



BIG STONE

PARTNERS IN TRANSMISSION

Agenda



- Project Description
- The Electrical System
- Transmission Evaluation
- Route Selection
- Land Rights
- Construction Methods
- Timeline

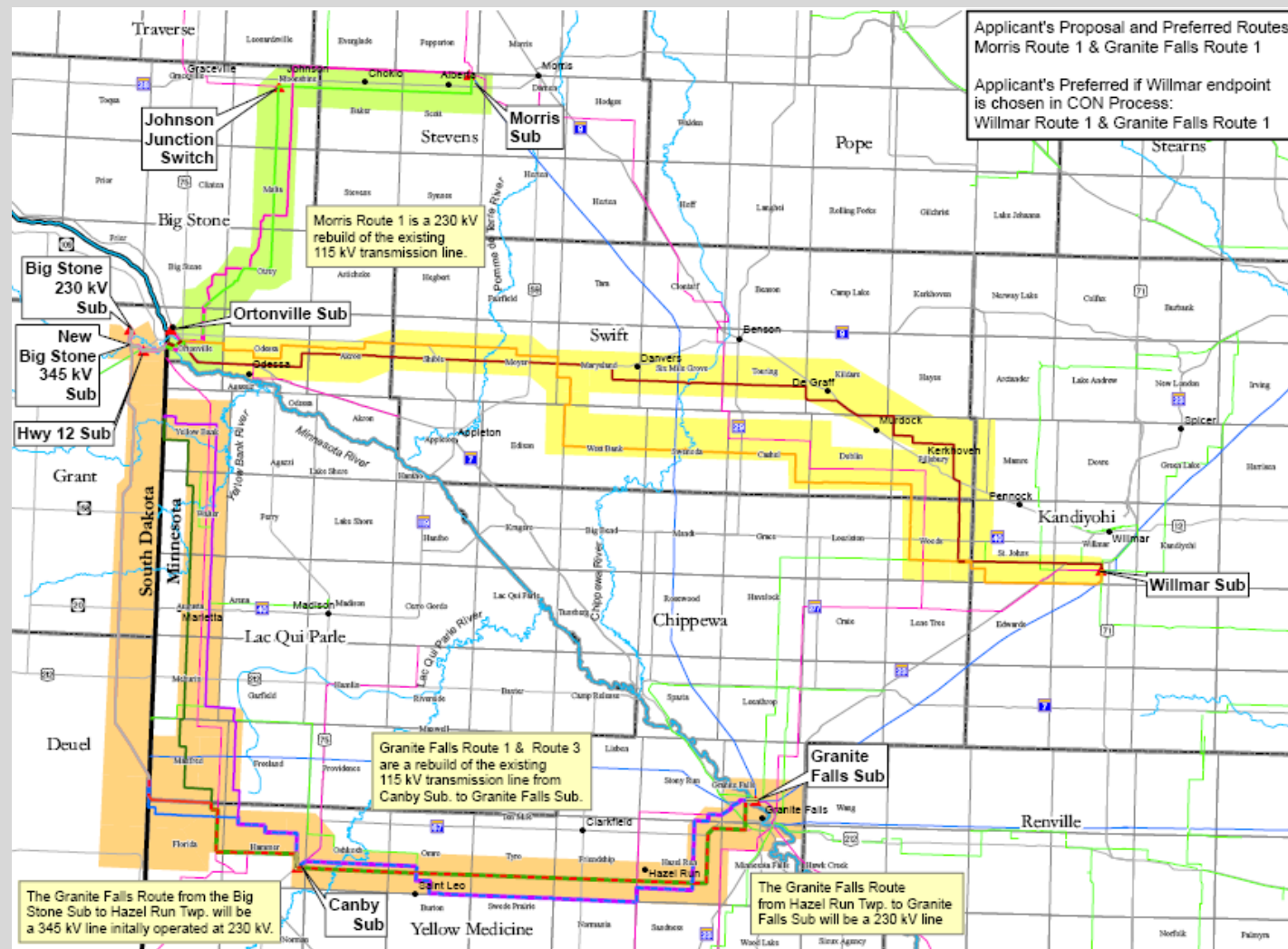
Big Stone Transmission Co-owners



Proposal



- **Alternative #1** A new line from Big Stone to Ortonville, MN, with an uprate of the Ortonville to Johnson to Morris, MN, line from 115 kV to 230 kV.
- **Alternative #2** A 230 kV new line from Big Stone to Willmar, MN.
- **Common to both** A new line from Big Stone to Canby, MN, and an uprate of the line from Canby to Granite Falls, MN. Line designed for 345 kV, but operated at 230 kV until other regional facilities constructed.
- **Other** Reroute Big Stone to Hankinson line

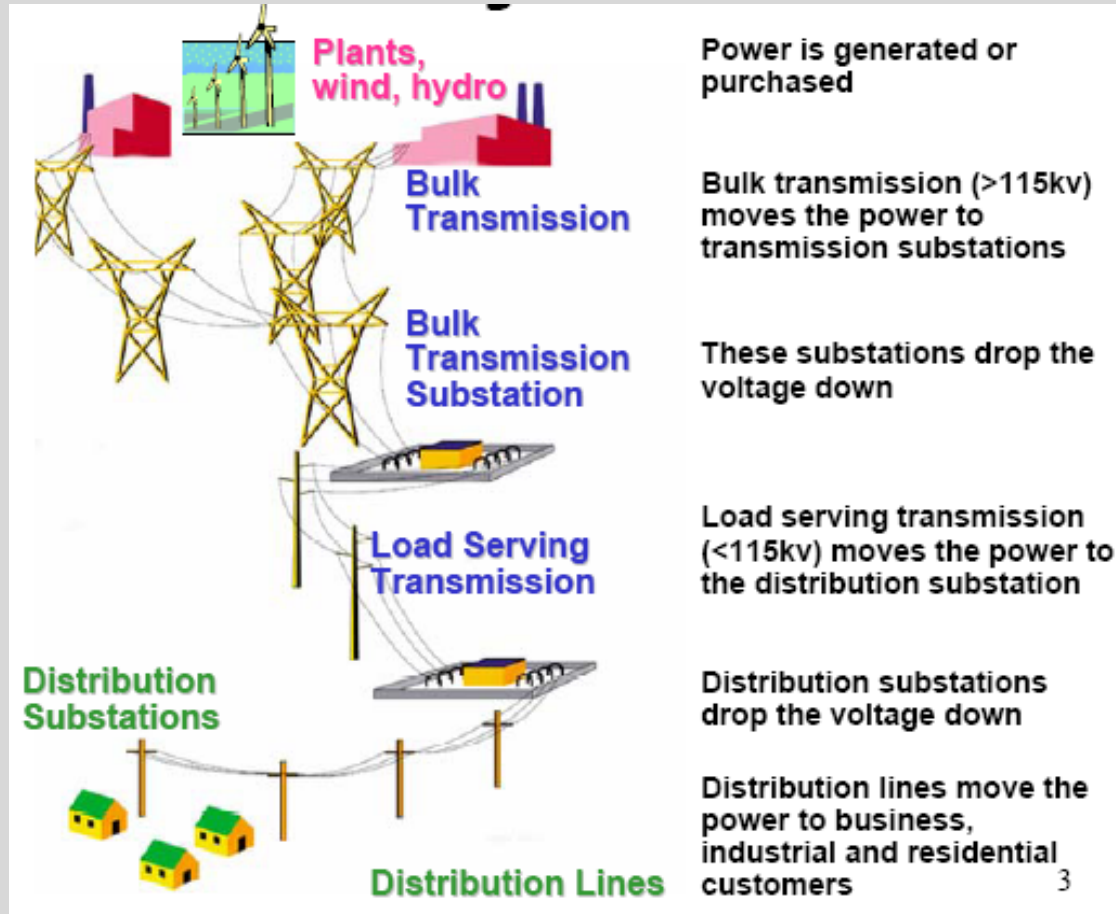




The Electrical System

How it works

The Electrical System



Transmission's Role



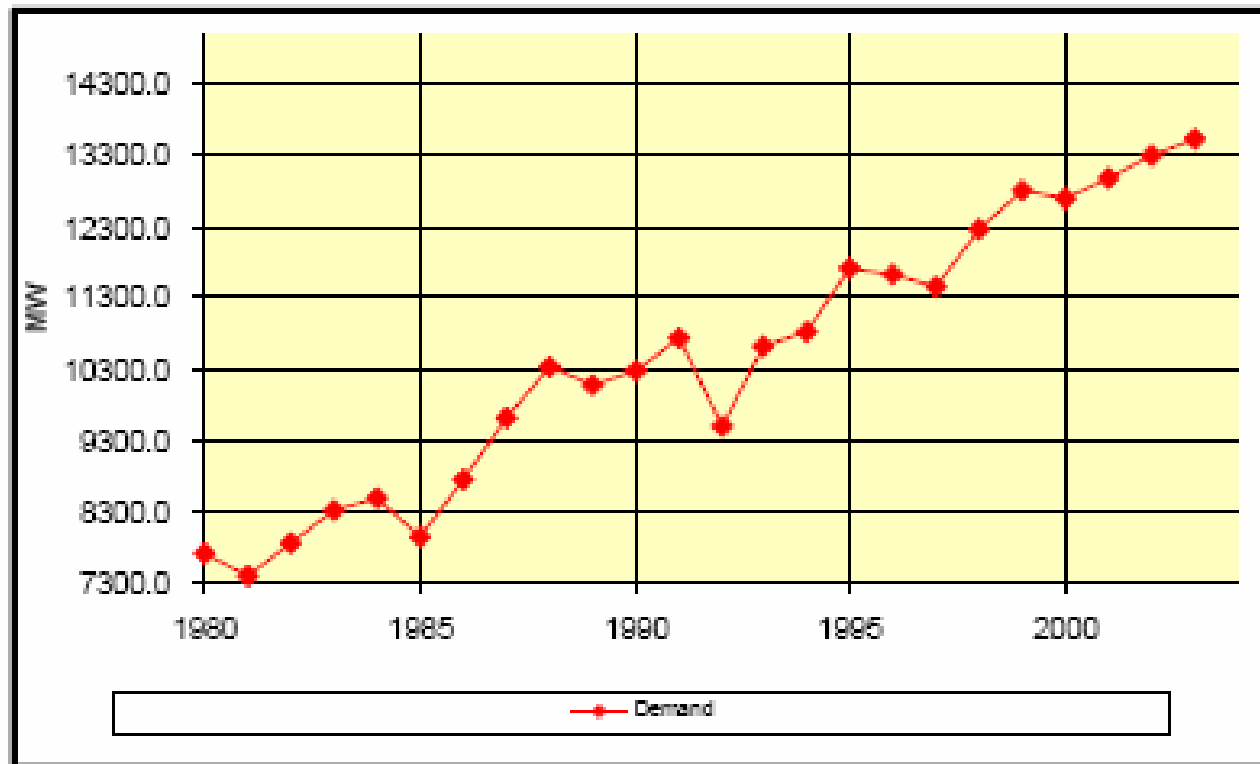
- To reliably deliver electricity to distribution systems
- To connect utilities together to enhance reliability

Today's Challenges



- Aging transmission system
- Growing electric consumption
- Increasing system congestion
- Changing role of system

Growing Demand

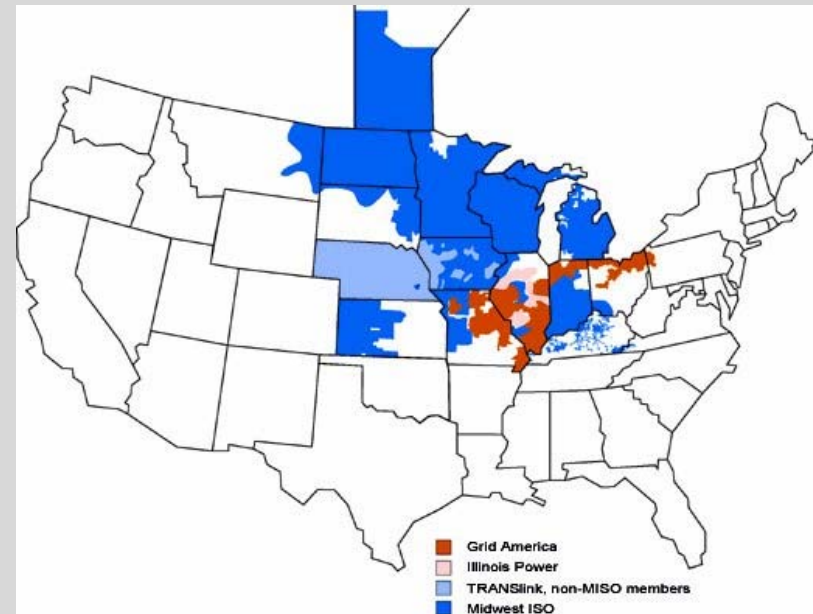


CapX Transmission Development Partners



Independent System Operator

- Coordinates regional planning
- Ensures equal access to transmission system
- Maintains or improves transmission reliability





Transmission Studies

Jason Weiers

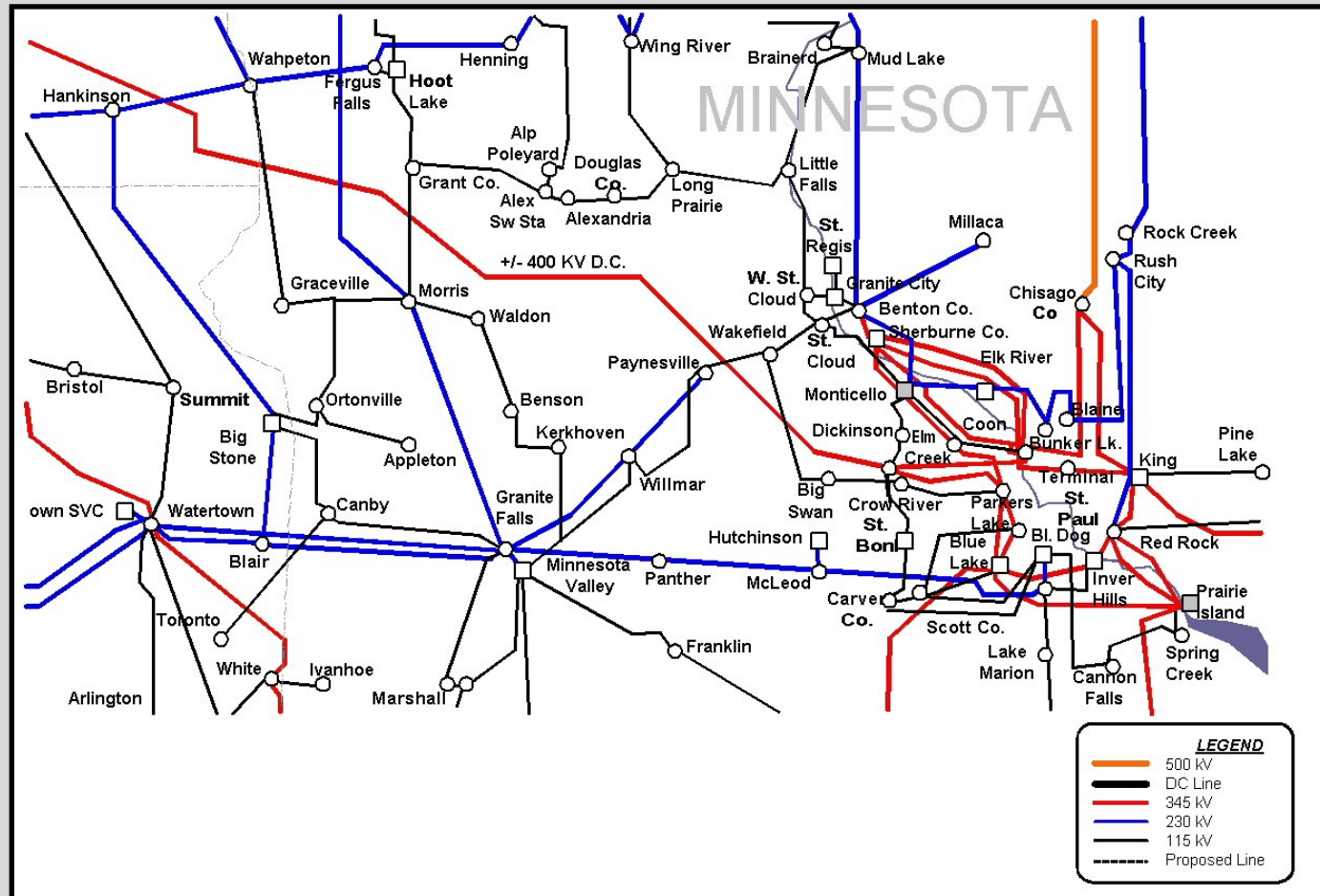
Transmission & Distribution Studies Engineer

Existing Transmission System



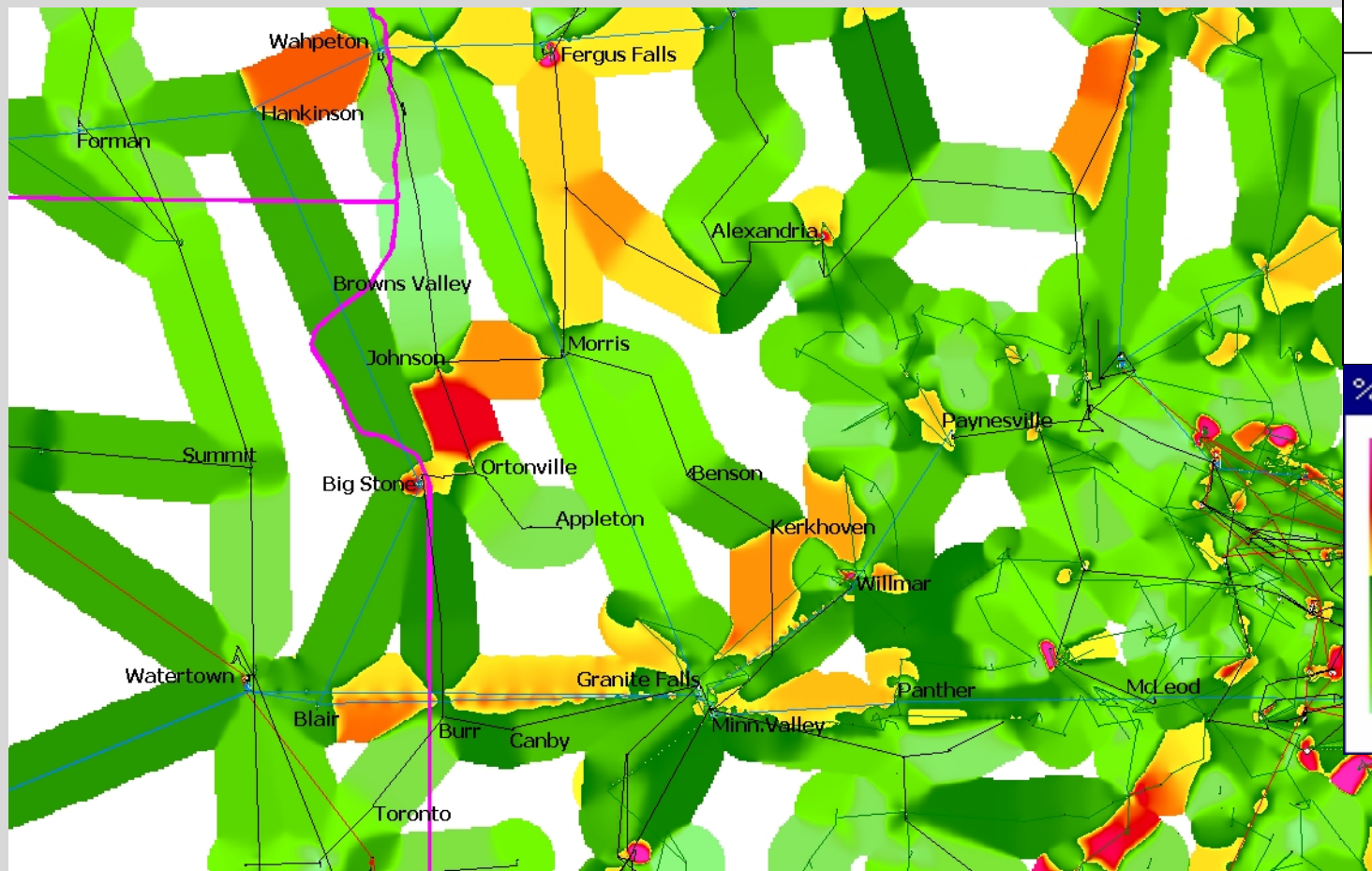
- Big Stone unit 1 is currently capable of approximately 500 MW.
- The power from this generator travels on 4 different transmission lines
 - Big Stone to Blair 230 kV
 - Big Stone to Hankinson 230 kV
 - Big Stone to Ortonville 115 kV
 - Big Stone to Canby 115 kV

Transmission Around Big Stone



Big Stone I with Existing Transmission System

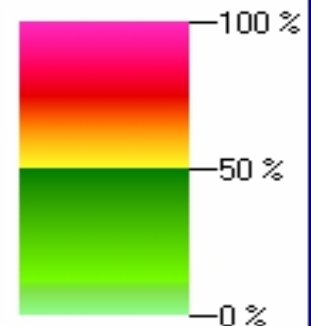
System Intact Conditions (All Facilities in-service)



Key

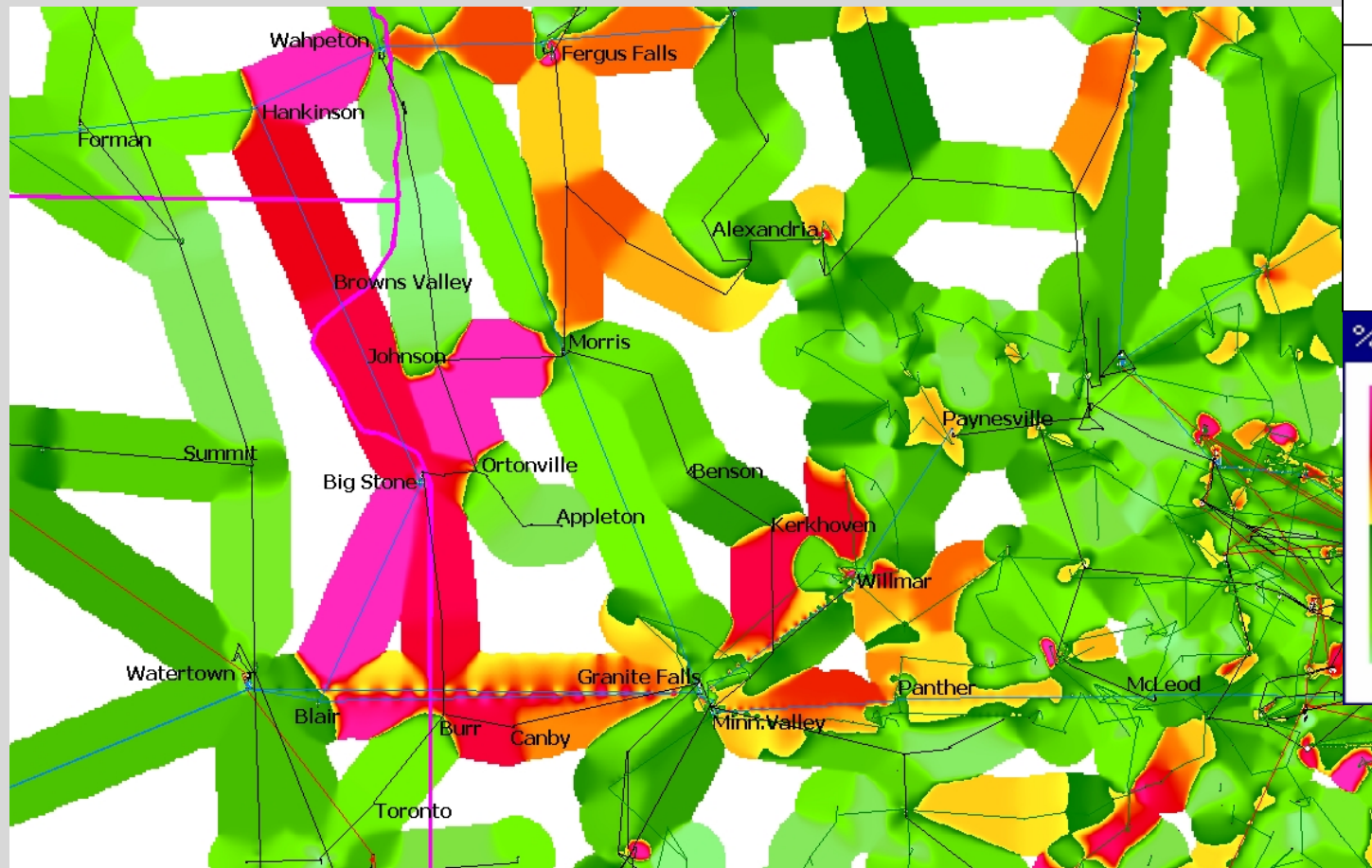
- 345 kV Line
- 230 kV Line
- 115 kV Line
- 69 kV Line
- State Boundaries

% of MVA Limit



Big Stone II with Existing Transmission System

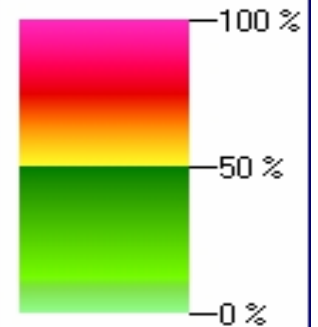
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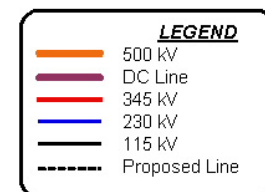
% of MVA Limit



MISO Study Process

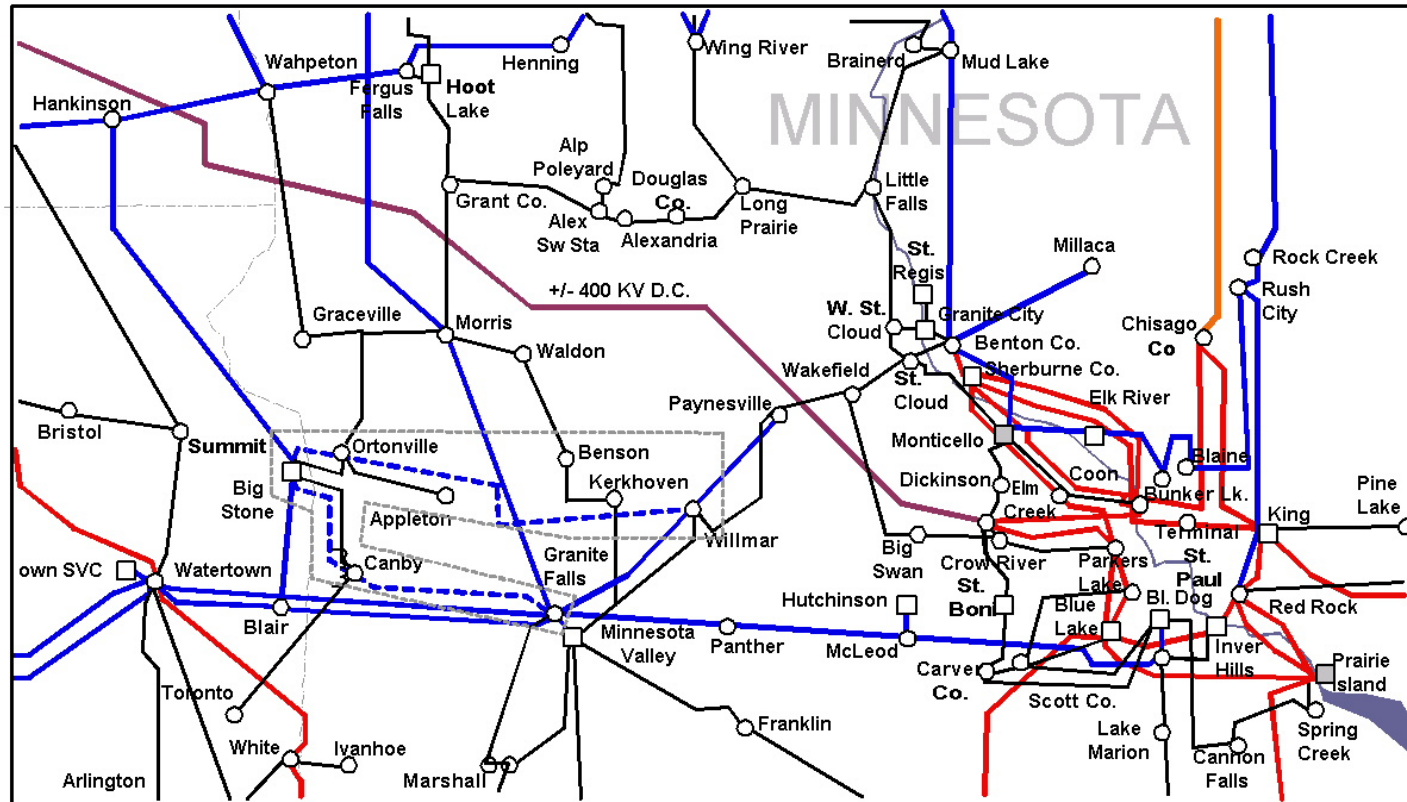


- Big Stone II participants submitted interconnection request to MISO on February 3, 2004 for a 600 MW project.
- Interconnection request initiated a transmission study for Big Stone II.

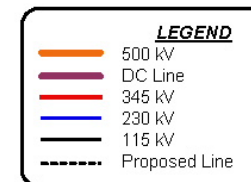


Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate

TRANSMISSION ALTERNATIVE 2



Big Stone - Canby - Granite Falls 115 to 230 kV Uprate with
Big Stone - Willmar 230 kV Line





Transmission Alternative #1

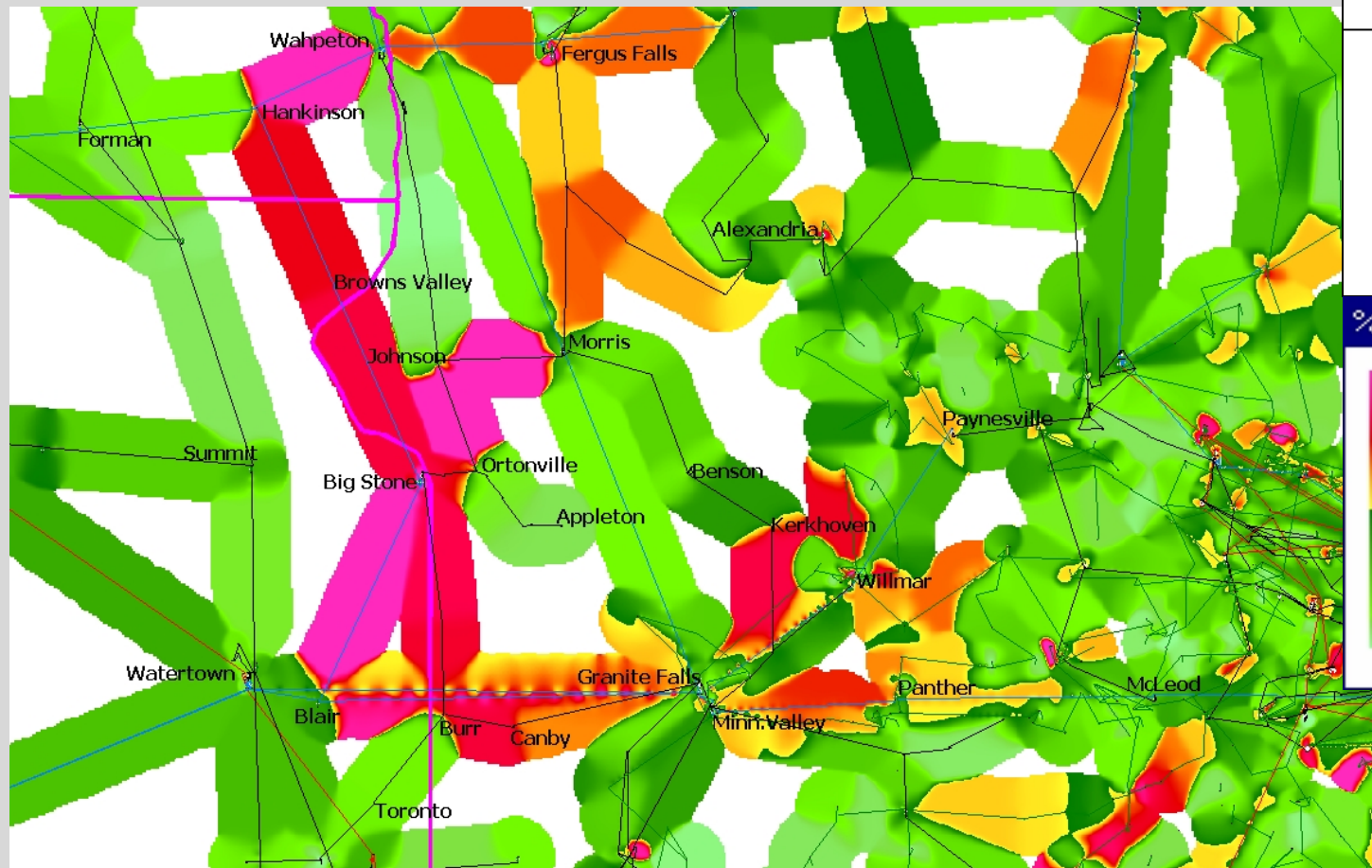
Big Stone – Ortonville – Johnson Jct. – Morris 230 kV Line

with

Big Stone – Canby – Granite Falls 230 kV Line

Big Stone II with Existing Transmission System

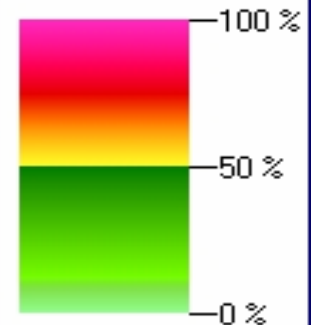
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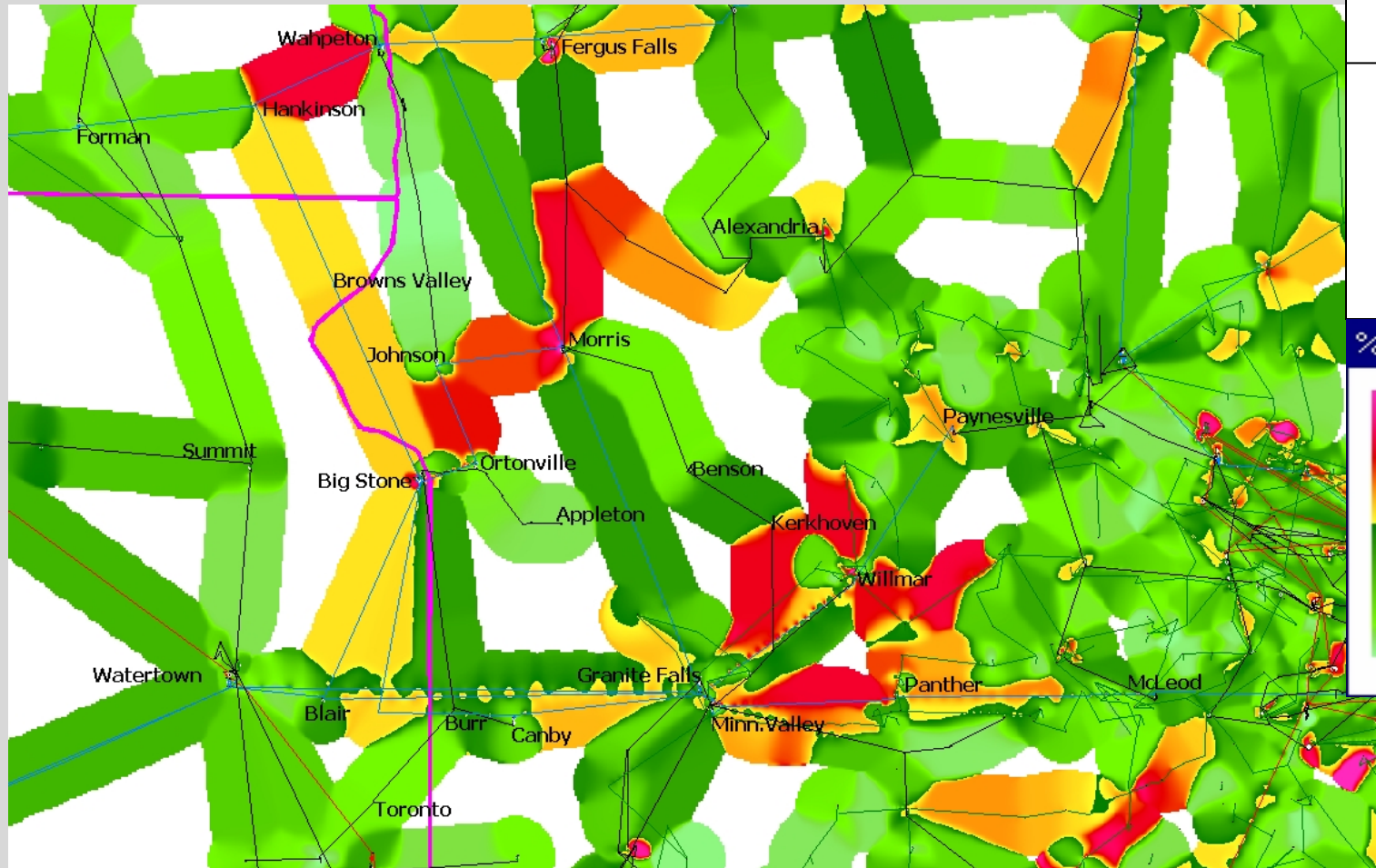
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Big Stone II Transmission Alternative #1

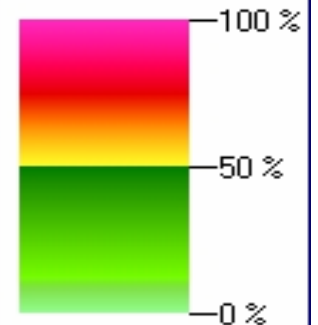
System Intact Conditions (All Facilities in-service)



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% of MVA Limit





Transmission Alternative #2

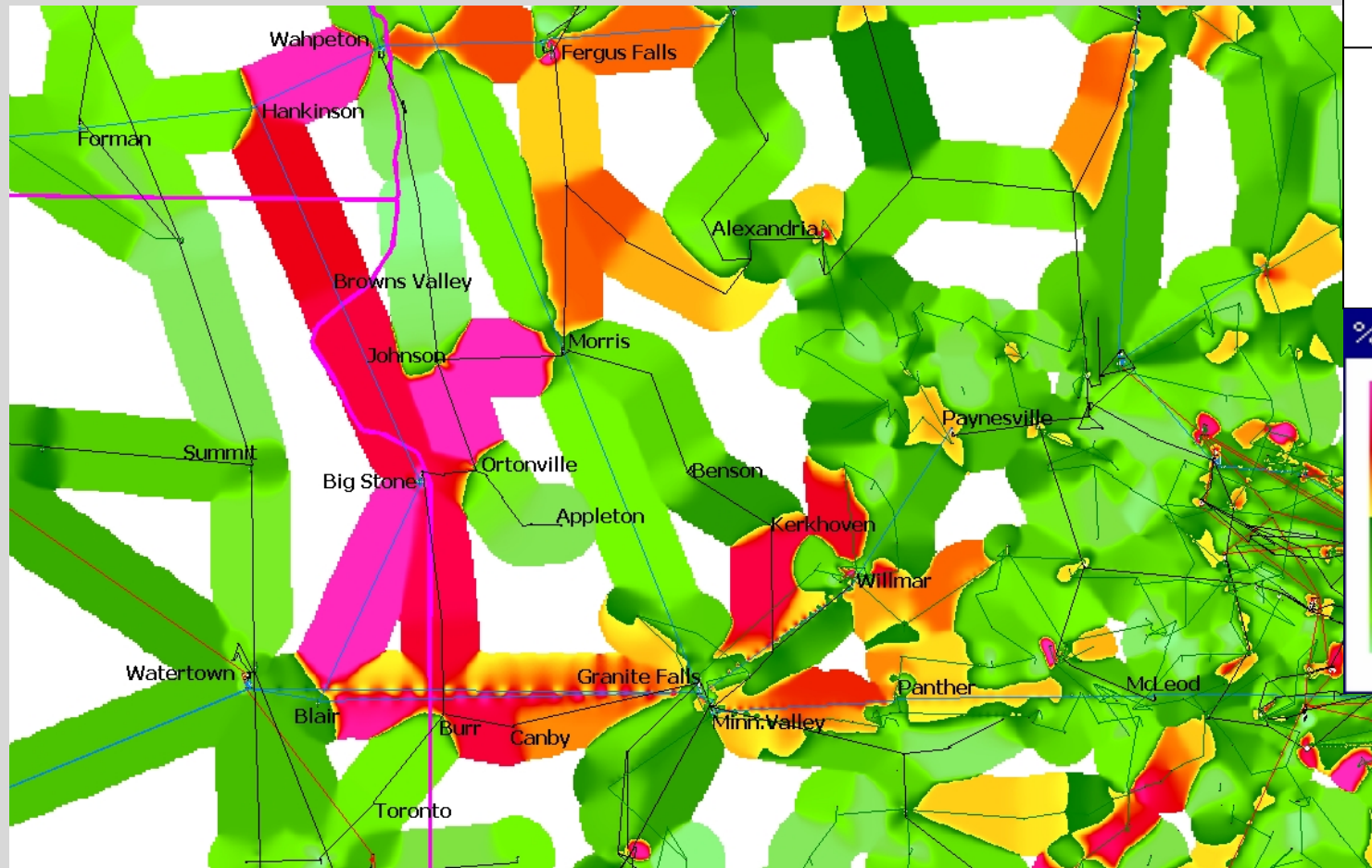
Big Stone – Willmar 230 kV Line

with

Big Stone – Canby – Granite Falls 230 kV Line

Big Stone II with Existing Transmission System

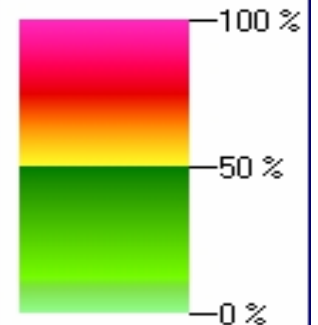
System Intact Conditions (All Facilities in-service)



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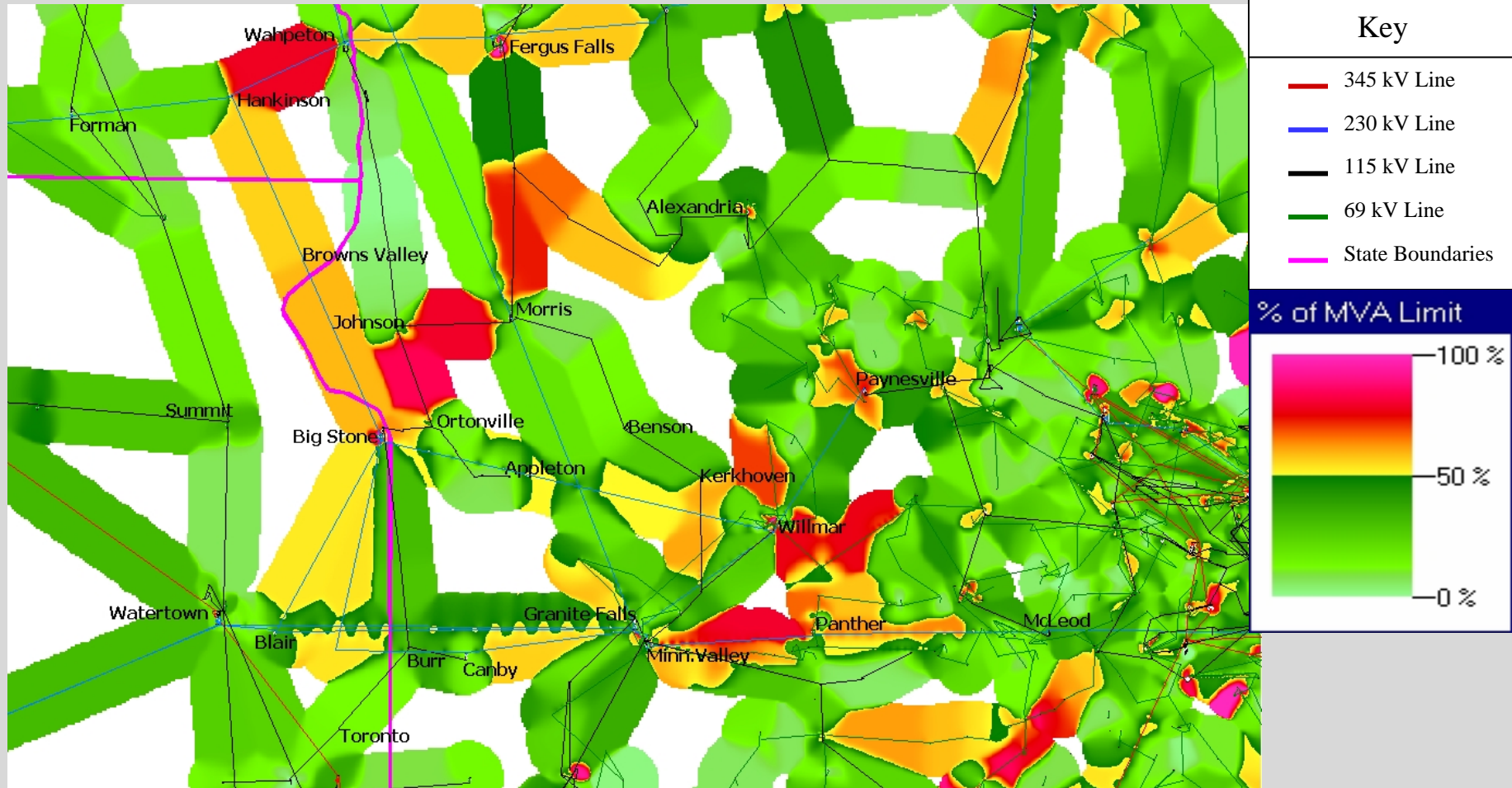
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% of MVA Limit



Big Stone II Transmission Alternative #2

System Intact Conditions (All Facilities in-service)



MISO Interconnection Study Conclusion



- Either of the transmission alternatives will be able to reliably interconnect Big Stone II.
- Additional upgrades will be necessary on the existing transmission system.

Regional Transmission Planning



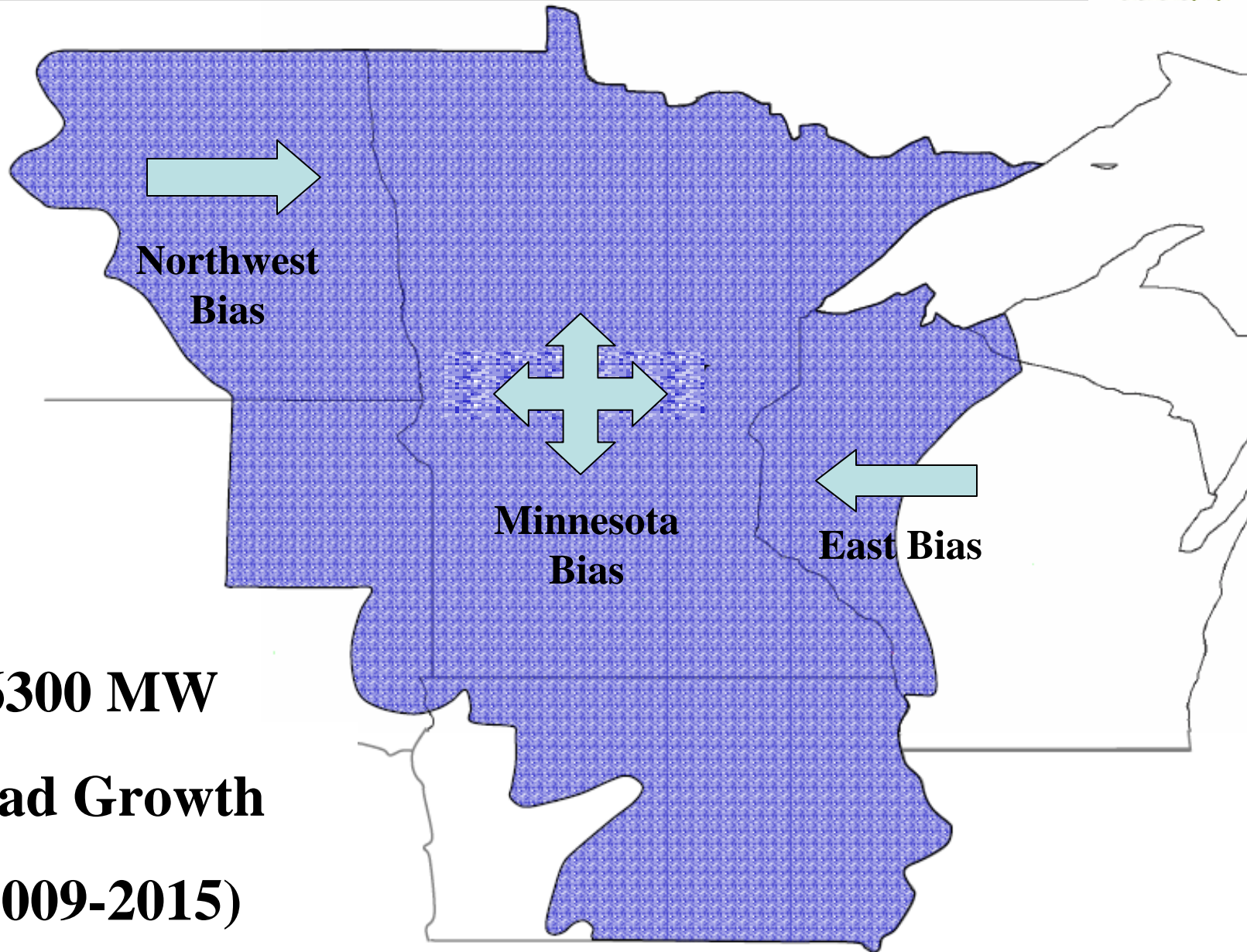
- Big Stone II interconnection study being coordinated with other regional transmission planning efforts.
 - CapX 2020 Vision Study
 - MISO Northwest Exploratory Study
 - Southwest MN → Twin Cities Electric High Voltage Study (SW MN → TC EHV Study)
- Looking to optimize opportunities for further wind development on Buffalo Ridge.
- Insure Big Stone II transmission plan is consistent with long-term and short-term regional transmission plans.

CapX 2020 Vision Study



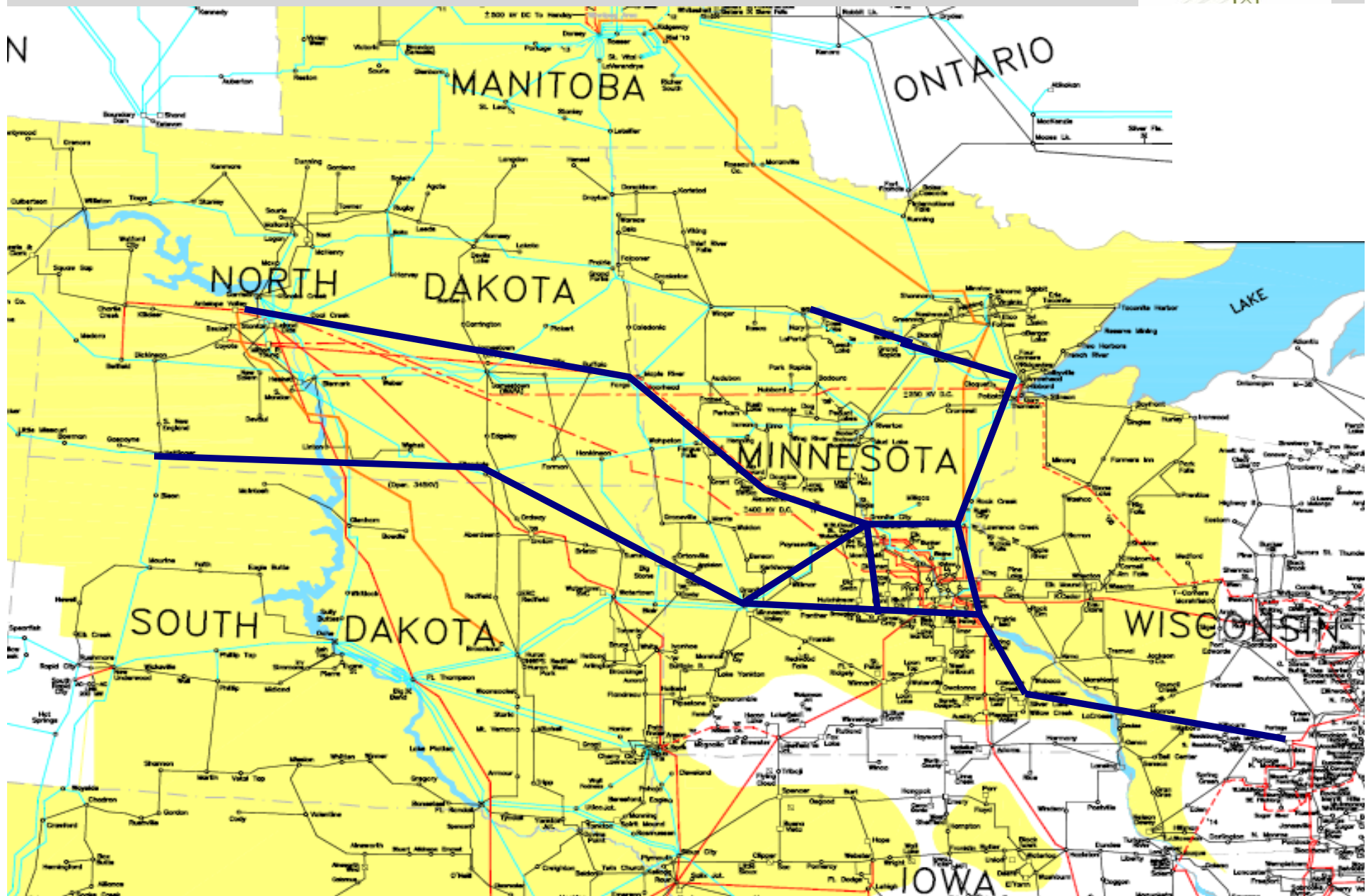
- A joint effort by regional transmission utilities to:
 - Identify future transmission needs in a coordinated way to meet the growing demand for electricity in MN and the region.
 - Create a methodology for allowing transmission projects to be developed in a timely and efficient manner.

Study Area



**6300 MW
Load Growth
(2009-2015)**

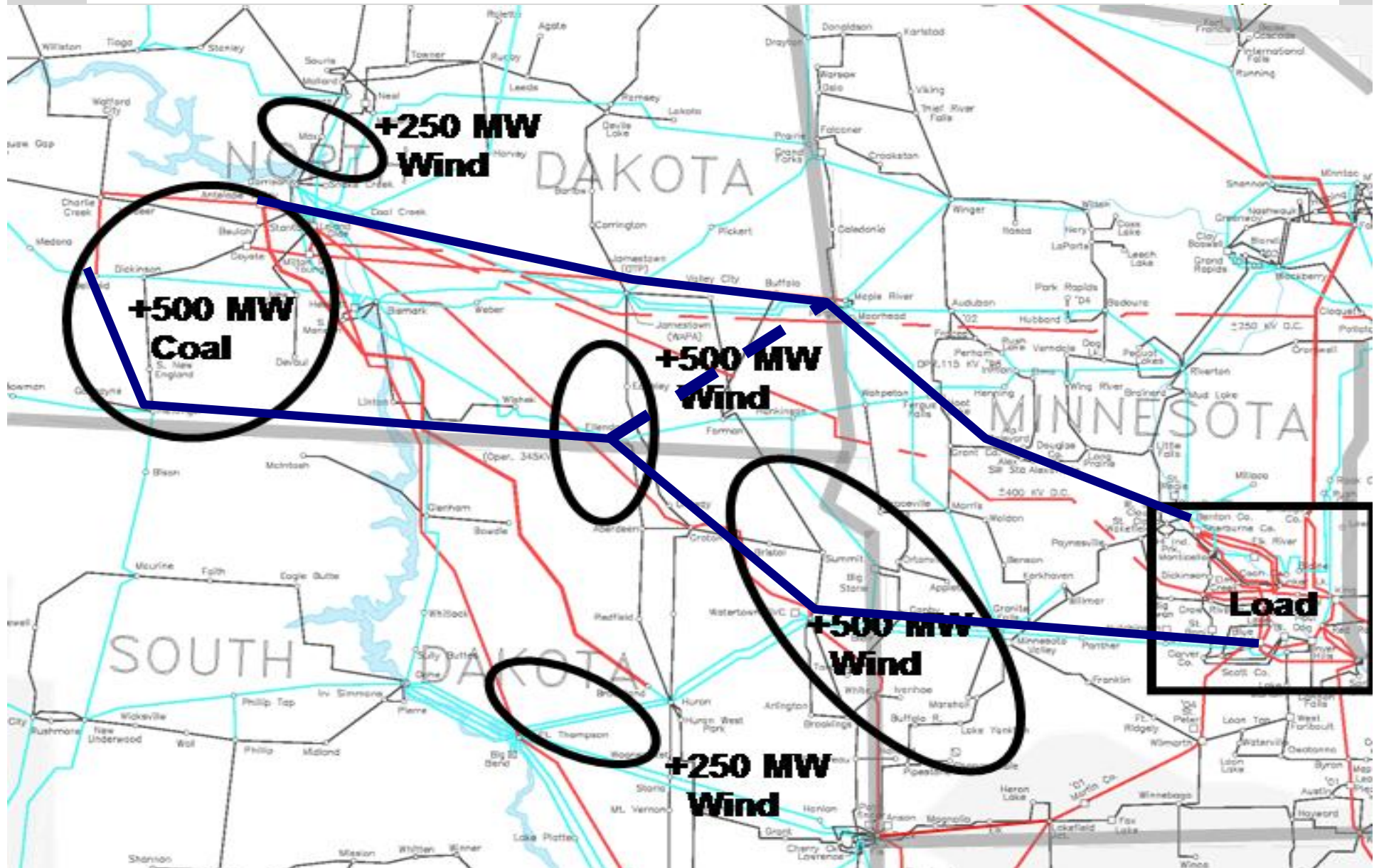
CapX Vision of Future Transmission Expansion



Northwest Exploratory Study



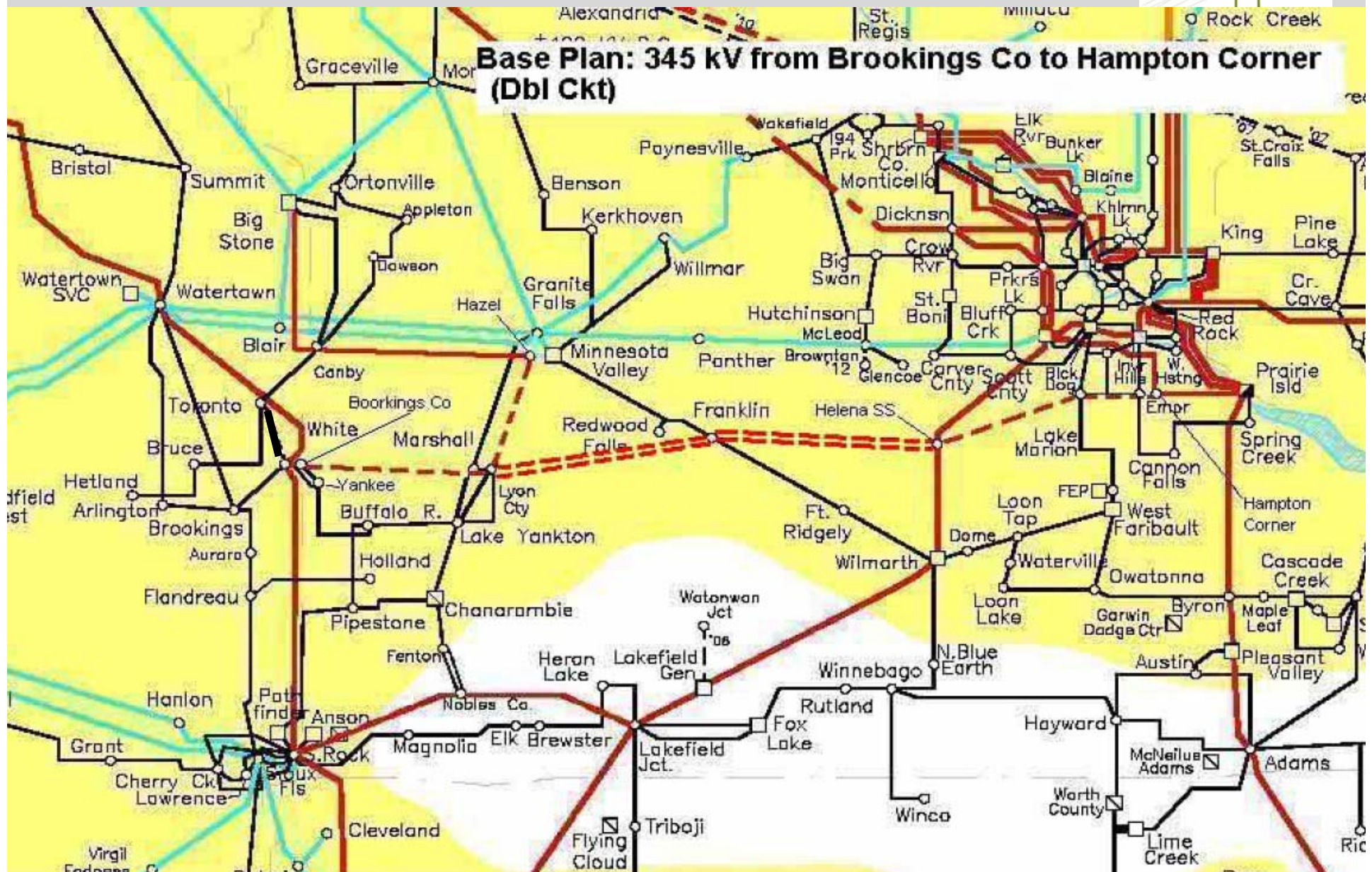
Recommended Transmission Plan



Southwest MN → Twin Cities EHV Study



SW MN → TC EHV Transmission Plan



SW MN → TC EHV Transmission Plan

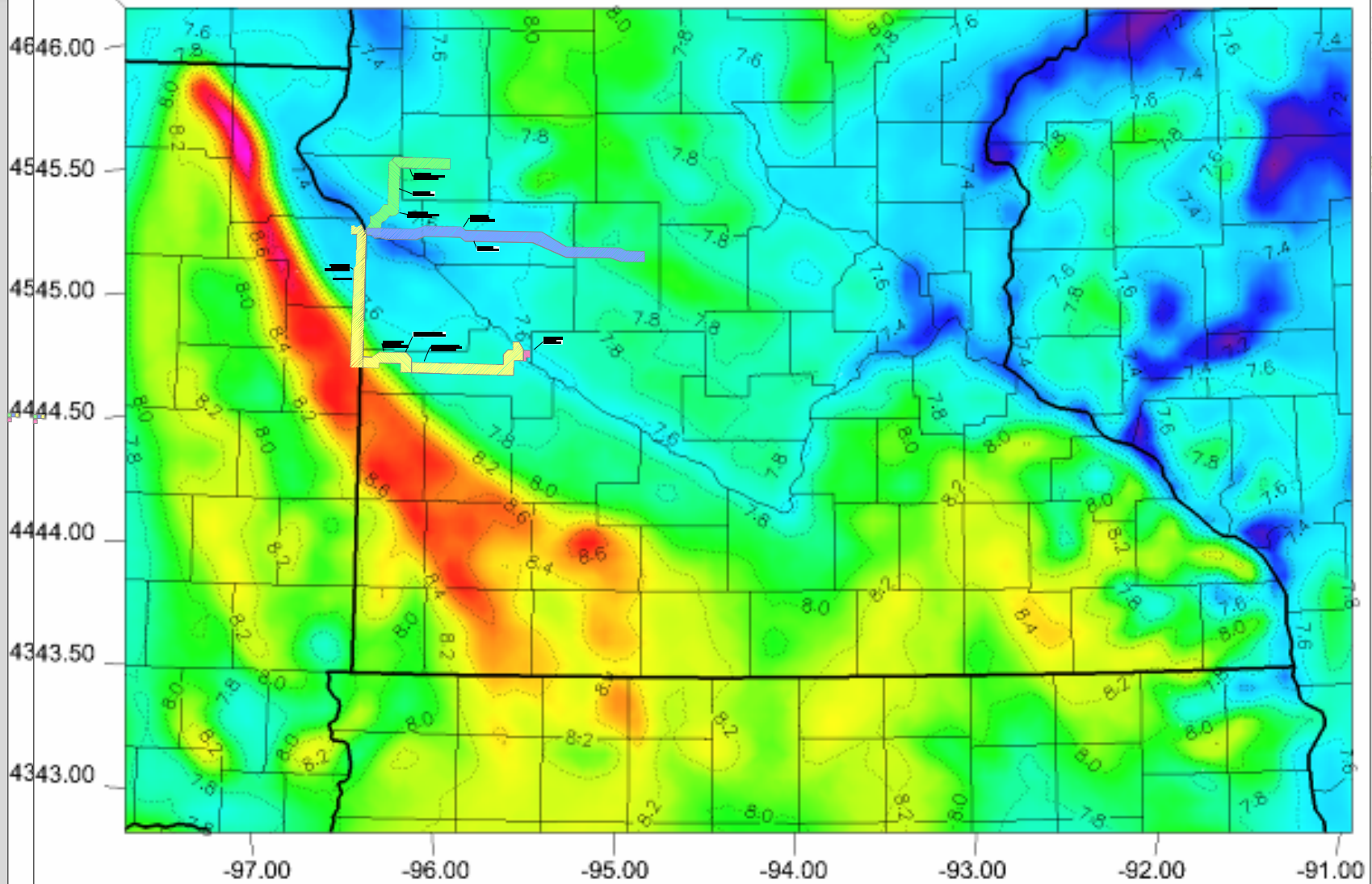


- New Transmission Plan allows for close to 1900 MW of total generation off Buffalo Ridge.
- Portions of new line will be constructed as double circuit.

Conclusions



- Big Stone II interconnection needs are satisfied by the addition of two new 230 kV transmission lines.
- Big Stone II transmission plan is consistent with long and short term regional needs.
 - Long-term: CapX 2020, NW Exploratory
 - Short-term: Buffalo Ridge Outlet Capability



AvgWindSpd m/s



Wind Speed Map of Midwest



- Big Stone – Granite Falls line proposed to extend south into high wind areas.
 - Promote new wind generation
 - Easier access to high voltage transmission system
- Alternative transmission routes for this line may not offer this benefit.



Permitting and Environmental Review Process

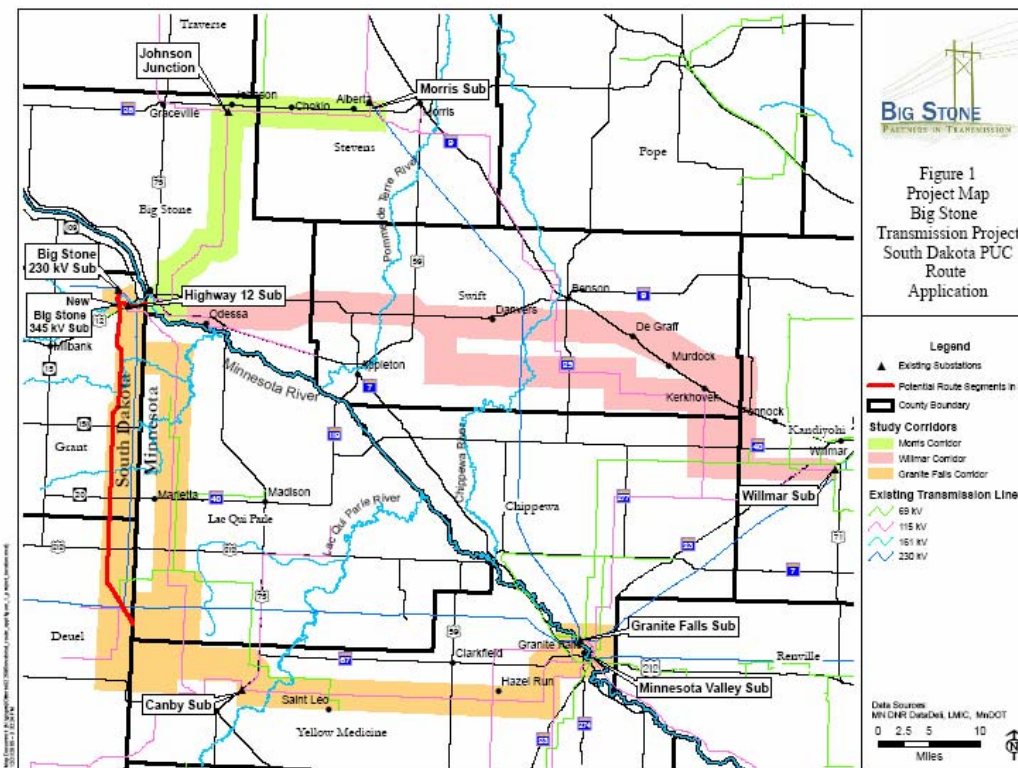
HDR ONE COMPANY | *Many Solutions*

Federal EIS Process



Federal environmental review process required for interconnection of Big Stone Transmission Project (BST) with Western Area Power Administration (Western) power grid system.

Federal EIS process identified two viable corridors for Big Stone Transmission to Granite Falls, MN



Corridor Selection Criteria



- Establish endpoints based on MISO studies
- Accommodate regional planning
- Improve system reliability
- Allow for more than one viable route
- Minimize length

Corridor Selection Criteria



- Avoid populated areas, public infrastructure and agricultural facilities
- Avoid major environmental features (natural and socioeconomic)
- Follow existing right-of-way, when feasible

SD Route Application Process



- Transmission Line Permit Application filed with the South Dakota Public Utilities Commission on January 17, 2006.

Application is required for electric transmission line and associated facilities if:

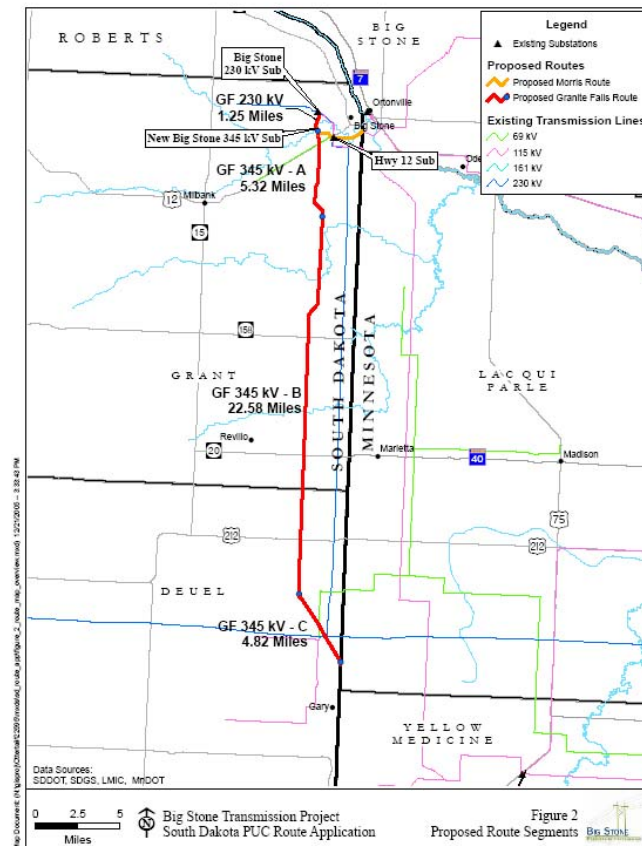
- 250 kV or greater;
- 115 kV to 250 kV of **new** line, if more than one mile does not follow section lines, property lines, roads, highways or railroads.

SD Route Application Process



- Big Stone Transmission Project includes:
 - 345 kV Transmission Line from BSP II to Granite Falls, MN (33 miles in South Dakota)
 - 230 kV Transmission Line from BSP II to Morris/Willmar, MN (4 miles in South Dakota)
 - 230 kV to 345 kV Substation south of existing BSP I

Proposed South Dakota Big Stone Transmission Routes

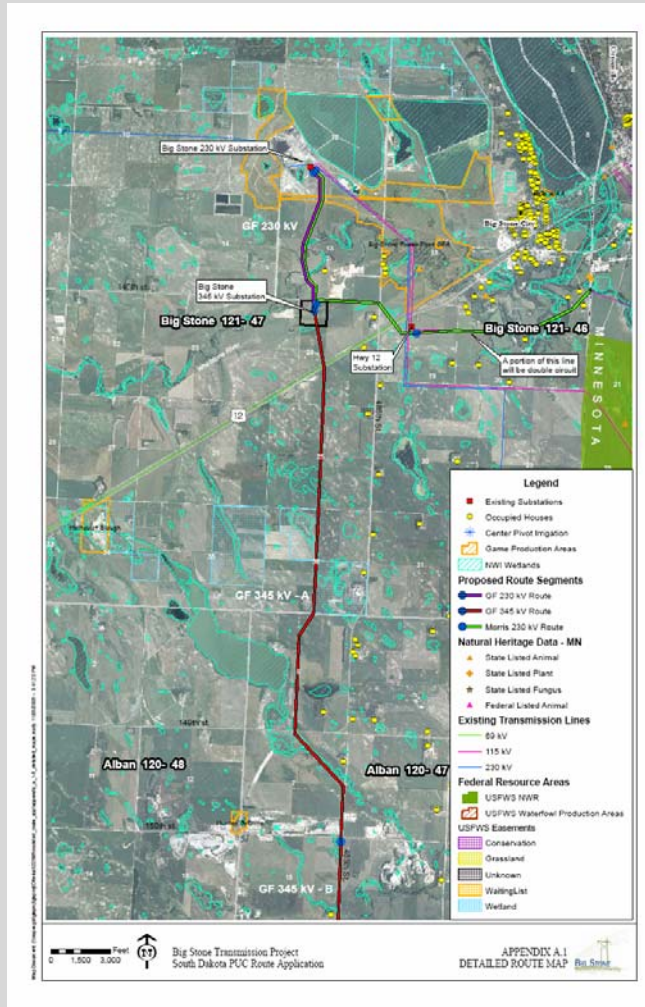


Route Selection Criteria

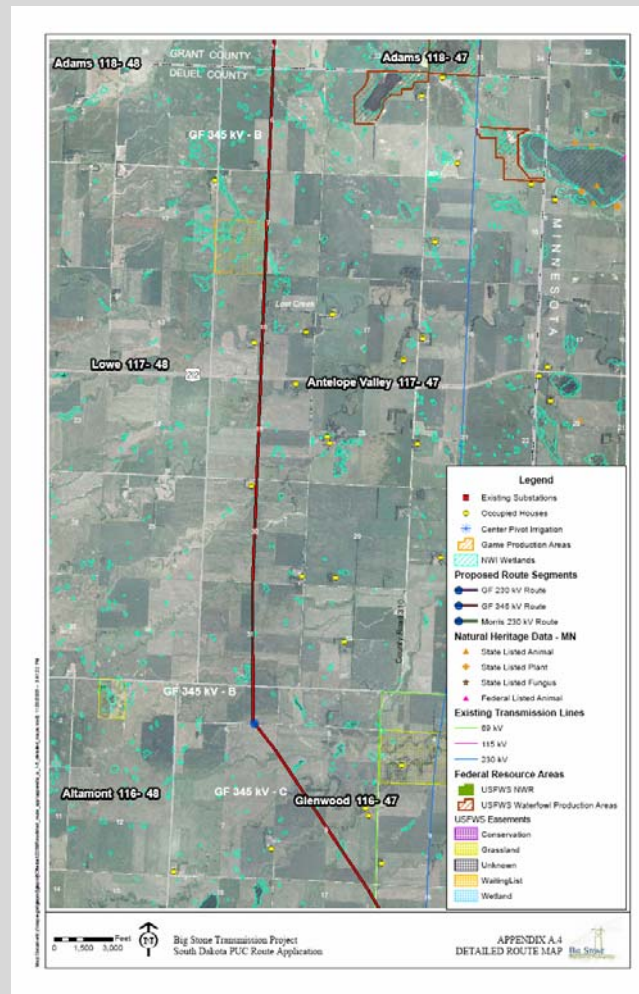


- Avoid populated areas and residences
- Improve reliability
- Minimize length
- Follow existing right-of-ways, survey lines, natural division lines and agricultural field boundaries
- Avoid public infrastructure and agricultural facilities
- Avoid environmentally sensitive resources

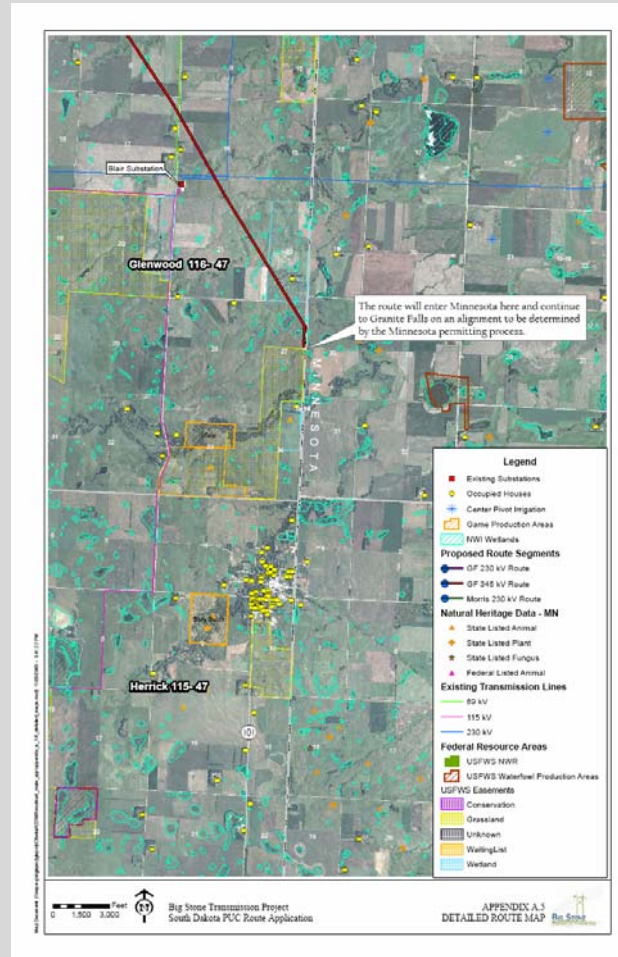
Route Selection Criteria



Route Selection Criteria



Route Selection Criteria



Route Selection Criteria



In Summary,

Proposed routes are based on the best combination of the following:

- Minimizing environmental impacts to agriculture, residents, and natural resources
- Minimizing costs
- Minimizing impacts to reliability

The Right-of-Way Process

For the Big Stone Transmission
Project

Gary Eggen



The Right-of-Way process consists of 4 parts

- Survey permission
- Option of easement
- Easement acquisition
- Crop & Land damage



Survey permission



- First step contact landowner and make sure they understand the project.
- Explain the potential impact to their property.
- Ask for survey permission.
- Pay for any damages done during survey.

Option of easement



- We will ask for a 3 year term of option.
- Content of the option will be:
 1. Legal ownership
 2. Property tract affected.
 3. Surveyed location of line.
- This will be a signed and notarized document.

Options continued



- Option payment will be 20% of estimated easement payment.
- Notice of Option will be recorded with the Register of Deeds.

Easement acquisition



- Easement will be offered to the landowner and will contain the following information:
 1. Legal ownership
 2. Property tract
 3. Description of property R/W strip

Easements continued



- This will be a signed and notarized document.
- After signing the easement will be recorded in the corresponding county.
- Payment in full will be made after the execution of the document.

Right-of-Way width to be requested



- 150 feet across or adjoining the property line.
 - 1 mile = 18 acres
 - $\frac{1}{4}$ mile = 4.5 acres
- 98.5 feet adjoining road right-of-way.
 - 1 mile = 12 acres
 - $\frac{1}{4}$ mile = 3 acres

Crop Damage



- Land Management will contact property owners to see if crop damage has occurred.
- We will fairly reimburse the property owner/tenant or both(if applies) for any damage done.



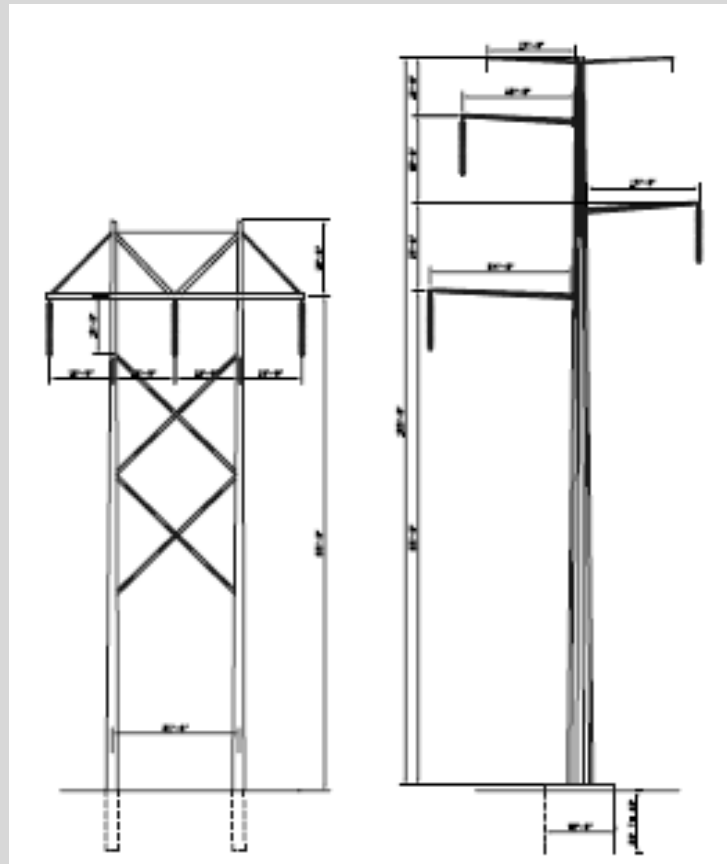
Construction

The Construction Process

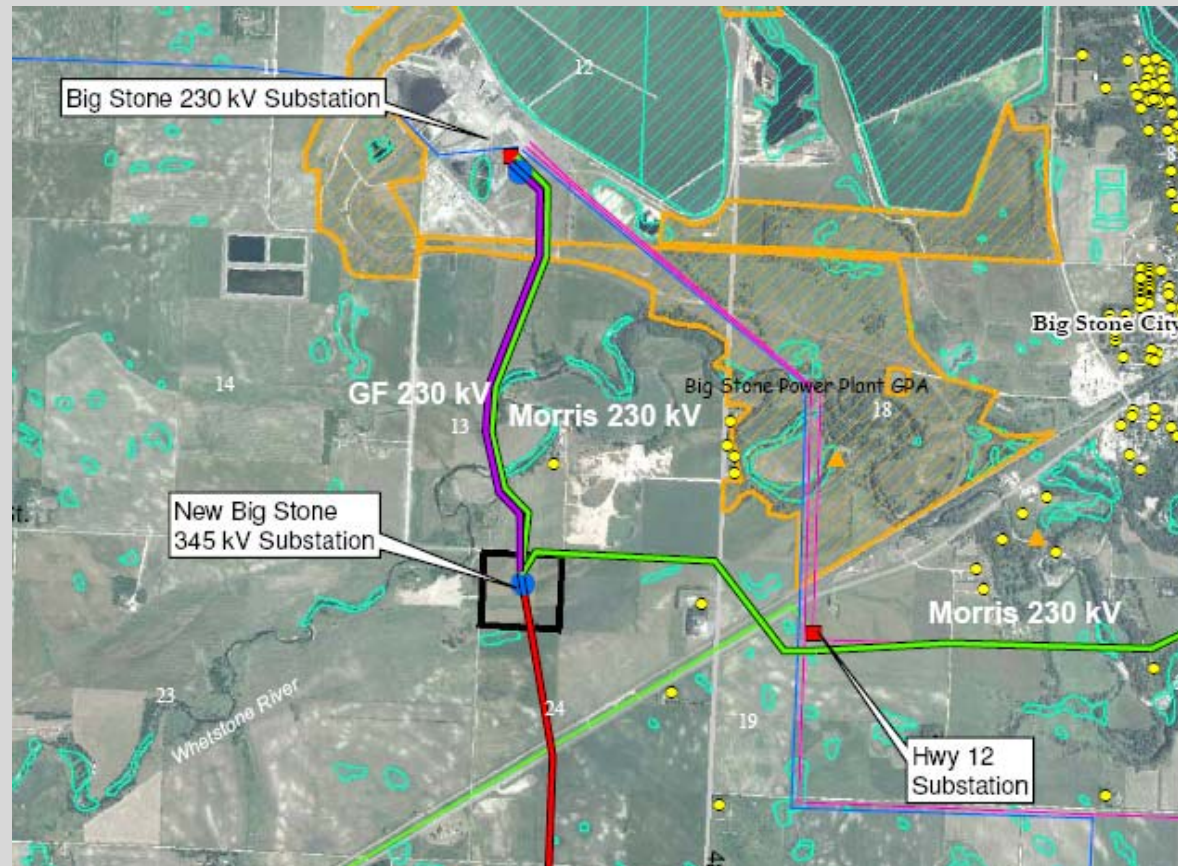


- Survey
 - Engineering and environmental
- Finalize design
 - Engineering and land owners
- Place pole
- String wire
- Clean up
- Damage restoration

Structure types



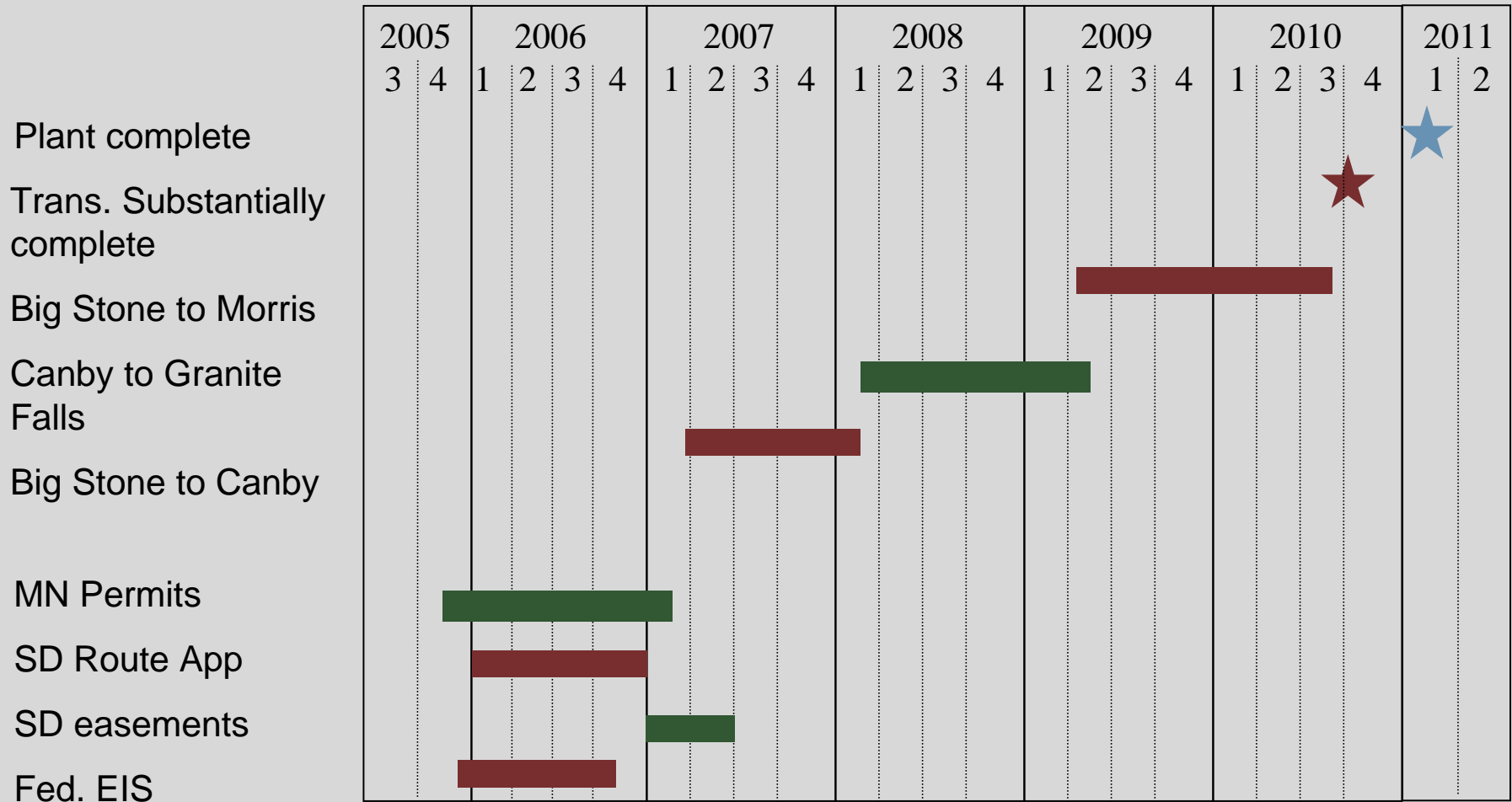
345 kV substation



Typical Hi-voltage substation



Schedule



Conclusions



- Proposal for the South Dakota portion:
 - Build 230 kV line from Big Stone to Ortonville
 - Build 345 kV line from Big Stone to Canby, MN but operate at 230 kV
- Benefits
 - Provide customers with low cost reliable electricity
 - Improve system reliability
 - Increase transmission system capability