STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE PUBLIC UTILITIES COMMISSION

In the Matter of the Route Permit Application by Great River Energy and Xcel Energy for a 345 kV Transmission Line from Fargo, ND to St. Cloud, MN	OAH DOCKET NO. 15-2500-20995-2 PUC DOCKET NO. E002/TL-09-1056

POST-HEARING BRIEF

NO CAPX 2020, UNITED CITIZENS ACTION NETWORK
and
NORTH ROUTE CITIZENS ALLIANCE

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I. INTRODUCTION

NoCapX 2020, United Citizens Action Network, and North Route Citizens Alliance are intervenors with full party status in this docket. NoCapX 2020 has been actively opposing CapX 2020 from its inception, intervening in the Certificate of Need proceeding, joining forces with United Citizens Action Network for the Certificate of Need appeal and the subsequent Brookings-Hampton, Fargo-St. Cloud and Hampton-LaCrosse routing dockets. The North Route Citizen's Alliance, NoRCA, has joined NoCapX 2020 and United Citizens Action to assure its distinct interests are represented in this docket.

NoCapX and U-CAN, over the multiple CapX transmission proceedings thus far, have been primarily focused on need for the line, not at issue in this routing docket. In routing dockets, NoCapX and U-CAN have noted that the applicants have not yet disclosed the ultimate owner of this transmission line, contrary to the directive in the Certificate of Need. In addition, in the Certificate of Need and the Brookings routing dockets, the range of magnetic field levels have been grossly understated. Now, in this proceeding, Applicants have admitted the full range of potential magnetic fields, modeled at up to ten times higher than earlier disclosed in this application and those prior proceedings. While appreciative of this admission, and aware of the safety function of right-of way width, NoCapX and U-CAN are concerned that the potential magnetic fields at the edge of the 150 foot right-of-way proposed are far higher than a precautionary approach would proscribe. NoCapX and U-CAN urge that the full range of magnetic field levels be acknowledged and that as a precaution, the right-of-way for this route be designated wide enough to provide for levels of no greater than 2mG at the right-of-way edge sufficient to protect landowners and residents.

NoRCA is an informal community-based coalition of over 300 directly-impacted stakeholders and landowners affected by the proposed 345kV High Voltage Transmission Line from Fargo to St.Cloud. NoRCA is particularly concerned about the CapX transmission segments in Central and Northern Stearns County known as the Modified Preferred, Alternate A and Alternate B "North" Routes. NoRCA has researched, analyzed and identified several important distinctions in impacts between the proposed Preferred, North Routes and other alternatives under consideration and has submitted testimony with this information. NoRCA's work has demonstrated that the Modified Preferred Route and Routes A and B have greater impacts than other routes, particularly Route E and Route G. Route E or G, with Option 11, would be in closer compliance with Minnesota's non-proliferation policy, the route shorter, fewer residences and acres would be affected, fewer acres of MCBS sites would be affected, all the potentially affected MCBS sites are "high quality," fewer airports would be affected and the line would be at a greater distance, less impacts on wooded land, freshwater forested and shrub wetlands, no recreational land impacts, and cost savings would range from $0.3 to $0.8 million.

NoRCA notes that the Applicants now also support Route E, with AS-4, Option 11 and Segment E-5 of Option 12, stating that it "is a constructible route that compares favorable to other alternatives to the Modified Perferred Route."[1] St. John's also supports Route E with Option 11 as an alternate to its preferred Route G.[2] Similarly, the Town of Avon also supports Route E with AS-4.[3]

For these reasons, upon this analysis of the routes, a detailed and quantified review using the statutory and rule-based criteria, NoRCA has found that although all routes inherently have a significant impact, we support Routes E and G with Option 11 because they have more

[1] Applicant Post-Hearing Brief, p. 6-7; see also p. 66..
[2] St. John's Post-Hearing Brief, p. 1 and p. 13 et seq.
[3] Final Environmental Impact Statement ("FEIS"), p. 2-89.

limited impacts than the Modified Preferred route and other options presented as alternatives for consideration.

II. LEGAL BASIS FOR ROUTING DECISIONS

The legal basis for routing recommendations and Commission decisions is found in the Minnesota statutes and rules. First, the statutory basis for routing comparisons and determinations:

Minn. Stat. § 216E.03 DESIGNATING SITES AND ROUTES (selected)

Subd. 5.Environmental review.
The commissioner of the Department of Commerce shall prepare for the commission an environmental impact statement on each proposed large electric generating plant or high-voltage transmission line for which a complete application has been submitted. The commissioner shall not consider whether or not the project is needed. No other state environmental review documents shall be required. The commissioner shall study and evaluate any site or route proposed by an applicant and any other site or route the commission deems necessary that was proposed in a manner consistent with rules concerning the form, content, and timeliness of proposals for alternate sites or routes.

Subd. 7. Considerations in designating sites and routes (language pertaining to generators eliminated).

(a) The commission's site and route permit determinations must be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure.

(b) To facilitate the study, research, evaluation, and designation of sites and routes, the commission shall be guided by, but not limited to, the following considerations:

(1) evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high-voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including baseline studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment;

(2) environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state;

(3) evaluation of the effects of new electric … transmission technologies and systems … designed to minimize adverse environmental effects;
…

(5) analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired;

(6) evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted;

(7) evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2;

(8) evaluation of potential routes that would use or parallel existing railroad and highway rights-of-way;

(9) evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations;

(10) evaluation of the future needs for additional high-voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications;

(11) evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved; and

(12) when appropriate, consideration of problems raised by other state and federal agencies and local entities.

(c) If the commission's rules are substantially similar to existing regulations of a federal agency to which the utility in the state is subject, the federal regulations must be applied by the commission.

(d) No site or route shall be designated which violates state agency rules.

(e) The commission must make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons.

Related statutory provisions:

17.80 STATE AGRICULTURAL LAND PRESERVATION AND CONSERVATION POLICY.

Subdivision 1.Policy.

It is the policy of the state to preserve agricultural land and conserve its long-term use for the production of food and other agricultural products by:

(a) Protection of agricultural land and certain parcels of open space land from conversion to other uses;

(b) Conservation and enhancement of soil and water resources to ensure their long-term quality and productivity;

(c) Encouragement of planned growth and development of urban and rural areas to ensure the most effective use of agricultural land, resources and capital; and

(d) Fostering of ownership and operation of agricultural land by resident farmers.

Subd. 2.Methods.

The legislature finds that the policy in subdivision 1 will be best met by:

(a) Defining and locating lands well suited for the production of agricultural and forest products, and the use of that information as part of any local planning and zoning decision;

(b) Providing local units of government with coordinating guidelines, tools and incentives to prevent the unplanned and unscheduled conversion of agricultural and open space land to other uses;

(c) Providing relief from escalating property taxes and special assessments and protection of normal farm operations in agricultural areas subject to development pressures;

(d) Development of state policy to increase implementation of soil and water conservation by farmers;

(e) Assuring that state agencies act to maximize the preservation and conservation of agricultural land and minimize the disruption of agricultural production, in accordance with local social, economic and environmental considerations of the agricultural community;

(f) Assuring that public agencies employ and promote the use of management procedures which maintain or enhance the productivity of lands well suited to the production of food and other agricultural products;

(g) Guiding the orderly development and maintenance of transportation systems in rural Minnesota while preserving agricultural land to the greatest possible extent;

(h) Guiding the orderly construction and development of energy generation and transmission systems and enhancing the development of alternative energy to meet the needs of rural and urban communities and preserve agricultural land to the greatest possible extent by reducing energy costs and minimizing the use of agricultural land for energy production facilities; and

(i) Guiding the orderly development of solid and hazardous waste management sites to meet the needs and safety of rural and urban communities and preserve agricultural land to the greatest possible extent by minimizing the use of agricultural land for waste management sites.

The Minnesota Rules pertaining to siting offer specific criteria as well (selected):

7850.1900, Subp. 2. Route permit for HVTL.

An application for a route permit for a high voltage transmission line shall contain the following information:
A. a statement of proposed ownership of the facility at the time of filing the application and after commercial operation;
B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated;
C. at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference;
D. a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line;
E. the environmental information required under subpart 3;
F. identification of land uses and environmental conditions along the proposed routes;
G. the names of each owner whose property is within any of the proposed routes for the high voltage transmission line;
H. United States Geological Survey topographical maps or other maps acceptable to the commission showing the entire length of the high voltage transmission line on all proposed routes;
I. identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share the right-of-way with the proposed line;
J. the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line;
K. cost analysis of each route, including the costs of constructing, operating, and maintaining the high voltage transmission line that are dependent on design and route;
L. a description of possible design options to accommodate expansion of the high voltage transmission line in the future;
M. the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line;
N. a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line; and
O. a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required.

7850.2700 FINAL DECISION (selected).

Subp. 2. EIS adequacy.
The commission shall not make a final decision on a permit until the commission has found the environmental impact statement to be adequate.

7850.2500 EIS PREPARATION (selected)(emphasis added)

Subp. 3. Alternative sites or routes.
During the scoping process, a person may suggest alternative sites or routes to evaluate in the environmental impact statement. A person desiring that a particular site or route be evaluated shall submit to the commissioner of the Department of Commerce, during the scoping process, an explanation of why the site or route should be included in the environmental impact statement and any other supporting information the person wants the commissioner to consider. The commissioner shall provide the applicant with an opportunity to respond to each request that an alternative be included in the environmental impact statement. The commissioner shall include the suggested site or route in the scope of the environmental impact statement only if the commissioner determines that

evaluation of the proposed site or route will assist in the commissioner's decision on the permit application.

Subp. 10. Adequacy determination.
The Public Utilities Commission shall determine the adequacy of the final environmental impact statement. The commission shall not decide the adequacy for at least ten days after the availability of the final environmental impact statement is announced in the EQB Monitor. The final environmental impact statement is adequate if it:

A. addresses the issues and alternatives raised in scoping to a reasonable extent considering the availability of information and the time limitations for considering the permit application;

B. provides responses to the timely substantive comments received during the draft environmental impact statement review process; and

C. was prepared in compliance with the procedures in parts 7850.1000 to 7850.5600.

If the commission finds that the environmental impact statement is not adequate, the commission shall direct the staff to respond to the deficiencies and resubmit the revised environmental impact statement to the commission as soon as possible.

7850.4100 FACTORS CONSIDERED.

In determining whether to issue a permit for a large electric power generating plant or a high voltage transmission line, the commission shall consider the following:
A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
B. effects on public health and safety;
C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
D. effects on archaeological and historic resources;
E. effects on the natural environment, including effects on air and water quality resources and flora and fauna;
F. effects on rare and unique natural resources;
G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;
H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;
I. use of existing large electric power generating plant sites;
J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;
K. electrical system reliability;
L. costs of constructing, operating, and maintaining the facility which are dependent on design and route;
M. adverse human and natural environmental effects which cannot be avoided; and
N. irreversible and irretrievable commitments of resources.

In addition to siting and routing criteria in statute and rule, there is case law emphasizing that pre-existing rights-of-way must be used. More than three decades ago, the PEER decision

set out the Minnesota transmission routing policy of "nonproliferation," to maximize utilization of existing and proposed railroad and highway rights-of-way. In a clear statement of intent, with full knowledge of the impact of establishment of nonproliferation on those near existing corridors:

> *We therefore concluded that in order to make the route-selection process comport with Minnesota's commitment to the principle of nonproliferation, the MEQC must, as a matter of law, choose a pre-existing route unless there are extremely strong reasons not to do so. We reach this conclusion partly because the utilization of a pre-existing route minimizes the impact of new intrusion by limiting its effects to those who are already accustomed to living with an existing route. More importantly, however, the establishment of a new route today means that in the future, when the principle of nonproliferation is properly applied residents living along this newly established route may have to suffer the burden of additional powerline easements.*

People for Environmental Enlightenment& Responsibility (PEER), Inc. v. Minnesota Environmental Quality Council, 266 N.W.2d, 858, 868 (Minn. 1978). The court compared proliferation with the MEQC's balance of noncompensable impairment of the environment against the compensable damages of number of homes to be condemned, and noted that:

> A*lthough the hearing examiner, the MEQC, and the district court all accepted both their reasoning and their conclusion, condemnation of a number of homes does not, without more, overcome the law's preference for containment of powerlines as expressed in the policy of nonproliferation. Persons who lose their homes can be fully compensated in damages. The destruction of protective environmental resources, however, is noncompensable and injurious to all present and future residents of Minnesota.*

Id., p. 869. The PEER-based non-proliferation routing policy was recently emphasized by the addition of Minn. Stat. §216E.03, Subd. 7(e) requiring specific findings by the Commission:

> The commission must make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons.

III. NORTH ROUTE A AND ROUTE B ISSUES OF CONCERN

A. Overview of North Routes

The portion of the Sauk Centre to St. Cloud segment of the Fargo to St. Cloud transmission project identified as the Modified Preferred Route, Route A and Route B, are the "North Routes." This geographic area varies greatly in character. The eastern portion is a combination of Upland Deciduous Forest, including Marschner's "Big Woods" and Aspen-Birch, and unique Coniferous Bogs. The Western portions of the North Routes consist of Brush Prairie and Prairie, interspersed with Wet Prairies. The Modified Preferred and Routes A and B contain rare areas of Outstanding, High and Moderate Value biologic and native plant communities, primarily located in Brockway and St. Wendel Townships, as well as along County Road 17 in the Birch Lake State Forest area. See Ex. 1, Application, Sections 5-7, p. 5-1 through 7-87; Ex. 22, DEIS, §1.1.3, §7 p.7-1 through 7-138; Ex. 47(& 12), Direct Testimony of Scott Hylla, p. 5-6; see also FEIS.[4]

Native Plant Communities consist of significant Tamarack Swamp Minerotrophic and Seepage Subtypes, fen complexes, including Calcareous fen, Willow Swamp and open wetlands. Water Resources include significant and unique concentrations of NWI Palustrine wetlands, important in the diffusion and filtration of water, floodshed and its unique biological diversity. The area also contains several recreational and environmentally sensitive lakes. The North Routes directly impact a large and significant complex known as the St. Wendel Tamarack Bog. The St. Wendel Tamarack Bog is a top biodiversity site and contains one of the largest remaining blocks of native vegetation in Stearns County. The St. Wendel Tamarack Bog Complex is a natural resource that has been documented as having local, state, national and even international

[4] The FEIS has not been entered in the hearing record and there is no exhibit number.

importance. See Ex. 1, Application, Sections 5-7, p. 5-1 through 7-87; Ex. 22, DEIS, §1.1.3, §7 p.7-1 through 7-138; Ex. 47(& 12), Direct Testimony of Scott Hylla, p. 5-6; see also FEIS.

Finally, the CapX 2020 North Routes contain 43 documented Century Farms. Ex. 47, Direct Testimony of Hylla, p. 7. Routing the CapX 2020 transmission line over these Century Farms would violate the spirit and letter of Minnesota's policy of agricultural preservation and conservation. Minn. Stat. §17.80. It would compromise the heritage and preservation of the family farm, particularly the many Century Farms that hold historical and cultural significance in Stearns County and Minnesota. The proposal of 175 foot, 345 KV high voltage transmission lines threatens the integrity of the family farms and the natural character of the property.

Summarizing the testimony of NoRCA's Scott Hylla, and NoRCA's Attachment A summarizing impacts using Lahr Rebuttal Testimony, Schedule 8:

1. "North Routes" would have higher "aesthetic" impact than several routes, particularly routes C & E, where "aesthetic" impact is measured, as in EIS, by distance from homes.[5]

2. "North Routes contain highest impacts to "Prime Farmland" with best characteristics for agricultural production and uses. Avoidance of these areas is consistent with the Stearns County Comprehensive Plan and the agricultural land preservation policy of Minn. Stat. §17.80.[6]

3. "North Routes" A and B contain highest acreage of Prime Farmland in ROW versus other routes. Avoidance of these areas would be consistent with the Stearns County Comprehensive Plan and preservation of agricultural land under Minn. Stat. §17.80.[7]

4. "North" Routes contain highest impacts to Forestry and Forested areas. The Preferred Route and Route A impact more than twice as much acreage as others.[8]

5. "North Routes" Preferred and A, and Route F, contain the highest number of water wells when compared with other routes.[9]

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[5] Ex. 47, Direct Testimony of Hylla, p. 6-7; Ex. 22, DEIS, Table 7.3-4, Aesthetic Impact Evaluation for Routes; Ex. 2, Lahr Direct, Schedule 8.

[6] Ex. 47, Direct Testimony of Hylla, p. 7; Ex. 22, DEIS, Table 7.7-4, Acreage of Prime Farmland within Route and Option Alternatives; Ex. 2, Lahr Rebuttal, Schedule 8.

[7] Ex. 47, Direct Testimony of Hylla, p. 8; Ex. 22, DEIS, Table 7.7-10, Acreage of Prime Farmland within Route and Option ROW; Ex. 2, Lahr Rebuttal, Schedule 8.

[8] Ex.47, Direct Testimony of Hylla, p. 8-9; Ex. 22, DEIS, Table 7.7-5, Wooded Lands by Route (Sauk Centre to St. Cloud); Table 7.7-12 Wooded Lands in Proposed ROW for Routes; Ex. 2, Lahr Rebuttal, Schedule 8.

6. "North Routes" Preferred Route and Route A contain significantly higher number of Total NWI Wetlands impacted vs. other routes.[10]

7. "North Routes" Preferred Route, Route A have far greater impacts on Wetlands than other routes.[11]

8. "North Routes" have a significantly higher number of Floodplains impacts when compared with all routes but Route F.[12]

9. "North Routes" Preferred, Routes A and B contain higher number of Perennial Stream crossings compared to other routes.[13]

10. "North Routes" contain highest concentration of non-agricultural vegetation impacted compared to other routes, the Preferred route having the most, and routes A, B and C following closely behind.[14]

11. "North Routes" contain the highest concentration of High to Outstanding MCBS, Sites of Biodiversity Significance, and rare and unique Natural Resources when compared with other routes.[15]

The broad range of heightened impacts of the Preferred Route and North Routes A and B detailed in Lahr's and Hylla's Testimony, the Draft Environmental Impact Statement, and the Final Environmental Impact Statement, provide the factual basis for a finding that these routes are routes with more significant impacts and that they are not the most feasible and prudent alternative.

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[9] Ex. 47, Direct Testimony of Hylla, p. 10; Ex. 22, DEIS, Table 7.8-3, Water Wells contained within the Proposed Routes and Route Options; Ex. 2, Lahr Rebuttal, Schedule 8.

[10] Ex. 47, Direct Testimony of Hylla, p. 11; Ex.22, DEIS, Table 7.8-4, Wetland Type and Acreage within the Proposed Routes and Route Options; Ex. 2, Lahr Rebuttal, Schedule 8; see also Stearns County Comprehensive Plan Update, Figure 4.3

[11] Ex. 47, Direct Testimony of Hylla, p. 12; Ex. 22, DEIS, Table 7.8-8, Potential Wetland Impacts Evaluation; Ex. 2, Lahr Rebuttal, Schedule 8.

[12] Ex. 47, Direct Testimony of Hylla, p. 13; Ex. 22, DEIS, Table 7.8-5, Floodplains within the Proposed Routes; Ex. 2, Lahr Rebuttal, Schedule 8.

[13] Ex. 47, Direct Testimony of Hylla, p. 13; Ex. 22, DEIS, Table 7.8-6, Floodplains within the Proposed Routes; Ex. 2, Lahr Rebuttal, Schedule 8.

[14] Ex. 47, Direct Testimony of Hylla, p. 14; Ex. 22, DEIS, Table 7.9-12, Temporary and Permanent Impacts to Non-Agricultural Vegetation (Sauk Centre to St. Cloud); Ex. 2, Lahr Rebuttal, Schedule 8.

[15] Ex. 47, Direct Testimony of Hylla, p. 14-15; Ex. 22, DEIS, Table 7.9-4, Route Impact Evaluation, MCBS, Sites of Biodiversity Significance; Ex. 2, Lahr Rebuttal, Schedule 8.

IV. NoRCA COMPARATIVE ANALYSIS OF ROUTES

North Route Citizen's Alliance, NoRCA, has taken the information provided by the Applicants and found in the Draft Environmental Impact Statement (DEIS), the Final Environmental Impact Statement (FEIS) and its own exhaustive investigation of conditions and features along the routes. NoRCA then researched and analyzed the route proposals in light of the criteria for selection of a transmission route. Through this process, NoRCA has identified demonstrable trends in impacts of each of the proposed routes. NoRCA is submitting this substantive analysis based upon our review of the application, the Draft Environmental Impact Statement (DEIS), the Final Environmental Impact Statement (FEIS) and our exhaustive on-the-ground investigation of conditions and features along the routes. This analysis is only of the southern segment of the Fargo to St. Cloud route, identified by the Applicants, and in the DEIS, as the segment from Sauk Centre to St. Cloud, particularly focused on the "North Routes" and alternatives within this segment. We do not attempt an analysis or have a position on other segments.

To equitably compare the route options, NoRCA has used an analysis based on the charts in Darrin Lahr's testimony,[16] updating using Applicants' and FEIS information, adding colors ranking them for impacts based on Applicant's analysis, and to the right, both a weighted and unweighted ranking of the route options (hereinafter "Attachment A Summary"). See Appendix A. Whether weighted or unweighted, the patterns of impacts are essentially the same: The Applicant's Preferred Route has high impacts, and Routes E and G have lower impacts.

A comparison of water resources, physical and land use, and human settlement/ecological factors, using first the weighted ranking in the Summary reveals that the Preferred Route and Route F have consistently higher impacts, and Routes E and G have the lowest impacts of all the

[16] See Attachment A, NoRCA Charts; see also Ex. 2, Lahr's Rebuttal, Schedule 8.

routes. A weighted score summary, based on Lahr's Rebuttal, Schedule 8, and weighted as set forth in Attachment A, reveals:

Weighted Score Summary									
Category	**Pref**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Water Resources	13.5	11.0	6.6	10.0	8.4	8.6	11.5	6.9	7.0
Physical and Land Use	16.4	12.3	10.5	11.6	12.5	10.3	14.9	7.7	11.6
Human Settlement / Ecological	10.4	10.1	11.6	5.4	9.0	7.1	12.7	8.4	10.2
Average Score	13.4	11.1	9.6	9.0	10.0	8.7	13.0	7.7	9.6
Total Score	40.3	33.4	28.7	27.0	29.9	26.1	39.0	23.0	28.8

An unweighted summary shows similar patterns:

Un-weighted Rank Summary									
Category	**Pref**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Water Resources	5.2	4.1	3.0	4.0	3.6	3.2	4.8	2.7	2.9
Physical and Land Use	4.2	3.5	3.1	3.1	3.8	3.1	4.6	2.7	3.4
Human Settlement / Ecological	2.0	2.4	3.7	1.4	2.5	1.9	3.2	2.1	2.7
Average Rank	3.8	3.3	3.3	2.8	3.3	2.7	4.2	2.5	3.0
Total Rank	11.5	10.0	9.8	8.5	9.9	8.2	12.6	7.5	8.9

NoRCA's analysis of Applicant and EIS data shows that of the options presented by the Applicants and in the Environmental Impact Statement, the Preferred Route has high impacts, and Routes E and G have demonstrably lower impacts when compared to the other routes, the "least harmful" alternatives.[17] The choice of route should focus on these two options, Route E and Route G, as the options with least proliferation, and least human and environmental impacts.

The Applicant's Preferred route, Alternate A, and Alternate B, represent gross proliferation of new transmission corridors through Central and Northern Stearns County. The Applicants proposed routes fail to utilize existing right-of-way corridor to the extent of alternatives, and

[17] Ex. 47, Direct Testimony, Scott Hylla.

would needlessly traverse, destroy and fragment sensitive wetlands, forested areas and prime agricultural farmland, all noncompensable impacts under the laws of the state of Minnesota.

CapX 2020 Applicants' Modified Preferred Route and the A and B Alternative Routes are unacceptable gross proliferation of transmission corridors and contrary to Minnesota transmission routing policy because they are not utilizing existing rights-of-way. Proliferation of transmission corridors is inconsistent with Minnesota's longstanding policy of Non-proliferation established by People for Environmental Enlightenment & Responsibility (PEER), Inc. v. Minnesota Environmental Quality Council, 266 N.W. 2d 858 (Minn. 1978). For these reasons, understanding that all transmission has significant impacts, our analysis shows that the "least harmful" routes for the Sauk Centre to St. Cloud segment of the Fargo to St. Cloud line are Route E or Route G.[18]

From Attachment A, the large attached analysis, and this Weighted Score Summary, the focus narrows, and this next step shifts from the macro view to a specific comparison of the performance of Preferred Route and Route E and Route G under the various criteria in statute and rule as as formatted in Lahr's Schedule 8.

A. APPLICANT'S DATA SHOWS THAT OVERALL, THE PREFERRED ROUTE HAS COMPARATIVELY HIGHER IMPACTS AND ROUTE E AND ROUTE G HAVE LOWER IMPACTS

A review of Applicant's data, as above, and provided in the Rebuttal Testimony of Darrin Lahr, demonstrates that the "Preferred" route, Route A and Route B have comparatively higher impacts and Route E and Route G have comparatively lower impacts. Whether analyzed for proliferation, human impacts or environmental impacts, when the state's criteria is considered, by their own accounting, the Applicant's Preferred Route would not be a supportable option because it has low non-proliferation and high impacts across criteria categories.

[18] Ex. 47, Direct Testimony, Scott Hylla; see also Rebuttal Testimony, Darrin Lahr, Schedule 8.

Un-weighted Rank Summary									
Category	Pref	A	B	C	D	E	F	G	H
Water Resources	5.2	4.1	3.0	4.0	3.6	3.2	4.8	2.7	2.9
Physical and Land Use	4.2	3.5	3.1	3.1	3.8	3.1	4.6	2.7	3.4
Human Settlement / Ecological	2.0	2.4	3.7	1.4	2.5	1.9	3.2	2.1	2.7
Average Rank	3.8	3.3	3.3	2.8	3.3	2.7	4.2	2.5	3.0
Total Rank	11.5	10.0	9.8	8.5	9.9	8.2	12.6	7.5	8.9

See Attachment A, Darren Lahr's Matrix updated with FEIS information.

B. APPLICANT'S PREFERRED ROUTE IS CONTRARY TO THE STATE'S POLICY OF NONPROLIFERATION

Minnesota has a longstanding policy of Non-proliferation established by People for Environmental Enlightenment & Responsibility (PEER), Inc. v. Minnesota Environmental Quality Council, 266 N.W. 2d 858 (Minn. 1978). This policy of non-proliferation of transmission corridors was further emphasized in recent legislation that added a section to the statute regarding criteria, focusing on use of existing corridor and requiring the Commission to explain any proliferation of corridors.

PEER provides guidance when weighing proliferating routes, such as the North Routes, with non-proliferation routes:

> *As interpreted by this court, the prudent and feasible alternative standard is analogous to the principle of nonproliferation in land use planning. In County of Freeborn v. Bryson, 309 Minn. 178, 188, 243 N.W. 2s 316, 321, we noted that although the state's past encouragement of highway construction resulted in the elimination or impairment of natural resources, "remaining resources will not be destroyed so indiscriminately because the law has been drastically cnaged by (MERA)." Similarly, in Reserve Mining Co. v. Herbst, Minn., 256 N.W. 2d 808, 827 (1977(, we recognized the state's "strongly held commitment * * * to protecting the air, water, wildlife, and forests from further encroachment," which supported our choice of Mile Post 7 over Mile Post 20 (256 N.W. 2d 823). The court had no trouble deciding that the Department of Natural Resources, which, like the MEQC, had a statutory duty to protect the environment, had failed to comply with this policy of nonproliferation in choosing between the alternative sites. See, also, No Power Line, Inc., v. Minnesota EQC, Minn. 262 N.W. 2d 312, 331 (Yetka, J., concurring specially).*

> *This policy of nonproliferation is also supported by legislative enactments. Minn. Reg. MEQC 74(d)(3)(ee), adopted pursuant to authority granted to the MEQC under the PPSA, requires the decisionmaker to consider as one factor in the selection process whether the proposed route will "maximize utilization of existing and proposed rights-of-way." The legislature explicitly expressed its commitment to the principle of nonproliferation in its 1977 revision of the PPSA. The MEQC is now required to consider the utilization of existing railroad and highway rights-of-way and the construction of structures capable of expansion in capacity through multiple circuiting in making its selection from among alternative HVTL routes. L. 1977, c. 439, s 10.*
>
> ***We therefore conclude that in order to make the route-selection process comport with Minnesota's commitment to the principle of nonproliferation, the MEQC must, as a matter of law, choose a pre-existing route unless there are extremely strong reasons not to do so. We reach this conclusion partly because the utilization of a new pre-existing route minimizes the impact of the new intrusion by limiting its effects to those who are already accustomed to living with an existing route. More importantly, however, the establishment of a new route today means that in the future, when the principle of nonproliferation is properly applied, residents living along this newly established route may have to suffer the burden of additional powerline easements.***

People for Environmental Enlightenment & Responsibility (PEER), Inc. v. Minnesota Environmental Quality Council, 266 N.W. 2d 858, 872 (Minn. 1978)(emphasis added). The court emphasized the heightened importance of environmental resources because loss of these resources cannot be compensated, and that in weighing noncompensable impairment of the environment against the compensable damages of number of homes to be condemned, non-proliferation has great weight:

> A*lthough the hearing examiner, the MEQC, and the district court all accepted both their reasoning and their conclusion, condemnation of a number of homes does not, without more, overcome the law's preference for containment of powerlines as expressed in the policy of nonproliferation. Persons who lose their homes can be fully compensated in damages. The destruction of protective environmental resources, however, is noncompensable and injurious to all present and future residents of Minnesota.*

Id., p. 869. The PEER-based non-proliferation routing policy was recently emphasized by the addition of Minn. Stat. §216E.03, Subd. 7(e) requiring specific findings by the Commission:

> The commission must make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons.

The definition of corridors is also important. PEER and Minn. Stat. §216E.03, Subd. 7(e) both refer to existing high-voltage transmission route and highway right of way, and PEER also refers to railroad right-of-way.[19] Nowhere in the PEER decision or in the statutes are field lines and property boundaries equated with right-of-way, nor are field lines and property boundaries regarded as "corridor." In environmental review and in argument, Applicants and MOES have analyzed routes using field lines and property boundaries and characterized use of such as "non-proliferation" and consistent with Minnesota's policy of non-proliferation, but this is a gross misinterpretation of the guidance in PEER and of the statute. A linear feature is not a transmission right-of-way or railroad right-of-way!

The proliferation data from Darrin Lahr's Rebuttal Testimony, Schedule 8, reveals that the Preferred route and Route A are lowest in miles and percentages paralleling existing right-of-way, proliferating more than other routes, and at 91% non-proliferation, only one route, Route F, approaches the non-proliferation standard:

	Pref	A	B	C	D	E	F	G	H
Length of Route (miles)	48	48	46	39	37	44	49	44	45
Length Paralleling Existing ROWs (miles)	29	33	41	32	30	32	45	33	32
Percent of Route Paralleling Existing ROWs	61	69	88	83	80	73	91	75	72

[19] Minn. Stat. §216E.03, Subd. 7(b)(8) refers to "evaluation of potential routes that would use or parallel existing railroad and highway rights-of-way" and field lines and property boundaries are referenced in Minn. Stat. §216E.03, Subd. 7(b)(9) addresses "evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations," and not as non-proliferation. As factors to be considered, Minn. R. 7850.4100, Subp. H. addresses "use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries" and then separately in Subp. J, "use of existing transportation, pipeline, and electrical transmission systems or rights-of-way."

For a comparison of Proliferation of the Preferred Route and Route E and Route G:

Description	Route		
	Pref	E	G
Length of Route (miles)	48	44	44
Length Paralleling Existing ROWs (miles)	29	32	33
Length Not Paralleling Existing ROWs (miles)	19	12	11
Residential Structures within 500 Feet of Alignment - FEIS	93	76	88

The Applicants rationalize their proliferation with statements that by avoiding existing rights-of-way, they can limit impacts on residences. However, the chart above shows that this is not correct. When comparing the additional number of miles of proliferation on the preferred route to the additional number of residents affected by a particular alternative, there is a relationship between them such that adding miles of proliferation increases residents affected. Comparing the Preferred Route with Route E, for every additional mile that the Preferred Route does not follow existing right-of-way, there are 2.4 additional residences per non-right-of-way mile. This equates to 7 additional miles not following right-of-ways and 17 additional residences within 500 feet affected if the Preferred Route would be selected over Route E. Similarly, when comparing the Preferred Route with Route G, for every additional mile that the Preferred Route does not follow existing right-of-way, there are 6 additional residences per non-right-of-way mile. This equates to 8 additional miles not following right-of-ways and 5 additional residences within 500 feet affected if the Preferred Route would be selected over Route G.

An analysis of the difference between the gross proliferation of the Preferred Route and Routes E and G shows a trend:

Description	Difference Pref v. E	Difference Pref v. G
Total Additional Miles on Preferred Route vs Alt Routes	4	4
Number of Miles Not following ROWs on Preferred Route vs Alt Routes	3	4
Additional Miles not Paralleling Existing ROWs on Preferred Route vs Alt Routes	7	8
Additional Residences Affected on Preferred Route vs Alt Routes	17	5
Residences per additional mile of proliferation on the preferred route	**2.4**	**0.6**

This means that for each additional mile of proliferation of the Preferred route, there is a 58% increase in the mileage differential between the Preferred Route and Route E, and a 73% increase in the differential between the Preferred Route and Route G. In addition, for each additional mile of proliferation of the Preferred route, there is a 22% increase in the number of residences between the Preferred Route and Route E, and a 6% increase in the number of residences between the Preferred Route and Route G.

Under the same analysis utilizing Option 11 with Routes E and G yields similar results by accentuating the decrease in impact on Routes E and G. Comparing the Modified Preferred Route with Route E and Option 11, for each additional mile that the Preferred Route does not follow existing rights-of-way, 3.4 additional residences per mile are affected, which equates 7 additional miles not following rights-of-way and 24 additional residents within 500 feet affected if the Preferred Route over Route E. Comparing the Modified Preferred Route with Route G and Option 11, for each additional mile that the Preferred Route does not follow existing rights-of-way, 1.5 additional residences per mile are affected, which equates 8 additional miles not following rights-of-way and 12 additional residences within 500 feet affected if the Preferred Route is selected over Route G with Option 11. Again, the Applicants' are increasingly failing to comply with Minnesota's policy of non-proliferation, and if the Modified Preferred route is selected over Route E with Option 11, 24 additional homes are affected, a 35% increase, and if

the Modified Preferred route is selected over Route G with Option 11, 12 more homes are affected, a 15% increase. This is shown in the progressions of the charts below:

	Route		
Preferred Route, Route E, and Route G	**pref 1**	**E**	**G**
Length of Route (miles)	48	44	44
Length Paralleling Existing ROWs (miles)	29	32	33
Length Not Paralleling Existing ROWs (miles)	19	12	11
Total Number of Residential Structures within 500 Feet of Alignment FEIS	93	76	88

When Option 11 is considered, the balance alters, lowering affected residences in Routes E and G:

	Route		
Option 11	**Pref**	**E**	**G**
Length of Route (miles)		3	3
Length Paralleling Existing ROWs (miles)		2	2
Length Not Paralleling Existing ROWs (miles)		1	1
Total Residential Structures within 500 Feet of Alignment FEIS		4	4

	Route		
Comparable portion of Route E to Option 11	**Pref**	**E**	**G**
Length of Route (miles)		4	4
Length Paralleling Existing ROWs (miles)		3	3
Length Not Paralleling Existing ROWs (miles)		1	1
Total Residential Structures within 500 Feet of Alignment FEIS		11	11

	Route		
Preferred Route and Both Routes E and G Utilizing Option 11	**Pref**	**E**	**G**
Length of Route (miles)	48	43	43
Length Paralleling Existing ROWs (miles)	29	31	32
Length Not Paralleling Existing ROWs (miles)	19	12	11
Total Number of Residential Structures within 500 Feet of Alignment FEIS	93	69	81

Applicants' advocacy for the Modified Preferred Route, and its gross proliferation is increasing, rather than limiting, number of residences affected when requesting the Preferred Route with Option 13. Similarly, if the Modified Preferred Route is selected over either Routes E and G with Option 11, additional residences are affected and the human impacts are increased. Routes E and G with Option 11 have less proliferation and affect fewer residences.

C. ANALYSIS OF HUMAN IMPACTS OF ROUTE OPTIONS

The state criteria and factors to be considered in siting transmission include human impacts, including displacement, and adverse human effects which can not be avoided. Minn. Stat. §216E.03, Subd. 7; Minn. R. 7150.4100, Subp. A, B, and M.

Human settlement impacts, as measured by numbers and distances of residences from the edge of the right-of-way, were listed in Darrin Lahr's Schedule 8 and in the Environmental Impact Statement. This data is not including the reduction of the 7 additional residences with utilization of Option 11:

Human Settlement Detail		Data		
		Pref	E	G
Number of Residences / Non-Non Residences within proximity of ROW	Residential Structures within 0-75 Feet of Alignment	1	-	-
	Residential Structures within 75-150 Feet of Alignment	7	12	9
	Total Residential Structures within 150 Feet of Alignment	8	12	9
	Residential Structures within 150-300 Feet of Alignment	50	37	49
	Residential Structures within 300-500 Feet of Alignment	35	27	30
	Total Residential Structures within 500 Feet of Alignment	93	76	88
	Non-Residential Structures within 150 Feet of Alignment	28	25	30

The Applicants' Modified Preferred Route has the higher human settlement impacts, when measured by number of residential structures within 500 feet of the alignment, Route E has fewer impacts in when considering all residential categories.

D. NATURAL RESOURCE IMPACTS ANALYSIS OF ROUTE OPTIONS

Natural resources are considered through a number of statutory criteria and factors, including conservation of resources, effects on land water and air, vegetation, animals, materials and aesthetic values, environmental evaluation of routes, evaluation of adverse direct and indirect environmental effects that cannot be avoided, evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations, effects on natural environmental, air and water quality and flura and fauna, rare and unique natural resources. Minn. Stat. §216E.03, Subd. 7; Minn. R. 7850.1400.

Examples of natural resources that must be considered included Minnesota County Biological Survey sites of Biodiversity Significance, native plant communities, trail crossings, the many varieties and sizes of wetlands, streams, drainage, floodplains and wells. An analysis of these many resources and the impact of this line reveals:

		Data		
		Pref	**E**	**G**
MIN County Biological Survey (MCBS) Sites of Biodiversity Significance	Total Acres MCBS Sites of Biodiversity Significance within ROW	20	8	14
	Number MCBS Sites of Biodiversity Significance within ROW	2	3	4
	Acres Moderate MCBS Sites of Biodiversity Significance within ROW	-	6	6
	Acres High MCBS Sites of Biodiversity Significance within ROW	20	2	8
	Acres Outstanding MCBS Sites of Biodiversity Significance within ROW	-	-	-
MCBS Native Plant Communities	Number MCBS Native Plant Communities within ROW	2	1	2
	Acres MCBS Native Plant Communities within ROW	7	3	7
Trails and Scenic Byways	Number State Trail Crossings within ROW	-	-	-
	Parallel Miles to State Trails	-	-	-
	Number County Trail Crossings within ROW	2	1	1

	Parallel Miles to County Trails	-	-	-
	Number of Scenic Byway Crossings within ROW	-	-	-
	Parallel Miles to Scenic Byways	-	-	-

Length of Route (miles)	48	44	44
Number of Acres in Representative 150-Foot ROW	866	797	808
Acres of NWI Wetlands within ROW	134	97	84
Percent of ROW - NWI Wetlands	16	12	10
Number of NWI Wetlands within	143	128	103
Acres of NWI Freshwater Emergent Wetlands within ROW	96	88	75
Percent of ROW - NWI Freshwater Emergent Wetlands	11	11	9
Acres of NWI Freshwater Forested/Shrub Wetlands within ROW	32	7	7
Percent of ROW - NWI Freshwater Forested/Shrub Wetlands	4	1	1
Acres of NWI Freshwater Pond Wetlands within ROW	5	-	-
Percent of ROW - Freshwater Pond Wetlands	1	-	-
Acres of NWI Lake within ROW	-	1	-
Percent of ROW - NWI Lakes	-	-	-
Acres of NWI Riverine within ROW	1	1	1
Percent of ROW - NWI Riverine Wetlands	-	-	-
Estimated Number of Poles in NWI Wetlands	27	18	19
Acres of Temporary NWI Wetland Impacts (1-Acre/Pole)	27	18	19
Sq. Feet of Permanent NWI Wetland Impacts (55-Sq. Feet/Pole)	1,485	990	1,045
Acres of Permanent NWI Wetland Impacts	-	-	-
Number Intermittent Stream, Drainage, or Waterway Crossings within ROW	13	21	26
Number PWI Intermittent Stream, Drainage, or Waterway Crossings within ROW	2	2	4

Number Perennial Stream, Drainage, or Waterway Crossings within ROW	16	10	9
Number PWI Perennial Stream, Drainage, or Waterway Crossings within ROW	11	5	7
Number Other Stream, Drainage, or Waterway Crossings within ROW	2	3	3
Number Other PWI Stream, Waterway, or Drainage Crossings within ROW	1	2	2
Number PWI Lake and Wetland Crossings within ROW	4	5	2
Acres PWI Wetlands within ROW	4	2	1
Percent ROW - PWI Wetlands	-	-	-
Estimated Number of Poles in PWI Wetlands	-	1	1
Acres Temporary PWI Wetland Impacts (1-Acre/Pole)	-	1	1
Sq. Feet Permanent PWI Wetland Impacts (55-Sq. Feet/Pole)	-	55	55
Acres Permanent PWI Wetland Impacts	-	-	-
Acres (100-year) Floodplain within ROW	24	13	14
Percent ROW - 100-Year Floodplain	3	2	2
Estimated Number of Poles in 100-Year Floodplain	8	5	5
Acres Temporary 100-Year Floodplain Impacts (1-Acre/Pole)	8	5	5
Sq. Feet Permanent 100-Year Floodplain Impacts (55-Sq. Feet/Pole)	440	275	275
Acres Permanent 100-Year Floodplain Impacts	-	-	-
Acres Restorable Wetlands within ROW	108	78	75
Percent ROW - Restorable Wetlands	12	10	9
Number Water Wells within ROW	1	4	4

The MCBS sites are of particular concern. The DEIS, on page 7-114 notes:

> *Areas with high biodiversity significance contain sites with high quality 0ccurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species; the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes*

present in Minnesota. MCBS sites are present in the area between Sauk Centre and St. Cloud but most are concentrated in the eastern area of Stearns County.

In addition:

The MCBS sites of biodiversity significance are ranked and organized into three classifications; moderate, high, and outstanding. Areas with moderate biodiversity significance contain significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery. ***The Preferred, Alternate A & B routes primarily possess MCBS Sites of Biodiversity that is high and outstanding.***

The Applicants' Modified Preferred Route has the higher natural resource impacts, when measured by the criteria in the statute and rules, with Route E and Route G superior to the Modified Preferred Route when considering Route E and Route G's lower impacts.

E. AGRICULTURAL RESOURCE IMPACT ANALYSIS OF ROUTE OPTIONS

In addition to the criteria and factors pertaining to agriculture, Minnesota has a strong statutory policy of protection of agricultural land, which specifically contemplates the impacts of transmission:

> Guiding the orderly construction and development of energy generation and transmission systems and enhancing the development of alternative energy to meet the needs of rural and urban communities and preserve agricultural land to the greatest possible extent by reducing energy costs and minimizing the use of agricultural land for energy production facilities…

Minn. Stat. §17.80, Subd. 2(h).

Looking at Agricultural impacts by criteria categories as set out in Lahr's Schedule 8, the Modified Preferred route is clearly an inferior option, with higher impacts in nearly every category and lesser impacts in only one category. Alternatively, Route E and Route G both have lesser temporary and permanent impacts on agriculture, with minor distinctions, and Route G having lower number of square feet of permanent impacts based on pole placement footage:

Agricultural Impacts		Data		
		Pref	E	G
Agricultural Land Use	Acres of Agricultural Land Use within ROW	813	763	776
	Percent of ROW - Agricultural Land	94	96	96
	Acres of Special Protection Agricultural Land Use within ROW	-	-	-
	Percent of ROW - Special Protection Agricultural Land	-	-	-
	Estimated Number of Poles in Agricultural Land	163	136	139
	Acres of Temporary Agricultural Land Impacts (1-Acre/Pole	163	136	139
	Sq. Feet of Permanent Agricultural Land Impacts (1,000-Sq. Feet/Pole)	163,000	136,000	139,000
	Acres of Permanent Agricultural Land Impacts within ROW	4	3	3
	Acres of CRP Lands within ROW	16	16	5
	Percent of ROW - CRP Lands	2	2	1

V. COST COMPARISON

The Modified Preferred route is not the least costly route. Using the cost data provided by the Applicants,[20] a comparison of costs shows that there is a cost savings with either Route E with Option 11 or Route G with Option 11 have a savings of -$800,000.00, or a -.3% variance, and -$300,000.00 or a -.1% savings, respectively, when compared to the Modified Preferred Route. Both routes C and D are also less expensive then the Modified Preferred Route by $2.9 million, or 1.2%, and $3.5 million, or 1.4%, respectively.[21]

The Modified Preferred Route route is more costly than either Route E with Option 11, or Route G with Option 11. Although a preference for lower cost would also support placing the

[20] Exhibit 3, Chizek Direct, p. 10.
[21] A +/- 2% variance to the Total Route cost of the Modified Preferred route equates to $5.04 million.

transmission line on Route C and D when compared to the Modified Preferred Route, the difference in the amounts are diminimus when compared to the possible range of error embedded into the cost estimates, and this small difference does not negate the comparatively greater impacts of Routes C and D.

Route Cost Comparison					
	(Total Route) 325 (in millions)	(Sauk Centre to St. Cloud) (in millions)	Variance to Modified Preferred Route (in millions)	% Variance to Total Modified Preferred Route	% Variance to Modified Preferred Route (Sauk Centre to St. Cloud)
Modified Preferred	$252.0	$63.8	$0.0	0.0%	0.0%
Route A	$290.7	$65.2	$38.7	15.4%	60.7%
Route B	$291.8	$66.3	$39.8	15.8%	62.4%
Route C	$249.1	$60.9	($2.9)	-1.2%	-4.5%
Route D	$248.5	$60.3	($3.5)	-1.4%	-5.5%
Route D - Underground	$796.2	$608.0	$544.2	216.0%	853.0%
Route E	$252.9	$64.7	$0.9	0.4%	1.4%
Route F	$262.4	$74.2	$10.4	4.1%	16.3%
Route G	$253.4	$65.2	$1.4	0.6%	2.2%
Route H	$253.0	$64.8	$1.0	0.4%	1.6%
Option 11	($1.7)	($1.7)			
Route E /w Opt 11	$251.2	$63.0	($0.8)	-0.3%	-1.3%
Route G with Option 11	$251.7	$63.5	($0.3)	-0.1%	-0.5%

These relatively small cost increases between the Modified Preferred route and Route E and Route G of approximately $1 million, in a $462+ million dollar project are not sufficient to tip a decision in favor of the Modified Preferred route. Under the Minnesota Environmental Rights Act, economic considerations alone shall not be the measure of a feasible and prudent alternative. See Minn. Stat. §116B.04.

VI. RGHT OF WAY SHOULD BE WIDENED TO ASSURE LOW MAGNETIC FIELD LEVELS AT EDGE OF RIGHT OF WAY

The modeled magnetic field levels provided in the application were misleadingly low. The conductor is a high capacity 345kV bundled 954 kcmil with thermal limits of each conductor at 3,347 amps and 2000MVA.[22] The planned right-of-way is 75 feet, and for just the Sauk Centre to St. Cloud segment of the line, between 37 and 50 residential structures are between 150 and 300 feet from the alignment.[23] An additional estimated 34 residential structures are located between 150 and 300 feet in the two Fargo to Sauk Centre segments[24], totaling 71 to 84 residences with an unknown number of individuals affected.

When additional magnetic field information was provided, disclosed in Direct Testimony and in the Final Environmental Impact Statement, potential magnetic fields are an alarming 10-20 times higher than originally stated. First, the levels declared in the Application:

Figure 3-10. Calculated Magnetic Fields (mG) for Proposed Double Circuit 345 kV Transmission Line Designs (3.28 Feet Above Ground)

			Distance to Proposed Centerline										
Structure Type	System Condition	Current (Amps)	-300'	-200'	-100'	-75'	-50'	0'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345 kV Single Circuit	Peak	50.2	0.15	0.32	1.07	1.66	2.74	6.06	3.40	1.93	1.19	0.31	0.14
	Average	30.1	0.09	0.19	0.64	1.00	1.64	3.63	2.04	1.16	0.71	0.19	0.08
Single Pole Davit Arm 345 kV/345 kV Double Circuit with One Circuit In Service	Peak	50.2	0.14	0.28	0.84	1.22	1.88	4.87	3.46	2.11	1.35	0.37	0.16
	Average	30.1	0.08	0.17	0.51	0.73	1.13	2.92	2.07	1.27	0.81	0.22	0.10

[22] Ex. 1, Application, p. 3-2,
[23] Ex. 2, Direct Testimony of Lahr, Schedule 8.
[24] Id.

Distance to Proposed Centerline													
Structure Type	System Condition	Current (Amps)	-300'	-200'	-100'	-75'	-50'	0'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345 kV/345 kV Double Circuit with both Circuits In Service	Peak	50.2	0.04	0.11	0.63	1.1.6	2.27	5.71	2.30	1.17	0.64	0.11	0.04
	Average	30.1	0.02	0.07	0.38	0.69	1.36	3.42	1.38	0.70	0.39	0.07	0.02

Exhibit 1, Application, Table 5.2-6, p. 3-22 & 3-23. Similarly low magnetic field levels were provided in the DEIS:

Table 5.2-6. Calculated Magnetic Fields (milligauss) for proposed double circuit 345 kV Transmission Line Designs (3.28 feet above ground)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline												
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	Peak	264	0.79	1.67	5.62	8.70	14.36	23.45	31.89	29.76	17.92	10.19	6.26	1.65	0.72
	Average	158	0.47	1.00	3.36	5.21	8.60	14.03	19.08	17.81	10.73	6.10	3.75	0.99	0.43
Single Pole Davit Arm 345kV Single Circuit Vertical Config	Peak	264	0.86	1.97	7.12	11.10	18.17	27.45	25.55	16.04	9.86	6.41	4.42	1.48	0.71
	Average	158	0.52	1.18	4.26	6.65	10.87	16.43	15.29	9.60	5.90	3.84	2.64	0.88	0.42
Single Pole Davit Arm 345kV/345 kV Double Circuit with One Circuit In Service	Peak	264	0.71	1.48	4.43	6.43	9.89	16.09	25.62	27.50	18.18	11.10	7.11	1.97	0.86
	Average	158	0.43	0.89	2.65	3.85	5.92	9.63	15.33	16.46	10.88	6.64	4.25	1.18	0.52
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	Peak	264	0.19	0.58	3.32	6.08	11.96	22.90	30.03	23.06	12.10	6.17	3.39	0.59	0.19
	Average	158	0.11	0.35	1.99	3.64	7.16	13.71	17.97	13.80	7.24	3.70	2.03	0.35	0.12

These amperage (current) levels used are not consistent with Certificate of Need testimony and Compliance Filing, and Comments were filed[25] putting MOES on notice that the modeling was materially in error based on these other documents. Applicants' witness Chizek's

[25] FEIS, Comment38-39, p.2-19 & 2-20.

undergrounding estimate[26] identifies capacity and loading, which show a planned amperage of 3,348 or 3,795 (2,000 MVA), a load factor of 75% of that amperage, and a "large load transfer capacity requirement of 2,000MVA per circuit" in numerous places in the study:

- § 1.3 Cable Case Summary, Table 1-1: Ampacity 3,795 or 3,348 depending on conductor used (p.2)
- §2.0 Project description – "ampacity requirement for each circuit is 3,347(2,000 MVA at 345kV) (p. 4)
- §2.3.1 Ampacity Calculations - 3,347 Amps (2,000 MVA) at 345kV, Load Factor 75% (p. 6)
- §2.3.1 Table 2-1Ampacity Table - 3,795 or 3,348 depending on conductor used (p.7)

These modeled levels were challenged by an engineer in an Affidavit submitted in another docket, and as a result, the Applicants filed a revised chart in Lahr's Direct Testimony, Schedule 7 (see Attachment B, for clearer graphic):

CALCULATED MAGNETIC FLUX DENSITY (MILLIGAUSS) FOR PROPOSED 345 KV TRANSMISSION LINE DESIGNS (3.28 FEET ABOVE GROUND) (ASSUMED 600 & 1,000 MVA LOADING)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline											
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	System Max	1000	2.98	6.33	21.28	32.97	54.40	88.83	120.79	112.71	67.90	38.59	23.71	6.27	2.73
	With Added Generation	2500	7.44	15.84	53.20	82.42	136.01	222.07	301.96	281.77	169.74	96.49	59.28	15.67	6.83
Single Pole Davit Arm 345kV Single Circuit Vertical Config	System Max	1000	3.26	7.46	26.96	42.06	68.82	103.97	96.76	60.77	37.34	24.29	16.73	5.60	2.67
	With Added Generation	2500	8.15	18.65	67.39	105.14	172.05	259.93	241.91	151.92	93.34	60.72	41.82	13.99	6.68
Single Pole Davit Arm 345kV/345kV Double Circuit with One Circuit In Service	System Max	1000	2.70	5.62	16.79	24.37	37.45	60.95	97.03	104.17	68.86	42.03	26.92	7.45	3.26
	With Added Generation	2500	6.74	14.06	41.96	60.92	93.64	152.38	242.57	260.42	172.14	105.07	67.29	18.62	8.15
Single Pole Davit Arm 345kV/345kV Double Circuit with Both Circuits In Service	System Max	1000	.73	2.19	12.58	23.01	45.30	86.76	113.75	87.37	45.85	23.39	12.8	2.25	.74
	With Added Generation	2500	1.81	5.47	31.44	57.53	113.26	216.89	284.37	218.42	114.62	58.47	32.08	5.61	1.84

[26] Ex. 3, Direct Testimony of Chizek, Schedule 1, 345kV Underground Report, p.2,4,6-7.

The World Health Organization has concluded that "an association exists between childhood leukemia and exposure to elevated magnetic fields in homes.[27] Dr. Carpenter raises concerns about magnetic fields, and testified that:

> 1) There is strong scientific evidence that exposure to magnetic fields from power lines greater than 4 milligauss ("mG") is associated with an elevated risk of childhood leukemia.
>
> 2) Some studies have demonstrated significant elevations in childhood leukemia when comparing children living in homes with 2 mG exposure as compared to those in homes with 1 mG of exposure. There is sufficient scientific evidence to cause concern about leukemia risks at exposures above 2 mG.
>
> 3) There is some evidence that occupational and residential exposure to magnetic fields is associated with cancer in adults as well, particularly brain cancer. There is strong scientific evidence that lifetime exposure to magnetic fields in excess of 2 mG is associated with an increased risk of neurodegenerative diseases in adults, including Alzheimer's disease and amyotrophic lateral sclerosis (ALS).
>
> 4) While there is a debate as to which mechanisms are responsible, and there no specific animal model for the way in which magnetic fields cause cancer, there is a large body of evidence of ways in which magnetic fields affect tissue at a cellular level which may be the basis for the development of cancer and neurodegenerative disease.
>
> 5) There is no reliable evidence that power-line magnetic fields do not cause cancer, and a large body of evidence that power-line magnetic fields do cause adverse human health impacts, including cancer.
>
> 7) Prudent public health policy requires minimizing the effects of power line magnetic fields on human health.

Looking at the Applicants' magnetic field chart, Lahr's Direct Schedule 7, and the FEIS added magnetic field chart, Table 3.4-5, the range of magnetic fields at the centerline, is up to ten times higher than originally disclosed in the application. At the centerline, the mG level ranges from 96.76 mG to 301.96 mG, which is from 30 to 100 times the 3 mG level of concern in Greenland's study, and 48-150 times the 2mG level associated with childhood leukemia, brain cancer, andneurodegenerative diseases in adults. At the edge of the planned right-of-way, 75

[27] Ex. 49, Direct Testimony of David Carpenter, p. 6, l. 16-19; see also Id., Sched 2, p. 95.

feet from the centerline, the levels range from 23.01 mG to 105.14 mG, which is 11-52 times the 2 mG level of concern raised in Dr. Carpenter's testimony. Although magnetic fields taper off towards the edge of the right of way, it is not until 300' from centerline edge of the chart that the levels range from 2.70 mG to 8.15 mG, near or approaching the 3-4 mG level demonstrated in epidemiological studies to be associated with childhood leukemia.[28] No modeling was provided for distances beyond 300 feet, but these charts agree that for all but one structure type, the magnetic field levels do not drop below 2 mG until more than 300 feet from the centerline. The one case where magnetic field levels are modeled below 2 mG is where the structure type is the Single Pole Davit Arm 345kV/345kV Double circuit with Both Circuits in Service – providing phase cancellation reduction in magnetic fields – and this project is not expected to be double circuited for some time.

Right-of-ways are established to protect the public health and safety. The planned 150 foot right-of-way, with 75 feet on each side of the centerline, does not provide sufficient levels of precaution to protect the public safety from the potential impacts of magnetic fields. If a routing permit for this line is granted, NoCapX 2020 and United Citizens Action Network request that the right-of-way be at minimum 600 feet wide such that magnetic field levels at the right-of-way edge will more nearly approach the 2 mG level of concern.

VII. ENVIRONMENTAL REVIEW IS INADEQUATE

The environmental review in this case is inadequate. This inadequacy is apparent in two examples, calculation of "non-proliferation" using field lines and "linear features" not

[28] Ex. 49, Direct Testimony of David Carpenter, p.7, l. 1-18, citing (3mG) Greenland, S. et al., A Pooled Analysis of Magnetic Fields, Wire Codes and Childhood Leukemia, Epidemiology (Nov. 2000); (4mG) Ahlbom, A., et al., A Pooled Analysis of MagneticFields and Childhood Leukemia, British Journal of Cancer (2000).

contemplated in PEER or transmission routing criteria, and characterization of aesthetic impacts using only distances from residences to quantify impacts.

A. FIELD LINES AND "LINEAR FEATURES" ARE NOT RIGHTS OF WAY

Minnesota has a policy of non-proliferation of transmission corridors based on case law and statute. People for Environmental Enlightenment& Responsibility (PEER), Inc. v. Minnesota Environmental Quality Council, 266 N.W.2d, 858, 868 (Minn. 1978); Minn. Stat. §216E.03, Subd. 7(e). Under PEER, non-proliferation is achieved through utilization of existing railroad and highway rights of way. PEER, at 868. The statute is similarly focused on "an existing high-voltage transmission route and the use of parallel existing highway right-of-way." Minn. Stat. 216E.03, Subd. 7(e).

In its Application, in addition to identifying "Right-of Way Type Paralleled (miles)," the Applicants also added the novel category of "Field/Parcel Lines Paralled (miles)" and added them to the existing rights-of-way[29] to come to a "Total Length of Parallel" and a percentage close to 100%!

Figure 3-4. Summary of Length of Existing Right-of-Way, Field/Parcel Lines, or Other Natural Division Lines Paralleled by the Proposed Routes

Route	Route Length (miles)	Right-of-Way Type Paralleled (miles)		Field/Parcel Lines Paralleled (miles)	Miles not Paralleling Existing Rights-of-Way, Field/Parcel Lines, or Other Natural Division Lines	Total Length of Parallel	% of Length
		Transmission Line	Road				

Despite the clear focus of the statute and PEER on existing right-of-way, the DEIS did not address right-of-way sharing, perhaps following the lead of the application. However, in response to "several commentors," the FIES did address corridor sharing, but also added "linear

[29] Ex 1, Application, Figure 3-4, p. 3-6.

features paralleled along the routes," including "other linear features" such as "field lines" and "trail" and counted such "other linear features" as "corridor sharing."[30] This characterization provides a distorted picture of corridor, leaving the impression that all the route options adhere closely to the states' policy of non-proliferation.:

Table 3.2-4. (Table added as a result of comments received) Sauk Centre to St. Cloud Section Sharing

Route/Option	Miles Paralleling Linear Features							Percent
	Road	Field	Rail	Trail	Transmission	None	Total	
Route Alternatives								

B. AESTHETICS ANALYSIS IS MORE THAN DETERMINING THE DISTANCE OF A TRANSMISSION LINE FROM HOMES

The Environmental Impact Statement's evaluation of the aesthetic impacts of this transmission line are inadequate. Although aesthetics technically "considered" because the topic is lumped into an EIS section entitled "Recreation and Aesthetic Resources" and there is some discussion of impacts on recreation areas, the "Aesthetic Impact Evaluation for Route Alternatives and Route Options" is limited to calculation of the numbers of homes within 150 and 500 feet of the alignment. A table[31] details the number of homes within 150 and 500 feet for each alternative proposed, followed by a sparse narrative noting that there are three wayside rest areas and a campground and that the "transmission lines would have visual impacts on these areas but not limit their function."[32] This is followed by a narrative listing of Wildlife Production Areas, a resort, and a scenic byway, followed by the statement that "No impacts on recreational uses that would alter or limit the use of these areas are anticipated, and therefore, no mitigative measures are proposed." These conclusory statements following a dismissive and non-specific narrative

[30] FEIS, Table 3.2-2, 3.2-3 and 3.2-4, p. 3-3 to 3-5.
[31] Ex. 22, DEIS, Table 5.3-4, Aesthetic Impact Evaluation for Route Alternatives and Route Options, p. 5-38.
[32] Id., p. 5—39.

that is neither inclusive nor easily comparable between routes is not sufficient to be helpful in building a record for a decision.

In addition, the FEIS is not entered into the hearing record in this docket, despite disclosure of crucial information and parties relying on it and citing to it repeatedly in briefing. These flaws are examples of ways in which the environmental review is inadequate.

VIII. CONCLUSION

NoCapX 2020, United Citizens Action Network, and the North Route Citizens Alliance join with the Applicants, St.John's Abbey and University and Avon Township and request that either Route E with Option 11, or Route G with Option 11, be recommended as we have found it to be the route with the least impacts.

NoCapX 2020, U-CAN, and the North Route Citizens Alliance also request that if a route is chosen, that in the interests of protection of the public, the right-of-way be of sufficient width to reduce potential magnetic field exposure to 2 mG or less.

February 18, 2011

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ATTACHMENT A

NoRCA Comparative Route Analysis

Lahr Rebuttal Tetimony Schedule 8, Pg 7 of 9

Reference: Water Resources Detail

	Data			Unweighted Rank			WeightedRank			
	pref 1	E	G	pref 1	E	G	Weight	pref 1	E	G
Length of Route (miles)	48	44	44	3	1	1	7	21	7	7
Number of Acres in Representative 150-Foot ROW	866	797	808	3	1	2	1	3	1	2
Acres of NWI Wetlands within ROW	134	97	84	3	2	1	10	30	20	10
Percent of ROW - NWI Wetlands	16	12	10	3	2	1	1	3	2	1
Number of NWI Wetlands within	143	128	103	3	2	1	1	3	2	1
Acres of NWI Freshwater Emergent Wetlands within ROW	96	88	75	3	2	1	5	15	10	5
Percent of ROW - NWI Freshwater Emergent Wetlands	11	11	9	2	2	1	1	2	2	1
Acres of NWI Freshwater Forested/Shrub Wetlands within ROW	32	7	7	3	1	1	5	15	5	5
Percent of ROW - NWI Freshwater Forested/Shrub Wetlands	4	1	1	3	1	1	1	3	1	1
Acres of NWI Freshwater Pond Wetlands within ROW	5	-	-	3	1	1	5	15	5	5
Percent of ROW - Freshwater Pond Wetlands	1	-	-	3	1	1	1	3	1	1
Acres of NWI Lake within ROW	-	1	-	1	3	1	5	5	15	5
Percent of ROW - NWI Lakes	-	-	-	1	1	1	1	1	1	1
Acres of NWI Riverine within ROW	1	1	1	1	1	1	5	5	5	5
Percent of ROW - NWI Riverine Wetlands	-	-	-	1	1	1	1	1	1	1
Estimated Number of Poles in NWI Wetlands	27	18	19	3	1	2	1	3	1	2
Acres of Temporary NWI Wetland Impacts (1-Acre/Pole)	27	18	19	3	1	2	1	3	1	2
Sq. Feet of Permanent NWI Wetland Impacts (55-Sq. Feet/Pole)	1,485	990	1,045	3	1	2	1	3	1	2
Acres of Permanent NWI Wetland Impacts	-	-	-	1	1	1	1	1	1	1
Number of Intermittent Stream, Drainage, or Waterway Crossings within ROW	13	21	26	1	2	3	1	1	2	3
Number of PWI Intermittent Stream, Drainage, or Waterway Crossings within ROW	2	2	4	1	1	3	3	3	3	9
Number of Perennial Stream, Drainage, or Waterway Crossings within ROW	16	10	9	3	2	1	1	3	2	1
Number of PWI Perennial Stream, Drainage, or Waterway Crossings within ROW	11	5	7	3	1	2	7	21	7	14
Number of Other Stream, Drainage, or Waterway Crossings within ROW	2	3	3	1	2	2	1	1	2	2
Number of Other PWI Stream, Waterway, or Drainage Crossings within ROW	1	2	2	1	2	2	5	5	10	10
Number of PWI Lake and Wetland Crossings within ROW	4	5	2	2	3	1	5	10	15	5
Acres of PWI Wetlands within ROW	4	2	1	3	2	1	1	3	2	1
Percent of ROW - PWI Wetlands	-	-	-	1	1	1	1	1	1	1
Estimated Number of Poles in PWI Wetlands	-	1	1	1	2	2	1	1	2	2
Acres of Temporary PWI Wetland Impacts (1-Acre/Pole)	-	1	1	1	2	2	1	1	2	2
Sq. Feet of Permanent PWI Wetland Impacts (55-Sq. Feet/Pole)	-	55	55	1	2	2	1	1	2	2
Acres of Permanent PWI Wetland Impacts	-	-	-	1	1	1	1	1	1	1
Acres of (100-year) Floodplain within ROW	24	13	14	3	1	2	3	9	3	6
Percent of ROW - 100-Year Floodplain	3	2	2	3	1	1	1	3	1	1
Estimated Number of Poles in 100-Year Floodplain	8	5	5	3	1	1	1	3	1	1
Acres of Temporary 100-Year Floodplain Impacts (1-Acre/Pole)	8	5	5	3	1	1	1	3	1	1
Sq. Feet of Permanent 100-Year Floodplain Impacts (55-Sq. Feet/Pole)	440	275	275	3	1	1	1	3	1	1
Acres of Permanent 100-Year Floodplain Impacts	-	-	-	1	1	1	1	1	1	1
Acres of Restorable Wetlands within ROW	108	78	75	3	2	1	1	3	2	1
Percent of ROW - Restorable Wetlands	12	10	9	3	2	1	1	3	2	1
Number of Water Wells within ROW	1	4	4	1	2	2	3	3	6	6
				Avg 2.2	1.5	1.4	Avg	5.3	3.7	3.2

Impact Color Key……	Lowest	Low	Highest

Lahr Rebuttal Tetimony Schedule 8, Pg 8 of 9

Reference: Physical and Land Use Detail

		Data			Unweighted Rank			WeightedRank			
		pref 1	E	G	pref 1	E	G	Weight	pref 1	E	G
General	Length of Route (miles)	48	44	44	3	1	1	7	21	7	7
	Length Paralleling Existing ROWs (miles)	29	32	33	3	2	1	10	30	20	10
	Percent of Route Paralleling Existing ROWs	61	73	75	3	2	1	10	30	20	10
	Length Paralleling Existing Linear Features (miles)	46	42	42	1	2	2	3	3	6	6
	Percent Paralleling Existing Linear Features	97	95	94	1	2	3	3	3	6	9
	Number of Acres in Representative 150-Foot ROW	866	797	808	3	1	2	5	15	5	10
Agricultural Land Use	Acres of Agricultural Land Use within ROW	813	763	776	3	1	2	7	21	7	14
	Percent of ROW - Agricultural Land	94	96	96	1	2	2	1	1	2	2
	Acres of Special Protection Agricultural Land Use within ROW	-	-	-	1	1	1	1	1	1	1
	Percent of ROW - Special Protection Agricultural Land	-	-	-	1	1	1	1	1	1	1
	Estimated Number of Poles in Agricultural Land	163	136	139	3	1	2	1	3	1	2
	Acres of Temporary Agricultural Land Impacts (1-Acre/Pole	163	136	139	3	1	2	1	3	1	2
	Sq. Feet of Permanent Agricultural Land Impacts (1,000-Sq. Feet/Pole)	163,000	136,000	139,000	3	1	2	1	3	1	2
	Acres of Permanent Agricultural Land Impacts within ROW	4	3	3	3	1	1	1	3	1	1
	Acres of CRP Lands within ROW	16	16	5	2	2	1	1	2	2	1
	Percent of ROW - CRP Lands	2	2	1	2	2	1	1	2	2	1
Land Use	Acres of Residential Land Use within ROW	9	10	9	1	3	1	7	7	21	7
	Percent of ROW - Residential Land Use	1	1	1	1	1	1	1	1	1	1
	Acres of Recreational/Open Space/Park Land Use within ROW	7	1	-	3	2	1	5	15	10	5
	Percent of ROW - Recreational/Open Space/Park Land Use	1	-	-	3	1	1	5	15	5	5
	Acres of Commercial/Business/Institutional/Public Land Use within ROW	10	1	-	3	2	1	5	15	10	5
	Percent of ROW - Commercial/Business/Institutional/Public Land Use	1	-	-	3	1	1	1	3	1	1
	Acres of Industrial Land Use within ROW	23	8	8	3	1	1	3	9	3	3
	Percent of ROW - Industrial Land Use	3	1	1	3	1	1	1	3	1	1
	Acres of Transitional/Growth Area Land Use within ROW	-	10	10	1	2	2	1	1	2	2
	Percent of ROW - Transitional/Growth Area Land Use	-	1	1	1	2	2	1	1	2	2
	Acres of County-Identified Municipal Land Use within ROW	4	4	4	1	1	1	2	2	2	2
	Percent of ROW - County-Identified Municipal Land Use	1	1	1	1	1	1	1	1	1	1
	Estimated Number of Poles in Non-Agricultural Land	124	133	146	1	2	3	1	1	2	3
	Acres of Temporary Non-Agricultural Land Impacts (1-Acre/Pole)	124	133	146	1	2	3	1	1	2	3
	Sq. Feet of Permanent Non-Agricultural Land Impacts (55-Sq. Feet/Pole)	6,820	7,315	8,030	1	2	3	1	1	2	3
	Acres of Permanent Non-Agricultural Land Impacts	-	-	-	1	1	1	1	1	1	1
	Number of Center Pivot Irrigation Systems within ROW	3	2	2	3	1	1	3	9	3	3
	Acres of Wooded Lands within ROW	71	40	35	3	2	1	10	30	20	10
	Percent of ROW - Wooded Lands	8	5	4	3	2	1	1	3	2	1
	Number of Daycare Facilities within ROW	-	-	-	1	1	1	10	10	10	10
	Number of Pipeline Crossings within ROW	3	2	2	3	1	1	7	21	7	7
	Number of FCC Antenna Structures within ROW	-	-	-	1	1	1	7	7	7	7
Trails and Scenic Byways	Number of State Trail Crossings within ROW	-	-	-	1	1	1	5	5	5	5
	Parallel Miles to State Trails	-	-	-	1	1	1	5	5	5	5
	Number of County Trail Crossings within ROW	2	1	1	3	1	1	5	15	5	5
	Parallel Miles to County Trails	-	-	-	1	1	1	5	5	5	5
	Number of Scenic Byway Crossings within ROW	-	-	-	1	1	1	1	1	1	1
	Parallel Miles to Scenic Byways	-	-	-	1	1	1	1	1	1	1
Airports/Landing Strips	Number of Airports/Landing Strips within 5-Miles	3	2	1	3	2	1	5	15	10	5
	Located within Instrument Approach to Airport	-	-	-	1	1	1	1	1	1	1
	Miles to Nearest Airport/Landing Strip	1	3	3	3	1	1	1	3	1	1
	Number of VOR Sites within ROW	-	-	-	1	1	1	1	1	1	1
Mining Aggregrate Resources	Total Number of Aggregate Source Pits within ROW	1	2	2	1	2	2	5	5	10	10
	Number of Prospective Aggregate Source Pits within ROW	1	1	1	1	1	1	1	1	1	1
	Number of Commercial Aggregate Source Pits within ROW	-	1	1	1	2	2	1	1	2	2
Cultural and Historic Resources	Number of NRHP Sites within ROW	-	-	-	1	1	1	1	1	1	1
	Number of Known Historic Structures within ROW	-	-	-	1	1	1	5	5	5	5
	Number of Known Archaeological Sites within ROW	-	1	-	1	3	1	5	5	15	5
				Avg	1.9	1.4	1.4	Avg	6.8	4.9	4.0

Impact Color Key.....	Lowest	Low	Highest

Lahr Rebuttal Tetimony Schedule 8, Pg 9 of 9: Updated with FEIS Data

Reference: Human Settlement & Ecological Detail

		Data			Unweighted Rank			WeightedRank			
		pref 1	E	G	pref 1	E	G	Weight	pref 1	E	G
Number of Residences / Non-Non Residences within proximity of ROW	Number of Residential Structures within 0-75 Feet of Alignment	1	-	-	3	1	1	10	30	10	10
	Number of Residential Structures within 75-150 Feet of Alignment	7	12	9	1	3	2	1	1	3	2
	Total Number of Residential Structures within 150 Feet of Alignment	8	12	9	1	3	2	1	1	3	2
	Number of Residential Structures within 150-300 Feet of Alignment	50	37	49	3	1	2	1	3	1	2
	Number of Residential Structures within 300-500 Feet of Alignment	35	27	30	3	1	2	1	3	1	2
	Total Number of Residential Structures within 500 Feet of Alignment	93	76	88	3	1	2	10	30	10	20
	Number of Non-Residential Structures within 150 Feet of Alignmen	28	25	30	2	1	3	1	2	1	3
USFWS Easements	Number of USFWS Easements within ROW	-	-	-	1	1	1	5	5	5	5
	Total Acres of USFWS Easements within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of USFWS Wetland Easements within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of USFWS Grassland Easements within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of USFWS Farmers Home Administration Easements within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of USFWS Other Easements within ROW	-	-	-	1	1	1	1	1	1	1
MIN County Biological Survey (MCBS) Sites of Biodiversity Significance	Total Acres of MCBS Sites of Biodiversity Significance within ROW	20	8	14	3	1	2	10	30	10	20
	Number of MCBS Sites of Biodiversity Significance within ROW	2	3	4	1	2	3	1	1	2	3
	Acres of Moderate MCBS Sites of Biodiversity Significance within ROW	-	6	6	1	2	2	3	3	6	6
	Acres of High MCBS Sites of Biodiversity Significance within ROW	20	2	8	3	1	2	10	30	10	20
	Acres of Outstanding MCBS Sites of Biodiversity Significance within ROW	-	-	-	1	1	1	10	10	10	10
MCBS Native Plant Com	Number of MCBS Native Plant Communities within ROW	2	1	2	2	1	2	1	2	1	2
	Acres of MCBS Native Plant Communities within ROW	7	3	7	2	1	2	10	20	10	20
MCBS Railroad ROW Praries	Number of MCBS Railroad ROW Prairies	-	-	-	1	1	1	1	1	1	1
	Linear Feet of Fair MCBS Railroad ROW Prairies within ROW	-	-	-	1	1	1	1	1	1	1
	Linear Feet of Good MCBS Railroad ROW Prairies within ROW	-	-	-	1	1	1	1	1	1	1
	Linear Feet of Very Good MCBS Railroad ROW Prairies within ROW	-	-	-	1	1	1	1	1	1	1
MIN Land Trust Conservation	Number of MN Land Trust Conservation Easement Crossings within ROW	-	-	-	1	1	1	3	3	3	3
	Acres of MN Land Trust Conservation Easements within ROW	-	-	-	1	1	1	1	1	1	1
BWSR RIM Easements	Number of BWSR RIM Easement Crossings within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of BWSR RIM Easements within ROW	-	-	-	1	1	1	1	1	1	1
Calcareous Fens	Number of Calcareous Fens within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of Calcareous Fens within ROW	-	-	-	1	1	1	1	1	1	1
Sensitive Management Areas and Resources	Number of Waterfowl Production Areas within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of Waterfowl Production Areas within ROW	-	-	-	1	1	1	1	1	1	1
	Number of Wildlife Management Areas within ROW	-	1	-	1	3	1	5	5	15	5
	Acres of Wildlife Management Areas within ROW	-	-	-	1	1	1	1	1	1	1
	Number of Scientific Natural Areas within ROW	-	-	-	1	1	1	10	10	10	10
	Acres of Scientific Natural Areas within ROW	-	-	-	1	1	1	1	1	1	1
	Number of Known Occurrences of Threatened and Endangered Species within ROW	-	-	-	1	1	1	10	10	10	10
	Number of Trout Stream Crossings within ROW	-	-	-	1	1	1	1	1	1	1
	Acres of Prairie Bank Easements within ROW	-	-	-	1	1	1	1	1	1	1
					Avg	1.4	1.2	1.4	Avg		5.6	3.6	4.5
											219	141	175
											3	1	2

Impact Color Key……	Lowest	Low	Highest

ATTACHMENT B

B-1 Applicants' EMF charts from Application

B-2 Applicants EMF charts – Lahr Direct Testimony

B-3 FEIS EMF charts

B-1 Applicants' EMF charts from Application

Modern bipolar devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/defibrillators, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices.

Older unipolar designs are more susceptible to electric field interference. Research completed by Toivoen et al. (1991) indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types does exceed levels that Toivoen et al. has indicated may produce interference. However, a recent paper (Scholten et al., 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

3.4.2 MAGNETIC FIELDS

Figure 3-10 provides calculated magnetic fields for each structure and conductor configuration proposed for the Project. Magnetic fields were calculated for each section of the Project and under two system conditions: the expected peak and average current flows as projected for the year 2011, under normal system intact conditions. Current is given in amps. The peak magnetic field values are calculated at a point directly under the transmission line and where the conductor is closest to the ground. The same method is used to calculate the magnetic field at varying distances from the alignment of the structure. The magnetic field profile data show that magnetic field levels decrease rapidly (inverse square of the distance from source) from the alignment.

Figure 3-10. Calculated Magnetic Fields (mG) for Proposed Double Circuit 345 kV Transmission Line Designs (3.28 Feet Above Ground)

			Distance to Proposed Centerline										
Structure Type	System Condition	Current (Amps)	-300'	-200'	-100'	-75'	-50'	0'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345 kV Single Circuit	Peak	50.2	0.15	0.32	1.07	1.66	2.74	6.06	3.40	1.93	1.19	0.31	0.14
	Average	30.1	0.09	0.19	0.64	1.00	1.64	3.63	2.04	1.16	0.71	0.19	0.08
Single Pole Davit Arm 345 kV/345 kV Double Circuit with One Circuit In Service	Peak	50.2	0.14	0.28	0.84	1.22	1.88	4.87	3.46	2.11	1.35	0.37	0.16
	Average	30.1	0.08	0.17	0.51	0.73	1.13	2.92	2.07	1.27	0.81	0.22	0.10

Distance to Proposed Centerline													
Structure Type	**System Condition**	**Current (Amps)**	**-300'**	**-200'**	**-100'**	**-75'**	**-50'**	**0'**	**50'**	**75'**	**100'**	**200'**	**300'**
Single Pole Davit Arm 345 kV/345 kV Double Circuit with both Circuits In Service	Peak	50.2	0.04	0.11	0.63	1.1.6	2.27	5.71	2.30	1.17	0.64	0.11	0.04
	Average	30.1	0.02	0.07	0.38	0.69	1.36	3.42	1.38	0.70	0.39	0.07	0.02

Because the magnetic field produced by the transmission line is dependent on the current flowing on its conductors, the actual magnetic field when the Project is in service is typically less than that shown in the table. This is because the calculations in the figures represent the magnetic field with current flow at expected normal system peak conditions. Actual current flow on the transmission line will vary as magnetic field changes throughout the day and will be less than peak levels during most hours of the year.

As load growth occurs, the current flow on the line will increase, and because the magnetic field is directly related to current flow, the magnetic field will also increase.

Figures 3-9 and 3-10 indicate that electric and magnetic fields are lower for a double circuit configuration than for a single circuit configuration. When there are two circuits on a single structure, and if the phases of each circuit are opposite, they have a cancellation effect which reduces the electric and magnetic fields.

3.4.3 STRAY VOLTAGE

Stray voltage is a condition that can occur on the electric service entrances to structures from distribution lines—not transmission lines. More precisely, stray voltage exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.

Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures will be taken to prevent stray voltage problems when the transmission lines proposed in this Application parallel or cross distribution lines.

B-2 Applicants EMF charts – Lahr Direct Testimony

CALCULATED MAGNETIC FLUX DENSITY (MILLIGAUSS) FOR PROPOSED 345 KV TRANSMISSION LINE DESIGNS (3.28 FEET ABOVE GROUND) (ASSUMED 600 & 1,000 MVA LOADING)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline											
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	System Max	1000	2.98	6.33	21.28	32.97	54.40	88.83	120.79	112.71	67.90	38.59	23.71	6.27	2.73
	With Added Generation	2500	7.44	15.84	53.20	82.42	136.01	222.07	301.96	281.77	169.74	96.49	59.28	15.67	6.83
Single Pole Davit Arm 345kV Single Circuit Vertical Config	System Max	1000	3.26	7.46	26.96	42.06	68.82	103.97	96.76	60.77	37.34	24.29	16.73	5.60	2.67
	With Added Generation	2500	8.15	18.65	67.39	105.14	172.05	259.93	241.91	151.92	93.34	60.72	41.82	13.99	6.68
Single Pole Davit Arm 345kV/345kV Double Circuit with One Circuit In Service	System Max	1000	2.70	5.62	16.79	24.37	37.45	60.95	97.03	104.17	68.86	42.03	26.92	7.45	3.26
	With Added Generation	2500	6.74	14.06	41.96	60.92	93.64	152.38	242.57	260.42	172.14	105.07	67.29	18.62	8.15
Single Pole Davit Arm 345kV/345kV Double Circuit with Both Circuits In Service	System Max	1000	.73	2.19	12.58	23.01	45.30	86.76	113.75	87.37	45.85	23.39	12.8	2.25	.74
	With Added Generation	2500	1.81	5.47	31.44	57.53	113.26	216.89	284.37	218.42	114.62	58.47	32.08	5.61	1.84

B-3 FEIS EMF charts

Table 3.4-5. (Table added as a result of comments received) Calculated Magnetic Fields (milligauss) for proposed double circuit 345 kV Transmission Line Designs (3.28 feet above ground) (600 and 1500 MVA Loadings)

Structure Type	System Loading	Current (Amps)	Distance to Proposed Centerline												
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single circuit Delta Config	600 MVA	1000	2.98	6.33	21.28	32.97	54.40	88.83	120.79	112.71	67.90	38.59	23.71	6.27	2.73
	1500 MVA	2500	7.44	15.84	53.20	82.42	136.01	222.07	301.96	281.77	169.74	96.49	59.28	15.67	6.83
Single Pole Davit Arm 345kV Single circuit Vertical Config	600 MVA	1000	3.26	7.46	26.96	42.06	68.82	103.97	96.76	60.77	37.34	24.29	16.73	5.60	2.67
	1500 MVA	2500	8.15	18.65	67.39	105.14	172.05	259.93	241.91	151.92	93.34	60.72	41.82	13.99	6.68
Single Pole Davit Arm 345kV/345 kV Double circuit with One Circuit In Service	600 MVA	1000	2.70	5.62	16.79	24.37	37.45	60.95	97.03	104.17	68.86	42.03	26.92	7.45	3.26
	1500 MVA	2500	6.74	14.06	41.96	60.92	93.64	152.38	242.57	260.42	172.14	105.07	67.29	18.62	8.15
Single Pole Davit Arm 345kV/ 345kV Double circuit with Both Circuits In Service	600 MVA	1000	0.73	2.19	12.58	23.01	45.30	86.76	113.75	87.37	45.85	23.39	12.80	2.25	0.74
	1500 MVA	2500	1.81	5.47	31.44	57.53	113.26	216.89	284.37	218.42	114.62	58.47	32.08	5.61	1.84