4.0 Alternatives to the Proposed Project

Certificate of need (CN) proceedings evaluate whether a proposed project is needed, or whether there is some other project that would be more appropriate for the State of Minnesota, for example, a project of a different type or size, or a project that is not needed until further into the future. Environmental review in a CN proceeding provides the Commission and the public with information on the potential human and environmental impacts of a proposed project and those alternatives that could meet the stated need.

In accordance with the scoping decision, this environmental impact statement (EIS) analyses those alternatives to the project listed in Minnesota Rules, part 7849.1500. **These alternatives are commonly referred to as system alternatives.** This analysis includes discussion of whether **these system** alternatives are feasible and available, and, if so, whether they can meet the need for the project. Additionally, included here is discussion of the potential human and environmental impacts of the alternatives that could meet the project's need. Analysis of the specific impacts and potential mitigation measures for ITCM's project is provided in Sections 5 and 6. The alternatives discussed here are:

- No-build alternative
- Demand side management
- Purchased power
- Transmission line of a different size, including upgrading an existing transmission line
- Generation rather than transmission
- Use of renewable energy resources

Of these, as discussed further below, the transmission line alternatives are the only alternatives that are feasible and available and that could meet the stated need for the project. However, based on studies by ITCM and the Midcontinent Independent System Operator (MISO), these transmission alternatives are less effective in meeting the need than ITCM's project.

4.1 Need for the Project

ITCM indicates in its CN application that its proposed project is needed to enhance regional electrical reliability, to increase transmission capacity to support additional generation, and to reduce congestion on the electrical grid:

- **Regional reliability.** ITCM indicates that its proposed project would improve regional electrical reliability by relieving heavy loading on the existing 161 kV transmission system in southern Minnesota. The project would eliminate reliance on system operating procedures that have been used, as a stopgap measure in lieu of transmission upgrades, to enable new wind and natural gas generators to interconnect to the electrical grid.

- **Capacity to support additional generation.** ITCM indicates that the project would increase the transmission system's ability to transfer generation, particularly wind generation, throughout the region. Currently, energy created by wind generation in southern Minnesota cannot always be delivered to existing loads due to system constraints. That is, energy is being generated, but cannot be sent to customers – whether 10 miles or 100 miles away – because there is not enough room, so to speak, for this power on existing transmission lines.

- **Reduced congestion and lower costs.** ITCM indicates that the project would reduce congestion on the regional transmission grid, resulting in lower cost energy for Minnesota consumers. Congestion on electrical lines, similar to congestion on freeways, causes inefficiencies in the delivery of electrical energy and tends to raise the price of energy to consumers. Reducing congestion on the transmission grid tends to reduce, relatively, the price of delivering energy and, ultimately, the price to consumers.

ITCM notes that the need for its project has been substantiated by its own studies and by those of MISO. MISO is the operator of the electrical grid in 15 states, including Minnesota and the province of Manitoba (the midcontinent region). MISO ensures the safe, reliable and cost-effective delivery of electrical power throughout this region. Among MISO's duties is to facilitate a planning process for determining the electrical transmission projects that are needed in the region. Additionally, MISO conducts studies to determine those projects that best meet identified transmission needs.

ITCM's project was studied in MISO's Transmission Expansion Plan 2011 (MTEP 11) and was designated

by MISO as a multi-value project (MVP) Project 3 (Reference 4). Projects designated by MISO as MVPs have been determined by MISO to meet public policy needs (e.g., state renewable energy goals) to provide economic value, and to address reliability concerns. The studies conducted in support of this designation indicate that ITCM's project best meets the need for the project and is the best performing of the alternatives studied.

For the discussion of alternatives here, it assumed that the underlying need for the project is as stated by ITCM and supported by MISO's MVP designation in MTEP 11.

4.2 No-Build Alternative

Under the no-build alternative, ITCM's project would not be constructed and all other electrical transmission facilities in southern Minnesota would remain as is.

The no-build alternative would not meet the need for the project. This alternative does not provide an outlet for current or future wind generation – a situation which could adversely affect Minnesota's (and other states') ability to meet mandated renewable energy goals. This alternative does not address heavy loading on the existing 161 kV system in southern Minnesota nor does it relieve congestion on the existing transmission grid. These shortcomings would likely lead to higher prices for **electricity** in the project area.

The no-build alternative would have no direct human or environmental impacts. It would, however, adversely affect the transmission grid and reduce reliability. In addition, it would adversely affect wind farm development, thereby keeping Minnesota from achieving its renewable energy goals and foregoing the economic and environmental benefits associated with wind farms.

4.3 Demand Side Management

Rather than increasing the supply of electricity, demand side management (i.e. conservation) would reduce the demand for electricity such that the existing transmission system in the area could operate reliably and efficiently. Such measures would likely need to be phased in over time and any proposed load growth in the area (e.g., new homes, new businesses) would need to be offset through further conservation.

ITCM is an electric transmission company; it does not operate electrical generation plants or provide retail electric service. ITCM does supply electrical power to local utilities that, in turn, serve retail customers. As ITCM does not directly serve retail customers, it has no means – conservation carrots or sticks – to make retail customers reduce their energy usage. Thus, this alternative is inapplicable to ITCM. ITCM cannot implement the alternative.

Additionally, even if demand side management could be implemented by ITCM, there would still remain an unmet need – the ability to deliver existing and future wind generation to regional load centers. Further, ITCM's analysis shows that reduced loads within the project area would only exacerbate the transmission shortage (Reference 5). This is because decreased electricity use within the project area would result in even more surplus generation that must be exported to regional load centers over the existing transmission system.

4.4 Purchased Power

Under a purchased power alternative, power would be purchased from existing sources, rather than generated by a new generating plant. This alternative is more relevant to a site permit application for a large electric power generating plant than a route permit for a transmission project.

This alternative does not meet the need for the project. Purchasing power would not enhance regional electrical reliability, increase transmission capacity to support additional generation, or reduce congestion on the electrical grid. The need for the project is of a transmission nature, not generation. Purchased power would still have to be delivered along an inadequate electrical transmission system.

4.5 Transmission Line of a Different Size

Under this alternative, the need for the project would be met by a transmission line of a different size – such as a line with a different voltage or with different endpoints. Transmission line alternatives are available, feasible and could meet the need for the project. Studies of transmission alternatives by ITCM and MISO indicate that ITCM's project (MVP Project 3) best meets the need for the project and is the best performing of the alternatives studied.

4.5.1 Projects with Different Voltages

Transmission line voltages in the project area range from 115 kV to 345 kV. Some lines operate at 69 kV,

a voltage that is considered a transmission voltage **in the project area**. Because higher voltage lines have the capability to move power more efficiently over long distances, ITCM considered voltages of 550 kV and 765 kV.

There are currently no existing transmission lines at these higher voltages in southern Minnesota or northern Iowa. Thus, any additions of these voltages would require extensive substation upgrades, which would impose significant costs. Further, studies by ITCM and MISO have indicated that these higher voltages are not warranted – the need for the project can be met by 345 kV lines and lines of lower voltage.

ITCM also considered lower voltage lines (230 kV, 161 kV, 138 kV, 115 kV and 69 kV). There are no existing 230 kV or 138 kV lines in the project area, so these voltages were eliminated from further consideration as they would require significant substation upgrades. The 115 kV and 69 kV voltages, on the other hand, would be unable to provide enough capacity to improve reliability or support additional generation.

Thus, of the voltages considered as an alternative to the project, 161 kV was the only voltage that could potentially meet the need for the project without imposing significant substation upgrade costs and without introducing a new transmission voltage into the project area. Consequently, ITCM evaluated upgrading its existing 161 kV facilities to meet the need for the project.

4.5.2 Upgrading Existing 161 kV Facilities

As an alternative to the project, ITCM studied the feasibility of upgrading its existing Lakefield to Border 161 kV line to meet the need for the project. This line runs from the Lakefield Junction substation, eastward through the Fox Lake and Rutland substations, to the Winnebago Junction substation and then south to the Iowa border.

To be successful as an alternative to the project, an upgraded 161 kV line would have to carry more power than the existing line. The existing conductor for the 161 kV line is rated at 168 megavolt-amperes (MVA). ITCM studied installing a larger, heavier conductor for this line, with a rating of 446 MVA. The structures for the 161 kV line would need to be replaced to properly support this new, heavier conductor.

ITCM performed an analysis comparing the performance of its project to that of the 161 kV line upgrade alternative across a range of scenarios (Reference 6). This analysis indicated that: (1) the upgraded line was inferior to ITCM's project in increasing outlet capacity for additional generation; and (2) the upgraded line was a less robust response to the project need. That is, an upgraded 161 kV line would reach its capacity sooner than a 345 kV line. Thus, ITCM concluded that an upgraded 161 kV line would not be an appropriate project to the meet the region's transmission needs.

The types of human and environmental impacts of an upgraded 161 kV line, were it to be constructed, would be similar to those of route A of ITCM's project, although there are some differences in the potential extent of those impacts. Route A follows, to a great extent, the existing Lakefield to Border 161 kV line (see Sections 5 and 6 for a detailed discussion of the potential human and environmental impacts of route A).

According to ITCM, the 161 kV upgrade would require relatively smaller structures (70 to 100 feet tall) and narrower rights-of-way (ROWs) (150 feet), but have relatively shorter spans (typically 700 feet). The 345 kV line would require larger structures (160 to 190 feet tall) and wider ROWs (200 feet), but have relatively longer spans (typically 900 feet). Both 161 kV and 345 kV structures would require foundations approximately eight feet in diameter.

Thus, there is a trade-off – a larger number of smaller structures versus a smaller number of larger structures. The potential for aesthetic impacts from transmission structures and clearing of ROW is likely larger for 345 kV lines, while the potential for ground disturbance would likely be greater for 161 kV lines. When following the existing 161 kV route, the 161 kV upgrade would presumably fit within the existing ROW, while the 345 kV line would require expansion of the ROW by 50 feet. As a 345 kV line would have relatively longer spans, it could be capable of spanning natural resources (e.g., wetlands) that could not be spanned by a 161 kV upgrade. Finally, while overall potential impacts per mile could arguably be lower for a 161 kV upgrade, such an upgrade would have less transmission capacity, which could require that additional new transmission lines be constructed sooner.

In conclusion, while the 161 kV rebuild alternative may have potential for reduced human and environmental impacts, ITCM's analysis indicates that it is less effective than a 345 kV line at meeting the need for the project.

4.5.3 Projects with Different Endpoints

ITCM and MISO studied three 345 kV alternatives with different endpoints: (1) the Spencer-Hazelton and Lakefield Junction-Mitchell County lines; (2) the Lakefield Junction-Rutland line; and (3) the Lakefield Junction-Adams line. Conceptual routes associated with these alternative endpoints are presented in Map 4-1. According to analyses performed by MISO, none of these alternatives performed as well as the combination of ITCM's Project (MVP Project 3) and MVP Project 4 (a separate 345 kV line in Iowa) (Reference 6). These alternatives were not as effective at removing transmission constraints or increasing transfer capacities. For further discussion of these alternatives, see Section 6.2.3 of Reference 7.

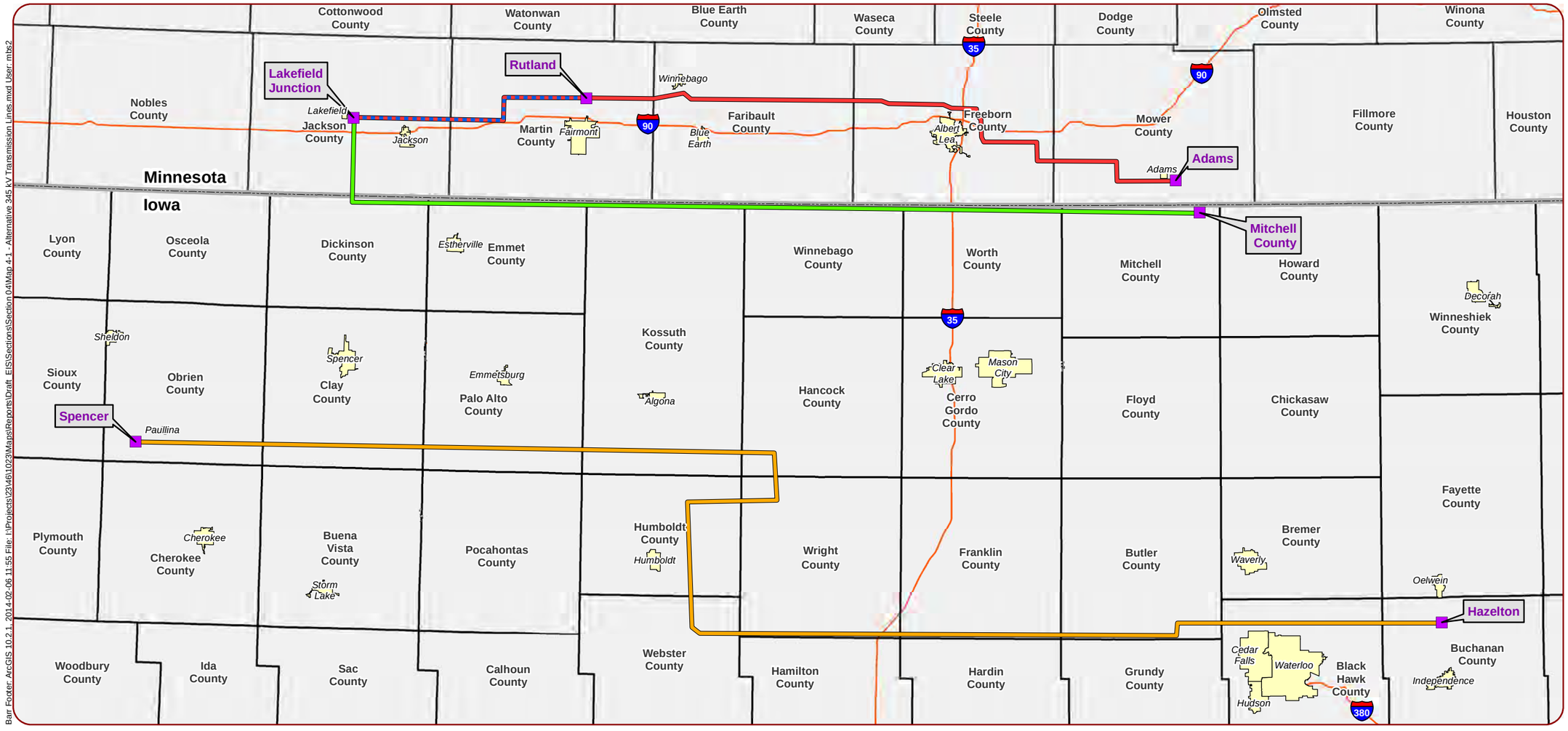
The human and environmental impacts of one of these alternatives, were it to be constructed, would be similar to those of ITCM's project. All of the alternatives are 345 kV lines that proceed across predominantly agricultural landscapes in southern Minnesota and northern Iowa. Assuming that many impacts could be mitigated by prudent routing, for example, impacts to human settlements, the differences in impacts would likely be related to the lengths of the projects. For example, relatively longer 345 kV lines would have relatively greater impacts to agricultural operations. Of the alternatives studied, only the Lakefield Junction – Rutland line (a subset of ITCM's project) appears substantially shorter than ITCM's project and thus likely would have fewer impacts than ITCM's project.

4.6 Generation Rather than Transmission

Adding generation rather than transmission would not meet the need for the project. The need for the project is due to difficulties in moving electrical energy across the electrical grid. The problem is not a lack of generation; the problem is a lack of transmission. There are, to put it simply, not enough wires of sufficient size to deliver the generation that is already occurring in the area and that is anticipated in the near future.

4.7 Use of Renewable Energy Resources

Under this alternative, the need for the project would be met by new generation through renewable energy resources. As noted above, generation – no matter the energy source – does not meet the need for the project. To the extent that the project interconnects generation in the project area, it provides additional outlet capacity for existing wind energy production (a renewable resource) and anticipated future production.



Barr Foster ArcGIS 10.2.1, 2014-02-06 11:55 File: I:\Projects\23\46\1023\Maps\Reports\Draft EIS\Sections\Section 04\Map 4-1 - Alternative 345 kV Transmission Lines.mxd User: mbs2

0 15 Miles
0 30 Kilometers

- Substation Location

Transmission Alternative from Past Study

- Lakefield Junction-Rutland 345 kV Line
- Lakefield Junction-Adams 345 kV Line
- Lakefield Junction-Mitchell County 345 kV Line
- Spencer-Hazelton 345 kV Line

- Municipal Boundary
- County Boundary
- State Boundary

Map 4-1

Alternative 345 kV Transmission Lines
Minnesota-Iowa 345 kV
Transmission Project
ITC Midwest LLC

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