for inventory control, monitoring and reporting of annual usage, and methods for handling of SF_6 gas while servicing substation equipment.					
Groundwater Resources	▪ Construction activities having a potential to impact groundwater would be limited to spills of fuel and oil. Impacts within the proposed transmission corridors, at the substations, the site of the relocated Canby Substation, and along the Hankinson line would be avoided or minimized by complying with the NPDES storm water permit for construction activities and the spill reporting and cleanup programs administered by South Dakota and Minnesota. ▪ Construction and operation of the transmission lines, substation modifications and other system improvements would not degrade groundwater quality or violate State and Federal standards. Impacts to groundwater resources within the corridors and substations would be less than significant.					
Floodplains	▪ Given the width of floodplains within the proposed corridors, some impacts due to construction activities and installation of transmission towers may occur. With the exception of the existing Canby Substation, the substations do not occur within FEMA-designated 100-year special flood hazard zones. The Canby Substation would be relocated approximately one mile to the northeast, out of the floodplain of Canby Creek. ▪ Upon completion of the engineering survey to determine which structures require modification or replacement along the Hankinson line, site specific environmental surveys would be conducted in accordance with the transmission-related standard mitigation measures SMMs. ▪ The proposed construction activities would not modify the floodplains or adversely affect the capacity of the floodplains, constrict or modify flow conveyances, or measurably add to flood flows. Impacts to floodplains would be less than significant.					

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Surface Water Resources	▪ Impacts within the proposed transmission corridors, at the substations, the site of the relocated Canby Substation, and along the Hankinson line would be avoided or minimized by complying with the NPDES storm water permit for construction activities and the spill reporting and cleanup programs administered by South Dakota and Minnesota. ▪ All jurisdictional stream and wetland crossings would be constructed according to CWA Section 404 permit requirements and the Section 401 Water Quality Certification requirements, which would include mitigation requirements to prevent erosion, sedimentation, and disturbances of stream banks and other impacts. ▪ By implementing the SMMs, construction activities would not result in a violation of Federal and/or State water quality standards or violate Section 404 of the CWA or other applicable surface water regulation. Impacts to surface water resources would be less than significant.					
Geology and Minerals	▪ No unique geologic features are located within any of the corridors, the substations, the proposed area for the relocation of the Canby Substation, and along the Hankinson line. Potential geologic hazards, such as seismicity, landslides, and sinkhole development associated with karst formation, are not present within nor are they identified in the vicinity of any of the corridors. Therefore, there would be no impacts to unique geological features or impacts associated with geologic hazards as a result of constructing or operating a transmission line within any of the proposed corridors, from modifying substations, relocating the Canby Substation, or upgrading the Hankinson line. ▪ Mineral resources would not be precluded from development. There would be no significant impacts to mineral resources from constructing or operating a transmission line within any of the proposed corridors, from modifying substations, relocating the Canby Substation or upgrading the Hankinson line.					
Paleontological Resources	▪ There is low potential for the presence of scientifically important fossils within the proposed corridors, substations, the proposed area for the relocation of the Canby Substation, and along the Hankinson line. There would be no significant impacts to paleontological resources from constructing or operating transmission line within any of the proposed corridors or from modifying substations.					
Soils	▪ Transmission line construction within any of the proposed corridors, modifications to substations, relocating the Canby Substation, and upgrading the Hankinson line would result in temporary impacts as well as permanent removal of soils. The long-term impact to soils for each transmission alternative is shown below. ▪ Small areas of soils may be permanently removed during modifications of substations if the substations require expansion, at the proposed area for the relocation of the Canby Substation (about 8.3 acres), and at affected Hankinson line structures. ▪ By implementing SMMs and additional mitigation measure S-1, impacts to soils would be less than significant.					
	▪ Long-term impacts to 71 acres of soils.	▪ Long-term impacts to 58 acres of soils.	▪ Long-term impacts to 80 acres of soils.	▪ Long-term impacts to 68 acres of soils.	▪ Long-term impacts to 79 acres of soils.	▪ Long-term impacts to 66 acres of soils.
Vegetation Resources	▪ Short-term vegetation disturbances (totals shown below) associated with construction activities of the proposed corridors would occur during construction of structures and pads, access roads, turnarounds, pulling/tensioning sites, and staging areas. The majority of short-term impacts would be in agricultural areas, which would be returned to production after construction activities are completed. ▪ Long-term vegetation impacts (totals shown below) associated with transmission line construction activities would occur exclusively within the wetland/riparian, shrubland, and upland forested communities due to their extended recovery timeframes. All other vegetation types would return to pre-disturbance conditions following successful reclamation within two years after short-term disturbances depending on the sensitivity of the plant communities, the timing and extent of the disturbance, and the geographic and topographic location. ▪ Substation modifications would result in long-term removal of agricultural cropland if the substations require expansion. The relocated Canby Substation would be located on disturbed agricultural land (approximately 8.3 acres).					

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Vegetation Resources	▪ Regardless of the locations of the Hankinson line upgrades, the Co-owners would implement vegetation-related protection mitigation measures. With these measures, the improvements to the existing Hankinson Line would not cause any significant impacts to vegetation. ▪ There would be no loss of any plant population that would result in a species being listed or proposed for listing as threatened or endangered.					
	▪ Long-term loss of 71 acres of vegetation, including approximately 32 acres of wetlands, 15 acres of forest, and 3 acres of shrubland habitat. ▪ Short-term loss of 793 acres of vegetation.	▪ Long-term loss of 58 acres of vegetation, including approximately 23 acres of wetlands, 11 acres of forest, and 3 acres of shrubland habitat. ▪ Short-term loss of 818 acres of vegetation.	▪ Long-term loss of 80 acres of vegetation, including approximately 30 acres of wetlands, 18 acres of forest, and 5 acres of shrubland habitat. ▪ Short-term loss of 1,034 acres of vegetation.	▪ Long-term loss of 68 acres of vegetation, including approximately 20 acres of wetlands, 14 acres of forest, and 6 acres of shrubland habitat. ▪ Short-term loss of 1,059 acres of vegetation.	▪ Long-term loss of 79 acres of vegetation, including approximately 28 acres of wetlands, 18 acres of forest, and 5 acres of shrubland habitat. ▪ Short-term loss of 1,042 acres of vegetation.	▪ Long-term loss of 66 acres of vegetation, including approximately 19 acres of wetlands, 14 acres of forest, and 6 acres of shrubland habitat. ▪ Short-term loss of 1,067 acres of vegetation.
Wildlife	▪ Direct short-term impacts to wildlife would occur during construction due to elevated noise and increased human presence. Short-term and long-term impacts would occur from the loss of vegetation from construction activities. ▪ Most of the wildlife habitat that would be impacted is agricultural land. Between three to seven percent of the corridors' wetlands, forests, and shrublands would be impacted by constructing and operating the proposed transmission facilities. ▪ Nominal declines in wildlife populations, losses of economic or recreational opportunities, habitat fragmentation, and direct mortality would be expected. ▪ Long-term impacts to bird species would result from the increased potential for collision of migrating and foraging birds with overhead wires. An Avian Protection Plan would be developed to minimize impacts to nesting birds, as well as to minimize the electrocution and collision of migratory and resident bird species. ▪ There would be no loss of individuals that would result in the species being listed or proposed for listing as threatened or endangered. ▪ There would be no violation of any statute or regulation pertaining to wildlife. No constituents would be introduced into any waterbody that would cause an adverse effect on wildlife. ▪ By implementing standard and additional mitigation measures, there would be no significant impact to wildlife species.					
Fisheries	▪ There would be no loss of individuals of an aquatic species that would result in the species being listed or proposed for listing as threatened or endangered. ▪ By implementing mitigation measures and complying with permit requirements, there would be no significant impacts to fisheries from construction activities.					
Special Status Species	▪ A total of 27 special status plant species (nine special status species and 18 species of special concern) were identified as occurring within the proposed corridors. No special status plant species were identified as occurring within the proposed substations modification areas or the site of the relocated Canby Substation. ▪ A total of 16 terrestrial wildlife special status species (six special status species and 10 species of concern) may inhabit the proposed corridors. A total of four terrestrial wildlife species may occur within the substation areas.					

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Special Status Species	▪ Construction work related to modifications at Granite Falls Substation could result in surface disturbance in the Minnesota River drainage, which supports special status fish and mussel species. Mitigation measures would ensure that no long-term loss, habitat alteration, or water quality changes would affect special status fish and mussel species. ▪ Upon completion of the engineering survey to determine which structures require modification or replacement along the Hankinson line, a survey for special status species would be conducted in accordance with the transmission-related SMMs. ▪ Impacts to special status plant and wildlife species would be similar to those identified for the proposed plant. In addition, the presence of a new transmission line may increase the potential for collision by special status birds. The collision potential would be minimized through design and implementation of mitigation measures. ▪ Western's determinations regarding effects to federally-listed species cannot be made until the selection of the transmission line routings and completion of a biological assessment. Western would complete its obligation under the ESA prior to authorizing interconnections with its system.					
Wetland/Riparian Areas	▪ The acreage of wetlands that may be impacted within each transmission alternative varies from approximately 18.8 to 32.3 acres. Impacts were calculated based on the percentage of wetland habitat within each corridor in proportion to the total land cover types. Actual impacts would likely be less than the above range, since in accordance with SMM Bio-3, all wetland and riparian areas would be avoided to the extent practical. ▪ No wetland/riparian areas were identified as occurring within the proposed substation modification sites. No wetland areas are anticipated within the area proposed for relocation of the Canby Substation. ▪ Regardless of the locations of the Hankinson line upgrades, mitigation measures would be implemented to protect wetland/riparian areas. ▪ A significant impact would not occur as a result of any loss or degradation of any jurisdictional wetland, since these impacts would be mitigated under a CWA Section 404 permit. Impacts would include the initial loss of wetland/riparian areas acreages, but these losses would be offset per Section 404 permit requirements. With implementation of the SMMs, impacts to wetland/riparian areas would be minimal.					
Archaeological Resources Historical Resources	▪ It is anticipated that by following the procedures outlined in Section 106 of the NHPA and the PA, adverse impacts to archaeological and historic resources eligible for inclusion to the NRHP would be avoided or mitigated. Unavoidable impacts to NRHP-eligible sites would be mitigated by implementing a treatment plan in accordance with the proposed PA. ▪ Impacts to NRHP-eligible sites would not be significant by implementing the proposed PA and SMMs. ▪ Any TCP identified within the proposed Project area would receive the appropriate level of protection or recovery by implementing mitigation measures, treatment plans, or compliance actions (e.g., protecting burial sites) under the proposed PA. Impacts to these resources would not be significant by implementing the proposed PA. ▪ The existing Hankinson line traverses across approximately 25 miles of the Lake Traverse Indian Reservation along a north-south corridor. The required improvements to the existing Hankinson line would cause a need for structure modifications, the extent of which are not yet known. For improvement activities, all provisions for the PA described for the transmission corridors would apply.					

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Land Use Resources	▪ New land required for constructing the transmission lines (i.e., land that is not already within existing ROWs) would be acquired by negotiating easements with private landowners and/or with local, State, or Federal agencies. Since most of the land within the corridors is agricultural, the majority of land would be owned by private landowners. Long-term impacts are shown below for each transmission alternative. ▪ Substation expansions would require a minimal amount of land purchase. The Co-owners have acquired 57 acres of land for the relocation of the Canby Substation. ▪ No additional lands would be acquired for the upgrades to the existing Hankinson line. ▪ The proposed corridors and substations would require various permits, land use approvals, or zoning changes for construction and operation. With approval of zoning changes, there would be no conflicts with land use plans, zoning, or with special use areas. ▪ Short-term impacts to land use due to construction activities would occur from temporary interruption of farming activities due to the presence of heavy equipment and line stringing activities. Short-term impacts would not be significant, and the loss of the use of agricultural land during construction activities would be compensated. Short-term impacts are shown below for each transmission alternative. ▪ The impacts to the demands for recreation from constructing and operating the proposed transmission lines and modifying substations would be less than significant.					
	▪ Short-term impacts to 793 acres. Long-term impact to 71 acres.	▪ Short-term impacts to 818 acres. Long-term impact to 58 acres.	▪ Short-term impacts to 1,034 acres. Long-term impact to 80 acres.	▪ Short-term impacts to 1,059 acres. Long-term impact to 68 acres.	▪ Short-term impacts to 1,042 acres. Long-term impact to 79 acres.	▪ Short-term impacts to 1,067 acres. Long-term impact to 66 acres.
Agricultural Practices	▪ Long-term impacts to prime and unique farmland include the loss of agricultural land for substation expansions, the relocation of the Canby Substation, and new transmission line structures. The loss of the use of agricultural land due to structure placement would be compensated. Long-term impacts are shown below for each transmission alternative. ▪ The permanent conversion of prime farmland to the proposed Project would be small in comparison to the amount of prime farmland in each corridor; therefore, there would be no adverse affect on agriculture in the region.					
	▪ Long-term impact to 21 acres.	▪ Long-term impact to 21 acres.	▪ Long-term impact to 27 acres.	▪ Long-term impact to 28 acres.	▪ Long-term impact to 28 acres.	▪ Long-term impact to 28 acres.
Center Pivot Irrigation Systems	Center-pivot irrigation areas occur within the transmission line corridors (totals shown below). Temporary impacts could occur to non-fallow fields during construction that could remove some crops from irrigation. Potential interference with center-pivot irrigation systems would be a primary consideration when routing the transmission lines through irrigated areas. Landowners would be compensated for any disturbance to center-pivot irrigation agricultural areas.					
	1	10	19	28	26	35

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Public Facilities	▪ Public facilities such as schools, day care facilities, hospitals, churches, and cemeteries exist within the corridors (totals shown below). Visual and health impacts could occur at these public facilities if the transmission line were to be routed close to them. Visual impacts to public facilities would occur from the presence of transmission structures. ▪ The substations included in the proposed Project are not located near any public facilities. ▪ No public facilities, such as day care centers, hospitals or airports, are located within the area that would be affected by the Hankinson line upgrade.					
	41	35	44	38	41	35
Infrastructure, Public Health and Safety, and Waste Management	▪ After implementing the standard and additional mitigation measures, construction of the proposed transmission lines, substation modifications, relocating the Canby Substation, and upgrades to the Hankinson line would involve short-term localized traffic delays. Increases in traffic due to construction and operation would not exceed the service level of any roadway within the corridors. Impacts resulting from constructing or operating the proposed transmission lines, modifying substations, relocating the Canby Substation, and upgrading the Hankinson line would be less than significant for infrastructure. ▪ Implementing a health and safety plan would assure there would be no interference with local emergency response capabilities or resources and prevent serious injuries to workers. Implementing additional mitigation measures would control access to the proposed construction sites, and would prevent injury to the public and local land users. The transmission lines and substations would be designed to minimize electric and magnetic fields, corona effects, and interference with emergency communication and electronic health and safety devices. The transmission lines would be designed so as not to pose a health risk at sensitive receptors. Construction activities would not significantly change traffic patterns, so there would not be a hazardous situation for motorists or pedestrians. Construction and operation of the proposed transmission lines, substation modifications, the relocated Canby Substation, and upgraded Hankinson line would not cause a significant impact to public health and safety by implementing standard and additional mitigation measures. Residual impacts would be less than significant. ▪ By implementing SMMs, there would be no improper disposal of wastes, spills, and releases of hazardous material, hazardous substances, and oil would not be in excess of reportable quantities. There would be no impacts to public health from chemical management from constructing and operating transmission lines or substations for the proposed Project. The health and safety plan would ensure there would be no impacts to any adopted emergency hazardous materials spill response plans or emergency evacuation plans.					
Visual Resources	▪ The proposed corridors are located primarily on visual resource management (VRM) Class III lands, where proposed Project facilities (e.g., transmission line structures and conductor, ROW, and access roads) and activities may be visible but not dominate the landscape. Upgrading/rebuilding existing transmission lines or constructing new transmission lines would result in long-term low to moderate additive visual impacts, depending on the characteristics of each corridor. Transmission upgrades would have similar form, line, color, and texture as the existing lines. Additive impacts would occur where transmission lines are constructed parallel to existing lines. Generally, visual impacts may be higher where the new line does not parallel or is built away from the visual range of an existing line. Also, higher impacts may occur in areas where major highway crossings occur near water. Visual impacts to three potential substation expansions and the relocated Canby Substation would result in low additive long-term impacts. Implementation of standard and additional mitigation measures would reduce visibility of the proposed transmission line from sensitive viewpoints and visual impacts associated with installing the new line (e.g., structures, conductors, access roads). The Co-owners have committed to reducing visual impacts to sensitive travel and recreation corridors such as highway and trail crossings by placing the structures at the maximum feasible distance from the crossings, within limits of structure design. The substations would use similar form, line, texture, and color elements as the existing structures. Visual impacts along the existing Hankinson line after the upgrade would not be substantially different than existing conditions. ▪ Visual impacts from constructing and operating transmission lines, the substation modifications, relocating the Canby Substation, and upgrading the Hankinson line would be less than significant.					

Resource	Transmission Alternative A Big Stone – Morris Substation and Big Stone – Granite Falls Substation		Transmission Alternative B Big Stone – Willmar Substation and Big Stone – Granite Falls Substation			
	Corridors A and C	**Corridors A and C1**	**Corridors B and C**	**Corridors B and C1**	**Corridors B1 and C**	**Corridors B1 and C1**
Noise	▪ Noise levels would increase during the construction of the transmission lines, the substation modifications, the relocated Canby Substation, and the upgrades to the Hankinson line, but are considered to be short-term impacts. ▪ Operational noise occurs from electrical current moving through transmission lines and conductors. This noise is only noticeable when standing directly under the transmission line and does not exceed five dBA; therefore, is not considered a significant long-term impact. ▪ The only incremental noise increases occur during opening and closing breakers, which would be infrequent instantaneous sounds. Constructing and operating the proposed substation modifications, the relocated Canby Substation, and the upgraded Hankinson line would result in less than significant noise impacts.					
Social and Economic Values, and Environmental Justice	▪ The construction of transmission lines and substation modifications would create approximately 40 jobs. Construction personnel would primarily use temporary housing at local motels in the area, although some personnel may be local. Activities associated with the upgrades to the existing Hankinson line would require one to two construction crews, each consisting of about two workers. The number of new employees would have a less than significant impact on the local population or housing in the proposed Project area. ▪ The poverty rates and minority population percentages for all proposed corridors are less than or comparable to rates for those counties and States through which they pass. There is not a disproportionate amount of minority or low-income populations in the proposed corridors. Constructing and operating the transmission lines within the proposed corridors, the substations modifications, relocating the Canby Substation, and upgrading the Hankinson line would not have a disproportionate negative effect on minority or low-income populations in the area.					
No Action Alternative (Addressed in Final EIS under each resource)	▪ Under the No-Build Alternative of the No Action Alternative, the Co-owners would not proceed with the proposed Big Stone II plant, and therefore would not seek alternate transmission configurations. Changes to the Canby Substation (i.e., relocation out of the floodplain) and the upgrades to the Hankinson Line that are associated with the proposed Project would not occur. Existing resources within the proposed transmission corridors (such as agricultural land, prime farmland, wildlife, vegetation, wetlands, surface water, and visual) would not be impacted and current environmental conditions and trends would continue. Existing EMF levels and health and safety considerations from transmission lines and substations in the area would continue. Growth in population and housing would likely continue along present trends. Additionally, the Co-owners would not fulfill their purpose and need for the proposed Project, and opportunities to support regional utility needs would not be realized. ▪ Under Sub-alternative 1 of the No Action Alternative, the Co-owners would not proceed with the proposed Project. The beneficial and adverse impacts associated with constructing and operating the proposed transmission lines would not be realized and existing conditions would continue during the foreseeable future. Courses of action that might be taken by the Co-owners to develop or secure alternative baseload generation are uncertain and describing the potential impacts of this sub-alternative are speculative; therefore, the Final EIS does not attempt to describe any potential impacts associated with Sub-alternative 1. ▪ Under Sub-alternative 2 of the No Action Alternative, the Co-owners would not obtain transmission interconnections on the Federal transmission system. The Co-owners would seek an alternative transmission configuration that would provide firm transmission service on the MISO system or purchase non-firm transmission rights from MISO over the MISO system. The environmental consequences associated with obtaining transmission capacity would likely be similar to those summarized above for the transmission component of the proposed Project, though those impacts may occur at different locations. Because the Co-owners have not explored the possibility of proceeding with the construction of the proposed plant without the interconnection to Western's transmission system, the locations of those potential transmission impacts are unknown. ▪ Each sub-alternative would include rebuilding the existing Ortonville-Johnson Junction-Morris 115-kV transmission line to the Morris Substation to meet existing and future power delivery needs. Rebuilding the existing transmission line would occur at a later date and would have similar impacts to those summarized above for the proposed Project's transmission corridors. ▪ The Hankinson transmission line would not be upgraded under any of the sub-alternatives. Emergency and routine maintenance and current environmental conditions and trends would continue.					

Short-term effects from the proposed Project would primarily be related to construction activities. For the most part, these would be localized effects. No significant long-term adverse effects are expected from operating the proposed Project. In addition to a summary of impacts in Table ES-4, the following summarizes the impacts to several resource areas:

Air Quality

Results of the air quality analysis for the proposed Project show that constructing and operating the proposed Big Stone II plant, transmission lines, and substation modifications would not cause or contribute to a significant degradation of ambient air quality. There would be no exceedances of National Ambient Air Quality Standards or Prevention of Significant Deterioration (PSD) increment thresholds; no significant degradation of visibility in Class I areas; and with the exception of incomplete or unavailable information about mercury[3], there would be no significant impacts from the emissions of HAPs. The proposed Project would be designed and permitted to operate in compliance with State implementation plan requirements. The proposed plant would include a new WFGD system to control SO_2 emissions for both the proposed Big Stone II plant and the existing Big Stone plant. A fabric filter would control particulates, and NO_X emission control would be achieved through boiler design and SCR treatment. With the implementation of the air pollution controls (further described in Section 4.1.2.1), satisfaction of the conditions of the Settlement Agreement[4] (described in Section 1.5.2), and compliance with the conditions of the air permit for the proposed plant, SO_2 would decrease and NO_X emissions would not increase, when compared to emissions from the existing Big Stone plant. Emissions of organic HAPs would be reduced through the application of BACT for VOCs. Particulate emissions would increase, but the emissions would not exceed thresholds established by the State of South Dakota and the U.S. Environmental Protection Agency (USEPA) for protection of human health and the environment.

Mercury emissions from the proposed plant would be controlled by the WFGD scrubber and fabric filter while mercury emissions from the existing plant would be controlled by its fabric filter and by ducting the exhaust to the new WFGD scrubber. The Co-owners have committed to install control equipment that is most likely to result in removal of at least 90 percent of the mercury emitted from both the existing plant and the proposed Big Stone II plant. This would result in mercury emissions of approximately 81.5 lb per year from the combined plants, which is lower than the 189.6 lb of mercury emitted from the existing plant alone in 2004. Ongoing accumulation of mercury is expected to continue from various sources, including regional and global airborne emissions and past deposition on croplands and waterbodies. Mercury effects on the environment from all sources are expected to remain a long-term impact issue.[5]

---

[3] With respect to mercury and CO_2 emissions, Western has identified the areas where information does not yet exist and relies on available information where it does exist. In accordance with 40 CFR 1502.22, Western: (1) recognizes that information regarding impacts from mercury and CO_2 is incomplete or unavailable, (2) recognizes that with the absence of this relevant information, it is unable to use available information to determine whether there are significant adverse impacts on the human environment, (3) has provided the relevant information regarding mercury and CO_2 within the Final EIS, and (4) has discussed and evaluated the impacts of mercury and CO_2 based upon theoretical approaches and generally accepted methods.

[4] The key elements of the Settlement Agreement describe how the Co-owners would implement procedures or emissions controls in the mitigation of pollutants emitted by the proposed plant, and other certain conditions. Conditions of the Settlement Agreement are described further in Section 1.5.2 of the Final EIS. The terms of the Settlement Agreement were included as a condition to the Certificate of Need, issued March 17, 2009. A copy of the agreement is provided in Appendix K, Volume III.

[5] Western does not have access to mercury emission data that can be used to determine the forms of mercury in the proposed plant's emissions. Western does have access to emission data from tests performed on the existing plant that could be used to analyze deposition, but planned emission controls at the existing plant and proposed new plant would change the amount of the various forms of mercury emitted. Thus, without this emissions data, Western cannot perform an analysis to assess the cumulative impact of mercury emissions from the existing or proposed Project. However, since mercury emissions from the existing and proposed plant combined would be lower than mercury emissions from the existing plant alone, it is reasonable to assume the cumulative impacts of mercury would also decrease.

The operation of the proposed Big Stone II plant would release an estimated 4.7 million tons of CO_2 into the atmosphere each year. Currently, there are no Federal standards for carbon dioxide. According to testimony before the SDPUC (SDPUC, 2006), and based on Energy Information Administration (EIA) information, this amount would represent about one one-hundredth of one percent (0.00014) of global anthropogenic emissions. In accordance with the Settlement Agreement, the Co-owners have agreed (in absence of Minnesota and Federal rules applicable to the proposed Big Stone II plant) to offset 100 percent of the emissions of CO_2 from the proposed Big Stone II plant that are attributable to the generation of electricity for Minnesota consumers, for a period not to exceed four years after the commercial operation date of the proposed Big Stone II plant. Several of the offset methods outlined in the Settlement Agreement would serve to further reduce the intensity of U.S. carbon emissions by investing in renewable energy, achieving energy savings, and investing in transmission that the MnPUC certifies would enhance renewable energy development. It is reasonably anticipated that State of South Dakota or Federal GHG emissions regulations will be promulgated before 2019 (i.e., four years after commercial operation). If Minnesota or Federal GHG rules have not been developed that apply to the proposed Big Stone II plant within the four-year timeframe following commercial operation, the offset requirement would cease. The terms of the Settlement Agreement were included as a condition to the Certificate of Need, issued March 17, 2009 (MnPUC, 2009). The proposed plant, as well as other sources in the region, would emit CO_2, which could have an undetermined effect on local, regional, or global climate change. Because numerous models produce widely divergent results, and there is insufficient information, Western is unable to identify the specific impacts of regional CO_2 emissions on human health and the environment. Any attempt to analyze and predict the local or regional impacts of the proposed plant's CO_2 emissions when added to other past, present, and reasonably foreseeable future actions cannot be done in any way that produces reliable results.

The South Dakota Board of Minerals and Environment (SDBME) issued the PSD permit to the proposed Big Stone II plant on November 20, 2008. The SDBME also issued the Big Stone site Title V permit on November 20, 2008, for the USEPA's 45-day review period. On January 22, 2009, the USEPA issued objections to the Big Stone Title V permit during their 45-day review period. The South Dakota Department of Environment and Natural Resources (SDDENR) revised the Title V permit to satisfy the objections raised by the USEPA, and the permit revisions underwent a 30-day public notice period which began on February 11, 2009, and ended on March 13, 2009. The SDBME held hearings on April 20 and 21, 2009, to consider the revised Title V permit and whether any revisions were needed for the PSD permit issued on November 20, 2008. On April 21, 2009, the SDBME issued a signed final approval document after the SDBME the day before unanimously approved the revised Title V permit that addressed the objections raised by the USEPA and reaffirmed the PSD permit that was issued on November 20, 2008. The SDBME approved the hearing Findings of Fact and Conclusions of Law during their April 21, 2009 meeting. On April 22, 2009, the revised Title V permit was submitted to the USEPA for a 45-day review. The decisions of the SDBME constitute the State's Final Permit Decision on the Title V Permit, but may be appealed to the State Circuit Court and the State Supreme Court, and with the USEPA, as provided by law. Through the permit application process and issuance of the PSD permit, the SDDENR has determined what emissions will be regulated from the proposed plant and specific control technologies and other conditions for plant operations. The Co-owners would be required to comply with these permit limits and conditions, and SDDENR would monitor emissions for the proposed plant and take regulatory action if conditions are not met. There would be no increase in NO_X or SO_2 emissions. Acid deposition is not expected to increase. Therefore, sulfur- and nitrogen-containing air pollutant

emissions would not be detrimental to the acid neutralizing capacity of sensitive lakes in Class I areas. As such, any short-term and long-term residual impacts would meet regulatory requirements and would be less than significant.

Water Resources

The proposed Big Stone II plant would typically require an additional 8,800 acre-feet of fresh water annually, in addition to typical withdrawals of 4,200 afy for the existing plant (i.e., totaling approximately 13,000 afy for the combined plants under the proposed Project) to replace water losses due to evaporation in the power plant cooling system and the WFGD system. The primary source of water for the existing plant and the proposed Big Stone II plant would be withdrawals from Big Stone Lake. Based on detailed modeling, surface water alone would not meet proposed water supply requirements. Groundwater would be used to supplement the water needs of the combined plants. Three water appropriation permits have been issued to Big Stone. Two of the permits authorize a combined withdrawal of up to 18,000 afy from Big Stone Lake and one of the permits authorizes up to 10,000 afy of groundwater withdrawal from the Veblen Aquifer. However, this combined water appropriation of 28,000 afy under the three permits does not mean that 28,000 afy would be used.

Water flows in the Minnesota River are regulated by releases from Big Stone Lake. Extensive simulation and calibration of modeled lake levels over time, using historical agency measurements as modeling inputs and references, was used in a lake level and outflow evaluation by Barr (Barr, 2002) for withdrawals by both the existing and proposed plants. Study results indicate that if plant water withdrawals were increased to 13,000 afy with the existing cooling pond system storage volume of about 3,500 acre-feet (af), the worst effect would be that the lake would be 0.83 foot lower in two non-consecutive weeks out of a 70-year model period. On average, over 70 years, the lake elevation would only decrease by 0.15 feet (Barr, 2007b). The study predicted very slight increases in the relative frequency of lake levels less than 964 feet (project datum), and very slight decreases in the relative frequency of lake levels between 964 feet and 967 feet. Essentially no change in the relative frequency of attaining the target recreational season pool elevation (968 feet project datum) is expected.

Reductions in flow releases from Big Stone Lake downstream to the Minnesota River would be expected as a result of increased withdrawals of lake water. The key issue with respect to water withdrawals from Big Stone Lake is the impact on low flows (less than 80 cubic feet per second (cfs) in the Minnesota River below Big Stone Lake). Except for the different sources of the back-up water supply, the water supply plan described in the Draft EIS and the proposed water supply plan under the proposed Project are nearly identical, and the impacts on the Minnesota River low flows are limited to less than two percent of the 2,800 low flow weeks modeled in the 70-year study period. This is because the surface water appropriations permit limits most lake appropriations to periods when the Minnesota River flows are relatively high (e.g., during spring runoff periods). These flow changes would occur for short durations and would not significantly impact fisheries and water quality in the Minnesota River. Although minor and infrequent residual effects on lake levels and outflows at Big Stone Lake would occur, impacts to surface water resources from constructing and operating the proposed plant would be reduced by complying with regulatory programs and permit approval processes and by implementing SMMs and additional mitigation measures (if adopted), therefore resulting in impacts that would be less than significant.

The groundwater model (Barr, 2007c) was used to predict changes in base flows (i.e. groundwater contribution to streamflow) into areas of the Whetstone River within the groundwater area. Groundwater pumping, over time, is predicted to reduce the average groundwater flow into the

Whetstone River by approximately 0.64 cfs (from a modeled 2.0 cfs to a modeled 1.36 cfs, or approximately 32 percent of total groundwater inflow). Because groundwater is a very small portion of total flow in the Whetstone River, this predicted reduction is approximately 1.3 percent of average annual stream flow and 0.5 percent of average stream flow during the months of April through July. The predicted reduction is not of sufficient magnitude to affect human uses of the Whetstone River. Therefore, the reduced flows would not cause a long-term loss of human use.

Groundwater flow modeling predicts that pumping of proposed wells would not cause a reduction in groundwater flows to Big Stone Lake or the Minnesota River. Operating the proposed plant and groundwater well system would not degrade water quality within the affected area or violate State or Federal standards. The consumptive use of groundwater for proposed plant uses would not deplete groundwater supplies or interfere with groundwater recharge in the affected area in a way that would adversely affect existing or proposed uses of groundwater resources. The SDDENR concluded that the appropriation proposed by the Co-owners' application would not adversely impact existing rights and has imposed conditions to the approved Water Appropriation Permit that avoid adverse impacts to future groundwater resources. Short- and long-term impacts to groundwater resources from constructing and operating the proposed plant would not cause significant impacts to groundwater resources.

Even with the implementation of air pollution controls for SO_2, NO_X, and particulates, satisfaction of the conditions of the Settlement Agreement, compliance with the conditions of the air permit for the proposed plant, and compliance with National Ambient Air Quality Standards (NAAQS), the existing and proposed plants would still have emissions that could impact water, but not at levels expected to exceed thresholds established by the State and USEPA for protection of human health and the environment. Further, certain emissions (e.g., SO_2 and mercury) would be less if the power plant is constructed, since additional or improved emissions controls would be installed.

Construction and operation of the transmission lines, substations, substation modifications and other system improvements would not degrade groundwater or surface water quality or violate State and Federal standards.

Geology and Mineral, Paleontological Resources, and Soils

There would be no significant impacts to unique geological features, mineral resources, or impacts resulting from geological hazards from the construction or operation of the proposed plant. Surficial soil disturbances would occur during construction of the proposed plant site and during proposed well drilling and installation activities. Proposed plant and groundwater system components would disturb a total of 189.4 acres of soils, of which 2.4 acres would be permanently removed from potential agricultural use. Transmission line construction within any of the proposed corridors would result in a temporary impact as well as permanent removal of soils.

There is low potential for the presence of scientifically important fossils at the proposed plant, groundwater areas, and within the proposed corridors, substations, the proposed area for the relocation of the Canby Substation, and along the Hankinson line; therefore, it is unlikely that paleontological resources would be adversely affected by constructing the proposed plant, transmission lines, and substation modifications.

Biological Resources

Construction of the proposed power plant would permanently remove 3.0 acres of vegetation, as most of the proposed plant (24.5 acres) would be constructed on already developed industrial land. Installation of the proposed groundwater production wells, access roads, pipelines, and electrical distribution lines would affect an additional 3.8 acres of vegetation. Short-term impacts would occur on 150.1 acres from herbaceous trampling and partial removal of aboveground plant cover associated with construction of the proposed plant and facilities, and the installation of the proposed groundwater production wells, and associated proposed pipeline and electrical distribution lines. No significant residual impacts resulting in the loss of functionality of plant communities within the proposed corridors would be expected as a result of construction and operation. There would be no loss of any plant population that would result in a species being listed or proposed listing as threatened or endangered. Significant impacts to native vegetation may occur as a result of introducing noxious weeds during construction and operation. These impacts would be mitigated by implementing the SMMs and additional mitigation measures (if adopted).

Direct impacts to wildlife would include limited direct mortality from construction activities, habitat loss, alteration of habitat, animal displacement and disturbance of breeding, nesting, and foraging habitat for small game and birds. These impacts would not be in sufficient quantities to cause a species to become listed or proposed for listing as threatened or endangered. Since species compatible with the existing use would likely be compatible with the proposed use, there would not be a significant long-term impact to wildlife due to habitat alteration. Residual impacts would include the long-term net loss of approximately 6.8 acres of wildlife habitat at the proposed plant site. With the implementation of standard and additional mitigation measures (if adopted) and development of an Aviation Protection Plan, there would be no significant impact to wildlife species from the transmission line installations proposed.

The construction and operation impacts of the proposed plant or groundwater system construction activities would not result in a violation of statutes or regulations which involve protection of fish habitat, including spawning areas. There would not be a loss of a population of aquatic species that would result in the species being listed or proposed for listing as threatened or endangered. Water withdrawal would not exceed State-permitted levels and water intake would not result in a significant impact on fish populations. No residual impacts to fisheries are expected. Requiring best management practices to prevent spills during drilling activities, a Pipeline Construction Work Plan for proposed pipeline construction activities, implementing SMMs, and operating under required permits would minimize the impacts to fisheries from spills and erosion. Impacts to fisheries would not be significant by implementing SMMs and operating under required permits. After implementing standard and additional mitigation measures (if adopted) for water bodies that might contain habitat for game and native fish species, no residual impacts from constructing transmission lines within any corridor, during substation modifications, or during improvements to the existing Hankinson line would occur.

If the proposed Big Stone II plant is constructed (and after implementation of emissions controls), mercury emissions from both plants would be less than the emissions from the existing plant. Although the combined plants would continue to emit mercury, the decrease in mercury emissions would result in reduced impacts to biological resources in the vicinity. Further, the proposed Project would not cause an increase in the rate of accumulation of methylmercury concentrations in fish, although bioaccumulation of methylmercury would continue at a reduced rate. The reduced rate of bioaccumulation suggests that the lower mercury emissions from the existing and proposed plant could contribute to lower mercury concentrations in fish over time.

None of the anticipated impacts on special status species from construction and operation of the proposed Big Stone II plant or groundwater system for the proposed Project would violate Federal or other applicable statutes or regulations pertaining to special status species, jeopardize the continued existence of a federally-listed species, or cause a loss of individuals of a population of species that would result in a change in species status. No designated Critical Habitat is present within the proposed plant site or groundwater area.

Western has consulted with the U.S. Fish and Wildlife Service (USFWS) to comply with Section 7 of the Endangered Species Act for federally-listed and candidate species and species proposed for listing. Western prepared a Biological Assessment (BA) for constructing and operating the proposed Big Stone II plant and groundwater wells and pipelines. The BA was submitted to the South Dakota Ecological Services Office of the USFWS on August 30, 2007. Based on the BA, Western concluded that the construction and operation of the proposed Big Stone II power plant would not adversely affect federally-listed species. The USFWS concurred with this determination on October 9, 2007 (USFWS, 2007). The BA also addressed the bald eagle. A bald eagle nesting site is located near the proposed plant site. In the event that another new eagle nest, is found closer to the power plant prior to construction, the Co-owners would contact USFWS agency staff about implementing additional special mitigation measures. Copies of the BA and the USFWS concurrence are provided in Appendix L.

A separate BA is being prepared for the transmission lines and substation modifications. The transmission line BA will outline specific measures for siting transmission lines, biological surveys, limitations for construction activities (timing and extent of disturbance), and revegetation and contouring of disturbed areas. The BA would also provide measures for protection of listed species. The BA and consultation with the Minnesota Ecological Services Office of the USFWS would be completed prior to starting any transmission construction activities.

No surface drainage features were identified as perennial riverine systems within the proposed Big Stone II plant site; therefore, no adverse impacts to perennial riverine systems are expected as a result of constructing and operating the proposed plant. Following the implementation of the SMMs and permitting procedures of the USACE, no significant impacts to wetland/riparian areas would occur from the proposed well installation, pipeline construction, and electrical distribution line construction activities. No wetland losses are anticipated from constructing the proposed Big Stone II plant, and wetlands would not be lost or permanently de-watered by groundwater pumping. Construction of transmission lines within the corridors, modifications to substations, and relocation of Canby Substation would comply with regulations concerning wetlands.

Cultural Resources

A Programmatic Agreement (PA) has been developed for the proposed Project in accordance with the stipulations of Section 106 of the National Historic Preservation Act (NHPA). The PA (Western, 2006c) was developed by Western and was completed after consultation with the Minnesota and South Dakota State Historic Preservation Officers (SHPO), the Co-owners, interested tribes, cooperating agencies, and other interested parties. Mitigation measures as well as stipulations outlined in the PA are intended to eliminate or minimize adverse affects to cultural resources. Western, the South Dakota and Minnesota SHPOs, and other interested parties have signed the PA; it went into

effect on January 9, 2007. Western is currently working with Tribal Historic Preservation Officers to include tribal values in the PA through ongoing consultation meetings.

The PA outlines the steps to be taken to identify cultural resources and to: evaluate them to determine eligibility for listing on the National Register of Historic Places (NRHP); identify potential adverse effects; to develop measures to avoid, reduce, or mitigate adverse effects; and address inadvertent discoveries of cultural and paleontological resources. It also assigns roles and responsibilities for implementation of the PA, which ensures that all interested parties are involved in decisions regarding the treatment of historic and traditional cultural properties (TCPs) that may be affected by the proposed Project.

The proposed Project would be completed in accordance with the PA. By following the procedures outlined in Section 106 of the NHPA and the PA, adverse impacts, e.g., damage to, or loss of, archaeological and historic resources eligible for inclusion in the NRHP, would be avoided or mitigated. Unavoidable impacts to NRHP-eligible sites would be mitigated through implementation of a treatment plan in accordance with the PA. Impacts to NRHP-eligible sites would not be significant with implementation of the PA and SMMs. The proposed Project (with the exception of the upgrades required for the Hankinson line) is not located on any Native American lands. An ethnographic study would be performed by tribal members to identify TCPs within the area of the proposed Project.

Land Use

Construction and operation of the proposed power plant and groundwater system would result in conversion (long-term impact) of 2.1 acres of prime farmland to other uses. Long-term impacts to prime farmland would occur to 61.8 acres for construction activities at the proposed plant site; however, these areas would be restored to production at the end of construction activities. Because this is a small portion of the prime and unique farmland in Grant County, South Dakota, this would not result in a substantial loss of prime or unique farmland in the area, and there would not be significant impacts. There would be no compaction of soils that would result in long-term loss of productivity. Less than one percent of the amount of soils classified as prime farmland would be permanently lost within any of the proposed corridors and the Hankinson upgrades. The Co-owners have acquired 57 acres of land for the relocation of the Canby Substation. Modifications at the substation located in Willmar and Canby and the Johnson Junction Switchyard and relocation of the Canby Substation would be conducted following the mitigation measures outlined by the Co-owners and this EIS. No additional lands would be acquired for the upgrades to the existing Hankinson line; however, the same SMMs would apply to the upgrades for the Hankinson line.

Infrastructure, Public Health and Safety, and Waste Management

Notwithstanding the uncertainty regarding CO_2 and mercury, constructing and operating the proposed Big Stone II plant would not cause significant impacts to public health from regulated air pollutants. However, even with the implementation of the air pollution controls, satisfaction of the conditions of the Settlement Agreement, compliance with the conditions of the air permit for the proposed plant, and compliance with National Ambient Air Quality Standards, the existing and proposed plants would still have air emissions (SO_2 would decrease, NO_X emissions would not increase, and particulate emissions would increase). However, the emissions would not exceed thresholds established by the State and USEPA for protection of human health and the environment. The combined plants would continue to emit mercury (although at a decreased rate), and mercury emissions from the proposed plant (as well as mercury emissions from any and all sources) would still bioaccumulate in fish (although at a

reduced rate) and could affect those who eat fish and those with or concerned with neurological issues attributed to mercury. However, the reduced rate of bioaccumulation suggests that the lower mercury emissions from the existing and proposed plant could contribute to lower mercury concentrations in fish over time.

The addition of the proposed plant would increase emissions of CO_2. Even though CO_2 is an unregulated emission, the impact of CO_2 and other GHGs on the health of millions is projected in IPCC's Fourth Assessment Report (IPCC, 2007) to include increased malnutrition, increased deaths, diseases, and injury due to extreme weather events, increased cardio-respiratory diseases, and the altered spatial distribution of some infections diseases. It is also projected to bring some benefits, including fewer deaths from cold exposure and changes in range and transmission potential of malaria in Africa. Western is unable to identify the specific impacts of CO_2 emissions of the proposed plant on human health.

Transportation, storage, and use of fuel, chemicals, lubricants, and other fluids during construction or operation of the proposed Big Stone II plant and associated facilities could create contamination hazards. A list of chemicals and materials that would be used during plant operation is included in Table 2.2-2. Some of the chemicals and materials are considered hazardous substances and require appropriate handling, storage equipment, and documentation. Similar to the existing plant, it is anticipated that the proposed plant would also generate very small amounts of hazardous waste. Solid wastes (including hazardous and industrial wastes and combustion byproducts) generated during construction and operation of the proposed plant would be managed and disposed according to applicable regulations. Adherence to applicable regulations and best management practices would reduce the likelihood of a significant spill or release. Coal combustion byproducts include bottom ash, fly ash, and gypsum. These materials would be disposed of in the existing on-site landfill or hauled off-site by truck or rail for other uses.

Several SMMs are designed to control impacts from waste management activities. Management of solid wastes following the regulatory rules and standards and implementing best management practices would prevent any adverse impacts to human health and the environment. By implementing SMMs, impacts from hazardous materials and waste management during construction and operation of the proposed plant would not be significant. Disposal of wastes would be conducted in accordance with State and Federal regulations and would not impact public health. The Co-owners' health and safety program would establish procedures to control spill or releases of hazardous materials or substances, and the program would not interfere with any locally adopted emergency or response plan.

Visual Resources

Constructing and operating the proposed Big Stone II plant would not cause a substantial change in the landscape as seen from a highly sensitive viewer location due to the existing influence of similar structural elements present at the existing Big Stone plant. Visual impacts from constructing and operating the proposed Big Stone II plant would not be significant. No significant long-term additive impacts would result from the proposed well installations, pipelines, pumphouse buildings, fences, and distribution lines; and no substantial degradation to scenery resources of the Class II, III, or IV landscapes would occur. No substantial degradation of the foreground character or scenic quality of a visually important landscape would occur. No substantial dominant visual changes would occur due to construction of the well-associated facilities. The proposed corridors are located primarily on visual resource management (VRM) Class III lands, where proposed Project facilities (e.g., transmission line structures and conductor, ROW, and access roads) and activities may be visible but not dominate the

landscape. Visual impacts from constructing and operating transmission lines, the substation modifications, relocating the Canby Substation, and upgrading the Hankinson line would be less than significant.

Noise

Construction and operation of the proposed Big Stone II plant and groundwater system would not exceed local, State or Federal noise regulations of guidelines at sensitive receptors. Ambient noise levels at the nearest sensitive receptors would not increase substantially during operation of the groundwater wells. At the plant site, ambient noise levels would increase by less than five decibels, which would not be substantial. Noise during construction would occur from operating equipment to erect transmission lines, foundations, earthwork, etc. Although noise level impacts that are generated during construction could impact sensitive receptors in proximity of work sites, such impacts would be short-term and occur for brief periods of time, usually one or two days at each location. Such impacts would be minimized by scheduling activities to coincide with daylight hours and periods that would be relatively non-disruptive to local residents.

Social and Economic Values and Environmental Justice

The short-term impacts on housing and public services would be significant during construction of the proposed Big Stone II plant. A peak influx of 1,400 workers (peaking in late 2013) would create a relatively large short-term increase in population during the proposed plant construction. Increased market rental and housing costs would be caused by a temporary increase in demand for housing during the construction period. These costs would likely decrease after construction is completed and leave a surplus of housing. The temporary increase in rent could result in the permanent displacement of current residents who cannot afford increased rental costs. The influx of construction workers could also put a strain on community services such as fire and police protection. These short-term impacts would be considered significant. If adopted, implementing an additional mitigation measure for the Co-owners to work with local officials to alleviate any adverse impacts to housing and community services would lessen the impacts to less than significant. A Local Review Committee has been designated by the South Dakota PUC to assess the extent of the potential social and economic effects that would be generated by the proposed Big Stone II plant and to assess the affected areas capacity to absorb those effects at various states of construction.

The direct and indirect economic benefits from construction-related expenditures to the surrounding four-county region and the State of South Dakota would be a significant beneficial impact. Creation of temporary and permanent jobs in the community would also be a beneficial impact. The residual impacts to social and economic values resulting from operation of the proposed Big Stone II plant would be long-term beneficial impacts due to the creation of 35 new jobs in the local area and additions to the local and State tax base.

Mercury can be found in fish, which may be consumed by the general population and minority and low income populations. Mercury emissions from the existing and proposed plant would be less than total mercury emissions from the existing plant due to the planned implementation of the air pollution controls. Therefore, the rate of mercury deposition due to emissions from the combined existing and proposed plants would decrease (compared to the existing plant alone), as a result of the proposed plant being constructed. If the fish consumption advisories currently developed by State agencies (SDDENR, 2008a; MnDOH, 2008) are followed, there would not be a disproportionate impact from consumption of fish on any population (including minority or low income populations) concerned with

neurological issues attributed to mercury. However, even if fish are consumed by minority and low income populations in quantities greater than the State advisories, it is reasonable to assume that more mercury would be ingested, but the mercury contained in fish would be reduced over time with the lower mercury emissions from the proposed plant.

ACRONYMS AND ABBREVIATIONS

ACRONYMS

°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
µPa	Sound pressure in micropascals
ACFB	Atmospheric Circulating Fluidized Bed
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
af	acre-feet
afy	acre-feet per year
amsl	above mean sea level
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
AQRV	air quality related values
ARP	Acid Rain Program
ASU	Air separation unit
ATSDR	Agency for Toxic Substances and Disease Registry
AWEA	American Wind Energy Association
BA	Biological Assessment
BACT	Best Available Control Technology
Barr	Barr Engineering Company
BFE	Base Flood Elevation
bgs	below ground surface
BLM	Bureau of Land Management
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe Railroad
Btu	British thermal units
BWEA	British Wind Energy Association
CAA	Clean Air Act and Amendments
CAIR	Clean Air Interstate Rule
CAMR	Clean Air Mercury Rule
CCGT	Combined Cycle Gas Turbine
CCS	carbon capture and sequestration
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIP	Conservation Improvement Plan
CMMPA	Central Minnesota Municipal Power Agency
CMSP&P	Chicago, Milwaukee, St. Paul, and Pacific Railroad
CO	carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CON	Certificate of Need
Council	Advisory Council on Historic Preservation
CR	County Road
CRP	Conservation Reserve Program
CWA	Clean Water Act
dB	decibels
dBA	decibels on the A-weighted scale
Dba	doing business as
DOE	Department of Energy
DOT	Department of Transportation
Draft EIS	Draft Environmental Impact Statement

DSM	demand side management
EIA	Energy Information Administration
EERC	Energy and Environmental Research Center
EGU	electric generation unit
EIS	Environmental Impact Statement
EMF	electromagnetic field
EO	Executive Order
ESA	Endangered Species Act
EVA	Energy Ventures Analysis, Incorporated
EPRI	Electric Power Research Institute
EVC	existing visual condition
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FmHA	Farmers Home Administration
FR	Federal Register
FSA	Farm Service Agency
GAP	Gap Analysis Project
GFE	Granite Falls Energy LLC
GF Sub	Granite Falls Substation
GHG	Greenhouse Gas
GIS	Geographical Information System
GPA	Game Production Areas
gpm	gallons per minute
GPS	Global positioning system
GRE	Great River Energy
H_2SO_4	sulfuric acid
HAPs	Hazardous Air Pollutants
Hazcom	Hazard Communication
HC	hydrocarbons
HCPD	Heartland Consumers Power District
HDR	HDR Engineering Inc.
Hg	Mercury
HRSG	heat recovery steam generator
Hz	Hertz
IGCC	Integrated Gasification Combined Cycle
IMPLAN	Impact Analysis for PLANning
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Resource Plan
ISCST3	Industrial Source Complex Short Term
kV	Kilovolt
kWh	Kilowatt hour
L_{10}	decibels on the A-weighted scale that may be exceeded 10 percent of the time within an hour
L_{50}	decibels on the A-weighted scale that may be exceeded 50 percent of the time within an hour
lb	pound
lbs/yr	pounds per year
L_{dn}	day-night (average sound) level
L_{eq}	The equivalent or average noise level measured over the sampling period
LGIA	Large Generator Interconnection Agreement
LGIP	Large Generator Interconnection Procedures
MAPP	Mid-Continent Area Power Pool
MBTA	Migratory Bird Treaty Act
MBWSR	Minnesota Board of Water and Soil Resources
MCBS	Minnesota County Biological Survey
MDU	Montana-Dakota Utilities, Co.

mG	milligauss
mg/l	milligrams per liter
mgpy	million gallons per year
MnEIS	Minnesota Environmental Impact Statement
MISO	Midwest Independent System Operator
ml	milliliter
MLMIC	Minnesota Land Management Information Center
MnDNR	Minnesota Department of Natural Resources
MnDOC	Minnesota Department of Commerce
MnDOH	Minnesota Department of Health
MnDOT	Minnesota Department of Transportation
MnOAH	Minnesota Office of Administrative Hearings
MnPUC	Minnesota Public Utilities Commission
MnRAM	Minnesota Rapid Assessment Methodology
Mod	modified landscape
MPCA	Minnesota Pollution Control Agency
MnPUC	Minnesota Public Utilities Commission
MSBS	Minnesota Sites of Biodiversity Significance
MVA	Megavolt amps
MW	megawatts
MWh	megawatt hours
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAC	Noise Area Classifications
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NESC	National Electric Safety Code
NFIP	National Flood Insurance Program
NH_3	ammonia
NHPA	National Historic Preservation Act
NJDEP	New Jersey Department of Environmental Protection
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NSPS	New Source Performance Standards
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O_3	ozone
OPA 90	Oil Pollution Act of 1990
OPGW	optical ground wire
OSHA	Occupational Safety and Health Administration
OTP	Otter Tail Power Company
PA	Programmatic Agreement
Pb	lead
PC	pulverized-coal
PCBs	polychlorinated biphenyls
pCi	Pico curies
pCi/g	Pico curies per gram
PEM	palustrine emergent
PFO	palustrine forested
PLS	Public Land Survey
PM	particulate matter
PM_{10}	particulate matter with aerodynamic diameter less than 10 micrometers
$PM_{2.5}$	particulate matter with aerodynamic diameter less than 2.5 micrometers

PRB	Powder River Basin
PPR	Prairie Pothole Region
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
PUC	Public Utility Commission
PWI	Public Waters Inventory
RCRA	Resource Conservation and Recovery Act
RO	Reverse osmosis
ROW	rights-of-way
RUS	Rural Utilities Service
SARA	Superfund Amendments and Reauthorization Act
SARC	State Archaeological Research Center
SCADA	Supervisory Control and Data Acquisition
SCR	selective catalytic reduction
SCS	Soil Conservation Service
SDBME	South Dakota Board of Minerals and Environment
SDDENR	South Dakota Department of Environmental and Natural Resources
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDDW	South Dakota Division of Wildlife
SDGFP	South Dakota Game, Fish and Parks Department
SDPUC	South Dakota Public Utilities Commission
SDSU	South Dakota State University
SDWMB	South Dakota Water Management Board
SF_6	sodium hexafluoride gas
SHPO	State Historic Preservation Office(rs)
SMM	Standard Mitigation Measure
SMMPA	Southern Minnesota Municipal Power Agency
SNA	Scientific and Natural Area
SO_2	sulfur dioxide
SO_x	Sulfur oxides
SR	State Route
STATSGO	State Soil Geographic database
SWMA	State Wildlife Management Areas
SWPPP	Storm Water Pollution Prevention Plan
Tariff	Open Access Transmission Service Tariff
TCPs	traditional cultural property(ies)
TDS	total dissolved solids
TMDL	total maximum daily load
tph	tons per hour
tpy	tons per year
U.S.	United States
UBC	unburned carbon
UGP	Upper Great Plains Region
USC	United States Code
USD	University of South Dakota
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VISCREEN	Visual Impact Screening Analysis
VOC	volatile organic compounds
VRM	Visual Resource Management
WAAS	Wide Area Augmentation System
WCA	Wetland Conservation Act
Western	Western Area Power Administration

WFGD	Wet Flue Gas Desulfurization
WMA	Wildlife Management Areas
WMMPA	Western Minnesota Municipal Power Agency
WPA	Waterfowl Production Areas
WUS	Waters of the United States
yr	year

VOLUME CONTENTS

Volume I

Volume II - Responses to Comments

Volume III – Appendices

Volume IV - Public Comments

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES