TEXT ONLY VERSION –
THIS VERSION DOES NOT CONTAIN all MAPS AND APPENDICES
However, a Full TABLE OF CONTENTS is PROVIDED
ITEMS in Bold Italics Underline are available only in much larger Adobe PDF version and on EQB website

ENVIRONMENTAL ASSESSMENT

for

GREAT RIVER ENERGY 115 kV PROPOSAL

PLYMOUTH-MAPLE GROVE

DOCKET No. 03-65-TR-GRE PMG

Prepared by the Staff of the

Minnesota Environmental Quality Board
Room 300
658 Cedar Street
St. Paul, MN 55155

February 29, 2004

Preparer

George Johnson, Project Manager
Environmental Quality Board
Telephone: 651-296-2888
Email: George.Johnson@state.mn.us

Table of Contents

APPENDICES

FIGURES

(*Figure numbers are those used in the Route Permit Application. Alphabetic designators at the end of figure numbers indicate EQB- modified versions of figures to show alternate routes)*

ROUTE MAPS (Houston Engineering)

Notice, the color on these maps shows up very well on the website
http://www.eqb.state.mn.us/Docket.html?Id=3892

Table of Contents **80-82**

Plymouth to Bass Lake	***1***	***124***
Plymouth to Parkers Lake	***1A***	***125***
Plymouth to Parkers Lake	***2***	***126***
Plymouth to Parkers Lake	***3***	***127***
Plymouth to Parkers Lake	***3A (a is for Alternate route considered)***	***128***
Plymouth to Parkers Lake	***4***	***129***
Plymouth to Parkers Lake	***4A***	***130***
Plymouth to Parkers Lake	***5***	***131***
Plymouth to Parkers Lake	***5A***	***132***
Plymouth to Parkers Lake	***6***	***133***
Plymouth to Parkers Lake	***6A***	***134***
Plymouth to Parkers Lake	***7***	***135***
Plymouth to Parkers Lake	***7A***	***136***
Plymouth to Parkers Lake	***8***	***137***
Plymouth to Parkers Lake	***8A***	***138***
Plymouth to Parkers Lake	***9***	***139***
Plymouth to Parkers Lake	***9A***	***140***
Plymouth to Parkers Lake	***10***	***141***
Plymouth to Parkers Lake	***10A***	***142***
Plymouth to Parkers Lake	***11***	***143***
Plymouth to Parkers Lake	***11A***	***144***
Plymouth to Parkers Lake	***12***	***145***
Plymouth to Parkers Lake	***12A***	***146***
Plymouth to Parkers Lake	***13***	***147***
Plymouth to Parkers Lake	***13A***	***148***
Plymouth to Parkers Lake	***14***	***149***
Plymouth to Parkers Lake	***14A***	***150***

1.0 Introduction

Great River Energy (GRE) and Wright-Hennepin Cooperative Electric Association (W-H) have made a joint application to the Minnesota Environmental Quality Board (EQB) for a Construction and Route Permit for a High Voltage Transmission Line (HVTL) Route Permit pursuant to the provisions of the Power Plant Siting Act (Minnesota Statutes 116C.51 to 116C.69). Throughout this document, these applicants will be referred to as GRE.

1.1 Description

GRE has made an application to the EQB for a High Voltage Transmission Line (HVTL) Route Permit. This proposed HVTL will be a 115,000-volt (115 kV) alternating current transmission line. The permit application is for the construction, operation, and maintenance of a new 115-kilovolt high voltage transmission line circuit approximately 14 miles in length to connect seven existing electric substations in the cities of Plymouth and Maple Grove in Hennepin County, Minnesota.

1.2 Purpose

The proposed 115 kV HVTL is intended to provide better electric service to the residents of Plymouth and Maple Grove. Most of the existing transmission system in this area was designed and built prior to 1970. Growth in the electric load in this area can no longer be supported by the existing transmission system. The major benefit of the project is that it will put transmission infrastructure in place that will enable GRE to provide more reliable energy service to customers in the communities of Plymouth and Maple Grove. This new HVTL will increase electrical system reliability in Hennepin County sufficiently to allow for projected regional growth over the next twenty years.

1.3 Sources of Information

Much of the information used in this Environmental Assessment (EA) is derived from documents prepared by GRE and its consultants. These include, the "Application for Certificate of Need (CON) and Draft Environmental Report", November 14, 2002[1] hereinafter referred to as the "CON Application", the "Supplemental Application for CON and Draft Environmental Report", May 12, 2003[2] hereinafter referred to as the "CON Supplement" , and the "Route Permit Application, Plymouth-Maple Grove 115 kV Transmission Line", September 9, 2003.[3] Hereinafter referred to as the "Permit Application." System reliability and economic analyses verifying GRE's CON application were provided by the Department of Commerce in Exhibits 16, 17 and 18 to the CON.[4]

Discussion of Electromagnetic Field (EMF) issues came primarily from the white paper developed by the Interagency Task Force led by the Minnesota Health Department.[5], hereinafter known as EMF White Paper.

---

[1] "CON Application", pg 1-225
[2] "CON Supplement"
[3] "Permit Application", pg 1-79, Appendices A, B, C &D at website: http://www.eqb.state.mn.us/pdf/FileRegister/Plymouth-MapleGrove/PMGEQB.pdf
[4] Minnesota Department of Commerce, Exhibits 16, 17 and 18 to Public Utilities Commission Docket ET2/CN-02-536, May 7, 2003
[5] EMF White Paper, at website http://www.health.state.mn.us/divs/eh/radiation/emf/emfrept.pdf

2.0 Regulatory Framework

In Minnesota, most of the larger HVTL projects go through a two stage regulatory process. First, application is made to the Minnesota Public Utilities Commission (PUC) for a Certificate of Need (CON). If this CON is granted, the utility must then obtain a Route Permit from the Environmental Quality Board (EQB) that determines where the HVTL will be located. Certain smaller HVTL projects under given regulatory thresholds can be authorized by local permitting or administratively as minor facility alterations by the EQB Chair. Under conditions of catastrophic unforeseen events, a utility may be given a short-term emergency permit for the immediate construction of HVTL until a more formal permit can be issued.

2.1 Certificate of Need Requirement

Certificate of Need

The Public Utilities Commission (PUC) must grant a utility a Certificate of Need (CON) before any route permit is granted. In preparing the CON application documents for this project, GRE evaluated several alternatives for supplying more power to the Plymouth-Maple Grove area. These included upgrading the existing 69 kV lines in various configurations as well as alternative and distributed generation options. After analyzing the various options, GRE applied to the PUC for a CON to allow for the construction of a new 115 kV transmission line. In November 2002, the PUC determined that there was a need for more power in the Hennepin County area and issued a CON for a new 115 kV line. PUC Docket Number ET2/CN-02-536. The CON specified a new single circuit 115 kV line between the Elm Creek substation at County Road 81 and Fernbrook Lane on the north, and the Parker's Lake Substation located near Interstate 494 and County Road 6 on the south.

The new line must also connect five other substations between the end points – the Hennepin, Arbor Lake, Cedar Island, Bass Lake and Plymouth substations. The new line is about 14 miles long. The proposed route involves approximately 10 miles of upgraded existing 69 kV lines to 115 kV and approximately 4 miles of new 115 kV transmission lines near Interstate 494.

PUC found that the proposed route alternative submitted by GRE and approved in the CON was the least cost option that would satisfy PUC requirements. The proposed project cost was estimated originally at approximately $ 9,500,000. Costs that are more precise were developed during the route analyses stage that put the proposed project cost at approximately $11,500,000.00.[6]

GRE must now obtain a route permit from the EQB for the new transmission line. Under Minnesota Statutes § 116C.53 subd. 2, the EQB is precluded from considering other voltages or system alternatives (different end points) from what was approved by the PUC. In addition, the EQB is not permitted to consider whether no line should be constructed. EQB's obligation is to choose routes that minimize adverse human and environmental impact while insuring continuing electric power system reliability and integrity while insuring that electric energy needs are met and fulfilled in an orderly and timely fashion.

[6] "Permit Application," pg. 64

2.2 Route Permit Requirement

Route Permit
Minnesota Statutes § 116C .57 subd 2 states that "No person may construct a high voltage transmission line without a route permit from the Environmental Quality Board." Minn. Stat. § 116 C.57 subd. 2a. states, "Any person seeking to construct a large electric power generating plant or a high voltage transmission line must apply to the board for a site permit or a route permit." A "High voltage transmission line means a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more." according to Minn. Stat. § 116C.52 subd 4. The proposed GRE 115 kV power line in Plymouth and Maple Grove meets this definition and GRE is required to obtain a route permit from the EQB for the line.

In September 2003, GRE applied to EQB for a route permit for the proposed new power line. GRE identified in its application a preferred route for the new line, shown in Figure 1-2 of this document.

Environmental Assessment
For this project, and all other projects using the alternative route permitting process in Minnesota Rules, parts 4400.2000 to 4400.2900, the EQB prepares an Environmental Assessment (EA). The EA shall contain information on the human and environmental impacts of the proposed project. It shall address required methods to mitigate such impacts for all of the routes considered. The EA shall be the only state environmental review document required to be prepared on the project by the EQB. The route permit shall specify construction and system operation standards required for the proposed HVTL.

The Environmental Quality Board held a public meeting on this project, as required by Minnesota Rules part 4400.2500, in Plymouth on October 28, 2003. This meeting was intended to provide the public with an opportunity to learn about the proposed project, to suggest other route alternatives, and to identify concerns that should be considered by the EQB in preparing the EA. The EA will assist the board in making its decision on exactly what route to approve and what construction and operation conditions to attach to the final permit. Public comments on the scope of the EA were accepted until November 28, 2003. Copies of the comment letters received regarding this project and alternative routes are found in Appendix B. Copies of the comment letter received from GRE regarding EQB's informational requests on this project and their evaluation of alternative route options are found in Appendix C.

After consideration of the public comments, the Chair of the EQB issued a Scoping Order on December 16, 2003. A copy of this order is found in Appendix A. The major concerns expressed by citizens about this project are the potential impact of the new and upgraded line on property values, health concerns from the potential effects of electromagnetic fields (EMF) on nearby residents, aesthetic concerns about vegetation removal, and negative visual impacts of HVTL structures.

All alternative route options identified by citizen groups during the public meetings and EA scoping process were included in the Scoping Order found in Appendix A. These include:

A. A different above ground route near the present Cedar Island Lake segment
B. Under grounding most of the present Cedar Island Lake segment
C. A different above ground route near Bass Lake Road and Interstate 494
D. A different above ground route near the Rockford Town homes near Interstate 494
E. A different crossing of Interstate 494 near the Target store and Xenium Lane.

In this Environmental Assessment, the EQB addresses the major social, environmental and economic concerns associated with the new HVTL and the different route options described above.

Public Hearing
The EQB is required to hold a public hearing once the EA has been completed by Minnesota Statutes §116C.57 subd 2d. This hearing will be held in the Plymouth-Maple Grove area and conducted by an Administrative Law Judge (ALJ). Interested persons may comment upon the environmental assessment at the public hearing. Persons interested in being notified of the date of the hearing can register online at http://www.mnplan.state.mn.us/mailinglist.html?Id=3892&redirect=http://www.mnplan.state.mn.us/eqb/Docket.html?ID=3892. Persons may testify at the hearing without being first sworn under oath. The ALJ shall ensure that the record created at the hearing is preserved and transmitted to the board. The ALJ will prepare a report that will include proposed findings of fact and conclusions and a recommendation on a route.

Comments received on the Environmental Assessment shall become part of the record in the proceeding but the board shall not be required to revise or supplement the EA document. A final decision on a route permit will be made by the EQB Board at an open meeting within a couple of months after the public hearing depending on scheduling opportunities.

2.3 Other Permits

The EQB route permit is the only State permit required for routing of the high voltage transmission lines. This EA includes a list of supplementary permits that will be required for the project proposers to complete this project below this paragraph. This listing of supplementary permits required is also found in the "Permit Application"[7] The applicant must apply for and obtain all permits required for project completion. The following local and specialized county or state permits have been identified as potential requirements for this project:

A. **Certificate of Need (PUC)** **Already Granted**
B. **Route Permit (EQB)** **Currently Under Review**
C. City Road Crossing Permits (Plymouth, Maple Grove)
D. County Road Crossing Permits (Hennepin County)
E. Zoning or Land Use Permits (Plymouth, Maple Grove and Hennepin County)
F. Building Permits (Plymouth, Maple Grove)
G. Licenses to Cross Protected Waters (DNR)
H. Road Crossing Permits (DOT)
I. State Lands Permits (DNR)
J. Rural Utilities Service Approval (RUS)

[7] "Permit Application", pg. 73

2.4 Applicable Codes

(National Electrical Safety Code (NESC) and Rural Utilities Service (RUS) Design Manual for High Voltage Transmission Lines)

The transmission line, regardless of route location, must meet all requirements of the National Electrical Safety Code (NESC) and the Rural Utilities Service (RUS) Design Manual for High Voltage Transmission Lines (HVTL).[8] These standards are designed to protect human health and the environment. They also ensure that transmission line and all associated structures are built from high quality materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment provided normal routine operational and maintenance is performed.

2.5 Issues outside EQB Authority

The EQB will not, as part of this environmental review, consider whether a different size or different type of transmission line should be built instead of that which GRE has proposed and for which the Public Utilities Commission (PUC) has granted a CON. The PUC order also establishes that all the selected substations must be interconnected by this 115 kV line. No route alternative that excludes any of these facilities can be considered by EQB. Nor will the EQB consider the no-build option.

3.0 Proposed Project

GRE Preferred Route

GRE proposes to build a single 115-kV transmission line between the Elm Creek Substation in Maple Grove and the Parkers Lake Substation in Plymouth, Minnesota.[9] The planned line will be 14 miles long. Two-thirds of the proposed route will follow an existing 69 kV transmission line corridor and use existing rights-of-way; one-third of the route will follow a new corridor and require acquisition of new rights-of-way. The proposed new line will also connect five other substations – the Hennepin, Arbor Lake, Cedar Island, Bass Lake and Plymouth substations.

The entire GRE permit application, maps, appendices and other documents may be viewed at the EQB website at link:http://www.eqb.state.mn.us/pdf/FileRegister/Plymouth-MapleGrove/PMGEQB.pdf
The route proposed by GRE is shown in Figure 1-2.

3.1 Route Segments

The proposed GRE route is described by the following route segments:

A. Construct approximately 2.25 miles of 115 kV line to the existing Xcel Energy single circuit 115 kV line running southeasterly from Xcel Energy's Elm Creek Substation to its intersection with GRE's existing 69 kV line connecting the Arbor Lake and Hennepin substations. The existing Xcel Energy line would be rebuilt from the existing single circuit configuration to a double circuit configuration for this 2.25-mile distance.

[8] "Permit Application", pg. 53
[9] Ibid, pg 18

B. Rebuild approximately 0.5 mile of 69 kV line to 115 kV from the termination of the 115 kV double circuit line described above to the Hennepin Substation. This 0.5 mile of 115 kV line would connect to the existing Xcel Energy 115 kV line, which runs southeasterly from Xcel Energy's Elm Creek Substation to the Osseo Substation.

C. Upgrade 69 kV line to 115 kV, or build new 115 kV line, for approximately 7.1 miles of existing 69 kV line between the termination of the double circuit 115 kV line described above and Wright-Hennepin Cooperative Electric Association's Arbor Lake, Cedar Island, Bass Lake and Plymouth substations.

D. Build approximately 4.25 miles of new 115 kV line from W-H's Plymouth Substation to Xcel Energy's Parkers Lake Substation.

3.2 Substation Modifications

The new line will require certain modifications at each of the existing substations connected, although no changes in the existing footprint of any substation will be required by the planned project.[10]

A. Elm Creek (Xcel Energy)

Modifications within Elm Creek Substation would be required to construct the additional 115 kV termination for the new GRE line.

B. Hennepin (Connexus Energy)

The existing 69 kV distribution transformers would be replaced with 115 kV distribution transformers.

C. Arbor Lake, Cedar Island, Bass Lake, Plymouth (W-H)

The existing 69 kV distribution transformers would be replaced with 115 kV distribution transformers.

D. Parkers Lake (Xcel Energy)

Modifications would be required to construct the additional 115 kV termination for the new GRE line.

3.3 Other Modifications

A. De-energize the existing 69 kV line between W-H's Bass Lake and Corcoran substations, GRE's existing 69 kV line between W-H's Plymouth Substation and Xcel Energy's Hollydale Substation, and GRE's existing 69 kV line between Connexus Energy's Hennepin Substation and GRE's Parkwood Substation.

[10] "Permit Application", pg. 20

3.4 Design Structures

Design voltage of the proposed project is 115 kV. Distance between structures will be approximately 400 feet.[11] Structure heights and spans will vary depending on topography and environmental constraints, such as highway crossings, stream crossings and required angle structures.

Lines and Conductors
The line design consists of three single conductor phase wires and one shield wire. The phase wires will be 795 MCM (795,000 circular mil) aluminum conductor steel supported (ACSS) with seven steel core strands and 26 outer aluminum strands. The industry code word for this conductor is "Drake." The conductor has an overall diameter of 1.108 inches and weighs 1.094 pounds per lineal foot.

Poles and Top Assemblies.
GRE proposes to use single shaft wooden poles for the majority of the project. Galvanized steel single shaft poles will be used in a few places where longer spans are required, such as over Interstate 494. Horizontal post insulators are planned unless design requires longer spans beyond the capability of the insulators. The longest spans will utilize a braced post design to accommodate the increased loadings. Schematic diagrams showing typical pole structure are shown in Figure 7-2 at the end of this document.

4.0 Route Alternatives

In the public meetings on the CON and at the EQB's EA scoping process, a number of citizens and groups suggested alternative segments to portions of the proposed route that should be evaluated by EQB. These alternative route segments are identified below in Sections 4.1 to 4.4

4.1 Cedar Island Lake

A Different above ground route near the Cedar Island Lake segment or

B. Undergrounding most of the Cedar Island Lake segment

Route Description
The residents of 73rd Avenue living near Cedar Island Lake suggested an alternate route segment between the intersection of 73rd Avenue and Interstate 494 east to the Cedar Island Lake substation.[12] This proposed segment is shown in Figure 4.2C. The existing 69 kV line dissects a residential neighborhood surrounding Cedar Island Lake. The citizens suggested re-routing of the new line by following the I-494/94 right-of-way east and south of the Interstate 494.

Route Analyses
GRE provided discussion and additional cost information on route alternative segments they evaluated to EQB in a letter dated October 29, 2003.[13] In this letter on a number of topics, GRE specifically referenced a route segment similar to the alternative suggested by the Cedar Island Lake group.

[11] "Permit Application", pg. 53
[12] Letter from Tim Theisen, 73rd Avenue/Cedar Island Liaison to EQB, Dec 2, 2003, full text, Appendix B
[13] Letter from Kevin Lennon, GRE Project Engineer, in response to EQB request for additional cost and design analysis on Plymouth Maple Grove 115 kV HVTL line, Oct 29, 2003, pg. 5, full text, Appendix C

In discussion of the route segment most similar to that proposed by the Cedar Island Lake group that would follow the south side of I-694, GRE stated,

> "This route is not buildable due to inadequate clearance between the road right-of-way and the town-homes on 74th Avenue. This route would impact a residential area not already impacted by the existing line. Estimated costs were not calculated because this route is unbuildable."[14]

In this same section, GRE referenced another alternative that would be similar to the alternate suggested by the Cedar Island group. This proposed segment would cross I -694 and run along the north side of the freeway, later crossing back to the south side of I-694 to connect to the substation. This alternative involved multiple HVTL crossings of Interstate 694[15]. In discussing this route, GRE stated,

> "This route is buildable but with considerable technical issues. It is questionable if the size structures needed, will fit in the very limited amount of space that exists between I-694 and roads for the Arbor Lakes Shopping area. Easements would be required of the present landowners. This route would impact a residential area not already impacted by the existing line.[16]"

Later on in the same passage, referring to the same route segment GRE stated,

> "This route works on paper. Estimated costs are $ 1,250,000 vs. $ 100,000 to follow the existing 69 kV route.[17]"

The Cedar Island neighborhood group suggested that if the new HVTL could not be rerouted its second choice is to have this segment placed underground[18]. In Mr. Lennon's letter, when addressing the option of placing segments of transmission line underground, GRE states,

> "The estimated cost to install an equivalent capacity transmission line underground is $1,250,000 for the approximately 3/8 mile of concern."[19]

EQB interprets these GRE comments to mean that it would be technically possible to re-route the section of the proposed HVTL along the Interstate as desired by the Cedar Island group. However this action would involve $ 1,150,000 in additional costs for an above ground alternative, require acquisition of new right-of-ways and result in the placement of a new transmission line near homes where there had not previously been one. If the current 69 kV line is replaced with an underground segment following the existing right-of-way, this alternative also has substantial technical problems and would also require $ 1,150,000 in additional project costs. Coincidently, the cost amounts are the same for both options

Alternative	Modified Route Cost		GRE Segment Cost		Difference
Above ground	$ 1,250,000	subtract	$ 100,000`	equals	$ 1,150,000
Underground	$ 1,250,000	subtract	$ 100,000`	equals	$ 1,150,000

[14] Letter from Kevin Lennon, pg. 5, full text, Appendix C
[15] Ibid, pg 5
[16] Ibid, pg 5
[17] Ibid, pg 5
[18] Letter from Tim Theisen, 73rd Ave/Cedar Island Liaison to EQB, Dec 2, 2003, full text in Appendix B
[19] Letter from Kevin Lennon, pg. 6, full text, Appendix C

4.2 Bass Lake

C. A different above ground route near Bass Lake Road and Interstate 494

Route Description
A group of property owners in Plymouth, Minnesota wrote a comment letter[20] suggesting that GRE consider an alternative transmission line route rather than the existing 69 kV line between the Plymouth and Bass Lake substations. This proposed segment is shown in Figure 4.2B. The Bass Lake group proposes that the line follow the Interstate 494 right-of-way north from the Plymouth substation to the intersection with Hennepin County Highway 10 (Bass Lake Road). The transmission line would then turn northwest along Bass Lake road until it connected to the Bass Lake substation.

Route Analyses
This group stated that Bass Lake Road is due to be reconstructed and upgraded in 2004 and suggests that utility work could be coordinated with highway reconstruction to achieve overall cost reductions. The group felt that this alternative route segment has less socioeconomic impact than the GRE preferred route connecting the Bass Lake and Plymouth substations. Two routes very similar to the alternative segment suggested were examined by GRE. Alternative # 2 according to Mr. Lennon,

> "This route did not have adequate space to provide NESC-required separation between the 345 kV line and a new 115 kV line without placing new structures in roadways, people's front yards or between houses . By placing both the 345 kV line and the 115 kV line in the same corridor, the North American Electric Reliability Council (NERC) "N-1" criteria were violated."[21] …

Later in the same section, Mr. Lennon stated

> "The existing road is also curvy and would require large self-supporting structures. The estimated cost of this route (*Alternative 2*) is 125% of the proposed route."[22]

In looking at the other route similar to that proposed by the Bass Lake group, Mr. Lennon stated,

> "Alternative # 3 is similar to Alternative # 2. This route has the same residential impact and buildability concerns. Following the east side of I-494 is estimated to cost 125% of the proposed route."[23]

GRE does not provide exact cost figures for these alternatives but the figures can be calculated from other information provided in the response letter. At one point GRE stated,

> "The cost of building a 115 kV overhead line along existing 69 kV right-of-way is $300,000 per mile." [24]

[20] Letter to EQB from Barbara Ross, Bass Lake Road Liaison, Nov 10, 2003, full text in Appendix B
[21] Letter from Kevin Lennon, pg. 3, full text, Appendix C
[22] Ibid, pg. 3
[23] Ibid, pg 3
[24] Ibid, pg 4

In this same section, GRE stated that either of their two alternatives most similar to that proposed by the Bass Lake group is would cost 125% of the proposed GRE route cost.[25]

The measured distance of the line between Plymouth and Bass Lake substations is approximately 2.5 miles. GRE has stated,

> "The cost of initial installation of a new overhead 115 kV line is $300,000 per mile."[26]

Cost Comparison Calculations

$ 300,000 per mile multiplied by 2.5 miles equals $ 750,000 cost for 2.5 miles of 115 kV line

$750,000 for 2.5 miles multiplied by 125%[27] to account for the extra costs of either alternative route # 2 or #3 between Plymouth and Bass Lake substation would equal $ 937,500.

$ 937,500 (Bass Lake Route) subtract $ 750,000 (GRE route) equals $ 187,500 (extra project cost)

The Bass Lake alternative routes would theoretically add $187,500 to the project cost, assuming there were no other savings to the project cost due to the potential ability to construct the HVTL in conjunction with the proposed reconstruction of Bass Lake Road. In addition to the extra cost, GRE anticipates some increased buildability and decreased system reliability concerns with this alternative when compared to the proposed preferred route.

On February 23, 2004, EQB staff contacted Mr. Guy Nowlan, MNDOT Project Engineer for the Bass Lake Road County Highway 10 upgrading project. Mr. Nowlan indicated that this project was first bid out in 1999 but has been delayed several times due to budget cuts. He said the current proposed start date for work was April 2005. He also said according to his project maps the rehabilitation work will be almost entirely west of the Bass Lake substation. Almost no rebuilding will be done along the segment of Bass Lake Road between the substation and I-494.

4.3 Rockford Town homes

D. A different above ground route near the Rockford Town homes near Interstate 494

Route Description

Ms. Jeanette Miesen of Plymouth wrote a letter on behalf of the Rockford Estates Town house Association[28]. She was concerned that GRE try to cooperate with Xcel Energy to install this new 115 kV on the existing 345 kV transmission towers or at least parallel these structures on the west side of Interstate-494. She urged the EQB to preserve the existing trees on her property, maintain the wildlife habitat, and require GRE to reconsider the placement of a 115 kV line in her residential development. GRE did hold a couple of public meetings specifically to deal with the concerns of the Rockford town house residents about placement of the proposed new 115 kV line along their property.

[25] Letter from Kevin Lennon, pg. 3, full text, Appendix C
[26] Ibid, pg 12
[27] Ibid, pg 3
[28] Letter to EQB from Jenette Miesen, Rockford Estates Liaison, Oct 29, 2003, full text in Appendix B

Route Analyses

Mr. Lennon specified that the new line cannot be added to the existing structures because.

> "The structures were not designed to support the weight of an additional line. The new line could not be built underneath the existing 345 kV line because there is not enough vertical clearance to provide the separation required by the NESC." [29]

GRE also stated,

> "The existing 345 kV transmission towers could not be replaced with stronger structures. Replacement of the structures would require taking the 345 kV line out of service for several months. The electric reliability within the region would be severely jeopardized should this 345 kV line be removed from service."[30]

GRE estimated that the cost of the new 4.25 mile segment of overhead 115 kV HVTL along I-494 would be approximately $4,500,000. [31] This is roughly $1,060,000 per mile. GRE did conduct a preliminary examination of the possibility of rerouting the new line to the opposite side of the I-494 from the Rockford town-homes. GRE's discussion states that the new line cannot be added onto the existing 345 kV structures due to design limitations. Specifically, in response to the direct question from EQB "Can the new line be added to the existing structures?", GRE stated,

> "The structures were not designed to support the weight of an additional line."[32]

When asked if the new line could be built along the west side of the existing 345 kV line, GRE replied,

> "Yes, but with great impact to commercial and residential areas. (refer to map in attachments for MEQB Request # 5). The NESC requires adequate horizontal spacing so the lines cannot swing into each other. This required separation means the new line could be no closer than 80 feet west of the 345 kV line. Preliminary design identified seven locations where structures would be in the middle of buildings or in roads and parking lots, rendering the site inaccessible."[33]

Later on in this same section when discussing building the new 115 kV line on the west side of I-494 parallel to the existing 345 line GRE stated,

> … "This route does not comply with the NERC N-1 criteria of a separate corridor The least cost variation of Alternative # 2 would be to span the impacted buildings. This is estimated to cost 150% of the proposed route. [34]"

[29] Letter from Kevin Lennon, pg. 2, full text, Appendix C
[30] Ibid, pg. 2
[31] "Permit Application", pg. 64
[32] Letter from Kevin Lennon, pg. 2, full text, Appendix C
[33] Ibid, pg 2
[34] Ibid, pg 2.

When considering running a greater length of the new 115 kV line parallel to the existing 345 kV line on the west side of the Interstate-494, GRE anticipates some increased buildability and decreased system reliability concerns with the alternative route segment when compared to GRE's proposed route. GRE's mapping consultants did prepare preliminary maps that allow us to analyze this proposed segment and the alternative in great detail This alternative route segment is shown in Figure 4.1B.

However, because of existing encroachments of commercial and industrial businesses into this proposed easement in many areas, routing the line along this alignment would result in the placement of poles in parking lots and loading areas, with transmission lines over the top of buildings (creating possible fire hazards). Although impacts to residences would be minimal with this alternative, GRE rejected this route alternative due to impacts to businesses, safety issues, and engineering and cost concerns.

Specifically, the alternative route would require HVTL structure placement and right-of-way acquisition from seven or possibly eight large commercial buildings along the west side of I-494 across from the Rockford town houses. The estimated aggregate market value of these buildings and associated property is about $ 50,000,000 according to EQB and LMIC data .

The existing placement of the buildings may require specially built HVTL structures or special conditions or variances in the required right-of-way agreements due to construction difficulties in accommodating the HVTL structures and the limited location flexibility of this route segment alternative. .

EQB staff analysis of both routes showed the proposed GRE route would result in the need to acquire new right-of way from 30 town houses along the east side of I-494 with an estimated aggregate market value of approximately $ 5,000,000. This new line would also have a secondary impact on another 33 homes adjacent to the properties with new HVTL structures. The sum of the market value of these secondary homes is approximately $ 5,000,000. Cost estimates are based on market price parcel data available to EQB and LMIC staff.

GRE's proposed route presently exits the Plymouth substation and turns south, running along the west side of I-494 for approximately one mile, running parallel to the existing 345 kV line for this portion of the route. GRE's proposed line then crosses I-494 to the eastside just north of the Target store near proposed power pole 39. The proposed line runs along the east side of I-494 for the remaining 3.25 miles of this segment until it reaches the Parkers Lake substation.

The alternate route that would avoid the Rockford town homes and also avoid the difficult Interstate crossing near the Target store would involve extending the proposed transmission line for another mile south along the west side of I-494 running parallel to the existing 345 kV line until the proposed 115 kV line was south of the Rockford town homes. This route exits the Plymouth substation and turns south, running along the west side of I-494 for approximately two miles, running parallel to the existing 345 kV line for this portion of the route. The alternate route then crosses I-494 to the eastside near proposed power pole 28. The proposed line runs along the east side of I-494 for the remaining 2.25 miles of this segment until it reaches the Parkers Lake substation.

Based on the cost information provided by GRE for this portion of the proposed line and the estimated increased cost ratio for the alternative provided by Mr. Lennon, EQB can estimate the increased project cost of this modification to the proposed route. Moving the 115 kV line to the west side of I-494 for another mile would cost approximately $1,590,000 (1 mile of line times $ 1,060,000 per mile times 150% of the original cost.). Comparing this figure from the original cost estimate of $1,060,000 would yield an estimate of $ 530,000 additional cost for this modification.

4.4 Target Store Crossing of I-494

E. A different crossing of Interstate 494 near the Target store and Xenium Lane.

At the public meeting on October 28, 2003 a couple of individuals living in a residential development immediately north of the Target store on the east side of Interstate 494 orally requested that GRE consider moving the crossing at proposed power pole 39 farther south of the northwest corner Target property. This situation is best illustrated in the detailed map of hydrologic features shown in diagram WR11, Appendix D1 of the Route Permit Application.

In a project update conference call between EQB and GRE staff, the subject of alternate crossing of I-494 to avoid the town houses north of the Target store came up. According to Mr. Lennon,

> "The proposed modification requested is difficult because of steep slopes and the presence of a large wetland area in the proposed alternate crossing location. The crossing would have to be engineered with large spans and massive structures, which would be very expensive compared to the proposed project. "[35]

Although impacts to residences would be minimal with this alternative, no formal cost analysis of this alternative crossing was conducted as it was regarded as unbuildable by GRE, due to projected impacts to businesses, safety issues, and engineering and cost concerns..

The concern of the neighbors north of the Target store would also be mitigated by the alternate route proposed to deal with the Rockford town home request discussed in item 4.3 above. No separate financial analysis of this alternative route was conducted because there does not appear to be any other reasonably convenient place to cross I-494 unless one goes south of the GRE proposed crossing for at least another three-quarters of a mile along the west side of the Interstate to the approximate position projected for pole # 28.

5.0 Potential Impacts of the Project

Regardless of the route that is ultimately selected, there are a number of potential impacts associated with HVTLs that must be taken into account on any project. Minnesota Rules part 4400.3150 designate certain factors that must always be considered when examining a high voltage transmission line. During the public meetings and hearings on the scope of the environmental assessment, citizens raised additional issues of concern specific to the particular project. All of these factors are discussed in the following sections.

[35] Phone conference between GRE and EQB staff , Nov. 13, 2003

5.1 Electro-Magnetic Fields

What is EMF

EMF stands for electric and magnetic fields. The Minnesota Department of Health maintains a webpage with information about electric and magnetic fields. The following statements are found at http://www.health.state.mn.us/divs/eh/radiation/emf/index.html[36]

> "EMF refers to electric and magnetic fields which are invisible lines of force that surround any electrical device, such as a power line, electrical wiring, or an appliance. Electric fields are produced by voltage and these fields are easily shielded by objects (e.g., trees, buildings, and skin). In contrast, magnetic fields are produced by current and these fields pass through most materials. Both electric and magnetic fields weaken with increasing distance from the source."

> "Even though electric and magnetic fields are present around appliances and power lines, more recent interest has focused on the potential health effects of magnetic fields. This is because some epidemiological studies have suggested that there may be an association between increased cancer risks and magnetic fields."

Interagency White Paper on EMF

In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from the Department of Health, the Department of Commerce, the Public Utilities Commission, the Pollution Control Agency, and the Environmental Quality Board. The Department of Health coordinated the activities of the Working Group.

In September 2002, the Working Group published its findings in a White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options (hereinafter "White Paper").[37] The following quote from the White Paper summarizes the findings of the Working Group:

> "Research on the health effects of EMF has been carried out since the 1970's. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently , laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe."[38]

[36] Minnesota Department of Health Website http://www.health.state.mn.us/divs/eh/radiation/emf/index.html

[37] A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options, Minnesota State Interagency Working Group on EMF Issues, September 2002, http://www.health.state.mn.us/divs/eh/radiation/emf/emfrept.pdf

[38] "White Paper" pg. 1

Given the questions and controversy surrounding this issue, several Minnesota agencies that regularly deal with electric generation and transmission formed an Interagency workgroup to provide information and options to policy-makers. Based on its review the Work Group believes the most appropriate public health policy is to take a prudent avoidance approach to regulating EMF.[39] Policy recommendations of the Work-Group include:

- apply low-cost EMF mitigation options in electric infrastructure construction projects,
- encourage energy conservation,
- encourage distributed generation,
- continue to monitor EMF research,
- encourage utilities to work with customers on household EMF issues and
- provide public education on EMF issues.[40]

The Minnesota Department of Health made the following statement in the "White Paper":

> "The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be completely dismissed. The uncertainty surrounding EMF health effects presents a difficult context in which to make regulatory decisions. This approach suggests that one should avoid any activity or exposure about which there are questions of safety or health, at least to the extent that an activity can be avoided easily or cheaply. "[41]

Other EMF Studies

Recent studies of potential human health effects from transmission line EMF done in California[42] and for the Arrowhead line EIS in Wisconsin[43] have shown the same conclusions of no discernible health impacts from power lines. Both of these studies recommend the general precaution of minimizing unnecessary contact and advise prudent avoidance to EMF exposure.

[39] "White Paper", pg. 2
[40] Ibid, pg. 2
[41] Ibid, pg. 36
[42] California Department of Health , California EMF Program (2002), An Evaluation of Possible Risks from Electric and Magnetic Fields (EMFs) from Power Lines, Internal Wiring , Electrical Occupations and Appliances AND Policy Options in the Face of Possible Risks from Power Frequency Electric and Magnetic Fields (EMF) pg. 383
[43] Arrowhead-Weston Transmission Project, Final Environmental Impact Statement (EIS) Wisconsin Public Service Commission, Oct 10, 2000 pg 5-21

The 1999 National Academy of Science report from its National Research Council found,

> "No clear, convincing evidence exists to show that residential exposures to electric and magnetic fields (EMFs) are a threat to human health. After examining more than 500 studies spanning 17 years of research, the committee said there is no conclusive evidence that electromagnetic fields play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems. Specifically, no conclusive and consistent evidence shows that
>
> exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects. Committee chair Charles F. Stevens, investigator, Howard Hughes Medical Institute, and professor, Salk Institute, La Jolla, Calif. said, Research has not shown in any convincing way that electromagnetic fields common in homes can cause health problems, and extensive laboratory tests have not shown that EMFs can damage the cell in a way that is harmful to human health."[44]

EMF Standards

> "Electric utilities have a variety of methods for reducing EMF exposures when they upgrade or install transmission and distribution lines. The main methods for mitigating EMF include increasing distance from the line, using phase cancellation, shielding, and limiting voltage and current flow levels."[45]

In Route Permit application when discussing HVTL line clearance from nearby receptors, GRE stated,

> "The proposed HVTL will be constructed to comply with Rural Utilities Service (RUS) standards as well as all applicable provisions of the National Electric Safety Code (NESC)."[46].

These standards are designed to minimize human exposure from electric and magnetic fields.

> "The proposed 115 kV line will have a maximum magnitude of electric field density of approximately 1.1 kV per meter directly underneath the conductors one meter above ground level Research on the biological effects from electric fields on animals and humans has shown no significant association with negative health effects in humans.."[47].
>
> "Although there is no state or federal standard for transmission line electric field exposures, the EQB-has imposed standard of a maximum electric field limit of eight kV per meter at one meter above ground. That standard was implemented to mitigate serious hazard from shocks when touching large objects parked under transmission lines with voltage of 500 kV or greater."[48]

[44] National Academy of Science, National Research Council, Stevens, et al, 1999, Possible Exposure to Residential Electric and Magnetic Fields pg. 132
[45] "White Paper" pg. 2
[46] "Permit Application", pg. 53
[47] "Permit Application", pg. 60
[48] Ibid , pg 60

EMF field strength decreases with increasing distance from the line. This design standard provides significant protection from electric fields for every homeowner adjacent to the proposed transmission line, even those within 30 to 40 feet of the line or right-of-way. This electric field density charge limit standard is more than sufficiently protective of human health impacts from EMF for the lower voltage 115 kV line proposed for this project.

> "Currently there are no federal or state *health-based* exposure standards for magnetic fields. This is due to the fact that there is inadequate scientific evidence to develop a health-based standard. References to safe/unsafe magnetic field levels in studies are not health-based standards; they are arbitrary exposure cut off points used by researchers, and they provide no scientific basis to evaluate or estimate potential health risks."[49]

On the basis of the most current information available and the expert advice of the Interagency workgroup on EMF lead by the Minnesota Department of Health the EQB has not established any standard or regulatory limit on magnetic fields from HVTLs.

5.2 Property Values

This issue of the impact of a new transmission line on property values arises in nearly every public discussion of transmission line permits. Landowners in the vicinity of this proposed transmission line have raised such a concern. It is impossible to know what the impact of a particular transmission line on a particular piece of property will be, and there are no studies of such impacts anywhere in Minnesota.

Recent Studies

There are studies available from other parts of the country. These studies are instructive.

Craig L. Solum and Associates, a firm of Wisconsin Certified Real Estate Appraisers, was hired by Northern States Power (now d.b.a. Xcel Energy) to collect market substantiated information on the impact attributable to the imposition of transmission line easements on residential property values in suburban and undeveloped areas near Eau Claire and La Crosse, Wisconsin. The Solum group examined 200 residential property transactions adjacent to or in close proximity to high voltage electric transmission lines in urban, suburban and rural areas of western Wisconsin during the mid 1990's[50]. The selection process used in his study concentrated primarily on upper price level residences and vacant lots ready for construction on the assumption that these properties would be most sensitive to potential negative influences. In the report, Mr. Solum asserted that the very minor positive and negative impact results he observed indicate that there is virtually no impact present that is attributable to the presence of a transmission line encumbrance on residential properties. He stated,

> "It is typical for sale prices to vary from market values in ordinary transactions by several percentage points. Each purchaser of a residence has different motives and expectations that result in varying reasons for the reconciliation of the final price paid. The transmission line presence has no real impact on the price paid for residential property."[51]

[49] Minnesota Department of Health Website
http://www.health.state.mn.us/divs/eh/radiation/emf/index.html

[50] Transmission Line Impact Study Based on Paired Sale Comparisons of Residential Properties Located within Northwest and West Central Wisconsin, Craig Solum & Associates, 329 South River Street, Suite 100, P.O. Box 280, Spooner, Wisconsin 54801

[51] Ibid, pg 13

Cowger and his associates looked at a number of property transactions in the vicinity of Portland, Oregon, Seattle, Washington ,and Vancouver, British Columbia impacted by transmission lines of the Bonneville Power Administration (BPA)[52]. As an introduction to the article, Cowger reviewed generalized findings from several studies done between 1975 and 1995. He extracted the following six key points from these studies:[53]

1. "Overhead transmission lines can reduce the value of residential and agricultural property. The impact is usually small (0 – 10 per cent) for single family residential properties."

2. "Other factors such as location, improvements and lot size are more likely to be major determinants of sale price."

3. "Impacts on sales are most likely to occur on property crossed or immediately adjacent to the lines."

4. "In areas where the right-of-way has been landscaped or developed for recreational use, positive impacts have been measured."

5. "Impacts may be greater on small properties than for larger properties."

6. "Impacts are more pronounced immediately after construction of a new line and diminish over time."

Cowger et al[54] examined 296 subject sales in four counties, each one paired with a comparable property transaction that occurred in the same year, where the comparable property was not influenced by an adjacent HVTL.

> "Analysis of this data show overhead HVTLs had minimal impacts on residential property values in these metropolitan areas. Seattle and Vancouver subjects averaged small decreases in property values (-1.00 per cent and -1.05 per cent respectively). Portland subjects were on average, worth slightly more (+1.46 per cent) than the matched comparable properties. None of the difference was statistically different from zero at the 95 per cent probability level."[55]

In the Final Environmental Impact Statement on the Arrowhead-Weston Electric Transmission Line Project , the Wisconsin Public Service Commission addressed the issue of property value changes associated with HVTL[56]. This document looked at approximately 30 papers, articles and court cases covering the period from 1987 through 1999.

[52] Transmission Line Impact on Residential Property Values, Jr. Cowger et al, "Right of Way" September 1996 pg 13
[53] Ibid, pg .14
[54] Ibid, pgs 13-17
[55] Ibid, pg 16
[56] Final Environmental Impact Statement , Arrowhead –Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, pg 212-215

> "In general there are two types of property value impacts that can be experienced by property owners affected by a new transmission line. The first is a potential economic impact associated with the amount paid by a utility for a right-of-way (ROW) easement. The second is the potential economic impact involving the future marketability of the property."[57]
>
> However, substantial differences may exist between people's perceptions about how they would behave and their actual behavior when confronted with the purchase of property supporting a power line."[58]
>
> "The presence of a power line may not affect some individual's perceptions of a property's value at all. These people tend to view power lines as necessary infrastructure on the landscape, similar to roads, water towers and antenna. They generally do not notice the lines nor do they have strong feelings about them."[59]

The Final EIS provides six general observations among all the studies it evaluated. These are:[60]

1. "The potential reduction in sale price for single family homes may range from 0 to 14 per cent.

2. "Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties".

3. "Other amenities, such as proximity to schools or jobs, lot size, square footage of a house and neighborhood characteristics, tend to have a much greater effect on sale price than the presence of a power line."

4. "The adverse effects appear to diminish over time."

5. "Effects on sale price are most often observed for property crossed by or immediately adjacent to a power line, but effects have also been observed for properties farther away from the line."

6. "The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations."

Later on the same page, the Final EIS stated,

> "In coastal states, such as California and Florida, the decrease in property values can be quite dramatic; in states within the Midwest (Minnesota, Wisconsin and the Upper Peninsula of Michigan), the average decrease appears to be between 4 and 7 per cent ."[61]

The Final EIS succinctly summarizes the dilemma in its closing paragraph which stated,

> " It is very difficult to make predictions about how a specific transmission line will affect the value of specific properties."[62]

[57] Final Environmental Impact Statement , Arrowhead –Weston, pg 215
[58] Ibid, pg 213
[59] Ibid, pg 215
[60] Ibid, pg 215
[61] Ibid, pg 215

In 1995, two university professors named Stanley Hamilton and Gregory Schwann published a highly empirical study of residential home prices in Vancouver, British Columbia[63]. The study contrasted sales in four separate Vancouver neighborhoods of residences adjacent to power lines of 60 kV or greater from 1985 to 1991. The sample size was 12,097 transactions in the four study areas. The authors stated,

> "We find that properties adjacent to a line lose 6.3 per cent of their value due to proximity and the visual impact." "The statistical findings presented in this article lead one to conclude that the depressing effect power lines have on property value is not merely an American phenomenon." [64]

Haider and Haroun did a quantification of property value impacts of high voltage transmission lines examining 27,400 freehold residential properties sold in the Toronto area during 1995[65]. This research presents summary statistics, uses several econometric models and spatial autoregressive techniques to analyze the data. This research offers strong evidence to the claim that proximity to HVTL lowers property values. Results suggest that properties within one kilometer lose between 4 to 6.2 per cent of their total value strictly due to power line effects. The loss in value decreases with distance from the power lines. The authors chose to use actual transaction prices and not assessed property values. They assert that only market prices can reflect the true perceptions of consumers of the impact of HVTLs on residential real estate values. They also discovered that the relationship between proximity to power lines and price reduction is not uniform throughout the Greater Toronto area. The study concludes with an analysis of its own limitations.

According to the Gary Ostrom, Land Rights Supervisor from GRE, in his years of experience, real estate appraisers generally felt that any impact a power line may have on commercial and industrial property would be less than similar impacts to residential property.[66] During the CON and permitting process for this GRE project, no commercial or industrial property owner expressed any concern over property value impacts from proposed transmission lines.

Much of this specific GRE proposal involves reconstructing an existing 69 kV transmission line to a higher voltage (115 kV). EQB staff was unable to locate any specific studies that examined the change in property values associated with upgrading an existing power line to a higher voltage within the same easement.. Based on the research examined, it would be likely that an existing transmission line upgraded entirely within existing easements and similar design parameters would have a relatively small effect, if any, on land values. This reasoning would imply that economic impact of upgrading the existing 69 KV line to 115 kV within the existing easement would have a negligible effect on existing property values along this segment.

---

[62] Ibid pg 215

[63] Stanley Hamilton and Gregory Schwan, "Electric Transmission Lines and Property Value," Land Economics, Vol 71, No. 4, p 436 (1995).

[64] Ibid pg 436

[65] Murtaza Haider & Antoine Haroun, "Impact of Power Lines on Freehold Residential Property Values in the Greater Toronto Area," Master's Thesis, Department of Civil Engineering, University of Toronto, 2000.

[66] Phone conversation by George Johnson, EQB staff and Gary Ostrom , Land Rights Supervisor, GRE Oct. 14, 2003

A portion of the proposed new 115 kV would require new easements along Interstate 494. Based on the research examined, it would be likely that a new HVTL placed along Interstate 494 could cause some change in property values. This change could range from +1.0 to -6.3 per cent on individual properties.. GRE's experience shows there may be no net change in property value from the HVTL, but more time required in marketing the unit.[67]

5.3 Visual Impacts

Poles

The primary visual impact associated with transmission lines is from the pole structures that must be constructed at various intervals along the route. The wires themselves (the conductor) are much less of a visual impact.

The present transmission line uses wooden pole structures that are 60 to 75 feet tall. The new line will also use wooden poles, but the poles will be higher, about 80 to 95 feet tall. However, the new structures will have a narrower profile than the old poles. A schematic of typical structures planned for this project are shown in Figure 7-2

For the new route along Interstate 694 the new transmission towers will be much shorter and less massive than the 345 kV towers that presently can be seen along this stretch. In addition, other objects, such as commercial establishments and roads and highways, will also be observable.

Portions of the proposed transmission lines would be visible in the foreground and middle ground views from residences adjacent to the ROW in this highly urbanized area. Some of the alternative segments are located within areas of existing housing developments and there would be impacts to present residences not presently affected. Some residences currently experience visual impacts from existing transmission lines. The degree of aesthetic impact from existing and proposed facilities is highly subjective, but nonetheless is very significant to many people.

New Right-of-Way

A new transmission line would be installed either on existing ROW or on new ROW along existing highways or county roads. New ROW would be required for the route between Parkers Lake and Plymouth substations in all proposed routes.

Those persons who live along the existing transmission line, or observe the structures along the present route, will continue to observe the new structures along these portions of the route. Persons living along new right-of-way will, of course, be able to see a new transmission pole where one did not exist before.

[67] Phone conversation of George Johnson, EQB staff and Gary Ostrom , Land Rights Supervisor, GRE Oct. 14, 2003

Vegetation

It helps to mitigate the visual impact of transmission line poles if there is vegetation near the right-of-way. Nearby residents have inquired about the removal or trimming of trees to construct and maintain the line. GRE has indicated that it will work with residents to minimize the need to remove or trim nearby vegetation, although the company will have to do what is necessary to safely construct and maintain the line regardless of route selected.

Undergrounding

Undergrounding of segments of the proposed HVTL is discussed in Section 5-17

5.4 Human settlement patterns

The existing 69 kV transmission system serving the Plymouth – Maple Grove area was built in phases mainly from 1954 to 1971. Since the existing transmission network was installed in the 1960's, Plymouth and Maple Grove have increased in population more than ten-fold. In the last twenty years, population has more than doubled.

As the population of this area has increased, the electric demand has increased dramatically. The construction of this new transmission line will not lead to development that would not otherwise occur. Nor will it interfere with future development.

The location of the transmission line and new poles will be done in a manner such that no person will be displaced from his or her residence or business. This project will have no significant impact on human settlement patterns in the Plymouth and Maple Grove area.

5.5 Socioeconomics

The project will result in a short-term of infusion of capital and employment in the local area from construction jobs, material purchases and minor purchases by workers at establishments near the proposed corridor. GRE expects between 15 and 25 additional temporary jobs to be created during construction and that no permanent jobs would be created by the transmission options.[68] Workers may make minor purchases from the area during construction. GRE may hire a few more workers long time related to maintenance of the transmission line but the number of new employees is unknown.

By providing local customers with a reliable and efficient future energy supply, the anticipated long-term impacts are positive for future growth in the project area. There do not appear to be any unavoidable impacts to the LOCAL land-based economies due to the proposed 115 kV transmission line project. Mitigation measures are not anticipated for the land-based economies along the proposed transmission line route.

[68] "Permit Application", In Appendix A, pg. 18

5.6 Archaeological and historic resources

There are no properties listed on the National or State Registers of Historic Places,[69] and no known or suspected archaeological properties in the area that will be affected by this project. The proposed route was reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

It was also reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36 Code of Federal Regulations (CFR)800). If any archeological artifacts or sites are identified during placement of the poles along the proposed route, work will cease immediately at the site and the Minnesota Historical Society contacted for further instructions.

5.7 Environmental Impacts

This project is located in a heavily developed, highly urbanized portion of the western Twin Cities. There are very limited areas that could be termed unique natural resources. Almost all waters of the state, wetlands, forests, agricultural land and other natural areas remain as isolated patches in the urban matrix. These areas are already protected through designations as parks, wetlands and waters of the state. The environmental setting along the proposed route includes hydrological features such as lakes, creeks, ditches, wetlands, and riparian areas. A mix of vegetative communities dominated by yards, ornamental and boulevard trees, and herbaceous plants are also present along the proposed route. Wildlife habitat exists although it is limited to wetlands and park property. There are no threatened or endangered species or state listed species identified along the proposed route or any sites that are classified as rare or unique habitat. Mitigation measures will be required during construction to protect all natural areas from impact.

5.7.1 Rare and Unique Natural Resources

Rare and unique natural features include federal and state protected and rare species, remnant areas of native vegetation, significant natural resource sites, and significant natural features.

The Minnesota County Biological Survey (Minnesota County Biological Survey Map Series, 1998)[70] lists one feature in the Plymouth – Maple Grove area as a remnant natural community. This feature is a maple-basswood forest located south of Schmidt Lake Road in the Plymouth to Parkers Lake segment of the proposed route. The forest is located in Section 15, T119N, R22W. In a letter dated August 26, 2003,[71] the DNR indicated that the Maple-Basswood remnant natural community is the only rare community in the Plymouth – Maple Grove area that it was aware of.

[69] Response letter from Minnesota Historical Society, Sep 4, 2003, full text found in Appendix C, Route Permit Application, Plymouth-Maple Grove 115 kV Transmission Line, Great River Energy & Wright-Hennepin Cooperative Electric Association, September 9, 2003

[70] "Permit Application", pg 43

[71] Response letter from Minnesota Department of Natural Resources, Aug 26, 2003, full text found in Appendix C, Route Permit Application, Plymouth-Maple Grove 115 kV Transmission Line, Great River Energy & Wright-Hennepin Cooperative Electric Association, September 9, 2003

The DNR Biological Survey describes this maple-basswood forest community as follows[72]:

> **Maple-Basswood Forest –**
> Mesic to wet-mesic forests on moist soils formed in glacial till or on cool, north-facing slopes of outwash terraces. Dense canopy dominated by sugar maple, basswood, and red oak, with lesser amounts of slippery elm *(Ulmus rubra),* green ash *(Fraxinus pennsylvanica),* and black ash *(Fraxinus nigra)*. American elm *(Ulmus Americana)* was once common in the canopy but is present today mostly as standing dead snags. Subcanopy and shrub layers are usually dominated by sugar maple and often contain ironwood, bitternut hickory, bladder-nut *(Staphylea trifolia),* pagoda dogwood *(Cornus alternifolia),* red-berried elder *(Sambucus pubens),* or gooseberries. Ground layer includes early spring ephemeral species such as Dutchman's breeches *(Dicentra cucullaria),* false rue-anemone (Isopyrum biternatum), toothwort *(Dentaria liciniata),* and white trout-lily *(Erythronium albidum)* ; other common herbs are plants adapted to deep shade such as white bear sedge *(Carex albursina),* putty-root *(Aplectrum hyemale),* Virginia waterleaf *(Hydrophyllum virginianum),* wild leek *(Allium tricoccum),* and zig-zag goldenrod *(Solidago flexicaulis),* as well as several species present in mesic oak forests.

The City of Plymouth has expressed concern regarding the location of the proposed line relative to the maple-basswood forest.[73] This is a future park area in the City of Plymouth comprehensive plan. The City would like to preserve as many trees as possible.

The City suggested that the line be placed east of the trees towards the Xcel Energy 345 kV transmission line, but GRE has stated that there is not enough room to site the proposed GRE line without clearing some trees. City staff then asked if the line could be engineered with extra spans or taller structures so that less tree clearing would be necessary. GRE has also agreed to minimize the impact of the line on this area by clearing as few trees as possible. GRE has agreed to stake the proposed route in the fall when the leaves are off so City of Plymouth staff can walk the woodland area and assess the potential impacts. The City of Plymouth has an existing tree preservation policy, and if GRE surpasses the threshold, restitution will be required.

5.7.2 Threatened and Endangered Species

There are no threatened or endangered species or state listed species identified by the DNR along the proposed route.[74] The United States Fish and Wildlife Service reviewed the proposed route and concluded that the project would not affect any federally listed or proposed threatened or endangered species. It is not likely that any migratory threatened or endangered species will intrude into what is a highly developed urbanized environment.

[72] "Permit Application", pg 43
[73] Letter from Kevin Lennon, pg. 9, full text, Appendix C
[74] "Permit Application", pg 43

5.7.3 Wetlands

Because most of the area within the proposed transmission line route has been converted to urban development, potential impacts to wetland and water resources will be minimal and limited to ground disturbances associated with placement of the transmission structures, regardless of the route selected.

The HVTL route preferred by GRE will cross several DNR-protected waters and wetlands. These locations are formally designated as DNR Public Waters 545W and 535W (Elm Creek), 99W (Mud Lake) 594W (an unnamed stream), 617W (Plymouth Creek).[75]

GRE will have to apply to the DNR Division of Lands and Minerals for a license to cross these waters and wetlands, which will be spanned where possible. In cases where spanning is not possible, impacts will be short-term and limited to placement of poles. Construction in these areas will take place during the winter to minimize impacts to the natural environments.

There are seven wetland areas along the proposed route segment from Bass Lake to Plymouth substations. Rerouting the 115 line along I-494 and Bass Lake Road (County State Aid Highway 10) would place the line in a more highly developed highway right-of way, with what appears to be less wetland impact. The alternative line route would run over two or three small wetland areas instead of the seven identified with the GRE proposed route. This hydrographic information is best illustrated by examining maps WR8 and WR9 in Appendix D1 of the Permit Application.[76]

There are ten wetland areas impacted by the GRE proposed route between Parker Lake and Plymouth substations. Three of these areas are found in the portion of the route segment between the I-494 crossing north of Target and the area just south of Rockford Town houses on the east side of I-494. The alternative route proposed for this section would have a slight change on this wetland impact. One of the wetlands would be impacted by either route. If the route was modified and the I-494 crossing moved one mile farther south along the west side of I-494 to avoid the town home complex, one new wetland would be affected and two of the original three would be avoided. So in the alternative route two small wetlands rather three are affected by the HVTL. This comparison is best illustrated by examining Map WR11 in Appendix D1 of the Permit Application.[77]

There are no wetland areas within the right-of-way of the proposed route or the alternative route in the Cedar Island Lake area. There would be no difference in wetland impact between these two route segments. This can be seen by examining Map WR6 in Appendix D1 of the Permit Application.[78]

5.7.4 Topography

The topography of Hennepin County is the result of glacial deposition[79]. The project area is characterized by nearly level to steep topography. The elevation ranges from approximately 860 to 1040 feet mean sea level. The area is generally characterized by gentle to moderate topography. There are small areas located in the central portion of Plymouth that have slopes steeper than 12 percent. There are no significant topographical changes to distinguish one route segment from another.

[75] "Permit Application", pg 36
[76] Ibid, Appendix D1, Maps WR8 & WR9
[77] Ibid, Appendix D1, Map WR11
[78] Ibid, Appendix D1, Map WR6
[79] "Permit Application", pg 44

5.7.5 Geology

The majority of the corridor soils were formed on the Grantsburg sub lobe of the Late Wisconsonian glaciation period.[80] The most recent glaciation period began approximately 70,000 years ago and ended 10,000 years ago. The Grantsburg Loamy Till Plain varies in thickness but is generally over forty feet in thickness. The northeast area of the proposed route consists of fluvial sediment, or outwash, deposited by water running out of a glacier. Transmission line structure construction will result in no disturbances to the bedrock geology in the area regardless of route and mitigative measures are not required.

5.7.6 Soils

Soils in the area were formed primarily in glacial till except for the northeast area of the corridor where soils formed in outwash sediments. The dominant soil series are the Lester, Angus, Koronis and Kingsley series[81], which are deep, well drained soils. Lester and Angus soils formed in calcareous loamy glacial till while Koronis and Kingsley soils formed in loamy glacial till on glacial moraines. These soils are generally fine to medium-textured and include loam and clay loam. Past and current land uses have already resulted in the disturbance of native soils in much of the area.

Potential soil impacts associated with construction of the transmission line are compaction of the soil and exposure of the soils to increased risk of wind and water erosion. Some compaction of surface soils will result from the use of heavy construction equipment. Soils will need to be revegetated as soon as possible to minimize erosion or some other method used during construction to prevent soil erosion. No grading of any areas will be necessary during transmission line construction. The impacts to the physiographic features should be minimal during and after installation of the transmission line structures and these impacts will be short term.[82] There should be no long-term impacts on the soils resulting from this transmission line project.

A portion of the proposed route, north of I-694 to 85th Avenue, is an active gravel pit. The dominant soil complex is Gravel-Udipsament, which are deep, well drained soils. These soils formed in outwash sediments and are coarse textured, including sand and gravel. Factors to consider regarding the gravel pit are discussed further in section 5.13.

5.7.7 Air Quality

During construction of the project, there will be emissions from vehicles and other construction equipment and fugitive dust from right-of-way clearing. Temporary air quality impacts caused by the proposed construction-related emissions are expected to occur during this phase of activity.

Fugitive dust may result from replacing the existing structures and from any additional ROW clearing that may be required. The magnitude of these emissions is influenced heavily by weather conditions and the specific construction activity taking place. Exhaust emissions from primarily diesel equipment will vary according to the phase of construction but will be minimal and temporary.

There will be no impact on air quality during operation of the lines.

[80] "Permit Application", pg 44
[81] Ibid pg 44
[82] Ibid pg 45

There will be no significant adverse impacts to the surrounding environment because of the short and intermittent nature of the emission and dust-producing construction phases. No mitigation measures are necessary for the construction of the transmission lines.

5.7.8 Noise

During Construction

Normal construction noise can be expected during the installation of transmission line structures. These operations will be of short duration and conducted during daylight hours to minimize any unavoidable residential impact. The noise impacts are the same regardless of which route is selected.

During Operation

Audible noise is due to point source corona (minor breakdown of air insulating a conductor) and is a function of conductor voltage gradient, which is increased by irregularities on the conductor surface and hardware due to burrs on the material when new, and rain droplets on the surface. The major causes of these irregularities are rain droplets or droplets from heavy fog that form underneath the conductor. In foggy, damp, or rainy weather conditions, power lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the wires.

Audible noise is generally measured by the decibel (dB(A)) scale (the "A" suffix refers to the weighting network used for measurement), which is used for general noise ordinances. A 115 kV line operating normally should not exceed approximately 12 dB(A) at the edge of the right of way during fair weather conditions. For comparison, the maximum noise level permitted under standards established by the Minnesota Pollution Control Agency is 55 dBA during the nighttime. Minn. Rules part 7030.0040.[83]

When dry, the noise level at the right of way edge will be essentially inaudible. During a heavy rain (1 inch per hour) the noise level may approach 18 dB(A) at the right of way edge. However, background noise levels will also be greatly increased by the rainfall itself, thereby minimizing the additional power line noise.

[83] Minnesota Pollution Control Agency, Noise Pollution Control **7030.0040 NOISE STANDARDS at website:** http://www.revisor.leg.state.mn.us/arule/7030/0040.html

5.7.9 Water Quality

There will be no change in grading required for construction of the transmission line. Therefore, there should not be any change in runoff due to the transmission lines. Impacts to water quality are not expected and mitigation measures are not necessary.

5.7.10 Groundwater

The transmission line poles will be set in the ground approximately 8 to 10 feet deep and 2 feet in diameter for each pole. This will not affect the local water table levels or groundwater quality. Mitigation measures are not necessary.

5.7.11 Floodplains

No part of the transmission line, regardless of route, will be located in a delineated floodplain.

5.7.12 Fish and Wildlife Resources

Most of the transmission line will be located in a highly developed area. Only a small amount of wildlife habitat, in the forested area in Plymouth described in Section 5.7.1, will be permanently lost. All wildlife species that may be displaced are considered "common" in Minnesota, and their displacement would not be detrimental to their populations. No mitigation measures are necessary.

5.7.13 Aesthetics

Aesthetic concerns are always subjective, depending on individual perception. Any change in the visual appearance they have grown accustomed to is disturbing to most people to a greater or lesser degree. The new pole design for the 115 kV transmission line while taller, will have a narrower profile and be less intrusive than the existing 69 kV line poles. This may result in a more aesthetically pleasing design for the new poles compared to the existing poles. In some instances, particularly in neighborhoods, the existing distribution line will be placed underground, improving the overall appearance of the line. For the new line segment along Interstate 694 the new transmission towers are less visually intrusive than the existing 345 kV towers almost universally visible along this stretch. "Experience has shown that shortly after installation, new transmission line structures become accepted as a normal part of the urban view shed."[84]

[84] Phone conversation of George Johnson, EQB staff and Gary Ostrom , Land Rights Supervisor, GRE Oct. 14, 2003

5.8 Economics

5.8.1 Cost Estimates

Great River Energy has provided estimates of the costs of construction along the company's preferred route and the costs associated with the various route segments under review. These are the only estimates available. The GRE cost estimates are presented in the Estimated Project Cost Table below[85]:

Starting at Parkers Lake in the South to Plymouth	**GRE Proposed Route**	**Rockford Town-Homes Route and Different I-494 Crossing Alternative**	**Bass Lake and County Road 10 Alternative Route**	**Cedar Island Lake Alternative Above or Underground**
NEW LINE R.O.W First Segment 4.25 miles along I -494	$ 4,473,200.00	$ 4,473,200.00	$ 4,473,200.00	$ 4,473,200.00
Extra Costs of Change in this segment	$ 0.00	**$ 530,000.00**[86]	$ 0.00	$ 0.00
Total Segment 2 Cost	$ 4,473,200.00	$ 5,003,200.00	$ 4,473,200	$ 4,473,200
Segment 2 Cost / per mile (4.25 mi)	$ 1,052,470.00	$ 1,177,176.40	$ 1,052,470.00	$ 1,052,470.00
REBUILD 69 to 115 kV Plymouth to Hennepin Sub	$6,694,300.00	$6,694,300.00	$6,694,300.00	$6,694,300.00
Extra Costs of Change	$0.00	$0.00	**$ 187,500.00**[87]	**$1,150,000.00**[88]
Total Segment 1 Cost	$6,694,300.00	$6,694,300.00	$6,881,800.00	$7,844,300.00
Segment 1 Cost / per mile (9.85 mi)	$ 679,593.00	$ 679,593.00	$ 698,680.00	$ 796,345.17
Henn Sub Rework	$ 197,500.00	$ 197,500.00	$ 197,500.00	$ 197,500.00
Total Project Cost	**$11,364,000.0**	**$11,894,500.0**	**$11,552,300.0**	**$12,514,800.0**

[85] "Permit Application", pg 63 & 64,
[86] Letter from Kevin Lennon, pg. 2, full text, Appendix C
[87] Ibid , pg. 12
[88] Ibid, pg. 5

5.8.2 Undergrounding

GRE Project Engineer Kevin. Lennon provided the following analysis of the costs associated with undergrounding a portion of the line near Cedar Island Lake[89].

> "The estimated cost to install an equivalent capacity transmission line underground is $1,250,000 for the approximately three eighths mile of concern" in the 73rd Avenue Cedar Island lake segment. The estimate for an aboveground segment of this length is approximately $100,000. The underground system would require six (6) cables with one (1) termination structure supporting six (6) terminations at each end. Each self-supporting termination structure would be approximately 150 feet tall and 10 feet in diameter at the base. Cables would run down the structure into a concrete duct and manhole system. Installing the duct system would require opening a trench about 10 feet deep and 15 to 20 feet wide for the entire length of the circuit. This trench would be open for about 6 to 8 weeks. Once the concrete is cured, the trench would be filled with thermal backfill. Cables would be pulled into the ducts and spliced as needed. Pulling and splicing would require about 4 to 6 weeks. After cleanup, grass would be restored over the duct. Larger forms of vegetation would not be restored as it causes future reliability problems."[90]

> "Operating concerns include life span, thermal heating, and cable losses. The operating life of underground cable is presently 30 years vs. the typical 50-60 years for overhead lines. Due to the design of underground cable, capacitive losses are much greater. For this installation, capacitive losses are calculated to be 5 MVar of capacitive losses. These losses can become operationally significant when considering cable losses of half a mile here, half a mile there."[91]

> "Underground transmission for this project is estimated to cost $3,055,310 per mile vs. the $300,000 per mile for 115 kV overhead line."[92]

5.9 Land Use Impacts

5.9.1 Existing Land Uses

Land use along the proposed route consists of roadways and streets, residential, commercial, industrial, railroad and utility property, public and institutional property, parks and open space, agricultural lands and lakes. Maps showing land use along the proposed route are provided in Appendix D4, LU1-LU13.[93]

Industrial land uses include manufacturing, office-warehouse, office-showroom, and warehouses. Commercial uses include retail and service businesses. The residential areas along the proposed route range from single-family homes to mixed high-density dwellings.

[89] Letter from Kevin Lennon, pg. 6, full text, Appendix C
[90] Ibid, pg 6
[91] Ibid, pg 6
[92] Ibid, pg 4
[93] "Permit Application", Appendix D4

Parks and open space include community and school playfields, neighborhood and regional parks, and golf courses. Agricultural lands along the proposed route are quite limited and exist as undeveloped land. The nature of urban expansion in the Twin Cities area for the last twenty years make it quite likely that virtually all undeveloped land in the project area which is not already protected will be occupied by business or residential development in the next twenty years.

It is anticipated that the new transmission line will not have any long term impact on existing land uses along the proposed corridor. There may be temporary disruption to right-of-way property while new transmission poles are installed and wires strung. There are some limitations on the types of vegetation that can be planted under and immediately adjacent to the power lines.

At the EQB public meeting on October 28, 2003, Gary Ostrom, GRE Land Rights Supervisor, stated that Great River Energy has always reimbursed landowners for any damages they might cause during construction. He stated that GRE would continue to honor this commitment on this project and future projects.

5.9.2 Farmland

Prime farmlands are listed by soil mapping unit for Hennepin County. Some soils have limitations such as high water table or flooding, and may qualify as prime farmland if these limitations are overcome by management methods. Some soil associations are mapped as a complex of two or three soil types and only part of the complex may be listed as prime farmland. Urban or built-up areas of soils are not considered prime farmland by the Natural Resource Conservation Service (NRCS).

Acreage of prime farmland was estimated using the (NRCS) Soil Survey of Hennepin County.[94] Using the NRCS soil survey maps, there are approximately 1.6 acres of prime farmland in the right-of way zone between the Plymouth and Bass Lake substations. The remainder of the proposed route consists of urban or built-up land. The NRCS was contacted (GRE letter of June 24, 2003, Appendix C, Route Permit Application) requesting information on the possible effects of the proposed project on important or prime farmlands in the project area. In a letter dated August 20, 2003 (Appendix C of the Permit Application) the NRCS indicated that prime farmland in the area of the project that is currently cropped will not be directly affected.[95]

5.9.3 Local Zoning Requirements

GRE has been in contact with local officials for the past two years and has met on several occasions with both Plymouth and Maple Grove staff and with the Three Rivers Park District to discuss issues of concern to local officials. GRE staff met formally with Plymouth and Maple Grove Staff on two separate occasions and reported the results of these meetings to EQB staff.[96] The meetings occurred during the 1st week of March 2002 and again during July of 2003.

The March meetings consisted of a general presentation centered on the need for the project. According to GRE, the staff of both cities seemed content with the explanation, although they were interested in GRE's routing criteria. The routes within the general corridor were reviewed briefly with staff. The EQB permitting process and schedule were also discussed briefly.

[94] "Permit Application", pg 45
[95] Ibid, pg 45
[96] Letter from Kevin Lennon, pg 9 & 10

The meetings in July with City Staff[97] were centered on the route for the proposed transmission line and potential issues with regard to the proposed route. A representative from GRE also met with the City Administrators of Plymouth and Maple Grove to personally deliver copies of the CON and the Route Permit Application. No significant environmental concerns were brought forth by these individuals according to GRE reports of the meetings.

GRE staff met with the staff of the Three Rivers Park District (TRPD) on two separate occasions. GRE will need to obtain an easement from the District for crossing park land near the Plymouth Substation. TRPD did not have many concerns regarding GRE's proposed route, particularly since the line will be on the west side of I-494 for the first mile or so south of the Plymouth Substation.

The City of Maple Grove has not registered any specific concerns about the transmission line.

Both cities have discussed with GRE fire safety issues related to the proximity of the transmission line to buildings and access to the line along the route. GRE indicated they were able to adequately satisfy both city's concerns in these matters. No safety concerns have been brought to the attention of the EQB.

GRE also met with the City of Plymouth staff on several occasions regarding this project during both the CON process and the routing process. At a meeting of March 26,2003, GRE provided a general overview of the project and the upcoming routing process, but the specific route through the City of Plymouth had not yet been identified.

The other issue raised by the City of Plymouth staff is a proposed ball field complex in the area just south of the Plymouth Substation. City staff indicated that they would not require GRE to go around the complex, but perhaps locate a structure between the fields as shown on preliminary plans. GRE assured City staff that our design engineers would work with the City of Plymouth staff to locate the structures in that area such that the ball fields could be constructed without interference from the transmission line.

5.10 Radio, Television, and Cell Phone Interference

GRE reports that interference with existing television or radio is typically not a problem with transmission lines designed and operated at 115 kilovolts. The proposed transmission facilities will be designed to industry standards to avoid interference with reception. If due to some unique circumstance this new transmission line causes some localized effect outside the right of way that was not previously experienced, GRE will be responsible to rectify the situation.

While transmission lines are designed so no interference occurs, in areas where radio, television, or cell phone signals are weak, the presence of a structure (transmission structure, tree, building, etc.) may cause interference. Interference caused by electrical noise is very uncommon and is typically the result of loose hardware. This can be easily corrected. It is very common for cell phone providers to install their antennas on transmission structures.

[97] Notes for July 18, 2003 and July 21, 2003 meeting with the Cities of Plymouth, Maple Grove and the Three Rivers Park District, Follow-up correspondence with City Administrator, Copies provided to EQB staff in response to request for further information from GRE on Oct 29, 2003

5.11 Use of Department of Transportation Right-of-Way

The Minnesota Department of Transportation has adopted a basic policy regarding the proper use of state highway right-of-ways for locating transmission lines. MnDOT Policy Guideline Highway No. 90-1. That policy states, "Private lines are allowed only to cross trunk highway right of way. Longitudinal installations are not permitted. Overhang is allowed."

Construction of the GRE HVTL is complicated by portions of the designated route being adjacent to US I-494 and I-694. The MnDOT Policy has additional limitations on HVTL structures and lines when these are involving Federal Interstate highways. Then they refer to the standards of the American Association of State Highway and Transportation Officials "A Policy on the Accommodation of Utilities Within Freeway Right-Of-Way," which says in part:

> "New utilities will not be permitted to be installed longitudinally within the control of access lines of any freeway, except that in special cases such installations may be permitted under strictly controlled conditions. Utilities will not be allowed to be installed longitudinally within the median area. All longitudinal utility accommodations as may be warranted herein shall only be in accordance with an approved permit issued by the State highway agency."

5.12 Condemnation of Property

Great River Energy presently has easements for the right-of-way required for the existing transmission line. Much of that existing right-of-way will be used for the new line. It is uncertain at the moment whether GRE can rely on the existing easements to construct the higher voltage line. The EQB has requested that GRE inform the agency when GRE has resolved the question of the need for new easements.

In those areas where new right-of-way is required, GRE will have to obtain new easements or obtain the property through exercise of condemnation power. Public utilities like Great River Energy have been granted the right of eminent domain and may take private property, upon payment of just compensation, for construction of high voltage transmission lines. Minn. Stat. § 116C.63.

5.13 Impact of Existing Gravel Pit

One unique area of environmental impact along the proposed HVTL route is the existing gravel pit between GRE's Arbor Lake and Hennepin substations. This pit is presently active and will eventually need to be crossed by the proposed line. Gravel extraction and site restoration activities are being coordinated to permit the proposed line to be built through the area in the near future.

Over the past several years Tiller Corporation, C.S. McCrossen, the City of Maple Grove, and GRE have been working together to site a substation facility and relocate and upgrade the transmission system in the area of an undeveloped "gravel pit" (Arbor Lakes) area in Maple Grove. GRE is presently working with the above referenced parties to relocate a segment of GRE's transmission line near Zachary Lane and 85th Avenue. This is a portion of the 69 kV transmission line that GRE proposes to upgrade to 115 kV as part of the Plymouth-Maple Grove project. GRE relocated a segment of this same transmission line to accommodate roadway construction in 1997. When undertaking this relocation, GRE acquired easements and rebuilt the transmission line to 115 kV standards in anticipation of eventual conversion of the transmission system from 69 kV to 115 kV.

Mitigation at the gravel pit to date has centered on GRE's need to accommodate planned infrastructure as this segment of Maple Grove transitions from gravel pit to commercial and residential development. This accommodation may involve GRE's willingness to relocate facilities once infrastructure develops and land use plans are finalized.

5.14 Summary of Mitigative Measures

The applicant has indicated that the proposed transmission line will be designed to meet or exceed all relevant State codes and those of the NESC. GRE adheres to RUS standards regarding clearances to ground , clearances to crossing utilities, clearance to buildings, right-of-way widths erecting power poles, and stringing transmission lines.[98] Appropriate standards will be met for construction and installation, and all applicable safety procedures will be followed after installation. The proposed transmission lines will be equipped with protective devices to safeguard the public from the transmission lines if an accident occurs and a structure or conductor falls to the ground. The protective equipment would de-energize the line when an event occurred. In addition, the substation facilities will be fenced and access restricted.

The only identified environmental effects that cannot be avoided are primarily short-term during the construction of the line. According to GRE staff, if any archeological sites are identified during placement of the poles along the proposed route, the particular site will be avoided and the poles placed outside the specified buffer zone. Native vegetation will be maintained within the proposed route that is compatible with the operation and maintenance of the transmission line. If necessary, native species will be planted or seeded in areas that are devoid of native species. Soils will be revegetated as soon as possible to minimize erosion or some other method will be used during construction to prevent soil erosion. During construction temporary guard or clearance poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities.

5.15 Technical and economic feasibility

The economic details of the various alternatives and route options were covered by GRE extensively in the Application for Certificate of Need (CON) and Draft Environmental Report and several of the exhibits prepared by staff economists at the Department of Commerce that were submitted with the CON application.[99] Detailed economic and engineering feasibility analysis of several alternatives indicated that the preferred 115 kV route selected by GRE was the most cost-effective option using the "Least Cost Plan" methodology which requires the selection of the minimum total cost sum of all required transmission and distribution costs incurred in providing the mandated level of service.[100].

[98] "Permit Application", pg 69
[99] Application for CON and Draft Environmental Report, Plymouth-Maple Grove Large High Voltage Transmission Line , Great River Energy & Wright-Hennepin Cooperative Electric Association, November 14, 2002 pg 69
[100] Ibid, pg 69

According to GRE engineering analyses of all alternative route segments, the cost of constructing, operating, and maintaining the facilities along the proposed route is no higher, and is likely to be lower than along any of the alternative routes they evaluated during the planning process.[101] The proposed route relies on existing rights of way to the extent technically and economically feasible. GRE staff has stated that the existing right-of-way and easement agreements for the 69 kV lines would be sufficient to accommodate the proposed in place upgrade to 115 kV lines. This reduces the cost of acquiring easements, and right of way preparation. The alternative that would attempt to force the line onto the full length of the existing Xcel Energy right of way between the Plymouth and Parkers Lake substations would increase construction costs, as it would be necessary to install taller poles, have very long spans between poles, and include changes in direction (with attendant higher costs) to avoid the safety risks caused by the numerous encroachments into the existing right-of-way.

[101] Letter from Kevin Lennon, GRE Project Engineer in response to EQB request for additional cost and design information on Plymouth- Maple Grove 115 kV HVTL Route Permit Application, Oct 29, 2003 pg. 1-6

APPENDIX A –

ENVIRONMENTAL ASSESSMENT (EA) SCOPING DOCUMENT

The Chair of the Minnesota Environmental Quality Board (EQB) determined the scope of the Environmental Assessment (EA) to be prepared on the proposed Great River Energy (GRE) Plymouth-Maple Grove transmission line project. The EQB held two public meetings on October 28, 2003, to discuss the project with the public and to solicit input into the scope of the EA document which is required to be prepared for this project. The public was given until November 14, 2003 to submit written comments regarding the scope of the EA. Having reviewed the public comments submitted and consulted with EQB staff, the Chair made the following Scoping Order. This order was signed on December 16, 2003.

FULL TEXT OF SCOPING DOCUMENT IN PDF VERSION

APPENDIX B Citizen Comment Letters

In addition to verbal comments at various public meetings four comment letters were submitted by citizen groups. These letters were reproduced exactly as received to help gauge citizen viewpoints on the projects. In some cases, the letters propose route alternatives, or express general concerns with the project. In some cases, both types of comments are found in the same letter.

First Tim Theisen of Cedar Island Lake, 73rd Avenue group

Second Barbara Ross of Bass Lake Road group

Third was Jeanette Meisen from the Rockford Town homes group

Fourth was Mr. or Ms. Ele Sherrard

FULL TEXT OF COMMENT LETTERS IN PDF VERSION

APPENDIX C -
GRE Responses to EQB written inquiry
Referred to in footnotes as;

"Letter from Kevin Lennon"

State of Minnesota
Minnesota Environmental Quality Board

Request for Additional Technical Information from GRE

For use in the Environmental Assessment (EA) of a
Great River Energy (GRE) Route Permit Application

Docket Number #03-65-TR-GRE-PMG
Date of Request: October 29, 2003

Request No. 1

What are the cost and design details considered for all alternative route segments examined between the Parkers Lake and Plymouth substations?

Figure 3-2 of the Route Application shows the area between the Parkers Lake and Plymouth substations. The alternatives investigated included the proposed route plus three other primary routes, which when combined in various ways with other segments, form approximately 40 different routes.

Alternative #1 (Northwest Boulevard route) can be considered as three parts: the south part from Parkers Lake to Xenium Lane, the middle part from Xenium Lane to County Road (CR) 9, and the north part from CR 9 to the Plymouth Substation.

> The south part is through commercial properties and follows a reasonably straight path. The straight path results in smaller, less visible, and less costly structures.
>
> The middle part is through single and multi-family residential homes, following Northwest Boulevard which is quite curvy, requiring larger structures with greater visual impact. Each time the line changes direction a larger, stronger structure is needed. At the intersection of Northwest Boulevard and Medicine Lake Drive West, there are traffic signals and a retaining wall that is approximately 20 feet tall. Getting through this point would require a significant amount of tree clearing and placement of approximately six structures in people's yards.
>
> The north part is single and multi-family residential homes.

Due to the large number of angle structures, Alternative #1 is estimated to cost 125% of the proposed route.

Alternative #2 (345 kV line corridor) can also be considered as three parts. In general this alternative would follow the 345 kV transmission line on the west side of I-494. Considerations with this route were:

Can the new line be added to the existing structures?

No, the structures were not designed to support the weight of an additional line.

Can the existing structures be replaced with stronger ones?

No, replacement of the structures would require taking the 345 kV line out of service for several months. The electric reliability within the region would be severely jeopardized should this 345 kV line be removed from service.

Can the new line be built underneath the 345 kV line?

No, there is not enough vertical clearance to provide the separation required by the NESC.

Can the new line be built along the west side of the 345 kV line?

Yes, but with great impact to commercial and residential areas (refer to map in attachments for MEQB Request #5). The NESC requires adequate horizontal spacing so the lines do cannot swing into each other. This required separation means the new line could be no closer than 80 feet west of the 345 kV line. Preliminary design identified seven locations where structures would be in the middle of buildings or in roads and parking lots, rendering the site inaccessible. Spanning the buildings was considered, and although GRE could not find any codes requiring fortifying roof systems, we do have great concern for the safety of Fire Departments during an emergency. GRE therefore designed the line to go around these constrained locations, which resulted in significant impacts to residential areas east of Fernbrook Lane and along the west side of the commercial areas. This route does not comply with the NERC N-1 criteria of a separate corridor.

The least cost variation of Alternative #2 would be to span the impacted buildings. This is estimated to cost 150% of the proposed route.

Alternative #3 (Fernbrook Lane) is the most westerly route. Except for a commercial area between 23rd Avenue and Harbor Lane, this route is mainly residential. The positive attributes of this route are that is very straight, and as a result the structures would be small. The negative attributes of this route are that it is heavily congested with an overhead distribution feeder, service drops to homes, and other services. Existing underground water, sewer, gas, and phone make burial of the overhead extremely difficult and expensive.

Alternative #3 is estimated to cost 150% of the proposed route.

Request No. 2

What are the cost and design details considered for all alternative route segments examined between the Plymouth and Hennepin substations?

The new transmission line must connect the Parkers Lake, Plymouth, Bass Lake, Cedar Island, Arbor Lake, and Elm Creek substations. Although located mainly in residential and some commercial areas, the existing 69 kV and 115 kV corridors between the Plymouth and the Elm Creek substations are usable.

Figure 3-1 of the Route Application shows the alternate routes considered.

Between the Plymouth and Bass Lake Substations

Alternative #1 (Northwest Boulevard) goes east to Northwest Boulevard, north to Bass Lake Road, then west to the substation. This route is mainly residential and 50% longer than the proposed route. Both Northwest Boulevard and Bass Lake are curvy enough that large self-supporting structures would be required. This route is estimated to cost 200% more than the proposed route.

Alternative #2 (345 kV line corridor) goes east to I-494 and follows the existing 345 kV line north to Bass Lake Road, then follows Bass Lake Road west to the substation. The south 0.5 miles along I-494 is all multi-family residential. From there north to CR 47 is single family residential, then north of CR 47 it is again multi-family residential. This route did not have adequate space to provide NESC-required separation between the 345 kV line and a new 115 kV line without placing new structures in roadways, people's front yards, or between houses. By placing both the 345 kV line and the 115 kV line in the same corridor, the NERC "N-1" criteria are violated. Additional lines would need to be built to comply with these criteria. Following Bass Lake Road west to the substation is mainly single family residential. The existing road is also curvy and would require large self-supporting structures. The estimated cost of this route is 125% of the proposed route.

Alternative #3 (along the east side of I-494) is similar to Alternative #2. This route has the same residential impact and buildability concerns. Following the east side of I-494 is estimated to cost 125% of the proposed route.

Alternative #4 (Fernbrook Lane) would follow the existing line west to Fernbrook Lane, go south to Schmidt Lake Road, then west to Vicksburg Lane. At Vicksburg Lane the route would turn north and go to Bass Lake Road, where it would turn east and proceed to the substation. As with other alternatives, this route is mainly single family residential. It is also 2.25 times longer than the proposed route. The north portion of Vicksburg Lane and Bass Lake Road would require numerous large self-supporting structures. This route is estimated to cost 250% of the proposed route.

Between the Bass Lake and Cedar Island Substations

Alternative #1 (Hemlock Lane) would follow Bass Lake Road east to 61st Avenue, turn north following 61st to Hemlock Lane, then proceed north to the existing route on 73rd Avenue and into the Cedar Island Substation. This route is mainly single and multi-family residential and two times as long as the proposed route. Because of the numerous corners on the existing route, this alternative would have slightly more large, self-supporting structures. The estimated cost is 225% of the proposed route.

Alternative #2 (345 kV line corridor) follows Bass Lake Road to I-494 then turns north to 73rd Avenue, where the existing route is followed into the Cedar Island Substation. This route is approximately 50% residential and 50% commercial. Bass Lake Road has the same concerns as previous alternatives. The 3-story hotel just north of Bass Lake Road, the 4-story building on the south side of Fish Lake Road, and the single story office building just north of Fish Lake Road are close enough to the 345 kV line that the corridor can not be used. To get around these buildings, the new line would need to be routed through additional residential areas. This alternative is estimated to cost 150% of the proposed route.

Alternative #3 (along the east side of I-494) is similar to Alternative #2 but does not use 73rd Avenue into the Cedar Island Substation. It follows I-494 to I-694, then proceeds along the north side of I-694 as described in Information Request #3. The residential areas along Bass Lake Road are impacted, plus homes at the I-94/494/694 interchange. This alternative is estimated to cost 300% of the proposed route.

Between the Cedar Island and Elm Creek Substations

Alternative #1 (Elm Creek Boulevard) follows Elm Creek Boulevard through downtown Maple Grove. This route is not supported by the City of Maple Grove. The route is about 35% commercial and 65% single and multi-family residential. The length is 150% of the proposed route and has numerous curves or corners. The estimated cost is 250% of the proposed route.

Alternative #2 (345 kV line corridor) would follow the 345 kV corridor with lines to the Cedar Island, Arbor Lake and Hennepin substations. This route also runs through downtown Maple Grove and is not supported by the City. The length is about 175% of the proposed route. The estimated cost is 200% of the proposed route due to the extra length and additional self-supporting structures.

Request No. 3

What are the cost and design details considered for all alternative route segments examined in the vicinity of Cedar Island Lake?

A variety of options were reviewed when considering possible routes for the new 115 kV line: placing the line underground, routing the line along the freeway using road right of way, routing the line along the freeway but on private property, and using the existing 69 kV corridor based on statute and case law.

Underground

Underground transmission for this project is estimated to cost $3,055,310 per mile vs. the $300,000 per mile for 115 kV overhead lines. See Request #4 for a more detailed response.

Along Freeway Using Road Right of Way

The Minnesota Department of Transportation (MnDOT) has indicated that there are state and federal policies that prevent use of freeway easements for non road-related structures (see Request #11 for details). Recent policy interpretations also prevent structures required for long span perpendicular crossings from being placed in the road easement.

Along Freeway Using Private Right of Way

Possible routes using private easements included turning north at the line intersection with I-494 near 73rd Ave. Both east and west sides of I-494 were considered. The east side included routes on the north and south sides of I-694.

- The westerly route would follow the 345 kV line to the north side of I-94, then turn east following the north side of I-694 to some point where it could cross I-694 and proceed to the Cedar Island Substation.

  This route is not buildable due to technical constraints with getting across I-94. The road is very wide at this location. Based on MnDOT requirements, structures cannot be put in the median. This means the structures would need to be very tall to provide adequate midspan clearances over the road. Making the structures taller prevents getting the 115 kV line underneath the 345 kV line.

  In addition, this route would impact a residential area not already impacted by the existing line.

Estimated costs were not calculated because this route is unbuildable.

- The easterly route would cross I-494, then turn north and follow the east side of I-494 where it would proceed along the south side of I-694 to the Cedar Island Substation.

  This route is not buildable due to inadequate clearances between the road right of way and the town homes on 74th Ave.

  This route would impact a residential area not already impacted by the existing line.

  Estimated costs were not calculated because this route is not buildable.

- The easterly route would cross I-494, then turn north and follow the east side of I-494. At 74th Ave. the line would cross to the north side of I-694, then turn east crossing back to the south side of I-694.

  This route is buildable but with considerable technical issues. It is questionable if the size structures needed will fit in the very limited amount of space that exists between I-694 and roads for the Arbor Lakes Shopping area. Easements would be required of the present landowners.

  This route would impact a residential area not already impacted by the existing line.

  Three options were considered to get south across I-694 and to the Cedar Island Substation: 1) Follow the existing line, crossing the exit for CR 61. This was not possible due to the span length and MNDOT requirement; 2) Turn south just west of CR 61. There was insufficient space between buildings and the roadway; and 3) Turn south at the east end of 74th Ave. and reconnect to the existing 69 kV route. This route works on paper.

  Estimated costs are $1,250,000 vs. $100,000 to follow the existing 69 kV route.

Request No. 4

What are the cost and design details considered for the options of placing transmission lines underground in the vicinity of the Cedar Island Lake segment, along the 494 Plymouth Town home segment and any other line segment neighborhood that has requested underground installation during the course of the project?

The estimated cost to install an equivalent capacity transmission line underground is $1,250,000 for the approximately 3/8 mile of concern. The system would require six (6) cables with one (1) termination structure supporting six (6) terminations at each end. Each self-supporting termination structure would be approximately 150 feet tall and 10 feet in diameter at the base. Cables would run down the structure into a concrete duct and manhole system. Installing the duct system would require opening a trench about 10 feet deep and 15 to 20 feet wide for the entire length of the circuit. This trench would be open for about 6 to 8 weeks. Once the concrete is cured the trench would be filled with thermal backfill. Cables would be pulled into the ducts and spliced as needed. Pulling and splicing would require about 4 to 6 weeks. After cleanup, grass would be restored over the duct. Larger forms of vegetation would not be restored as it causes future reliability problems.

Operating concerns include life span, thermal heating, and cable losses. The operating life of underground cable is presently 30 years vs. the typical 50-60 years for overhead. Due to the design of underground cable, capacitive losses are much greater. For this installation, capacitive losses are calculated to be 5MVar of capacitive losses. These losses can become significant when considering cable losses of half a mile here, half a mile there.

Request No. 5

Please provide copies of all available map information, air photos and narrative text prepared by Houston Engineering and other firms as part of the route analyses.

Three separate engineering/environmental firms reviewed the project area between the Wright-Hennepin Plymouth Substation and the Xcel Energy Parkers Lake Substation where right of way will be required for a new segment of transmission line. The engineering firms were Burns & McDonnell, Houston Engineering, and HDR Engineering. Attached and identified are packets of routing information from the respective engineering firms.

Burns & McDonnell developed a route comparison matrix that keyed in on three major routes and multiple variations within each route. The analysis based the route rating on a number of routing criteria sets within three major groups – social, environmental and engineering. The three major routes reviewed were Fernbrook Lane, Northwest Boulevard (CR 61) and the I-494 corridor. Forty combinations were suggested as possible routes for the proposed new transmission line. Burns & McDonnell's analysis resulted in a preferred route that utilizes, nearly exclusively, the I-494 corridor. The analysis identifies the west side of I-494 for the northerly portion of the route and the east side of I-494 for the south portion of the proposed route.

Houston Engineering used the routing criteria developed by Burns & McDonnell but changed the criteria units to reflect a value more representative of the criteria impact. For example, line length was converted to an average unit value rather than simply using lineal footage (see the enclosed explanation and chart revised by Houston Engineering). Although the base unit numbers were changed, the resultant preferred route was similar to the route suggested by Burns & McDonnell.

HDR Engineering relied on a visual inspection to select a preferred route for the proposed transmission line. HDR's analysis resulted in a route that was similar to both the Burns & McDonnell and Houston Engineering preferred route. Note the map attached to the back of HDR's comment packet.

Request No. 6

Please provide a memorandum summarizing GRE staff meetings with staff and elected officials from the cities of Plymouth and Maple Grove regarding their land use and zoning concerns with the proposed project.

GRE staff met formally with Plymouth and Maple Grove Staff on two separate occasions. The meetings occurred during the 1st week of March 2002 and again during July of 2003. Formal presentations were given to staff members (Planning & Zoning, Public Works and the City Administrator).

The March meetings consisted of a general presentation centered on the need for the project. The Cities Staff seemed content with the explanation, although they were interested in GRE's routing criteria. The routes within the general corridor were reviewed briefly with staff. The state permitting process and schedule were also discussed briefly.

The meetings in July with City Staff were centered on the route for the proposed transmission line and potential issues with regard to the proposed route (see attached meeting report). A representative from GRE also met with the City Administrators of Plymouth and Maple Grove to personally deliver copies of the Certificate of Need and the Route Application.

GRE staff also met with the staff of the Three Rivers Park District on two separate occasions. Meeting notes for the July 18th meeting are attached for reference.

Request No. 7

Please provide a memorandum summarizing discussions with GRE and other engineering firms on general route alternatives deemed reasonable and technically feasible in the Plymouth-Maple Grove area.

GRE staff reviewed alternative routes between the Plymouth Substation and the northerly project termination point at the Elm Creek Substation. The engineering firms used to analyze possible routes for the proposed new segment of line between the Plymouth and Parkers Lake substations were not used in the route analysis between the Plymouth and Elm Creek substations. It was generally felt that the existing corridor provided the only reasonable route between Plymouth and Elm Creek, although other routes were reviewed by GRE staff as cited in the Route Application document.

Request No. 8

Please provide copies of relevant sections of the national electrical code and sections of national, state and local fire safety codes applicable to this proposed project.

Portions of the National Electric Safety Code are attached. These sections provide data on horizontal and vertical clearances to buildings, signs, trees, other lines, etc. Also included is data on required structure strength.

There are no national, state or local fire codes that require special clearances to transmission lines or modifications to buildings.

Request No. 9

Please provide a memorandum summarizing discussions with GRE and the gravel pit operator in Maple Grove on potential transmission line impacts and mitigation measures to be used.

Over the past several years Tiller Corporation, C.S. McCrossen, the City of Maple Grove and GRE have been working together to site a substation facility and relocate and upgrade the transmission system in the undeveloped "gravel pit" (Arbor Lakes) area in Maple Grove. GRE is presently working with the above referenced parties to relocate a segment of GRE's SL transmission line in the vicinity of Zachary Lane and 85th Avenue. This is a portion of the 69 kV transmission line that GRE proposes to upgrade to 115 kV as part of the Plymouth - Maple Grove project. GRE relocated a segment of this same transmission line to accommodate roadway construction in 1997. When undertaking this relocation, GRE acquired easements and rebuilt the transmission line to 115 kV standards in anticipation of eventual conversion of the transmission system from 69 kV to 115 kV.

Mitigation to date has centered on GRE's need to accommodate planned infrastructure as this segment of Maple Grove transitions from gravel pit to commercial and residential development. This accommodation may involve GRE's willingness to relocate facilities once infrastructure develops and land use plans are finalized.

Request No. 10

Please provide a memorandum summarizing any specific environmental concerns, such as wetland impacts, vegetation, or habitat preservation that may have been raised during project planning and route data collection.

Because most of the area within the proposed Plymouth-Maple Grove transmission line route has been converted to urban development, impacts to environmental resources would be minimal and limited to ground disturbances associated with placement of the transmission structures.

The proposed line will cross several DNR-protected waters and wetlands, including Elm Creek, 545W, 535W, Mud Lake (99W), an unnamed stream, 594W, Plymouth Creek, and 617W. GRE will apply to the DNR Division of Lands and Minerals for a license to cross these waters and wetlands, which will be spanned where possible. In cases where spanning is not possible, impacts will be short-term and limited to placement of poles. Construction in these areas will take place during the winter to minimize impacts to the natural environments.

Both the Minnesota Department of Natural Resources (DNR) and the US Fish and Wildlife Service (USFWS) reviewed the proposed route relative to potential impacts on wetlands, threatened and endangered species, and critical wildlife habitat. The USFWS concluded that the project would not likely adversely affect any federally listed or proposed threatened or endangered species or adversely modify their habitat. The DNR 's only comment on the project came during the Certificate of Need proceedings, in which they identified one significant natural feature, the Old Growth Maple-Basswood Forest located in Plymouth, south of Schmidt Lake Road in Section 15, T119N, R22W. This area is identified in the Minnesota County Biological Survey as a Significant Native Plant Community, and it is owned by the City of Plymouth.

GRE met with the Three Rivers Park District (TRPD) a couple times to discuss the project. GRE will need to obtain an easement from the District for crossing parkland near the Plymouth Substation. TRPD did not have a lot of concerns regarding GRE's proposed route, particularly since the line will be on the west side of I-494 for the first mile or so south of the Plymouth Substation.

GRE met with the City of Maple Grove on several occasions regarding the project. No environmental concerns were brought forth.

GRE also met with the City of Plymouth staff on several occasions regarding this project during both the Certificate of Need process and the routing process. At a meeting of 3/26/03, GRE provided a general overview of the project and the upcoming routing process, but the specific route through the City of Plymouth had not yet been identified.

At a meeting of 7/21/03, where the specific route through Plymouth proposed by GRE was discussed, City of Plymouth staff expressed concern regarding the location of the proposed line relative to the maple-basswood forest. This is a future park area in the City of Plymouth comprehensive plan. Inquiries were made regarding whether the line could be placed to the east of the trees towards the Xcel Energy 345 kV transmission line. GRE responded that there was not enough room to site the proposed GRE line without clearing some trees. Staff then asked if the line could be engineered with extra spans or taller structures so that less tree clearing would be necessary. GRE staff indicated that some tree clearing would probably be necessary, but GRE would work with City of Plymouth staff to design the line with the least impact to the maple-basswood forest owned by the City of Plymouth. The City of Plymouth has a tree preservation policy (50% preservation), and if GRE surpasses the threshold, restitution would

be required. City staff asked that GRE stake the proposed line in the fall when the leaves are off so staff can walk the woodland area and assess impacts. GRE agreed to this request.

The other issue raised by the City of Plymouth staff is a proposed ball field complex in the area just south of the Plymouth Substation. City staff indicated that they would not require GRE to go around the complex, but perhaps locate a structure between the fields as shown on preliminary plans. GRE assured City staff that our design engineers would work with the City of Plymouth staff to locate the structures in that area such that the ball fields could be constructed without interference from the transmission line.

There was also a brief discussion concerning fire safety issues when looking at routing the transmission line over or in close proximity to buildings.

See meeting notes in attachments for response to Request #6.

Request No. 11

Please provide a memorandum outlining GRE's discussion with the Minnesota Department of Transportation regarding issues of using and paralleling state and federal highway rights-of-way for High Voltage Transmission Lines (HVTL), including restrictions on crossing the highway above or below grade.

Discussions with MnDOT have occurred on numerous occasions regarding the use of freeway right of way for the longitudinal placement of a transmission line. MnDOT has referred to the American Association of State Highway and Transportation Officials "A Policy on the Accommodation of Utilities Within Freeway Right-Of-Way". This policy states "New utilities will not be permitted to be installed longitudinally within the control of access lines of any freeway, except that in special cases such installations may be permitted under strictly controlled conditions. Utilities will not be allowed to be installed longitudinally within the median area." "All longitudinal utility accommodations as may be warranted herein shall only be in accordance with an approved permit issued by the State highway agency."

MnDOT Procedures for Accommodation of Utilities on Highway Right Of Way issued under MnDOT Policy Guideline – Highway No. 90-1 states "Private lines are allowed only to cross trunk highway right of way. Longitudinal installations are not permitted."

Request No. 12

Please provide copies of any general information in GRE files addressing the issues of:

A. Property value impacts of new transmission lines on residential property
B. Property value impacts of new transmission lines on commercial property
C. Property value impacts of upgraded transmission lines on residential property
D. Property value impacts of upgraded transmission lines on commercial property

Enclosed find preliminary results for a power line impact study performed by Shenehon Company. As stated in the text of this study, the analysis was based upon residential sales data. It is generally felt that any impact a power line may have on commercial and industrial property would be less than similar impacts to residential property. This analysis should be complete by the end of 2003. Also included with this correspondence are the following studies: "The Effects of Overhead Transmission Lines on Property Values" by Edison Electric Institute Sting & Environmental Planning Task Force; "Transmission Line Impact Study on Single Family Residential Property Values" by Colliers Towle (A MN. Appraisal firm);

"Further Analysis of Transmission Line Impact on Residential Property Values" by Marvin Wolverton, PhD; "Transmission Line Impact on Residential Property Values" by Cowger, Bottemiller and Cahill.

GRE is in possession of older studies conducted by Jensen Management Service, Inc. in 1980 and the Shenehon Company in 1988. GRE also possesses "Transmission Line Impact Study Based on Paired Sale Comparisons of Residential Properties Located within Northwest and West Central Wisconsin" by Craig Solum and Associates and "Power Lines and Property Value" by Cheryl Mitteness, Masters Degree Student at St. Cloud State University. GRE does not have permission to release the Solum study; however, it is available for review at GRE. The Mitteness study is not a paired sales analysis, but rather a survey of buyers and sellers and appraisers of residential property.

Property value impacts of upgraded transmission lines on residential and commercial are not readily available at this juncture. It would be reasonable to assume, based on available studies, that if a new or existing transmission line has little effect on land values, an upgrade would have an even lesser effect.

E. Health effects of Electromagnetic Forces (EMF) from HVTLs

Since 1979, magnetic fields have been studied as a possible human carcinogen. The early studies questioned specifically if there was a connection between childhood leukemia and magnetic fields. Over the years hundreds of epidemiological and clinical studies have been completed, looking for possible connections to a variety of medical problems. Some of the epidemiological studies, which form a conclusion based on statistical review of medical records, developed an opinion that there may be an increased probability of a variety of childhood and adult cancers. As these epidemiological studies have been refined, the opinion has shifted toward non- conclusive or no correlation. The few studies (9) on EMF and cancers in adults suggest that no conclusion can be drawn. Of the clinical studies (laboratory studies exposing test subjects to high magnetic fields), none support the opinion that magnetic fields are carcinogenic.

Data on EMF can be found at a variety of web sites including the following:

www.niehs.nih.gov/emfrapid (US EMF Research and Public Information Dissemination program)

www.who.int/peh-emf (World Health Organization International EMF Project)

www.iarc.fr (World Health Organization International Agency for Research on Cancer)

http://monographs.iarc.fr (World Health Organization International Agency for Research on Cancer)

www.dhs.ca.gov/ps/deodc/ehib/emf (California Department of Health Services)

www.health.state.mn.us/divs/eh/radiation/emf (MN Department of Health)

F. Radio, television and cell phone interference from HVTLs

HVTLs are designed so no interference occurs. In areas where radio, television, or cell phone signals are weak, the presence of a structure (transmission structure, tree, building, etc.) may cause interference. Interference caused by electrical noise is very uncommon and is typically the result of loose hardware. This can be easily corrected. It is very common for cell phone providers to install their antennas on transmission structures.

G. Economic and operational problems associated with underground placement of HVTLs

The initial installation of an equivalent capacity underground line is estimated to be $3,055,310 per mile vs. the $300,000 per mile for 115 kV overhead.

The operational lifespan of underground cable is presently 30 years vs. 60 years for overhead.

Losses for this underground line are calculated to be 5MVar per mile vs. 0.01MVar per mile for overhead. The losses from a few miles of underground transmission quickly add up and become significant.

H. EMF health effect standards used with HVTLs in other developed nations

The International Commission on Non-Ionizing Radiation Protection, ICNIRP, has produced a guideline for exposure of the general public with recommended limits of 833 milligauss (mG).

The State of Florida requires the magnetic field at the edge of the right of way be less than 150 mG for a 69-230 kV line.

The State of New York requires the magnetic field at the edge of right of way to be less than 200 mG.

Additional Request by Phone

Please indicate the sufficiency of the existing easements along the 69 kV transmission line corridor between the Plymouth and Elm Creek substations.

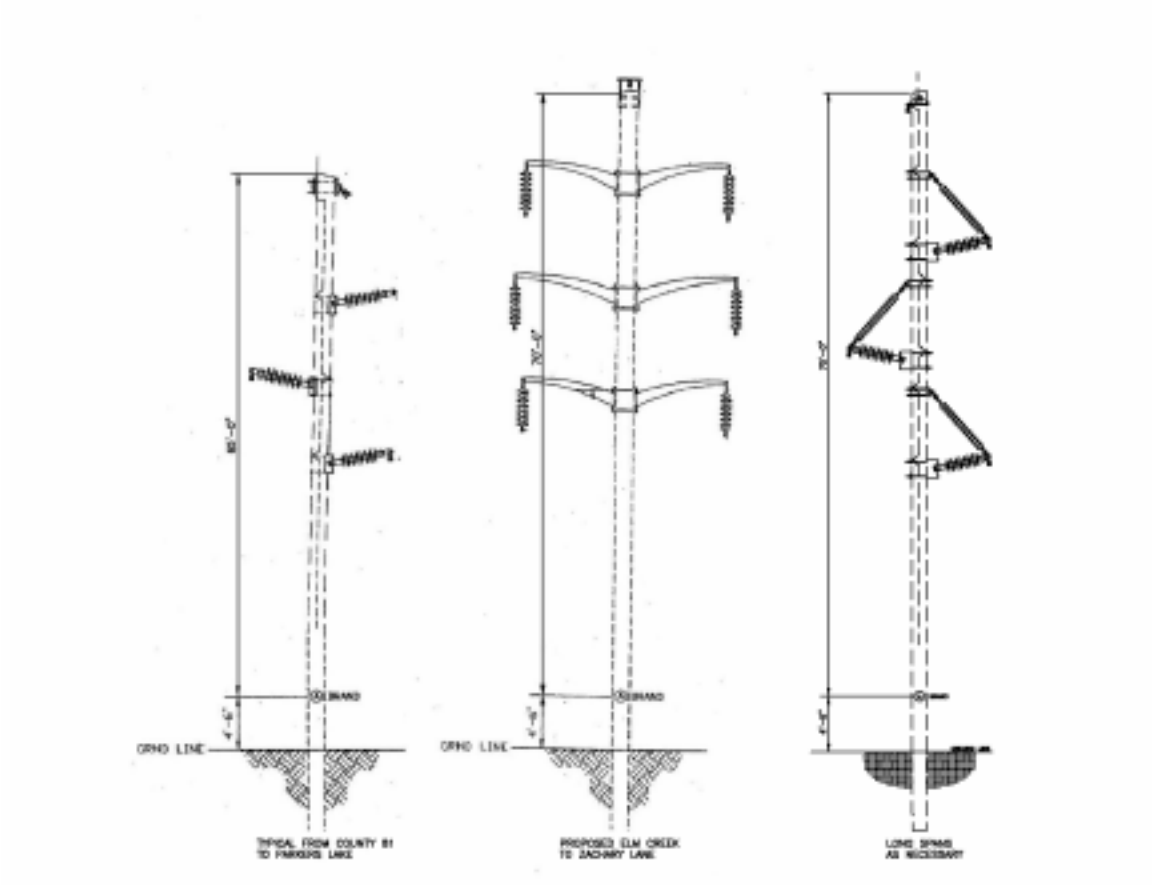
Legal council is presently reviewing the existing easements to determine if they are legally sufficient to use for the proposed transmission line conversion between Plymouth and Elm Creek. Preliminary review of easements by GRE staff indicates that the existing easements are legally sufficient. The complete analysis and legal opinion should be forthcoming by the end of 2003. Once available, they will be forwarded to the appropriate MEQB office.

FIGURES

ALL FIGURES FOUND IN PDF VERSION

FIGURES

Figure 7-2 Schematic Diagrams of Typical Structures



FULL COLOR ROUTE MAPS FOUND IN PDF VERSION

ROUTE MAPS (Houston Engineering)

Notice, the color on these maps shows up very well on the website

http://www.eqb.state.mn.us/Docket.html?Id=3892

Hennepin to Elm Creek	11
Hennepin to Elm Creek	10
Hennepin to Elm Creek	9
Hennepin to Elm Creek	8
Hennepin to Elm Creek	7
Hennepin to Elm Creek	6
Hennepin to Elm Creek	5
Hennepin to Elm Creek	4
Hennepin to Elm Creek	3
Hennepin to Elm Creek	2
Hennepin to Elm Creek	1

Arbor Lake to Hennepin	8
Arbor Lake to Hennepin	7
Arbor Lake to Hennepin	6
Arbor Lake to Hennepin	5
Arbor Lake to Hennepin	4
Arbor Lake to Hennepin	3
Arbor Lake to Hennepin	2
Arbor Lake to Hennepin	1

Cedar Island to Arbor Lake	3
Cedar Island to Arbor Lake	2
Cedar Island to Arbor Lake	1

Bass Lake to Cedar Island	10
Bass Lake to Cedar Island	9
Bass Lake to Cedar Island	8
Bass Lake to Cedar Island	7
Bass Lake to Cedar Island	6
Bass Lake to Cedar Island	5
Bass Lake to Cedar Island	4
Bass Lake to Cedar Island	3
Bass Lake to Cedar Island	2
Bass Lake to Cedar Island	1

Plymouth to Bass Lake	10
Plymouth to Bass Lake	9
Plymouth to Bass Lake	8
Plymouth to Bass Lake	7
Plymouth to Bass Lake	6
Plymouth to Bass Lake	5
Plymouth to Bass Lake	4
Plymouth to Bass Lake	3
Plymouth to Bass Lake	2
Plymouth to Bass Lake	1

Plymouth to Parkers Lake	1
Plymouth to Parkers Lake	2
Plymouth to Parkers Lake	3
Plymouth to Parkers Lake	3A (a is for Alternate route considered)
Plymouth to Parkers Lake	4
Plymouth to Parkers Lake	4A
Plymouth to Parkers Lake	5
Plymouth to Parkers Lake	5A
Plymouth to Parkers Lake	6
Plymouth to Parkers Lake	6A
Plymouth to Parkers Lake	7
Plymouth to Parkers Lake	7A
Plymouth to Parkers Lake	8
Plymouth to Parkers Lake	8A
Plymouth to Parkers Lake	9
Plymouth to Parkers Lake	9A
Plymouth to Parkers Lake	10
Plymouth to Parkers Lake	10A
Plymouth to Parkers Lake	11
Plymouth to Parkers Lake	11A
Plymouth to Parkers Lake	12
Plymouth to Parkers Lake	12A
Plymouth to Parkers Lake	13
Plymouth to Parkers Lake	13A
Plymouth to Parkers Lake	14
Plymouth to Parkers Lake	14A