Appendix A

Public Engagement Process

Appendix A – Public Engagement Program

1. Purpose of the Public Engagement Program

The purpose of the Public Engagement Program (PEP) was to support the initial stages of stakeholder and public consultation for an Environmental Assessment license application to Manitoba Conservation and Water Stewardship for the 500 kV AC transmission line.

Information collected as a result of the PEP informed two principal aspects of the project:

- Site Selection, particularly criteria for site selection and identification of preliminary transmission line routes and border crossing areas.
- Environmental Assessment, particularly socio-economic considerations.

Information collected through the Public Engagement Program included biophysical, socio-economic, and heritage data, and other.

2. Goal and Objectives of PEP

The goal of the PEP was to facilitate the exchange of information between members of the public (including First Nations and Métis people), and the site selection and environmental assessment teams regarding the installation of a proposed new transmission line.

The objective of the PEP was to provide stakeholders and the general public with meaningful opportunities to receive information about, and provide input into the site selection and environmental assessment process. The PEP included:

- Conducting Key Person Interviews to support the Environmental Assessment (particularly socio-economic considerations).
- Consulting with stakeholders and the general public, including First Nations and the MMF, in the initial stages of the environmental assessment process.
- Providing input into Route Selection (route selection criteria, evaluation of alternative routes) and Environmental Assessment (Valued Components, socio-economic considerations, potential effects, mitigation measures) using information gathered from the PEP.

2.1 PEP Components

The PEP was developed in cooperation with Manitoba Hydro and the other project consultants. A Program outline is included in Appendix A.

2.1.1 Principal Components of the PEP

Data sources related to socio-economic, natural and built environment issues and concerns, physical constraints and potential mitigation strategies included:

- Key Person Interviews (KPI), done in conjunction with the St. Vital Transmission Complex project.
- Stakeholder Workshops (Workshops).
- Stakeholder Meetings (Meetings).
- Public Open House events (POH).
- Email and telephone communications (Communications) with landowners and other interested parties.

- Media outreach and information venues, e.g. mail outs and project website.

2.2 Communications Strategy/Protocol

AECOM established a communications strategy/protocol with Manitoba Hydro staff and other project consultants, which allowed us to work in partnership with the overall project team. Key staff contacts in the AECOM office were:

- Project Manager: Myron Paryniuk, M Sc., P. Eng./Don Hester, ML Arch., FCSLA, MCIP
- Project Coordinator: Alison Weiss, P. Eng. /Stephen Biswanger, P. Eng.

Key contacts at Manitoba Hydro were:

- Project Managers: Maggie Tisdale, M.R.M and Patrick McGarry
- Public Engagement Lead: Trevor Joyal, BES, E. Pt
- Aboriginal Engagement Lead: Lindsay Thompson
- Project Co-ordinator: David Block

3. Relation to Route Selection Process

Manitoba Hydro's route selection process identified a number of Alternative Routes between Winnipeg and three Border Crossing Areas along the Manitoba-Minnesota boundary. Stakeholder and public input to the route selection process included the following:

- KPI interviews obtained comments about specific features and considerations that would affect transmission line routing.
- Public Open Houses included Map Stations, which permitted members of the public, particularly local landowners and leasers, to indicate specific issues and concerns, and constraints associated with alternative route segments.
- Stakeholder Workshops allowed a limited number of stakeholders to identify and evaluate criteria for route selection, and see how they applied to the route selection process.
- Stakeholder Meetings provided opportunities for various stakeholders, typically municipalities, for question and answer and information sessions with Manitoba Hydro staff.
- A number of people emailed, telephoned or wrote to Manitoba Hydro and their consultants to provide a range of comments, some specific to alternative routes.

Appendix B

B1 – KPI Scripts

B2 – Map from Dairy Farmers of Manitoba

B3 – KPI Responses by Sector

B4 – RCMP Letter

AECOM

Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Agricultural KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization? (Do you wish to remain anonymous?)	What interests do you represent?	Approximate-ly how many people are directly employed by agriculture/ your industry in your local area? (round number or estimated percentage of population)	How would you describe the current economic state of agriculture/ your industry in the local area?	How do you see agriculture/ your industry changing in the future (locally)?	What are some of the most significant economic events that have taken place in agriculture/ your industry in the recent past?	Are there any government subsidies or incentives for your industry?
Name:			State of growth			
			State of decline			
			No perceptible change			
				How will this affect the overall economy?	How has this affected the overall economy?	
Location:						
					How has this affected the labour force in Manitoba?	

Agricultural KPI Questions

8	9	10	11	12	13	14
Has the labour force changed over time in agriculture/ your industry?	Are there more or less jobs available now compared to the past?	Have types of agricultural/ related industry employment changed recently?	Does agriculture/ your industry regularly seek employees from outside the province, or the local area?	Is the agricultural sector/ your industry affected by power system reliability?	Is agriculture/ your industry in need of more electric power?	In your opinion, where should Transmission Line routes be located relative to existing property lines?
YES	MORE	YES	YES	YES	YES	Section and Quarter-section boundaries
NO	LESS	NO	NO	NO	NO	Other
How?	Please explain	How?		How?	Please explain	

Agricultural KPI Questions

15	16	17	18	19	20	21
In your opinion, If Transmission Lines are constructed in an agricultural area which land uses should be avoided or favoured?	In your opinion, what land uses are best suited to Hydro Transmission Lines?	In your opinion, do Hydro Transmission Lines have any effects on agricultural practices?	In your opinion, will property values be affected due to the implementation of this transmission line?	In your opinion, will the transmission towers and lines affect aerial spraying operations?	In your opinion, will the transmission towers and lines affect pivot irrigation systems?	In your opinion, will the transmission towers and lines affect GPS or other navigation tools?
	Grain/Oilseed Farming	YES	YES	YES	YES	YES
Avoided:	Market Gardening	NO	NO	NO	NO	NO
	Berry Farms	How?	How?	How?	How?	How?
	Horticulture/Tree Nurseries					
Why?	Pasture/ Grazing					
	Intensive Animal Operations (Hog, Cattle, Poultry)					
	Woodlots					
Favoured?	Wetlands and Marsh Areas			Could placement minimize effects?	Could placement minimize effects?	
	Parks and Recreation Areas					
Why?	Transportation Corridors					
	Other					

Agricultural KPI Questions

22	23	24	25	26	27	28
In your opinion, will the transmission towers and lines affect your industry's ability to conduct organic farming on or near the proposed ROW?	Do you have any concerns from construction or operation and maintenance activities associated with a Transmission Line right-of-way on agricultural/ your industry's operating activities?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?		
YES	YES		YES	YES		
NO	NO		NO	NO		
			Would you be interested in attending a related Workshop in mid August (half day in length)?			
How?	What are they?		YES			
			NO			
	Could they be mitigated?					

Agricultural KPI Questions

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Business and Industry KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization? (Do you wish to remain anonymous?)	What is the scale and geographic extent of your company within Manitoba? Canada? Internationally?	How many people are directly employed by your organization?	How would you describe your industry's economic state?	Do you see your industry changing in the future?	What are some of the most significant economic events that have taken place in your industry in the recent past?	Are there any government subsidies or incentives for your industry?
Name:	Manitoba?		State of growth	YES		YES
			State of decline	NO		NO
Location:			No perceptible change	How?	How has this affected the overall economy?	What are they?
	Canada?					
	Internationally?				How has this affected the labour force in Manitoba?	

Business and Industry KPI Questions

8	9	10	11	12	13	14
How has the labour force changed in your industry?	Are there more or less jobs available now compared to the past?	Generally, how have various types of employment changed over time in the local area?	Does your business or industry regularly seek employees from outside the province, or the local area?	What are your company's (or industry's) power requirements?	Is your business or industry currently affected by the electric power system's reliability?	Is your industry in need of more electric power?
	MORE		YES		YES	YES
	LESS		NO		NO	NO
	Why?		Outside Province		How?	Why?
			Outside Local Area	What energy sources are used?		
				Manitoba Hydro electric power?		Other power?
			Why?	Other?		

Business and Industry KPI Questions

15	16	17	18	19	20	21
Are there any development initiatives (by others) – recently approved or in the approval process - that may affect your business or industry?	Is your business or industry planning any new developments that Manitoba Hydro should be aware of in planning for a new Transmission Line?	Would there be any effects on your business, or operating activities, related to construction, or operation and maintenance activities associated with a new Transmission Line right-of-way?	In your opinion, will your property values be affected due to the construction of this Transmission Line?	Where should Transmission Line routes be located relative to existing property lines?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?
YES	YES	YES	YES	Section and Quarter-section boundaries?	YES	YES
NO	NO	NO	NO	Other?	NO	NO
Type?		What would they be?	Why?			Would you be interested in attending a related Workshop in mid August (half day in length)?
						YES
						NO
Where located?						

Business and Industry KPI Questions

22						
If we have any additional questions, is it possible to contact you again?						
YES						
NO						

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Education KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization	What facilities are operated by your organization?	How many people are employed by your organization (provide breakdown by type if possible)?	What types of programs are offered at facilities operated by your organization?	What communities/ areas are serviced by your facilities?	Are rates of enrolment on the rise, steady state, in decline?	What are the demographics of your student bodies?
Name:					RISING	
					STEADY	
		Is the employment long term/short term/ contract			DECLINING	
Location:						

Education KPI Questions

8	9	10	11	12	13	14
What are typical employment rates after graduation?	Do you have any programs linked with Manitoba Hydro (such as cooperative education)?	Would a new Transmission Line impact the operations of your organization?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?	
		YES		YES	YES	
		NO		NO	NO	
		How?		Would you be interested in attending a related Workshop in mid August (half day in length)?		
				YES		
		Facilities?		NO		
		Transportation?				

Education KPI Questions

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Environmental KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization (Do you wish to remain anonymous?)	What interests do you represent?	How many people are directly employed by your organization?	What environmental features are important to your organization (e.g. water quality, wetlands)?	What type of initiatives does your organization undertake related to these features?	Have past development projects affected environmental features important to your organization?	How was your organization involved in past projects?
Name?					YES	
					NO	
					How?	
		How many people volunteer at your organization?				
Location?						

Environmental KPI Questions

8	9	10	11	12	13	14
How were impacts mitigated, if any?	In your opinion, will a new Transmission Line affect environmental features important to your organization?	What land uses are best suited to be in proximity to Hydro Transmission Line routes?	In your opinion, will there be impacts related to transmission line construction on local watersheds and aquifers?	Are there any vegetation types in the Study Area that are especially important (such as orchids, remnant tree stands, native prairie)?	Are there any areas with important wildlife habitat (spawning, calving, breeding and nesting areas) in the Study Area?	Are there any areas with large concentration or gatherings of wildlife in the Study Area? (e. g. A flush of migrating raptors through the area or large numbers of waterfowl feeding on grain fields?)
	YES			YES	YES	YES
	NO	Grain/Oilseed Farming		NO	NO	NO
	How?	Market Gardening		What type?	What type?	Where located?
		Berry Farms				
		Horticulture/Tree Nurseries				
		Pasture/ Grazing				
		Intensive Animal Operations (Hog, Cattle, Poultry)				
		Woodlots		Where located?	Where located?	
		Wetlands and Marsh Areas				
		Parks and Recreation Areas				
		Transportation Corridors				

Environmental KPI Questions

15	16	17	18	19	20	21
Are there any important rivers, streams or wetlands in the Study Area that provide wildlife habitat or fishing opportunities?	Where should Transmission Line routes be located relative to existing property lines?	What are current stressors on important environmental features?	Are there any important recreation areas or areas of ecotourism in the Study Area?	Do you have concerns related to important recreation areas or areas of ecotourism and a new Transmission Line?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?
YES	Section and Quarter-section boundaries?		YES	YES		YES
NO	Other?		NO	NO		NO
Where located?		Are they increasing, decreasing or remaining relatively constant?	Where located?	What?		Would you be interested in attending a related Workshop in mid August (half day in length)?
						YES
		What can be done to reduce these stressors?				NO

Environmental KPI Questions

22						
If we have any additional questions, is it possible to contact you again?						
YES						
NO						

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Health KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization (Health Authority, hospital etc.)	What facilities are operated by your organization?	How many people are employed by your organization (provide breakdown by type if possible)?	What types of services are offered at the facilities operated by your organization?	What communities/ areas are serviced by your facilities?	How would you rate emergency response time in the communities/ areas serviced?	Would you expect emergency services be impacted by the Transmission Line project?
Name:					GOOD	YES
					FAIR	NO
Location:					POOR	
					UNSURE	How?
					Issues?	
					What changes have you noticed over time?	

Health KPI Questions

8	9	10	11	12	13	14
What services are unavailable at your facilities that patients need to travel elsewhere to obtain?	What are the predominant health concerns in the area?	Do you have any power reliability concerns?	Have you heard of any health impacts from Transmission Lines?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?
			YES		YES	YES
			NO		NO	NO
					Would you be interested in attending a related Workshop in mid August (half day in length)?	
			What?		YES	
					NO	

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
July 16, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Government Infrastructure KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization (Do you wish to remain anonymous?)	How many people are directly employed by your organization?	Do you see your organization changing in the future?	What are some of the most significant economic events that have taken place in your organization in the recent past?	How has the labour force changed in your organization?	Are there more or less jobs available now compared to the past?	Does your organization regularly seek employees from outside the province?
Name:		YES			MORE	YES
		NO			LESS	NO
		How?	How has this affected the overall economy?		Why?	
Location:						
			How has this affected the labour force in Manitoba?			Why?

Government Infrastructure KPI Questions

8	9	10	11	12	13	14
How would a new Transmission Line affect existing transport-ation and utility corridors?	In your opinion, If Transmission Lines are constructed in an agricultural area which land uses should be avoided or favoured?	What land uses are best suited to be in proximity to Hydro Transmission Line routes?	Do Hydro Transmission Lines have any effects on agricultural practices?	In your opinion, will your property values be affected due to the construction of this Transmission Line?	Where should Transmission Line routes be located relative to existing property lines?	Are there concerns locally about the impact of construction on local watersheds and aquifers?
Significantly			YES	YES	Section and Quarter-section boundaries?	YES
Not much	Avoided:	Grain/Oilseed Farming	NO	NO	Other?	NO
Not at all		Market Gardening	How?	Why?		Why?
Why?		Berry Farms				
	Why?	Horticulture/Tree Nurseries				
		Pasture/ Grazing				
		Intensive Animal Operations (Hog, Cattle, Poultry)	Could effects be minimized or mitigated?			
	Favoured?	Woodlots				
		Wetlands and Marsh Areas				
	Why?	Parks and Recreation Areas	How?			
		Transport-ation Corridors				

Government Infrastructure KPI Questions

15	16	17	18	19	20	21
Has the community experienced any infra-structure issues from past industrial construction projects, such as roads, sewer and water lines?	What are community perceptions related to the aesthetics of existing utility infrastructure, such as telephone pole lines, transmission lines and wind farms?	Has the community expressed any concerns about construction noise or dust issues for approved projects or projects in the process of being approved?	Are new projects (lagoons, landfills, other) planned in the next few years that could potentially be impacted by the Transmission Line?	Are there any development initiatives (by others) – recently approved or in the approval process - that may affect your organization?	Is your organization planning any new developments that Manitoba Hydro should be aware of in planning for a new Transmission Line?	Would there be any effects on your business, or operating activities, related to construction, or operation and maintenance activities associated with a new Transmission Line right-of-way?
YES	Major Concerns	YES	YES	YES	YES	YES
NO	Some Concerns	NO	NO	NO	NO	NO
Projects?	Minimal Concerns	UNSURE	Where?	Type?		What would they be?
	Unconcerned					
	Prefer buried lines	Noise	Types of Development?			
Where are they located?		Dust		Where located?		
		Other				
			Impacts?			

Government Infrastructure KPI Questions

22	23	24	25	26	27	28
What safety measures should be put in place related to right-of-way access?	Would you expect emergency services to be impacted by the Transmission Line project?	Is your organization currently affected by the electric power system's reliability?	Has your organization undertaken any sustainable development initiatives?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?
	YES	YES	YES	YES	YES	YES
	NO	NO	NO	NO	NO	NO
		How?	Where?		Would you be interested in attending a related Workshop in mid August (half day in length)?	
	How?				YES	
					NO	
			Initiative?			
			PowerSmart?			

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Municipal KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Municipality (Do you wish to remain anonymous?)	What are the (approximate) current municipal population, and the populations in your major Urban and Rural Centres?	What are the major types of employment in your Municipality?	What are the principal industries, and other employers in your Municipality?	How would a new Transmission Line affect business in your Municipality?	What positive or negative effects do you think a new Transmission Line would have on the Municipality, if any?	What highways and rail lines run through your Municipality?
Name:	Overall Municipal Population?	Agricultural		POSITIVE	POSITIVE	Major Highways:
				NEGATIVE	NEGATIVE	
	Urban Centres?			DON'T KNOW	DON'T KNOW	
				EXPLAIN?	EXPLAIN?	
Location:		Industrial	Approximately how many people are employed by the principal employers in your Municipality?			
	Rural Centres?					Rail Lines?
		Other	What industry or other employer has the largest labour force?			Are there any major drainage ditches associated with this infrastructure?

Municipal KPI Questions

8	9	10	11	12	13	14
How would a new Transmission Line affect existing transport-ation and utility corridors?	In your opinion, If Transmission Lines are constructed in an agricultural area which land uses should be avoided or favoured?	What land uses are best suited to be in proximity to Hydro Transmission Line routes?	Do Hydro Transmission Lines have any effects on agricultural practices?	Where should Transmission Line routes be located relative to existing property lines?	What are community perceptions related to the aesthetics of existing utility infrastructure, such as telephone pole lines, transmission lines and wind farms?	Has the community expressed any concerns about construction noise or dust issues for approved projects or projects in the process of being approved?
Significantly			YES	Section and Quarter-section boundaries	Major Concerns	YES
Not much	Avoided:	Grain/Oilseed Farming	NO	Other	Some Concerns	NO
Not at all		Market Gardening	How?		Minimal Concerns	UNSURE
Why?		Berry Farms			Unconcerned	
	Why?	Horticulture/Tree Nurseries			Prefer buried lines	Noise
		Pasture/ Grazing				Dust
		Intensive Animal Operations (Hog, Cattle, Poultry)	Could effects be minimized or mitigated?			Other
	Favoured?	Woodlots				
		Wetlands and Marsh Areas				
	Why?	Parks and Recreation Areas	How?			
		Transport-ation Corridors				

Municipal KPI Questions

15	16	17	18	19	20	21
Has the community experienced any infra-structure issues from past industrial construction projects, such as roads, sewer and water lines?	Are there concerns locally about the impact of construction on local watersheds and aquifers?	Are there parks or recreation areas in your Municipality, or areas used for extensive outdoor activities (snow-mobiling, skiing, hiking, or camping)?	Do you think that any phases of the Transmission Line project (construction, operation, monitoring or maintenance) will affect recreational activities in your Municipality?	Are new residential, commercial or industrial developments planned in your Municipality that would be impacted by the proposed Transmission Line corridor?	Are new municipal projects (lagoons, landfills, other) planned in the next few years that could potentially be impacted by the Transmission Line?	Has your municipality undertaken any sustainable development initiatives?
YES	YES	YES	YES	YES	YES	YES
NO	NO	NO	NO	NO	NO	NO
Projects?	Why?	Activities?	HOW?	Where?	Where?	Where?
				Types of Development?	Types of Development?	Initiative?
Where are they located?		Locations?				
				Impacts?	Impacts?	PowerSmart?

Municipal KPI Questions

22	23	24	25	26	25	26
Would you anticipate community members accessing the Transmission Line right-of-way?	Are there any vegetation types in your Municipality that are especially important (such as orchids, remnant tree stands, native prairie)?	Are there any areas with important wildlife habitat (spawning, calving, breeding and nesting areas)?	Have you noticed any areas with large concentration or gatherings of wildlife in your area? (e.g. A flush of migrating raptors through the area or large numbers of waterfowl feeding on grain fields)	Are there any rivers, streams or wetlands in your area that provide important wildlife habitat or fishing opportunities?	Are there any flood-related issues in your Municipality that would impact transmission line development?	Are there other hazards to be addressed in your Municipality, such as frequent wildfires?
YES	YES	YES	YES	YES	YES	YES
NO	NO	NO	NO	NO	NO	NO
Why?	What type?	What type?	Where located?	Where located?	How extensive are they?	What are they?
Snow-mobiling?						
Hiking/skiing?						
Berry picking?						
Other?	Where located?	Where located?				

Municipal KPI Questions

27	28	29	30	31	32	33
What safety measures should be put in place related to right-of-way access?	How would you describe the overall health and well-being of people in your Municipality?	Would you expect emergency services to be impacted by the Transmission Line project?	Are there any airports, including float plane landing areas in your Municipality?	Do you have any comments or further information that you would like to add?	Can a copy of the municipal development plan be provided?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line Corridor?
	GOOD	YES	YES	YES		YES
	FAIR	NO	NO	NO		NO
	POOR					Would you be interested in attending a related Workshop in mid August (half day in length)?
	UNSURE	How?				YES
						NO
	Issues?		Where located?			
	What changes have you noticed over time?					

Municipal KPI Questions

34						
If we have any additional questions, is it possible to contact you again?						
YES						
NO						

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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Manitoba Hydro
St. Vital Transmission Complex
ITEM 2: Public Engagement Program Consulting Services
June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Policing KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Organization	How many people are employed at your detachment (provide breakdown by type if possible)?	When was your detachment established?	What facilities are available at your detachment?	What communities/ areas are served by your detachment?	How would you rate emergency response time in the communities/ areas serviced?	What are the most common calls received?
Name:					GOOD	
					FAIR	
	Short Term/Long Term/Contract?	Have there been any upgrades?			POOR	
Location:					UNSURE	
		Are there any plans for future upgrades?			Issues?	Is 911 available in the area?
	Where are most employees coming from?					YES
					What changes have you noticed over time?	NO
		Is there a need for upgrades?				

Policing KPI Questions

8	9	10	11	12	13	14
Have you seen changes in the types of crimes being committed recently?	Is the detachment involved in any programs or activities in the communities?	Would you expect emergency services to be impacted by the Transmission Line project?	Do you have any comments or further information that you would like to add?	Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?	
		YES		YES	YES	
		NO		NO	NO	
		How?		Would you be interested in attending a related Workshop in mid August (half day in length)?		
				YES		
				NO		

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

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June 25, 2013 QUESTIONS FOR STAKEHOLDERS – KEY PERSON INTERVIEWS

Trappers KPI Questions

In the context of southeastern Manitoba, east of the Red River (except for the RM of Morris and RM of Montcalm in southern Manitoba) and south of the Trans Canada Highway:

1	2	3	4	5	6	7
Name: Do you wish to remain anonymous?	We would like to ask some general questions about trapping in the area. Has the price of fur changed significantly in recent years?	Have trapper demographics changed in recent years?	Has the purpose of trapping changed in recent years?	Have trapping methods changed?	Have animal resources in the local area changed in recent years? (Population fluctuations, size, etc.)	We would also like to know some specific things about the local industry. How has recent development in the local area affected trapping activities?
	YES	YES	YES	YES	YES	
Location:	NO	NO	NO	NO	NO	
	How?	How?	How?	How?	How?	
How many years have you been trapping?						
	How do you anticipate the price of fur will change in the future?					
Where is your trapline located?						
	What factors affect the price of fur?					
	What species are your primarily focused?					
	Has this changed over time?					

Trappers KPI Questions

8	9	10	11	12	13	14
What are the current stressors on species you trap?	What seasons are most important to trappers?	How do you access your trap line?	Can you identify any important areas for trapping that Manitoba Hydro should be aware of (tree stands, outpost cottages, baiting locations)?	Do you think that any phases of the Transmission Line project (construction, operation, monitoring or maintenance) will affect trapping activities?	What positive or negative effects would a new Transmission Line have on trappers, if any?	Would you anticipate that trappers might use the Transmission Line right-of-way for access to their traplines?
			YES	YES	POSITIVE	YES
			NO	NO		NO
Are they increasing, decreasing or remaining relatively constant?			Located where?		NEGATIVE	
				How?		Why?
What can be done to reduce these stressors?					DON'T KNOW	
					EXPLAIN?	What safety measures should be put in place related to transmission line right-of-way access?

Trappers KPI Questions

15	16	17	18	19	20	21
What land uses are best suited to be in proximity to Hydro Transmission Line routes?	Are there any particular vegetation types that should be protected (such as orchids, remnant tree stands, native prairie)?	Are there any areas with important wildlife habitat that should be protected (spawning, calving, breeding and nesting areas)?	Do you know of any areas with large concentrations or gatherings of wildlife? (e.g. A flush of migrating raptors through the area, or large numbers of waterfowl feeding on grain fields)	Are there any rivers, streams or wetlands that provide important wildlife habitat or fishing opportunities?	Do you know of any specific trappers we should be talking to related to this project?	Do you have any comments or further information that you would like to add?
Grain, Oilseed Farming	YES	YES	YES	YES	YES	YES
Market Gardening	NO	NO	NO	NO	NO	NO
Berry Farms	What type?	What type?	Where located?	Where located?		
Horticulture/ Tree Nurseries					Who?	
Pasture/ Grazing						
Intensive Animal Operations (Hog, Cattle, Poultry)					Where located?	
Woodlots						
Wetlands and Marsh Areas	Where located?	Where located?				
Parks and Recreation Areas						
Transport Corridors						

Trappers KPI Questions

22	23					
Would you be interested in learning more about how Manitoba Hydro is planning the new Transmission Line routes?	If we have any additional questions, is it possible to contact you again?					
YES	YES					
NO	NO					
Would you be interested in attending a related Workshop in mid August (half day in length)?						
YES						
NO						

Do you give your consent to Manitoba Hydro to use the information provided in this interview for future project planning including the Manitoba Minnesota Transmission Project?

Appendix B

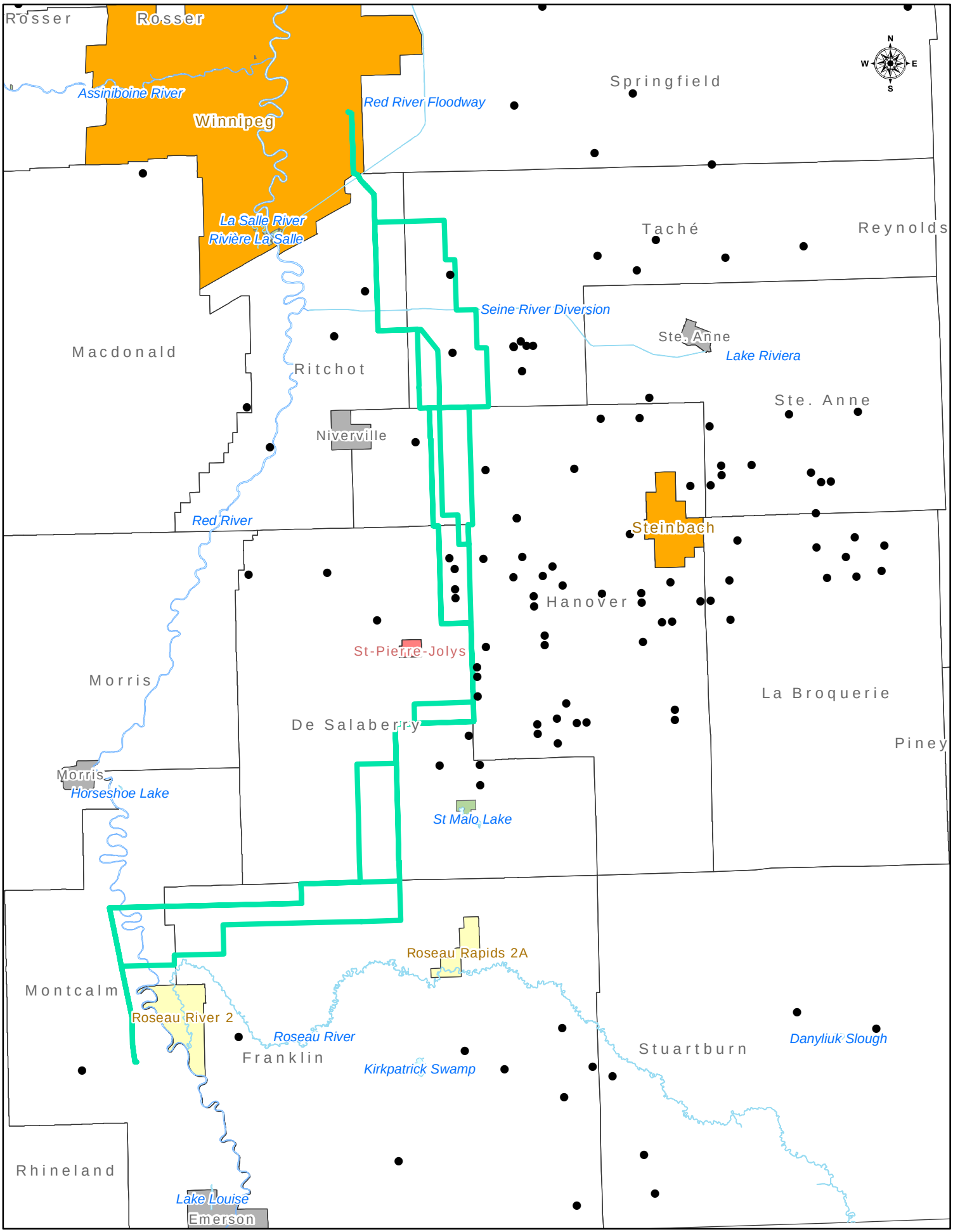
B1 – KPI Scripts

B2 – Map from Dairy Farmers of Manitoba

B3 – KPI Responses by Sector

B4 – RCMP Letter

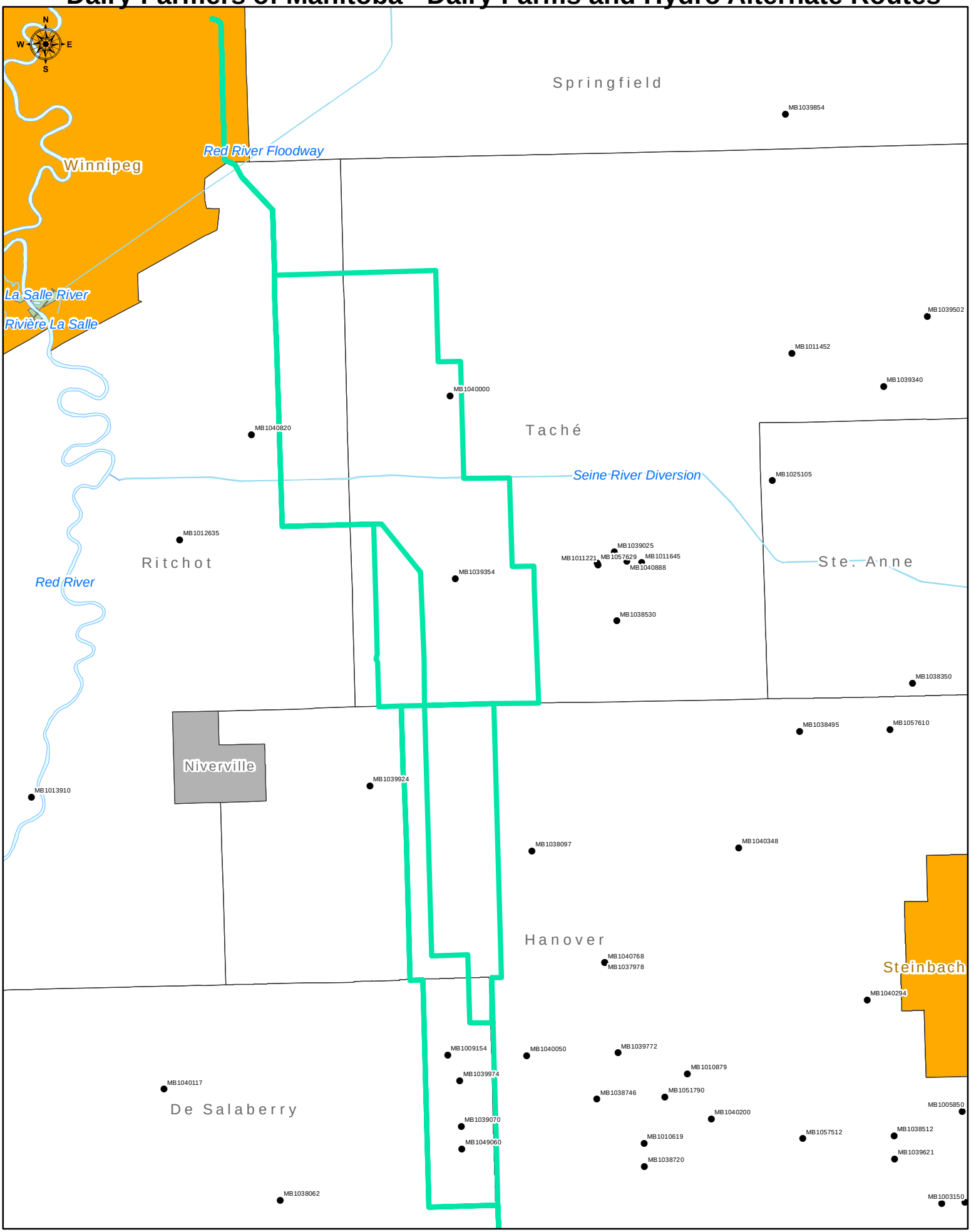
Dairy Farmers of Manitoba - Dairy Farms and Hydro Alternate Routes



1 centimeter = 4,000 meters

August 13, 2013

Dairy Farmers of Manitoba - Dairy Farms and Hydro Alternate Routes



1 centimeter = 1,700 meters

August 13, 2013

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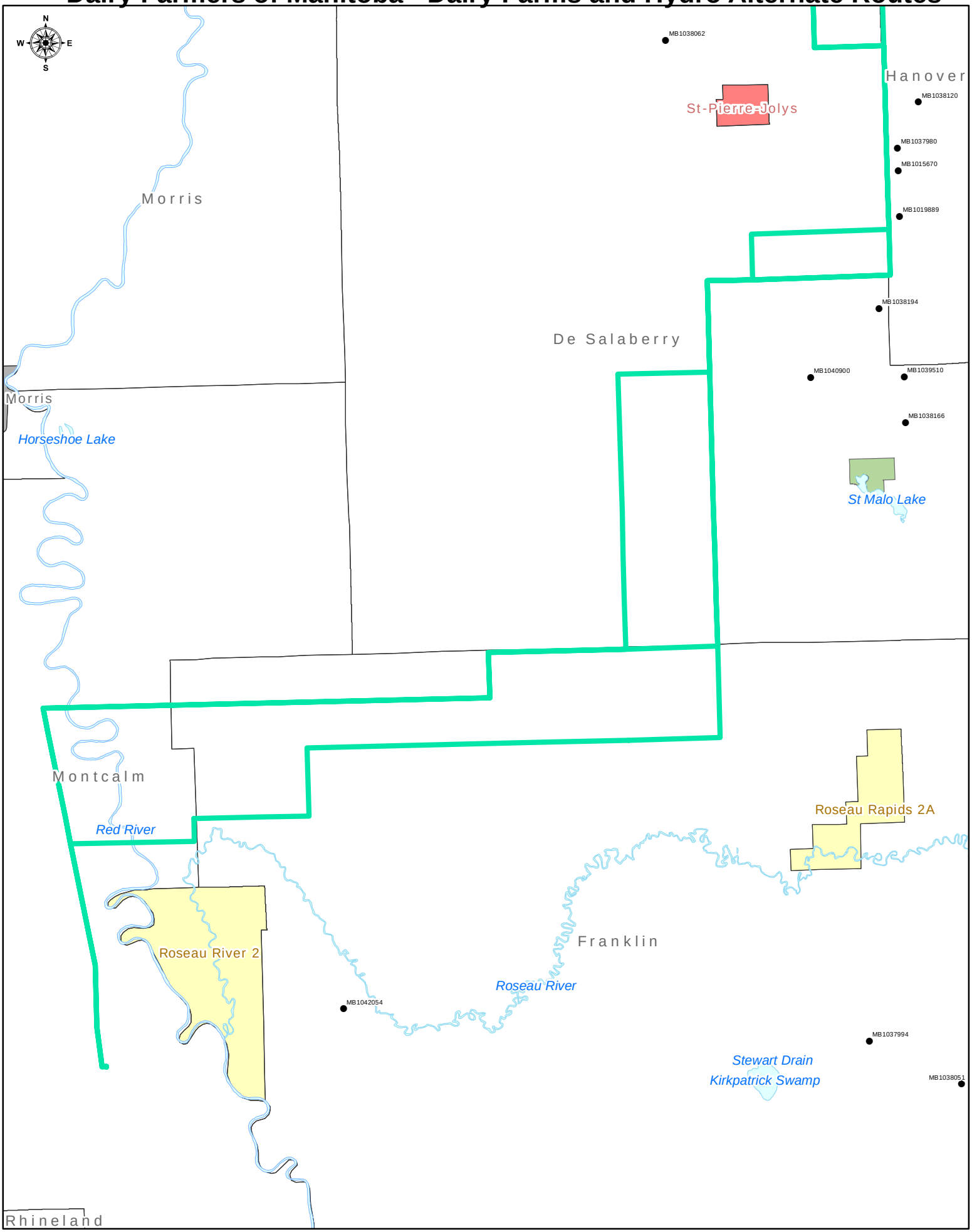

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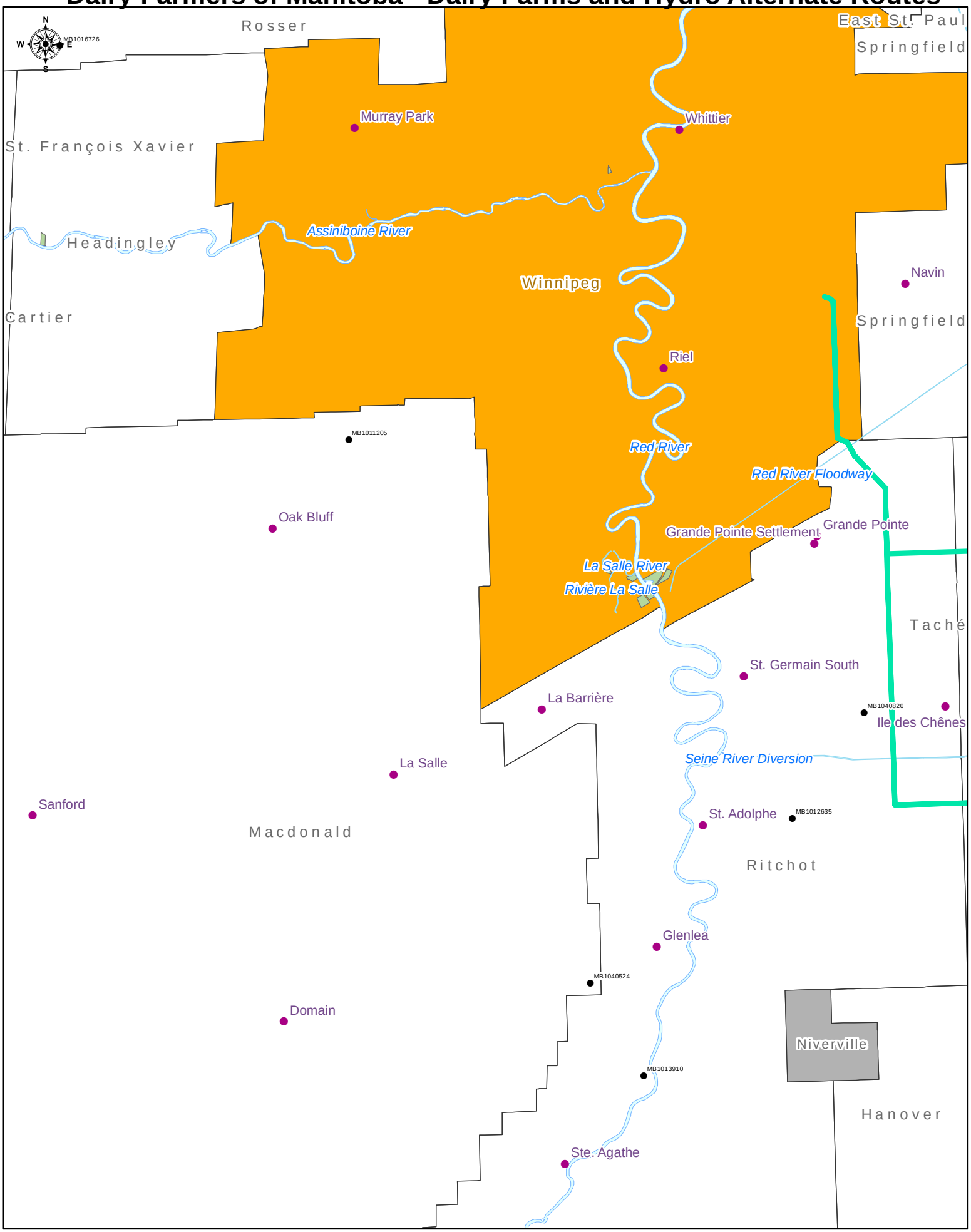

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August 13, 2013

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Summary of Key findings – Manitoba Hydro Key Person Interviews

Overview

These results exclude those respondents who stated that they did not wish their responses to be included in the findings for the Manitoba Manitoba-Minnesota Transmission Line Project.

In total 35 surveys have been completed with Key Persons, of which 32 stated they were happy for their responses to be included in both the summary for the Manitoba-Minnesota Transmission Line Project and also the St Vital Project. The breakdown by category is as follows:

Category	Number of Interviews
Business and Industry	3
Environment	8
Municipal	5
Trappers	1
Education	7
Agriculture	5
Infrastructure	2
Health	1
Policing	0
Total	32

Key Findings

- Agriculture
  - Respondents were split in in their opinion with respect to the agricultural industry in their area – two respondents felt that it was in a state of growth, two thought it was in a state of decline and one thought there was no perceptible change
  - Almost all respondents (four out of five) felt that the labour force had changed over time
  - Almost all respondents (four out of five) said that the agricultural sector is affected by power system reliability
  - All respondents said that transportation corridors was the land use best suited to Hydro transmission lines and all respondents felt that hydro transmission lines have an effect on agricultural practices.
  - All respondents said that they thought property values, irrigation systems, GPS and aerial spraying operations would be affected by the implementation of this transmission line
  - Concerns include loss of land, use of large machinery and stray voltage as well as affecting meat production standards.

    - All respondents said that they had concerns about operation or maintenance activities on their operating activities.
    - All respondents were interested in learning more about the project and attending the workshop.

- Environment
    - Almost all respondents (7 out of 8) said that past developments had affected environmental features important to their organisation. Most respondents said that they thought this project would affect features important to their organisation.
    - Most respondents felt that there are important areas to avoid such as wildlife habitat, waterways and vegetation.
    - Key concerns are changes to drainage patterns, changes to species habitat, climate change, heritage areas and flooding.
    - Most respondents (6 out of 8) felt that the transportation corridor would be the best land use to be in proximity to the transmission line.
    - Existing Rights of Way or private lands were suggested as the best locations for the Transmission line.
    - All respondents wanted to learn more about the project.
- Municipal
    - Four out of five municipal respondents thought that the new transmission line would positively affect business in the municipality
    - Positive aspects included increased growth and industry expansion as well as providing better service
    - Generally, respondents did not think there would be any major impacts on existing transportation and utility corridors
    - Transportation corridors and pasture/grazing lands were considered the land uses best suited to siting the transmission line.
    - All respondents felt that hydro lines had an impact on agricultural practices
    - Only one respondent said that the community had expressed concerns about noise or dust while a further respondent said that they had heard concerns about infrastructure or water
    - Two respondents said that there were concerns in their community about the impact of construction on watersheds and aquifers
    - All respondents said that they thought there would be effects from the proposed transmission corridor on planned residential, commercial or industrial developments.
    - All respondents were interested in learning more about the project
- Education
    - Three out of seven respondents said that a new transmission line would impact the operations of their organisation
    - Impacts included better resources and more reliable power and concerns over safe walking passages for students

    - Almost all respondents said that they would like to learn more about the project.
- Government Infrastructure
    - All (2) respondents thought that there are more jobs available now compared to the past;
    - Both respondents thought that the new transmission line would affect existing transportation and utility corridors in a significant way;
    - In building a new transmission line it was felt by both respondents that agricultural lands (particularly with cows on them) should be avoided;
    - Both respondents felt that the transmission line would affect agricultural practices;
    - It was not felt that property values would be affected;
    - It was not expected that emergency services be affected by the Project.
- Health
    - The one respondent we spoke to felt that there would be effects on emergency services from the Project from road closures which can affect response times.
- Business and Industry
    - One of the three respondents we spoke to said that they thought the economy was in a state of decline while the other two respondents felt unable to comment;
    - Two respondents thought that there may be some effects on their businesses or operating activities from a new transmission line rights of way, this was related to utility and railway line crossings (situation of transmission lines away from railway lines);
- Trappers
    - The one trapper we spoke to said that they felt that the project would affect trapping activities in a negative way due to disruption to wildlife and will detract fur bearers.

Key Word analysis

1. Aerial spraying – 6 mentions
2. Agriculture – 6 mentions
3. Air field/airstrip - 0
4. Cemetery - 0
5. Commercial – 3 mentions
6. Development – 33 mentions
7. Farmers/farming – 23 mentions
8. Glider- 1 mention
9. Growth – 11 mentions
10. Highways – 8 mentions
11. Habitat – 15 mentions
12. Health – 5 mentions
13. Housing – 1 mention
14. Industry/ industrial – 17 mentions
15. Lagoon – 2 mentions
16. Landfill – 2 mentions
17. Mitigation – 7 mentions
18. Residential – 7 mentions

19. Rail lines – 8 mentions
20. Raptors - 3 mentions
21. Roads – 13 mentions
22. Safety – 3 mentions
23. Trail – 29 mentions
24. Transmission line(s) – 22 mentions
25. Trapping – 9 mentions
26. Vegetation – 2 mentions
27. Views – 0
28. Wetland – 22 mentions
29. Wildlife – 15 mentions
30. Wildfowl- 0

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B3 – KPI Responses by Sector

B4 – RCMP Letter

Royal Canadian Mounted Police / Gendarmerie royale du Canada

Security Classification/Designation

Protected A

"D" Division

Your File

Ms. Jen Murray

Our File

2013-06-05

Dear Ms. Murray:

Manitoba Hydro Survey

Thank you for your recent email to Inspector David Thorne, Officer in Charge of Operations Strategy Branch expressing your interest relative to the Manitoba Hydro Survey, your request for information and the potential for partnership with the RCMP in Manitoba. In the interest of efficiency I will provide one consistent message with regards to the Manitoba Hydro Survey. The vast majority of information that you seek can be found on the external RCMP Manitoba Website at <http://www.rcmp-grc.gc.ca/mb/index-eng.htm>. I encourage you to visit the website for the information you require.

From an operational perspective I ask, please, that the RCMP be notified well in advance of any extended road closures to be forecast by Manitoba Hydro in order that we may plan for possible disruptions in traffic. Furthermore, if as a result of the proposed expansion of service any large work camps are formed in the rural area, I ask that the RCMP be notified in advance so that ample contingency plans can be put in place to ensure effective police service delivery to affected area(s).

Thank you in advance for your assistance.

Yours truly,

Scott A. Kolody, Chief Superintendent
Officer in Charge
Criminal Operations

Box 5650, 1091 Portage Avenue
Winnipeg, Manitoba
R3C 3K2

Canada

Appendix C

C1 – Contact Information and Scripts

C2 – Workshop Background Presentation

C3 – Workshop Workbook and Summary of Responses

C4 – Workshop Mapping Exercise Results

C5 – Workshop Comment Sheet and Responses

C6 – Stakeholder Group Meeting Minutes

TELEPHONE CONTACT SCRIPT FOR **No. _____**
MMTP STAKEHOLDER FOLLOW-UP TELEPHONE CALLS

AECOM August , 2013 Organization _____
Hi, my name is_____ with AECOM, and I am calling on behalf of Manitoba Hydro to follow up on an invitation that was emailed to you on Monday (August 12). The letter was regarding your participation as a stakeholder in the public engagement process for a proposed new electric power transmission line in southeastern Manitoba, called the Manitoba-Minnesota Transmission Project.

Manitoba Hydro is currently collecting information from a variety of stakeholders to gauge their interest in the Project, and to understand how they would like to be involved in the engagement process.

Would your organization be interested in just receiving Project information at important steps in the routing process, or would it benefit from being more involved in the process?

1. I do not want to be involved in the public engagement process for this Project. ____
   (Reason, if provided _____)

[If they say "Just keep me informed," go to questions 5 and 6, below.]

Please let us know how you would like to be involved in the project. (You can certainly indicate more than one opportunity from those I will list.)

2. Would you be interested in attending a Stakeholder Workshop, if they are held? Y N

3. Would you be interested in attending a Public Information Centre? Y N
   (If yes, we will send you an email invitation at a later date, with locations, dates, times.)

4. Would your organization benefit from meeting with Manitoba Hydro representatives at various stages in the Project? Y N

5. Would your organization be interested in participating in a Telephone Interview? Y N

   (If yes, what is your preferred date/time _____
   Would you like us to follow up with an email reminder. Y N

   [Note if they refer to the St. Vital Transmission Complex interviews: Y N]

6. Is email or hard copy preferable to provide your organization with information? Email
   Hard Copy

7. Will you seek information from the Manitoba Hydro website? Y N

Please note that information on the Manitoba–Minnesota Transmission Project is also available on Manitoba Hydro's project website www.hydro.mb.ca/mmtp and we encourage all participants to go through new material as we progress through the Project. Questions can be addressed to mmtp@hydro.mb.ca or the Project telephone line at 1-877-343-1631.
THANK YOU VERY MUCH!

Manitoba Hydro

Cusitar, Kristiina

From: Cusitar, Kristiina
Sent: Friday, November 01, 2013 9:59 AM
Subject: Manitoba-Minnesota Transmission Project Events

Good Morning,

Thank you for completing a survey with our public engagement team regarding your preferences for involvement in the Manitoba-Minnesota Transmission Project. Manitoba Hydro would like to inform you of two methods which you can participate and become informed of the Project. You or a representative of your organization can attend both of these events if you wish and Manitoba Hydro encourages your participation throughout each of these engagement methods.

Government Stakeholder Meeting

To share project information and to gather feedback from interested government representatives, Manitoba Hydro will be holding a Government Stakeholder Meeting on **November 18th 2013 at 820 Taylor Avenue from 2:00-4:30pm.**

At this meeting Manitoba Hydro will aim to accomplish the following;

i. Introduce the Project including the alternative routes and potential border crossings
ii. Share Project Timelines
iii. Share information regarding the public engagement and environmental assessment processes
iv. Outline the routing process and ways that groups can become involved in route determination

Manitoba Hydro will begin with a presentation outlining the above and will then open the floor for a Q&A session. At the completion of this Manitoba Hydro will then welcome any interested member to stay and discuss concerns/opportunities with regards to routing with Manitoba Hydro representatives. Manitoba Hydro will have a variety of maps on hand to document concerns noted.

Stakeholder Workshop

Project information will be shared at this venue but will include more hands on involvement from participants.

i. Present project information
ii. Determine route selection criteria that are most important to stakeholders
iii. Identify a Preliminary Alternative Route and Preferred Border Crossing that meets the route selection criteria selected (working groups)
iv. Determine local issues and concerns
v. Discuss mitigation strategies

These workshops will allow different stakeholder groups to work together to assist Manitoba Hydro in further refining routes currently presented. These workshops aim to have open dialogue and contributions from varying

perspectives in order to best understand the landscape. These will be held from 9:00am till 1:30pm on the following dates:

November 13th - Winnipeg, Winakwa Community Centre, 980 Winakwa Rd.

November 15th - Winnipeg, Norberry- Glenlee Community Centre, 26 Molgat Ave

November 19th - Steinbach, Friedensfeld Community Centre, 32004 Rd, 35E

Your attendance is most welcome and Manitoba Hydro asks that you please reply to this email if you or a representative from your organization would like to attend the stakeholder meeting or one of our workshops.

If you or a representative from your organization is unable to attend these venues, please contact us directly and we can arrange to meet with your organization.

Please review the Project's website to understand the current alternative routes and border crossings under consideration (www.hydro.mb.ca/mmtp). Manitoba Hydro will also be holding public Open House events in the upcoming weeks as described under the Public Engagement section of the Project's website. GIS Files and mapping can also be found in the document library.

Manitoba Hydro looks forward to your involvement and thanks you for your interest in this Project.

Thank you.

Kristiina Cusitar, C.E.T.
Environmental Technologist
D 204.928.7475
kristiina.cusitar@aecom.com

AECOM
99 Commerce Drive, Winnipeg, MB R3P 0Y7
T 204.477.5381 F 204.284.2040
www.aecom.com

This email and supporting documentation is sent on behalf of Trevor Joyal of Manitoba Hydro.

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If council wishes to meet with us in council chambers as well as the options presented above, we will accommodate this request and ask that you reply to this email indicating that preference.

Please review the Project's website to understand the current alternative routes and border crossings under consideration (www.hydro.mb.ca/mmtp). Manitoba Hydro will also be holding public Open House events in the upcoming weeks as described under the Public Engagement section of the Project's website. GIS Files and mapping can also be found in the document library.

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Workshop

Manitoba – Minnesota Transmission Project

Welcome

Manitoba Hydro

1. Introduction 9:00 to 9:10am

Safety

1.1 Manitoba Hydro/Consultant Project Team

1.2 Stakeholders/Workshop Participants

1.3 Project Description

1.4 Project Need

1.5 Purpose of Workshop

1.6 Workshop Agenda

1.1 Manitoba Hydro Project Team

- Project Coordination – Manitoba Hydro
- Route Selection Process – Manitoba Hydro
- Stakeholder & Public Engagement – AECOM/MH
- Environmental Assessment – Stantec/MH
- Mapping – Stantec

1.2 Stakeholder Workshops

- Representation
  - Agriculture
  - Business and Industry
  - Environmental – Provincial and Groups
  - Health, Education and Policing
  - Infrastructure
  - Municipal – RMs, Towns and Cities
  - Aboriginal
- Invited through interviews, telephone calls, letters and emails

1.3 Project Description

- The **Manitoba-Minnesota Transmission Project** includes:
  - construction of a 500 kilovolt AC transmission line
  - Upgrades Dorsey, Riel, and Glenboro Stations
- The transmission line will travel to one of three border crossings
- The Project will connect to the Great Northern Transmission Line, constructed by Minnesota Power, and terminate at Blackberry Station, northwest of Duluth, Minnesota.
- Anticipated in-service date is 2020.
- Estimated cost is $350 million.

1.4 Project Need

- The **Manitoba-Minnesota Transmission Project** is required to:
  - export electric power based on current sales agreements
  - improve reliability and import capacity in emergency and drought situations
  - increase Manitoba Hydro access to markets in the United States.

1.5 Purpose of the Workshop

- Provide stakeholders with **information** about the proposed Manitoba-Minnesota Transmission Project and environmental assessment process.
- Identify stakeholder's **routing criteria**
- Gain **feedback on alternative routes and border crossings**, including issues, concerns, constraints and opportunities.
- Gather stakeholder **input related to routing options**
- Gather information that will feed into the **environmental assessment**.

Slide 7

MTI1 Would prefer to say "to identify stakeholder input related to routing options"
MTI_LEA, 10/21/2013

1.6 Workshop Agenda

1. **Introduction** – 10 min.
2. **Background** – 40 min.

Refreshment Break /Grouping – 15 min.

3. **Breakout Discussion/Map Exercise** – 2 hr. 25 min.

Lunch - 15 min.

4. **Summary** – 45 min.
   - Group Presentations
   - Dot-mocracy Exercise
5. **Wrap up** – 5 min.

2. Background 9:10 to 9:50am

2.1 Why does Manitoba Hydro export/import power?

2.2 Southern Loop and Route Selection Process

2.3 Regulatory Considerations

2.4 Environmental Assessment

2.5 Public Engagement

2.6 Tower Design

2.7 Schedule

2.8 Questions

2.1 Why does Manitoba export and import power?

- In 2012–13 Manitoba Hydro export sales totaled $353 million with **88% derived from sales in the U.S. market**, and 12% from Canadian markets.

- Manitoba Hydro's utility customers in the United States want **long-term price certainty and stability**. These utilities see value in purchasing hydroelectricity from Manitoba through long-term fixed contracts that are not linked to volatile natural gas prices and will **not be subject to future changes in regulatory requirements associated with air emissions.**

2.1 Why does Manitoba export and import power?

- This project will meet a **250MW power sale** with Minnesota Power and will allow for increased access to markets in the United States, which could lead to further sales to other utilities.

- Manitoba Hydro also **imports power in situations of extreme drought** to meet provincial demands exceeding Manitoba Hydro's generating capacity. This line will provide a secondary 500kV line to support provincial needs when there is a need.

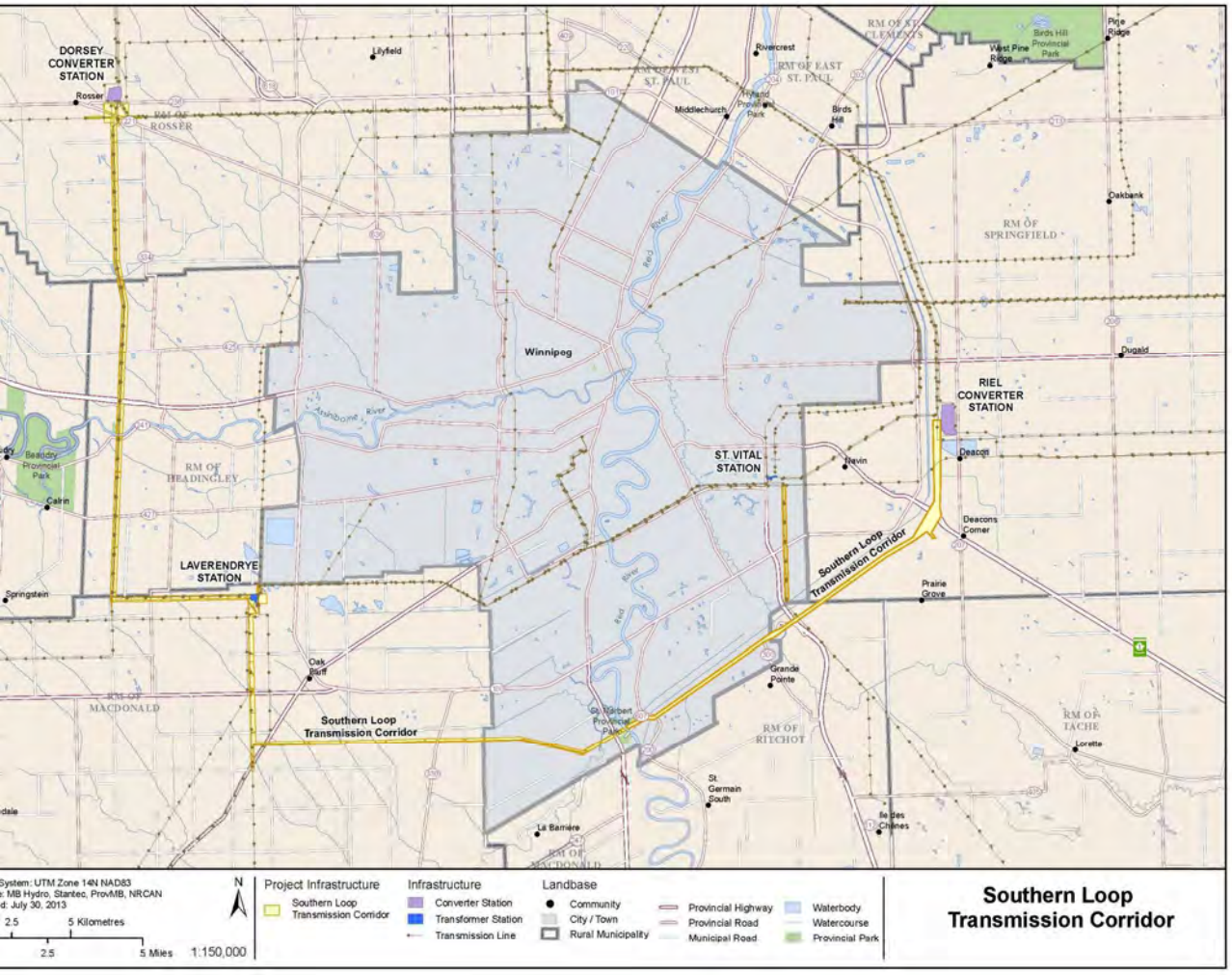
2.2 Southern Loop Transmission Corridor

- The Project will originate at the Dorsey Converter Station and will travel south around Winnipeg along what is known as the Southern Loop.
- The Southern Loop is a dedicated transmission corridor that will accommodate multiple transmission lines necessary for system reliability and meeting future energy demands.
  - Manitoba Hydro has been acquiring property rights for the Southern Loop for many years.
  - The Southern Loop will reduce the number of independent rights-of-way on the landscape.

Slide 12

MTI3 this sentence bugs me....we say it elsewhere as well?
MTIs_LEA, 10/21/2013

2.2 Southern Loop



2.2 Alternate Routes

- Many segments have been developed
- Some criteria for preliminary route development include:
    - GET THIS INFORMATION FROM JAMES (A few bullets)

2.3 Regulatory

- National Energy Board Act & Canadian Environmental Assessment Act (2012)
- Manitoba Conservation and Water Stewardship
- Manitoba's Clean Environment Commission may become involved

- An **Environmental Impact Statement** (EIS) will be developed that will be subject to review and approval under the respective federal and provincial environmental regulatory processes

2.4 Routing

- **Round 1** (Fall/Winter 2013)
  - Three border crossing areas
  - Numerous alternative routing options
- **Round 2** (Spring 2014)
  - Border crossing refined (one or two)
  - Refined alternative routes
- **Round 3** (Fall 2014)
  - Preferred border crossing area and preferred route

2.4 Environmental Assessment

- Construction of the proposed transmission line will require a **Class 3 License** under *The Environment Act* (Manitoba).

- The Environmental Impact Statement (EIS) for the project will include:
  - **Study area characterization**, obtained through site visits and background investigations
  - Documentation of **public engagement** to obtain input and feedback into route selection
  - Assessment of potential **environmental and socio-economic effects**
  - Assessment of **cumulative effects** of the transmission line
  - **Mitigation measures and monitoring plans** developed for the Project
  - An **environmental protection program**

2.4 Environmental Assessment VCs

- The environmental assessment determines **Valued Components** (VCs)
  - **VC definition:** any part of the environment that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of societal or cultural values, scientific interest or concern.
  - **VCs are selected by:**
    - Utilizing experience from other, similar projects.
    - Getting input from specialists in the various disciplines.
    - Collecting input from interested stakeholders and the public.

2.5 Stakeholder and Public Engagement

- Manitoba Hydro will seek input from local landowners, municipalities, First Nations, the Manitoba Métis Federation, stakeholder groups, government departments and the general public during the route selection and environmental assessment processes.
- Participants in engagement processes will identify both their criteria for route selection and preferred routes and border crossing locations.

- **Engagement process** will include:
  - Key Person Interviews
  - Stakeholder Workshops
  - Public Open Houses/Public Information Centers
  - Email and Telephone Contacts
  - Website and Newsletters
  - Meetings

2.5 Public Engagement Process

Round 1: October - November 2013

- Introduce the Project
- Present alternate routes and proposed border crossings
- Answer questions
- Identify and document routing criteria and concerns
- Use input to guide Preferred Border Crossing selection

Round 2: Spring 2014

- Present findings
- Present the Preferred Border Crossing
- Present alternative routes for preferred border crossing
- Answer questions
- Identify and document routing criteria and concerns
- Use input to guide preferred route selection

Round 3: Fall 2014

- Present findings
- Present the Preferred Route
- Answer questions
- Identify and document routing criteria and outstanding concerns
- Provide opportunity to discuss potential effects and possible mitigation measures to minimize effects

2.5 Key Person Interviews – What we heard

KPI Conducted Summer and Fall of 2013

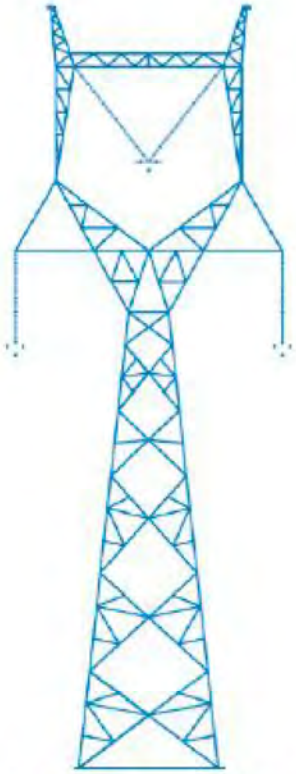
- **Need for the project:**
  - Agricultural and municipal sectors are affected by electric power system reliability.
  - Municipalities believe new transmission lines positively affect local businesses.
- **Siting considerations:**
  - Transportation corridors, existing right-of-ways, privately owned lands, pasture/grazing lands were identified as land uses best suited to transmission lines.
- **Comments/concerns related to the construction of the project:**
  - Concerns about noise and dust.
  - Effects on infrastructure and water.
  - Effects on trapping activities due to disruption of wildlife.
  - Effects on emergency services (and response times) due to road closures.

2.6 Preliminary Tower Design

- **Steel lattice towers:**
  - Self-supporting towers will be utilized in agricultural areas,
  - Guyed structures will be used in all other terrain.

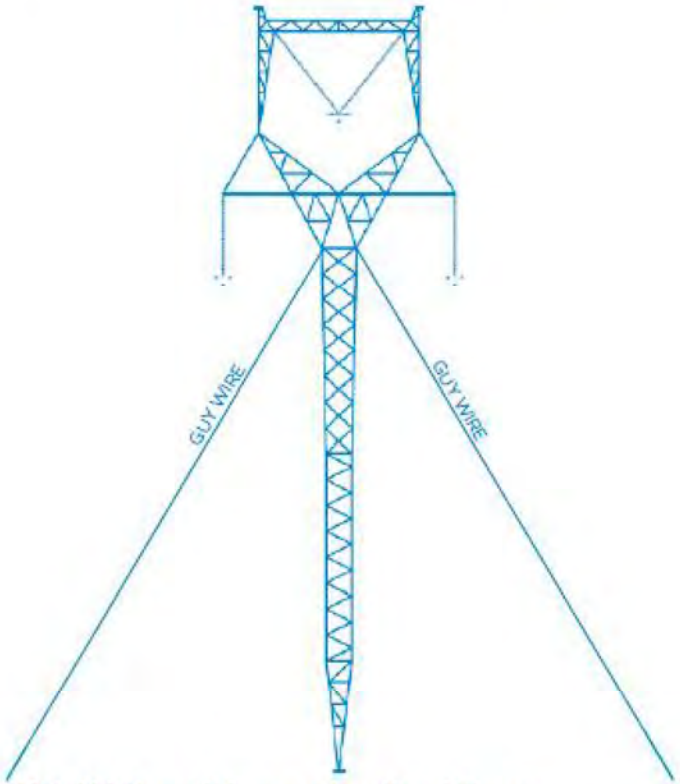
- Current design details anticipate towers will:
  - range from 40-60 m (130-200 ft) in height
  - be spaced on average 400-500 m (1300-1650 ft) apart
  - utilize a right-of-way width of 80-100 m (260-330 ft)

2.5 Preliminary Tower Design



500-kV Self-Supporting Lattice Steel Tower

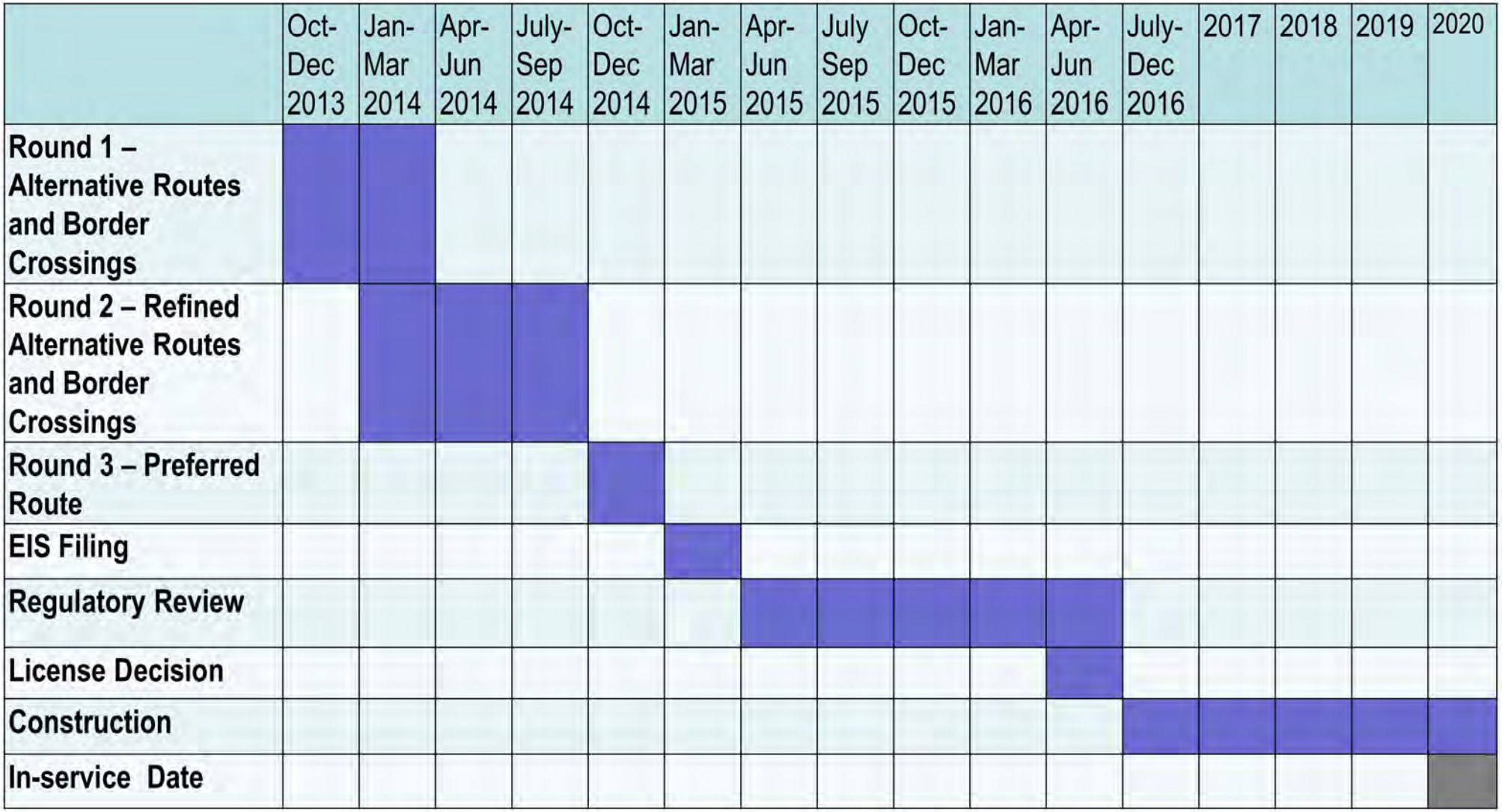
(Towers are not drawn to scale — conceptual only.)



500-kV Guyed Suspension Steel Tower

(Angle of guy wires depicted on tower are not accurate — conceptual only.)

2.7 Project Timelines



Questions?

3.1 Breakout Map Exercise - Materials

10:05am to 12:30pm

1. **Workbooks** incorporating process, exercises and recording sheets
2. **Maps** showing Alternative Route Segments and Border Crossing Areas
3. **Route Statistics** (digital)
   - Built, Natural and Engineering Features
4. **Pens, notes and dots**

3.2 Breakout Exercise – Summary

Stakeholder Teams

1. Individually, note **Key Issues and Concerns** applicable to alternative routes and border crossing locations; incorporate local knowledge

2. Working in teams, discuss and record:
   - **Major Criteria** for choosing alternative routes
   - **Evaluation Criteria** for alternative route segments
   - **Thresholds** for sorting route segments
   - **Locations** of preferred route segments

3.2 Breakout Exercise – Summary

Stakeholder Teams

3. Show **Preliminary Alternative Route(s)** on maps, combining Alternative Route Segments and indicate **Rationale** for route selection on large sheets

4. Record **Mitigation Strategies** for Preliminary Alternative Route(s)

5. Wrap-up 1:40 to 1:45pm

- **Immediate Next Steps:**
  - Complete the First Round of Public Open Houses
  - Identify Preferred Border Crossing
  - Meet with Minnesota Power on Preferred Border Crossing
  - Identify Preliminary Routes based on inputs
  - Review by Manitoba Hydro staff
  - Additional rounds of engagement
  - Complete Environmental Assessment

Thank you for attending!

Please complete a comment sheet.

Licensing & Environmental Assessment Department

- Toll Free: 1-877-343-1631
- In Winnipeg: (204)360-4305
- Email: mmtp@hydro.mb.ca
- Visit the Project website for up-to-date Project information, and sign up to receive Project updates at **www.hydro.mb.ca/mmtp**
- Open House display boards and Project newsletters are also available on the Project website.

Appendix C

C1 – Contact Information and Scripts

C2 – Workshop Background Presentation

C3 – Workshop Workbook and Summary of Responses

C4 – Workshop Mapping Exercise Results

C5 – Workshop Comment Sheet and Responses

C6 – Stakeholder Group Meeting Minutes

Manitoba- Minnesota Transmission Project

Workshop Location/Date WINNIPEG Team TEAM 1

Workbook

The intent of the Workshop is to involve Stakeholders in the following:

1. identifying their Major Criteria for Route Selection
2. identifying Preferred Alternative Routes for the Manitoba-Minnesota Transmission Project
3. identifying Preferred Border Crossing Areas

Note: Route and border crossing selections should be based on the Major Criteria and Evaluation Criteria identified in the Workbook.

Step 1 - Identify Individual Stakeholder Issues and Concerns

Some examples of issues and concerns related to new transmission lines are provided below. Please indicate: first whether you view each issue is positive (+) or negative (-), or both; then how you would evaluate the importance of each issue by circling either "H" (High Importance, major issue), "M" (Medium), or "L" (Low). If you have no concerns related to an issue circle NC. (Time allotted is 5 min.)

• Access to the transmission line right-of-way	(+) -	H	M	L	NC
• Aesthetics of the right-of-way	+ -	H	M	L	(NC)
• Impact on agricultural activities	+ (-)	H	M	L	NC
• Construction of the transmission line	+ -	H	M	L	(NC)
• Economic considerations	(+) -	H	M	L	NC
• Health and safety issues	+ (-)	H	(M)	L	NC
• Location of the line	+ -	H	M	L	(NC)
• Location of related border crossing	+ -	H	M	L	(NC)
• Property issues	+ (-)	H	(M)	L	NC
• Reclamation	+ (-)	H	(M)	L	NC
• Protection of vegetation	+ (-)	(H)	M	L	NC
• Impacts on wetlands	+ (-)	H	(M)	L	NC
• Impacts on wildlife / waterfowl	+ (-)	H	(M)	L	NC

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Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Please add and evaluate other issues and concerns that you consider to be important, particularly **any based on your direct knowledge of the local area**.

- Other + - H M L

  _____

  _____

- Other + - H M L

  _____

  _____

- Other C + - H M L

  _____

  _____

Manitoba Hydro has already developed a number of alternative route segments at this stage in route planning. Our next step is to evaluate these segments, using route selection criteria to determine those that are more or less preferred, and to understand why. In the route planning process, we considered known opportunities and constraints on the landscape, and other planning criteria such as the co-locating with existing infrastructure, avoiding homes, looking for straight line opportunities and minimizing turns, if possible (they add to cost). Input from these Workshops will help inform our evaluation process.

Step 2 - Define Major Criteria for Route Selection and Border Crossing Areas

Each team's major or over-riding criteria for route selection will depend on the backgrounds and interests of its members.

Examples of Major Criteria:

1. Avoid Residences
2. Minimize impact on agricultural land
3. Minimize impact on wildlife habitat
4. Minimize cost

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Please agree **as a team** on the **3 over-riding route selection criteria** you believe should be used to define an Alternative Route. (Time allotted 15 min.)

Major Criteria A

_____

_____

_____

Major Criteria B

_____

_____

_____

Major Criteria C

_____

_____

_____

Step 3 – Review Evaluation Criteria

a) Please review the **Raw Statistics** for each of the Alternative Route Segments, which have been provided to each team.
b) Based on your teams' **Major Criteria**, identified above, please work as a team to rate the features listed in the following table as being of High, Medium or Low (H, M and L) importance. (Time allotted is 10 min.)
c) Then add to the list, and rate, any other evaluation criteria based on team members' knowledge of the local context.

-LOCOFA

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Table 1 – Evaluation Criteria

Item	Features	Importance Rating (H, M or L)
	Built	
1.1	Relocated Residences - Within ROW	
1.2	Potential Relocated Residences (75m) - Edge of ROW	
1.3	Proximity to Residences (75 - 250m) - Edge of ROW	
1.4	Agriculture Crop Land (Acres) - ROW	
1.5	Proximity to Commercial Buildings (100m) - Edge of ROW	
1.6	Special Features (School, Daycare, Church, Cemetery, Park Parcels, Recreational Trail, Campgrounds, Lodges) (250m) - Edge of ROW	
1.7	Historic / Cultural Resources (250m) - Edge of ROW	
	Natural	
2.1	Natural Forests (Acres) - ROW	
2.2	Stream/River Crossings - Centerline	
2.3	Wetland Areas (Acres) - ROW	
2.4	Floodplain/Riparian Areas (Acres) - ROW	
2.5	Special Areas (ASI, Heritage Marshes, Proposed Protected Areas, Conservation Lands)	
2.6	Native Grassland Areas (Acres) - ROW	
	Engineering	
3.1	Length (Km)	
3.2	Length in Separation Buffer (Km) - D602F	
3.3	Length in Separation Buffer (Km) - BPIII	
3.4	Existing Transmission Line Crossings (#)	
	Construction Cost Considerations	
4.1	Clearing Costs	
4.2	Land Acquisition Costs	
4.3	Property Compensation Costs	
4.4	High Angle Costs	
4.5	Existing Transmission Line Crossing Costs	
	Other Evaluation Criteria (Team Generated)	

Break (5 min.)

Step 4 – Set Thresholds

Manitoba Hydro

Workshop Location/Date _____ Team _____

Setting thresholds means finding ways of quickly narrowing choices, and reducing the number of Alternative Route Segments that will need to be further evaluated.

a) One approach would be to review the Raw Statistics data sets for all of the Alternative Route Segments, focusing particularly on the Features that your team has rated as High (and possibly Medium), to identify logical thresholds and all of the Alternative Route Segments exceeding them. Put a red sticker on these less suitable route segments.
b) Another way to determine thresholds is suggested by the chart below (e.g. 3 High ratings versus 9 Medium ratings). Your team can put its own threshold numbers into the second column.

Table 2 – Suggested Thresholds (Optional)

Features Importance Rating	Threshold	Result
High	3	Do not use Alternative Route Segment
Medium	9	Do not use
Low	27	Do not use
High and Medium		Do not use
		Do not use
		Do not use

Step 5 – Rate Remaining Alternative Route Segments

a) First put aside all Alternative Route Segments that your team determined to be **least preferred**.
b) Then consider whether there are some **complete** Alternative Routes (multiple segments) that should not be evaluated further.
c) Finally proceed to **rate the remaining Alternative Route Segments** from 1 (best) to 3 (worst).

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Ratings should be based on the features' "Importance Rating" (third column, **Table 1 – Evaluation Criteria** (e.g. 2.4 Floodplain/Riparian Areas, 3.1 Length) to indicate Features/Ratings relevant to each remaining Alternate Route Segment.

Please focus on one or more **groups** of Alternative Route Segments with the potential to form a complete route(s) from Winnipeg to one of the Alternative Border Crossing Locations.

Table 3 – Potential Route Segments and Ratings

Note: teams can use specific feature numbers or just make notes on primary evaluation criteria for each Alternative Route Segment, which they consider to have potential to form an Alternative Route. From the list in the following table, highlight those route segments you most prefer on the large-scale maps. Use a green highlighter. Use a yellow highlighter to show other potential route segments.

Route Segments	Features/Ratings	Notes
e.g. 24	e.g. 2.4; 3.1	Route has some concerns related to riparian areas, long route
e.g. 35		No significant issues
Route Segments	Features/Ratings	Notes

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Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Route Segments	Features/Ratings	Notes

Route Segments	Features/Ratings	Notes

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Note on determining preferred Alternative Route Segments: to quickly identify their preferred route segments (colour green), teams may want to look at the Raw Statistics again to identify those with the lowest levels of concern.

Step 6 – Identify Mitigation Strategies

Consider strategies, typically these would relate to Major Criteria, which could potentially mitigate concerns with various Alternate Route Segments. Mitigation could include:

- Avoidance, leading to changes in the final locations of route segments
- Relocation of impacted features
- Compensation
- Special items, such as bird diverters

Item	Mitigation Strategy

Step 7 - Identify Route(s) and Preferred Border Crossing Location(s)

Now put together the Alternative Route Segments that you most prefer, to identify a complete **Alternative Route(s)**. Note that you may need to add back in some segments you originally set aside in order to complete a route.

a) Show the complete **Alternative Route(s)** on the small-scale maps using a marker with your team's colour.

Workshop Location/Date _____Team _____

b) Write the **Major Criteria** for your route on a large sheet (3 criteria).

c) Make sure your **team name** is on the sheets and maps.

Step 10 - Proceed to Dot-mocracy Exercise!

Dot-mocracy (voting on the Preliminary Alternative Routes and Preferred Border Crossing Locations, and the Major Criteria and Mitigation Approaches)

- Green Dots – "Thumbs up" 6 per map/ 3 per work sheet
- Red Dots – "Thumbs Down" 6 per map/3 per work sheet

Considerations:

- What do you like about Alternative Routes (consider individual **Alternative Route Segments**)?
- What **Major Criteria** do you consider to be most appropriate for route selection?

Manitoba- Minnesota Transmission Project

Workshop Location/Date Friday Nov 15/13. Winnipeg Team 1

Workbook

The intent of the Workshop is to involve Stakeholders in the following:

1. identifying their Major Criteria for Route Selection
2. identifying Preferred Alternative Routes for the Manitoba-Minnesota Transmission Project
3. identifying Preferred Border Crossing Areas

Note: Route and border crossing selections should be based on the Major Criteria and Evaluation Criteria identified in the Workbook.

Step 1 - Identify Individual Stakeholder Issues and Concerns

Some examples of issues and concerns related to new transmission lines are provided below. Please indicate: first whether you view each issue is positive (+) or negative (-), or both; then how you would evaluate the importance of each issue by circling either "H" (High Importance, major issue), "M" (Medium), or "L" (Low). If you have no concerns related to an issue circle NC. (Time allotted is 5 min.)

• Access to the transmission line right-of-way	(+) -	H	(M)	L	NC
• Aesthetics of the right-of-way	(+) -	H	M	(L)	NC
• Impact on agricultural activities	+ -	H	M	(L)	NC
• Construction of the transmission line	+ -	H	(M)	L	NC
• Economic considerations	+ -	H	(M)	L	NC
• Health and safety issues	+ -	(H)	M	L	NC
• Location of the line	+ -	H	(M)	L	NC
• Location of related border crossing	+ -	H	(M)	L	NC
• Property issues	+ (-)	(H)	M	L	NC
• Reclamation	+ -	H	(M)	L	NC
• Protection of vegetation	+ (-)	(H)	M	L	NC
• Impacts on wetlands	+ (-)	(H)	M	L	NC
• Impacts on wildlife / waterfowl	+ (-)	(H)	M	L	NC

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Please add and evaluate other issues and concerns that you consider to be important, particularly **any based on your direct knowledge of the local area.**

- Other +(-) (H) M L
  Forest Health
  _____
  _____
- Other +(-) (H) M L
  Woodlot Properties. ~~residents~~ private land forests.
  _____
  _____
- Other C + - H M L
  _____
  _____

Manitoba Hydro has already developed a number of alternative route segments at this stage in route planning. Our next step is to evaluate these segments, using route selection criteria to determine those that are more or less preferred, and to understand why. In the route planning process, we considered known opportunities and constraints on the landscape, and other planning criteria such as the co-locating with existing infrastructure, avoiding homes, looking for straight line opportunities and minimizing turns, if possible (they add to cost). Input from these Workshops will help inform our evaluation process.

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Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

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_____

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_____

Major Criteria B

_____

_____

_____

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Manitoba- Minnesota Transmission Project

Workshop Location/Date Winnipeg Nov 15/13 Team 1

Table 1 – Evaluation Criteria

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	Built	
1.1	Relocated Residences - Within ROW	M
1.2	Potential Relocated Residences (75m) - Edge of ROW	M
1.3	Proximity to Residences (75 - 250m) - Edge of ROW	M
1.4	Agriculture Crop Land (Acres) - ROW	H
1.5	Proximity to Commercial Buildings (100m) - Edge of ROW	M
1.6	Special Features (School, Daycare, Church, Cemetery, Park Parcels, Recreational Trail, Campgrounds, Lodges) (250m) - Edge of ROW	H
1.7	Historic / Cultural Resources (250m) - Edge of ROW	L
	Natural	
2.1	Natural Forests (Acres) - ROW	H
2.2	Stream/River Crossings - Centerline	M
2.3	Wetland Areas (Acres) - ROW	M
2.4	Floodplain/Riparian Areas (Acres) - ROW	M
2.5	Special Areas (ASI, Heritage Marshes, Proposed Protected Areas, Conservation Lands)	H
2.6	Native Grassland Areas (Acres) - ROW	H
	Engineering	
3.1	Length (Km)	H
3.2	Length in Separation Buffer (Km) - D602F	M
3.3	Length in Separation Buffer (Km) - BPIII	M
3.4	Existing Transmission Line Crossings (#)	M
	Construction Cost Considerations	
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	Other Evaluation Criteria (Team Generated)	

Break (5 min.)

Step 4 – Set Thresholds

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date Winnipeg Nov 15/13 Team 1

Setting thresholds means finding ways of quickly narrowing choices, and reducing the number of Alternative Route Segments that will need to be further evaluated.

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Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

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Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Route Segments	Features/Ratings	Notes

Route Segments	Features/Ratings	Notes

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Note on determining preferred Alternative Route Segments: to quickly identify their preferred route segments (colour green), teams may want to look at the Raw Statistics again to identify those with the lowest levels of concern.

Step 6 – Identify Mitigation Strategies

Consider strategies, typically these would relate to Major Criteria, which could potentially mitigate concerns with various Alternate Route Segments. Mitigation could include:

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- Compensation
- Special items, such as bird diverters

Item	Mitigation Strategy

Step 7 - Identify Route(s) and Preferred Border Crossing Location(s)

Now put together the Alternative Route Segments that you most prefer, to identify a complete **Alternative Route(s)**. Note that you may need to add back in some segments you originally set aside in order to complete a route.

a) Show the complete **Alternative Route(s)** on the small-scale maps using a marker with your team's colour.

Workshop Location/Date _____ Team _____

b) Write the **Major Criteria** for your route on a large sheet (3 criteria).

c) Make sure your **team name** is on the sheets and maps.

Step 10 - Proceed to Dot-mocracy Exercise!

Dot-mocracy (voting on the Preliminary Alternative Routes and Preferred Border Crossing Locations, and the Major Criteria and Mitigation Approaches)

- Green Dots – "Thumbs up" 6 per map/ 3 per work sheet
- Red Dots – "Thumbs Down" 6 per map/3 per work sheet

Considerations:

- What do you like about Alternative Routes (consider individual **Alternative Route Segments**)?
- What **Major Criteria** do you consider to be most appropriate for route selection?

Manitoba- Minnesota Transmission Project

Workshop Location/Date WINNIPEG GLENLEA COMMUNITY CENTRE Team 1

Workbook

The intent of the Workshop is to involve Stakeholders in the following:

1. identifying their Major Criteria for Route Selection
2. identifying Preferred Alternative Routes for the Manitoba-Minnesota Transmission Project
3. identifying Preferred Border Crossing Areas

Note: Route and border crossing selections should be based on the Major Criteria and Evaluation Criteria identified in the Workbook.

Step 1 - Identify Individual Stakeholder Issues and Concerns

Some examples of issues and concerns related to new transmission lines are provided below. Please indicate: first whether you view each issue is positive (+) or negative (-), or both; then how you would evaluate the importance of each issue by circling either "H" (High Importance, major issue), "M" (Medium), or "L" (Low). If you have no concerns related to an issue circle NC. (Time allotted is 5 min.)

• Access to the transmission line right-of-way	+ (-)	H	(M)	L	NC ← INTRODUCES SAFETY CONCERNS
• Aesthetics of the right-of-way	(+) -	(H)	M	L	NC
• Impact on agricultural activities	(+) -	(H)	M	L	NC
• Construction of the transmission line	+ (-)	H	(M)	L	NC
• Economic considerations	(+) -	(H)	M	L	NC
• Health and safety issues	(+) -	(H)	M	L	NC
• Location of the line	+ (-)	H	(M)	L	NC
• Location of related border crossing	+ (-)	H	M	(L)	NC
• Property issues	(+) -	H	(M)	L	NC
• Reclamation	+ (-)	H	(M)	L	NC
• Protection of vegetation	+ (-)	H	(M)	L	NC
• Impacts on wetlands	(+) -	(H)	M	L	NC
• Impacts on wildlife / waterfowl	(+) -	(H)	M	L	NC

Manitoba Hydro

Manitoba- Minnesota Transmission Project

Workshop Location/Date _____ Team _____

Please add and evaluate other issues and concerns that you consider to be important, particularly **any based on your direct knowledge of the local area**.

- Other + - H M L

  ~~[illegible]~~ _____

  _____

- Other + - H M L

  _____

  _____

- Other C + - H M L

  _____

  _____

Manitoba Hydro has already developed a number of alternative route segments at this stage in route planning. Our next step is to evaluate these segments, using route selection criteria to determine those that are more or less preferred, and to understand why. In the route planning process, we considered known opportunities and constraints on the landscape, and other planning criteria such as the co-locating with existing infrastructure, avoiding homes, looking for straight line opportunities and minimizing turns, if possible (they add to cost). Input from these Workshops will help inform our evaluation process.

Step 2 - Define Major Criteria for Route Selection and Border Crossing Areas

Each team's major or over-riding criteria for route selection will depend on the backgrounds and interests of its members.

Examples of Major Criteria:

1. Avoid Residences
2. Minimize impact on agricultural land
3. Minimize impact on wildlife habitat
4. Minimize cost

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Please agree **as a team** on the **3 over-riding route selection criteria** you believe should be used to define an Alternative Route. (Time allotted 15 min.)

Major Criteria A

MINIMIZE IMPACT ON AGRICULTURAL LAND

Major Criteria B

Major Criteria C

Step 3 – Review Evaluation Criteria

a) Please review the **Raw Statistics** for each of the Alternative Route Segments, which have been provided to each team.
b) Based on your teams' **Major Criteria**, identified above, please work as a team to rate the features listed in the following table as being of High, Medium or Low (H, M and L) importance. (Time allotted is 10 min.)
c) Then add to the list, and rate, any other evaluation criteria based on team members' knowledge of the local context.

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Table 1 – Evaluation Criteria

Item	Features	Importance Rating (H, M or L)
	Built	
1.1	Relocated Residences - Within ROW	
1.2	Potential Relocated Residences (75m) - Edge of ROW	
1.3	Proximity to Residences (75 - 250m) - Edge of ROW	
1.4	Agriculture Crop Land (Acres) - ROW	
1.5	Proximity to Commercial Buildings (100m) - Edge of ROW	
1.6	Special Features (School, Daycare, Church, Cemetery, Park Parcels, Recreational Trail, Campgrounds, Lodges) (250m) - Edge of ROW	
1.7	Historic / Cultural Resources (250m) - Edge of ROW	
	Natural	
2.1	Natural Forests (Acres) - ROW	
2.2	Stream/River Crossings - Centerline	
2.3	Wetland Areas (Acres) - ROW	
2.4	Floodplain/Riparian Areas (Acres) - ROW	
2.5	Special Areas (ASI, Heritage Marshes, Proposed Protected Areas, Conservation Lands)	
2.6	Native Grassland Areas (Acres) - ROW	
	Engineering	
3.1	Length (Km)	
3.2	Length in Separation Buffer (Km) - D602F	
3.3	Length in Separation Buffer (Km) - BPIII	
3.4	Existing Transmission Line Crossings (#)	
	Construction Cost Considerations	
4.1	Clearing Costs	
4.2	Land Acquisition Costs	
4.3	Property Compensation Costs	
4.4	High Angle Costs	
4.5	Existing Transmission Line Crossing Costs	
	Other Evaluation Criteria (Team Generated)	

80-100

Break (5 min.)

Step 4 – Set Thresholds

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Setting thresholds means finding ways of quickly narrowing choices, and reducing the number of Alternative Route Segments that will need to be further evaluated.

a) One approach would be to review the Raw Statistics data sets for all of the Alternative Route Segments, focusing particularly on the Features that your team has rated as High (and possibly Medium), to identify logical thresholds and all of the Alternative Route Segments exceeding them. Put a red sticker on these less suitable route segments.
b) Another way to determine thresholds is suggested by the chart below (e.g. 3 High ratings versus 9 Medium ratings). Your team can put its own threshold numbers into the second column.

Table 2 – Suggested Thresholds (Optional)

Features Importance Rating	Threshold	Result
High	3	Do not use Alternative Route Segment
Medium	9	Do not use
Low	27	Do not use
High and Medium		Do not use
		Do not use
		Do not use

Step 5 – Rate Remaining Alternative Route Segments

a) First put aside all Alternative Route Segments that your team determined to be **least preferred**.
b) Then consider whether there are some **complete** Alternative Routes (multiple segments) that should not be evaluated further.
c) Finally proceed to **rate the remaining Alternative Route Segments** from 1 (best) to 3 (worst).

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Ratings should be based on the features' "Importance Rating" (third column, **Table 1 – Evaluation Criteria** (e.g. 2.4 Floodplain/Riparian Areas, 3.1 Length) to indicate Features/Ratings relevant to each remaining Alternate Route Segment.

Please focus on one or more **groups** of Alternative Route Segments with the potential to form a complete route(s) from Winnipeg to one of the Alternative Border Crossing Locations.

Table 3 – Potential Route Segments and Ratings

Note: teams can use specific feature numbers or just make notes on primary evaluation criteria for each Alternative Route Segment, which they consider to have potential to form an Alternative Route. From the list in the following table, highlight those route segments you most prefer on the large-scale maps. Use a green highlighter. Use a yellow highlighter to show other potential route segments.

Route Segments	Features/Ratings	Notes
e.g. 24	e.g. 2.4; 3.1	Route has some concerns related to riparian areas, long route
e.g. 35		No significant issues
Route Segments	Features/Ratings	Notes

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Route Segments	Features/Ratings	Notes

Route Segments	Features/Ratings	Notes

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Note on determining preferred Alternative Route Segments: to quickly identify their preferred route segments (colour green), teams may want to look at the Raw Statistics again to identify those with the lowest levels of concern.

Step 6 – Identify Mitigation Strategies

Consider strategies, typically these would relate to Major Criteria, which could potentially mitigate concerns with various Alternate Route Segments. Mitigation could include:

- Avoidance, leading to changes in the final locations of route segments
- Relocation of impacted features
- Compensation
- Special items, such as bird diverters

Item	Mitigation Strategy

Step 7 - Identify Route(s) and Preferred Border Crossing Location(s)

Now put together the Alternative Route Segments that you most prefer, to identify a complete **Alternative Route(s)**. Note that you may need to add back in some segments you originally set aside in order to complete a route.

a) Show the complete **Alternative Route(s)** on the small-scale maps using a marker with your team's colour.

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b) Write the **Major Criteria** for your route on a large sheet (3 criteria).

c) Make sure your **team name** is on the sheets and maps.

Step 10 - Proceed to Dot-mocracy Exercise!

Dot-mocracy (voting on the Preliminary Alternative Routes and Preferred Border Crossing Locations, and the Major Criteria and Mitigation Approaches)

- Green Dots – "Thumbs up" 6 per map/ 3 per work sheet
- Red Dots – "Thumbs Down" 6 per map/3 per work sheet

Considerations:

- What do you like about Alternative Routes (consider individual **Alternative Route Segments**)?
- What **Major Criteria** do you consider to be most appropriate for route selection?

Appendix C

C1 – Contact Information and Scripts

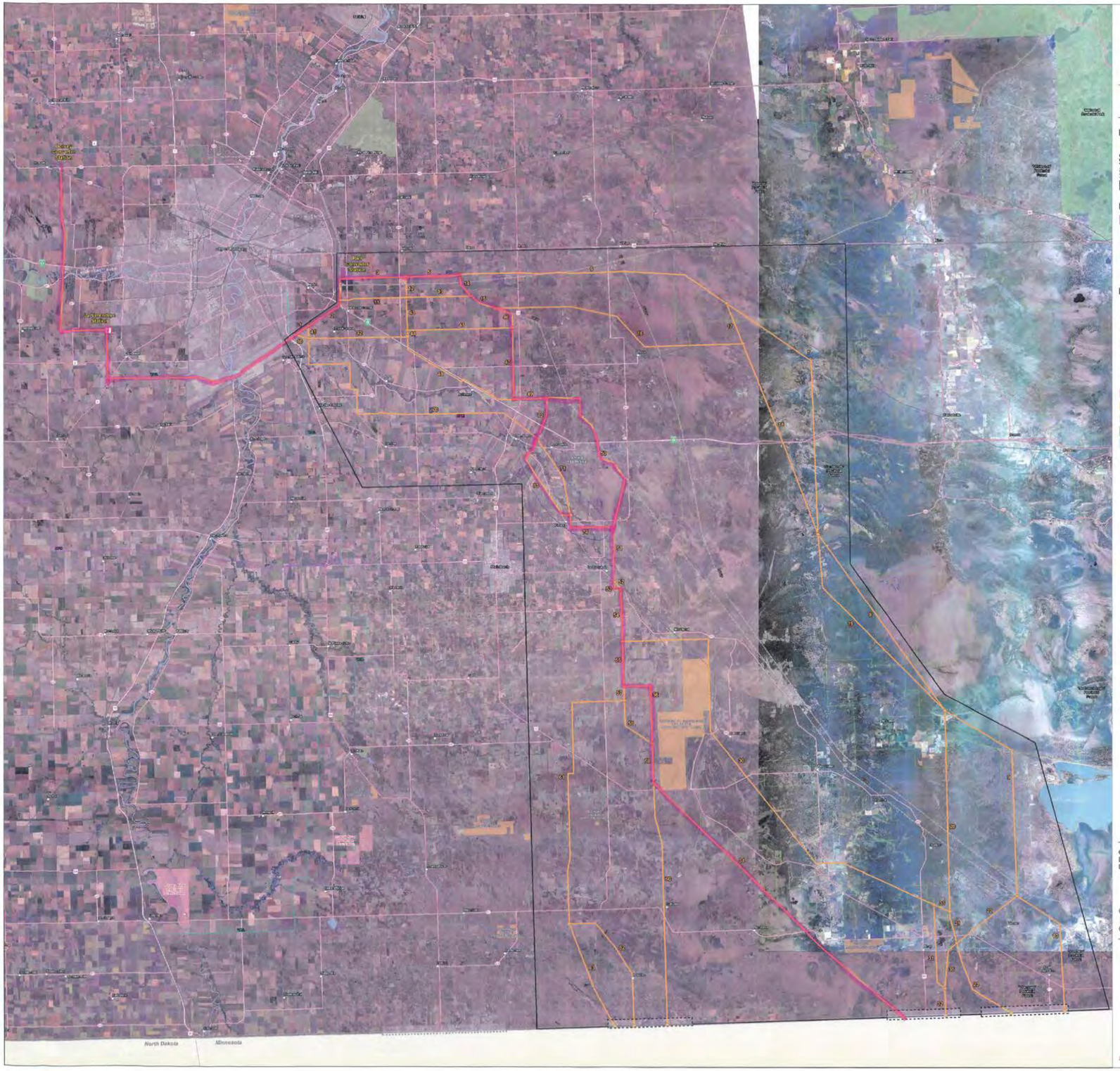
C2 – Workshop Background Presentation

C3 – Workshop Workbook and Summary of Responses

C4 – Workshop Mapping Exercise Results

C5 – Workshop Comment Sheet and Responses

C6 – Stakeholder Group Meeting Minutes



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure
- Alternative Routes
- Border Crossing Area
- Border Crossing Area (Not Under Consideration)
- Alternative Routing Study Area

Infrastructure
- Converter Station
- Electrical Station
- Bipole III Transmission Line (Approved)
- St. Vital Transmission Complex (Planned)
- Existing Transmission Line

Landbase
- Community
- Trans Canada Highway
- Provincial Trunk Highway
- Provincial Road
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- Railway (Abandoned)
- City / Town
- First Nation
- Wildlife Management Area
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- Provincial Forest
- Waterbody
- Watercourse

Coordinate Source: UTM Zone 14 N, NAD 83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: November 12, 2013

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Alternative Routes

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Winnipeg Nov 15 Workshop 2013

KEY CRITERIA

① MINIMIZE IMPACTS ON PRODUCTIVE AG. LAND

② AVOID PITS & QUARRIES

③ MINIMIZE IMPACTS ON PRIVATE WOODLOTS

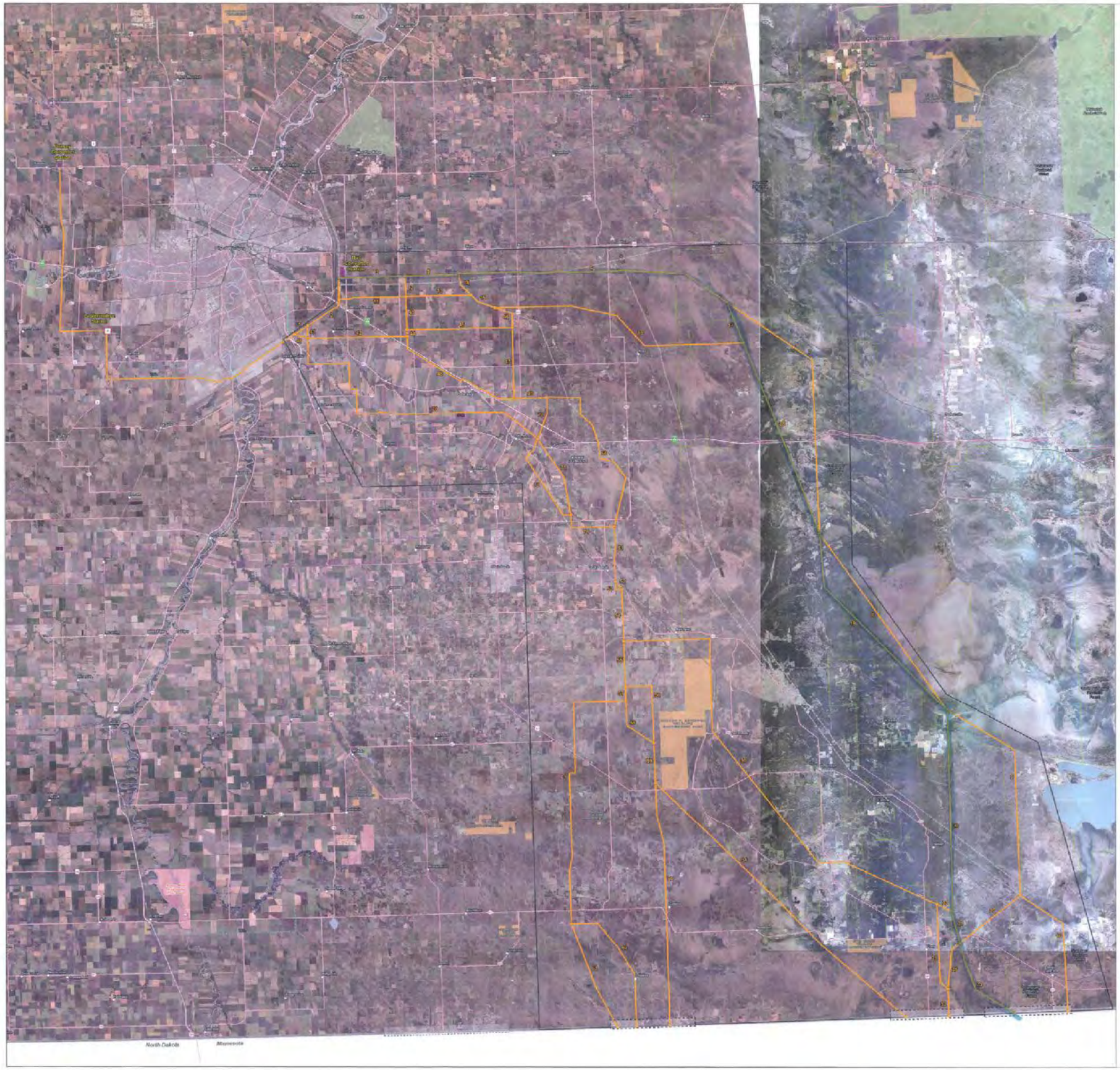
④ DO NOT COMPROMISE TRANSPORTATION CORRIDORS

(EXISTING + FUTURE [IF KNOWN])

STEINBACH
NOV. 19 2013 BLUE TEAM

Criteria for Route Selection:

Item	FEATURES	DEFINITION	RANKING
	Built		
1.1	**Relocated Residences** - Within ROW		H
1.2	**Potential Relocated Residences** (75m) - Edge of ROW		H
1.3	**Proximity to Residences** (75 - 250m) - Edge of ROW		H
1.4	**Agriculture Crop Land** (Acres) - ROW		
1.5	**Proximity to Commercial Buildings** (100m) - Edge of ROW		M-L
1.6	**Special Features** (School, Daycare, Church, Cemetery, Park Parcels, Recreational Trail, Campgrounds, Lodges) (250m) - Edge of ROW	SCHOOL + DAYCARE Campground / lodge Cemetry / Church	H M L
	AGLAND ROW CROP		H
	LIVESTOCK PRODUCTION		H
	NATURAL HAYS		M
	Natural		
2.1	**Natural Forests** (Acres) - ROW	SEE BELOW	
2.2	**Stream/River Crossings** - Centerline		L
2.3	**Wetland Areas** (Acres) - ROW		L
2.4	**Riparian Areas** (Acres) - ROW		L
2.5	**Special Areas** (ASI, Heritage Marshes, Proposed Protected Areas, Conservation Lands)		L
2.6	**Native Grassland** Areas (Acres) - ROW		L
	PRIVATE FOREST		H
	CR. FOREST		M
	Engineering		
3.1	**Length** (Km)		
3.2	**Length in Separation Buffer** (Km) - D602F		L
3.3	**Length in Separation Buffer** (Km) - BPIII		
3.4	**Existing Transmission Line Crossings** (#)		
	Construction Cost Considerations		
4.1	**Clearing Costs**		
4.2	**Land Acquisition Costs**		
4.3	**Property Compensation Costs**		
4.4	**High Angle Costs**		
4.5	**Existing Transmission Line Crossing Costs**		L
	Other Evaluation Criteria (Team Generated)		



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Nov 19, 2013
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STEINBACH

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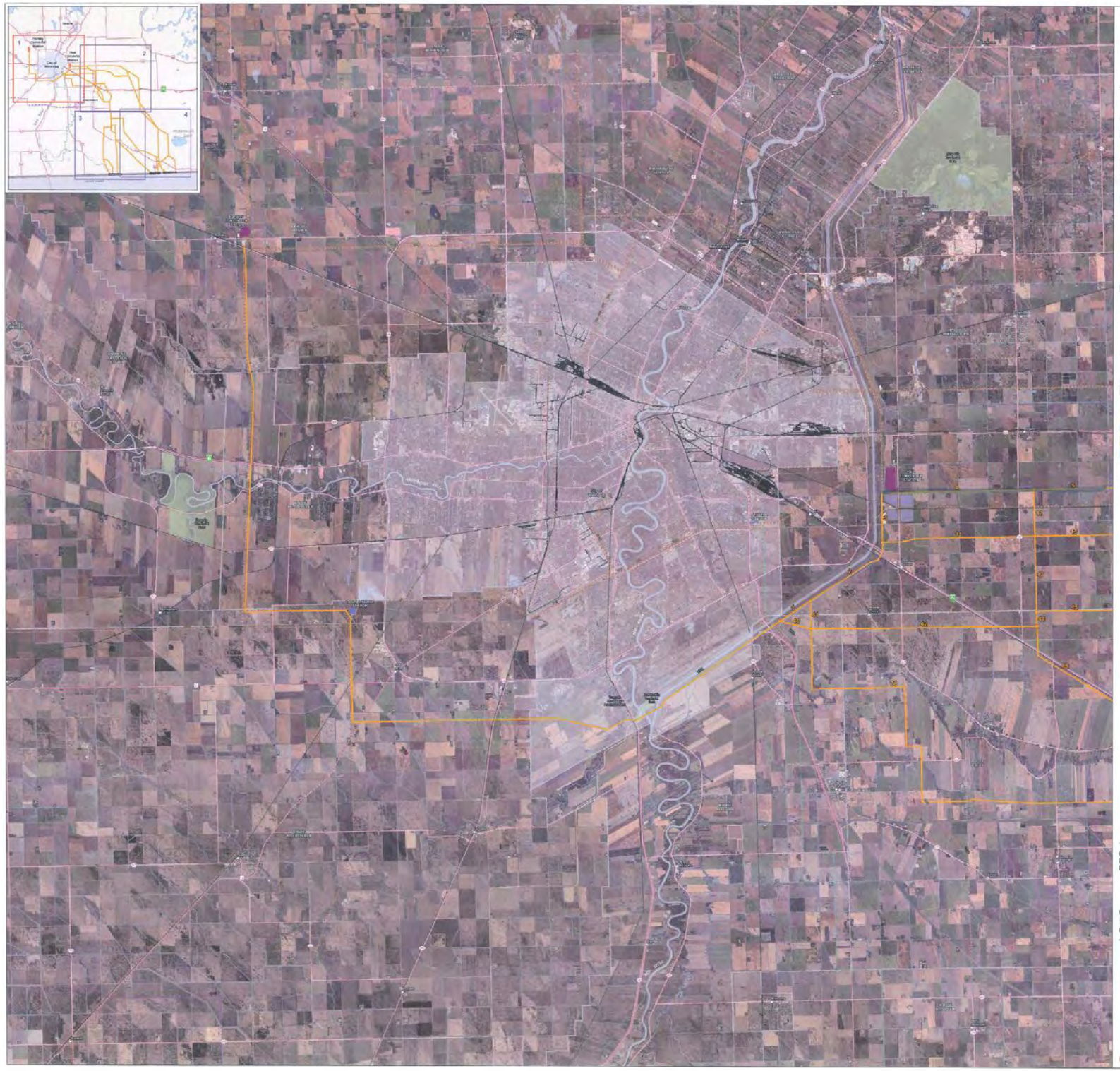

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Alternative Routes

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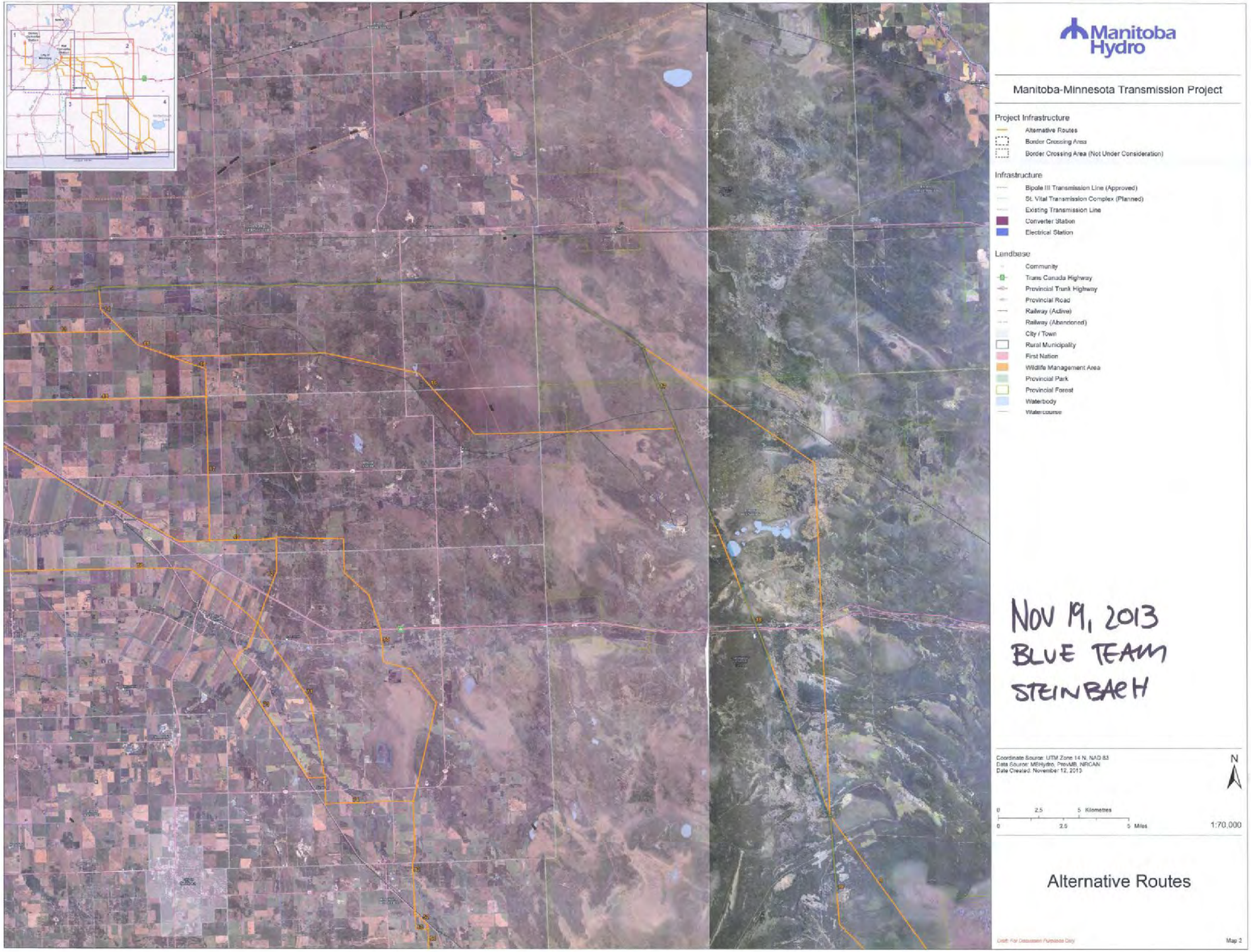
Map 1



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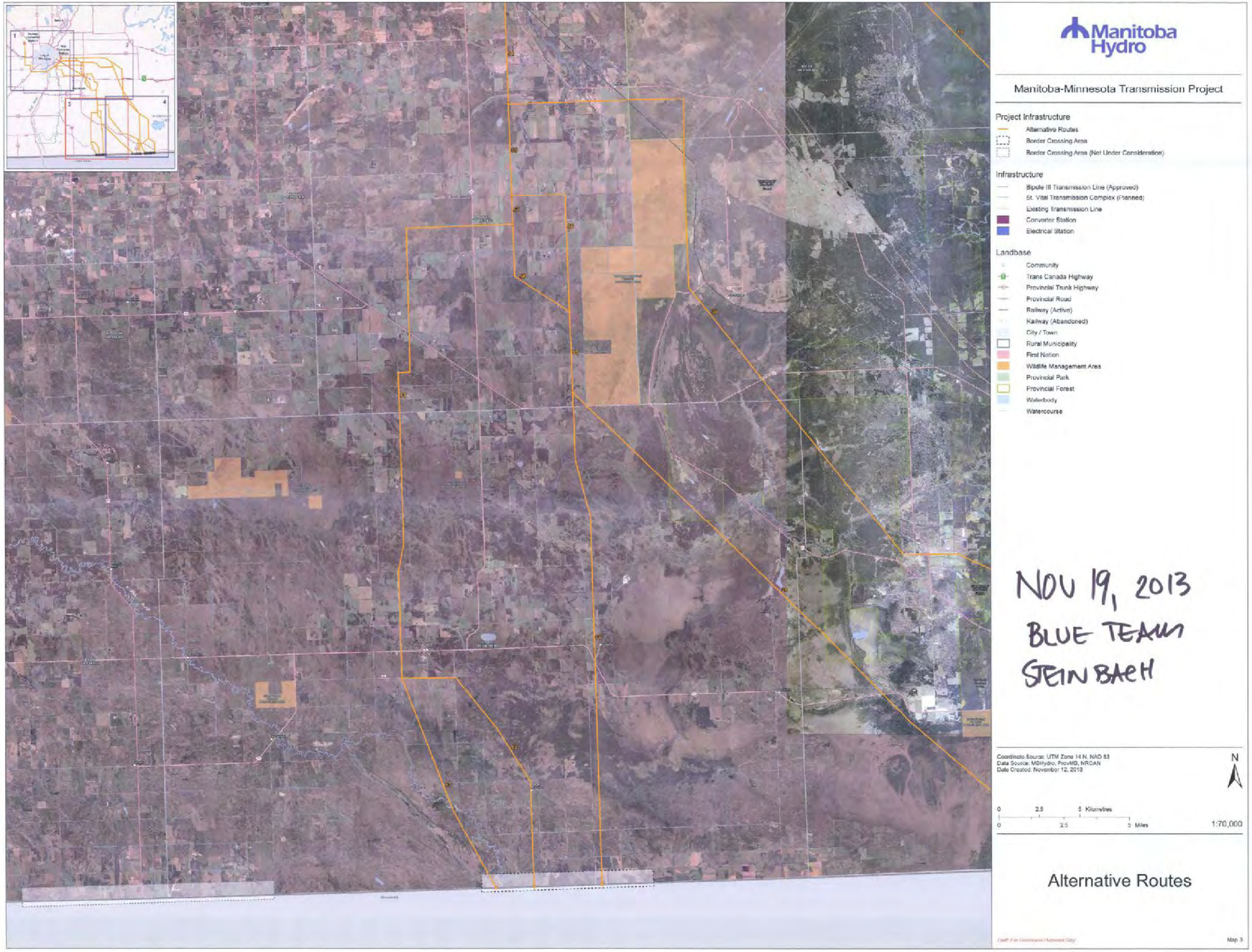
Map 2



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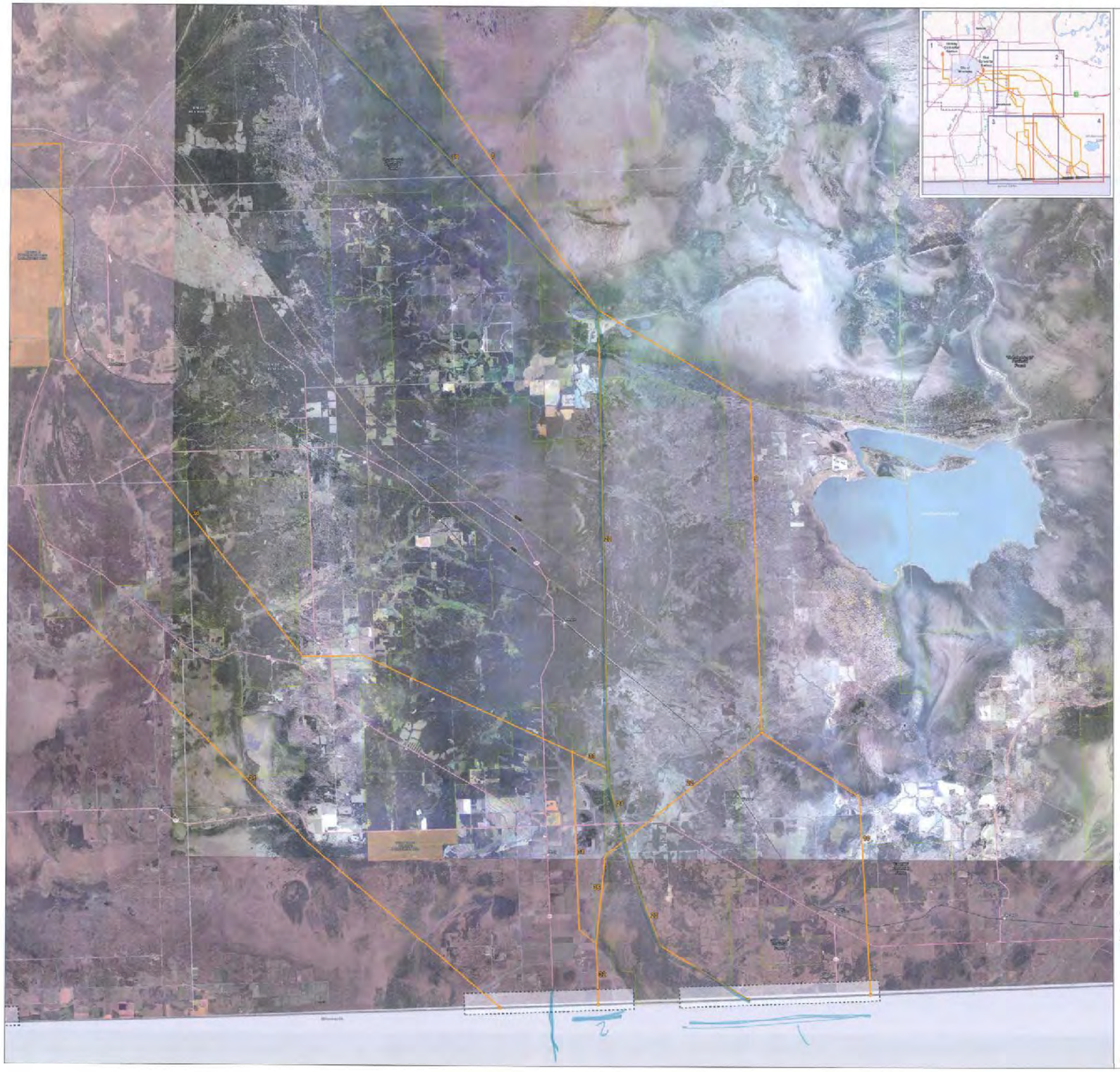
Alternative Routes

Map 3



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Alternative Routes

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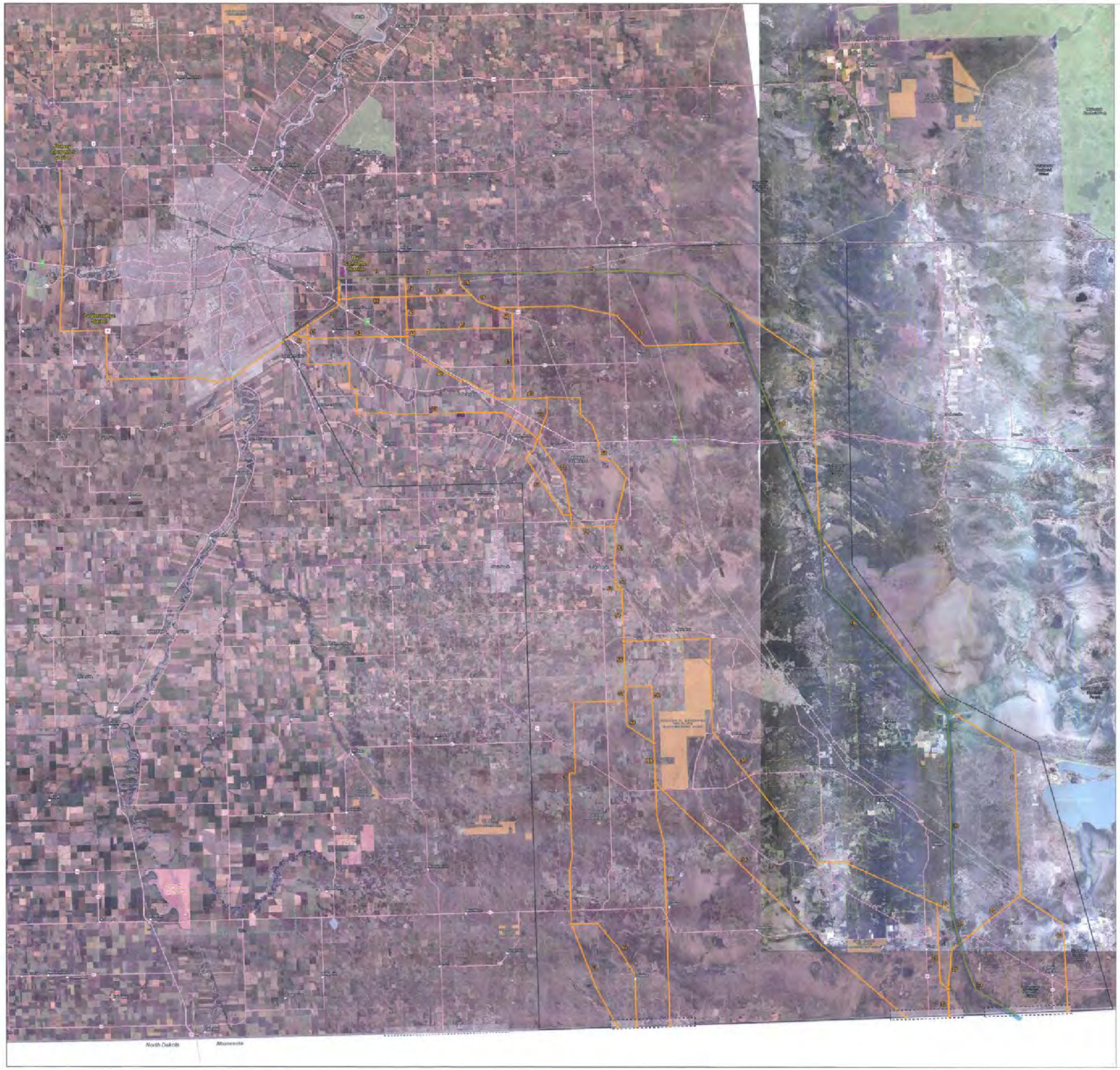
Map 4



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Alternative Routes

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Criteria for Route Selection:

1. Agriculture Crop Land
2. Land Acquisition Costs
3. Class 1, 2, 3
4. Relocated Residences
5. Road Maintenance

Purple Group
Nov 19/13

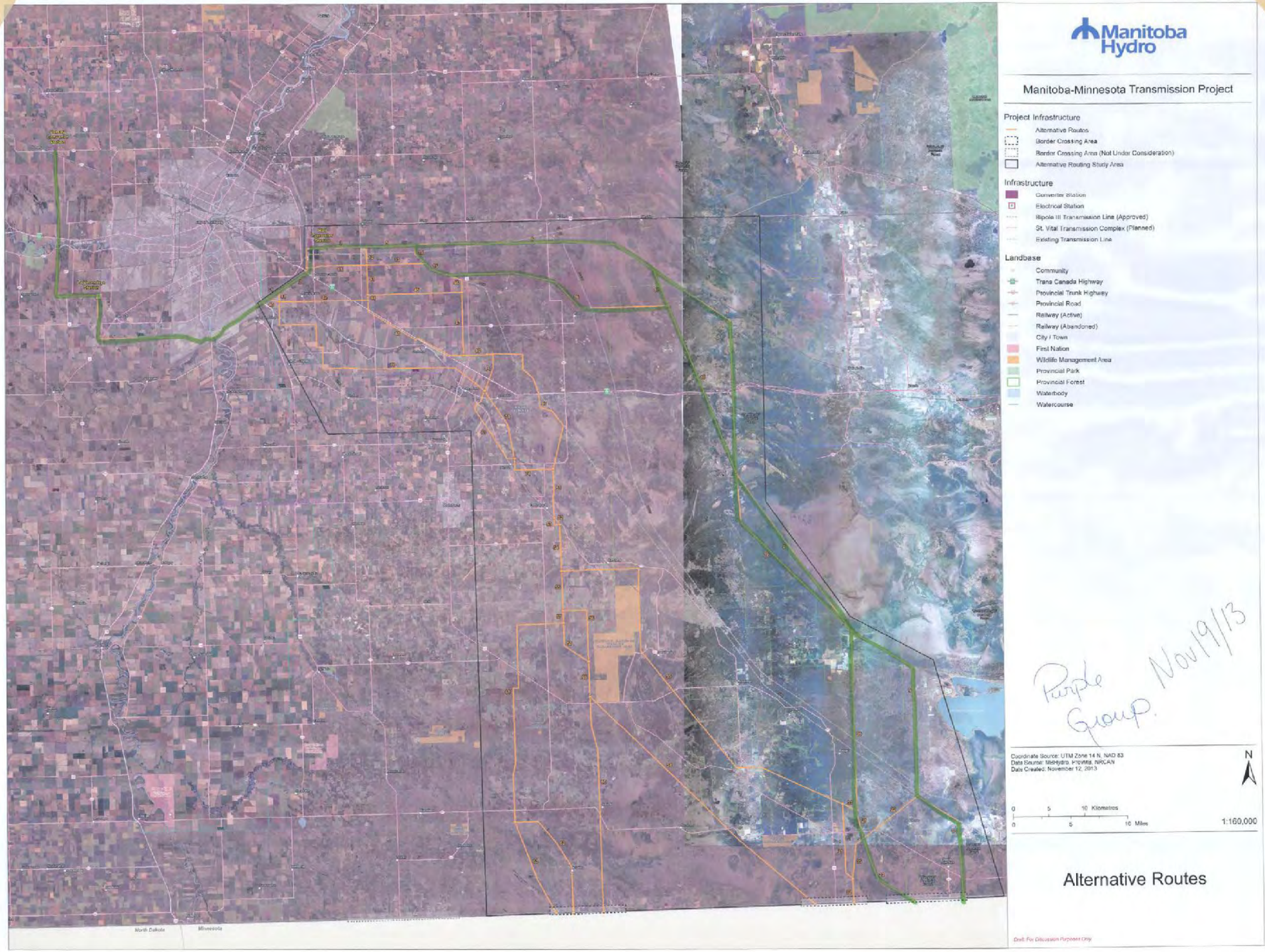
Criteria for Route Selection:

Item	FEATURES	DEFINITION	RANKING
	Built		
1.1	**Relocated Residences** - Within ROW		
1.2	**Potential Relocated Residences** (75m) - Edge of ROW		
1.3	**Proximity to Residences** (75 - 250m) - Edge of ROW		
1.4	**Agriculture Crop Land** (Acres) - ROW	Ag. capability	
1.5	**Proximity to Commercial Buildings** (100m) - Edge of ROW	assessment use	
1.6	**Special Features** (School, Daycare, Church, Cemetery, Park Parcels, Recreational Trail, Campgrounds, Lodges) (250m) - Edge of ROW	intensive use: school/dc/church/cg/lodges (250) less intensive: trail, park, cemetery (75)	
1.7	Class 1/2/3		
1.8	Class 4/5/~6		
1.9	Manure application	avoid infield lagoon	
	Natural		
~~2.1~~	~~**Natural Forests** (Acres) - ROW~~		
2.2	**Stream/River Crossings** - Centerline		
2.3	**Wetland Areas** (Acres) - ROW	} classification system } MCWS	
2.4	**Riparian Areas** (Acres) - ROW	↳ broken out	
2.5	**Special Areas** (ASI, Heritage Marshes, Proposed Protected Areas, Conservation Lands)	✓	
2.6	**Native Grassland** Areas (Acres) - ROW	NCC	
2.1	Crown Forest (acre)		
2.11	Private Forest (acre)		
	Engineering		
3.1	**Length** (Km)		
3.2	**Length in Separation Buffer** (Km) - D602F		
3.3	**Length in Separation Buffer** (Km) - BPIII		
3.4	**Existing Transmission Line Crossings** (#)		
3.5	FOUNDATION NEEDS		
	Construction Cost Considerations		
4.1	**Clearing Costs**		
4.2	**Land Acquisition Costs**		
4.3	**Property Compensation Costs**		
4.4	**High Angle Costs**		
4.5	**Existing Transmission Line Crossing Costs**		
4.6	Proximity to PR & PTH (m)	access impact minimized	
4.7	Road maintenance cost	impact to municipal roads $5000/km/yr	
	Other Evaluation Criteria (Team Generated)		
1.11	Proximity to livestock operations	hogs, cattle.... (pending buffer)	

Purple Group

November 19, 2013

Trevor's Group


Manitoba Hydro
Manitoba-Minnesota Transmission Project
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Purple Group. Nov 19/13
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Alternative Routes
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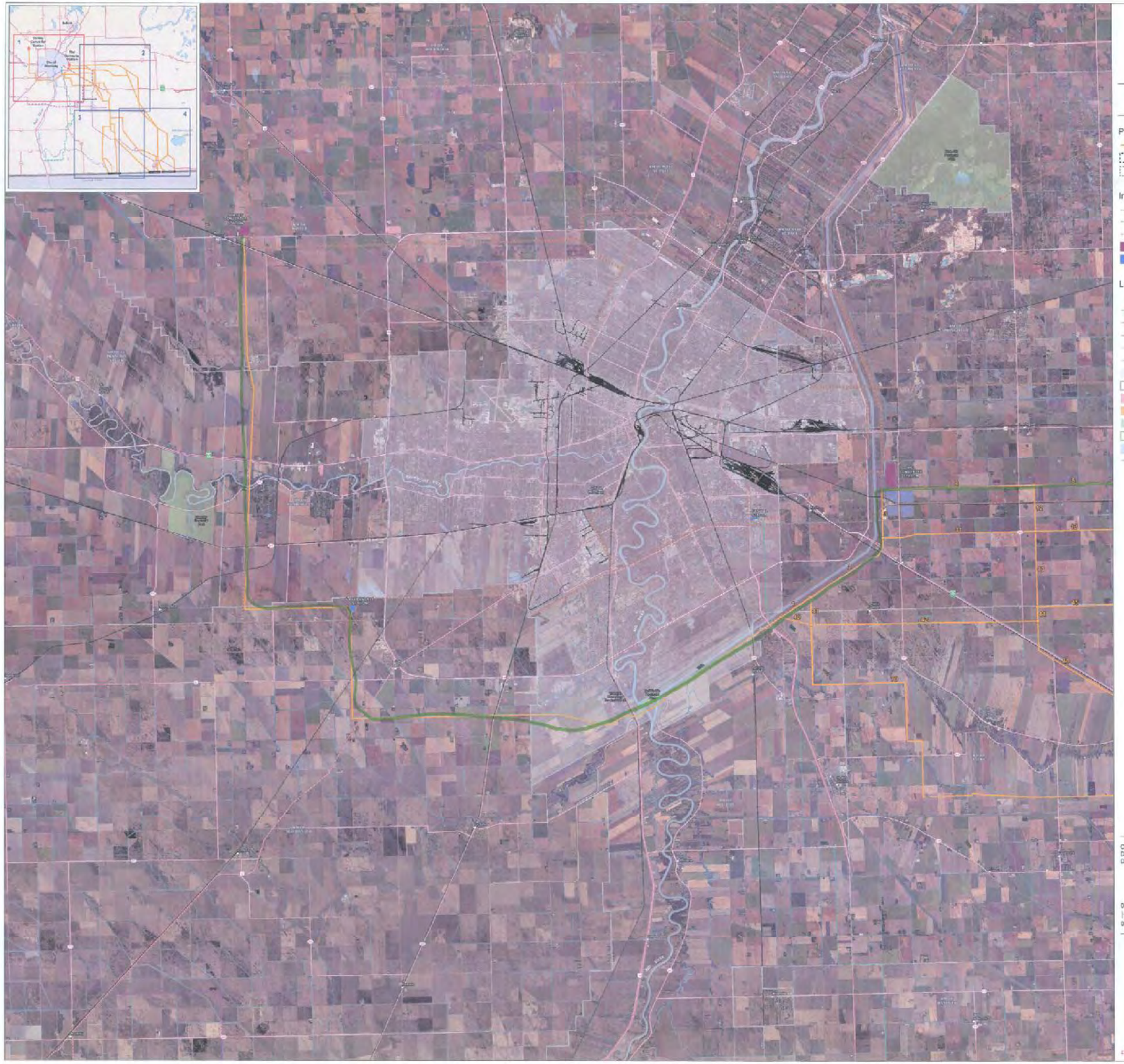
North Dakota
Minnesota



Manitoba Hydro

Manitoba-Minnesota Transmission Project

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Alternative Routes

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Map 1

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Manitoba-Minnesota Transmission Project

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Alternative Routes

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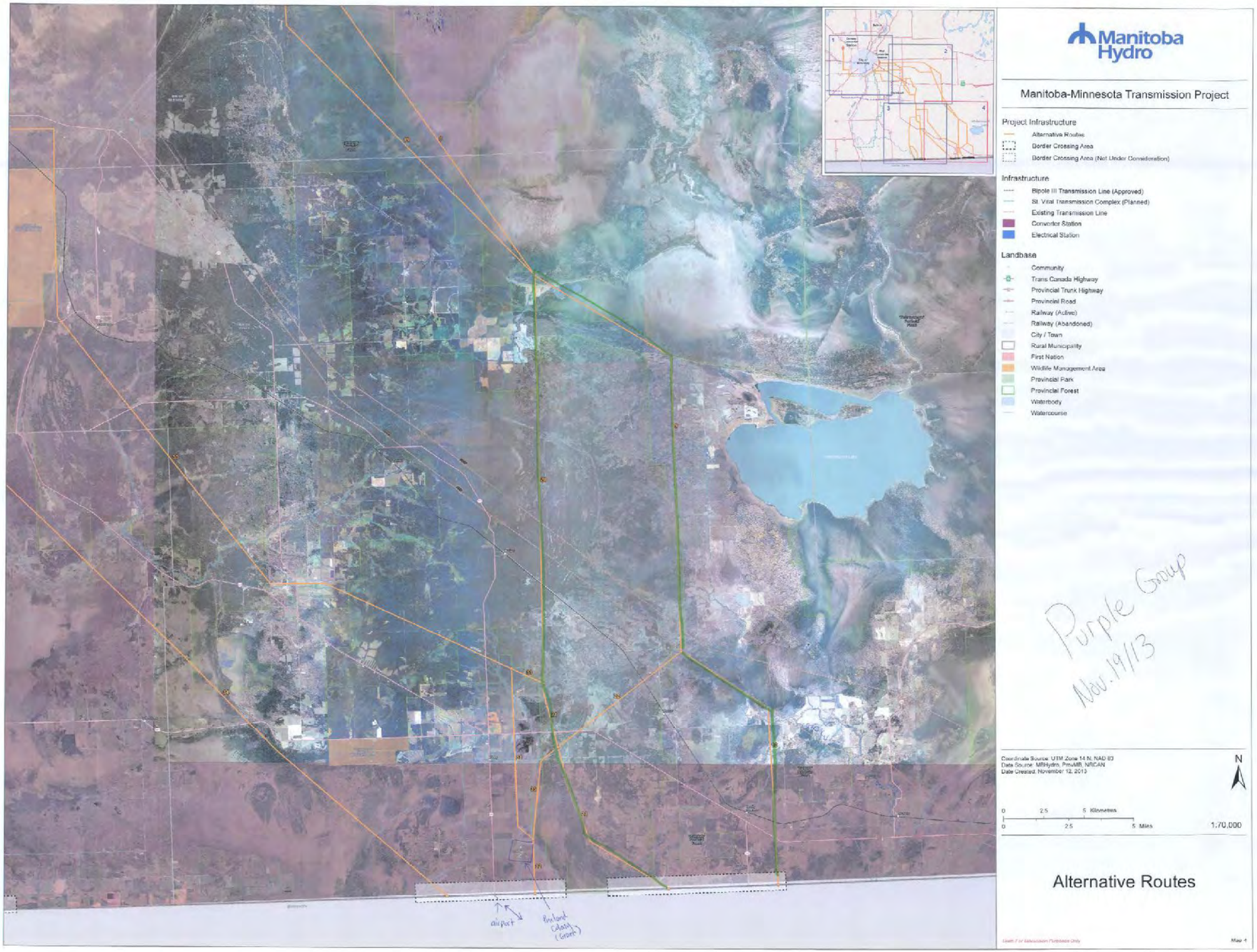
Map 2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Manitoba-Minnesota Transmission Project
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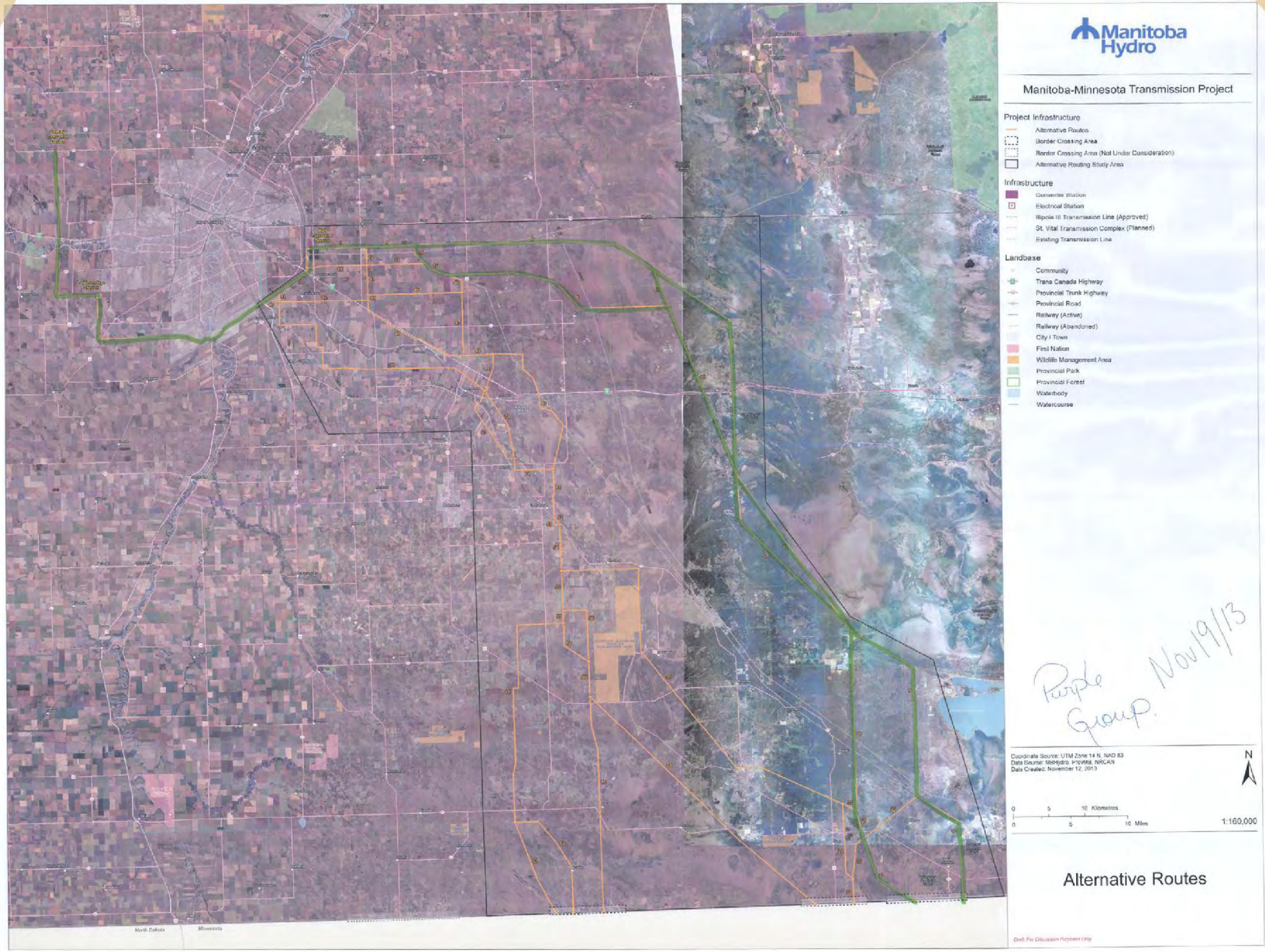
Alternative Routes
Map 1
airport
Portland Colony (Grant)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Coordinate Source: UTM Zone 14 N, NAD 83
Data Source: MbHydro, HydMtl, NRCAN
Date Created: November 12, 2013
N
0 5 10 Kilometres
0 5 10 Miles
1:160,000
Alternative Routes
Draft For Discussion Purposes Only
North Dakota
Minnesota

Appendix C

C1 – Contact Information and Scripts

C2 – Workshop Background Presentation

C3 – Workshop Workbook and Summary of Responses

C4 – Workshop Mapping Exercise Results

C5 – Workshop Comment Sheet and Responses

C6 – Stakeholder Group Meeting Minutes

Manitoba-Minnesota Transmission Project

Date _____

Workshop Comment Sheet

1. Name (optional), organization /department?

   _____

2. What do you think of the Workshop approach used to determine the Preliminary Alternative Routes and Preferred Border Crossing Locations?

   Very Appropriate Somewhat Appropriate Not Appropriate Don't Know

   _____

   _____

   _____

   _____

   _____

3. Please provide any comments you may have regarding the proposed Manitoba-Minnesota Transmission Project.

   _____

   _____

   _____

   _____

   _____

   _____

4. Overall what is your opinion of the Stakeholder Workshop?

   Liked Disliked No Opinion

   Why?_____

   _____

   _____

   _____

   _____

   _____

Please return you comment sheet to a Manitoba Hydro or AECOM representative at the Workshop.

Or complete it later and email, fax or mail your response to: Don Hester, AECOM, 99 Commerce Dr., Winnipeg, MB, R3P 0Y7 Don.Hester@aecom.com

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Date _____

5. Siting Criteria

How would you and your organization prioritize the following site criteria for transmission lines? Note: Please rank only your five most important (positive) site selection criteria from 1 (most important) to 5. Do not use the same ranking more than once.

Criteria	Rank (1 to 5)
Parallel existing transmission lines	
Follow existing highways or roadways	
Avoid Agricultural lands	
Follow undeveloped roadways	
Follow existing drainage ditches	
Separation from heritage/cultural sites	
Avoid wetlands/marshes	
Avoid forested/natural areas	
Separation from residences and urban areas	
Length of line	
Cost	
Other	

Manitoba Hydro

Date	2a. What do you think of the Workshop approach used to determine the Preliminary Alternative Routes and Preferred Border Crossing Locations?	2b. Comments	3. Please provide any comments you may have regarding the proposed MMTP.	4a. Overall what is your opinion of the Stakeholder Workshop?	4b. Why?
Nov 15-2013	Somewhat Appropriate	More detailed information especially regarding land ownership would be very useful.	-	Dislike	Found that it was disorganized when we sat and looked at different proposed line sections. With the low attendance, it wasn't very productive use of everyone's time.
Nov 15-2013	Somewhat Appropriate	Would obviously have worked better with more participants. Population of south east MB not represented.	Lack of local knowledge of areas outside of RM.	Liked	-
Nov 15-2013	Very Appropriate	Took into account a lot of the criteria used to select a route and engaged participants.	Realized the complexity of planning such a facility.	Liked	Facilitator did a very good job in leading the disucssion and engaging participants; important to get feedback from different stakeholders. Visuals were a bit hard to see at times (maybe too many people at one table & proximity of monitors).
Nov 19-2013	Very Appropriate	-	People and their homes and the environment are far more important than economics. People-their wishes and concerns must be a priority.	Liked	Appreciated getting more information and the availability of exact numbers and information on which to make recommendations.
Nov 19-2013	Very Appropriate	Difficult to focus on criteria only. Needs to emphasized more at beginning that it is the focus of the workshop.	-	Liked	Good and small group discussions.
Nov 19-2013	Very Appropriate	Identifying important criteria & ranking was useful to help in route seletion but need better explanation of dots, ie. H, M, L might be better or Positive vs. Negative, ie. avoid Ag land, stay on Crown.	-	Liked	Good mix of stakeholders. Good format, like the group facilitator, helpful to keeping discussion on track.
Nov 19-2013	Very Appropriate	I think it was a great opportunity to identify and discuss our concerns and help refine the selection criteria.	-	Liked	Great group discussion
Nov 19-2013	Very Appropriate	-	-	Liked	-

Date	5. Siting Criteria - How would you and your organization prioritize the following site criteria for transmission lines? Please rank only your five most important (positive) site selection criteria from 1 (most important) to 5. Do not use the same ranking more than once.												Other Comments
	Parallel existing transmissoin lines	Follow existing highways or roadways	Avoid agricultural lands	Follow undeveloped roadways	Follow existing drainage ditches	Separation from heritage/cultural sites	Avoid wetlands/marshes	Avoid forested/natural areas	Separation from residences and urban areas	Length of line	Cost	Other	
Nov 15-2013	-	-	-	4	3	-	2	1	5	-	-	-	-
Nov 15-2013	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov 15-2013	-	4	2	-	-	-	5	3	1	-	-	-	-
Nov 19-2013	2	3	-	4	5	-	-	-	1	-	-	-	-
Nov 19-2013	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov 19-2013	2	-	1	-	-	-	-	-	3	-	5	4	Proximity to livestock (TBD)
Nov 19-2013	3	4	1	-	-	-	-	-	2	-	-	-	-
Nov 19-2013	1	2	3	-	5	-	4	-	-	-	-	-	-

Appendix C

C1 – Contact Information and Scripts

C2 – Workshop Background Presentation

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C4 – Workshop Mapping Exercise Results

C5 – Workshop Comment Sheet and Responses

C6 – Stakeholder Group Meeting Minutes

RECORD OF MEETING

Title:	MMTP – AM Stakeholder Meeting Nov. 18
Date of Meeting:	Monday, November 18, 2013
Time:	
Location:	Manitoba Hydro 820 Taylor, Winnipeg
In Attendance:	MH - Trevor Joyal, Robin Gislason, Maggie Tisdale. Mark Clarke (Travel Manitoba), Bob Bodnaruk (RM of Springfield), Rob Kostihk (City of Winnipeg), Alanna Grey (Keystone Agricultual Producers), Ken Holme (K&E's Outfitting), Nevin Bachmeier (KAP), Cary Hamel (Nature Conservancy)
Meeting Description	MMTP – AM Stakeholder Meeting Nov. 18 --2013-11-18

Item	Description	Manitoba Hydro Response
1	Representative from RM of Springfield asked: What are the current long term rates the U.S. pays MH for power?	MH representative answered that the price is not public as it is different for each contract.
2	Representative from RM of Springfield asked: How does MH establish the weights for each criterion?	MH representative answered that the process is conducted by the MH team and is informed by the public engagement process. The weighting is informed and used after the first round of public engagement. A weighting exercise conducted with stakeholders was also used to inform the weighting process.

Item	Description	Manitoba Hydro Response
3	Springfield Rep: Is there an industry standard that would determine the weightings?	No because there are different issues and landscapes all across North America. MH is trying to be very transparent and clear on these weightings. Bipole III led us to learn MH needs to be much more transparent and give explanation for these weightings. The workshops and stakeholder meetings will assist in determining the weightings of each category.
4	Representative from KC's Outfitters: What are the preferred soil conditions for towers for the guyed towers?	Engineers prefer bedrock but can build through any terrain except for wide open water. Our engineers can build through marsh if necessary.
5	KAP Representative: Is the project comment sheet is on the website? KAP would like to insert the comment sheet into their newsletter. Would be a good opportunity to gain further insight from stakeholders unable to attend meetings and open houses	yes on the website as well as all the maps with potential segment options.
6	RM of Springfield: how does MH determine property values?	our property department will have a discussion with each individual landowner. Based on market values and current sales in the area. Expropriation is a last resort, MH does not want to expropriate

	Action Title	Date Completed
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Recorded By: Robin Gislason

RECORD OF MEETING

Title:	Manitoba Aerial Applicators
Date of Meeting:	Monday, December 16th, 2013
Time:	
Location:	820 Taylor, Manitoba Hydro
In Attendance:	Manitoba Hydro - Trevor Joyal, Robin Gislason, Manitoba Aerial Applicators - Mike Alarie
Meeting Description	Meeting with the Manitoba Aerial Applicators

Item	Description	Manitoba Hydro Response
1	If the route stayed east of segments 50 and 51 this would be most preferable to the Manitoba Aerial Applicators.	
2	Preference to parallel the #1	
3	Segments 3 and 5 have a considerable amount of spraying that occurs. There is a major drain in the area, and they would prefer the route stayed as close to the drain as possible. Then segments 11 or 13, 43, 44, 48, would be acceptable as a route.	
4	Preference to also parallel other existing lines, with enough space for the plane to go in between the lines. Also preferred to parallel with whatever else is already existing on the landscape.	

Item	Description	Manitoba Hydro Response
5	Preference to be very close to existing lines or a minimum of 2 miles apart from other existing lines.	
6	Segment 70 due to proximity to Bipole III is least preferred.	
7	Segment 47 – if we are routing in close proximity to an existing line it should be very close to it or at least 2 miles away.	
8	Preference is to follow the #1 highway the whole way east.	
9	Segment 48 would be preferred over segment 70.	
10	Every time a line changes direction 80 acres is lost for aerial application. This is a considerable economic impact to the applicators and the growers. Staircases are not preferable.	
11	Running a line the width of a river lot is very expensive and time consuming for the applicators. It would include many fly overs across narrow fields.	
12	There are a lot of airplanes and air travel to the west of segment 51. Hard to avoid conflict in that area.	
13	120 feet would be an acceptable offset if the route is infield so as to not be boxed in between two lines.	

Item	Description	Manitoba Hydro Response
14	Manitoba Aerial Applicators Representative would like to get in touch with the growers and have a discussion on the map to determine where would be the best route adjustment based on application and grower perspectives.	
15	Aerial applicators would prefer to avoid all river lots. If you do it should be parallel with the river lot not across the river lot. If you go in the middle of a section it is easier to deal with.	

	Action Title	Date Completed
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Recorded By: Robin Gislason

RECORD OF MEETING

Title:	Nature Conservancy stakeholder meeting
Date of Meeting:	Wednesday, December 11, 2013
Time:	
Location:	Winnipeg - Nature Conservancy Office
In Attendance:	Manitoba Hydro: Maggie Tisdale, Robin Gislason, and Mike Sweet (Stantec) Nature Conservancy: Kevin Teneycke, Carry Hammil, Julie Pelc, Tim Teetaert, Steven Gietz , Jeff Polokoff
Meeting Description	Nature Conservancy stakeholder meeting--2013-12-11

Item	Description	Manitoba Hydro Response
1	What type of criteria was used to determine the 3 border crossing areas?	High level of known opportunities and constraints on the landscape as well as "No go" areas: • Incompatible land uses • Areas of special interest and protected areas both on the southern and northern sides of the border •
2	Why was the 4th potential border crossing closer to highway 59 taken away?	It was determined on both sides of the border that routing to these border crossings would encounter a large number of private landowners, prime agricultural land, and an increasing amount of rural-residential development, aerial applicators.

Item	Description	Manitoba Hydro Response
3	Were the border crossings negotiated or did MN make the decisions?	The border crossing areas were negotiated between Manitoba Hydro and Minnesota Power.
4	Was there a consultation process on the selected border crossings?	No, the 3 border crossings presented in round 1 were selected based on an evaluation of data. The 3 potential crossings were then presented to the public and the information gleaned from round 1 public engagement will aid in reducing the number of routes under consideration, refining these routes and selecting a border crossing.
5	Why route in the middle of a section? (1/2 mile)	Manitoba Hydro cannot butt-up as close to the side of a road with a 500kv line as we can with a 230kv line (also recommended by Clean Environment Commission that routing on 1/2 mile in agricultural areas has less impacts as it is thought that in some instances it is easier for agricultural equipment to go around larger towers in the middle of a section as opposed to against a road or highway.

Item	Description	Manitoba Hydro Response
6	How do you determine the criteria from one project to the other? Does the criteria change from project to project?	Manitoba Hydro re-examines the criteria for each project and modifies or adds to the criteria in regards to the specific project. Some criteria such as routing away from homes does not change from project to project; technical criteria would change – ie – 230kv line vs. 500kv line – they have different needs in terms of size of ROW, size of towers, and mitigation. The MMTP project has routing options that move into diverse forested and wetland areas and hence additional criteria to evaluate the relative difference between route alternatives is needed.
7	When considering weighting criteria would the numeric value represent a range of native grasslands and the biodiversity included with that?	This is why Manitoba Hydro is here to talk to you today. Manitoba Hydro also met with Manitoba Protected Areas staff to have a similar conversation; to assist with determining weighting and value of each natural featuer and how to represent it. Built, natural, and technical perspectives all need to be input and used together to inform a balanced decision. Manitoba Hydro hopes to finalize the criteria and values of all the criteria by January in terms of the schedule and decision-making. The next round will further refine and determine a preferred route.

Item	Description	Manitoba Hydro Response
8	How can Manitoba Hydro move forward if you do not have the values and weightings in place for different species and biodiversities?	Manitoba Hydros objective is to want to narrow down and refine the routing options in January. From here a border crossing will be determined removing numerous segments. This evaluation fo route alternatives will include refinements offered through the public and stakeholder engagement processes. MN Power is undertaking a similar process to determine narrow down and refine route alternatives on their side of the border. MN Power and Manitoba Hydro have agreed to negotiate and maintain communication on the border crossings so there are no surprises when we come to the table to determine a final border crossing.
9	Is the criteria being used for MN Power and Manitoba Hydro the same? The Nature Conservancy is interested in learning about MN Power's process for weighting and valuing criteria when making choices.	Some of the criteria would be the same, however, MN Power is not a Crown Utility, therefore they are not able to expropriate, making avoiding homes and private property very important. They also have to avoid environmentally protected areas. They try to avoid agricultural land. They have different rules and regulations to follow, but have many of the same considerations as Manitoba Hydro.
10	Are biodiversity values the same in MN as they would be in MB? Is it possible to share information on the values and weightings to have the same type of prioritization process?	

Item	Description	Manitoba Hydro Response
11	The Nature Conservancy would also like to learn more about biodiversity values. How will Manitoba Hydro assess for biodiversity? The Nature Conservancy would like a secondary discussion with Manitoba Hydro on how it's measured.	Manitoba Hydro would welcome the opportunity to discuss further and will maintain contact with the Nature Conservancy as this process unfolds to continue the dialogue reltaed to biodiversity value and assessment.
12	How does mitigation influence the weighting and value system?	Mitigation is considered throughout the entire routing and planning proces. We start with broader value systems and get more detailed as the engagement process inputs get put into the model.
13	Is there a weighting per section? Yes through two methods:	1. Simple average weighting is done first; each criteria gets the same weighting input into the model 2. A second process is also completed where we test which routes come out on top if we give each criteria a higher value? Ideally we want achieve routing with the simple average as this balances the perspectives of built, natural and technical (33/33/33).
14	Do some of the design elements get impacted by natural criteria?	This comes later in the project. But what happens at this stage is to formulate the criteria. There is a consideration in determining the tower type as the towers planned for use on agricultural land are generally more expensive. Whereas guyed towers are used on uncultivated land. Also each 5x5 square on the grid has a weighted value based on criteria given by stakeholder feedback and data.

Item	Description	Manitoba Hydro Response
15	Manitoba Hydro should do a sensitivity analysis on the value of routing through natural land versus agricultural land. The value of public crown land vs. the cost to the agricultural producer would be beneficial.	Manitoba Hydro will take this into consideration.
	Does MN Power have a mirrored timeline?	Yes MN Powers timeline is similar, draft EIS date is October 2014. They will also have a longer construction phase as it is a much longer route than in MB.

Item	Description	Manitoba Hydro Response
	MAP DISCUSSION:	Nature Conservancy polygons are blue on the Manitoba Hydro map Nature Conservancy Map includes their tall grass prairie area (red boundary line); which goes into the US as well. Biggest swath of tall grass prairie in the region and is quite intact in terms of natural areas, most connected areas of wildlife management areas, connecting to the US and the Whitemouth and Sandiland areas. Not necessarily all prairie. (Blue boundary line) Whitemouth River Watershed – biggest peat expanse in southern MB. Whitemouth River has a distinct fish, Carmine Shiner. The Whitemouth River is considered a very important river for biodiversity. The Nature Conservancy areas are determined by what is most important to conserve with regards to biodiversity. The Nature Conservancy has mapped tall grass prairie in the area including quality and connectivity. Large mammal movement is also a surrogate for determining biodiversity importance. Nature Conservancy will prepare a response back to Manitoba Hydro on what we've learned today. Our concerns – avoid special areas identified by Nature Conservancy and talk more about potential opportunities to provide insight into natural area values. Nature Conservancy would like to be able to better answer questions from organizations like Manitoba Hydro. We are of the opinion that there is much better data out there and we are interested in learning more. Nature Conservancy would also like to carry on

	Action Title	Date Completed
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Recorded By: Robin Gislason

RECORD OF MEETING

Title:	IRMT Meeting
Date of Meeting:	Monday November 25, 2013
Time:	
Location:	Manitoba Conservation Office, Lac du Bonnet
In Attendance:	Morgan, Greg Carlson, Mitch Walker, Mike Lloyd, Derek Kroeker, Dunuit, Diane Oertel, Cheryl Prosser, Sue Atkin
Meeting Description	IRMT Meeting

Item	Description	Manitoba Hydro Response
1	In Vita area there is a Elk herd (Sprague herd). There are current concerns about opening up access in the area. Area residents want to have a draw for Elk. There are currently about 100 animals in the area around segments 60, 63, 61	Manitoba Hydro noted the concerns.
2	There was discussion about how many corridors Manitoba Hydro would need as there is a preference for Manitoba Hydro to follow existing ROWs. There is concern about opening new corridor. Could Manitoba Hydro rehabilitate old corridors?	Manitoba Hydro indicated that they follow existing infrastructure whenever possible.
3	There is a potential crocus near 61	*Send out shapefiles

	Action Title	Date Completed
1	Send out shapefiles.	Lindsay Thompson

Recorded By: Lindsay Thompson

RECORD OF MEETING

Title:	MMTP - PM Stakeholder Meeting November 18, 2013
Date of Meeting:	Monday, November 18, 2013
Time:	
Location:	Manitoba Hydro, 820 Taylor, Winnipeg
In Attendance:	MH - Trevor Joyal, Maggie Tisdale, Robin Gislason. Phil Keenan (MCWS), G. Caillier (MCWS), A. Melnyk (MIT), K. Jacobs (MCWS), J. Kelly ((MCWS), M. Erb (MARFI), E. Roberge (MCWS), Myra Sitchon (Mb Tourism, Culture, Sport, and Historic Resources
Meeting Description	MMTP - PM Stakeholder Meeting November 18_ 2013--2013-11-18

Item	Description	Manitoba Hydro Response
1	MCWS representative: There are areas designated for future protection but are not designated right now. It seems that this process does not consider these high quality habitat spaces. The future wildlife habitat data set is available and should be involved in this process. Is MH doing this?	These routes have not been analyzed and have not yet gone through the model. Evaluation comes next. The conversations regarding the high quality habitat are happening right now. The EPRI model takes this into consideration but is only one lense of measurement. The other is information that cannot be put into statistical numbers. Habitat fragmentation also has not yet been addressed.

Item	Description	Manitoba Hydro Response
2	MCWS representative: The high quality habitat modeling was not done for St. Vital/Letellier but should be done for this project. It is important to ensure that this data is going to be incorporated even if the data is currently not available at this stage. MCWS rep wants to make sure this wasn't missed. Also modeling for species at risk should be included.	it can and will definitely come in a future stage.
3	Manitoba Culture representative enquired as to how MH will address concerns around culturally and historically significant sites in the region.	Right now MH is looking at culture and heritage sites that are known. In the next stage if it is deemed necessary through public engagement that potential unidentified sites do occur, MH will go out and gather this information and include in the model.
4	MAFRI representative – concern around applying manure and livestock operations. How will a potential RoW with towers affect these operations?	The tower placement on these types of land will provide enough room between towers for the machinery and equipment to move under the line and between the towers efficiently. The MH Property Department with work with individual landowners to determine the best tower placement on their land.
5	MCWS – why would MH select a regulatory process with more hoops. Ie – why not just the NEB process and not including the Provincial process?	this is a MB project that directly affects the residents of Mb and therefore should go through this process to ensure the residents of the province are considered throughout the process.
6	Myra Sitchon requested a shape file or google earth kml file of the proposed routes. Send to Myra Sitchon myra.sitchon@gov.mb.ca. Much easier for her to then overlay on their data to see if there are any concerns.	

	Action Title	Date Completed
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Recorded By: Robin Gislason

RECORD OF MEETING

Title:	Seine-Rat River Conservation District
Date of Meeting:	Tuesday, December 17, 2013
Time:	
Location:	SRRCD Office, La Broquerie, Manitoba
In Attendance:	MH – Robin Gislason and Pat McGarry, SRRCD - Cornie Goertzen - Chairman (Sub-District 3/4), Jim Swidersky – Vice-Chairman (Sub-District 3/4), Ed Penner (Sub-District 2), Gerry Maynard (Sub-District 5), Germain Roy (Sub-District 6), Earl Funk (Sub-District 7), Bob Brandt (Sub-District 8), Art Bergmann (Sub-District 9), Larry Bugera (Provincial Appointee), Jodi Goertzen (CD manager)
Meeting Description	Meeting with Seine/Rat River Conservation District

Item	Description	Manitoba Hydro Response
1	The RM of DeSalaberry representative requested information on closure of Manitoba Hydro district offices in southern Manitoba.	The Manitoba Hydro representative indicated he would follow up and provide the board further information.
2	The RM of DeSalaberry representative asked for the Manitoba Hydro representative to please explain why Bipole III is going down the west side of the Province instead of the East?	The Manitoba Hydro representative indicated that the government of the day's decision was to route down the west side of the Province to avoid the potential World Heritage Site on the east side of Lake Winnipeg. It was also felt that there would be a down fall to export markets if the Bipole III was attached to a project going through the World Heritage site.

Item	Description	Manitoba Hydro Response
3	The RM of DeSalaberry representative asked if the RM had ever received compensation for lines going through the RM? RMs should be compensated as the land value will decrease if there are transmission lines going through an RM making the tax base lower.	The Manitoba Hydro representative explained that the RM's only receive compensation if the line is on RM owned land. There is only compensation for private land owners.
4	The RM of Stuartburn representative requested a second meeting other than the previous open house as a particular land owner did not like the way the presentation occurred with storyboards. More discussion is preferred.	The Manitoba Hydro representative noted the requested.
5	The RM of Stuartburn representative asked when was the last time Manitoba Hydro spoke with the landowner who had issues with the open House and engagement strategies for MMTP?	The Manitoba Hydro representative explained that they will follow up with Reeve of Stuartburn.
6	The RM of Stuartburn representative asked if there is a way for southern MB to tap into this line for emergency purposes or is it just for export purposes?	The Manitoba Hydro representative indicated that the proposed transmission line is for export only. The St. Vital Letellier Line will add additional reliability for the growing population and industrial purposes in southern Manitoba.
7	The RM of Stuartburn representative indicated that there are many problems with the 66kv distribution lines around here. Reliability is extremely poor.	The Manitoba Hydro representative indicated that the Manitoba-Minnesota Transmission Project is an international transmission line and totally separate from distribution lines. The Manitoba Hydro representative will follow up with the distribution issues.

Item	Description	Manitoba Hydro Response
8	The RM of Stuartburn representative explained that the community finds issues with realizing the direct benefit of these export transmission lines to their communities and families.	The Manitoba Hydro representative indicated that the benefits come through revenue to Manitoba Hydro which is direct revenue to the Province of Manitoba. The Manitoba-Minnesota Transmission Project will also offset rate increases for Manitobans.
9	The RM of Stuartburn representative explained that the RM of Stuartburn and Piney have the least amount of reliability in their lines. Last winter the power was out for 8 days. They are upset that the domestic service is terrible but yet a new large transmission line is going right through these RMs yet their service and reliability is very poor.	The Manitoba Hydro representative indicated that export sales offset rates and create revenue. It is recognized that there is aging infrastructure for domestic purposes that needs to be updated. Manitoba Hydro is in the middle of a large upgrade to the system within the Province of Manitoba.
10	The RM representatives asked if Minnesota Power has a preference for the border crossing?	The Manitoba Hydro representative explained that Minnesota Power will have a preference as does Manitoba Hydro. A process and negotiation is occurring right now to come to an agreement.
11	The SRRCD representatives asked if Manitoba Hydro hires construction companies and consultants in the local area to support local business?	The Manitoba Hydro will take this into consideration and will hire local companies and consultants whenever possible.
12	The SRRCD representatives asked how does Manitoba Hydro respond to concerns regarding health and EMF concerns?	The Manitoba Hydro representative indicated that Manitoba Hydro provides worldwide literature and literature from Health Canada and the World Health Organization on the health concerns. We encourage residents to do their own research as well to make their own decisions on the concerns. International research on EMF indicates there are no known health effects from hydro-electric transmission lines.

Item	Description	Manitoba Hydro Response
13	The SRRCD representative indicated their routing preference criteria:• Least amount of residences impacted• Preferable to route away from highways, railroads and valuable agricultural land	The Manitoba Hydro representative noted the preferences.
14	The SRRCD representative explained that the conservation district was created to maintain ecological areas in producer land. Therefore, the issues of the transmission lines being in agricultural areas are: • Bigger agricultural equipment makes it harder to get around the towers • As the producer moves around the tower, you never move soil away from the tower, but continually moves soil towards the tower. • Aerial spraying – crops that are vulnerable to insects need aerial spraying some years.	The Manitoba Hydro representative noted the issues.

Item	Description	Manitoba Hydro Response
15	The SRRCD representative discussed routing preferences on the map provided for the meeting:• Preference is to route away from the #1 highway due to proximity to railroads and highways as well as agricultural land and residences. • Preference to route through the most northerly and easterly segments. • Fire road 13 as a segment is preferred which also runs fairly parallel to D602F. Runs north of the #1 all the way to segment 34. • Segment 60 is preferred due to easy accessibility for maintenance and would connect to fire road 13. This route would also avoid the tall grass prairie. • Segment 48 is not preferred. •Preferable to go east between highway 15 and #1 highway. Once on the east side of #12 highway there is also not nearly as much agricultural land. • Segments 53-55 are not preferable as the area has way too much agriculture and too difficult to mitigate. • Segment 50 includes Paradise village which the SRRCD absolutely wants to avoid. • Preferred route would be segment 16 then cut through Ross and St. Genevive	The Manitoba Hydro representative noted the preferences.

Item	Description	Manitoba Hydro Response
	• Firegaurd 31 is very close to segment 18. This would be a preferred route as well. • Segment 50 goes right through the Giroux Bog (Balsam Willows Proposed Protected Area). SRRCD is interested in retaining water in this area. • SRRCD would like to see fireguard road 13 from Marchand south to highway 12, could be extended to assist with water retention and would also be useful for a Hydro RoW as well. Can the SRRCD work together with Manitoba Hydro? This would be a beneficial project to both Manitoba Hydro and SRRCD.	
16	The RM representatives discussed routing preferences on the map provided for the meeting: • Would prefer the more easterly route which runs through Provincial Crown lands which puts it out of site. • East of Ross all the way down the #12 highway. Virtually all crown land and would also be accessible in terms of maintenance, etc. • The route should go through Crown forests. It was indicated there are enough bogs in the area that will ensure recreational users do not over run the area. They will not be able to travel long distances as the bogs will ensure trails are not long.	The Manitoba Hydro representative noted the preferences and indicated they would be happy to continue working with SRRCD on routing and informing the public on the project.

	Action Title	Date Completed
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Recorded By: Robin Gislason

RECORD OF MEETING

Title:	Meeting With Manitoba Trappers Association
Date of Meeting:	
Time:	
Location:	Lac du Bonnet - MB Trappers Association offices
In Attendance:	Stu Jansen, Trevor Barker, Pat McGarry
Meeting Description	

Item	Description	Manitoba Hydro Response
1	The Trappers Association have no real issue or preference for route location or criteria. The Trappers Association responded that they have no allocation in open trapping areas.	A Manitoba Hydro representative asked to provide information on potential issues if a route was in the eastern open trapping area.
2	The Trappers Assocation explained that pine marten more important species for trappers. A ROW can increase predation by raptors for marten	
3	The Trappers assocation described how mowed and low grass ROW like on D602F can be barrier to small mamals crossing the ROW. Leaving a low shrub community on ROW is beneficial especially where natural small mammal trails cross the ROW.	

Item	Description	Manitoba Hydro Response
4	The Trappers Association suggested creating an edge effect along ROW by reducing straight line cutting to edge of ROW.	
5	The Trappers Association suggested creating an edge effect along ROW by reducing straight line cutting to edge of ROW.	
6	The Trappers Assocation talked about access and how it can benefit trappers	
7	The Trappers Assocation did not recommend paralleling roads and leaving a buffer strip between road and ROW. ROW should be adjacent to road where it occurs.	
8	The Trappers Assocation provided suggestions for engaging local trappers in the MMTP engagement process: They recommended that Manitoba Hydro set-up information table at North American Fur Auction (NAFA) in early January. Leave newsletter and notice of a meeting/workshop for interested trappers to attend late in January	

	Action Title	Date Completed
1	Trevor Barker to contact NAFA group to discuss possibility of set-up. Also contact Roger? with similar idea for eastern region.	Trevor Barker
2	PM to follow-up with PEP team on execution and timing.	Patrick McGarry

Recorded By: Pat McGarry

Appendix D

D1 – Open House Advertising

D2 – Open House Storyboards and Route Selection Presentation

D3 – Open House Handouts and Comment Sheet

D4 – Open House Comment Sheet Responses

D5 – Open House Mapping Exercise Results

We want to hear from you.

Manitoba–Minnesota Transmission Project

Nous voulons vous entendre.

Projet de transmission Manitoba–Minnesota

Manitoba Hydro is proposing to construct a 500-kilovolt AC (alternating current) transmission line from Winnipeg to Minnesota to sell surplus power and to enhance the reliability of supply in Manitoba in times of drought or emergency.

You are invited to drop by an open house to gather project information and share your local knowledge in the review of alternative routes which will assist in the determination of a border crossing for the project.

Open houses will be held from 4:00 to 8:00 p.m. Staff will be available to provide project information and answer questions. Refreshments will be served.

Manitoba Hydro propose de construire une ligne de transmission à courant alternatif de 500 kilovolts entre Winnipeg et le Minnesota pour vendre son surplus d'énergie et augmenter la fiabilité de l'alimentation au Manitoba pendant les périodes de sécheresse ou en cas d'urgence.

Nous vous invitons à participer à l'une ou l'autre des journées portes ouvertes pour recueillir des informations sur le projet. Vous pourrez communiquer vos connaissances locales lors de l'examen des tracés possibles et aider à l'établissement d'un point de passage frontalier pour le projet.

Des membres du personnel seront sur place pour fournir des renseignements sur le projet et répondre aux questions. **Les journées portes ouvertes se dérouleront de 16 h à 20 h.** Des rafraîchissements seront servis.

Headingley

November 12
Headingley Community Centre
5353 Portage Avenue

12 novembre
Centre communautaire de Headingley
5353, avenue Portage

Winnipeg

November 13
Winakwa Community Centre
980 Winakwa Road

13 novembre
Centre communautaire Winakwa
980, chemin Winakwa

Ste. Anne

November 14
Seine River Banquet Centre
80A Arena Road

14 novembre
Salle de réception Rivière Seine
80A, chemin Arena

Steinbach

November 19
Friedensfeld Community Centre
32004 Road 35E

19 novembre
Centre communautaire Friedensfeld
32004, chemin 35E

Vita

November 20
Vita Community Hall
209 Main Street North

20 novembre
Salle communautaire de Vita
209, rue Main Nord

Piney

November 21
Piney Community Center
Highway 89

21 novembre
Centre communautaire de Piney
Route 89

Marchand

November 26
Marchand Community Club
Dobson Ave.

26 novembre
Club communautaire de Marchand
Avenue Dobson

Anola

November 27
Anola Over 50 Club
Wieser Crescent

27 novembre
Anola Over 50 Club
Promenade Wieser

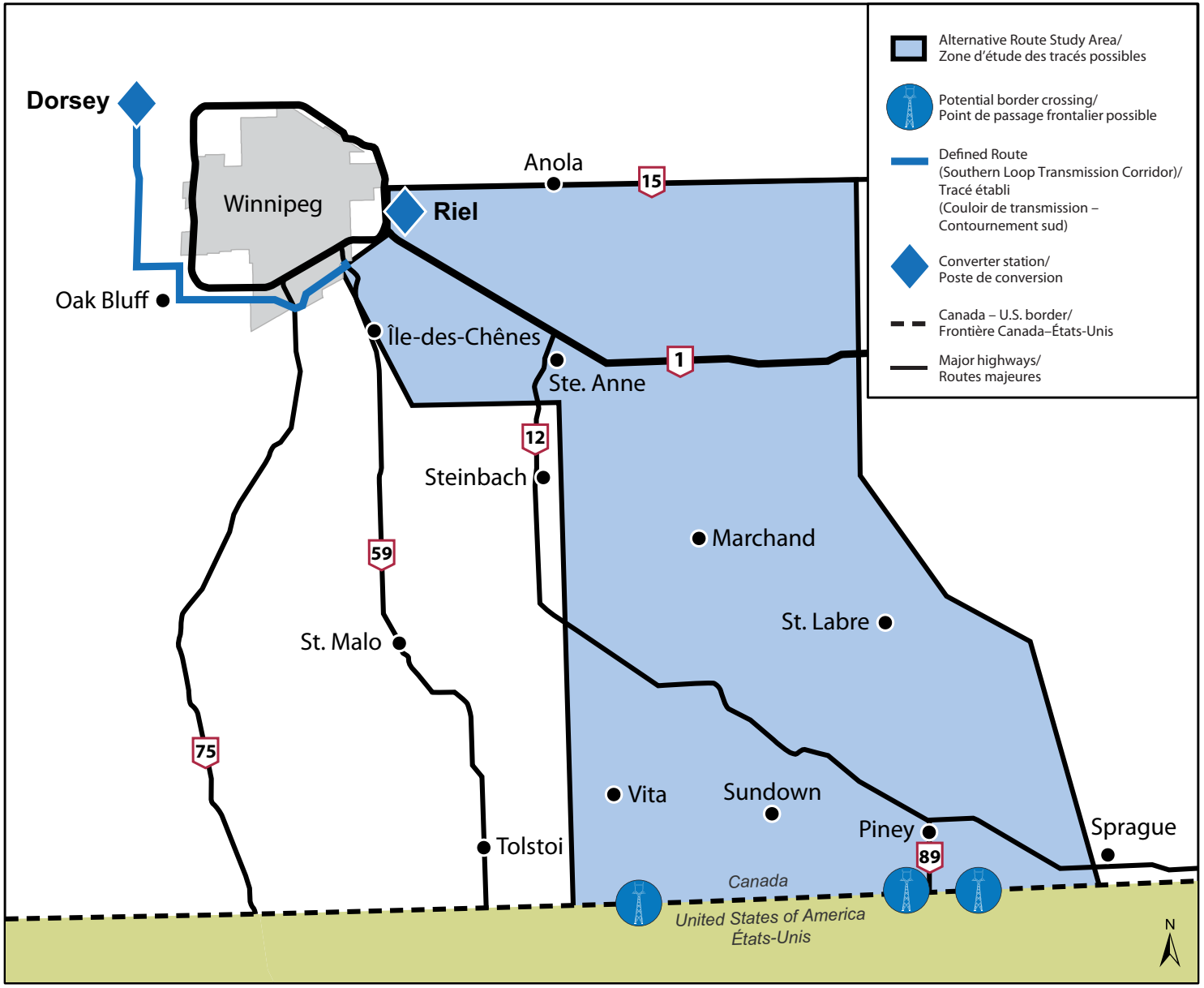
Île-des-Chênes

November 28
TransCanada Centre
1 Rivard Street

28 novembre
Centre TransCanada
1, rue Rivard

Manitoba Hydro

Alternative route study area and border crossing options
Zone d'étude des tracés possibles et options de points de passage frontaliers



This map outlines the three border crossings under consideration and the geographic focus of the engagement and routing process.

Alternative routes for the three border crossings will be presented at the open houses and posted on our website.

For more information on the Manitoba–Minnesota Transmission Project and how you can become involved, please visit the project website at: **www.hydro.mb.ca/mmtp** or contact a project team member at:
Project info line: **1-877-343-1631;**
in Winnipeg: **204-360-7888**
email: **mmtp@hydro.mb.ca**

La carte indique les trois points de passage frontaliers à l'étude ainsi que la zone géographique visée pour le processus de dialogue et d'établissement de tracé.

Les tracés possibles associés aux trois points de passage frontaliers seront présentés aux journées portes ouvertes et affichés sur notre site Web.

Pour plus de renseignements sur le Projet de transmission Manitoba–Minnesota et sur comment y participer, veuillez visiter le site Web du projet **www.hydro.mb.ca/mmtp** ou communiquer avec un membre de l'équipe du projet.
Ligne d'information : **1 877 343-1631**
À Winnipeg : **204 360-7888**
Courriel : **mmtp@hydro.mb.ca**

We want to hear from you.

Manitoba–Minnesota Transmission Project
Glenboro Station Expansion

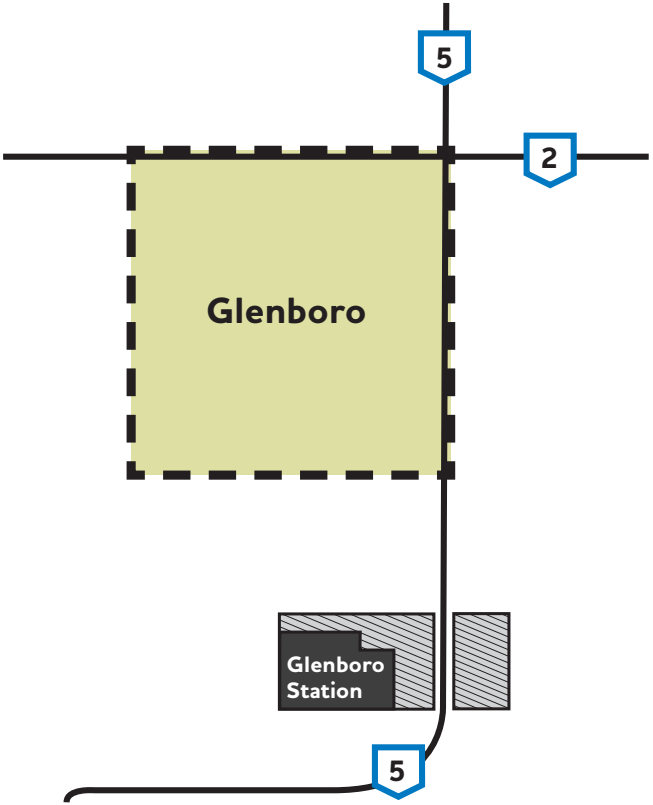
Manitoba Hydro is proposing to construct a 500-kilovolt transmission line from Winnipeg to Minnesota to sell surplus power and to enhance the reliability of supply in Manitoba in times of drought or emergency.

As part of the project, we will be modifying and upgrading our Dorsey, Riel and Glenboro stations in order to accommodate the line within the Manitoba Hydro system. Expansion of the Glenboro Station and the relocation of transmission line towers will be required.

You are invited to drop by the open house to gather project information and share your knowledge of your area. Your input will help Manitoba Hydro address concerns related to this portion of the project. Staff will be on hand to provide project information and answer questions. Refreshments will be served.

Glenboro
Wednesday, December 4
4 to 8 p.m.
Glenboro Community Hall
900 Railway Ave.

Manitoba Hydro



Legend

Existing Glenboro Station

Station expansion and tower relocation area

Glenboro Station Expansion Project

For more information on the Manitoba – Minnesota Transmission Project and how you can become involved, please visit Manitoba Hydro's website or contact us at:

Website: www.hydro.mb.ca/mmtp
Email: mmtp@hydro.mb.ca
Project info line (toll-free): 1-877-343-1631
In Winnipeg: 204-360-7888

Manitoba Hydro

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Manitoba–Minnesota Transmission Project
Glenboro Station Expansion

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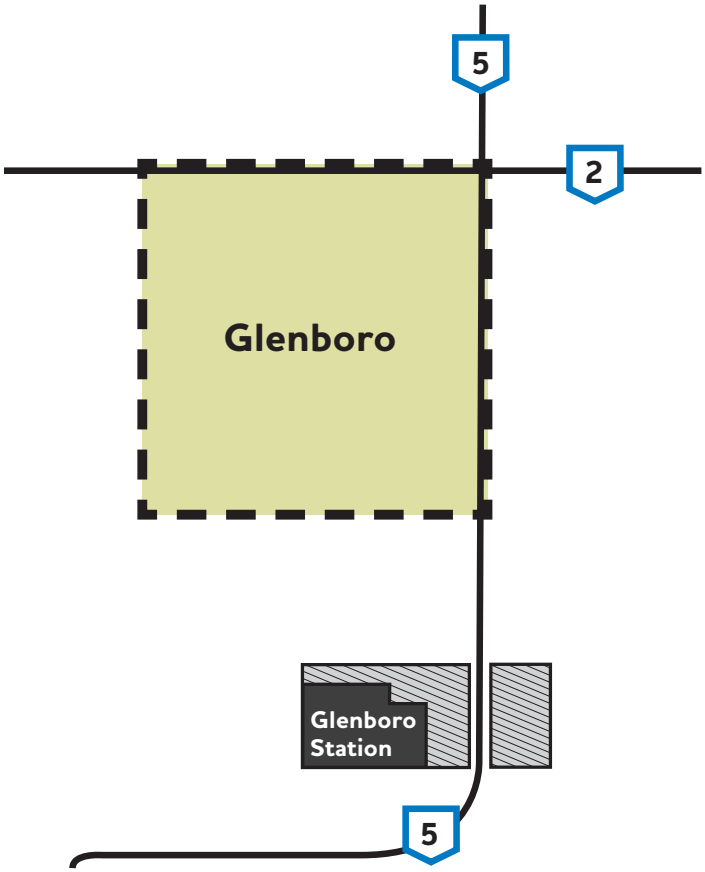
You are invited to drop by the open house to gather project information and share your knowledge of your area. Your input will help Manitoba Hydro address concerns related to this portion of the project. Staff will be on hand to provide project information and answer questions. Refreshments will be served.

New date

Glenboro
Thursday, December 12
4 to 8 p.m.
Glenboro Community Hall
900 Railway Ave.

December 4 event cancelled due to poor road conditions.



Legend

- Existing Glenboro Station
- Station expansion and tower relocation area

Glenboro Station Expansion Project

For more information on the Manitoba–Minnesota Transmission Project and how you can become involved, please visit Manitoba Hydro's website or contact us at:

Website: www.hydro.mb.ca/mmtp
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Manitoba Hydro

Appendix D

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Public Open House
Manitoba-Minnesota Transmission Project

Welcome

Manitoba Hydro

Purpose of the Open House

- Provide information about the proposed Manitoba-Minnesota Transmission Project
- Gather feedback on alternative routes and border crossings.
- Identify interests, opportunities and constraints to inform the route selection and environmental assessment; and
- Answer questions and address local concerns.

Manitoba Hydro

Project Need

The Manitoba-Minnesota Transmission Project is needed to:

- Export electric power based on current sales agreements.
- Improve reliability and import capacity in emergency and drought situations; and
- Increase Manitoba Hydro access to markets in the United States.

Manitoba Hydro

Why does Manitoba export and import power?

- In 2012–13 Manitoba Hydro export sales totaled $353 million with 88 per cent derived from sales in the U.S. market, and 12 per cent from Canadian markets.
- Manitoba Hydro's utility customers in the United States want long-term price certainty and stability. These utilities see value in purchasing hydroelectricity through long-term fixed contracts that are not linked to volatile natural gas prices and will not be subject to future changes in regulatory requirements associated with air emissions.

Manitoba Hydro

Why does Manitoba export and import power?

- This project will meet a 250-mega watt (MW) power sale with Minnesota Power and will allow for increased access to markets in the United States.
- Manitoba Hydro also imports power in drought conditions to meet provincial demand when it exceeds Manitoba Hydro's generating capacity.

Manitoba Hydro

Project Description

- **The Manitoba-Minnesota Transmission Project includes:**
  - construction of a 500-kV AC transmission line in southeastern Manitoba
  - upgrades to associated stations at Dorsey, Riel, and Glenboro
- **The transmission line will travel to one of three border crossings.**
- **The project will connect at the Minnesota border to the Great Northern Transmission Line, constructed by Minnesota Power**
- **Anticipated in-service date is 2020.**
- **Estimated cost is $350 million.**

Manitoba Hydro

Station Modifications

Dorsey & Riel Converter stations

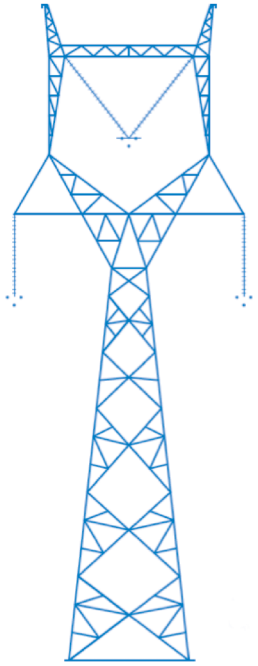
- Upgrades (equipment) needed to accommodate the 500-kV AC line.
- All upgrades will be undertaken within fenced area of both stations.

Glenboro station

- Station expansion needed (east).
- Equipment upgrades.
- Current terminus of an existing import/export line.
- Tower relocation will be necessary.
- Engagement process being undertaken with local residents to explain the expansion and address any concerns.

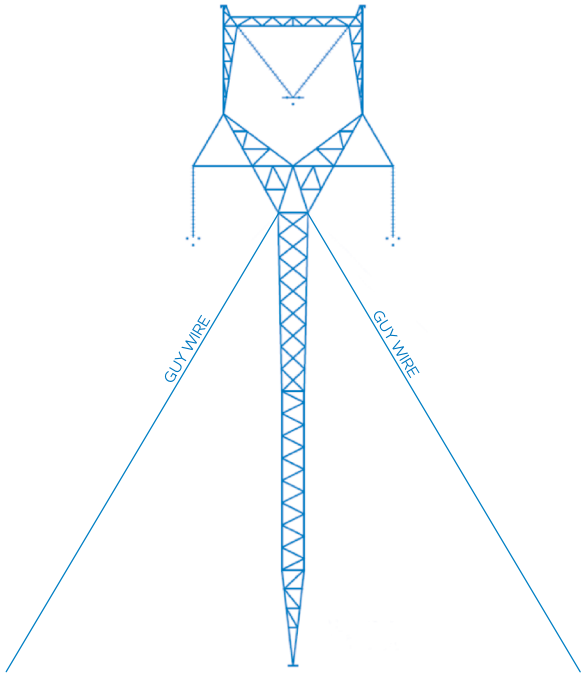
Manitoba Hydro

Preliminary Tower Design



Self Supporting Structure (cultivated lands).
(Towers are not drawn to scale — conceptual only.)

- **Steel lattice towers:**
  - Self-supporting towers in cultivated agricultural areas;
  - Guyed structures will be used in all other terrain.
- **Current design anticipates:**
  - range from 40 to 60 m (130 to 200 ft) in height.
  - average span of 400 to 500 m (1300 to 1650 ft) apart.
  - utilize a right-of-way width of 80 to 100 m (260 to 330 ft).



Guyed Wire Structure (Non-cultivated lands)
(Angle of guy wires depicted on tower are not accurate — conceptual only.)

Manitoba Hydro

Regulatory

- **The Manitoba-Minnesota Transmission Project is subject to environmental regulatory review and approval, including:**
  - Authorization of an international power line, which is required under the *National Energy Board (NEB) Act*.
  - Environmental assessment by NEB under the *Canadian Environmental Assessment Act*, 2012.
  - Reviewing and licensing by Manitoba Conservation and Water Stewardship under *The Environment Act* (Manitoba); and
  - Under the direction of the Minister, the Clean Environment Commission may hold a public hearing.
- **Further information on the regulatory process will be provided as information becomes available.**

Manitoba Hydro

Environmental Assessment

- **Construction of the proposed transmission line will require a Class 3 License under *The Environment Act* (Manitoba).**
- **The Environmental Impact Statement (EIS) for the project will include:**
  - Study area characterization;
  - Public engagement program;
  - Assessment of potential environmental and socio-economic effects;
  - Assessment of cumulative effects;
  - Mitigation measures and monitoring plans; and
  - An environmental protection program.

Manitoba Hydro

Environmental Assessment VCs

- **The environmental assessment determines Valued Components (VCs)**
  - **VC definition:** any part of the human and natural environment that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of societal or cultural values, scientific interest or concern.
- **VCs are selected by:**
  - Utilizing experience from other, similar projects.
  - Getting input from specialists in the various disciplines.
  - Collecting input from interested stakeholders and the public.

Manitoba Hydro

Stakeholder and Public Engagement

- **Manitoba Hydro will seek input from local landowners, First Nations, the Manitoba Métis Federation, local municipalities, stakeholder groups, government departments and the general public during the route selection and environmental assessment process.**
- **Engagement process will include:**
  - Key Person Interviews;
  - Workshops;
  - Public open houses;
  - Email and telephone contacts;
  - Website and newsletters; and
  - Meetings.

Manitoba Hydro

Engagement Process

Round 1:

October to November 2013

- Introduce the Project.
- Present alternative routes and proposed border crossings.
- Answer questions.
- Identify and document concerns.
- Use input to guide route refinement & preferred border crossing selection.

Round 2:

April to June 2014

- Present findings of Round 1.
- Present refined alternative routes to preferred border crossing.
- Answer questions.
- Identify and document concerns.
- Use input to guide preferred route selection.

Round 3:

October to December 2014

- Present findings of Round 2.
- Present the preferred route.
- Answer questions.
- Identify and document outstanding concerns.
- Discuss potential effects and possible mitigation measures to minimize effects.

Route Selection Process

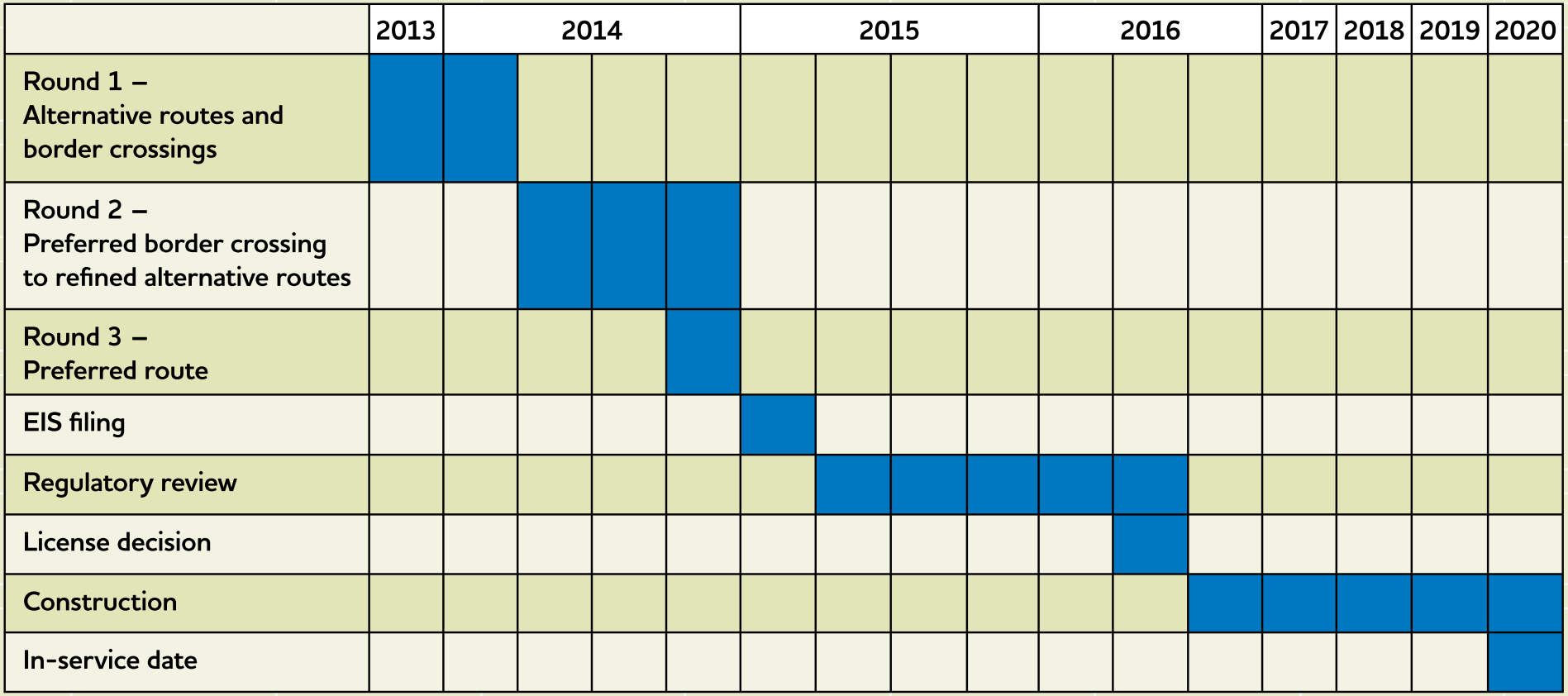
- **The routing process is based on the EPRI-GTC methodology* which includes:**
  - Earlier stakeholder input into the route selection process to help guide alternative route selection;
  - Balancing of multiple perspectives from natural, technical and socio-economic.

For more information on this methodology, visit our project webpage at **www.hydro.mb.ca/mmtp** or speak with a Manitoba Hydro representative.

* Electrical Power Research Institute

Manitoba Hydro

Project Timelines



Manitoba Hydro

The project team wants to hear from you!

- Manitoba Hydro representatives are available to answer your questions.
- Please take a moment to complete a comment sheet so the project team can document your concerns.
- You can also visit a map station to show us where you may have any information or additional considerations regarding the alternative routes.

Manitoba Hydro

The project team wants to hear from you!

- **Please contact:**
  Licensing & Environmental Assessment Department
  Toll Free: 1-877-343-1631
  In Winnipeg: 204-360-4305
  Email: mmtp@hydro.mb.ca
- **Visit the project webpage at www.hydro.mb.ca/mmtp for up-to-date information, and register to receive project updates**
- **Display boards and the Manitoba-Minnesota Transmission Project comment sheets are also available on the project webpage.**

Manitoba Hydro

Thank you for attending and providing your feedback!

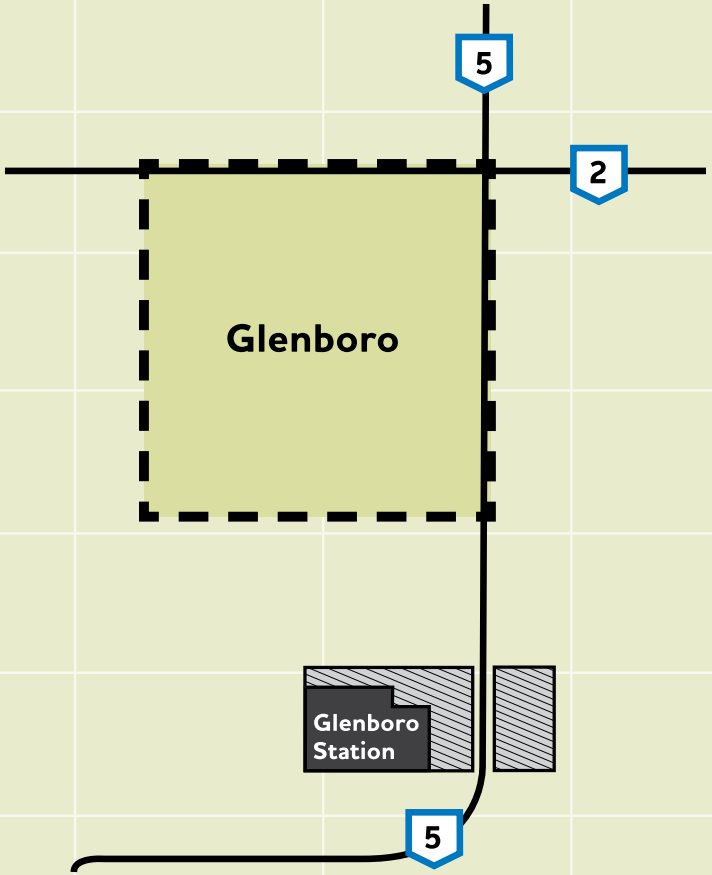
Manitoba Hydro

Glenboro Station Modifications

- Although distant from the proposed transmission line, modifications to Glenboro Station will be required, including extending the current switch yard and installing additional equipment.
- Due to the expansion of the station, towers in proximity will be relocated.
- Expansion of the station is an additional 420ft. x 195ft.

Manitoba Hydro

Glenboro Station Expansion Project



Legend

Existing Glenboro Station

Station expansion and tower relocation area

Manitoba Hydro

View of Glenboro South Station

Manitoba Hydro

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Manitoba-Minnesota Transmission Project

Round 1 – Public Engagement
Alternative Routes & Potential Border Crossings

What is it?

Manitoba Hydro is proposing construction of a 500-kilovolt (kV) alternating current (AC) transmission line from the Dorsey Station to the international border between Manitoba and Minnesota. Known as the Manitoba-Minnesota Transmission Project, this line is needed to export surplus electricity and enhance the reliability of the province's electricity supply in emergency and drought situations.

The project also includes upgrades to associated stations at Dorsey, Riel and Glenboro. The anticipated in-service date for the project is 2020.

Where is it?

The Manitoba-Minnesota Transmission Project will originate at the Dorsey Converter Station, located near Rosser, northwest of Winnipeg, and travel south around Winnipeg along what is known as the Southern Loop corridor. (Please see map on page three.) From southeast Winnipeg, the transmission line will continue south crossing the Manitoba-Minnesota border at one of the border crossing locations currently under consideration. (Please see map on pages four and five.) It will then connect to the Great Northern Transmission Line, which will be constructed by Minnesota Power, and ultimately terminate at the Blackberry Station located northwest of Duluth, Minnesota.

Manitoba Hydro

Part of Manitoba Hydro's plan to meet future electricity needs

Electricity use in Manitoba is projected to grow by 1.6 per cent annually (80 megawatts per year) over the next two decades. New sources of electricity will be needed to supply the province by 2023.

To meet this need, Manitoba Hydro is continuing a path of investing in predominantly hydro generation with enhanced access to export markets.

Specifically, Manitoba Hydro's development plan includes:

- construction of the 695-megawatt Keeyask Generating Station on the Nelson River;
- construction of the 1,485-megawatt Conawapa Generating Station;
- construction of domestic AC transmission facilities associated with the future Keeyask and Conawapa generating stations;
- a new Manitoba to U.S. transmission interconnection, the Manitoba-Minnesota Transmission Project, to provide additional capacity for new export sales, allow for imports during droughts and enhance reliability;
- expansion of electricity exports.

What will the line look like?

The Manitoba-Minnesota Transmission Project will use steel lattice towers. A self-supporting design will be used in cultivated agricultural areas and guyed structures (see illustrations below) will be used in all other terrain. The design will:

- range from 40 to 60 metres (130 to 200 feet) in height.
- be spaced 400 to 500 metres (1,300 to 1,650 feet) apart (on average).
- utilize a right-of-way width of 80 to 100 metres (260 to 330 feet).

Additional information on tower design and more detailed specifications will be provided in later rounds of the project's environmental assessment process.

Why does Manitoba Hydro import and export power?

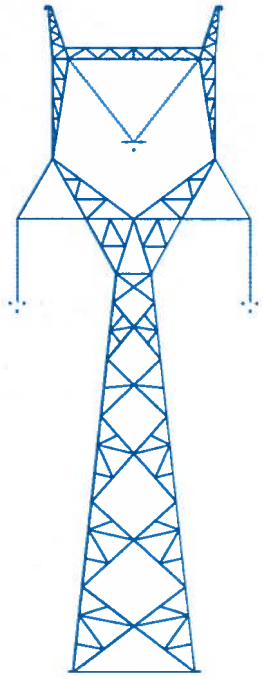
Manitoba Hydro exports surplus electricity that results from normal operation of a hydroelectric system. Revenue from these export sales helps to keep rates low in Manitoba. In 2012–13, for example, Manitoba Hydro's electricity export sales totalled $353 million with 88 per cent derived from the U.S. market and 12 per cent from Canadian markets.

U.S. utilities who purchase our electricity want long-term price certainty and stability. These utilities see value in purchasing hydroelectricity from Manitoba Hydro through long-term fixed contracts that are not linked to volatile natural gas prices or subject to future changes in regulatory requirements associated with air emissions.

The Manitoba-Minnesota Transmission Project will serve a 250-megawatt (MW) power sale with Minnesota Power and will provide increased access to additional markets in the U.S.

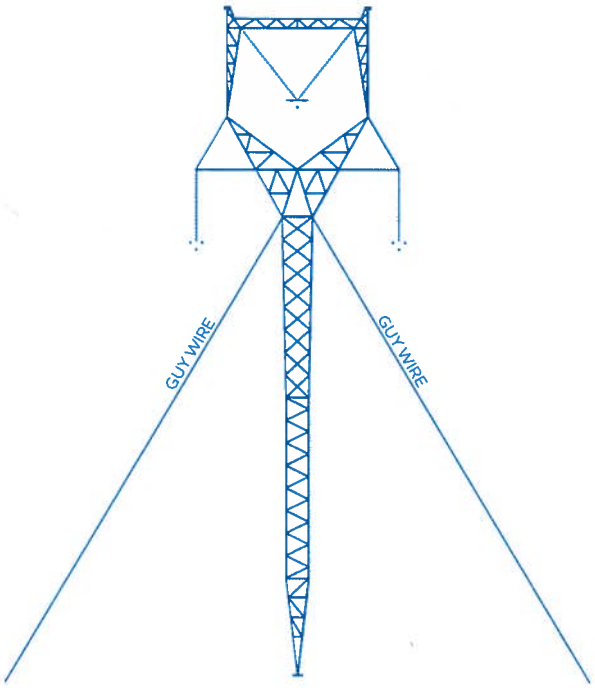
Adding a second 500-kV interconnection will also increase Manitoba Hydro's ability to import electricity, strengthening the reliability of the province's electricity supply. In times of extreme drought or an unforeseen outage, transmission interconnections to other utilities provide access to electricity needed to meet demand in Manitoba.

Preliminary tower design parameters



500-kV Self-Supporting Lattice Steel Tower

(Towers are not drawn to scale — conceptual only.)



500-kV Guyed Suspension Steel Tower

(Angle of guy wires depicted on tower are not accurate — conceptual only.)

Route selection and environmental assessment processes

Manitoba Hydro is developing potential transmission line routes for discussion with the public. Our approach includes early stakeholder input and takes into account engineering considerations as well as the built and natural environment. This approach is based on the EPRI –GTC (Electric Power Research Institute – Georgia Transmission Corporation) Methodology.

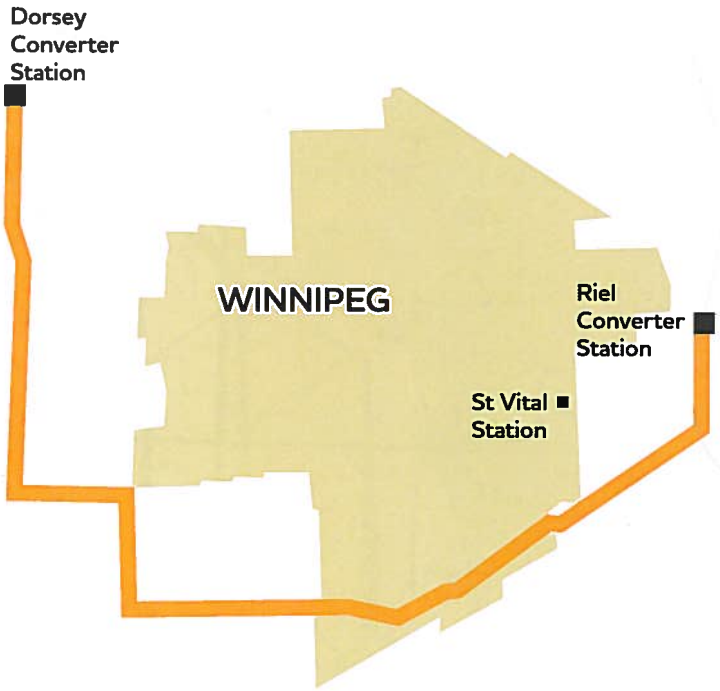
The project will require a Class 3 Licence under *The Environment Act* (Manitoba) and National Energy Board authorization.

The environmental assessment for the project will include:

- study area characterization through field work and background investigation;
- public engagement to obtain input and feedback into route selection;
- assessment of potential environmental and socio-economic effects;
- assessment of cumulative effects;
- development of mitigation measures and monitoring plans;
- development of an environmental protection program;

It is anticipated the environmental impact statement will be submitted to regulatory authorities in spring 2015.

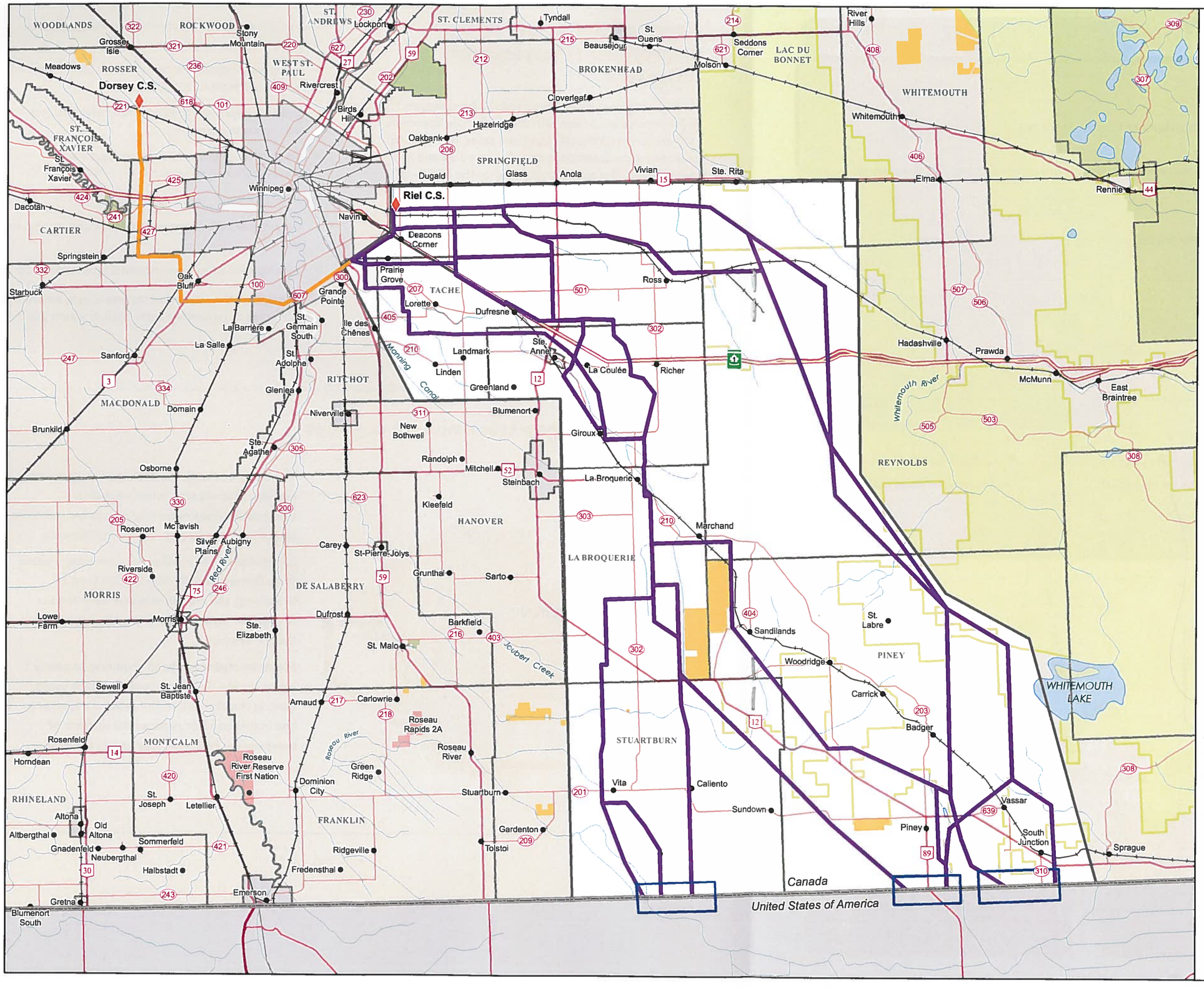
Southern Loop transmission corridor



The Southern Loop is a dedicated transmission corridor that will accommodate multiple transmission lines necessary for system reliability and to help to meet future energy demands.

Located between the Dorsey Converter Station (near Rosser) and the Riel Station (east of Winnipeg), the transmission corridor follows the western and southern boundaries of the City of Winnipeg.

Manitoba Hydro has been acquiring property rights for the Southern Loop for many years. Placing the Manitoba-Minnesota transmission line in this corridor reduces the number of independent rights-of-way on the landscape.



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Alternative Route
- Potential Border Crossing
- Alternative Route Study Area

Infrastructure

- Converter Station
- Southern Loop Transmission Corridor

Landbase

- Community
- Trans Canada Highway
- Provincial Highway
- Provincial Road
- Railway
- City / Town
- Rural Municipality
- First Nation
- Wildlife Management Area
- Provincial Park
- Provincial Forest
- Watercourse
- Waterbody

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: October 21, 2013

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Alternative Routes

Project timelines

We are here.

Round 1

- Alternative routes and proposed border crossings: October to February 2014.

Round 2

- Preferred border crossing with refined alternative routes: March 2014 to July 2014.

Round 3

- Preferred route: October 2014 to December 2014.

Anticipated next steps

- Environmental Impact Statement (EIS) Filing: Spring 2015.
- Regulatory review process: early 2015 to mid-2016.
- Licence decision: mid-2016.
- Construction: 2016 to 2020.
- In-service date: 2020.

Why do we have surplus electricity?

Manitoba Hydro's generating stations are designed to produce electricity even when the water supply is equal to the lowest flows on record. This is called dependable flow. Building to dependable flow ensures we're capable of meeting our electricity commitments to our Manitoba customers.

Most of the time, water flows are well above this dependable flow level. In fact, in almost every year since 1900, our water supply has produced more electricity than is required in the province. Export sales provide an outlet for this excess electricity and a revenue stream that helps keep energy prices low in the province.

Who is Minnesota Power?

Minnesota Power is a private utility company based in Duluth, Minnesota that provides electricity to a 67,000 square kilometre electric service area in the northeastern part of that state. It supplies retail electric service to 144,000 customers and wholesale electric service to 16 municipalities.

In 2011, Minnesota Power signed a long-term agreement to purchase 250-MW of electricity from Manitoba Hydro. This will allow Minnesota Power to increase the renewable resources in their energy portfolios, while providing price stability that natural gas-fuelled sources cannot. Purchasing power from Manitoba Hydro will also allow Minnesota Power to replace energy supplied by coal-fired generating stations that will be retired in the next decade and meet increased load growth. The utility is willing to build a new transmission interconnection in Minnesota to be able to do so.

This proposed transmission interconnection, named the Great Northern Transmission Line, would run from the Manitoba-U.S. border to the Mesabi Iron Range near Duluth, Minnesota. It is currently in the development stage, with the company recently filing it's Certificate of Need. The company is also in the process of finalizing route options. In addition to providing access to clean, affordable and reliable energy for Minnesota Power customers and the region, other factors driving the need for the Great Northern Transmission Line include:

- increased industrial load growth on Minnesota's Iron Range associated with iron ore mining;
- the need to strengthen system reliability for Minnesota Power and the region.

For more information on Minnesota Power, visit **www.mnpower.com**. For more information on the Great Northern Transmission Line, visit **www.greatnortherntransmissionline.com**.

How can you be involved?

Manitoba Hydro will seek input from local landowners, First Nations, the Manitoba Métis Federation, local municipalities, stakeholder groups, government departments and the general public during the route selection and environmental assessment process.

The goals for the Manitoba-Minnesota Transmission Project public engagement process are to:

- share project information as soon it becomes available;
- obtain feedback for use in the route selection and environmental assessment processes;
- gather and understand local interests and concerns;
- integrate interests and concerns into the routing and assessment processes;
- review potential mitigation measures.

We will meet these goals by:

- involving the public throughout the route selection and environmental assessment stages.;
- providing clear, timely and relevant information and responses;
- delivering a public engagement process that is adaptive and inclusive;
- informing the public as to how their feedback influenced the project;
- documenting and reporting on feedback.

Meetings, open houses, workshops and a range of other methods will provide opportunities for interested groups and individuals to participate in the route selection and environmental impact assessment.

We would like to hear from you.

Please contact:

Licensing & Environmental Assessment Department
Phone (Toll-free) 1-877-343-1631,
(in Winnipeg) 204-360-4305, or
email: mmtp@hydro.mb.ca

Visit **www.hydro.mb.ca/mmtp** for up-to-date information on the Manitoba-Minnesota Transmission Project and to register for updates.

For more on Manitoba Hydro's development plan visit **www.hydro.mb.ca.**

Manitoba Hydro

Can AC electric and magnetic fields cause audible noise or radio/ television interference?

Possibly, effects on amplitude-modulated (AM) radio stations may be noticeable, particularly when crossing underneath a transmission line. Effects may also be noticeable when viewing television stations that still broadcast with analog signals outside major population areas, particularly when one is both very close to a transmission line and far from the broadcasting station. Frequency-modulated (FM) radio stations, cable television, and television stations that broadcast with digital signals are rarely affected. Adherence to Canada's and Manitoba's electrical codes and standards will minimize possible effects.

For more information, please visit the following websites:

Canada

Health Canada
http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php

BC Centre for Disease Control
http://www.bccdc.ca/NR/rdonlyres/E1B06155-6B2A-419E-95C0-3CA6A0F-A17BF/0/R1N01.pdf

International

World Health Organization
http://who.int/peh-emf/about/en/

This brochure was created by epidemiologists and biological scientists in the Health Sciences Practice of Exponent, a leading firm in scientific and engineering disciplines.

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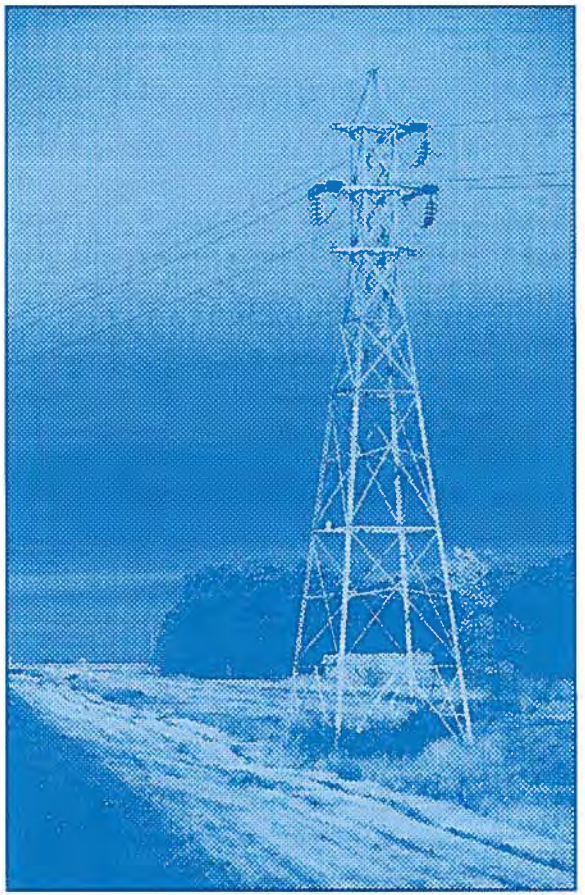
Engineering and Scientific Consulting

Alternating Current

Electric and Magnetic Fields



Manitoba Hydro

Manitoba Hydro is a crown corporation that generates and distributes electricity to customers in Manitoba. This electric system and any device connected to it produces alternating current (AC) electric and magnetic fields (EMF) that oscillate at a frequency of 60 Hertz (Hz).

This brochure describes EMF, the health research that has been conducted, and the conclusions offered by various scientific agencies on AC EMF and effects on human health.

What are AC electric and magnetic fields?

Manitoba Hydro's electric system carries power from generating stations to customer's homes by way of transmission lines, substations and distribution lines. Each component of this system — from the transmission lines that carry the electricity to the appliances that use the electricity — produces EMF in the extremely low frequency range that includes 60 Hz.[1] In scientific terms, a field describes the properties of space surrounding an object due to the characteristics of the object. A temperature field, for example, surrounds a warm object, just as both electric fields and magnetic fields surround electrical objects.

What do health and scientific agencies say about EMF?

In the past 35 years, several thousand research studies have investigated the potential health effects of EMF in human populations, laboratory animals and cells. Numerous scientific and health agencies have evaluated this body of research, including the World Health Organization, the International Agency for Research on Cancer and Public Health England.[2] In Canada, the topic has been evaluated by the Federal Provincial Territorial Radiation Protection Committee (FPTRPC). The FPTRPC is an intergovernmental Canadian committee assembled to harmonize the standards and practices for extremely low frequency EMF within federal, provincial and territorial jurisdictions. Health Canada refers to the FPTRPC as the authority on issues related to EMF. The FPTRPC established an extremely low frequency working group to carry out periodic reviews, to recommend appropriate actions and to provide position statements that reflect the common opinion of intergovernmental agencies.

The conclusion of these scientific agencies has been generally consistent. Overall, they concluded that the research does not show that either electric fields or magnetic fields are a known or likely cause of any disease, including cancer. They also concluded that while some statistical data suggests a relationship between childhood leukemia and rare exposure to high average magnetic field levels, the uncertainty associated with these findings and the lack of support from experimental studies does not support a true causal relationship. Please see the end of this brochure for additional sources that provide more details about these agencies' conclusions.

What are the specific conclusions of agencies in Manitoba and Canada?

The FPTRPC concluded "...there is insufficient scientific evidence showing exposure to EMFs from power lines can cause adverse health effects such as cancer." (See www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/emf-cem-eng.php for more.) Also, the Manitoba Clean Environment Commission recently concluded that while "... some Manitobans are concerned about theories that EMFs from transmission lines can be harmful, ultimately decisions need to be made on the basis of international scientific consensus, and the scientific consensus is that there is no evidence for these concerns about EMFs."

Are there any standards or guidelines to limit exposure to AC EMF in Canada?

Canada does not have any national, territorial, or provincial standards or guidelines related to extremely low frequency EMF.

What does Health Canada recommend?

Health Canada states, "You do not need to take action regarding typical daily exposures to electric and magnetic fields at extremely low frequencies. There is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living and working environments."

Do AC electric and magnetic fields affect animals and plants?

Numerous research programs have been created to study the effects of extremely low frequency EMF on wild and domesticated animals; the largest of these research programs was conducted at McGill University in Quebec. Overall, this research has not found any relationship between EMF and the health, behaviour, or productivity of animals, including cows, pigs and sheep. Furthermore, studies of crops and other plants have reported no adverse effects on growth or viability.

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[1] Extremely low frequency EMF is different than radio frequency fields, such as those produced by mobile phones and radio and TV stations.

[2] Public Health England is the successor agency to the National Radiological Protection Board and the Health Protection Agency.

GPS Use in Agriculture

As described, radio noise from an AC transmission line would not be expected to directly affect GPS receivers used for farming or other operations from receiving GPS signals or the satellite- or antenna-based correction signals.

Since real-time kinematic correction signals are transmitted from antennas that are typically only a few metres high, AC transmission line towers are not expected to produce much blocking of the line of sight signals from these sources either. Repositioning of the real-time kinematic base station antenna should resolve any issues if they occur.

Signal degradation can occur due to reflections from a nearby flat-topped building or other reflecting surfaces (such as lakes). The overall performance of a GPS guidance system in agriculture depends upon a high-quality receiver and good positional correction from an independent source.

Studies of the performance of vehicle mounted receivers using GPS and Russian Global Navigation Satellite signals around AC transmission lines in Manitoba have not reported any problems in obtaining positional signals with centimetre accuracy with satellite or real-time kinematic error corrections signals [14].

For more information on AC lines and electronic devices, please consult the refrences listed on the next panel.

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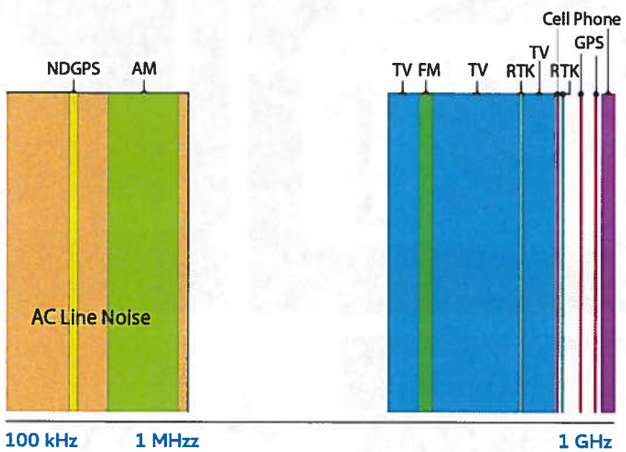
AC Lines and Electronic Devices

Manitoba Hydro distributes electricity throughout the province using alternating current (AC) transmission lines operating at voltages between 66-kilovolts (kV) and 500-kV. This brochure outlines information about electronic devices including global positioning system (GPS) receivers, radios, TVs, wireless internet and cell phones in the presence of AC transmission lines.

GPS receivers, radios, TVs, wireless internet, and cell phones all receive radio frequency signals. While radio and TV transmitters produce relatively strong radio frequency signals, GPS satellites, computers and transmission lines produce weaker radio frequency signals.

Radio and TV Receivers

Radio and TV interference may be noticeable when near an AC transmission line. Many people have heard interference while listening to amplitude-modulated (AM) radio stations and driving under power lines, particularly high voltage transmission lines. Interference to AM signals is caused by corona discharge around the transmission line conductors. This corona discharge generates broadband radio noise over a range of radio frequencies. If the signals from AM and non-digital TV sources are weak, the radio noise from nearby power lines can overlap and cause poor reception very close to the lines (Figure 2).



The illustration above represents the frequency band of radio signals from electronic devices such as TVs, cell phones, and GPS superimposed with the primary frequency range of radio noise from an AC transmission line.

TVs receiving digital television signals are not susceptible to this source of interference.

Manitoba Hydro has decades of experience designing transmission lines that minimize radio noise and has worked with customers to solve interference problems that sometimes arise near AC transmission lines

Cell Phones

Cell phones receive and transmit radio frequency signals at frequencies ranging from 850 megahertz (MHz) to 2,150 MHz. Radio noise from an AC transmission line does not overlap with the signals from a cell phone and, therefore, does not interfere with a phone's functioning near an AC transmission line.

Wireless Internet

Wireless internet operates at a frequency of 2,400 MHz. Radio noise from an AC transmission line does not overlap with wireless internet signals and, therefore, does not affect wireless internet function near an AC transmission line.

Global Positioning System Receivers

GPS is a space-based navigation system that relies on orbiting satellites circling Earth to establish the position of a GPS receiver. The receiver uses the radio frequency signals sent from three or more of these satellites to determine its exact location.

Naturally-occurring sources of radio frequency such as geomagnetic storms and man-made sources of radio frequency such as TV transmitters are sometimes reported to interfere with GPS signals because these sources produce interference in the same frequency range as the GPS satellite's signals.

Since GPS signals are of far higher frequency than the radio noise from an AC transmission line, it is very unlikely that an AC transmission line will interfere with GPS functioning.

Systems to Improve GPS Accuracy

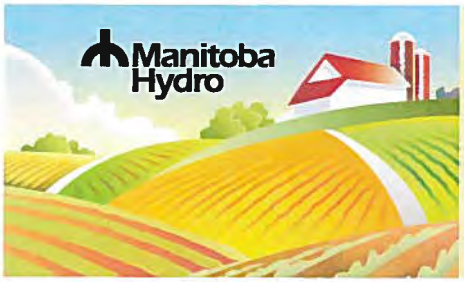
Modern GPS receivers can receive corrections from a number of satellite-based systems with frequencies above 1 gigahertz to improve the accuracy of positional location; this is called differential GPS (DGPS). [1-3, 5-12] Nationwide Differential GPS (NDGPS) is a GPS system used in the United States and along the southern border of Canada that was developed to improve GPS accuracy when GPS first became available.[1] This system, as well as the Canadian System GPS-C (now decommissioned) make use of land-based antennas to transmit correction signals to GPS receivers at lower frequencies, but are no longer used, particularly for high-precision applications.

Some GPS systems also make use of real-time kinematic (RTK) systems to improve the accuracy of the GPS system by making use of the ultra-high frequency radio communication range.[1, 12] Since the frequency bands of these systems are far higher than the radio noise frequencies produced by an AC transmission line, signal interference is unlikely to occur. [3,13] It is possible, however, that some receiver designs may be susceptible to minor interference to the receiver, not the GPS signal due to certain related factors. Conceptually, an AC transmission line might affect GPS performance by signal blocking and reflection.

Signal Blocking and Reflection

RF signals can be blocked by physical objects such as mountains or dregraded by reflections off large solid objects. Reflections of GPS signals by buildings, lakes, and ponds can affect the accuracy of GPS positions. The towers of an AC transmission line, while relatively large compared to the size of a person for example, do not have a large footprint and they are not solid structures. So while the towers can result in some reflections and blocking of radio frequency signals, their impact is generally momentary and insignificant. Transmission line conductors also are too thin to block or cause large reflections of radio frequency signals. [3, 4]

GPS and related receivers are typically configured to reduce the effects of blocked and reflected signals, resulting in a very small and temporary blockage area if it occurs. Further, the reception of signals from multiple satellites means that the loss of a signal from one satellite is not consequential since signals from other satellites are still available to accurately determine the position of the GPS receiver.



Stray voltage on dairy farms

SYMPTOMS AND SOLUTIONS

December 2006

Milking parlour in a barn with an equipotential plane that has eliminated stray voltage problems

Stray voltage, also referred to as tingle voltage, refers to a small voltage difference between two animal contact points. A common example is the small voltage difference between the water bowl and the floor of a dairy barn – points that an animal can touch simultaneously.

If the stray voltage is large enough, it can cause a current to flow through cows, creating a tingling sensation that can disturb your herd. The animals may not want to come in for milking, be nervous during milking, eat less or produce less milk.

When stray voltage occurs, the sources can usually be found and corrected following a thorough investigation by your electrical contractor.

This data sheet presents instructions on measuring stray voltages and taking reference voltage measurements to find the sources of stray voltage. The stray voltage checklist can reveal potential on-farm problems with electrical equipment or wiring, which a qualified electrician can repair or replace to reduce stray voltage levels on your farm. Basic solutions and details on installing an equipotential plane, whether in new construction or as a retrofit are also offered.

Effects of stray voltage on production, health and behaviour

Cows are many times more sensitive to voltages than humans. Furthermore their sensitivity varies with the area of contact: the same voltage between nose and hoof, for example, elicits a larger behavioural response than an identical voltage between hoof and hoof.

Symptoms of a stray voltage problem typically take the form of reduced milk quality, lower milk production, weakening of the immune system and behavioural indicators such as a reluctance to use certain parts of the barn.

In tackling a perceived stray voltage problem it is vital that any other factors contributing to the problem be addressed and corrected accordingly. Only then will the producer be able to identify a problem caused by stray voltage.

Here is an overview of the symptoms of stray voltage, according to the province's dairy specialist:

Milk quality symptoms

An indicator of a stray voltage problem is an elevated somatic cell count (SCC) that cannot be attributed to either poor milking practices or environmental conditions. This results from retained residual milk that provides a greater "foothold" for invading mastitis-causing microorganisms. (Mastitis is an inflammation of the mammary gland.)

If the cow's immune status is compromised, then the udder is less able to effectively fight off a mastitis infection, leading to a sharp rise in SCC.

Stray voltages that affect the initial milk letdown time will lead to teat ends being exposed to higher vacuum levels with no milk flow. This leads to damaged teat ends, which do not provide an effective barrier to invading bacteria. Consequently, the cow is at a much higher risk of developing a mastitis infection.

As mentioned earlier, however, a "symptom" such as an elevated SCC may be attributed to a variety of other factors.

Production symptoms

If the stray voltage is primarily occurring during milking, the milk letdown response may be attenuated or reduced in force. The oxytocin release will be lower, which means that more residual milk may be retained in the udder. Such incomplete "milkout" across the herd represents considerable loss of production.

Fans in the rear wall of this barn are wired for 240-volt operation, for a lower neutral-to-earth voltage. In this barn, which uses an equipotential plane to eliminate stray voltage, producers have installed 15-20 foot candles of lighting, well over traditional barn lighting levels of 5 foot candles, since studies show that more light can increase milk production up to 16% .

Stray voltage can also alter feed and water intakes. If cows are reluctant to feed and drink, then milk yield will decrease as the rumen (first stomach) does not maintain a stable environment and the cows' energy intake is not maintained. If feed intake is reduced enough to affect body condition, the cows will almost certainly be more difficult to get back in calf (rebreed).

Health symptoms

Research has shown that persistent intermittent shock equivalent to that of stray voltage produces a stress hormone response in cattle. This is characterized by an increase in blood cortisol and epinephrine. Both these hormones put the cow in a catabolic state, which means she will break down body fat reserves. The efficiency of the liver to process metabolites will also be affected.

Cortisol is also known to weaken the animal's immune response by reducing the numbers of peripheral white blood cells, which are directly responsible for defending against microbial attack in the udder and gastrointestinal tract.

Behavioural symptoms

Common behavioural indicators for cows are nervousness or reluctance to use certain parts of the barn. Cows may be extremely hesitant to enter a milking parlour and often defecate immediately on entry.

Stray voltage problems during milking will also cause restlessness in cows, shown by foot raising, swaying, tail swishing and an increased likelihood of the animals kicking off their milking units. Cows will rapidly exit the parlour following milking, increasing the risk of slipping and injuring themselves.

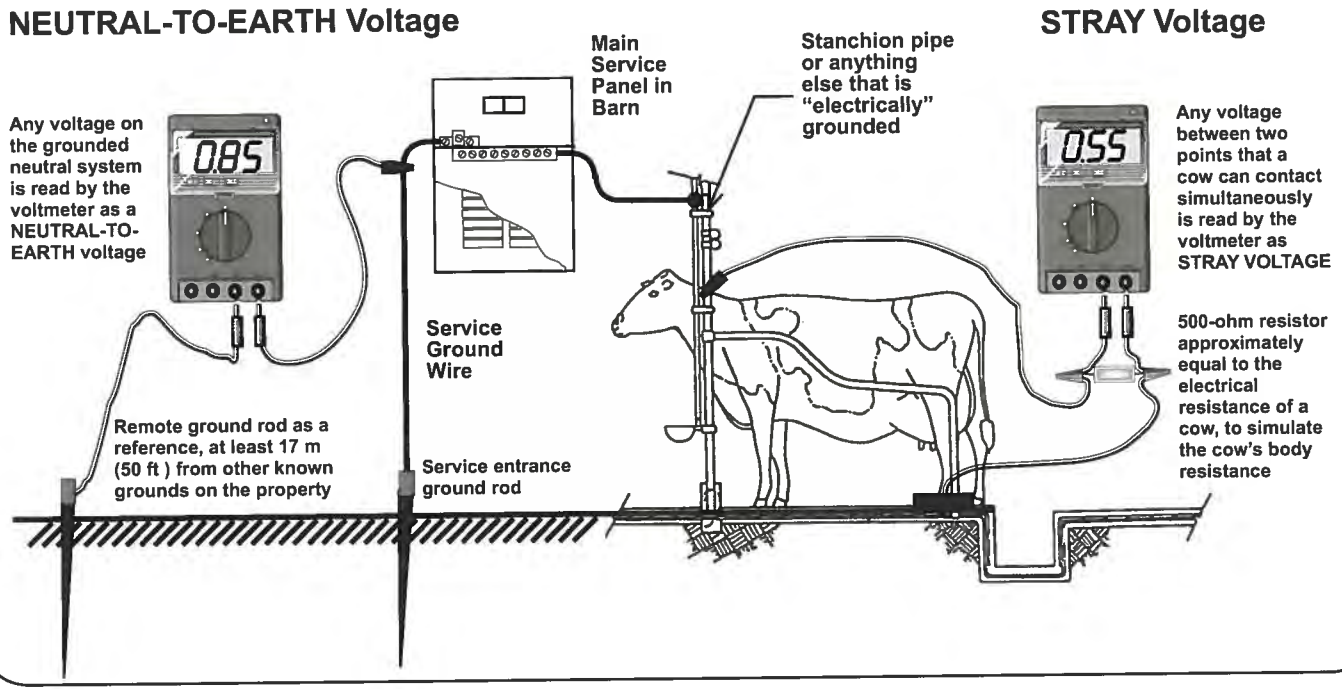
Problems elsewhere in the barn may alter feeding and drinking behavior. One commonly observed problem is cows lapping or splashing water, if a stray voltage potential is present at the drinker.

Stray Voltage versus Neutral-to-Earth Voltage

Neutral-to-earth voltage (NEV) is a voltage between a neutral conductor or other metal objects when measured to an electrically remote ground reference point. It is typically higher than stray voltage.

NEV is a useful diagnostic measurement, but it doesn't necessarily have an impact on the animals.

Stray voltage (SV) is a specific occurrence of NEV where a voltage difference exists at any two points an animal can reasonably be expected to touch simultaneously. You can have significant NEV and insignificant SV, but not the other way around, unless there is a fault in the internal electrical wiring somewhere.



Causes of stray voltage

The causes of stray voltage are often very difficult to locate. They may originate on the farm, off the farm or both.

A source of on-farm stray voltage is the small AC voltage associated with poor wiring in the farm's electrical system. The small AC voltage is referred to as the neutral-to-earth voltage (NEV). NEV is a normal and unavoidable consequence of operating electrical farm equipment. It is the result of current flowing through the resistance of the grounded neutral conductors and connections. NEV is measured between the electrical system neutral and an electrically remote ground reference point or earth.

Anything that offers a conductive path between a voltage on the electrical system neutral and true earth will conduct an electrical current.

For example, a cow standing on the floor of a barn has its hoofs in good contact with true ground or earth through the concrete, which is often highly conductive because it is saturated with manure. When the cow drinks from water bowls, which are grounded through the metallic plumbing system, the animal makes an electrical connection between the neutral conductor and true earth. If the ground potentials are different, current will flow through the cow. The current can create a tingling sensation if the voltage is high enough.

STRAY VOLTAGE LEVELS

Measured between two points that a cow can contact simultaneously

Voltage	Effect on Cows	Action
more than 2.0 volts AC RMS 60 Hz steady state*	Stray voltage may cause problems	Utility and customer mitigation strategy
1.0-2.0 volts AC RMS 60 Hz steady state	Stray voltage may be a problem	Customer mitigation on a case-by-case basis (optional, at discretion of customer)
less than 1.0 volt AC RMS 60 Hz steady state	Stray voltage is unlikely to be a problem	Customer mitigation (optional, at discretion of customer)

*Steady state means that the voltage must last longer than 1 minute.

One reason the situation is so critical on dairy farms is that cows have a much lower resistance to current than humans. The resistance of a cow typically ranges from 300 to 900 ohms, while the resistance of a person ranges from 3000 to 9000 ohms.

The difference is mainly because cows are much heavier and have four hooves in good contact with the earth. Compare their situation to a man with dry socks, rubber boots and cal-

loused hands. Under these conditions the man may not even detect a current flow, while the cow may experience noticeable discomfort.

Other on-farm sources of stray voltage are: electrical short circuits in equipment; defective underground cable; unbalanced 120-volt loads that cause an increased voltage on neutral conductors; corroded neutral conductor connections; missing or inadequate equipment grounding systems; and corroded or missing bonding connections (such as floors not electrically connected to pipelines); stanchions: and metal water bowls.

The normal operation of electrical equipment (such as welders, motors, pumps and conveyors) in remote areas of the barn or other buildings may also result in stray voltage within animal confinement areas.

Unusual intermittent sources of stray voltage have been traced to a bare section of energized copper wire that the wind occasionally blew against the metal wall of a barn; a spider web that, when wet, made a connection between the lead-out wire of an electric fence and a nearby stanchion; and the grounding system on a telephone that caused a problem every time the phone rang.

How much a source contributes to stray voltage levels depends on many factors, including the layout of the farm electrical system.

Soil moisture levels affect both stray voltage and the resistance of the electrical path through the cow's body to earth. As a result, problems and symptoms tend to vary greatly with the weather and seasonal conditions.

The variability of factors that affect stray voltage, as well as the reaction of the cow to these voltages, explains the intermittent "here today, gone tomorrow" nature of the problem.

A visual inspection checklist of potential on-farm problems that could cause stray voltage is included later in this data sheet. Correction of on-farm deficiencies requires the services of a qualified electrician.

Off-farm voltage sources may also be present on your farm. If required, Manitoba Hydro will conduct an investigation using controlled, standardized test procedures to determine to what extent electrical distribution facilities or other off-farm sources contribute to stray voltage levels. If an abnormal contribution is found, Manitoba Hydro will take action to help reduce the level of stray voltage on your farm.

Strategy for determining sources of stray voltage

Whether your electrician sets up to measure stray voltage or to take neutral-to-earth voltage readings (as described in the following sections), both set-ups can be used to determine sources of stray voltage.

The strategy is to switch various electrical loads "on" and then "off" to see if stray voltage is present when the loads are on.

In addition, if your electrician has two properly connected voltmeters, stray voltage and neutral-to-earth voltage can be measured at the same time to streamline your search for sources of stray voltage.

Measuring stray voltage

Ask your electrician to determine if there is stray voltage on your farm by using a voltmeter to measure the voltage between two points that may be simultaneously contacted by livestock.

Stray voltage is usually measured between points such as drinking cups, water pipes, stanchions and the floor.

Voltage measurements should be taken whenever livestock exhibit symptoms that reportedly have been attributed to stray voltage.

Voltmeters

A good quality, true RMS digital voltmeter, with excellent contact at both lead ends, can be used to measure stray voltage. By reading the RMS value of the voltage, the voltmeter gives an "average" rather than peak value for an accurate measure of stray AC voltage.

Stray voltage readings should be steady state values that last longer than a minute, not transient voltages. Transients, caused by equipment startups for example, typically do not contribute to stray voltage problems. In cases where they are suspected of causing a problem, their magnitude, duration and frequency should be evaluated.

The voltmeter should have a high input impedance of 5000 ohms or more. It should be able to differentiate between AC and DC.

A meter with a full-scale reading of 2.5 volts AC RMS 60 Hz steady state is ideal. A full-scale reading of 5.0 volts AC is normally acceptable.

Voltage recorders are valuable for monitoring voltage levels over time, helping to identify the "here today, gone tomorrow" nature of stray voltage problems.

Taking accurate stray voltage measurements

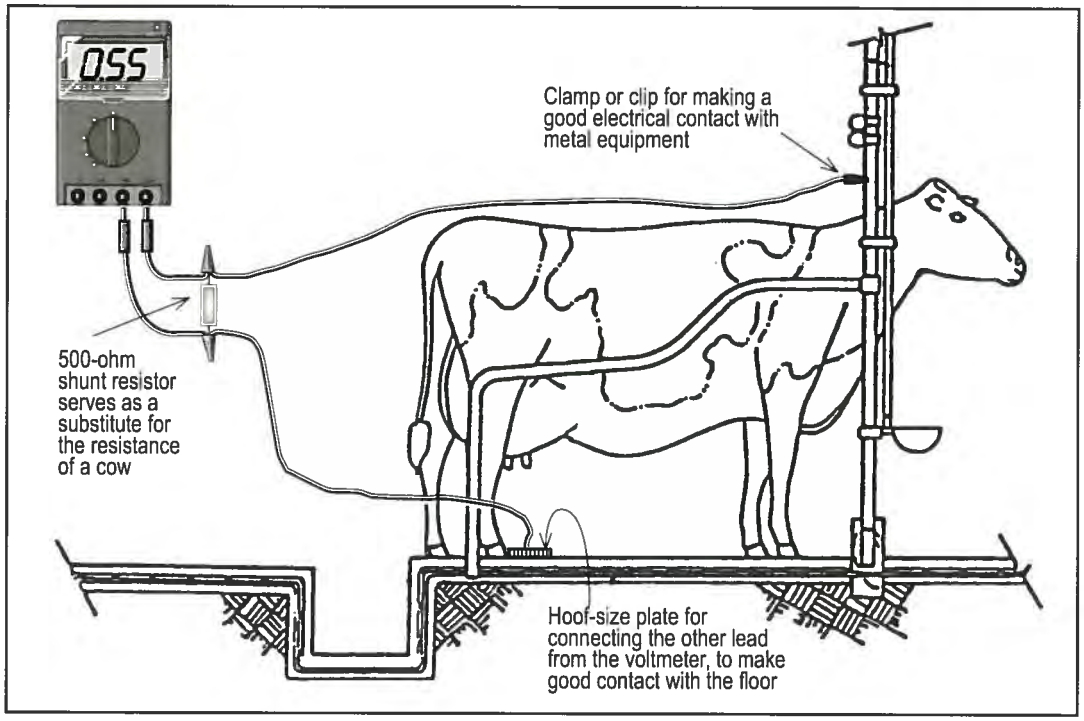
To accurately measure the stray voltages that your livestock may feel, the voltmeter must "look" like a cow (electrically). The electrician can do that by connecting a 500-ohm shunt resistor across the voltmeter leads.

The 500-ohm shunt resistor is approximately equal to the resistance of a cow. It will also bleed off or "drain" weak voltage sources, such as static, that do not contribute to stray voltage. A two-watt, flameproof resistor of about 500 ohms, available at most electronics parts stores, is recommended as the shunt resistor.

NOTE: The shunt resistor should be removed from the meter before using the meter to make any measurements other than stray voltage measurements.

Taking stray voltage measurements

Point-to-point measurements simply mean taking voltage measurements between two points that may simultaneously be touched by livestock. Typical pathways include body to hooves, mouth to hooves, and mouth to body.



Typical voltmeter connections for measuring stray voltage between animal contact points, such as stanchions, water troughs, and feeders, and the concrete floor. The 500-ohm shunt resistor across the leads of the voltmeter is approximately equal to the resistance of a cow, to simulate the resistance of the cow's body for an accurate measurement of stray voltage.

The meter probe that is in contact with the floor must be in a wet location with good contact pressure to ensure electrical contact.

The recommended method is to attach the lead to a hoof-area-size copper plate 100 to 230 sq.cm (16 to 36 square inches), placed on the wet concrete floor.

A water/salt mixture can be used to improve the electrical contact of the plate with the floor. Other alternatives, such as standing on the voltmeter probe or clamp, or attaching the clamp to wet metal contact points may work satisfactorily in many cases.

When measurements are taken, the clamp on the end of the voltmeter lead should be twisted or scraped when attaching it, to make sure there is good electrical contact.

Two copper plates can be used to measure "step" voltages – the voltage between an animal's front and rear hooves as it steps onto an equipotential plane.

Voltmeter leads

Most voltmeter leads are too short to make point-to-point voltage measurements. You may want to use two No. 18 wires to extend the length of the voltmeter leads when making measurements to the various metal contact points.

To determine the effect of bonding, you can use light duty car battery jumper cables as temporary bonding jumpers.

Taking voltage readings

Normally, stray voltage should be measured during milking, when the highest electrical loads are present and any substantial stray voltage levels may occur.

Voltage measurements should be taken at several animal contact locations to determine where the voltage is greatest. Use **TABLE 1: Stray Voltage Measurements**, at the end of this data sheet as a guide for recording voltage measurements.

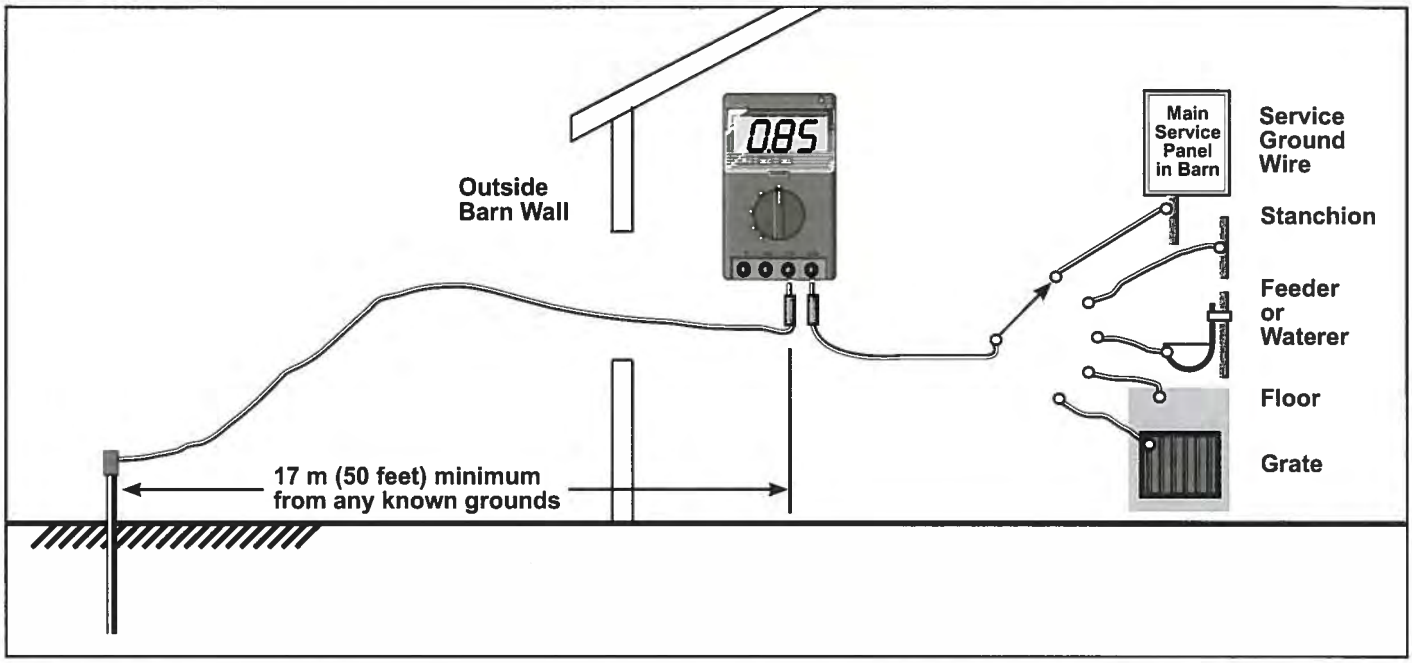
The date and time that measurements are taken should be included. This information may serve as a future reference to detect any changes in your farm electrical system.

If stray voltages exceed 2.0 volts AC

If your electrician measures stray voltage above 2.0 volts AC RMS 60 Hz steady state, or you are concerned that you have a stray voltage problem, the next step would be to turn off and on the electrical loads in your barn to determine the source of stray voltage as measured. If this does not reduce or eliminate the stray voltage, ask your electrician to take neutral-to-earth voltage measurements without the 500 ohm resistor, as described in the following section. The electrician should also make a visual inspection of your electrical systems, using **TABLE 3: Stray Voltage Checklist**, at the end of this data sheet.

The visual inspection and the diagnostic voltage measurements may indicate repairs or replacement of electrical equipment or wiring is required by a qualified electrician to reduce or eliminate stray voltage.

Your electrician should also consult the material on basic solutions, installing an equipotential plane, and other options for further details on reducing stray voltage.



Measuring neutral-to-earth voltages in the milkhouse and barn area to help diagnose sources of stray voltage. The 500-ohm shunt resistor is not used when taking these measurements

Taking neutral-to-earth voltage readings

If stray voltage measured as described in the previous section exceeds 2.0 volts AC RMS 60 Hz steady state, and if stray voltage cannot be accurately measured or isolated by switching barn electrical loads on and off, your electrician could take neutral-to-earth voltage readings in the barn area. The readings would determine if the source of the electrical problem was somewhere else on the farm (for example, the house, other buildings, or other utilities such as the telephone) or from an off-farm source.

As mentioned earlier, when taking neutral-to-earth voltage readings, various electrical loads on the farm can also be switched off/on or isolated, then switched on, to determine the source of the stray voltage problem.

Stray voltage measurements can also be taken at the same time as neutral-to-earth voltage measurements, if your electrician has two properly connected voltmeters.

Neutral-to-earth voltages are measured between a reference ground and various pieces of metal equipment and the floor to help diagnose sources of stray voltage. **Use TABLE 2: Neutral-to-Earth Voltage Readings**, at the end of this data sheet, for recording voltage readings.

Metal equipment includes: stanchions, feeders, waterers and grates. The reference ground is usually a metal stake or rod driven into the soil at least 17 metres (50 feet) from any known electrical grounds, water pipes or grounded metal equipment. An insulated wire (No. 18 is adequate) is used to connect the probe from one terminal of the voltmeter to the reference ground stake or rod. The other probe is used to contact metal objects and floors within the animal confinement area. For future readings, use a ground rod driven at the same location for consistency.

Measuring voltages between a reference ground and other points usually results in higher voltage readings than voltages read between points that an animal can touch simultaneously at various times of the day.

The voltages read are not a measurement of stray voltage that can harm animals, because an animal cannot simultaneously contact points that are so far apart. But they may indicate whether the source of stray voltage is on- or off-farm.

When you measure voltages on outside equipment, such as feeders or stock waterers, use a metal rod driven 30 to 45 centimetres (12 to 18 inches) into the ground approximately 10 metres (30 feet) from the equipment being measured.

Neutral-to-Earth voltages higher than 5.0 Volt AC

If your diagnostic voltages exceed 5.0 volt AC RMS 60 Hz steady state, call Manitoba Hydro to request assistance in conducting further voltage measurements. Have your voltage measurements available in **TABLE 2: Neutral-to-Earth Voltage Readings**, which appears at the end of this data sheet.

WARNING

Never remove or cut the ground at the transformer service pole or anywhere else in the system when taking these or any other voltage measurements. Damage to equipment, severe shock or electrocution may result.

Solutions

Basic measures

Here is a summary of checks that your electrician should perform at a dairy operation where stray voltage is suspected.

1. **Check for faulty equipment, loose or corroded wiring, and failed electrical insulation.** High humidity, silage acids, urine and manure make dairy farms a corrosive environment for electrical wiring and equipment. Regular maintenance of the electrical equipment is important.
2. **Check that service entrance grounding meets the requirements of the Manitoba Electrical Code.** Recent studies show that ground rods in service for 10 years or more may become less effective because of erosion by galvanic action or because of dry soil conditions.
3. **Balance all 120-volt loads.** For single-phase service, motors and heating equipment for new installations should be wired for 240-volt operation rather than 120 volts. This reduces the voltage drop across the neutral.
4. **Provide adequate power circuits for all equipment.**
5. **Interconnect and bond all metallic structures and electrical equipment.** Take special care for structures that animals touch. Isolated metal parts not in contact with electrical equipment, such as metal water bowls supplied by polyethylene water lines, need not be bonded.

Equipotential planes

An equipotential plane is an area where wire mesh (or other conductive elements) are embedded in a concrete floor or platform and bonded to all nearby conductive equipment, structures or surfaces. This area is connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.

Livestock that make contact between the concrete floor or platform and the equipment or metal structures will be less likely to be exposed to a level of voltage that may alter animal behaviour, health or productivity.

An equipotential plane is highly recommended for all new milking parlours. Proper consultation before construction should result in an equipotential plane being included in the farm building plan. Owners should seek assistance from their general contractor, a licensed electrical contractor, and Manitoba Hydro. The plane should be inspected by one of Manitoba Hydro's electrical inspectors before the concrete floor is poured.

New installations

Mesh size – Wire mesh 15 centimetres by 15 centimetres (6 inches by 6 inches), commonly used for reinforcing concrete, will provide a satisfactory conductive gridwork in the concrete floor of the milking parlour and tie stall area. The wire mesh can range in size from No. 6 to No. 10 AWG.

Bare copper wire not smaller than No. 8 AWG, or reinforcing steel not smaller than No. 3 gauge, placed in a grid pattern may also be used.

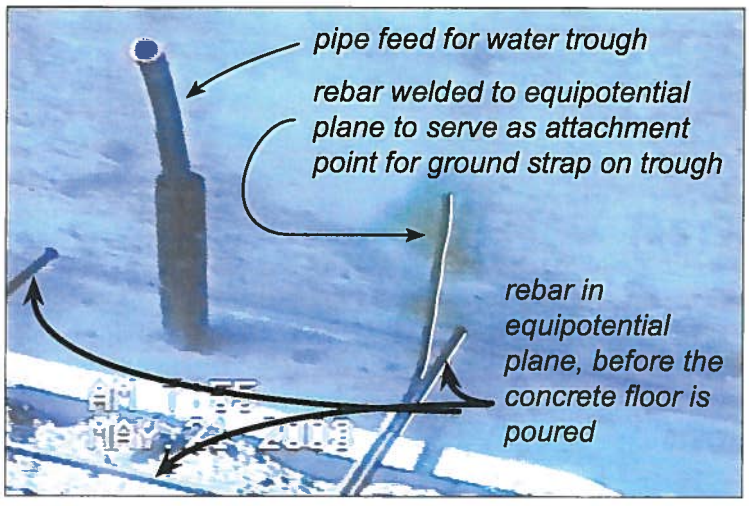
Grid spacing should not exceed 45 centimetres by 45 centimetres (18 inches by 18 inches) in freestall areas.

Where wire mesh is used, a grid of interconnecting No. 3 steel reinforcing rod can serve as a support for the mesh. It should be welded at several locations to the mesh to ensure electrical conductivity between segments.

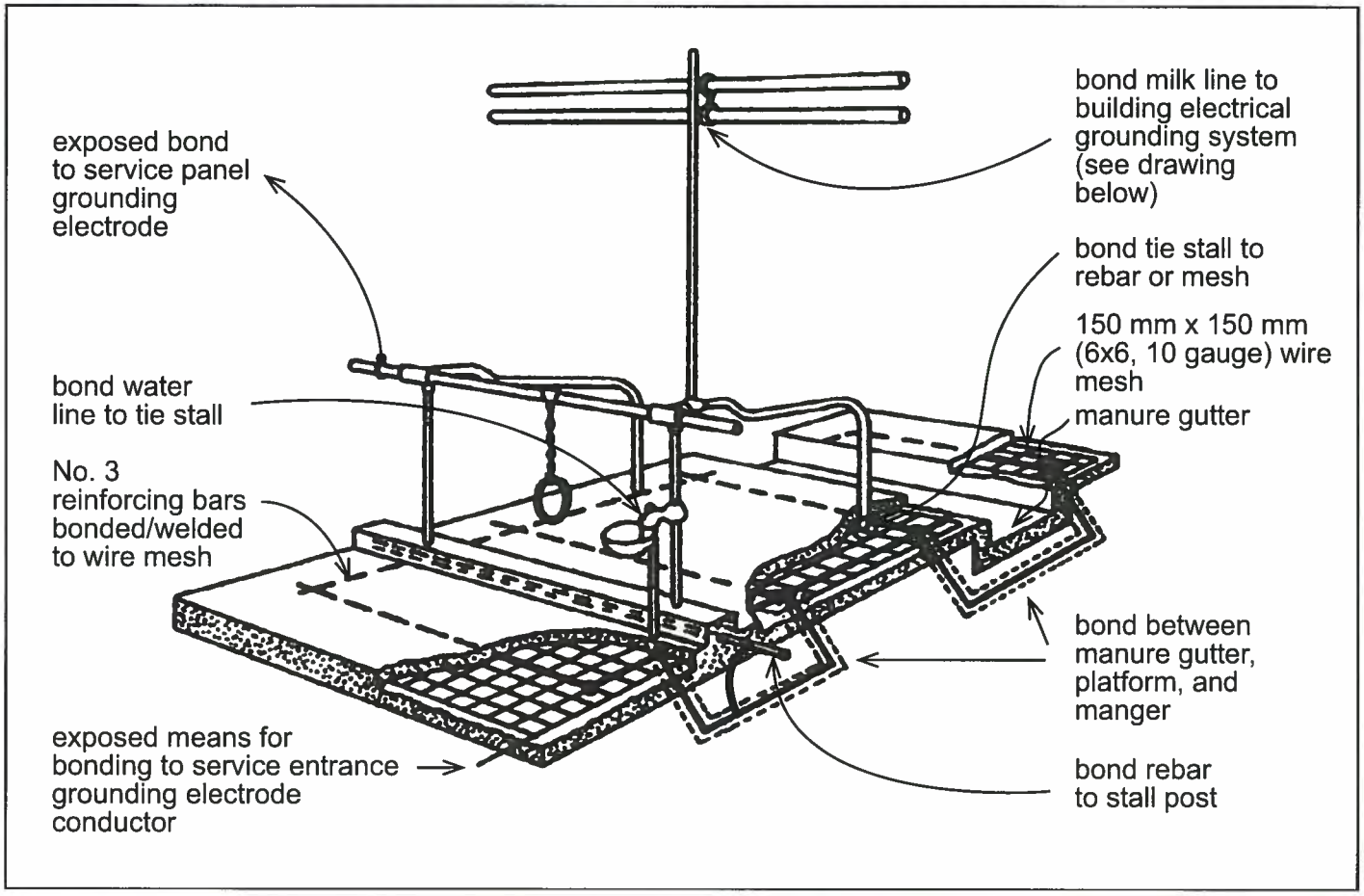
The supporting rebars can also ensure that at least 4 centimetres (1.5 inches) of concrete is above and below the wire mesh. In a 60- to 80-cow barn, two or three rebars the length of the floor, and three or four rebars across the floor of each side and alley have proven effective.

Bonds – Bonds should be made where reinforcing steel or wire mesh cross. All metal conductors should be bonded to one another and bonded to the grid so that the complete interior of the milking parlour is electrically grounded. This is the most effective solution to achieve a zero voltage difference between the cow and the equipment in the parlour and stall. Multiple bonds at connections between the wire mesh and other equipment give the system continuity, even if some bonds fail.

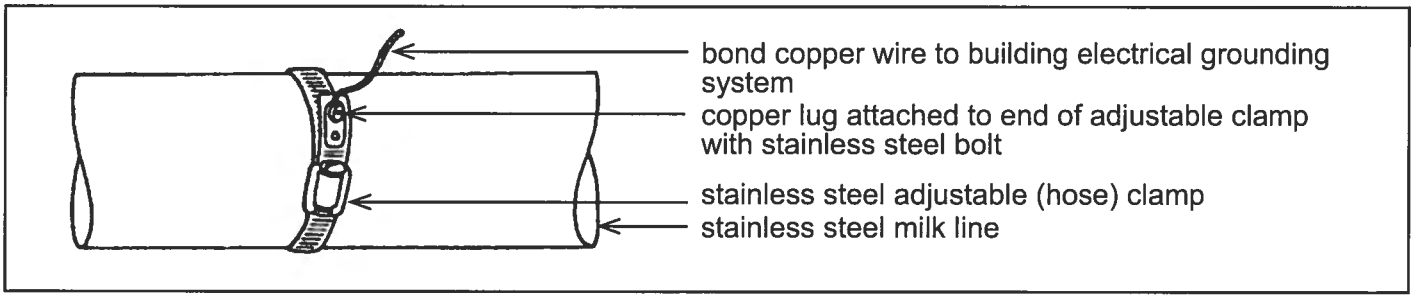
Electrically conductive bonds can be created by welding, brazing,or using clamps and compression connectors.
Even when small amounts of corrosion occur, compression connections and clamps may be rendered ineffective. Welding or brazing is the preferred method to obtain a permanent electrical connection.



Equipotential plane before the concrete floor is poured. After the pour, the piece of rebar welded to the plane will project above the floor where it can be used to ground a water trough, eliminating a possible source of stray voltage at the trough.



Installation of an equipotential plane in a tie-stall barn



Bonding a milk line

Equipotential planes using rebar in the milking parlour and loafing area, in position before concrete is placed. A grid size of 15 cm x 15 cm (6 in. x 6 in.) is recommended for the milking parlour, 30 cm x 30 cm (12 in. x 12 in.) elsewhere.

Stanchion bonded by welding a piece of rebar to its base and to the rebar that forms the equipotential plane.

Rebar welded to intersecting rebars to ensure equipotential plane is continuously conductive

The following equipment and components should be bonded to the wire mesh or rebar in the floor:

- stanchions
- stall partitions
- metals posts or columns
- water line (if metal)
- milkline (if metal)
- vacuum line (if metal)
- waterers
- feeders.

To bond stanchions and tie stalls to the wire mesh:

- lay a steel reinforcing rod in the front curb to bond the posts to the mesh; or
- bond the back post of the partitions to one another and to the mesh in the stall platform.

When bonding a stainless steel milkline to the stalls, use a stainless steel clamp. To protect against possible corrosion, do not allow copper or other types of steel to come into direct contact with a stainless steel milkline.

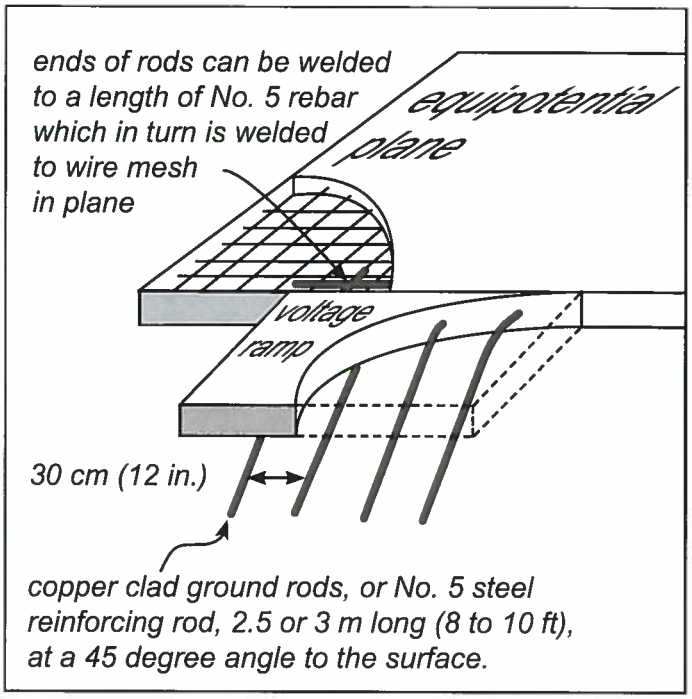
Exposed bond – An exposed bond is required so that you can check the connection between the equipotential plane and the building ground electrode system. There are several methods of producing this exposed bond:

1. Steel reinforcing rods not smaller than No. 3 (10 millimeters or 3/8-inch diameter) can be bonded to the wire mesh and left protruding from the concrete. The protruding rebars are then connected to the building grounding system to produce a visible bond.
2. Bond bare copper conductors to the wire mesh and leave them protruding from the concrete. The exposed conductors are then connected to the building grounding electrode system to produce the visible bond.
3. Bare copper conductors can also be connected between the building grounding electrode system and stanchion metal or other metalwork that has been bonded to the wire mesh at numerous locations.
4. The exposed bonding conductor from the equipotential plane can be connected directly to the building grounding electrode system at the building's service entrance panel, or to any equipment that is, in turn, electrically connected to the electrode system at the service entrance, such as a metal water line.

Voltage gradient ramp – Voltage ramps set up a gradual change in voltage potential that livestock may encounter. The gradual change reduces the likelihood of discomfort or stress when animals are stepping on or off the equipotential plane.

You can make an effective transition area at livestock entrances or exits by extending the equipotential plane outward and downward at 45 degrees to the surface, as shown in the drawing.

Use 2 1/2 or 3 metre-long (8-10 foot) copper clad ground rods or No. 5 rebar. The rebar should be spaced no more than 30 centimetres (12 inches) apart with enough rods to span the width of the entrance or exit. Electrical connections bonding the equipotential plane and the grounding rebar should be encased in concrete.



Installation of a voltage gradient ramp

Retrofit construction

Most barns can be retrofitted with an equipotential plane – an appropriate and cost-effective method of minimizing stray voltage levels. You should analyse the sources and levels of stray voltage before you install an equipotential plane to determine if one is required.

Retrofit construction options:

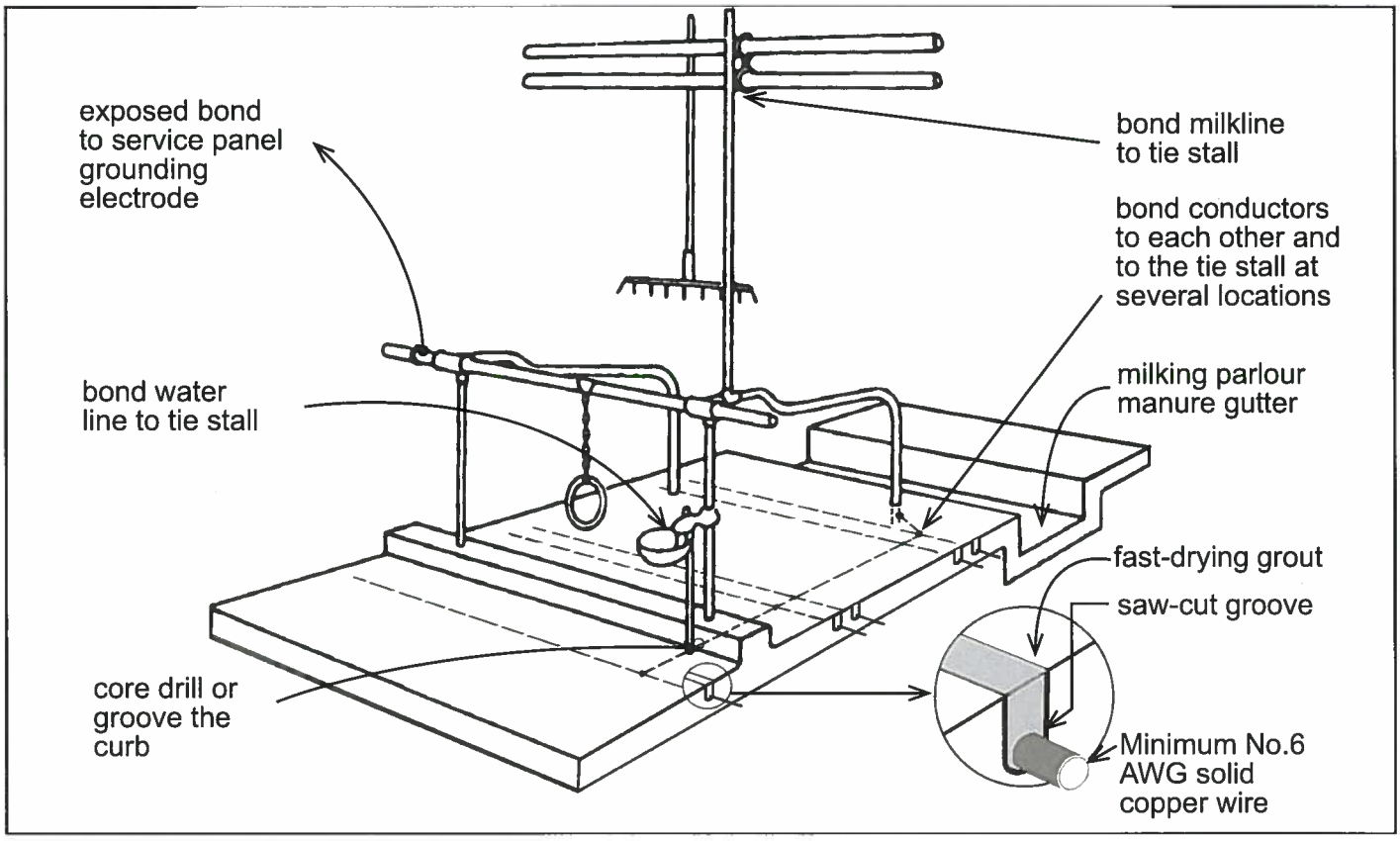
Groove existing floor – Where the floor has steel rebar, a satisfactory alternative to embedding wire mesh is to grout, as a minimum, No. 6 AWG bare copper wires into slots cut in floors where the cows stand. Wires do not need to be larger than No. 4 AWG.

Use a concrete saw to cut grooves 6 millimetres wide by 38 millimetres deep (1/4-inch by 1 1/2-inches) on your barn floor in the feed manger, front- and rear-hoof area, and, if necessary, the walk alley.

For the front hoof area, place two conductors 30 to 45 centimetres (12 to 18 inches) apart, with the first located 15 to 25 centimetres (6 to 10 inches) from the front curb.

For the rear hoof area, place two conductors 30 to 45 centimetres (12 to 18 inches), starting 7 to 15 centimetres (3 to 6 inches) from the gutter. The conductors should be bonded together; and to the stall work and to metal water lines. One or two conductors should be placed in the central area of the feed manger. Two conductors can also be placed in the centre alley, where voltage readers show that the centre alley needs an equipotential plane.

Due to the limitations of the concrete sawing equipment, the exact location of where you place the grooves depends on the arrangement of the stall dividers and stanchions. With the bare copper wires in the grooves, bond them together at several points along the length of the barn. The number of bonding points and their locations will depend on the layout of the facility.



Retrofit equipotential plane in a tie-stall barn

Use a quick-setting grout to fill the grooves and finish the installation. At a minimum, bond the wires at each end of the barn, and to the stanchions, milkline (if metal), waterline and any other metal structures in the barn.

Milking parlours and holding areas can also be retrofitted with this method. If you are installing a retrofit plane in a milking parlour, you may need to place wire in areas where cows stand to be milked, under the worker area of the pit floor and the livestock walk aisles.

To ensure all cow contact areas are bonded together, you will need to bond plane wires to the milkline (if metal), steel partitions and the feeders.

All bonding should be done by welding or by using pressure-type connections. If possible, the copper wire should also be connected to the rebar.

Capping the floor – Another method of retrofitting your barn with an equipotential plane is to lay wire mesh on the old concrete, bond it to all metal components, and then "cap" the floor by pouring a new 8 to 10 millimeter (3 to 4 inches) thick layer of concrete. The wire mesh can sit directly on the old surface.

This method might not be practical because it is time-consuming and will raise the level of your barn floor. It might also be inconvenient if your livestock needs access to the area during installation. However, if you are replacing corroded stanchions, this method might be the most cost-effective for you.

New floor – Another option is to completely remove your old concrete floor and lay a new one with the wire mesh installed. This method is the same as new construction but it might be inconvenient if livestock are to be housed in the area during construction.

Other options

Alternate equipment is available on the market to reduce stray voltage. For details, contact your dairy equipment supplier.

For more information

If you have questions or concerns about stray voltage, or would like to have a copy of this data sheet contact your local District Office.

You can also consult the following publication, which served as source material for the data sheet: Equipotential Plane in Livestock Containment Areas (ASAE EP473.2 Jan01), prepared by the American Society of Agricultural Engineers.

Manitoba Hydro

TABLE 1: Stray Voltage Measurements

Use this table to record voltages measured between two points that may be simultaneously contacted by livestock. *Take all measurements with a 500-ohm resistor.* Record voltages at several locations in the barn while milking equipment is running and cycling normally. Note which equipment is running during measurements.

COW CONTACT POINTS		Volts (AC)	Equipment Running
FROM	***TO***		
Drinking cup	Floor	_____	_____
Stanchion	Floor	_____	_____
Waterer	Floor	_____	_____
Floor of manure gutter	Floor of animal area	_____	_____
Floor of manure gutter	Feeders and waterer	_____	_____
Floor of manure gutter	Metal cluster on milker	_____	_____
Points on floor covered by animal's feet		_____	_____
Floor at animal's front feet	Metal feeders & waterers	_____	_____
Floor at animal's rear feet	Metal feeders & stanchions	_____	_____
Stanchions	Other metal parts such as:		
	vacuum lines	_____	_____
	water lines	_____	_____
	milk lines	_____	_____
	feeders	_____	_____
	waterers	_____	_____

TABLE 2: Neutral-to-Earth Voltage Readings

Use this table to record voltages measured between a reference ground and various pieces of metal equipment and the floor. Measurements are taken without a 500-ohm resistor. Voltages are *not animal contact voltages*, but they can be useful in diagnosing their origins.

		DATE:	_____	_____
		TIME:	_____	_____
CONTACT POINTS FOR DIAGNOSTIC READINGS			**VOLTS AC**	**VOLTS AC**
FROM	***TO***			
Bulk Tank	Remote Reference Ground		_____	_____
Milkhouse Floor Drain	Remote Reference Ground		_____	_____
Milk Pipeline	Remote Reference Ground		_____	_____
Water Pipe	Remote Reference Ground		_____	_____
Barn Entrance Panel	Remote Reference Ground		_____	_____
Water Bowl	Remote Reference Ground		_____	_____
Stanchion (loafing area)	Remote Reference Ground		_____	_____
Stanchion (milking parlour)	Remote Reference Ground		_____	_____

TABLE 3: Stray Voltage Checklist

This table is designed to help with a visual inspection of dairy barn electrical systems and note potential stray voltage sources. A check mark placed in the "yes" column indicates a potential problem. A qualified electrician should be contacted for the repair or replacement of electrical equipment or wiring that may be needed.

	YES	NO
MAIN FARM ELECTRICAL SERVICE		
Connection to the ground rod - loose, corroded	___	___
Ground rod(s) missing at the service entrance	___	___
BARN SERVICE ENTRANCE		
Ground rod(s) missing at the service entrance	___	___
Connection to ground rod(s) - loose, corroded	___	___
Large accumulation of feed dust or other debris on service box	___	___
Corroded or loose neutral connection	___	___
Panel cover missing or removed	___	___
MILKHOUSE		
Broken or missing bonding strap for milkline	___	___
Damaged or missing seals on electrical fixtures, switches, outlets, lights, etc.	___	___
Corrosion of electrical fixtures	___	___
IN THE PARLOUR OR AROUND THE BARN		
Milking pump electrical supply		
—Pinched wires	___	___
—Loose, hanging wires, stripped screws	___	___
—Scrapes, breaks or cracks in insulation exposing the conductors	___	___
Loose, hanging wires	___	___
Broken or bent conduit	___	___
Energized open wires taped or untaped and extending from ceiling or wall, not in a junction box	___	___
120-volt non-polarized or non-grounded appliances used in barn (clocks, heaters, radios, stereos, etc.)	___	___
Cow trainer insulators broken, missing, dirty or covered with whitewash	___	___
OTHER PROBLEMS		
Light dimming when motors start	___	___
Electrical shocks from any equipment	___	___
Wires, electrical boxes or motors in wet or damp areas	___	___
Frequent fuse or circuit breaker operation	___	___
Electric fence or cow trainer bonded to farm electric system ground	___	___
Electric fence or cow trainer bonded to water or milk lines or stanchions	___	___
Bent or broken conduit	___	___
Damaged wire insulation exposing conductors	___	___
Insulated wires wrapped around metal pipes	___	___
Damaged or frayed extension cords	___	___
Motors, operating irregularly under load, sparking, etc.	___	___
Electrical outlets not properly bonded or will not accept a three-prong plug	___	___

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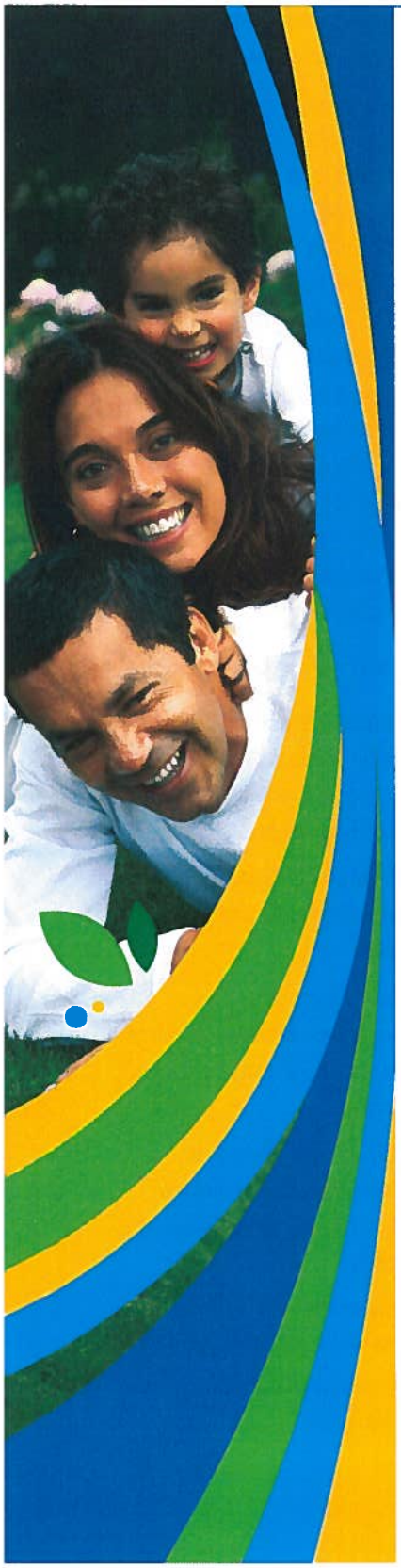
Your health and safety... our priority. *Votre santé et votre sécurité... notre priorité.*

Electric and Magnetic Fields

Updated: November 2012

Original: November 2001

IT'S YOUR HEALTH



Electric and Magnetic Fields from Power Lines and Electrical Appliances

THE ISSUE

Some people are concerned that daily exposure to electric and magnetic fields (EMFs) may cause health problems.

ELECTRICITY AND ELECTRIC AND MAGNETIC FIELDS (EMFS)

Electricity delivered through power lines is important in today's society. It is used to light homes, prepare food, run computers and operate other household appliances, such as TVs and radios. In Canada, appliances that plug into a wall socket use electric power that flows back and forth at a frequency of 60 cycles per second (60 hertz). The frequency used with the distribution of electricity from power lines and electrical appliances is different than the frequencies used for Wi-Fi, cell phones, and smart meters.

Every time you use electricity and electrical appliances, you are exposed to electric and magnetic fields (EMFs) at extremely low frequencies (ELFs). The term "extremely low" is described as any frequency below 300 hertz. EMFs produced by the transmission and use of electricity belong to this category.

EMFs are invisible forces that surround electrical equipment, power cords, and wires that carry electricity, including outdoor power lines.

- *Electric Fields:* These are formed whenever a wire is plugged into an outlet, even when the appliance is not turned on. The higher the voltage, the stronger the electric field.
- *Magnetic Fields:* These are formed when electric current is flowing within a device or wire. The greater the current, the stronger the magnetic field.

EMFs can occur separately or together. For example, when you plug the power cord for a lamp into a wall socket, it creates an electric field along the cord. When you turn the lamp on, the flow of current through the cord creates a magnetic field. Meanwhile, the electric field is still present.

Canada

POWER LINES AND YOUR HOME

EMFs are strongest when close to their source. As you move away from the source, the strength of the fields fades rapidly. This means you are exposed to stronger EMFs when standing close to a source (e.g., right beside a transformer box or under a high voltage power line), and you are exposed to weaker fields as you move away.

When you are inside your home, the magnetic fields from high voltage power lines and transformer boxes are often weaker than those from household electrical appliances.

Electric fields can be shielded using materials such as metal. Things like buildings and trees—and even the ground when power lines are buried—can block electric fields.

CANADIANS EXPOSURE TO EMFS AT EXTREMELY LOW FREQUENCIES (ELFS)

On a daily basis, most Canadians are exposed to EMFs generated by household wiring, lighting, and any electrical appliance that plugs into the wall, including hair dryers, vacuum cleaners and toasters. In the workplace, common sources of EMFs include computers, air purifiers, photocopiers, fax machines, fluorescent lights, electric heaters, and electric tools in machine shops, such as drills, power saws, lathes and welding machines.

EXPOSURE IN CANADIAN HOMES, SCHOOLS AND OFFICES PRESENT NO KNOWN HEALTH RISKS

There have been many studies on the possible health effects from exposure to EMFs at ELFs. While it is known that EMFs can cause weak electric currents to flow through the human body, the

intensity of these currents is too low to cause any known health effects. Some studies have suggested a possible link between exposure to ELF magnetic fields and certain types of childhood cancer, but at present this association is not established.

The International Agency for Research on Cancer (IARC) has classified ELF magnetic fields as "possibly carcinogenic to humans". The IARC classification of ELF magnetic fields reflects the fact that some limited evidence exists that ELF magnetic fields might be a risk factor for childhood leukemia . However, the vast majority of scientific research to date does not support a link between ELF magnetic field exposure and human cancers. At present, the evidence of a possible link between ELF magnetic field exposure and cancer risk is far from conclusive and more research is needed to clarify this "possible" link.

Health Canada is in agreement with both the World Health Organization and IARC that additional research in this area is warranted.

REDUCE YOUR RISK

Health Canada does not consider that any precautionary measures are needed regarding daily exposures to EMFs at ELFs. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors.

THE GOVERNMENT OF CANADA'S ROLE

Health Canada, along with the World Health Organization, monitors scientific research on EMFs and human health as part of its mission to help Canadians maintain and improve their health.

International exposure guidelines for exposure to EMFs at ELFs have been established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). These guidelines are not based on a consideration of risks related to cancer. Rather, the point of the guidelines is to make sure that exposures to EMFs do not cause electric currents or fields in the body that are stronger than the ones produced naturally by the brain, nerves and heart. EMF exposures in Canadian homes, schools and offices are far below these guidelines.

FOR MORE INFORMATION

- Health Canada's Electric and magnetic fields at: www.hc-sc.gc.ca/ewh-semt/radiation/cons/electri-magnet/index-eng.php
- The World Health Organization – Electromagnetic fields and public health:
  - Exposure to extremely low frequency fields at: www.who.int/mediacentre/factsheets/fs322/en/index.html
  - Extremely low frequency at: www.who.int/docstore/peh-mf/publications/facts_press/efact/efs205.html
  - Extremely low frequency fields and cancer at: www.who.int/docstore/peh-emf/publications/facts_press/efact/efs263.html

Electric and Magnetic Fields

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FOR INDUSTRY AND PROFESSIONALS

- The International Agency for Research on Cancer (IARC) Volume 80 – Non-Ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields at: http://monographs.iarc.fr/ENG/Monographs/vol80/volume80.pdf
- IARC Carcinogen classifications at: http://monographs.iarc.fr/ENG/Classification/index.php

RELATED RESOURCES

- Health Canada, *It's Your Health*:
  - Safety of Wi-Fi Equipment at: www.hc-sc.gc.ca/hl-vs/iyh-vsv/prod/wifi-eng.php
  - Safety of Cell Phones and Cell Phone Towers at: www.hc-sc.gc.ca/hl-vs/iyh-vsv/prod/cell-eng.php
- For safety information about food, health and consumer products, visit the Healthy Canadians website at: www.healthycanadians.gc.ca
- For more articles on health and safety issues go to the *It's Your Health* web section at: www.health.gc.ca/iyh

You can also call toll free at 1-866-225-0709 or TTY at 1-800-267-1245*

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Canada

Bipole III

Bipole III Transmission Project: A Major Reliability Improvement Initiative

Alternating Current Electric and Magnetic Fields (EMF)

Manitoba Hydro is proposing to build a new direct current (DC) transmission line, known as Bipole III, to improve system reliability. The new line will link the northern power generating complex on the Lower Nelson River with the delivery system in southern Manitoba. In addition to the DC transmission line, the Bipole III Transmission Project will include the construction of a 230 kV alternating current (AC) transmission line between the existing 230 kV switchyard at Long Spruce Generating Station and a new 230 kV switchyard at the site of the new northern converter station; and two 230 kV AC transmission lines to connect the existing 230 kV switchyard at Henday Converter Station to the new 230 kV switchyard at the new northern converter station.

The proposed AC transmission lines will produce AC electric and magnetic fields (EMF) that oscillate at a frequency of 60 Hertz (Hz). This brochure describes electric and magnetic fields, the health research that has been conducted, and the conclusions offered by various scientific agencies on AC EMF and effects on human health.

What are AC electric and magnetic fields?

Our electrical system carries power from generating stations to our homes by way of transmission lines, substations, and distribution lines. Each component of this system – from the transmission lines that carry the electricity, to the appliances that use the electricity – produces electric and magnetic fields in the extremely low frequency (ELF) range that includes 60 Hz[1]. A field describes the properties of the space surrounding an object due to the characteristics of the object. A temperature field, for example, surrounds a hot object, just as electric and magnetic fields surround electrical objects.

[1]ELF EMF is different from radiofrequency fields, such as those produced by mobile phones and radio and TV stations.

There are differences between electric fields and magnetic fields. Electric fields are due to a system's voltage and are measured in kilovolts per meter (kV/m). Magnetic fields are due to the flow of electrical current and are measured in milligauss (mG). Most objects partially block electric fields, including trees, cars and buildings, while magnetic fields are not shielded by these objects. Since magnetic fields are more pervasive, magnetic fields have been the focus of health research.

The EMF levels measured near any source depend on a number of factors, but largely on the distance at which the measurement is taken. Both electric and magnetic field levels decrease with increasing distance from the source, just as the heat from a candle or stove decreases as you move farther away. The box below describes the general properties of different EMF sources.

Some EMF sources and their general properties

Appliances. Appliances, such as microwave ovens, vacuum cleaners, and hand-held appliances tend to produce the highest EMF levels indoors. Compared to power lines, EMF levels from appliances drop off more rapidly with distance. A microwave oven, for example, produces a magnetic field of approximately 200 mG at 6 inches and 4 mG at 1 foot.

Power lines. The EMF levels associated with an AC power line depend on the configuration of the line's conductors, the line's voltage, the amount of current the line is carrying, distance from the conductors, etc. The EMF levels under AC transmission lines are higher than the levels under the distribution lines that run down local streets. Transmission lines are located on dedicated right-of-ways, and are typically farther away from residences.

Substations. Similar to appliances, substation equipment is configured in such a way that field levels drop off quickly with distance. At the fence surrounding a substation, the EMF levels associated with the substation's equipment are typically within the range of background levels, except where the transmission lines connect to the substation. Background levels are the EMF levels typically measured in homes or offices away from appliances and other major EMF sources.

What levels of magnetic fields are most people exposed to?

The answer to this question is difficult to answer precisely because, in our modern day society, we are all exposed for varying amounts of time to innumerable sources of magnetic fields throughout the day. The highest levels are recorded very close to electrical sources which range from dozens to hundreds of milligauss (mG). It is generally agreed, that if the average of a person's magnetic field exposures throughout an entire day is measured, most persons are exposed to levels in the range of 1 to 2 mG. While this is our average level of exposure, we are exposed to both higher and lower field levels throughout the day.

Has research been conducted on the potential for AC electric and magnetic fields to affect health?

Yes. A large body of research has been conducted in Canada and other countries for almost 40 years on a wide variety of topics. This research includes:

- **Epidemiology studies.** Observational studies of people, which evaluate the relationship between estimated magnetic field exposures and diseases.
- **Experimental studies.** This includes studies of laboratory animals exposed to high EMF levels for long periods of time and studies of cells and tissues exposed to EMF in the laboratory.

What have scientific agencies concluded about the research on AC electric and magnetic fields and human health?

Numerous scientific and health agencies have evaluated this body of research, including the World Health Organization (WHO), the International Agency for Research on Cancer (IARC), and the Health Protection Agency (HPA) of Great Britain. In Canada, the topic has been evaluated by the Federal Provincial Territorial Radiation Protection Committee (FPTRPC). The FPTRPC is an intergovernmental, Canadian committee assembled to harmonize the standards and practices for ELF EMF within federal, provincial and territorial jurisdictions. Health Canada refers to the FPTRPC as the authority on issues related to EMF. The FPTRPC established an ELF Working Group to carry out periodic reviews, recommend appropriate actions and provide position statements that reflect the common opinion of intergovernmental authorities.

The conclusions of these scientific agencies have been generally consistent. Overall, they concluded that the research does not show that electric or magnetic fields are a known or likely cause of any disease, including cancer. They also concluded that some statistical data suggests a relationship between childhood leukemia and rare exposure to high magnetic field levels, although the uncertainty associated with these findings and the lack of support from experimental studies does not support a true relationship. Please consult the documents listed at the end of this handout for more details on the agencies' conclusions.

What specifically did the FPTRPC conclude?

The Canadian committee concluded that, "there is insufficient scientific evidence showing exposure to EMFs from power lines can cause adverse health effects such as cancer" (http://hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/emf-cem-eng.php). Also, the Manitoba Clean Environment Commission developed a Health and EMF Expert's Consensus Statement on the Human Health Effects of ELF EMF in 2001, which concluded that "The weight of scientific evidence does not support the conclusion that extremely low frequency EMFs such as those produced by power lines are a cause of adverse effects on human health." (http://www.cecmanitoba.ca/Reports/PDF/CEC_EMF_Consensus_Report.pdf).

Are there any standards or guidelines to limit exposure to AC electric and magnetic fields in Canada?

Canada does not have any national, territorial or provincial standards or guidelines related to EMF. However, Canada supported the application of the precautionary principle in the assessment of environmental factors in the late 1990s, at about the same time as Europe. The principle states that, in areas of scientific uncertainty, steps should be taken to reduce exposures that are proportional to the perceived level of risk. This principle has been supported by the WHO, which recommends low-cost measures to reduce EMF exposure such as constructing electrical infrastructure in ways that reduce EMF levels. Such measures might include adjusting the design of adjacent lines to minimize magnetic fields.

What does Health Canada recommend?

Health Canada states the following: "You do not need to take action regarding typical daily exposures to electric and magnetic fields at extremely low frequencies. There is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living and working environments." (http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php).

Do AC electric and magnetic fields affect animals or plants?

Numerous research programs have been conducted to study the effects of EMF on wild and domesticated animals; the largest of these research programs was conducted with cows at the University of McGill in Quebec. Overall, this research has not found any relationship between EMF and the health, behavior or productivity of animals, including cows, pigs and sheep. Furthermore, studies of crops and other plants have reported no adverse effects on growth or viability.

Can AC EMF cause audible noise or radio/TV interference?

Yes, these effects may be noticeable, particularly when crossing underneath a transmission line. These occur when the strength of the electric field at points on the conductors' surface locally exceeds the insulating properties of air and tiny amounts of energy are released. This may be noticeable for AM radio or analog television pictures, but not for FM radio or cable television. Adherence to Canadian and Manitoba electrical codes and standards will minimize such effects.

For more information, please visit the following websites:

Canadian

Health Canada:

http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php

BC Centre for Disease Control:

http://www.bccdc.ca/healthenv/Radiation/ElectromagRadiation/PowerLines.htm

Canadian Cancer Society:

http://www.cancer.ca/Canada-wide/Prevention/Specific%20environmental%20contaminants/Electromagnetic%20fields.aspx?sc_lang=en#exposure

International

World Health Organization:

http://www.who.int/peh-emf/about/en/

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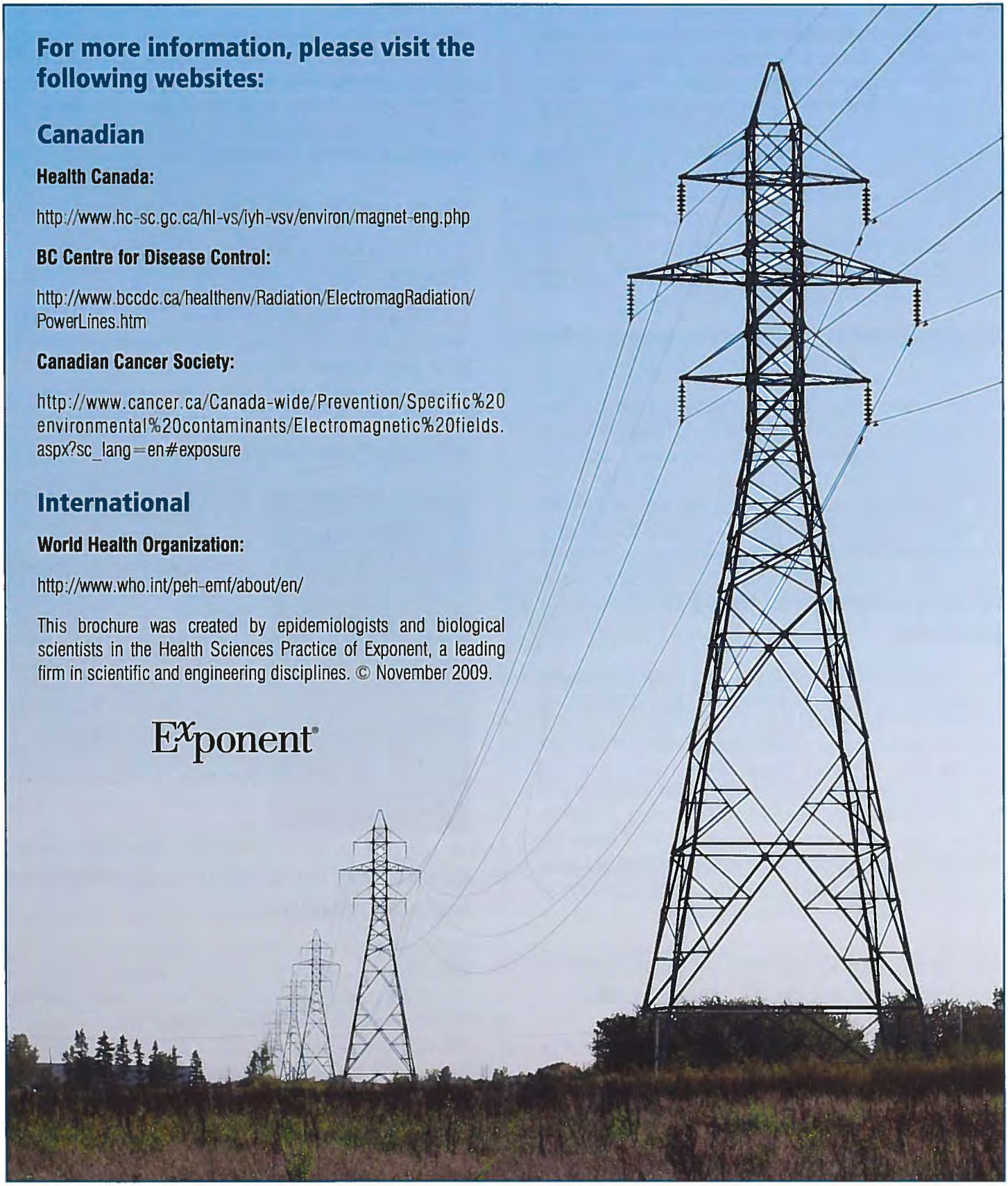

There is a shortage of high-voltage transmission lines, and demand is expected to grow in the future. Even so, these lines are usually unwanted as a result of the real and perceived impacts to people and natural resources. Selection of transmission line routes is a growing source of public controversy and regulatory scrutiny throughout the world.

A siting methodology was developed through a $500,000 collaborative effort co-funded by the Electric Power Research Institute (EPRI), the nonprofit Georgia Transmission Corporation (GTC), and Photo Science, a geospatial solutions contractor. The methodology addresses these criticisms by allowing external groups to participate in the process and by making decisions by utility professionals more transparent and credible. It uses a GIS to map all geographic features, assign stakeholder-generated numerical suitability values, assign engineering constraints, generate corridor alternatives using computer algorithms, and automatically create reports summarizing criteria used and values assigned. The methodology has proven to be objective, consistent, and defensible. A report is available to help transmission line developers implement the methodology.

The methodology is being adopted throughout the United States and has received international interest. The siting methodology earned GTC the National Rural Electric Cooperative Association's 2006 Cooperative Innovators Award.

Siting Transmission Lines Using the EPRI–GTC Siting Methodology

Jesse Glasgow

Keywords: geographic information system, stakeholder input, transmission line siting

Environmental Concerns in Rights-of-Way Management
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INTRODUCTION

Electric transmission lines are a critical component to the modern electric power system. Transmission lines carry wholesale electricity in bulk from the generator to the local distribution systems or industrial consumers. Transmission lines move power at a high voltage from plants to substations and transform power from high voltage to low voltage so that it can be delivered to homes and businesses. Transmission line voltage can range from 69 to 765 kV. Subtransmission lines, ranging from 34.5 to 69 kV, are often grouped with major transmission lines in a power company's organization structure. Lower-voltage lines require smaller structures and narrower rights-of-way (ROWs), while higher-voltage lines require larger structures and wider ROWs. In general, the perception is that lower-voltage lines have less impact and, therefore, the siting criteria may differ from those of higher-voltage lines.

Population growth and migration, increased per-capita electricity consumption, new power plants, and the need to add efficiency to the transmission system have increased the need for new transmission lines. The world population reached 7 billion in 2011, just 12 years after reaching 6 billion, and, in mid-2011, the U.S. population reached 312 million and has grown approximately 1% per year from 2000 to 2011 (Population Reference Bureau 2011). The world population is expected to peak at 9.2 billion in 2075 (United Nations 2004).

World per-capita electricity consumption increased by 25% from 1990 to 2005. The U.S. per-capita electricity consumption increased by almost 17% in that same time frame (International Energy Agency 2007). Residential electricity use in the United States increased by 23% from 1999 to 2009, and the trend is expected to continue increasing by 20% from 2007 to 2030 (Energy Information Administration 2009). Between 2010 and 2030, the U.S. electric utility industry will need to make a total infrastructure investment of $1.5 to $2.0 trillion—$300 billion of which is needed for transmission (Chupka et al. 2008).

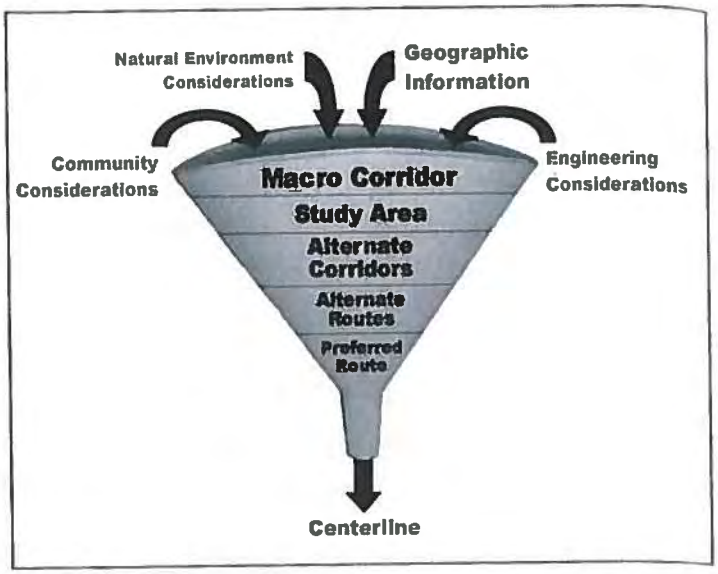

Figure 1. Corridor analysis funnel.

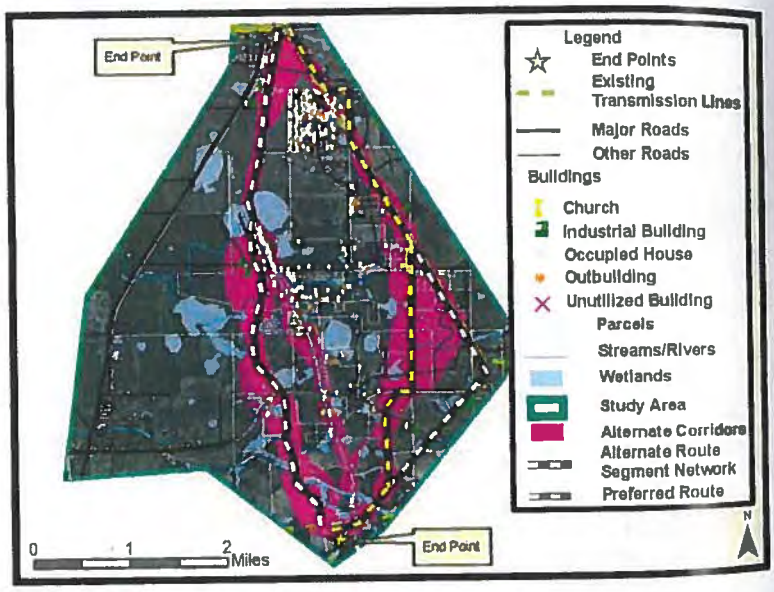

Figure 2. Alternative routes within alternative corridors.

Nevertheless, public opposition to new transmission lines is increasing. Typically, people prefer not to have transmission lines erected near where they live, work, or play. This is because of both real and perceived impacts to the scenery, property values, land use, and safety. At the same time, many people prefer to keep new transmission lines out of undeveloped natural areas so as to preserve wildlife habitat. Transmission line developers often find themselves between a rock and a hard place (Mortenson 2009; Wheeler 2009).

EPRI–GTC SITING METHODOLOGY

Development of transmission line ro is a growing source of public contro versy and regulatory scrutiny. A sitin methodology developed by Georgia Transmission Corporation (GTC), Photo Science, and the Electric Pow Research Institute (EPRI) addresses these criticisms. The EPRI–GTC siti methodology allows external group participate in the process and make decisions by utility professionals m

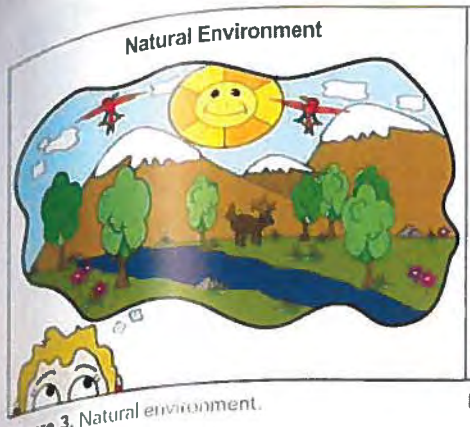

Figure 3. Natural environment.

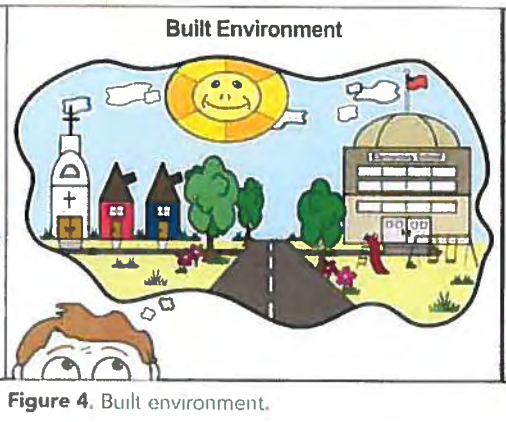

Figure 4. Built environment.

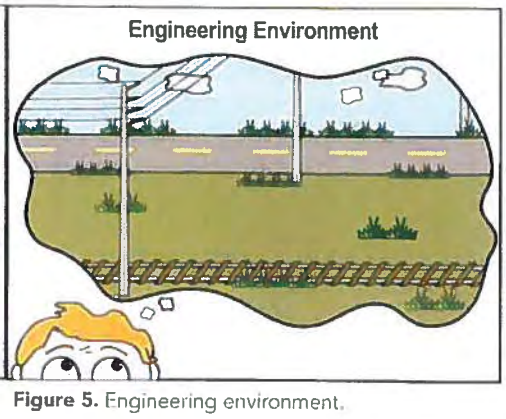

Figure 5. Engineering environment.

transparent and credible. It capitalizes on the ability of GIS software to map all geographic features in a study area, assign numerical suitability values to all features, assign engineering constraints, generate corridor alternatives using statistically sound algorithms, automatically generate alternative corridor reports, and automatically create reports summarizing criteria used and values assigned. At least nine utilities have adopted the methodology, and it has been used on more than 70 projects in at least seven U.S. states and Korea.

Methodology Overview

The funnel (Figure 1) is a conceptual diagram that illustrates the siting methodology at a high level. Values and weights developed during the process are applied to geographic information. During each phase of the process, as the area of interest becomes more focused and defined, and the data incorporated become more detailed and accurate. The final stage of this siting methodology culminates in route selection, whereby a preferred route, or centerline, is selected for the proposed facility.

Stakeholder Input

One of the key components to this methodology is the incorporation of input from external stakeholders. Stakeholders develop the criteria, determine relative suitability, and determine the relative importance of the criteria used to identify alternative corridors. Stakeholders represent members of community groups, regulatory agencies, conservation groups, other utilities, government agencies, elected officials, and others. This is done on a programmatic basis, and the resulting model is used on multiple projects.

Stakeholder input is used to create suitability maps from three perspectives. One perspective is the built environment, which contains mapped features that represent human and cultural resource areas. Another is the natural environment, which includes mapped features that represent plants, animals, and hydrologic resources. Finally, there is an engineering concerns perspective, which addresses physical constraints and contains features for maximizing co-location and minimizing cost and schedule delays. A computer algorithm is applied to evaluate all possible routes, determining the routes most preferred from each perspective. The top 3% of all the routes are used for the alternative corridors (Figure 2).

Once the corridors are identified, the process continues down the funnel. More detailed data are collected for these refined areas. As the process moves down the funnel, the data become more detailed and accurate, and the area to locate the transmission line becomes more concentrated and precise.

The professional siting team identifies alternative routes (Figure 2) within the alternative corridors. The alternative route evaluation model applies a standard set of metrics and weights to each route.

To select the preferred route, all top-scoring routes are scrutinized by the project team in a procedure known as "expert judgment." The team decides on a set of issues or risk factors that may be unique to each project. These issues are more subjective—such as public concern, maintenance accessibility, and schedule delay risk. Using the expert judgment model, the project team selects the preferred route.

Siting Criteria

Transmission line siting criteria can be grouped into three general categories: Criteria aimed at minimizing impacts to the natural environment (Figure 3), the built environment (Figure 4), and the engineering environment (Figure 5). By grouping criteria in this manner, models can be developed to place emphasis on one of these groups or consider them equally. This organization structure also provides options for obtaining input from stakeholders with varying expertise. Some stakeholders may have more expertise and concern relative to people, places, the natural environment, or engineering.

Another consideration for criteria is the phase of the project. As the project proceeds, more-detailed criteria are considered. The criteria used for the identification of corridors may not be as detailed or specific as the criteria used to evaluate alternative routes.

Following is an example of criteria for the identification of alternative corridors within a siting program in the eastern United States. It should be noted

that these criteria may be different in different regions; therefore, the model should be updated to accommodate region-specific concerns. These criteria and the suitability values and weights were identified by a group of external stakeholders.

Natural Environment

- Streams and Wetlands
  - ⇨ No streams and wetlands
  - ⇨ Small streams
  - ⇨ Nonforested, noncoastal wet lands
  - ⇨ Large streams
  - ⇨ Nonforested coastal wetlands
  - ⇨ Trout streams
  - ⇨ Forested wetlands

- Floodplain
  - ⇨ In the floodplain
  - ⇨ Not in the floodplain

- Public Lands (see other public lands, in the avoidance category)
  - ⇨ Areas where there are no public lands
  - ⇨ Wildlife management areas (private ownership)
  - ⇨ Other conservation land
  - ⇨ U.S. Forest Service land
  - ⇨ Wildlife management areas (state owned)

- Protected Wildlife Habitat
  - ⇨ Federally endangered
  - ⇨ Federally threatened
  - ⇨ State endangered
  - ⇨ State threatened
  - ⇨ No protected wildlife habitat

- Land Cover
  - ⇨ Open land
  - ⇨ Managed pine plantation
  - ⇨ Row crops
  - ⇨ Developed land
  - ⇨ Forest

- Avoidance Areas
  - ⇨ EPA Superfund sites
  - ⇨ Federal, state, and local parks
  - ⇨ Wilderness areas
  - ⇨ National Wild and Scenic Rivers
  - ⇨ Wildlife refuge

Built Environment

- Proximity to Buildings
  - ⇨ Close to buildings
  - ⇨ Far from buildings

- Building Density
  - ⇨ High building density
  - ⇨ Low building density

- Proximity to Eligible Historic Structures
  - ⇨ Close to historic structures
  - ⇨ Far from historic structures

- Proposed Developments
  - ⇨ Area with proposed development
  - ⇨ No proposed development

- Land Use
  - ⇨ Undeveloped
  - ⇨ Developed nonresidential
  - ⇨ Residential

- Avoidance Areas
  - ⇨ Listed archeology sites, historic structures, and districts
  - ⇨ Areas of ritual importance
  - ⇨ School and daycare parcels
  - ⇨ Cemetery parcels
  - ⇨ Church parcels
  - ⇨ Buildings

Engineering Environment

- Slope
  - ⇨ High slope
  - ⇨ Low slope

- Intensive Agriculture
  - ⇨ Center pivot irrigation
  - ⇨ Fruit orchards
  - ⇨ No intensive agriculture

- Co-Location Opportunities
  - ⇨ Rebuild existing transmission lines
  - ⇨ Parallel existing transmission lines
  - ⇨ Parallel gas transmission lines
  - ⇨ Parallel roads
  - ⇨ Parallel interstates
  - ⇨ Scenic highways
  - ⇨ Parallel railroads

- Avoidance Areas
  - ⇨ Airports and glide paths
  - ⇨ Nonspannable water
  - ⇨ Military facilities
  - ⇨ Mines and quarries

Stakeholder Calibration

The methodology recommends that a group of stakeholders identify/refine the siting criteria and assign relative suitability values and relative importance weights (Figure 6). This is accomplished by using the modified Delphi process to gain consensus on the suitability values and the analytical hierarchy process to

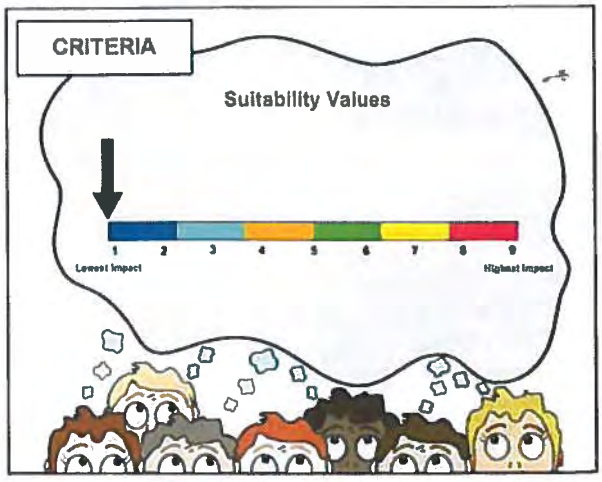

Figure 6. Suitability values.

Engineering		Natural Environment		Built Environment		Avoidance Areas
Linear Infrastructure	**48.3%**	**Floodplain**	**6.2%**	**Proximity to Buildings**	**11.5%**	Listed archaeology sites
Rebuild existing transmission lines	1	No floodplain	1	> 1200	1	Listed NRHP districts and buildings
Parallel existing transmission lines	1.4	100-year floodplain	9	900–1200	1.8	Eligible NRHP districts
Parallel roads ROW	3.6	**Streams/Wetlands**	**20.9%**	600–900	2.6	Airports
Parallel gas pipelines	4.5	No streams/wetlands	1	300–600	4.2	EPA Superfund sites
Parallel railway ROW	5	Streams < 5 ft^3/sec. + regulatory buffer	5.1	0–300	9	Nonspannable water bodies
No linear infrastructure	5.5	Nonforested noncoastal wetlands + 30-foot buffer	6.1	**Eligible NRHP Historic Structures**	**13.9%**	State and national parks
Future GDOT plans	7.5	Rivers/streams > 5 ft^3/sec. + regulatory buffer	7.4	>1500	1	Military facilities
Parallel interstates ROW	8.1	Nonforested coastal wetlands + 30-foot buffer	8.4	0–1500	9	City and county parks
Road ROW	8.4	Trout streams (50-foot buffer)	8.5	**Building Density**	**37.4%**	Mines and quarries
Scenic highways ROW	9	Forested wetlands + 30-foot buffer	9	0–0.05 buildings/acre	1	Daycare parcels
Slope	**9.1%**	**Public Lands**	**16.0%**	0.05–0.2 buildings/acre	3	Cemetery parcels
Slope 0–15%	1	No public lands	1	0.2–1 buildings/acre	5	School parcels (K–12)
Slope 15–30%	5.5	WMA, not state owned	4.8	1–4 buildings/acre	7	Church parcels
Slope >30%	9	Other conservation land	8.3	4–25 buildings/acre	9	USFS wilderness area
Intensive Agriculture	**42.6%**	U.S. Forest Service	8	**Proposed Development**	**6.3%**	National Wild and Scenic Rivers
No intensive agriculture	1	WMA, state owned	9	No proposed development	1	Areas of ritual importance
Fruit orchards	5	**Land Cover**	**20.9%**	Proposed development	9	Wildlife refuge
Pecan orchards	9	Open land (pastures, scrub/shrub, etc.)	1	**Spannable Lakes and Ponds**	**3.8%**	Buildings + buffer
Center pivot irrigation	9	Managed pine plantations	2.2	No spannable lakes or ponds	1	
		Row crops and horticulture	2.2	Spannable lakes and ponds	9	
		Developed land	6.5	**Major Property Lines**	**8.0%**	
		Hardwood/mixed/natural coniferous forests	9	Edge of field	1	
		Wildlife Habitat	**36.0%**	Land lots	7.9	
		No sensitive wildlife habitat	1	No major property lines	9	
		Species of concern habitat	3	**Land Use**	**19.1%**	
		Natural areas	9	Undeveloped	1	
				Nonresidential	3	
				Residential	9	

Table 1. Alternative corridor model.

develop relative importance weights. The stakeholders are grouped by expertise/concern, and a facilitator drives the group to as much consensus as possible.

The stakeholder input process results in a model that contains weights (measured by percentage of total) that represent the relative suitability of the layers and suitability values representing the relative suitability of the features. The higher the weight, the more important the layer is within that group. The lower the suitability value, the more suitable a feature is for a new transmission line.

GIS tools, such as ESRI's Spatial Analyst, are used to perform suitability and least-cost-path analysis. Multiple suitability maps and corridors are generated based on emphasizing each perspective. For example, a fivefold emphasis is placed on the built perspective to develop the built corridor. Finally, an analysis is performed equally weighting all three perspectives. This process results in four corridors which, when combined, form the alternative corridors (Table 1).

Table 2. Alternative route evaluation model.

For All Routes		Sample Weights					
Feature	**33%**	**Route A**	**Route B**	**Route C**	**Route D**	**Route E**	**Route F**
Built		Unit	Unit	Unit	Unit	Unit	Unit
Relocated residences (within 75-foot corridor)	44.3%	0.00	0.00	1.00	0.00	1.00	0.00
Weighted		0.00	0.00	0.44	0.00	0.44	0.00
Proximity to residences (300 feet)	13.1%	0.00	1.00	0.25	0.13	0.28	0.16
Weighted		0.00	0.13	0.03	0.02	0.04	0.02
Proposed residential developments	5.4%	1.00	0.00	0.50	0.00	0.00	0.00
Weighted		0.05	0.00	0.03	0.00	0.00	0.00
Proximity to commercial buildings (300 feet)	3.6%	0.50	0.75	0.00	0.00	0.00	1.00
Weighted		0.02	0.03	0.00	0.00	0.00	0.04
Proximity to industrial buildings (300 feet)	1.8%	0.33	0.00	0.00	0.00	1.00	1.00
Weighted		0.01	0.00	0.00	0.00	0.02	0.02
School, daycare, church, cemetery, park parcels (#)	16.3%	1.00	0.14	0.14	0.00	0.00	0.00
Weighted		0.16	0.02	0.02	0.00	0.00	0.00
NRHP listed/eligible structures/districts (1500 feet from edge of ROW)	15.5%	1.00	0.50	0.00	0.00	0.00	0.00
		0.16	0.08	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.40	0.26	0.53	0.02	0.50	0.07
WEIGHTED TOTAL		0.13	0.09	0.17	0.01	0.16	0.02
Natural	33%						
Natural forests (acres)	9.3%	0.00	0.54	0.49	0.61	0.88	1.00
Weighted		0.00	0.05	0.05	0.06	0.08	0.09
Stream/river crossings	38.0%	0.00	0.50	0.00	0.00	1.00	1.00
Weighted		0.00	0.19	0.00	0.00	0.38	0.38
Wetland areas (acres)	40.3%	0.02	0.00	0.62	0.72	0.90	1.00
Weighted		0.01	0.00	0.25	0.29	0.36	0.40
Floodplain areas (acres)	12.4%	0.29	0.00	1.00	0.85	0.67	0.29
Weighted		0.04	0.00	0.12	0.11	0.08	0.04
TOTAL	100.0%	0.04	0.24	0.42	0.45	0.91	0.91
WEIGHTED TOTAL		0.01	0.08	0.14	0.15	0.30	0.30
Engineering	33%						
Miles of rebuild with existing transmission line	65.6%	1.00	0.16	0.84	0.00	0.43	0.32
Weighted		0.66	0.11	0.55	0.00	0.28	0.21
Miles of co-location with transmission line	19.2%	2.58	1.25	8.50	2.36	3.69	9.50
Weighted		0.50	0.24	1.63	0.45	0.71	1.82
Miles of co-location with roads	7.8%	0.84	1.00	0.12	0.87	0.70	0.00
Weighted		0.07	0.08	0.01	0.07	0.05	0.00
Total project costs	7.4%	4.05	1.04	3.63	0.62	0.43	0.23
Weighted		0.30	0.08	0.27	0.05	0.03	0.02
TOTAL	100.0%	1.52	0.50	2.46	0.57	1.08	2.05
WEIGHTED TOTAL		0.50	0.17	0.81	0.19	0.36	0.68
SUM OF WEIGHTED TOTALS		0.65	0.33	1.12	0.34	0.82	1.00

Table 3. Expert judgment model.

For Top 3 to 5 Routes (Internal)		Sample Weights		
Expert Judgment	Per Project	Route A	Route B	Route D
Visual issues	10%	1	3	1
Weighted		0.1	0.3	0.1
Community issues	20%	1	3	2
Weighted		0.2	0.6	0.4
Schedule delay risk	0%	0	0	0
Weighted		0	0	0
Special permit issues	40%	1	3	1
Weighted		0.4	1.2	0.4
Construction/maintenance accessibility	30%	3	1	2
Weighted		0.9	0.3	0.6
Environmental justice	0%	0	0	0
Weighted		0	0	0
TOTAL	100%	1.6	2.4	1.5

The interdisciplinary project team identifies alternative routes within the alternative corridors that minimize impacts and maximize efficiency in accordance with each company's principles. Once the alternative routes are identified, they are evaluated using the alternative route evaluation model (Table 2). This model normalizes metrics on a scale from 0 to 1 so that metrics using different units can be compared. Stakeholders typically identify the criteria and calibrate the weights in this model on a programmatic basis and use it on multiple projects. Typically, a group of internal stakeholders (company representatives) will calibrate this model with corporate values. However, there have been instances of external stakeholders, such as regulatory agency representatives, calibrating this model for specific projects.

Regardless of how this model is calibrated, it is used to evaluate the alternative routes and filter out the top routes. Sensitivity analysis is applied by, again, placing fivefold emphasis on the three perspectives and equally weighting all three perspectives. This method can be used to produce the top route finalist.

The top three to five routes are then taken into the expert judgment model (Table 3). This model is used to guide the project team in selecting the preferred route. The project team adjusts the criteria as necessary on a per project basis, as well as on the relative importance weights. Then the project team ranks each of the route finalists based on their relative score in comparison to the other finalists. The route with the lowest score is the preferred route.

Finally, the route is selected and a detailed technical routing report is created that describes the study area, alternative corridors, alternative routes, and preferred route. This report also describes the siting methodology.

CONCLUSION

Population growth and migration, increased per-capita electricity consumption, new power plants, and the need to add efficiency to the transmission system have increased the need for new transmission lines. There is significant public opposition to new transmission line development projects. The EPRI–GTC siting methodology offers a standardized, objective, consistent, inclusive, transparent, and defensible methodology for siting new transmission lines. Application of this methodology may lead to more-defensible siting programs and transmission line development projects.

ACKNOWLEDGMENTS

The EPRI–GTC siting methodology was developed by a core team of utility practitioners, academics, and consultants including Gayle Houston; Christy Johnson; Christopher Smith; Steven French, Ph.D.; Steven Richardson, Esq.; Paul Zwick, Ph.D.; Joseph Berry, Ph.D.; Elizabeth Kramer, Ph.D.; and the author.

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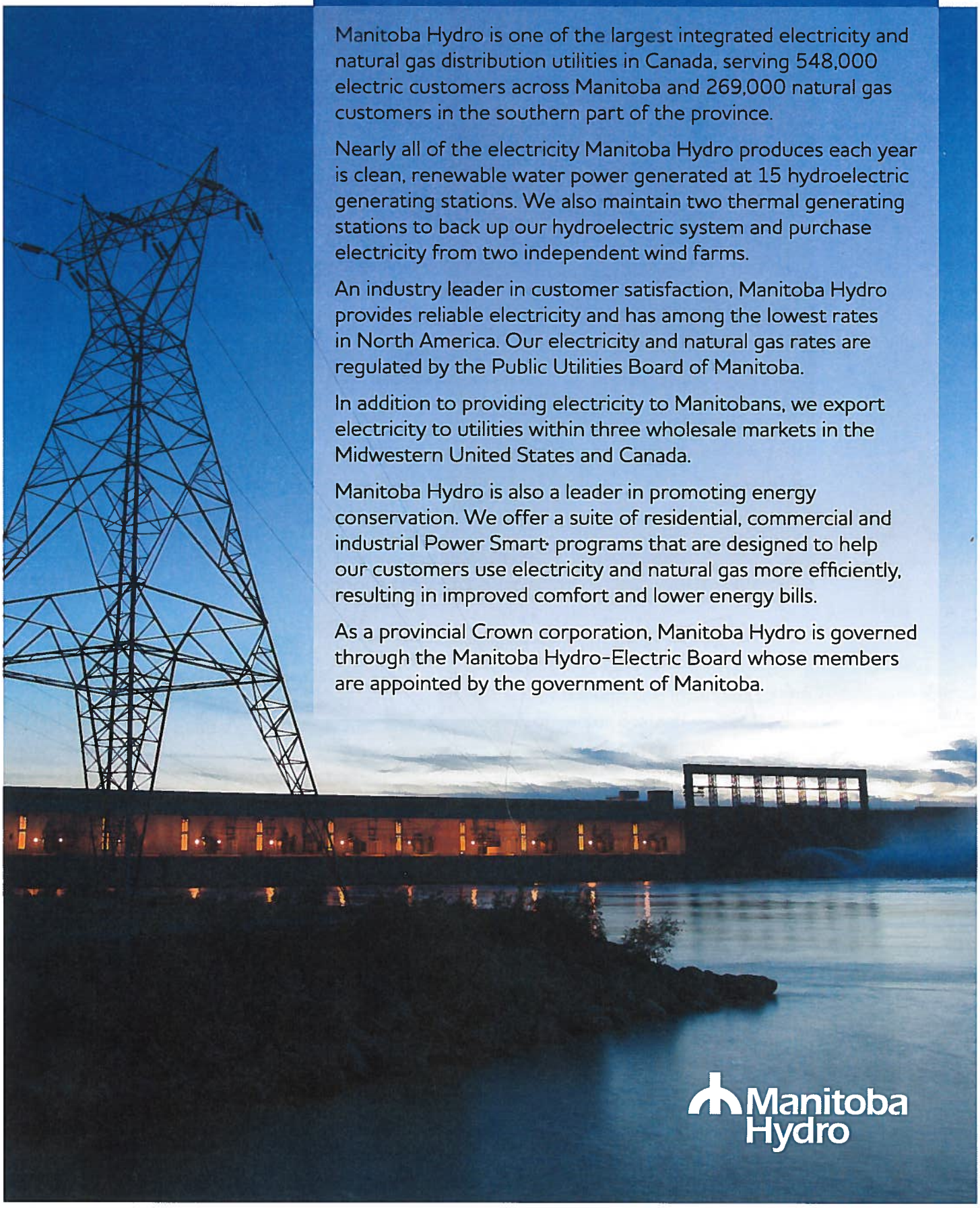
Since 1999, Jesse Glasgow has been responsible for oversight of the geographic information acquisition, management, analysis, and distribution functions and staff for Georgia Transmission Corporation (GTC). While at GTC, he has led the development of business processes and custom software solutions in support of the siting, design, construction, operations, and maintenance of electric transmission facilities. Glasgow was a team leader in developing the EPRI–GTC siting methodology. Additionally, Glasgow manages transmission line siting projects and consults with a variety of clients involved in developing electric transmission lines, power plants, and greenways. Glasgow earned a BS degree in professional geography from the University of North Alabama and a GIS certification from the University of North Alabama, and is a Licensed Professional Land Surveyor (GIS surveyor) in South Carolina. He serves on the board of directors for the MillionMile Greenway organization. Prior to working in the utility/energy industry, Glasgow was a planner at a regional government agency.

The Hydro Province



Manitoba Hydro is one of the largest integrated electricity and natural gas distribution utilities in Canada, serving 548,000 electric customers across Manitoba and 269,000 natural gas customers in the southern part of the province.

Nearly all of the electricity Manitoba Hydro produces each year is clean, renewable water power generated at 15 hydroelectric generating stations. We also maintain two thermal generating stations to back up our hydroelectric system and purchase electricity from two independent wind farms.

An industry leader in customer satisfaction, Manitoba Hydro provides reliable electricity and has among the lowest rates in North America. Our electricity and natural gas rates are regulated by the Public Utilities Board of Manitoba.

In addition to providing electricity to Manitobans, we export electricity to utilities within three wholesale markets in the Midwestern United States and Canada.

Manitoba Hydro is also a leader in promoting energy conservation. We offer a suite of residential, commercial and industrial Power Smart® programs that are designed to help our customers use electricity and natural gas more efficiently, resulting in improved comfort and lower energy bills.

As a provincial Crown corporation, Manitoba Hydro is governed through the Manitoba Hydro-Electric Board whose members are appointed by the government of Manitoba.

Manitoba Hydro

Where our power comes from

98%

Average percentage of electricity generated from renewable hydropower annually

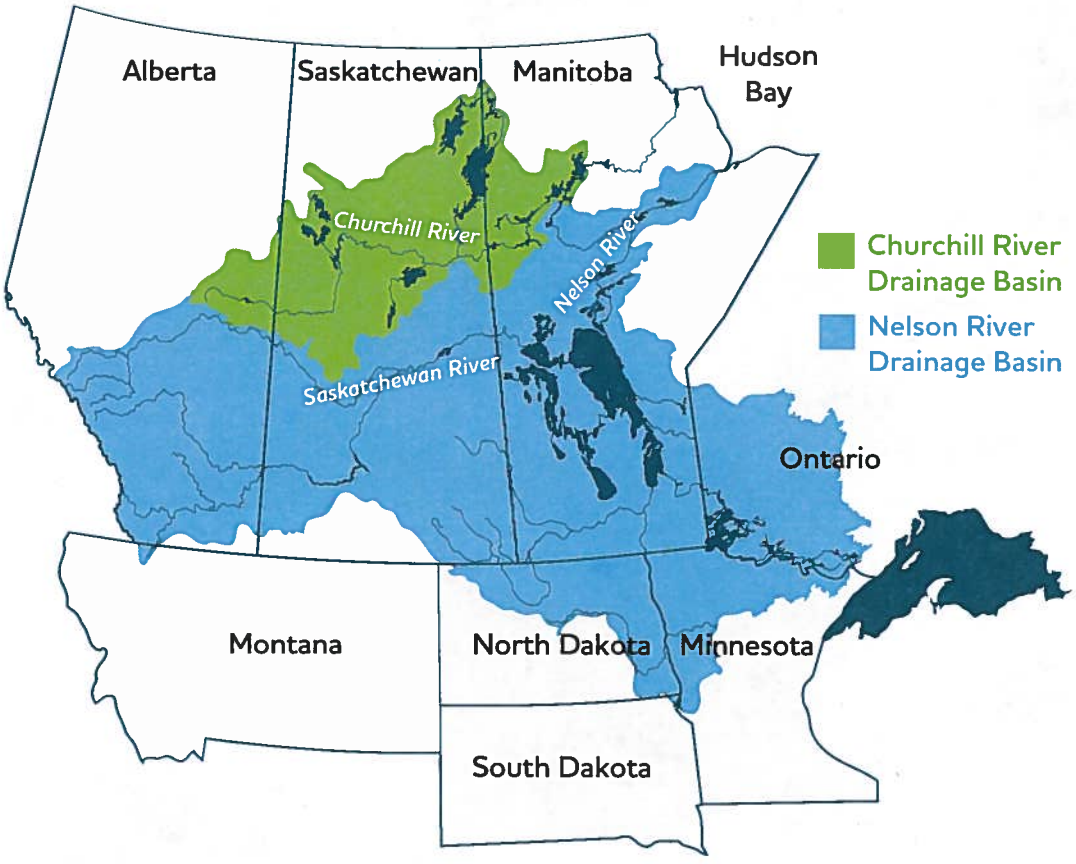
5,685 megawatts

Manitoba Hydro's total generating capability

Over the last 60 years, Manitoba Hydro has developed one of the cleanest, most sustainable power systems anywhere. Virtually all electricity we generate is produced using this province's vast water resources.

A number of drainage basins converge in Manitoba, drawing water from an area that stretches from very near Lake Superior to the Rocky Mountains and into South Dakota. The largest of these basins, the Nelson River drainage basin, gathers water from an area exceeding one million square kilometres before emptying into Hudson Bay.

Five hydroelectric generating stations harness the energy of the Nelson River, including three on the lower reaches, producing over 70 per cent of Manitoba Hydro's electricity. To enable the development of these stations, we undertook a number of bold projects over 40 years ago, including the Churchill River Diversion, Lake Winnipeg Regulation and the construction of a high voltage direct current (HVDC) transmission system that is one of the longest in the world.



Churchill River Diversion

The Churchill River Diversion diverted a portion of the Churchill River's flow into the Nelson River via the Rat and Burntwood rivers. Although the Churchill River has considerable hydroelectric potential, there is a significant economic advantage to augmenting the flow on the Nelson River and building generating stations there rather than developing both rivers.

Lake Winnipeg Regulation

Lake Winnipeg Regulation was completed in 1976. Designed primarily as a flood control project that could also ensure adequate water flows to downstream generating stations, the project involved excavating a series of channels at the north end of Lake Winnipeg — one of the largest freshwater lakes in North America. The Lake Winnipeg Regulation project also involved the construction of the Jenpeg control structure and generating station on the upper Nelson River, immediately upstream from Cross Lake.

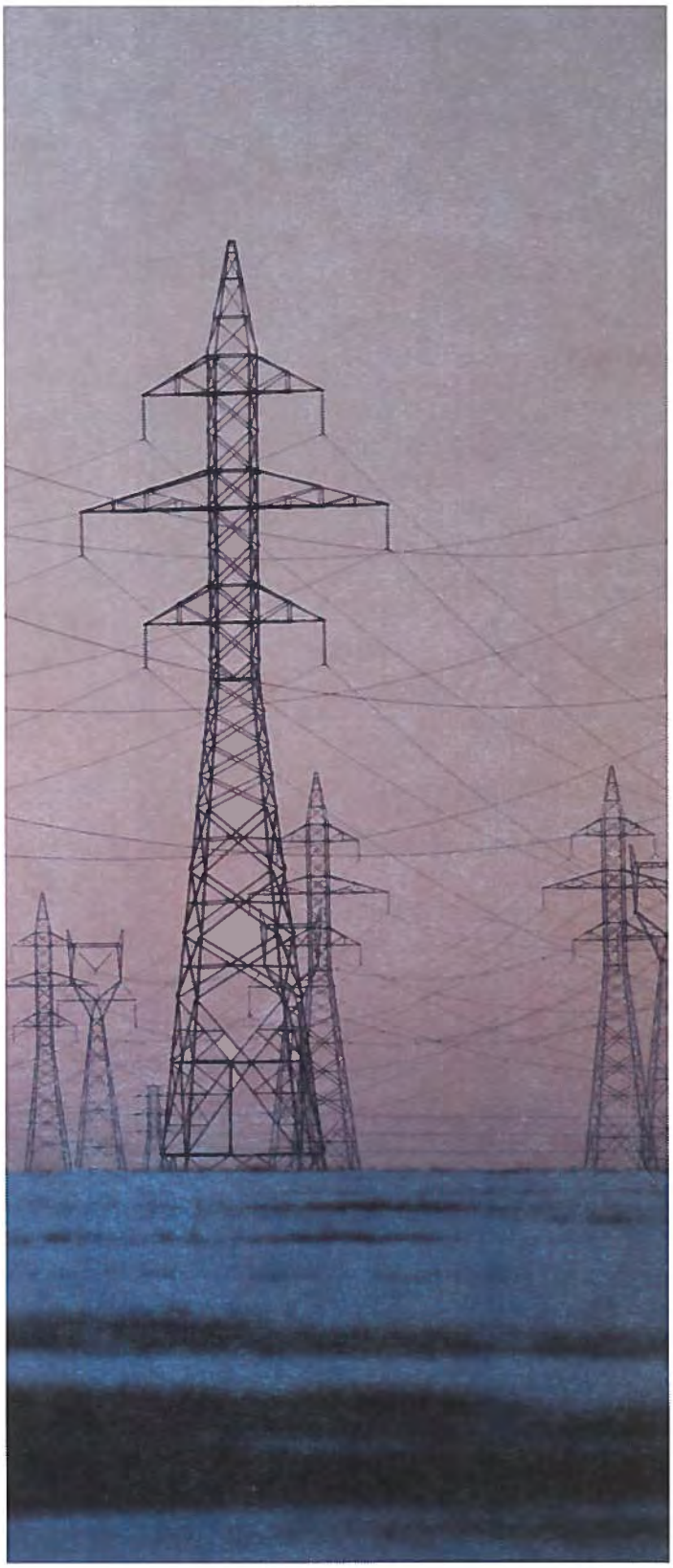
HVDC transmission system

The third project, the HVDC transmission system, saw Manitoba Hydro work with Atomic Energy of Canada Limited to develop two 900-kilometre transmission lines: Bipole I and Bipole II, which were completed in 1977 and 1985 respectively. Both lines deliver electricity from hydroelectric stations on the lower Nelson River to our customers in southern Manitoba as well as export markets. Both Bipole I and II

originate near Gillam at the Henday and Radisson converter stations and travel south though the Interlake to the Dorsey Converter Station — located near Winnipeg — carrying over 70 per cent of the electricity that we produce.

To reduce dependence on this HVDC system, Manitoba Hydro is building the Bipole III transmission line. This line will originate at the proposed Keewatinoow Converter Station — located north of Gillam — and travel 1,384 kilometres along the west side of the province to the new Riel Converter Station east of Winnipeg. Capable of carrying 2,000 megawatts, Bipole III will significantly improve the reliability of our power supply.

Electricity export market sales



Manitoba Hydro's generating system is designed to meet the province's demand for power even during periods of low water flow. As a result, in most years a surplus of electricity is generated. In fact, in a typical year approximately 40 per cent of the hydroelectricity we produce is surplus to domestic needs. Since 1957, we have sold this surplus to markets outside of Manitoba, including Saskatchewan, Ontario and the Midwestern United States, earning over $10 billion in revenue.

Transmission interconnections

Manitoba Hydro's network is connected to energy utilities in neighbouring jurisdictions through transmission line interconnections. These interconnections are critical to providing a reliable and affordable electricity supply to our customers because they allow us to export electricity outside of the province and, in turn, to import electricity in the event of unforeseen electrical outages or periods of drought.

Manitoba Hydro has two key advantages in the electricity market. First, our province's rivers provide a vast, renewable source of clean energy. Second, the seasonal demand for electricity in the Midwestern United States, our largest export market, is opposite to our own. U.S. demand peaks in the summer while Manitoba's peaks in the winter, offering opportunity for increased system efficiency and reliability.

Affordable, clean electricity

With a portfolio of clean energy resources, combined with aggressive energy conservation programming, Manitoba operates one of the cleanest, most sustainable electricity systems in the world. Hydroelectric generating stations are virtually free of greenhouse gas and other emissions. Our clean electricity exports have also reduced global greenhouse gas emissions by displacing fossil-fired generation in neighbouring jurisdictions.

In 2011, Manitoba's electricity exports reduced global greenhouse gas emissions by an estimated 7,400 kilotonnes of carbon dioxide equivalents – equal to removing 1.5 million vehicles from the road.

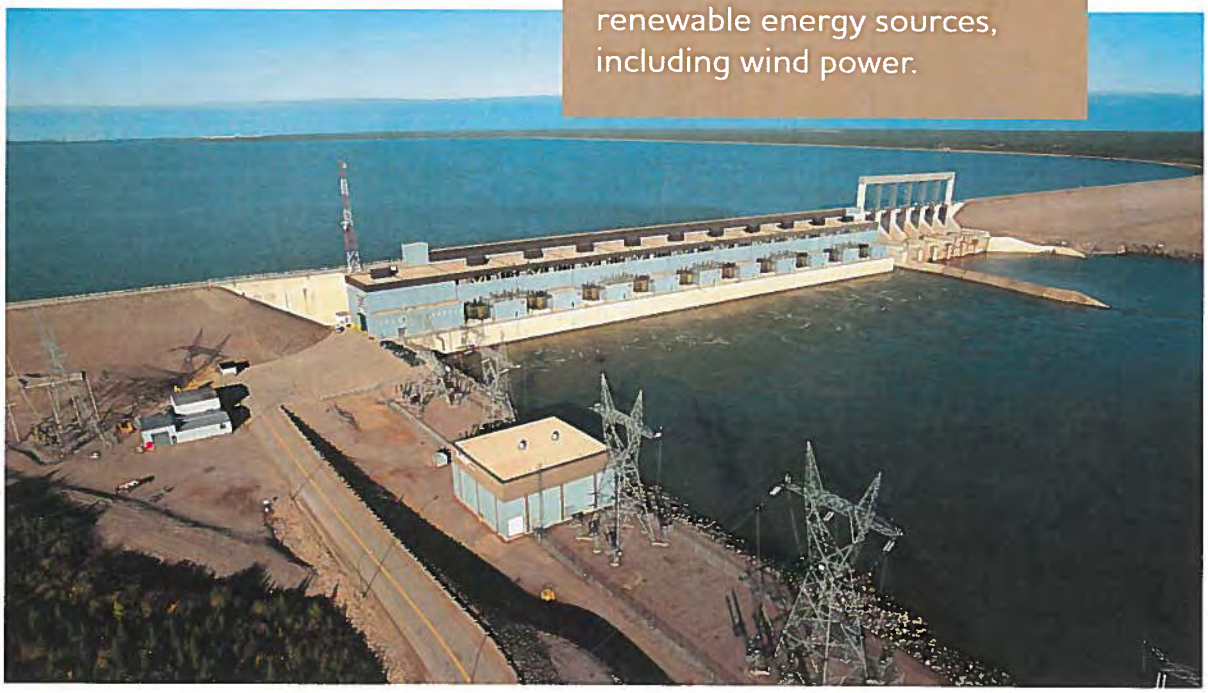
Manitoba Hydro supports these export sales through demand side management programs designed to encourage energy efficiency.

When Manitobans use less electricity, they save on their electricity bills and we can export more power, generating more revenue, which allows us to keep our rates among the lowest in North America.

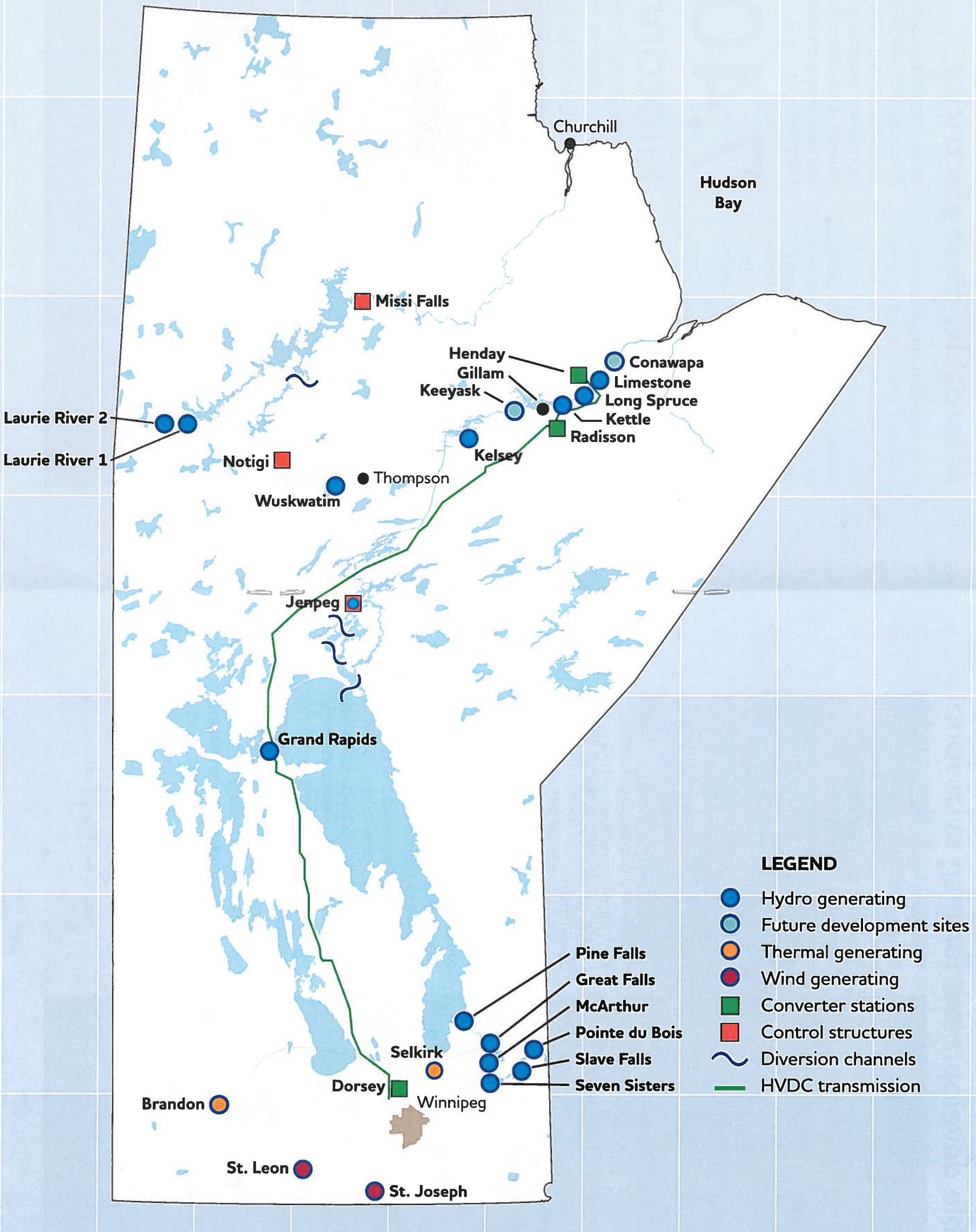
7,400 kilotonnes

Estimated reduction in carbon dioxide equivalents from electricity exports in 2011

The U.S. National Academy of Sciences has determined that life-cycle greenhouse gas emissions from hydropower are comparable to other renewable energy sources, including wind power.



Manitoba's hydroelectric system



Responsible development

New hydroelectric developments are subject to stringent environmental protection requirements and regulatory oversight. Projects undergo a comprehensive environmental impact assessment, which includes wide-ranging environmental and socio-economic studies as well as stakeholder engagement. Manitoba Hydro carries out environmental assessments of our hydroelectric projects, including the recently completed Wuskwatim Generating Station and the proposed Keeyask and Conawapa generating stations in cooperation with First Nation communities in the area of the developments.

This approach includes incorporating Aboriginal traditional knowledge into the project planning, monitoring and environmental assessment which complements Western scientific approaches. In the case of the Wuskwatim Generating Station, decisions on the location of the construction camp and access road were made in consultation with First Nation elders and resource users, using traditional knowledge.

We also work to ensure that local Aboriginal communities benefit from new hydroelectric developments through training, employment and business opportunities.

Innovative partnerships

The Wuskwatim Generating Station, Manitoba's newest hydroelectric plant, is located on the Burntwood River, near Thompson. The 200-megawatt facility, completed in 2012, was developed by the Wuskwatim Power Limited Partnership, a venture involving the Nisichawayasihk Cree Nation (NCN) and Manitoba Hydro. Wuskwatim marked the first time that Manitoba Hydro partnered with a First Nation on the development of a hydroelectric facility. This arrangement, the first of its kind in Canada, provides NCN the opportunity to own up to 33 per cent of the station.

We also reached a partnership agreement in 2009 with four First Nations in the vicinity of the proposed Keeyask Generating Station — Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation — for the development of that project.

Since 1977 the Grand Rapids Hatchery has helped to sustain native fish species diversity, including lake sturgeon. It is also a base for research aimed at improving aquaculture techniques and conservation stocking of native species. In 2011, the hatchery produced 5,500 lake sturgeon fingerlings. In 2012, 5,000 of those fingerlings were released in the Nelson River near the Jenpeg Generating Station.

Manitoba Hydro Place

The most energy efficient office tower in North America

Manitoba Hydro's commitment to sustainability is embodied by our corporate headquarters in downtown Winnipeg. Completed in 2009, Manitoba Hydro Place is the first office tower in Canada to achieve Leadership in Energy and Environmental Design (LEED)® platinum certification.

Manitoba Hydro Place is the most energy efficient office tower in North America. Compared to conventional office towers, it achieves reductions in energy use of over 70 per cent – from over 300 kilowatt hours per square metre to under 85 kilowatt hours.

These savings were achieved thanks to a unique building design that utilized leading edge Power Smart technologies as well as passive and active energy efficient systems. They include south-facing winter gardens to capture passive solar energy during winter, a geothermal system, a solar chimney to provide ventilation with a minimum of energy usage and the extensive use of glass to allow for natural lighting.

70%

Reduction in energy use from over 300 kilowatt hours per square metres to under 85 kilowatt hours

Power for tomorrow

Building Manitoba's future

Driven by growing electricity demand in Manitoba and the call for clean, renewable and stably-priced sources of energy throughout North America, Manitoba Hydro is proceeding with plans to develop over 2,100 megawatts of additional capacity on the lower Nelson River. Our development plan includes:

- construction of the 695-megawatt Keeyask Generating Station.
- construction of the 1,485-megawatt Conawapa Generating Station.
- a new Manitoba to U.S. transmission interconnection to provide additional capacity for new export sales as well as additional import capability to strengthen reliability.

This development plan continues to leverage the province's significant resource of clean, renewable hydropower — and the associated export sales opportunities — to ensure a reliable, affordable supply of electricity for Manitoba.

695
megawatts
Keeyask
Generating Station

1,485
megawatts
Conawapa
Generating Station

Manitoba's generating stations

Wuskwatim
200 MW (2012)

Limestone
1,340 MW (1992)

Long Spruce
1,010 MW (1979)

Jenpeg
131 MW (1979)

Kettle
1,220 MW (1974)

Kelsey
223 MW
(1961-1st stage,
1972-2nd stage)

Laurie River I
5 MW
(1952-1st stage,
1970-2nd stage)

Grand Rapids
479 MW (1968)

Laurie River II
5 MW (1958)

McArthur
55 MW (1955)

Seven Sisters
165 MW
(1931-1st stage,
1952-2nd stage)

Pine Falls
88 MW (1952)

Slave Falls
67 MW (1931)

Great Falls
133 MW (1928)

Pointe du Bois
78 MW (1911)

For more information, please contact
Public Affairs at:

email: publicaffairs@hydro.mb.ca
Phone: 204-360-3233
Mail: PO Box 815 STN MAIN
Winnipeg, Manitoba, Canada
R3C 2P4
Website: www.hydro.mb.ca

Selkirk
126 MW (1961)

Brandon
345 MW
(1958-1st stage,
2002-2nd stage)

Manitoba-Minnesota Transmission Project Comment Sheet

November 2013

How did you hear about this open house?

Postcard ☐ Letter ☐ Newspaper ☐ Word of mouth ☐ Website ☐ Other: _____

Do you live/work near one of the alternative routes (optional)?

Yes ☐ No ☐

Do you have any concerns regarding the alternative routes or border crossing locations?

Yes ☐ No ☐

What are your predominant concerns regarding this project? (Check all that apply.)

☐	Access to the right-of-way	☐	Construction of the line	☐	Location of the line	☐	Protection of vegetation	Other (Please specify)
☐	Aesthetics of the line (visual)	☐	Economic considerations	☐	Proximity to residences	☐	Impact on wetlands	Other
☐	Impact on agricultural activities	☐	Health and safety issues	☐	Site clean up	☐	Impact on wildlife/ birds	Other

Please describe and indicate locations of your concerns, or visit our mapping station to map them.

_____

_____

_____

Are there any specific sites that you think Manitoba Hydro should be aware of along or near the alternative routes or near the border crossings? (This is for consideration in refining routes and assessment.)

_____

_____

_____

_____

_____

Do you have recommendations for Manitoba Hydro on minimizing any potential effects of this project?

_____

_____

_____

_____

_____

_____

Manitoba Hydro

Siting Criteria

How would you prioritize the following site criteria for transmission lines? Note: Please rank only your five most important (positive) site selection factors from 1 (most important) to 5. Do not use the same ranking more than once.

Criteria	Rank (1 to 5)
Parallel existing transmission lines	
Follow existing highways or roadways	
Avoid agricultural lands	
Follow undeveloped roadways	
Follow existing drainage ditches	
Separation from heritage/cultural sites	
Avoid wetlands/marshes	
Avoid forested/natural areas	
Separation from residences and urban areas	
Length of line	
Cost	
Other	

Please provide any general comments you may have regarding the project.

Optional: I would like to receive project updates. ☐

Name

Contact information (mailing address or email)

Please return your comment sheet to a Manitoba Hydro representative at the open house or complete it at home and email, fax or mail your response to:

Don Hester
AECOM, 99 Commerce Dr.
Winnipeg, MB, R3P 0Y7
Don.Hester@aecom.com
Fax: 204-284-2040

You can also email Manitoba Hydro's Licensing & Environmental Assessment team at: mmtp@hydro.mb.ca

Appendix D

D1 – Open House Advertising

D2 – Open House Storyboards and Route Selection Presentation

D3 – Open House Handouts and Comment Sheet

D4 – Open House Comment Sheet Responses

D5 – Open House Mapping Exercise Results

Manitoba Hydro – Manitoba-Minnesota Transmission Line Project

Open House Summary Report

Open house events were held in the month of November to advise the public on plans for this project and to gain insight on opinions and concerns that they may have.

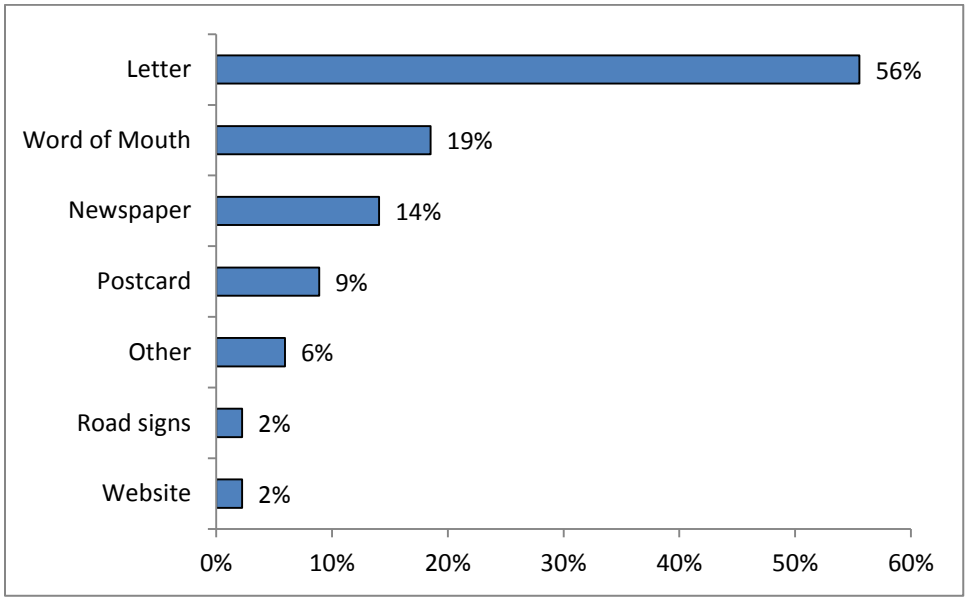
Table 1 below shows the number of comment forms received at each Public Open house event, and to date by mail or email.

Table 1 – Open House Comment Sheets

Date	Number of comment sheets
12 November, 2013 – Headingly	**9**
13 November, 2013 - Winnipeg	**8**
14 November, 2013 – Ste. Anne	**18**
19 November, 2013 - Steinbach	**18**
20 November, 2013 - Vita	**19**
21 November, 2013 - Piney	**11**
22 November, 2013	**4**
25 November, 2013	**1**
26 November, 2013 – Marchand	**21**
28 November, 2013 – Ile des Chenes	**18**
29 November, 2013 -	**2**
03 December, 2013	**1**
04 December, 2013	**4**
05 December, 2013	**1**
Total	**135**

Respondents were asked how they heard about the Open House event that they attended. Figure 1 below shows the breakdown.

Figure 1 – How Respondents heard about the Open House



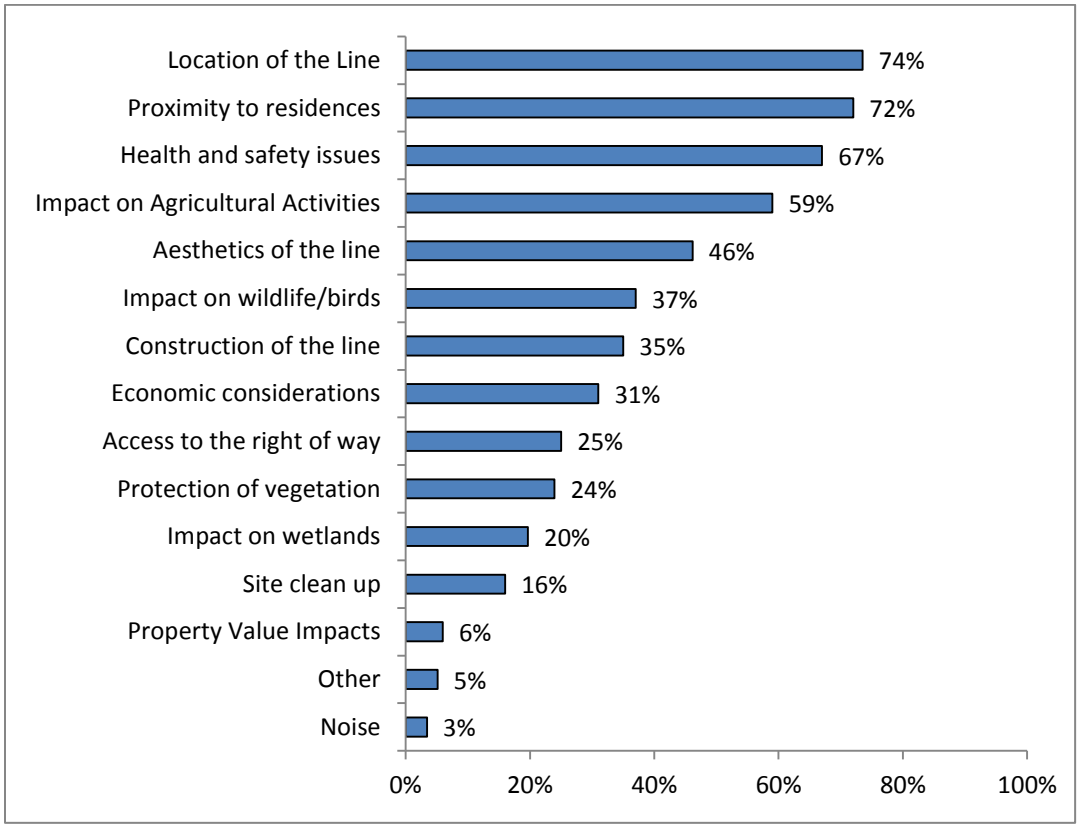
Base=129 Totals equal more than 100% as respondents could give more than one answer.

Over half of respondents (56%) said that they received a letter about the Open Houses, while 19% heard via word of mouth and 14% read about it in a newspaper.

An overwhelming majority of attendees said that they lived or worked near one of the Alternative Routes (82%), and when asked if they had any concerns about the Alternative Routes or Border Crossing areas over three quarters of respondents (78%) said that they did.

Respondents were asked about their predominant concerns regarding the project. Figure 2 below shows the complete breakdown of responses. Almost three-quarters of respondents (74%) said that the location of the line was their main concern, while a similar proportion (72%) said that the proximity to residences was a concern. Two-thirds of respondents (67%) said that health and safety issues concerned them, and 59% said that they were worried about potential impacts on agricultural activities.

Figure 2 – Concerns Surrounding the Project



Base= 123 – percentages equal more than 100% as respondents could give more than one answer

Eighty six percent of respondents said that there were specific sites that Manitoba Hydro should be concerned about along or near one of the Alternative Routes or near a Border Crossing. Common responses included:

- Marchand
- Vita
- Beekeepers in section 23-9-4E
- Any residential areas
- Prime agricultural areas
- Areas with species at risk
- Lagoons/swamp areas

Several respondents said that they thought the route should be located as far east as possible.

Ninety-three percent of respondents said that they had recommendations for Manitoba Hydro on minimizing/mitigating any potential effects from the project. Common responses included:

- Keep line as far east as possible
- Avoid farmland

- Avoid new homes being built in Marchand
- Avoid populated areas
- Consider using line 63
- Restrict access to hydro corridors to avoid hunting, ATVs etc.
- Keep the public informed of project developments

Respondents were asked to rank various site factors for transmission lines on a scale of 1 to 5. "Separation from residences and urban areas" clearly ranked as the number one priority by the majority of respondents. "Avoid agricultural lands' was a somewhat distant second priority, followed closely by "Following existing transmission lines". Following existing transmission lines, roadway infrastructure and undeveloped roadways were the most frequent third or fourth ranked factors.

Factor	Number of #1 Rankings	Number of #2 Rankings	Number of #3 Rankings	Number of #4 Rankings	Number of #5 Rankings	Total Responses
Follow existing transmission lines	16	12	18	11	15	72
Following existing highways or roadways	3	9	13	12	10	47
Avoid agricultural lands	26	22	10	6	11	75
Follow undeveloped roadways	7	6	17	13	7	50
Follow existing draining ditches	2	2	7	5	13	30
Separation from heritage/cultural sites	9	4	9	11	6	39
Avoid wetlands/marshes	7	9	10	7	8	41
Avoid forested/natural areas	10	5	7	7	12	41
Separation from residences and urban areas	55	27	10	2	7	101
Length of line	5	4	6	5	8	28
Cost	7	6	8	7	13	42
Other	5	3	0	0	4	12

General Comments

"Use the route that goes furthest east, (through bush) Staying away from populated areas is our greatest priority."

"The Eastern route appears to be the best option, less impact on farming operations, low population, and closer to the U.S. link-up and on non-productive land."

"Agricultural land is our livelihood, not just a cosmetic piece of property! It is not only the land that the line is on that is affected."

"Agriculture should be protected and promoted. I do not agree with any infringement on any and all agriculture."

"Scary!"

"Taking any potential funds/land away from the Marchand area could greatly impact the future of this small town. The town is currently rebuilding after our only store burning down. The development on this land will help to build and enhance the way of life in our area, where using this land for hydro lines will bring the growth of our community to a screaming halt. We work hard on our land to be where we are. We have plans for our family to live here and continue to develop during our lifetime."

"I am concerned about the cost. That worries me. Are you really going to listen to our concerns?"

"I am concerned about the increased access to hunters and 4x4's and ATV's onto newly established hydro lines."

"Proposed line would be too close for safe operation of flight training and local flying."

"By cutting across our land, not only will it hinder our farming operation, it will also allow the public to use this ROW with snowmobiles, ATV's, etc. Our land will then be invaded with trespassers and hunters. So, why not move it 1/2 mile and stay on crown land?"

"It makes me angry to say the least although the proposed route would not be too close to my house. I would support anybody who is close. You would spoil a pristine clean area with a growing population and destroy property values for some. Put the lines out of sight in the forest area. The rabbits and deer and squirrels know to stay the hell away from these already. The trees will stay well back too. The cost is unimportant. Raise the rates for the US. It's annoying they pay less than we do for our HYDRO!! Yet we would have to suffer!"

Key Word Analysis

Hunting – 5 mentions

Wilderness – 2 mentions

Aerial applicator/application (aerial spraying) – 3 mentions

Aesthetics – 4 mentions

Airstrips /air fields – (airport) – 2 mentions

already decided – 0 mentions

agricultural land- 15 mentions

bio-security – 1 mention

Bipole III/Bipole – 5 mentions

Birds – 0 mentions (as free text)

border crossing – 1 mention

bush loss/loss of bush – 15 mentions

cell phone/cell phone reception – 1 mention

cheap power – 0 mentions

clearing – 0 mentions

compensation /compensation percentage – 1 mention

dust – 1 mention (crop dusting)

easterly route/stay east – 11 mentions

economics – 2 mentions (as free text)

EMF – 5 mentions

Energy markets – 0 mentions

export of power – 1 mention

farm equipment operation – 0 mentions

half-mile – 2 mentions

heritage /heritage sites – 2 mentions

Hydro rates- 0 mentions

landing strips – 0 mentions

livestock – 5 mentions

lodge – 0 mentions

magnetic fields - 2 mentions

manure application/manure application equipment – 1 mention

noise – 0 mentions (a large number of noise mentions were coded into the original document so it could be quantified)

profit – 0 mentions

property development – 0 mentions

safety- 9 mentions (as free comment)

shelterbelts- 0 mentions

snowmobilers/Sno-Man/Sno-riders – 5 mentions

spraying /aerial spraying – see above

stream crossings – 0 mentions

St. Vital – 0 mentions

subdivision/ subdivision potential – 2 mentions

transparency- 1 mention

underground lines – 4 mentions

vegetation management- 0 mentions

view/ view-shed – 6 mentions

well/contamination –0 mentions

wetlands- 1 mention (as free comment)

wildlife – 14 mentions (as free comment)

Appendix D

D1 – Open House Advertising

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D5 – Open House Mapping Exercise Results

Date	SegmentID	Concern Description	Concern	ConcernLevel
12-Nov-13		Emf lives next to existing lines family has cancer	House	Medium
13-Nov-13	42	Concerned about location of line along half mile and how it may impede farming. Also pointed out about potential development on east portion of section along highway.	House	
13-Nov-13		Sightlines and emf ask about us sales	House	Medium
13-Nov-13		Emf	House	Low
13-Nov-13	47	Concerned about segment 47 splitting farm land on half mile. Concerned about BPIII to the west of her property. Concerned about emf. Compensation too low. Land value and farming operations. Aerial spraying and seeding concerns. Concerned demand may not be there for the power export. aesthetic concerns. Would prefer another alternate route option (segment 16) or that it parallel HWY 12. Segment 16 is more marginal land (stony lands).	House	High
13-Nov-13	9	Under dot is cottage (approx). Concerned about opening up bush along segment #9 allowing more access to ATVs, hunters etc.	House	
13-Nov-13		Residence on property. Home faces east (route 43 would not be seen). ~ 1 1/4 miles	House	
13-Nov-13	2	Private landowner with home on the land. Aesthetic concerns, lower property value concerns, health concerns EMF.	House	
13-Nov-13		Homeowner - not immediately affected. Concerned because they moved there to be away from transmission lines. Concerned about future development. Concerned about aesthetics in the neighbourhood. Concerned about health effects. Devaluation of property.	House	
13-Nov-13		Outfitter allocation area 10km radius. Bear.	Resource/Land Use	
13-Nov-13	34	Outfitter allocation area. Bear, deer. 10km radius.	Resource/Land Use	
13-Nov-13		Some homes along this road. Homeowner has no concerns about the projet.	House	Low
19-Nov-13	73	Only clear view is down the driveway. They are ugly.	House	
19-Nov-13			House	
19-Nov-13		Home and barn. Concerned it will impact with other routes in the area such as bipolar three. GPS and aerial application	House	
19-Nov-13	47	East side is bare. Bipole is one mile west. Concerned about emf and other potential health concerns. Segment 47 is currently 97 metres from the property line. Transmission line is on the half mile. Concern the line is too close to the home. Concern with viewshed and property value. Line goes through ag land. MMTP seg 47 would sandwich these home owners between MMTP and bipolar 3 which would be approx 1 mile apart from each other. Feels the line should go through the least populated areas. Probably would be crown land.	House	High
19-Nov-13	72	Campground Lilac Resort. It's like a small town.	Infrastructure	Medium
19-Nov-13	55	Feeder barn and rotational cattle grazing NW 17-5-8-E	Infrastructure	
19-Nov-13	52	Looking west out livinging room. Treed in during summer not in winter.	House	
19-Nov-13	52/53	20-6-8nw. In proximity to residential development. Preference to avoid agriculture and residential develment (3/5/7 then east). Worst case scenario would be if crossed we should use alignment 53. He is the sole landowner on 52 and 53 that would be affected by this alignment.	Resource/Land Use	
19-Nov-13	30	New development in this area - residential occurring right now	House	
19-Nov-13	58	See segment 56 concerns - HyLife farm	Constraint	
19-Nov-13	57	See segment 56 for concern. HyLife farms	Constraint	
19-Nov-13	73	Yard site. Facing west	House	
19-Nov-13	73	Already a small parcel. Triangle to start with. More obstructions.	Resource/Land Use	High
19-Nov-13	74	rather see routing go to east. Fewer people. Concerned about EMF. Not satisfied that there is no effect from EMF. Concerned about possible route changes that could bring lines closer to their house.	Resource/Land Use	
20-Nov-13	34	Cemetery	Infrastructure	
20-Nov-13	34	Proximity to home site ~700 m southeast of line. Emf and land value concerns.	House	High
20-Nov-13	20/9	Noted there may be some impacts from hunting including an increase in access as this area is not well accessed currently and that people will drive up the right of way. Does not believe wildlife would be affected greatly except a possible increase in some hunting even though its very used already. Noted trappers may have once runs with the eastern routes.	Resource/Land Use	Medium
20-Nov-13	63	Gardenton flood way. Limits flooding and acts as a sponge during spring	Constraint	Low
20-Nov-13		Proximity to residence	House	High
20-Nov-13		4 acre lot proximity to home	House	High
20-Nov-13	62	Home in prox.	House	High
20-Nov-13	62	Church in close proximity and. Is active.	Infrastructure	High
20-Nov-13	62	Sw and se 17-1-8e1. Pasture usage for 70 had of cattle. Pasture and hay lAnd throughout	Resource/Land Use	Medium
20-Nov-13	60		House	
20-Nov-13	60	Shop	Infrastructure	
26-Nov-13	54	Homeowners. Do not want line in proximity due to nuisance, viewshed, health, cougars, lynx, bears, moose, deer. On both sides of line.	House	
26-Nov-13	54	Homeowners. Do not want line in proximity due to nuisance, viewshed, health, cougars, lynx, bears, moose, deer. On both sides of line.	House	
19-Nov-13	70	Landowner affected by MMTP seg 70 and BPIII. Not in favour of either options. NE 32 8 6 E AND NW 32 8 6 E	House	High
19-Nov-13	70	Opposed to proposed seg 70 and BPIII. SW 6 9 6 E	House	High
27-Nov-13	6	Did not receive notification. Consider advertising in the clipper (local paper).	House	
27-Nov-13	42	SW 25 10 6 E. concerned about addition of routes with existing D602F. Follow up on property ownership and hydro corridor width north of her property and neighbours property.	House	
27-Nov-13		Recently built house in this area after the image was taken. Location of the house is not exact.	House	High
27-Nov-13	6	Concerned about location of line. Already lives close (.20 miles) to D602F.	House	Medium
28-Nov-13	48	yard is approximately 900 yards from seg 48. Not happy MH is using his money to build on agricultural land. Would prefer to use land that has no other purpose. Ie- through Agassiz and sandilands. Or run along the railway line, prefers the furthest east route. Less homes as well when considering through the bush and the furthest east route. These towers are unsightly and no one will see them in the bush. Too much interference with agricultural practices and crop spraying.	House	
28-Nov-13		concerned regarding the preferred st vital letellier line. Currently approximately 1/4 to 1/8 of a mile from his yard. Aesthetics and property values are of concern. Has to think about a better solution. Concerned about all development and growth in southern manitoba. Hydro is just one pressure. Could you have a more direct route straight down 200 is one example. Would be less expensive to choose a more direct. Concern for neighbour whose yard is very close to proposed route. Approx 35 meters. Could the route follow the railway tracks.	House	

Date	SegmentID	Concern Description	Concern	ConcernLevel
28-Nov-13	70	Livestock operations. Concerned with stray voltage. Noted they will have 10 structures which will cut up all of their management units. There would need to be an offset from the road which they are not happy about. Noted that options 4/5/6 then the bush makes more sense because it is out of productive lands and it is straight. Pivot irrigation potential.	Resource/Land Use	High
28-Nov-13	70	Health, aesthetic, property value major concerns. Not in favour of segment 70. Potential honey bee concerns with emf and bee death. Preferences to follow existing transmission lines at least including 3, 5, 6 avoid residences and minimize new impacts. Should not have impacts on existing residences.	House	High
28-Nov-13		Health, property values, aesthetics and farming concerns. Very opposed to segments 42, 41, 40 and 43. House is north of seg 42. Farming along 40, 41 and 43. Preference is to use existing right of way to minimize impacts on new land owners and reduce financial costs. Preference would also to follow highway 59.	House	High
28-Nov-13	40	Segment 1, 41, 40. Agricultural land is already being significantly impacted by the st vital line. Feels that as the st vital line is already affecting him it is not fair for the MMTP line to affect him as we'll. would like to to see the st vital line pushed closer to south side road and prairie grove east. Is it possible for the line to be put on the west side of prairie grove east road and also the southside road. Would prefer the line not to be there at all. Would also be less impact on his neighbour further south. Concerned with about future development potential around the row. Dissecting the quarter would hinder future development. Lot sizes would be very small to sell. Seg 40 would impact as it dissects his fields in the same quarter as st. Vital (nw32-9-4- e) there are actually three different land descriptions that are being affected by both lines. Seg 41 will impact his home quarter as well. Seg 41 land owner believes would be better placed on the east side of the municipal road allowance as it would impact less homeyards. Does not want either seg but if had to choose seg 41 would be preferable. Line should be built furthest north and furthest east option to avoid as many homes as possible. Seems like a more natural flow. Uses aerial spraying and feels the transmission lines would impact the spray methods. If the st vital line is closer to the road it will be easier for spray purposes. Also aerial seeding is affected. Concerns regarding health issues and also dealing with other development encroaching. Eric would like mh to email his comments to him for verification.	Resource/Land Use	High
28-Nov-13	70	Concern over proximity. Visual effect. Trees and aesthetics. Property value effects. Capability to subdivide. Zoned agriculture. Emf concern. Too dense of an area to put a t-line	House	
28-Nov-13	70	Proximity to house. View shed visual effect. Property value effects. Emf effects.	House	
28-Nov-13	70	Density of existing and proposed t-lines in the area. About 1.5 miles from segment 70. Suggest use of existing t-line corridors for routing	House	
28-Nov-13		Bee keeping site	Sensitive Site	
28-Nov-13	70	about affect on property value. Concerned about hydro rates. Would like to see rates decreased due to export sales. No possible routes in their mind nimby. Logistically makes go further east.	House	High
28-Nov-13	70	Concerned about property values, health, safety, noise. Concerned line will affect wildlife specifically bees and birds.	House	High
28-Nov-13	70	Landowner not in favour of segment 70. Preference is to use Far East options as it avoids homes, agricultural lands. Health concerns as well.	House	
28-Nov-13	70	590m	House	Low
28-Nov-13	70	Segment 70 is splitting up land that is worked as a whole. 21 9 4 e is being worked as a whole and residence here. Also working 22-9-4e ag lands. There is existing hydro lines already in this area and letellier line too. Too many lines are in this area.	House	High
28-Nov-13	70	Density of t-line development in the area.	House	
10-Dec-13	16	Would like route adjustment to avoid potential protected area crossed by segment 16.	Constraint	High
10-Dec-13	16	Would like route adjustment to avoid proposed protected area. Suggested paralleling the GWWD rail line north of the segment.	Constraint	High
10-Dec-13	17	Would like route adjustment to avoid proposed protected area.	Constraint	High
14-Nov-13		Placemark 1 Placemark 1 - Segment 42 will pass right by their residence. Segment 42 would also be splitting sw 32-9-5 they farm as a whole. Routing on the half mile line is a much bigger disruption to farming operations. Segment 4 is preferred. It is Using and	House	
21-Nov-13		Residence Residence - -	House	
12-Nov-13		Placemark 1 Placemark 1 - Homeowner asked if structures could be staggered to avoid visual impacts around home. Especially the view from his deck. -	House	
12-Nov-13		Placemark 2 Placemark 2 - Crop - soybeans 2014. Tower preferences - towers should line up and prefer one tower per section. Get back to him about tower spacing for south loop. -	Resource/Land Use	
12-Nov-13		Landowner Dot 1 Landowner Dot 1 Headingley Oh Nov 12, 2013 - -	Resource/Land Use	
14-Nov-13		RL-8-LO Dot 4 Ste Anne OH Nov RL-8-LO Dot 4 Ste Anne OH Nov 14, 2013 - Possible expansion of lagoon south of Lorette. -	Infrastructure	
12-Nov-13		Greg Dot 2 Headingley OH Nov 1 Greg Dot 2 Headingley OH Nov 12, 2013 - -	Resource/Land Use	
14-Nov-13		Landowner Dot 9 Ste Anne OH No Landowner Dot 9 Ste Anne OH Nov 14, 2013 - Ditch along segment 46 between this quarter and colony land was developed by landowner and colony. Concerned about impacting ditch. 120 acres farmed 1/4 mile wide and 3/4 miles in north south direction. Th	Infrastructure	
14-Nov-13		Landowner Dot 1 Ste Anne OH Landowner Dot 1 Ste Anne OH Nov. 14, 2013 - Segment 48 is very close to his home. Would like hydro to consider other routes in the north and over to the east. Further away from homes and ag land. Wondering why there is a big space with no alternat	House	
14-Nov-13		Residence Treed In Residence Treed In - Main view southward. -	House	
14-Nov-13		New Residence New Residence - Would look at segment 71. 0.81 miles to the east. - Just built and built to avoid Bipole 3. Sold to avoid.	House	
14-Nov-13		Landowner Dot 1 Ste Anne OH Nov 14, 2013 - Health concern is biggest issue. Preference is to not use segments 50 and 72. -	Resource/Land Use	
14-Nov-13		Owns A Quarter Owns A Quarter - Rents out land. Grain -	Resource/Land Use	
14-Nov-13		Dot 8 Ste Anne Oh Nov 14, 2013 Dot 8 Ste Anne Oh Nov 14, 2013 - Landowner stated that there was more residential development on his section than what google earth imagery provides. -	House	
14-Nov-13		Concern Noted Concern Noted - - A landowner (neighbour) noted that this land renter may not be happy but he believes the owner will not be too concerned.	Resource/Land Use	
14-Nov-13		Landowner Dot 6 Ste A Landowner Dot 6 Ste Anne OH Nov 14, 2013 - 350 m from segment 48. Route should go through wooded areas, not on prime farm land. Consider cost. Dufresne. -	Resource/Land Use	
14-Nov-13		Landowner Dot 7 Ste LandownerDot 7 Ste Anne OH Nov 14, 2013 - Segment 49 will be within 1/2 mile of residence. Lots of people live in this area. - Ne 5 9 7 e	Resource/Land Use	
14-Nov-13		Drainage Ditch Drainage Ditch - Full mile n/s. drains east land. Would not be able to place the line right on half mile. Would need to offset segment 47 -	Infrastructure	
14-Nov-13		Agriculture 400 Acres. Agriculture 400 Acres. - No aerial spraying. Rents out as well. Current alignment on 47 will split management unit. -	Resource/Land Use	
14-Nov-13		Residence Residence - North facing. East side semi opened. Will be looking at Bipole. -	House	
14-Nov-13		Proximity To Bipole Proximity To Bipole - Not preferred. Will already be close to the residence. -	House	
14-Nov-13		Airstrip Dot 2 Ste Anne Oh Nov Airstrip Dot 2 Ste Anne Oh Nov 14, 2013 - Airstrip location. Purchasing land further south to extend air strip south. Grass strip. Residence is here too. Other family members have also expressed concerns. Safety concerns. By opening bush will also op	Infrastructure	
14-Nov-13		Landowner Dot 5 Ste Anne OH N Landowner Dot 5 Ste Anne OH Nov 14, 2013 - Concerned about seg 72 passing by lilac resort. Landowner would prefer seg 70 and 71 if route had to go through his river lot. -	House	
14-Nov-13		Landowner Dot 8 Ste Landowner Dot 8 Ste Anne OH Nov 14, 2013 - Not in favour of segment 71. In favour of Far East options. Avoid ag lands and residential areas. Health concerns. Noise (humming) from lines. Highly subdivided area. Number one choice is eastern s	Resource/Land Use	
14-Nov-13		Landowner Dot 2 Ste Anne OH N Landowner Dot 2 Ste Anne OH Nov 14, 2013 - Does not like segments 73 and 71 land already fractured by rail (73). Excellent farm land already split. Segment 71 also crosses other property owned by same landowner. Segment 50 is preferred. Segment 18 i	Resource/Land Use	
14-Nov-13		Agricultural 90 Acres RL65 Agricultural 90 Acres RL65 - North south operation - No aerial application. Graze cattle at times and use temporary electric fencing. Need to know if this is a concern.	Resource/Land Use	

Date	SegmentID	Concern Description	Concern	ConcernLevel
14-Nov-13		Landowner Dot 5 Ste Anne LandownerDot 5 Ste Anne OH Nov 14, 2013 - Along old highway 12 future development may go north of the town for industrial and near highway 12. -	Resource/Land Use	
14-Nov-13		Landowner Dot 6 Ste Anne Landowner Dot 6 Ste Anne OH Nov 14, 2013 - Residential development north of river potential future area. Only direction of future expansion -	House	
14-Nov-13		Management Unit Split Management Unit Split - -	Resource/Land Use	
14-Nov-13		Residence Residence - Preference for 48 not be chosen based on viewshed issues - South facing. Open land. Moderate shelter belt. Would be able to see it.	House	
14-Nov-13		Landowner Dot 9 Ste Anne OH LandownerDot 9 Ste Anne OH Nov 14, 2013 - LUD of richer, preference for most easterly route 9 -	Resource/Land Use	
14-Nov-13		Residence Residence - Residence - Residence. No concerns noted.	House	
14-Nov-13		Residence Residence - Home faces 12 but she is treed in on east and partially north. Will go very close. Segment 47 is least preferred. -	House	
14-Nov-13		Landowner Dot 3 Ste Anne Landowner Dot 3 Ste Anne OH Nov 14, 2013 - Landowner did not receive a letter or postcard. Very upset as one of the alternate segments runs directly through his property. He was notified by a neighbour. Very concerned about health effects. Conce	Resource/Land Use	
14-Nov-13		Landowner Dot 3 Ste Ann Landowner Dot 3 Ste Anne OH Nov 14, 2013 - Concerned about Segment 71 proximity to residence. Health concerns. Property value concerns. To the north, neighbour is considering subdivision. Seg 50 is preferred over 73 or 71. Segment 18 is first	House	
14-Nov-13		Landowner Dot 3 Ste Anne O Landowner Dot 3 Ste Anne OH Nov 14, 2013 - Proximity to any segment within 2 km due to EMF as per WHO information. -	House	
14-Nov-13		Residence RL42 Residence RL42 - East west drive way. Does not look north. Treed in substantially. Daughter also has a treed in home north of her property. -	House	
14-Nov-13		Landowner Dot 4 Ste Ann Landowner Dot 4 Ste Anne OH Nov 14, 2013 - 80 acres owned here. All ag land. Leave it alone, stay out. Makes it too hard for farmers. Furthest east option is the best option. Seg 71 and 73 are not acceptable. Seg 50 is okay. -	Resource/Land Use	
14-Nov-13		Landowner Dot 7 Ste Anne OH Nov 14, Dot 7 Ste Anne OH Nov 14, 2013 - Has r49r already on east side of property. Doesn't want seg 50 across north side of his land. Expressed route preference for using 3, 5, 6 to get to most easterly route. -	Resource/Land Use	
13-Nov-13		Placemark 1 Placemark 1 - -	Resource/Land Use	
20-Nov-13		Preference - Preference for running down road allowance. He likes that it would open more land and allow for more residential homes -	Resource/Land Use	
20-Nov-13		Landowner Dot 2 Landowner Dot 2 Vita Oh Nov 20, 2013 - Vet clinic location. Lots of animals here. Potential health concern. -	Infrastructure	
20-Nov-13		Landowner Dot 3 Vita Landowner Dot 3 Vita Oh Nov 20, 2013 - Access point to dyke recreation area. Used year round for kayaking, skiing etc. communications concerns (will this affect cell service). Health concerns. Don't want to deter wildlife from the area. The	Resource/Land Use	
20-Nov-13		Wolves/cougars/bears Wolves/cougars/bears - Plenty of wildlife in the area and they don't want more predators coming in. -	Resource/Land Use	
20-Nov-13		Residence In Proximity. Residence In Proximity. - Line crosses property to the north on segment 34. Home is off the north south road north of Sundown. In very close proximity. Hinderence to their occupation (worried about wildlife) also worried about EMF and health concern	House	
20-Nov-13		Would not prefer segment 62. There is a lot of farming. 60 or 34 would be preferable. The area around Sandilands is higher so it would be easier. See Boris' comment sheet. -	Resource/Land Use	
19-Nov-13		Landowner Dot 6 Stein beach Landowner Dot 6 Stein beach Open House Nov 19, 2013 - Concerns with restrictions on land - towers. Land base is already limited. Seg 50, 51, 75 concerned with effects on ag operations. Land base is already limited. Preference is for Far East route	Resource/Land Use	
19-Nov-13		Landowner Dot 5 Steinbach O Landowner Dot 5 Steinbach Oh Nov 19, 2013 - Concerns with restrictions on land - towers. Land base is already limited. Seg 50, 51, 75 concerned with effects on ag operations. Land base is already limited. Preference is for Far East route to limit	Resource/Land Use	
19-Nov-13		Landowner Dot 1 Steinbach O Landowner Dot 1 Steinbach Oh Nov 19, 2013 - Home quarter, residence. Preference for 52 and 54 to minimize impacts on farming. 53 would have more impacts on neighbour's farm. -	Resource/Land Use	
19-Nov-13		Landowner Dot 4 Steinbach O Landowner Dot 4 Steinbach Open House Nov 19, 2013 - Concerns with restrictions on land - towers. Land base is already limited. Seg 50, 51, 75 concerned with effects on ag operations. Land base is already limited. Preference is for Far East route t	Resource/Land Use	
20-Nov-13		Landowner Dot 4 V Landowner Dot 4 Vita Oh Nov 20, 2013 - Segments 63 and 62 not preferred. Aesthetic concerns. Segment 60 is preferred. Less landowners affected, more direct. Landowner preference is to use Far East routes as it avoids productive ag lands	Resource/Land Use	
19-Nov-13		Landowner Dot 2 Steinbach O Landowner Dot 2 Steinbach Oh Nov 19, 2013 - - Ne-8-6-8e, not opposed to 54. He works land as a whole. Noel bremaud.	Resource/Land Use	
19-Nov-13		Landowner Dot 3 Steinbach Oh Landowner Dot 3 Steinbach Oh Nov 19, 2013 - - Landowner 17-4-12e, farmland and corn here. Rely on aerial spraying. If can move segment 20-2 miles to the east then not opposed (this proposed adjustment captured by Joey on gis). Daryl unger is land	Resource/Land Use	
21-Nov-13		All crown land in the area surrounding the property. Why not go on adjacent crown land. Large concern is public accessing the ROW via his property. Building a home next year on the quarter section. Would prefer not to have on his p	Resource/Land Use	
12-Nov-13		Grass airstrip	Constraint	High
19-Nov-13	49	Future development. Subdivision. 3 kids and 9 grand kids in the area. Want to expand further. 4 family owned homes. 4 others being developed on other sections. 14 total residential on 5-9-7e1 inside. East of 12 substantial development planned.	Infrastructure	High
19-Nov-13	20	Move seg 20 a mile and a half east to avoid agriculture areas with respect to spraying. Farm land on the north part of segment. Would prefer seg 9.	Alignment	Medium
20-Nov-13	34	Wildlife plenty including cougars, bears and wolves. Does not want to encourage predators to follow the ROW	Resource/Land Use	High
20-Nov-13	6263	Noted many birds of prey in the area. Noted some lynx but a few bobcats. Has been seeing more bear than deer lately. Never seen a cougar in this area.	Sensitive Site	Low
20-Nov-13	62	Parralel with road instead of down middle of the field, the road just East. Cuts through middle of field.	Alignment	
27-Nov-13	9	Proposes alignment 9 go 2 miles west to avoid private land.	Alignment	Medium
28-Nov-13	42/41	Grain lands. Aerially applications annually. Currently works around v95l and has issues with aerial and boom sprayer which is 125ft. 42 will split the management unit. Main concern with noise. Arcing concerns. Follow 3/5/6 then go into the bush due to safety. Predominant hay in 3/5 would be preferred.	Resource/Land Use	High
28-Nov-13		The final Bipole 3 route.	Alignment	
10-Dec-13	6	Dec. 10. Would like alteration of this segment to minimize the linear distance through the proposed protected area.	Constraint	High
19-Nov-13	70	Dairy farm operation	Infrastructure	Medium
19-Nov-13	56	Segment # 55,56,57,58,61 HyLife company, Concerns. Line goes thru calving area in seg 56. Segment 58 and 56?are adjacent to hog barns. Line goes through manure application on 55 and 56. 55 would be easier if the line went there rather than 56. Concern is bio security issues during construction between neighbours and between their own farms. Contamination is serious. Numerous barns throughout the property. Calving area concern over 2000 head of cattle in the area. Dangerous for cattle and employees.	Constraint	

OBJECT ID	Date	Segment ID	Concern Description	Concern	ConcernLevel
13	18-Nov-13		Location of lodge.	House	High
63	18-Nov-13	6	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 1. Segments 6, 7, 16, 17 - Overlap with the Nourse Bog Proposed Protected Area. This site is targeted for protection by the PAI. It is part of a large intact wetland complex that would connect to the existing Lewis Bog Ecological Reserve. The area is predominantly wetland to wetland tree/shrub in composition. It contains several rare or uncommon species including the rare golden-winged warbler, the mottled dusky wing, and several orchids such as ramâ€™s head ladyâ€™s-slipper, swamp pink (aka grass-pink), and dragonâ€™s mouth. The protected area proposal targets 2 common enduring features which are only partially represented (partially protected and therefore require additional protection) and 2 enduring features which only occur in this location in the natural region. The 2 single enduring features have no protection and are therefore significant to the PAI. The PAI does not support the proposed transmission route within Nourse Bog Proposed Protected Area. Segment 16 runs near an existing railway which is excluded from the proposed protected area. If the transmission line could be move to parallel the railway the PAI may be able to accommodate an enlarged corridor. The PAI does not support segment 6, 7, or 17.	Sensitive Site	-
64	18-Nov-13	7	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 1. Segments 6, 7, 16, 17 - Overlap with the Nourse Bog Proposed Protected Area. This site is targeted for protection by the PAI. It is part of a large intact wetland complex that would connect to the existing Lewis Bog Ecological Reserve. The area is predominantly wetland to wetland tree/shrub in composition. It contains several rare or uncommon species including the rare golden-winged warbler, the mottled dusky wing, and several orchids such as ramâ€™s head ladyâ€™s-slipper, swamp pink (aka grass-pink), and dragonâ€™s mouth. The protected area proposal targets 2 common enduring features which are only partially represented (partially protected and therefore require additional protection) and 2 enduring features which only occur in this location in the natural region. The 2 single enduring features have no protection and are therefore significant to the PAI. The PAI does not support the proposed transmission route within Nourse Bog Proposed Protected Area. Segment 16 runs near an existing railway which is excluded from the proposed protected area. If the transmission line could be move to parallel the railway the PAI may be able to accommodate an enlarged corridor. The PAI does not support segment 6, 7, or 17.	Sensitive Site	-
65	18-Nov-13	16	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 1. Segments 6, 7, 16, 17 - Overlap with the Nourse Bog Proposed Protected Area. This site is targeted for protection by the PAI. It is part of a large intact wetland complex that would connect to the existing Lewis Bog Ecological Reserve. The area is predominantly wetland to wetland tree/shrub in composition. It contains several rare or uncommon species including the rare golden-winged warbler, the mottled dusky wing, and several orchids such as ramâ€™s head ladyâ€™s-slipper, swamp pink (aka grass-pink), and dragonâ€™s mouth. The protected area proposal targets 2 common enduring features which are only partially represented (partially protected and therefore require additional protection) and 2 enduring features which only occur in this location in the natural region. The 2 single enduring features have no protection and are therefore significant to the PAI. The PAI does not support the proposed transmission route within Nourse Bog Proposed Protected Area. Segment 16 runs near an existing railway which is excluded from the proposed protected area. If the transmission line could be move to parallel the railway the PAI may be able to accommodate an enlarged corridor. The PAI does not support segment 6, 7, or 17.	Sensitive Site	-
66	18-Nov-13	17	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 1. Segments 6, 7, 16, 17 - Overlap with the Nourse Bog Proposed Protected Area. This site is targeted for protection by the PAI. It is part of a large intact wetland complex that would connect to the existing Lewis Bog Ecological Reserve. The area is predominantly wetland to wetland tree/shrub in composition. It contains several rare or uncommon species including the rare golden-winged warbler, the mottled dusky wing, and several orchids such as ramâ€™s head ladyâ€™s-slipper, swamp pink (aka grass-pink), and dragonâ€™s mouth. The protected area proposal targets 2 common enduring features which are only partially represented (partially protected and therefore require additional protection) and 2 enduring features which only occur in this location in the natural region. The 2 single enduring features have no protection and are therefore significant to the PAI. The PAI does not support the proposed transmission route within Nourse Bog Proposed Protected Area. Segment 16 runs near an existing railway which is excluded from the proposed protected area. If the transmission line could be move to parallel the railway the PAI may be able to accommodate an enlarged corridor. The PAI does not support segment 6, 7, or 17.	Sensitive Site	-
67	18-Nov-13	20	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 2. Segment 20 â€“ Overlaps with Badger Proposed Protected Area. This site is targeted for protection by the PAI. The proposed protected area targets three enduring features one is rare and all three are only partially protected in the natural region. The proposal contains both uplands and low wet areas. The area contains many rare to uncommon plant species such as Houghtonâ€™s umbrella-sedge, false heather, and turtlehead. The proposed transmission line, segment 20, runs through the centre of the proposed protected area and is therefore not supported by the PAI.	Sensitive Site	-
68	18-Nov-13	42	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 3. Segments 30, 42, 56, 59 â€“ is adjacent to Watson P. Davidson Wildlife Management Area (WMA) This WMA protects a diversity of habitat. It is important for breeding and migrating northern forest owls and many species of neo-tropical birds. It is also home to the rare mottled dusky wing, and several rare plants including the large northern aster and round-leaved bog orchid. The WMA is part of the protected areas network and legally prohibits logging, mining, hydroelectric development, oil and gas development, and other activities that significantly and adversely affect habitat. The PAI requests that the proposed transmission lines be kept at a minimum of one mile away from the WMA.	Sensitive Site	-
69	18-Nov-13	30	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 3. Segments 30, 42, 56, 59 â€“ is adjacent to Watson P. Davidson Wildlife Management Area (WMA) This WMA protects a diversity of habitat. It is important for breeding and migrating northern forest owls and many species of neo-tropical birds. It is also home to the rare mottled dusky wing, and several rare plants including the large northern aster and round-leaved bog orchid. The WMA is part of the protected areas network and legally prohibits logging, mining, hydroelectric development, oil and gas development, and other activities that significantly and adversely affect habitat. The PAI requests that the proposed transmission lines be kept at a minimum of one mile away from the WMA.	Sensitive Site	-
70	18-Nov-13	56	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 3. Segments 30, 42, 56, 59 â€“ is adjacent to Watson P. Davidson Wildlife Management Area (WMA) This WMA protects a diversity of habitat. It is important for breeding and migrating northern forest owls and many species of neo-tropical birds. It is also home to the rare mottled dusky wing, and several rare plants including the large northern aster and round-leaved bog orchid. The WMA is part of the protected areas network and legally prohibits logging, mining, hydroelectric development, oil and gas development, and other activities that significantly and adversely affect habitat. The PAI requests that the proposed transmission lines be kept at a minimum of one mile away from the WMA.	Sensitive Site	-
71	18-Nov-13	59	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 3. Segments 30, 42, 56, 59 â€“ is adjacent to Watson P. Davidson Wildlife Management Area (WMA) This WMA protects a diversity of habitat. It is important for breeding and migrating northern forest owls and many species of neo-tropical birds. It is also home to the rare mottled dusky wing, and several rare plants including the large northern aster and round-leaved bog orchid. The WMA is part of the protected areas network and legally prohibits logging, mining, hydroelectric development, oil and gas development, and other activities that significantly and adversely affect habitat. The PAI requests that the proposed transmission lines be kept at a minimum of one mile away from the WMA.	Sensitive Site	-
72	18-Nov-13	34	The Protected Areas Initiative (PAI) has reviewed the Manitoba-Minnesota Transmission project as presented to Conservation and Water Stewardship (CWS) and other stakeholder on November 18th at the Government Stakeholder Meeting. The PAI concurs with Parks and Protected Spaces comments regarding proposed ecological reserves and has the following additional comments and concerns. 4. Segment 34 â€“ Overlaps with a segment of the Caliento Bog Proposed Protected Area This site is targeted for protection by the PAI. The proposal captures an intact wetland complex including vegetation cover such as wetland meadows, tamarack, and black spruce muskeg. Some uncommon plants occur in the proposal such as wild ginger. Caliento Bog proposed protected area targets several enduring features. Segment 34 of the transmission line crosses through the northeast part of the proposed protected area. This segment of the proposal contains two enduring features which are both partially protected and therefore requires additional protection. The enduring features are common within the natural region. The PAI does not support this segment of the proposed transmission line.	Sensitive Site	-
116	18-Nov-13		Comment Preference Comment Preference - Outfitting - rm of sturatburn or crown. Least impact on KC Outfitters. Minimal agriculture	Resource/Land Use	-
1	12-Nov-13		Grass airstrip	Constraint	High
2	18-Nov-13		Use of lands for outfitting locations. Noted 24 bait sites	Resource/Land Use	Medium
3	18-Nov-13		Wintering area for elk in the area. Wintering area closer to border.	Sensitive Site	Medium
4	18-Nov-13	30		Resource/Land Use	Low

Appendix E

Summary of Email and Telephone Calls

Phone Call/Email	Date and Time of Call or Initial Email	Constraint/Constraint
Email	6/29/2013 6:01	Information request
Email	7/2/2013 15:45	Landowner indicated in 1979-80, a 500 kV line was ran through their quarter section North of Sprague - should they be concerned about this one?
Email	7/4/2013 16:30	Would like to be informed about the project.
Email	7/19/2013 14:53	Individual was interested in the project and would like ot be part of the project. He provided his work history.
Email	8/2/2013 9:07	Manitoba Hydro provided the link to the Manitoba-Minnesota website.
Email	8/23/2013 12:00	Manitoba Hydro requesting preferences for engagement for the Manitoba Minnesota Transmission Project.
Email	10/3/2013 22:41	Regarding the surplus of electricity that can be sold to our neighbours down south. Why does electricity rates continually rise? Since there is a surplus, our rates should be substantually lower.
Phone	10/4/2013 11:00	Lives on PTH59. Would prefer no agriculture interference as it is a hassle to work around. Wanted to know the type of towers to be used. Wanted to know average span. *Manitoba Hydro discussed the compensation policy for landowners.* Landowner stated it sounded like we knew what we were doing.
Phone	10/4/2013 13:00	Wanted to know about the project and whether 4 lines were being considered.
Phone	10/15/2013 14:00	Caller wanted to discuss St. Vital Transmission Complex and noted Manitoba-Minnesota Transmission Project will also be traversing this area. *Manitoba Hydro walked through EAB/CEC/NEB review for St. Vital and Manitoba-Minnesota.*
Email	10/6/2013 13:50	Information provided for a driver position for the Manitoba-Minnesota Transmission Project.
Email	10/11/2013 11:53	Concerned about the increase in cost for hydro customers in Manitoba.
Email	10/17/2013 12:56	Why don't you (Hydro) post hearing dates?
Email	10/20/2013 16:21	Concerned about overall hydro expansion. Stop northern dam development, stop biopole III and hold off expanding the infrastructure for US sales.
Email	10/23/2013 6:53	Concerned about selling hydro power to the USA.
Phone	10/28/2013 9:00	Wanted to get the number for AECOM to fill in her questionnaire but misplaced the number. *Manitoba Hydo indicated she could call me directly.*
	10/29/2013 11:00	No concern
Phone	10/29/2013 12:00	Requested the location of the venue in Steinbach for the project.
Phone	10/30/2013 9:00	Wanted to discuss MMTP and whether the power sale was firm or interuptable.
Email	11/1/2013 10:00	Information provided to stakeholders regarding the dates and times for meetings and workshops; requesting attendance.
Email	11/1/2013 10:00	Information provided to government stakeholders regarding the dates and times for meetings and workshops; requesting attendance.
Email	11/1/2013 10:00	Information provided to stakeholders regarding the dates and times for meetings and workshops; requesting attendance.
Email	11/1/2013 12:11	Wanted to be informed at various phases of the Project; email provided information as to how the information will be shared, scheduling and where to find the information on the website.
Email	11/1/2013 12:11	Updated response to the public engagement survey for the Project.
Email	11/1/2013 15:11	Information follow-up.
Email	11/1/2013 15:16	Information provided; Project handout.
Email	11/4/2013 8:49	Concerned as to where the lines and towers wil be placed along Oak Grove Road. There are many new homes have been built just north of that route. Is this line a D.C. line or A.C. and at what voltage would these lines be running at. The route that runs along highway 15 then heads south to Vassar looks like the best because it is out of the flood area, less people, and the hydro station would be close to the state that is requesting the line. Concerned about property values. *Manitoba Hydro noted landowners preference for the other routing adjustment based on landowners concerns regarding residential development. Manitoba Hydro also encouraged landowner and neighbours to attend one of the open houses (dates and locations attached in the email) and to share local knowledge, concerns and have questions answered with Manitoba Hydro staff.*
Phone	11/4/2013 11:00	Wanted information on the location of the line. Wanted information on wind energy and how Hydro works with the companies. *Manitoba Hydro provided him the Hydro website URL and walked him through where he can find information on wind.*

Phone Call/Email	Date and Time of Call or Initial Email	Constraint/Constraint
Phone	11/4/2013 15:00	No conerns
Email	11/4/2013 15:19	Manitoba Hydro provided information about the Project process along with the Project handout.
Email	11/4/2013 16:12	If it proceeds it should follow the route that goes straight east to the Ontario border then south. We don't need more farmland and family homes impacted.
Email	11/4/2013 18:48	Information request
Email	11/5/2013 8:32	Manitoba Hydro provided information about the Project process along with the Project handout.
Phone	11/5/2013 12:00	Information request
Email	11/5/2013 16:54	Information request/follow-up
Phone	11/6/2013 11:00	Wants to be added to the general notification.
Email	11/7/2013 9:55	Would like to know the route this project will follow. Will it be coming through western Ontario?
Email	11/7/2013 12:33	Concerned about yearly increase on their hydro bills over the next 20 years and selling cheap hydro to the US.
Email	11/8/2013 9:36	Concerned as to exactly where the line would run; requesting a map. *Manitoba Hydro provided the landowner a snap shot of the areas near Zhoda from Google Earth where there are currently two alternatives. Hydro also indicated that more detailed mapping will be available on the website in the near future and provided Vita Open House information.*
Email	11/8/2013 9:36	The landowner would object to this line running so close to my house, as it stands now the line would be very close to my house and therefore cause the value of my home to drop drastically after installation. I just built a new home and will be forced to relocated if this line goes through my property.
Phone	11/8/2013 10:10	Wanted to know where the line was in relation to Woodridge. She noted she has lots of cancer in her family and does not like the project or transmission lines.
Phone	11/8/2013 11:00	Caller indicated her proximity to the line would be closest for the southern loop portion which follows the highway.
Email	11/8/2013 17:53	Concerned about selling hydro to the USA.
Email	11/12/2013 10:12	Email reminder about Project Open Houses.
Phone	11/12/2013 15:00	No conerns
Phone	11/13/2013 9:00	Wanted to inform us that the CTV and CBC were advertising the wrong community for the Open house to be held today (13th)
Phone	11/13/2013 10:00	Wanted to inform us the media was giving out false information about the location of the Open House on the 13th.
Email	11/13/2013 14:55	Requesting to attend an information session.
Phone	11/14/2013 14:00	Question about tower spacing on ROW
Phone	11/14/2013 17:00	Information request.
Phone	11/15/2013 16:00	Wanted to know where the southern loop was crossing the floodway as he owns land in the area.
Phone	11/15/2013 17:00	Landowner was upset she received the open house letter after the open house date. *Manitoba Hydro appologized but we are unsure of why some people got it on time and not others.*
Email	11/18/2013 12:49	Manitoba Hydro provided information about the Project phases and provided information regarding the Glenboro open house.
Email	11/19/2013 7:11	We were not properly informed about this plan and did not receive notification until we returned to Manitoba from Calgary and after your meeting in Ile des Chene. We oppose this plan as it would devalue our property. We have spoken with our neighbour, who is also impacted and also very concerned. Requested a meeting.
Phone	11/19/2013 11:30	Provided information regarding the stakeholder meeting.
Email	11/19/2013 16:46	Meeting request.
Email	11/20/2013 15:46	Provided information for consideration into routing.
Phone	11/20/2013 14:00	Information request.
Email	11/20/2013 15:46	Provided information for consideration into routing.
Email	11/20/2013 15:55	Information request.

Phone Call/Email	Date and Time of Call or Initial Email	Constraint/Constraint
Phone	11/20/2013 17:00	Meeting request.
Email	11/21/2013 7:56	Information request.
Email	11/21/2013 7:56	Information request.
Phone	11/22/2013 10:00	Concerned with how close the line would be in relation to his home (280m). He believes it would devalue his home.
Phone	11/22/2013 17:00	Cannot be near any magnetic interference. Can pass under but cannot be in proximity for any length of time due to an ICD which is sensitive to magnetic fields. He is really worried about how this could effect him and he says he would have to move.
Phone	11/22/2013 17:00	Wanted to know where the line is being located in relation to Whitemouth Lake Road. The route should avoid agriculture lands where possible.
Phone	11/25/2013 8:00	Wanted to meet to discuss the Project (southern Loop).
Email	11/26/2013 7:45	Concerns about the lines coming close to their house.
Email	11/26/2013 7:57	Concerns about the lines coming close to their house.
Email	12/3/2013 11:11	Provided information regarding the Protective Areas Initiative and how it relates to the Project and proposed routes.
Email	12/5/2013 11:08	Provided information regarding proposed routes and proximity to Provincial Parks, Ecological Reserves, and Proposed Ecological Reserves in Relation to the Project. Map also provided.
Email	12/5/2013 11:08	Provided information regarding proposed routes and proximity to Provincial Parks, Ecological Reserves, and Proposed Ecological Reserves in Relation to the Project. Map also provided.