STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE APPLICATION OF NORTHERN STATES POWER COMPANY AND ITC MIDWEST LLC FOR A CERTIFICATE OF NEED FOR THE HUNTLEY-WILMARTH 345 KV TRANSMISSION LINE PROJECT	Docket No. E002, ET6675/CN-17-184 OAH Docket No. 82-2500-35157
IN THE MATTER OF THE APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A ROUTE PERMIT FOR THE HUNTLEY-WILMARTH 345 KV TRANSMISSION LINE PROJECT	Docket No. E002, ET6675/RP-17-185 OAH Docket No. 82-2500-35157

DIRECT TESTIMONY OF

GRANT D. STEVENSON

On Behalf of

NORTHERN STATES POWER COMPANY,
A MINNESOTA CORPORATION

and

ITC MIDWEST LLC

September 6, 2018

Exhibit ___(GDS-1)

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Grant D. Stevenson, and my business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as a Senior Transmission Project Manager by Xcel Energy Services Inc., the service company provider for Northern States Power Company, doing business as Xcel Energy (Xcel Energy). As part of my job responsibilities, I am the Project Manager for the Huntley – Wilmarth 345 kilovolt (kV) Transmission Line Project (Huntley – Wilmarth Project or Project) and am primarily responsible for scope, cost, schedule, and risk management of the Project.

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I graduated from the University of Minnesota in 1986 with a Bachelor's degree in Mechanical Engineering. After graduation, I joined Northern States Power Company, a Minnesota corporation, and have held various positions in engineering and project management at power plants, developing conservation programs for commercial/industrial customers and assisting retail customers in solving reliability and power quality issues. I became a Transmission Project Manager in September 2000. Transmission Project Managers guide project teams to manage scope, schedule, and cost of substation and transmission line projects. Some of my specific assignments include serving as a Transmission Project Manager for Xcel

Energy's 825 megawatt (MW) wind outlet transmission projects in southwestern Minnesota, which included more than 500 miles of transmission lines and affected 29 substations. In August 2006, I was assigned to the CapX2020 projects. Since 2006, I have been primarily responsible for managing the CapX2020 projects, although I managed several other smaller transmission line projects at the same time. On the CapX2020 projects, my primary responsibility was the permitting and construction phases of the Hampton-Rochester-La Crosse 345 kV Project (CapX La Crosse Project). The CapX La Crosse Project consisted of 156 miles of 345 kV connecting Wisconsin and Minnesota, two 161 kV transmission lines, three new substations, and modifications at several other substations. My responsibilities included assisting our routing lead in route development and state permitting, including active participation in public outreach, direct oversight and coordination of design, real estate acquisition, construction and contracting, managing the project budget, and reporting to the project's ownership committee. I have been a witness in multiple transmission permitting dockets, including eight previous Minnesota dockets. My resume is attached as Exhibit___(GDS-1), Schedule 1.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am testifying on behalf of Xcel Energy and ITC Midwest LLC (ITC Midwest) (collectively, Applicants) for a Certificate of Need and Route Permit for the Huntley – Wilmarth Project.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide information regarding the Project's design options, costs, and schedule.

Q. WHAT SCHEDULES ARE ATTACHED TO YOUR TESTIMONY?

A. Schedule 1: Resume of Grant Stevenson; and

Schedule 2: Cost Estimate Summary for Scoping Route Segments.

Q. ARE YOU AVAILABLE TO PROVIDE TESTIMONY IN SUPPORT OF PARTICULAR SECTIONS OF THE CERTIFICATE OF NEED AND ROUTE PERMIT APPLICATIONS?

A. Yes. I am testifying in support of the following sections of the Certificate of Need Application: Section 2.1 (Project Description); Section 2.3 (Design Alternatives); Section 2.4 (Project Costs); Section 2.5 (Project Schedule); and Chapter 7 (Transmission Line Construction and Maintenance). I am also testifying in support of the following sections of the Route Permit Application: Section 2.5 (Transmission Structure and Conductor Design); Section 2.7 (Associated Facilities); Section 2.8 (Project Schedule); Section 2.9 (Project Costs); Section 5.2 (Construction Procedures); Section 5.3 (Restoration Procedures); and Section 5.4 (Maintenance Procedures).

II. TRANSMISSION LINE ROUTES AND DESIGN

Q. PLEASE PROVIDE AN OVERVIEW OF THE PROJECT.

A. The Huntley – Wilmarth Project consists of a new, approximately 50-mile 345 kV transmission line connecting Xcel Energy's Wilmarth Substation located in northern Mankato, Minnesota, with ITC Midwest's Huntley Substation, south of Winnebago, Minnesota. The Project also includes the necessary modifications to the existing Huntley and Wilmarth substations to accommodate this 345 kV transmission line. The Applicants' proposed four route alternatives for the Project in the Route Permit Application: Purple, Green, Red, and Blue Routes, which traverse Blue Earth, Faribault, Martin, and Nicollet counties in Minnesota.

Q. WHAT TYPE OF STRUCTURES DO THE APPLICANTS PROPOSE TO USE FOR THE 345 KV TRANSMISSION LINE?

A. The Applicants propose to mainly use steel pole structures, in either a single-pole (monopole) or a two-pole (H-frame) design. The monopole structures will be a single-circuit design if they accommodate only the new 345 kV transmission line. The monopole structures can be a double-circuit design in areas where the route follows existing transmission line corridors and will accommodate both the new 345 kV line and an existing transmission line on the same structure. The H-frame structures will only be a single-circuit design. Thus, the three typical structure design options are: (1) single-circuit monopole, (2) double-circuit monopole, and (3) single-circuit H-frame. A monopole structure is typically installed on a concrete foundation while an H-frame structure can either be installed on two concrete foundations or embedded in the ground in steel culverts.

Q. WHY ARE THE APPLICANTS PROPOSING MULTIPLE STRUCTURE DESIGNS FOR CERTAIN ROUTES?

A. The structure design that is selected affects the Project's costs, which are a key input in evaluating the need for the Project, as the Applicants' witness Mr. Andrew Siebenaler will describe in more detail. The Applicants are proposing several structure design options for each route to enable the Commission to select an option that provides the appropriate balance between the economic-based need for the Project and the goal of minimizing the Project's potential impacts to human and natural environments

Q. CAN YOU SUMMARIZE THE DIFFERENT DESIGN OPTIONS FOR EACH ROUTE?

A. Yes. **Table 1** summarizes the design options by route.

Table 1: Proposed Design Options by Route

Proposed Route	Design Option
Purple Route	All Single-Circuit, H-frame, including parallel to the existing 345 kV transmission line starting west of Lake Crystal to the Wilmarth Substation, with the exception of crossings of: (1) Minneopa State Park, and (2) the Nelson Waterfowl Production Area (WPA). In these areas, the line will be double-circuited with the existing transmission line in the existing transmission line easement areas.

	All Single-Circuit, monopole, including parallel to the existing 345 kV transmission line starting west of Lake Crystal to the Wilmarth Substation, with the exception of crossings of: (1) Minneopa State Park, and (2) the Nelson Waterfowl Production Area (WPA). In these areas, the line will be double-circuited with the existing transmission line in the existing transmission line easement areas.
	Single-Circuit Monopole on the southern portion of the route and Double-Circuit, Monopole with the existing 345 kV line starting west of Lake Crystal to the Wilmarth Substation.
Green Route	Single-Circuit, H-frame
	Single-Circuit, Monopole
Red Route	Double-Circuit, Monopole and Single-Circuit, H-frame
	Double-Circuit, Monopole and Single-Circuit, Monopole
Blue Route	Double-Circuit, Monopole and Single-Circuit, H-frame
	Double-Circuit, Monopole and Single-Circuit, Monopole

Q. IN ADDITION TO THE APPLICANTS' FOUR PROPOSED ROUTE ALTERNATIVES, ARE THERE OTHER ROUTES UNDER CONSIDERATION IN THIS PROCEEDING?

A. Yes. During the scoping process for the Environmental Impact Statement (EIS), one new route (Purple-E-Red), 13 route segment alternatives, and three alignment alternatives were proposed and included in the scope of the EIS. In addition, five of the six alternative route segments proposed by the Applicants in the Route Permit Application (Segments A, B, D, E, and F) were also carried forward for analysis in the EIS.

Q. WHAT ARE THE DESIGN OPTIONS FOR THESE SCOPING ALTERNATIVES?

A. For the new route, the Purple-E-Red Route, the design options are the same as the Purple and Red routes. The remaining scoping alternatives are route segment alternatives and will utilize the same design as the portion of the route that they will replace.

Q. FOR THOSE ROUTES THAT FOLLOW EXISTING TRANSMISSION LINE CORRIDORS, WILL THE NEW DOUBLE-CIRCUIT STRUCTURES BE PLACED ON THE SAME CENTERLINE AS THE EXISTING TRANSMISSION LINE?

A. Yes, with the exception of the northern portions of the Purple and Red routes. After exiting the Wilmarth Substation, both the Purple and Red routes follow an existing 345 kV transmission line corridor. This existing 345 kV transmission line corridor does not follow property lines due to its predominantly diagonal orientation. To allow this existing 345 kV line to remain in service during the construction of the Project, the Applicants propose to offset the new double-circuit structures 100 feet to the north and northwest of the existing line for 18.5 miles of the Purple Route from the Wilmarth Substation to Minnesota Highway 60 west of Lake Crystal. On the Red Route the length of this offset corridor is approximately four miles from the Wilmarth Substation to the location where the Red Route turns south near the City of North Mankato. After the new line is constructed and the old line removed, Xcel Energy will release the existing transmission line easement to the extent that it is not needed for the new double-circuit structures.

Q. ARE THERE ANY AREAS ALONG THE PROPOSED ROUTES THAT WILL REQUIRE THE USE OF SPECIALTY STRUCTURES?

A. Yes. Certain areas may require multiple pole or other specialty structures. Examples of such areas include locations where the route changes direction, along highways, or in environmentally sensitive locations. For instance, three-pole structures may be used on all proposed routes to accommodate large angles where the transmission line route changes direction.

Q. WHAT IS THE TYPICAL RIGHT-OF-WAY WIDTH THAT WILL BE ACQUIRED FOR THE PROJECT?

A. The Project's typical right-of-way width will be 150 feet.

Q. WHAT ARE THE ANTICIPATED SPAN LENGTHS FOR THE PROJECT?

A. The typical span lengths between structures will be 900 to 1,000 feet. In some circumstances design requirements or topography may require longer or shorter spans.

Q. HOW TALL ARE THE TYPICAL STRUCTURES FOR THE PROJECT?

A. The proposed structures will typically range in height from approximately 75 feet to 170 feet depending on structure type and topography. Generally speaking, single-circuit H-frames are shorter with the majority of structures 100 to 120 feet tall; single-circuit monopoles are approximately 20 feet taller than H-frames; and double-circuit monopoles are approximately 40 feet taller than H-frames.

Q. WHAT TYPE OF CONDUCTOR DO THE APPLICANTS PROPOSE TO USE FOR THE PROJECT?

A. The proposed conductors for the Project will consist of double bundled, twisted pair Dove (2-556.5 kcmil) Aluminum Conductor Steel Reinforced (ACSR) cables, or cables with comparable capacity. The 345 kV twisted pair conductors will have a capacity equal to or greater than 3,000 amps.

III. PROJECT COSTS

Q. HOW MUCH WILL THE PROJECT COST?

A. The cost of the Project will depend, in part, on the route/design selected by the Commission. As summarized in **Table 2** below, the total Project costs for the nine routes/design options proposed in the Application range from $105.8 million to $138.0 million (2016$). These costs include all transmission line costs, right-of-way costs, risk contingencies for the transmission line and cost for substation modifications at both the Wilmarth and Huntley substations, and Allowance for Funds Used During Construction (AFUDC).

Table 2: Total Project Costs ($2016)

Design Option	Route Option			
	Purple Route (West Route) ($Millions)	Green Route (Middle Route) ($Millions)	Red Route (Middle Route) ($Millions)	Blue Route (East Route) ($Millions)
Single-Circuit H-frame		$109.0		
Single-Circuit Monopole		$121.3		
Single-Circuit Parallel H-frame	$105.8			
Single-Circuit Parallel Monopole	$121.7			
Double-Circuit Monopole and Single-Circuit H-frame			$135.2	$123.7
Double-Circuit Monopole and Single-Circuit Monopole	$137.9		$138.0	$135.8

Q. WHY DID THE APPLICANTS DEVELOP ROUTE- AND DESIGN-SPECIFIC COST ESTIMATES FOR THE PROJECT?

A. This Project is an economic project, and the costs of the Project impact the net benefits of the Project. To provide the Commission with the best information possible to find the appropriate balance between cost concerns associated with an economic project while at the same time minimizing impacts to the human and natural environment as required by the State routing rules, the Applicants developed route-specific and design-specific cost estimates and design-specific net benefits. For instance, the double-circuit monopole design option minimizes agricultural impacts by placing two lines on a single pole but also has a higher cost that lowers the net economic benefit of the Project.

Q. WHAT PROCESS DID THE APPLICANTS USE TO DEVELOP THE COST ESTIMATES FOR THE ROUTES AND DESIGNS PROPOSED IN THE ROUTE PERMIT APPLICATION?

A. Due to the role of costs in determining the need for this Project, the Applicants implemented an enhanced cost estimation process for this Project. This process is described in detail in pages 31-34 of the Certificate of Need Application. As the Applicants developed cost estimates for this Project, we were able to draw upon our extensive, recent experience in constructing high voltage transmission infrastructure in the Midwest region, including cost information for these prior transmission projects.

Q. DID THE APPLICANTS DEVELOP COST ESTIMATES FOR THE ROUTE ALTERNATIVE, SEGMENT ALTERNATIVES, AND ALIGNMENT ALTERNATIVES PROPOSED DURING SCOPING?

A. Yes. These costs are summarized in Exhibit___(GDS-1), Schedule 2. The lowest cost alternative is the Purple Route, single-circuit H-frame design with Alternative Segments F and J at $104.8 million (2016$). The highest cost alternative is the Purple-E-Red Route, double-circuit design with Alternative Segments E, Y, and Q at $160.7 million (2016$).

Q. CAN YOU EXPLAIN HOW THE DATA PRESENTED IN SCHEDULE 2 CAN BE USED TO DETERMINE THE COST OF A PARTICULAR SEGMENT ALTERNATIVE?

A. Yes. The "Affected Route" column has colors that indicate which of the Applicants' four routes is impacted by the proposed segment alternative. Then, the "Segment Name" column includes either a name of a segment alternative from the EIS Scoping Decision or includes the word "Base" followed by a segment alternative name. The term "Base" indicates that the shown costs are for the portion of the Applicants' route that the segment alternative replaces. For instance, "Base P" is the cost for the same section of the Blue Route that would be replaced if Segment Alternative P is selected for inclusion in the Blue Route. The incremental cost of "Base P" as compared to the cost of Segment P is shown in the column labeled "difference" and this amount is $1,740,000 (2016$). The last column on this spreadsheet provides a brief discussion of the main reasons for the cost difference between the "Base" and the segment alternative. In the case of Segment Alternative P, this alternative is 0.5 miles longer and requires more angle structures which are more costly than standard tangent structures. Therefore, utilizing Segment P increases the cost of the Blue Route by $1,740,000.

IV. PROJECT SCHEDULE

Q. WHAT IS THE APPLICANTS' ANTICIPATED SCHEDULE FOR COMPLETING THE PROJECT?

A. The Applicants have prepared an expected permitting and construction schedule with a December 2021 in-service date, just prior to the Midcontinent Independent System Operator, Inc.'s designated in-service date of January 1, 2022. Construction of the Project is anticipated to commence in 2020. This schedule, provided in **Table 3** below, is subject to change as further information develops or if there are delays in obtaining the necessary federal, state, and local approvals required for construction. I note that the schedule presented below requires construction to be completed in approximately 30 months from the issuance of the Route Permit which, in my experience, is a fairly aggressive schedule for approximately 50 miles of new 345 kV transmission line.

Table 3: Anticipated Project Schedule

Activity	Estimated Dates
Minnesota Certificate of Need and Route Permit Issued	Second Quarter, 2019
Survey and Transmission Line Design Begins	Second Quarter, 2019
Land Acquisition Begins	Third Quarter, 2019
Other Federal, State, and Local Permits Issued	First Quarter, 2020
Start Right-of-Way Clearing	Second Quarter, 2020
Start Project Construction	Second Quarter, 2020
Project In-Service	December 2021

V. ASSOCIATED FACILITIES

Q. WHAT SUBSTATION FACILITIES WILL BE CONSTRUCTED OR MODIFIED FOR THIS PROJECT?

A. The existing Huntley and Wilmarth substations will need to be modified to accommodate the new 345 kV transmission line. The Huntley Substation is owned by ITC Midwest and the Wilmarth Substation is owned by Xcel Energy. I will discuss modifications to the Wilmarth Substation only. The Applicants' witness Mr. Tom Peterson will address modifications to ITC Midwest's Huntley Substation.

Q. WHAT MODIFICATIONS WILL BE MADE TO THE WILMARTH SUBSTATION TO ACCOMMODATE THE NEW 345 KV TRANSMISSION LINE?

A. Xcel Energy will install new substation equipment at the existing Wilmarth Substation necessary to accommodate the proposed 345 kV transmission line. This new equipment will include the following:

- A substation dead-end structure for terminating the proposed 345 kV line;
- One new 345 kV circuit breaker and one isolation switch;
- New station DC battery system with charger;
- Associated bus work, wave traps, voltage transformers, and miscellaneous equipment; and
- Concrete foundations for the dead-end structure, breaker, switches, wavetraps, and bus supports.

All of this new substation equipment can be accommodated within the existing fenced area of the Wilmarth Substation. Due to the poor soil conditions at the Wilmarth Substation, all foundations are planned to be deep piers, including piers to support the breaker slab.

VI. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

Grant David Stevenson, PMP

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Experience

Senior Project Manager **2000 to present**
Transmission Business Unit, Xcel Energy, Minneapolis, MN

- Provide strategic leadership to multidisciplinary teams on complex, high-profile transmission and substation projects.
- Work with transmission planning, engineering, permitting, construction, consultants and contractors to define scope of work, produce project estimates, gain capital spending authorization, establish project schedules, track and reconcile expenditures, gain permits, design, bid and construct capital projects to that meet budgets and in-service dates.
- Work extensively with the public and state regulatory officials during project permitting phases to locate new transmission lines in areas that balance issues of land use, cost, impact to people and impact to the natural environment. Participate and lead public meetings and provide testimony in permit proceedings.
- Lead team in design, real estate acquisition, and construction of substation and transmission line projects.
- Project portfolio has included:
  - 2006 – 2016: CapX2020 La Crosse Project, a complex, multi-owner, $475 million, 150 mile 345 and 161 kV transmission project in Minnesota and Wisconsin. Included triple-circuit crossing of Mississippi River, portions which were accessible only by barge. https://youtu.be/PILUFRe_jjM
  - 2010 – 2011: Fifth Street Substation underground transformer replacement project. Project required coordination with City of Minneapolis and Metropolitan Transit to shut down light rail transit in downtown Minneapolis. https://youtu.be/v32338cAJBE
  - 2009 – 2011: Pleasant Valley to Byron 161 kV transmission project. Permitting, ROW acquisition, design, construction of 16 mile transmission line.
  - 2003 – 2006: Southwest Minnesota 825 MW wind transmission project. This $250 million project involved construction of 200 miles of new transmission lines, the reconstruction of 300 miles of existing lines, and impacted 29 substations. The project also required project agreements with 11 electric utilities.
  - Bloomington relocation project, including 115 kV double circuit underground transmission.

Sales and Customer Service Manager **1999 to 2000**
Electric Sales and Customer Service, Northern States Power Company, Minneapolis, MN

- Successfully led team of 10 account representatives to meet goals in sales, customer service, demand side management and customer satisfaction.
- Managed projects to improve customer satisfaction and team effectiveness.
- Hired, trained and coached employees on energy management, conservation, distribution reliability.

Energy Management Engineer, Account Executive **1990 to 1999**
Electric Sales and Customer Service, Northern States Power Company, Minneapolis, MN

- Provided effective technical support to key industrial customers and NSP sales representatives regarding energy conservation programs and initiatives.
- Managed NSP's relationship with several demanding, strategic, high-tech manufacturing customers.
- Led multidisciplinary teams to solve customer-specific electric reliability, power quality, capacity, and distribution construction problems.

Plant Project Engineer, Engineering Intern **1984 to 1990**
Sherburne County Generating Plant, Northern States Power Company, Becker, MN

- Managed contractors, directed work of plant operations, maintenance and technical personnel.
- Managed projects to improve productivity, efficiency and safety at NSP's largest generating plant.
- Identified electrical and mechanical problems and recommended corrective repairs.

Professional Certification

Certified Project Management Professional (PMP) by Project Management Institute, 2007

Education

Project Management Institute Project Management Professional Training, 2007

Minnesota Management Institute, University of Minnesota School of Management, 2000
Intensive, condensed MBA-level business management curriculum.

Minnesota Management Academy, University of Minnesota School of Management, 1998
Management principles and skills for front-line managers.

Post-graduate coursework at University of St. Thomas and University of Minnesota in economics, business law, marketing, manufacturing.

Bachelor of Mechanical Engineering, University of Minnesota, 1986

Huntley - Wilmarth 345 kV Transmission Project Scoping Segment Cost Estimates

Single-Circuit Monopole / Double-Circuit Monopole

Row #	Affected Route(s)	Segment Alternatives	Miles	Structure Type	Total Cost 2016	Cost Difference	Total Cost Escalated to 2022	Cost Difference	Discussion explaining Cost Differences
1		Base A-B (Red & Green routes)	3.0	SCM	9,420,000		10,540,000		
2		Segment A	3.4	SCM	11,550,000	2,130,000	12,860,000	2,320,000	0.4 miles longer than base; more angles; ravine crossing
3		Segment B	2.9	SCM	8,850,000	(570,000)	9,930,000	(610,000)	Easier access
4		Segment D	2.0	SCM	4,720,000		5,010,000		
5		Base E (Red and Green routes)	11.3	SCM	30,040,000		33,610,000		10.6 miles SC, 0.7 miles DC 345/115
6		Segment E	18.4	SCM + DC	49,080,000	19,040,000	54,910,000	21,300,000	7.1 miles longer; 12.4 miles SC, 6 miles DC 345/345
7		Segment E2	18.3	SCM + DC	48,580,000	18,540,000	54,350,000	20,740,000	7.0 miles longer; 12.4 miles SC, 6 miles DC 345/345
8		Base F-DC (Purple Route)	2.7	DC	10,780,000		12,080,000		DC
9		Segment F-SC	3.8	SCM	10,710,000	(70,000)	12,000,000	(80,000)	SC with existing line remaining in its current location
10		Base G (Blue Route)	2.8	SCM	7,030,000		7,860,000		
11		Segment G	3.5	SCM	8,990,000	1,960,000	10,060,000	2,200,000	0.7 miles longer, more small angles, adds 4 - 90 degree angles
12		Base I (Purple Route)	0.5	SCM	1,840,000		2,060,000		
13		Segment I	0.8	SCM	2,680,000	840,000	3,010,000	950,000	Adds two 90 degree angles over a very short distance
14		Base HJKLM (Purple Route)	5.3	SCM + DC	13,480,000		15,070,000		1 mile DC
15		Segment H	6.3	SCM + DC	17,520,000	4,040,000	19,610,000	4,540,000	2.5 miles DC; 1 mile longer than base
16		Segment J	4.8	SCM + DC	12,420,000	(1,060,000)	13,890,000	(1,180,000)	Same DC length as base; 0.5 mile shorter than base and fewer angles;
17		Segment K	5.2	SCM + DC	12,770,000	(710,000)	14,280,000	(790,000)	Same DC length as base; fewer angles;
18		Segment L	6.3	SCM	15,270,000	1,790,000	17,070,000	2,000,000	0 DC but 1 mile longer than base
19		Segment M	6.3	SCM	14,750,000	1,270,000	16,500,000	1,430,000	0 DC but 1 mile longer than base; fewer angles than L
20		Base N (Purple Route)	2.4	SCM	5,300,000		5,920,000		
21		Segment N	3.2	SCM	7,980,000	2,680,000	8,930,000	3,010,000	0.8 miles longer than base; more angles
22		Base O (Green Route)	4.9	SCM	10,040,000		11,210,000		
23		Segment O	5.1	SCM	11,360,000	1,320,000	12,690,000	1,480,000	3 - 90 degree angles replace 2 - 45 degree angles
24		Base P (Blue Route)	8.3	SCM	17,680,000		19,750,000		
25		Segment P	8.7	SCM	19,230,000	1,550,000	21,490,000	1,740,000	0.5 miles longer than base; more angles
26		Base Q (Red or Blue Route)	5.1	SCM	12,360,000		13,820,000		All SC
27		Segment Q	5.3	DC	15,560,000	3,200,000	17,420,000	3,600,000	4.5 miles DC, 0.8 miles SC
28		Base R (Red Route)	6.1	SCM	14,840,000		16,590,000		All SC
29		Segment R	6.2	SCM + DC	17,650,000	2,810,000	19,750,000	3,160,000	4.4 miles DC, 1.8 miles SC
30		Base Y (Red Route)	3.0	DC	8,870,000		9,930,000		
31		Segment Y	2.9	DC	9,310,000	440,000	10,430,000	500,000	Poor soils near wetland edge may require shorter spans and larger foundations.
32		Base AA1 (Purple Route)	0.8	SCM	1,900,000		2,130,000		
33		AA1	0.8	SCM	1,910,000	10,000	2,140,000	10,000	
34		Base AA2 (Blue Route)	0.5	SCM	1,520,000		1,700,000		4 poles, 3 small angles (15-20 degrees), one tangent
35		AA2	0.6	SCM	2,590,000	1,070,000	2,890,000	1,190,000	4 poles, all approximately 45 degree angles
36		AA3 North (Base Purple Route)	1.6	SCM	4,660,000		5,230,000		Includes trailer relocation
37		AA3 Middle	1.6	TC	7,300,000	2,640,000	8,190,000	2,960,000	Triple-circuit
38		AA3 South	1.6	SCM	5,360,000	700,000	6,040,000	810,000	Includes ITC structure relocation
Scoping Route Alternative									
39		Purple - E - Red Route	55.0	SCM + DC	157,000,000		174,800,000		

Footnotes:

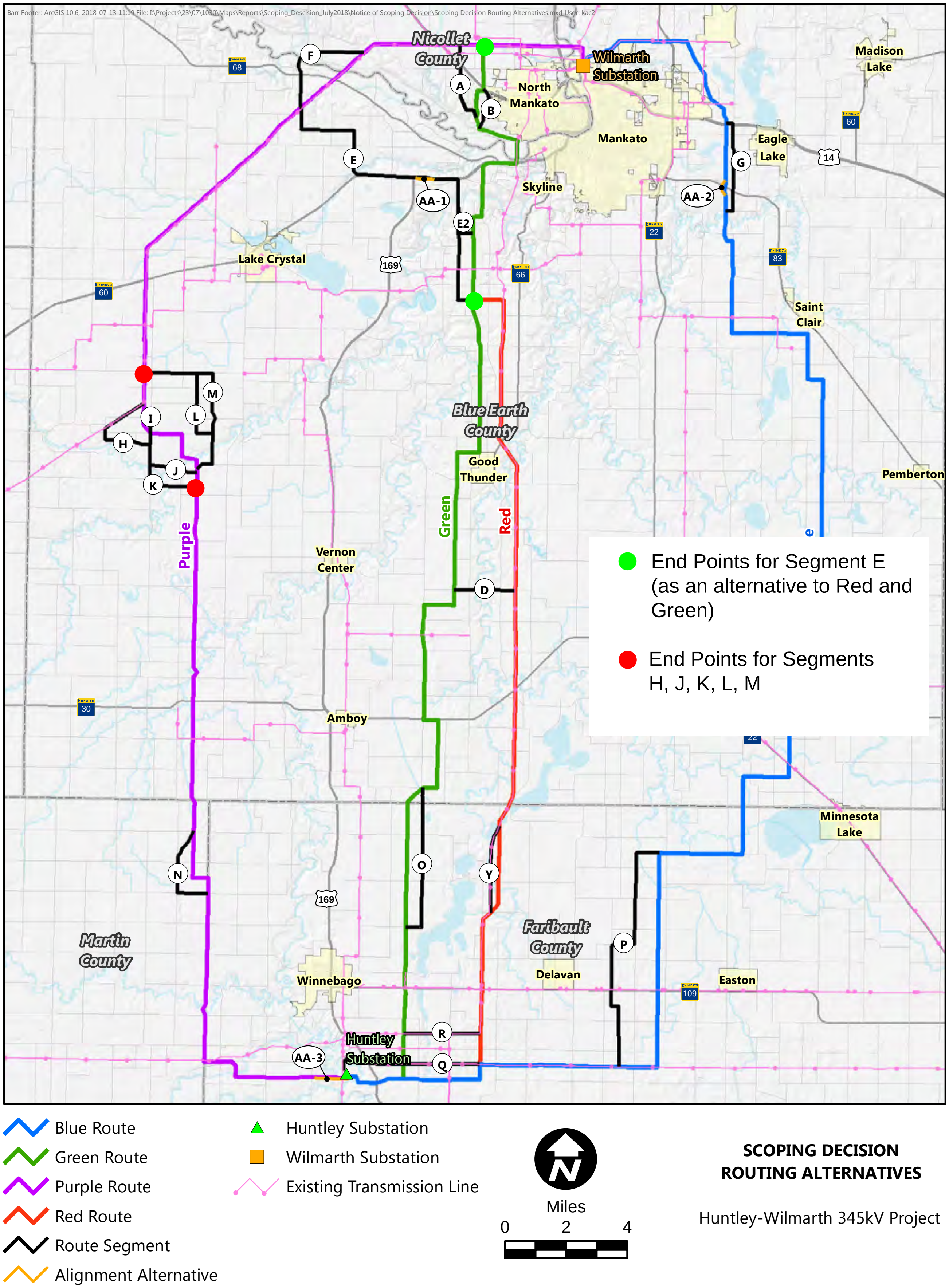
1. Segment alternatives were estimated assuming single-circuit monopole, double-circuit monopole or combination of these two designs. Single-circuit H-frames or single-circuit monopole adjacent to an existing line would cost less.

2. Segment endpoints are shown on the map on page 2.

3. Segment E in this analysis does not match Segment E in the Route Permit application. For this analysis, EERA requested endpoints (shown in the map on page 2) as an alternative to the Red/Green routes, resulting in Segment E length of 18.4 miles. In the Route Permit Application, Segment E was a connector segment between Purple and Red/Green routes and was 11.3 miles in length.

4. AA3 addresses routing constraints near the existing ITC 345/161 line west of Huntley. Therefore, Applicants assumed the triple-circuit longer than shown on the Scoping Decision to the point where the ITC Midwest line turns north.

5. SCH: Single-Circuit H-frame; SCM: Single-Circuit Monopole; DC: Double-Circuit; TC: Triple-Circuit



SCOPING DECISION ROUTING ALTERNATIVES

Huntley-Wilmarth 345kV Project