NATIONAL ENERGY BOARD

IN THE MATTER OF:	Sections 45(1) and 58.11 of the *National Energy Board Act*, R.S.C. 1985, c.N-7
AND IN THE MATTER OF:	Condition 13 of Permit EP-196 and Condition 8 of Certificate of Public Convenience and Necessity EC-III-16
AND IN THE MATTER OF:	An Application by Manitoba Hydro to construct and operate an international power line, alter the Glenboro international power line and alter the Riel international power line

RESPONSE TO INFORMATION REQUEST NO. 1

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IN THE MATTER OF:	Sections 45(1) and 58.11 of the *National Energy Board Act*, R.S.C. 1985, c.N-7
AND IN THE MATTER OF:	Condition 13 of Permit EP-196 and Condition 8 of Certificate of Public Convenience and Necessity EC-III-16
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RESPONSE TO INFORMATION REQUEST NO. 1

Manitoba Hydro provides the following response to the National Energy Board's ("NEB" or "Board") Information Request No.1 dated March 15, 2017 in the above-referenced matter. As directed by the Board, this response is being served on all parties participating in the CEC process, potentially affected neighbouring jurisdictions identified in Manitoba Hydro's above-referenced MMTP Application ("Application"), potentially affected Aboriginal groups identified in Manitoba Hydro's Application and affected landowners. No parties have self-identified as interested parties, as indicated in section 5.5.3 of the Application.

Correction: In the Board's covering letter to Information Request No.1, the following statement appears: "In addition, MH has applied to amend:

- Permit EP-196 in order to alter the Glenboro IPL; and
- Certificate EC-III-16 in order to alter the Riel IPL as part of the Project Application (the "Application")."

Manitoba Hydro wishes to draw to the Board's attention that this statement is not accurate. Section 1.4 of the Application outlining the scope of the Application states the following: "Applications for amendments to Manitoba Hydro's existing National Energy Board certificates and permits that will be required if the new international power line is

approved will be filed with the National Energy Board separately." Manitoba Hydro has not yet applied for such amendments, but will be doing so in the near future.

1.1 Update on the Provincial Environmental Assessment

Reference: *i) A81054-1, MMTP Application, Section 4.4.1 Provincial Approvals, PDF page 32 of 90*
Canadian Environmental Assessment Act. 2012 S.C. 2012, cl9, s52 (CEAA 2012):
ii) Section 19, Factors to be Considered, PDF pages 21-22 of 78
iii) Subsections 5(1) and 5(2), Environmental Effects, PDF pages 14-16 of 78

Preamble: *Reference i) states that on 31 December 2015 Minister Tom Nevakshonoff directed the Manitoba Clean Environment Commission (CEC) to hold public hearings on the proposed MMTP.*

Reference i) also states that the Manitoba CEC Hearing Directive for the MMTP can be accessed at a provided hyperlink.

Reference ii) outlines the factors that must be taken into account during an environmental assessment of a designated project under CEAA 2012.

Reference iii) outlines the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project, or a project for the purposes of CEAA 2012.

Request: *Please provide:*

a) a copy of the Manitoba CEC Hearing Directive for the MMTP;

b) Manitoba Hydro's view of how the factors to be considered under section 19 of CEAA 2012, including environmental effects as set out in section 5 of CEAA 2012, will be addressed through the CEC Hearing process, based on the issues to be assessed, as outlined in the Manitoba CEC Hearing Directive; and

c) an outline of the factors that must be considered under section 19 of CEAA 2012, including environmental effects as defined under section 5 of CEAA 2012, but that would not be addressed through the CEC Hearing process.

1.1 RESPONSE

a) Attached as Appendix 1 to this filing is a copy of the Manitoba CEC Hearing Directive for MMTP.

b) In Manitoba Hydro's view, all of the factors that are to be considered under section 19 of CEAA 2012, including environmental effects as set out in section 5 of CEAA 2012, will have the opportunity to be addressed through the Manitoba CEC Hearing process. This position is based on the Terms of Reference that were issued to

the Clean Environment Commission pursuant to the provisions of *The Environment Act* (C.C.S.M. c.E125), interpreted in the context of the scope of this legislation.

CEC Hearing Directive: In October of 2016, the Manitoba CEC issued the Hearing Directive attached as Appendix 1 to this Response to Information Request. Section 1 of the Hearing Directive states that the Minister of Conservation and Water Stewardship (now Sustainable Development) specified the scope of review for the CEC hearing regarding the MMTP through the issuance of Terms of Reference on December 31, 2015. This is consistent with subsection 6(5.1) of *The Environment Act* which gives the minister the legal authority to specify the terms of reference that the commission must follow in carrying out its duties. Although section 1 of the Hearing Order also states that "The List of Issues for the Panel's review of the Project is in Appendix 1", Manitoba Hydro notes that Appendix 1 indicates that it does not contain an exhaustive list of issues to be considered. Accordingly, the scope of the CEC's review is defined by the Terms of Reference, not the List of Issues.

Terms of Reference: Since issuance of the Hearing Order, the Terms of Reference were revised to add a clarification to the scope of review. Attached as Appendix 2 to this filing is a copy of a letter from the Minister of Sustainable Development to the CEC dated February 15, 2017 enclosing the revised Terms of Reference. The revised version is available to the public through the link referenced in section 1 of the Hearing Order. As indicated in the second section of the Terms of Reference, the CEC is broadly charged with: (i) reviewing the EIS, including the sections related to public consultation conducted by the proponent; (ii) holding public hearings to consider stakeholder and public input; (iii) preparing a report for the Minister of Sustainable Development, outlining the results of the review and providing a recommendation as to whether an *Environment Act* licence should be issued and, if so, any conditions that should be included in the licence. Given the broad mandate to "review" and make recommendations, an examination of the scope of a review under *The Environment Act* is necessary.

The Environment Act: There are no statutory limits on the factors that can be taken into consideration and assessed by the CEC when conducting a review under *The Environment Act.* This is consistent with the minister's broad authority pursuant to subsection 12(7) of the Act to issue a licence "as the minister deems necessary to ensure effective environmental management". The only limitations placed on the CEC are those that may be contained in its Terms of Reference for a given project. In the case of MMTP, the only limit contained in the Terms of Reference is found in the last paragraph which clarifies that Manitoba will be conducting a Crown-Aboriginal Consultation process to address concerns about Aboriginal or treaty rights and provides the following clarification:

> "the Commission is not being called on to conduct a Crown-Aboriginal consultation process or to consider the appropriateness or adequacy of the consultation process for the project. The Commission also need not assess whether identified impacts may constitute an effect on the exercise of Aboriginal or treaty rights."

In Manitoba Hydro's view, this clarification was likely considered necessary to respond to court decisions distinguishing between the regulatory review of impacts on Aboriginal communities during an environmental assessment versus judicial determinations regarding whether such impacts constitute an infringement of Aboriginal rights. Manitoba Hydro submits that this scope of review is consistent with the scope of review by NEB under section 19 of CEAA, 2012, and is consistent with the intentions of Minister Cox as articulated in the covering letter attached to the Terms of Reference (Appendix 2). Also consistent with this scope of review, Table C-2(a) of the Executive Volume of the Environmental Impact Statement ("EIS") prepared by Manitoba Hydro correlates all of the assessment criteria in CEAA, 2012 with the contents of the EIS.

Comparison with CEAA, 2012: Section 19(1) of CEAA, 2012 provides that the following factors must be taken into account in the environmental assessment of a designated project: (a) environmental effects of the designated project; (b) significance of the environmental effects; (c) comments from the public; (d) mitigation measures; (e) requirements of the follow-up program; (f) the purpose of the designated project; (g) alternative means of carrying out the project and the environmental effects of any such

alternative means; (h) any change to the designated project that may be caused by the environment; (i) the results of any regional study conducted under section 73 or 74; (j) any other matter relevant to the environmental assessment that the responsible authority requires to be taken into account. Nothing in *The Environment Act* or the Terms of Reference precludes these factors from being taken into account by the CEC in its assessment.

The definition of "environmental effects" as referenced in paragraph 19.1(a) of CEAA, 2012 is narrower than the definition under *The Environment Act*. Regulations under *The Environment Act*[1] require a proposal to contain a description of the potential impacts of the development on the "environment", which is broadly defined in the Act to mean: "(a) air, land and water, or (b) plant and animal life, including humans."[2] In contrast, section 5(1) of CEAA, 2012 limits the definition of "environmental effects" to: (a) specified components of the environment that are dealt with under federal legislation; (b) changes that would occur on federal lands, other provinces or outside Canada; (c) specified impacts on Aboriginal peoples. Manitoba Hydro notes that *The Environment Act* definition would include all of these matters as it is not confined to specific types of animals (eg. migratory birds) or specific types of impacts such as those identified for Aboriginal peoples, nor is it confined to local impacts. The wording of the Terms of Reference (in the second last paragraph) confirms that the impacts on Aboriginal peoples listed in paragraph 5(1)(c) of CEAA,2012 will be included in the scope of the CEC review.

Manitoba Hydro clarifies that it does not view the exclusion of a review of "alternatives to the project" (as referenced on page 3 of the CEC Hearing Directive) as inconsistent with paragraph 19(1)(g) of CEAA, 2012, since the latter refers to "alternative means of carrying out the designated project". Manitoba Hydro views the issue of alternatives to MMTP as being distinct from alternative means of carrying out the Project, such as through alternative routes or designs. These matters are included in the EIS which the CEC will be reviewing.

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[1] Licensing Procedures Regulation, M.R. 163/88, s.1.1(j)
[2] *The Environment Act*, C.C.S.M. c.E125, s.1(2)

Environmental Impact Statement (EIS) Scope and Review: It is important to note that the CEC Hearing process is not the only component of the Provincial review of the Project and its associated EIS. In anticipation of a federal regulatory review, the EIS was developed to meet the needs not only of *The Environment Act*, but also *CEAA, 2012* and the Environmental and Socioeconomic Assessment requirements of the *National Energy Board Act* regulations, as well as guidance contained in the Electricity Filing Manual. A Scoping Document that described the proposed EIS content and approach was finalized in June 2015, having benefitted from National Energy Board review and input. The development of the EIS incorporated input from several rounds of public and indigenous engagement to discuss the Project and its effects.

When submitted on September 25 2015 the EIS Executive Volume included a concordance table indicating which sections of the EIS provided information to meet the needs of each aspect of *CEAA, 2012* and the *NEB Act*. Table C-2 (a) in the Executive Volume lists each specific item under section 19 and section 5 of CEAA 2012 and indicates where information on these topics can be found in the EIS. Table C-3 similarly describes specific EIS locations that address each component of the Environmental and Socio-economic Assessment requirements from the NEB Electricity Filing Manual. The EIS then underwent a process of public and regulatory review. Through this process, both provincial and federal technical specialists were provided with the opportunity to comment and request additional information from Manitoba Hydro. This information can be found on the provincial Public Registry.

Manitoba Hydro notes that as part of the Terms of Reference the CEC was directed to consider any documents produced during the EIS review process, .Regarding impacts related to matters under federal legislation, the Terms of Reference stipulate that federal specialists will be invited to provide comments on the Project as part of the Technical Advisory Committee review and that these comments will be considered by the Commission as input for the hearings.

c) In Manitoba Hydro's view, there are no factors that must be considered under section 19 of CEAA, 2012, including environmental effects as defined under section 5 of CEAA, 2012, that would not be addressed through the CEC hearing process. However, Manitoba Hydro recognizes that provincial legislation is sometimes interpreted more narrowly than its explicit wording in order to reflect constitutional limits of provincial jurisdiction. Accordingly, the definition of "environment" in *The Environment Act* may be interpreted to exclude extraprovincial effects. Manitoba Hydro submits that even if a narrower interpretation is adopted, this should not present a practical concern as no issues of extraprovincial concern have been brought to Manitoba Hydro's attention by the MMF (the sole participant in the NEB proceeding) or the participants in the CEC hearing.

1.2 Navigation and Navigation Safety

Reference: *i) A81182-29, MMTP Environmental Impact Statement, Chapter 16 Assessment of Potential Environmental Effects on Land and Resource Use, PDF page 21 of 178*

ii) National Energy Board, Electricity Filing Manual, Chapter 6 Environmental and Socio-Economic Assessment, Table 6-3 Filing Requirements for Socio-Economic Elements, Navigation and Navigation Safety (PDF page 95 of 122)

Preamble: *Reference i) states that the Assiniboine and Red Rivers are both scheduled waters under the Navigation Protection Act, and that navigation on non-scheduled waterbodies such as Cooks Creek and the La Salle, Seine and Rat Rivers are also protected under that Act.*

Reference i) also states that the Board will make the decision whether to approve proposed crossings as part of its assessment of the Project.

Reference ii) provides guidance on filing requirements for navigation and navigation safety.

In order for the Board to conduct its assessment of potential Project effects on navigation and navigation safety, the Board requires additional information.

Request: *Please provide:*

a) an assessment of potential Project effects on navigation and navigation safety following the requirements and guidance outlined in reference ii) and including the potential effects of temporary watercourse crossings such as ice bridges;
b) a description of consultation activities that have been and will be conducted with all potentially affected waterway users and Aboriginal groups regarding navigational use, including a summary of any concerns raised and how Manitoba Hydro has addressed or plans to address any concerns raised;
c) a navigation and navigation safety plan that outlines mitigation measures to be implemented for the Project;
d) confirmation that the navigation and navigation safety plan will be included in the Construction Environmental Protection Plan provided to construction crews and contractors; and

e) confirmation that the navigation and navigation safety plan, and any other relevant information, will be included in pre-construction orientations for construction crews and contractors.

1.2 RESPONSE

Preamble: Manitoba Hydro has revised its approach to conductor stringing across navigable waters and will not be stringing conductors by boat for the crossings listed in reference i). Helicopters will be used to carry a rope from structure to structure at these crossings. Once the rope is routed through the travelers hanging from the insulator strings, each conductor will be pulled through the travelers. This will result in no impact to navigation or navigation safety. Manitoba Hydro will have flag persons in boats both upstream and downstream of the ROW during stringing as a navigation safety precaution.

a) Given that there are no temporary or permanent in-water works / structures planned for the Project, there is limited potential for the Project to cause effects on navigation and navigation safety. Taking into account the precautionary measures identified below, Manitoba Hydro submits that there will be no actual impact on navigation or navigation safety.

- Flag persons in boats will be situated upstream and downstream of the Red and Assiniboine River crossings as a navigation safety precaution. Flag persons may be used in the other crossings listed in reference i), depending on conditions at the time of construction.
- Although Manitoba Hydro may use ice bridges at the crossings listed, the following mitigation will be applied, thereby eliminating impacts to navigation or navigation safety:
  - Ice bridges will be constructed of clean (ambient) water, ice and snow and snowfills will be constructed of clean snow. Materials such as gravel, rock and loose woody material are NOT used. Crossings will not impede water flow at any time of the year.
  - Where logs are required for use in stabilizing shoreline approaches, they will be clean and securely bound together and they will be removed either before or immediately following the spring freshet.
  - When the crossing season is over and where it is safe to do so, a v-notch will be created in the centre of the ice bridge to allow it to melt from the

centre and also to prevent blocking fish passage, channel erosion and flooding. Compacted snow and all crossing materials will be removed prior to the spring freshet.

- No logs or woody debris will be left within the waterbody or on the banks or shoreline where they can wash back into the waterbody.

b) Manitoba Hydro conducted an extensive Public Engagement Process (PEP) and First Nations and Metis Engagement Process (FNMEP) as described in Chapters 3 and 4 of the Environmental Impact Statement. During the PEP and FNMEP, no concerns with respect to navigation or navigation safety were raised. Given the very limited restrictions to navigation and no impact to navigation or navigation safety, Manitoba Hydro did not specifically consult potentially affected waterway users and Aboriginal groups regarding navigational use. Manitoba Hydro's PEP and FNMEP are ongoing and will address concerns if raised.

c) The mitigation measures outlined above will be implemented for the Project as part of the Construction Environmental Protection Plan. Given these mitigation measures, no specific navigation safety plan will be prepared.

d) The above mitigation measures are part of the Construction Environmental Protection Plan (Chapter 22, Appendix 22A). The plan is provided to construction crews and contractors.

e) All relevant information will be included in pre-construction orientations for construction.

1.3 Fish and Fish Habitat - Silver Chub

Reference:

i) A81182-14, MMTP Environmental Impact Statement, Chapter 8 Assessment of Potential Environmental Effects on Fish and Fish Habitat, Table 8-8 Summary of Field-Assessed Watercourses Crossed by the Project, PDF page 52 of 97

ii) A8ll84-5, MMTP Fish and Fish Habitat - Technical Data Report, PDF pages 53-56, and 59 of 150

iii) National Energy Board, Electricity Filing Manual, Chapter 6 Environmental and Socio-Economic Assessment, Table 6-2 Filing Requirements for Biophysical Elements, Fish and Fish Habitat (PDF page 85) and Species at Risk or Species of Special Status (PDF pages 88-89 o f122)

Preamble: *Reference i) states that Silver Chub is a species of conservation concern present in the Assiniboine and Red Rivers.*

Reference ii) states that Silver Chub were previously documented in Sturgeon Creek, that the status of Silver Chub is provided in Table 3-5 of reference ii), and that habitat requirements are discussed in Section 3.5 of reference ii).

The Board notes that Silver Chub were not included in Table 8-8 of reference i) (Sturgeon Creek).

The Board further notes that the status of Silver Chub is not provided in Table 3-5 of reference ii), nor are the habitat requirements of Silver Chub discussed in Section 3.5 of reference ii). Reference iii) provides guidance on filing requirements for fish and fish habitat, including species at risk and species of special status.

The Board requires additional information on potential Project effects on Silver Chub.

Request: *Please provide:*

a) the provincial and federal status of Silver Chub populations that occur in the Project area, and a discussion of potential Project effects on Silver Chub; and
b) the proposed mitigation to minimize potential Project effects on Silver Chub.

1.3 RESPONSE

a) Federal Status: In 2012, COSEWIC split the Silver Chub populations into two separate units: 1) the Saskatchewan - Nelson River; and 2) the Great Lakes - Upper St. Lawrence. The Saskatchewan - Nelson River populations (which includes the Manitoba Population) are not considered at risk.

The Silver Chub is currently listed as Special Concern on Schedule I of the *Species at Risk Act* (June 2003); however, based on the above, a change in the legal status under the *Species at Risk Act* is now under consideration (See Appendix 3 to this filing).

Provincial Status: The Silver Chub is not listed on The *Endangered Species and Ecosystems Act* (Manitoba). The Manitoba Conservation Data Center lists the Silver Chub as S5 widespread, abundant, and secure throughout the range. (See Appendix 4 to this filing).

The potential environmental effects to Silver Chub are the same as to all fish and fish habitat (Change in Fish Habitat, Change in Fish Mortality) as described in Chapter 8, Section 8.5 of the Environmental Impact Statement.

Manitoba Hydro adopted the Fisheries and Oceans Canada 'Pathway of Effects' approach for understanding effects to Fish and Fish Habitat. Standard pathway of effects diagrams used by Fisheries and Oceans Canada were developed in consultation with habitat biologists, engineers and scientists from across the country, in order to ensure that most of the known effects on fish and fish habitat were included.

Manitoba Hydro used these diagrams to help in determining potential effects, and associated mitigation measures to reduce or eliminate these effects. The diagrams describe cause-effect relationships known to exist and mechanisms by which stressors ultimately lead to effects in the aquatic environment for various land based and in water activities for various types of projects. Based on the assessment and the pathway of effect process, Manitoba Hydro was able to apply mitigation along all pathways, minimizing all potential effects to fish and fish habitat. This method is aligned with Fisheries and Oceans Canada approach to understanding effects to fish and fish habitat.

The pathway of potential effects for each of the activities that could interact with fish and fish habitat during construction, and operation and maintenance of the Project are identified in the detailed pathway diagram attached as Appendix 5 to this filing.

Page 8-68 of the Environmental Impact Statement (EIS), provides a summary of environmental effects on fish and fish habitat including:

i. Selective removal of riparian vegetation;
ii. Direct disturbance to watercourse banks during site access, and
iii. Short-term and localized sedimentation

b) Mitigation for the potential effects is described in the EIS Chapter 8, Section 8.5.2.2 (Page 8-51); Chapter 22, Appendix 22A Construction Environmental Protection Plan, Section 2.3 (Pages 2-3, 2-4) and the general mitigation table "Stream Crossings PC-9" (page 5-35) as follows:

i. Riparian Buffers
   - Management Zone (30m+) that allows equipment to conduct low ground disturbance clearing; and,
   - Machine Free Zone (7m) which only allows reaching into the zone with equipment but not entering the zone except at trail crossings.

ii. Stream Crossings
   - Access road crossings will be at right angles to waterbodies to the extent possible.
   - Construction vehicles, machinery and heavy equipment will not be permitted in designated machine-free zones except at designated crossings.
   - Grading of the stream banks for the approaches should not occur. Establish a single entry and exit. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage. Disturbance to riparian vegetation is minimized.

iii. Erosion and Sediment Control Plan
   - The Contractor shall be responsible to develop and implement site-specific Erosion and Sediment Control Plans for its work. These plans will be based on the Erosion and Sediment Control Plan Framework (Chapter 22 of the EIS, Appendix 22A, Appendix I.3)

Section 8.7.1 of the EIS, page 8-71 (Significance of Environmental Effects from the Project) states:

> "The implementation of Manitoba Hydro's standard mitigation measures, provincial guidelines for watercourse crossings, and protection principles outlined in the Fisheries Protection Policy Statement and in the CEnvPP during construction, operation and maintenance is anticipated to result in minimal effects on fish and fish habitat, including CRA fisheries and SOCC. With environmental protection measures, mitigation and follow-up monitoring, the Project will not cause serious harm to fish and fish habitat, and residual environmental effects on fish and fish habitat are predicted to be not significant."

1.4 Fish and Fish Habitat – Candidate Assiniboine River Clam Ecological Reserve

Reference: *i) A81184-5, MMTP Fish and Fish Habitat – Technical Data Report, PDF page 41 of 150*
A81182-14, MMTP, Environmental Impact Statement, Chapter 8
Assessment of Potential Environmental Effects on Fish and Fish Habitat:
ii) PDF page 87 of 97
iii) PDF page 21 of 97
iv) Table 8-5 Aquatic Species of Concern Known or Expected to Occur within the Regional Assessment Area (RAA), PDF page 46 of 97
v) National Energy Board, Electricity Filing Manual, Chapter 6 Environmental and Socio-Economic Assessment, Table 6-2 Filing Requirements for Biophysical Elements, Species at Risk or Species of Special Status (PDF pages 88-89 of 122)

Preamble: *References i), ii), and iii) state that the Project crossing of the Assiniboine River is within an area of the candidate Assiniboine River Clam Ecological Reserve.*

Reference iii) states that the candidate Assiniboine River Clam Ecological Reserve (candidate Ecological Reserve) is a 100 ha area of river within Beaudry Park that contains eleven of the twelve species of clam found in the Assiniboine River, including the Mapleleaf Mussel.

Reference iv) states that the Mapleleaf Mussel is listed as Endangered on Schedule 1 of the Species at Risk Act (SARA).

Reference v) outlines filing requirements for Species at Risk Species of Special Status. The Board requires additional information on how the Project will affect the candidate Assiniboine River Clam Ecological Reserve and the species it supports.

Request: *Please provide:*

a) a discussion of potential Project effects on the candidate Assiniboine River Clam Ecological Reserve and the species that occur within the candidate Ecological Reserve;
b) a summary of the mitigation proposed by Manitoba Hydro to minimize potential Project effects on species and habitat within the candidate Ecological Reserve;
c) an update on the status of the candidate Ecological Reserve, including a discussion of when the candidate Ecological Reserve could be designated a protected area;
d) a description of the protections from or restrictions on development that are in place for the candidate Ecological Reserve; and
e) a summary of consultation with Manitoba Sustainable Development and any other relevant parties regarding potential Project effects on the candidate Ecological Reserve, including any comments on Manitoba Hydro's proposed mitigation to minimize potential Project effects on species and habitat that occur within the candidate Ecological Reserve area.

1.4 RESPONSE

a) Potential Project effects on the candidate Assiniboine River Clam Ecological Reserve and the species that occur within this area are described in Chapter 8, Sections 8.5.2, page 8-48, 8.5.3, page 8-63, and 8.10, page 8-74, of the EIS. For

further information please see responses to Information Requests 1.5. d) and 1.6. c).

b) Proposed mitigation is outlined in Chapter 8, Sections 8.5.2.2, page 8-51 and 8.5.3.2, page 8-65 of the EIS. For further information please see responses to Information Requests 1-1.5.e) and 1-1.6. c).

c) The candidate Assiniboine River Clam Bed Ecological Reserve is under preliminary consideration to be designated as an ecological reserve by the Province of Manitoba. The Province of Manitoba has not developed a timeline for the consideration or possible official designation of this candidate ecological reserve.

d) As a candidate ecological reserve, this area is provided with no added restrictions or protections from development under *The Ecological Reserves Act*.

e) Manitoba Hydro engaged Parks and Natural Areas Branch of Manitoba Sustainable Development regarding the status of this candidate ecological reserve in the ongoing Public Engagement Process. As a result, Manitoba Sustainable Development indicated that they have no concerns with potential Project effects and associated mitigation measures. No other regulatory authority or relevant party is responsible for the administration of this designation.

As part of the Provincial regulatory review process (which can be found posted in the Manitoba Sustainable Development – Environmental Assessment Branch Public Registry, file number 5750.00), Parks and Natural Areas Branch, represented on the Technical Advisory Committee, reviewed the EIS. Below is a quote from the Parks and Natural Areas Branch review as part of that process:

> "The Branch has no comments or concerns to offer as all concerns were addressed during the routing phase of the project. The Branch appreciates Manitoba Hydro's cooperation in avoiding provincial parks, ecological reserves, and proposed protected areas."

1.5 Fish and Fish Habitat - Effects of Proposed Boat Use on Mussels

Reference: *A81182-14. MMTP Environmental Impact Statement, Chapter 8 Assessment of Potential Environmental Effects on Fish and Fish Habitat:*
i) PDF page 78 of 97

ii) PDF page 76 of 97

Preamble: *Reference i) states that, in watercourses where mussel species of conservation concern are known to occur, watercourse crossings may occur by boat or barge to prevent mortality of the mussels.*

Reference ii) states that during months of open water, conductors will be transported across watercourses by boat.

Reference ii) also states that operation of a motor boat near shore in shallow water can result in physical contact with mussels causing mortalities.

The Board requires further information on the potential effects of boat use on mussel species of special status.

Request: *Please provide:*

a) a description of how boats would be used during construction;
b) a description of which watercourse crossings would require use of boats during construction;
c) a description of habitat, including any critical habitat, for mussel species at each watercourse crossing where boats may be used during construction;
d) an assessment of the potential effects on mussel species and habitats, including potential for mussel mortality or displacement of mussels, from boat use during construction; and
e) a description of mitigation that would be implemented during Project construction to minimize potential effects of boat use on mussel species and their habitats, including possible mussel relocation.

1.5 RESPONSE

With respect to Reference i), Manitoba Hydro advises that it has revised its approach to conductor stringing across watercourses and will not be stringing conductors by boat for any watercourse crossings. Helicopters will be used to carry a rope from structure to structure at these crossings. Once the rope is routed through the travelers hanging from the insulator strings, each conductor will be pulled through the travelers.

a) Manitoba Hydro will have flag persons in boats both upstream and downstream of the Right-of-Way ("ROW") during stringing as a navigation safety mitigation measure (See response to Information Request 1.2 for more details). This is the only planned use of boats for the Project. For the Red River and Assiniboine River crossings, boats will be launched from designated boat launches, will remain in deep water during stringing, then return to the boat launch.

b) Flag persons in boats will be used for the Red River and Assiniboine River crossings and may be used for Cooks Creek and the La Salle River, Seine River and Rat River, depending on water conditions at the time of stringing.

c) There is potential for mussel habitat at all crossings mentioned above (See response to Information Request 1.6). Critical habitat for the Mapleleaf Mussel may exist along stretches of the Red River and Assiniboine River (See references v and vi in Response to Information Request 1.6) but has not been identified in a Recovery Strategy or Action Plan for this population of Mapleleaf Mussel.

d) Potential effects to mussels, described in the EIS, Chapter 8, Section 8.5.2.1, page 8-49, include:

   i. effects to fish habitat that may affect the fish host: or

   ii. increased siltation.

   Based on the revised approach to stringing conductors described above, potential effects resulting from the operation of a motor boat near shore having direct physical contact with mussels (as referenced in the EIS, Chapter 8, section 8.5.3.1) are no longer a concern on the Red and Assiniboine River which are the only crossings that may contain Mapleleaf Mussel and will use boats.

   Boat use will be limited to deep water areas. Therefore, there is limited potential for effects to mussel species of special status. The species (Mapleleaf), its critical habitat or the residences of the species should not be affected by Project activities.

e) Mitigation to be implemented during Project construction to minimize potential effects of boat use on mussel species and their habitats will consist of: (i) limiting the use of boats to deep water areas at the transmission line crossings and (ii) only approaching shore at designated boat launches for stringing across the Red River and Assiniboine Rivers.

1.6 Fish and Fish Habitat - Project Effects on Mussel Species at Risk

Reference: *A81182-14. MMTP Environmental Impact Statement, Chapter 8 Assessment of Potential Environmental Effects on Fish and Fish Habitat:*

i) Table 8-5 Aquatic Species of Concern Known or Expected to Occur within the RAA, PDF page 46 of 97

ii) PDF page 38 of 97

iii) Table 8-8 Summary of Field-Assessed Watercourses Crossed by the Project, PDF page 52 of 97

iv) National Energy Board, Electricity Filing Manual, Chapter 6 Environmental and Socio-Economic Assessment, Table 6-2 Filing Requirements for Biophysical Elements, Species at Risk or Species of Special Status (PDF pages 88-89 of 122)
v) Fisheries and Oceans Canada (DFO), Aquatic Species at Risk Map, Manitoba South Map 22
vi) DFO, Aquatic Species at Risk Map, Manitoba South Map 23

Preamble: *Reference i) states that Mapleleaf Mussel is listed on Schedule 1 of the SARA as Endangered.*

Reference ii) states that the Assiniboine River is known to support Mapleleaf Mussel.

Reference iii) states that Mapleleaf Mussel was observed in the Local Assessment Area of the Assiniboine River and the Red River.

Reference iv) requires applicants to consult with relevant federal authorities such as DFO regarding species at risk or their critical habitat in the Project study area.

References v) and vi) are Aquatic Species at Risk Maps released by DFO in September 2016 that identify critical habitat for species including Mapleleaf Mussel in the Assiniboine River in the vicinity of the Project.

The Board notes that critical habitat for Mapleleaf Mussel in Manitoba was identified by DFO after Manitoba Hydro's fish and fish habitat assessment was completed. The Board requires additional information on the potential effects of the Project on Mapleleaf Mussel.

Request: *Please provide:*
a) a description of habitat, including any critical habitat, for Mapleleaf Mussel at each proposed watercourse crossing location;
b) a description of any pre-construction field surveys planned to identify locations of Mapleleaf Mussel that would be disturbed during construction; and
c) a summary of consultation with DFO regarding potential Project effects (including use of boats) on Mapleleaf Mussel, including:
c.l) Mapleleaf Mussel and its critical habitat, and
c.2) proposed mitigation to minimize potential Project effects on Mapleleaf Mussel.

1.6 RESPONSE

a) The Saskatchewan-Nelson populations of the Mapleleaf Mussel are located along the Red River and the lower reaches of its tributaries, the Assiniboine River and Lake Winnipeg. Mapleleaf occurs in a variety of habitats including slow to moderate current in mud, sand, or gravel substrates (COSEWIC 2006). There is potential for Mapleleaf habitat at both the Red River and Assiniboine River crossings. Critical habitat may exist along stretches of the Red River and Assiniboine River (references v and vi) but has not been identified in a Recovery Strategy or Action Plan for this population of Mapleleaf. The variability in habitat preferences likely reflects the adaptability of this species to particular habitats and a variety of substrates (COSEWIC 2006).

b) No pre-construction field surveys are planned as the potential for Project effects to mussel species is limited (See response to NEB-IR-1.5).

c) DFO has not been consulted on this Project regarding potential Project effects on Mapleleaf Mussel as the potential for Project effects to mussel species is limited. However, Manitoba Hydro has worked with Fisheries and Oceans Canada, Species at Risk Program, on two recent projects both of which required a SARA permit for the handling and relocation of Mapleleaf Mussel (Permit Nos. DFO-15-PCAA-00031 and DFO-16-PCAA-00029). The discussions included habitat requirements at the Project sites as well as those required for relocation. The SARA permit (and application) included "conditions required to avoid or minimize the impact of activities on the species, its critical habitat and the residences of its individuals". These "conditions" are all covered under the mitigation measures outlined in the EIS, including the Construction Environmental Protection Plan. Based on our recent experience, mitigation, and lack of potential Project effects on mussels (See response to Information Request 1.5), Manitoba Hydro does not believe a SARA permit will be required for this Project.

Mitigation, outlined in the EIS, Chapter 8, Sections 8.5.2.2 (Page 8-51) and 8.5.3.2 (Page 8-65) and Chapter 22, Appendix 22A, includes:

- Riparian Management
- Erosion and Sediment Control
- Emergency Response Planning; and
- Fisheries and Oceans Canada Measures to avoid causing harm to fish and fish habitat

1. 7 Fish and Fish Habitat - Restricted Activity Periods

Reference: *A81182-14, MMTP Environmental Impact Statement, Chapter 8 Assessment of Potential Environmental Effects on Fish and Fish Habitat:*
i) PDF page 81 of 97
ii) PDF page 57 of 97
iii) PDF page 47 of 97
iv) Table 8-4 Commercial, Recreational and Aboriginal Fishery Species Known or Expected to Occur within the RAA, PDF page 43 of 97

Preamble: *Reference i) states that by working outside of the restricted activity period (RAP), it is anticipated that mortality of fish eggs and young of the year from increased sedimentation will be mitigated.*

Reference ii) states that peak construction periods will take place during the winter months, outside the RAP for spring- and summer-spawning fish species.

Reference iii) states that Lake Whitefish, Burbot, and Lake Trout are fall spawners which have a RAP of September 15 through April 30.

Reference iv) indicates that these three species are known or expected to occur in the RAA.

It appears as though Project work may occur within the RAP for fall-spawning fish species. The Board requires more information about how construction activities will interact with RAP for fall-spawning fish species.

Request: *a) Please clarify which watercourse crossing locations support fall spawning fish species.*
b) Please outline which watercourse crossing locations that support fall spawning fish species would be subject to construction activities during the RAP for those fish species.
c) For those watercourses identified in a), please provide:
c.l) mitigation proposed to minimize the effects of the Project on fall-spawning fish species; and
c.2) a quantification of the change in habitat availability in metres square (m2) for fall-spawning fish species as a result of Project activities, including how many m2 of habitat will be permanently altered or removed.

1.7 RESPONSE

a) Fall spawning fish species[3] have been previously reported in the Assiniboine River, La Salle River, Red River, Seine River, and Rat River as reported in tables 3-3 and 3-4 in the Fish and Fish Habitat Technical Data report (See EIS, Biophysical Technical Data Reports, Part 2, 1.4).

b) All watercourse crossings mentioned above could be subject to construction activities during the RAP for fall spawning fish.

c.1) Mitigation proposed to minimize the effects of the Project on fall-spawning fish species includes:

- No in-water work;
- Riparian Management (EIS Chapter 22, Appendix 22A, Section 2.3, page 2-3), and
- Erosion and Sediment Control (EIS Chapter 22, Section 22.2.6.4, Page 22-14).

[3] burbot (Assiniboine River, La Salle River, Seine River, Rat River and Red River), cisco, lake trout, and lake whitefish (Red River).

c.2) There will be no change (0 m^2 of habitat will be permanently altered or removed) in habitat availability because the Project footprint does not include in-water works.

1.8 Fish and Fish Habitat - Outstanding Field Assessments

Reference: *A81182-14. MMTP Environmental Impact Statement, Chapter 8 Assessment of Potential Environmental Effects on Fish and Fish Habitat, PDF page 30 of 97*

Preamble: *Reference i) provides a summary of outstanding uncertainties in the assessment, and states that the final preferred route crossing of Fish Creek is more than 20 kilometres from the field-assessed location. Reference i) further states that the southern crossings on Cooks Creek and Edie Creek were not assessed during field studies, nor was a Type C Habitat watercourse crossing in the Roseau River sub-watershed southeast of Menisino.*

The Board requires further information on when these outstanding field assessments will be conducted, or how the effects of the Project will be assessed without the information from these outstanding assessments.

Request:

a) Please provide an update on when outstanding field assessments at the four locations listed above will be completed; or

b) if field assessments are not planned for these locations, please provide:

b.l) a rationale of why field assessments will not be completed; and

b.2) a discussion of how the effects of the Project on fish and fish habitat was or will be assessed for these locations, including how habitat suitability was or will be determined.

1.8 RESPONSE

a) Field assessment will not be conducted at the four locations listed

b.1) As described in EIS Chapter 8, Section 8.3.1(page 8-9), field and desktop data (sources described in Section 8.3.1.1, pages 8-10, 8-11) were analyzed to characterize the existing in-water and riparian physical environment, surface water quality, and habitat suitability for fish. Fish species potentially inhabiting watercourses in the Regional Assessment Area were identified and their seasonal ranges, sensitive periods, and habitat use were described with special attention to relevant SOCC. Known and potential CRA fisheries were also identified.

The data collected from the field and desktop studies, together with input from the other Project VCs, and Public and First Nations and Metis Engagement Processes, were used to determine the habitat sensitivity for each of the watercourses crossed by the Project. Sufficient information was available on the above–referenced

crossings to determine habitat sensitivity. Therefore no additional field assessments will be completed.

b.2) Effects of the Project on fish and fish habitat were assessed at these locations based on their habitat sensitivities determined as described above.

1.9 Fish and Fish Habitat - Turbidity Monitoring during Construction

Reference: *A81183-ll, MMTP Draft Environmental Monitoring Plan, Table 4-2 Fish and Fish Habitat, PDF pages 24-25 of 86*

Preamble: *Reference i) states the following:*

The loss of riparian vegetation can result in increased sediment in water. ... Increased suspended sediments can .... bury or create unsuitable habitats for aquatic invertebrates, infill spawning habitats, and reduce spawning and feeding success of fish. In-water construction activities have the potential to negatively affect fish health through changes in water quality. To validate Environmental Impact Statement (EIS) predictions, and to allow for adaptive management, construction monitoring will verify effectiveness of prescribed mitigation.

The Board requires further information on how Manitoba Hydro will monitor for potential effects to fish health that might arise from changes in water quality.

Request: *Please:*

a) identify stream crossing locations where instream work, use of boats, clearing of riparian vegetation, or any other construction activities may result in increased sedimentation;

b) discuss how turbidity will be monitored during construction (including activities listed above in a)), including frequency of monitoring;

c) outline turbidity thresholds Manitoba Hydro will use to decide when to stop construction (stop-work thresholds), including any criteria (e.g., Canadian Council of Ministers of the Environment guidelines) used to determine thresholds;

d) explain how adaptive management techniques will be used modify Project work or Project mitigation measures, should turbidity monitoring reveal that Project construction activities are affecting fish and fish habitat; and

e) confirm that details of turbidity monitoring, including roles and responsibilities, will be included in the Construction Environmental Protection Plan (CEnvPP) and Environmental Monitoring Plan prior to commencement of Project clearing and construction.

1.9 RESPONSE

a) Instream works are not proposed as part of the Project. The use of boats will be limited to flag person duties during conductor stringing across navigable waters (Assiniboine and Red Rivers). Locations of stream crossings can be found in the Fish and Fish Habitat Technical Data Report on Table 3-2 (See EIS, Biophysical Technical Data Reports, Part 2, 1.4) and EIS Map Series 1-100. Stream crossing

riparian zone mitigation includes the establishment of a riparian buffer with specific management zones and activities that will protect against erosion and sedimentation of streams (see EIS section 2.3 in Appendix 22A Construction Environmental Protection Plan (CEnvPP).

b) Monitoring at stream crossings will focus on ensuring successful implementation of the CEnvPP and will not include turbidity monitoring as there are no instream works proposed.

c) Turbidity monitoring is not proposed during construction and therefore thresholds are not required (see b).

d) Turbidity monitoring is not proposed during construction (see b). Adaptive management will be used during the implementation of the CEnvPP at stream crossings. Monitoring of the implementation of environmental protection measures at stream crossings will be performed by Environmental Inspectors and aquatic environment specialists. Should mitigation measures not be in compliance with the CEnvPP, further mitigation will be prescribed and implemented. This may include measures such as application of erosion sediment control (i.e., sediment fence, erosion control blankets, re-vegetation).

e) As described above, with no instream works planned, turbidity monitoring is not proposed during construction and therefore, it will not be included in the CEnvPP (see b).

1.10 Rehabilitation and Weed Management Plan

Reference: *i) A81183-l l, MMTP Draft Environmental Monitoring Plan, Table 4-5 Invasive Plant Species, PDF pages 31-32 of 86*
ii) A81182-38, MMTP Environmental Impact Statement, Chapter 22 Environmental Protection, Follow-up and Monitoring, PDF page 26 of 278

Preamble: *Reference i) states that surveys for non-native and invasive species are planned for the first summer season after construction is completed.*

Reference i) also indicates that the decision trigger/threshold for action is the establishment and spread of invasive species along the right-of-way (RoW).

Reference ii) states that a Rehabilitation and Weed Management Plan will be prepared by Manitoba Hydro to manage rehabilitation and weed management activities at construction sites for the Project.

The Board notes that Manitoba Hydro does not identify what action will be taken to prevent and mitigate for the establishment and spread of invasive species along the RoW, should the establishment and spread of invasive species be encountered.

Request: *Please provide:*

a) a draft of the Rehabilitation and Weed Management Plan (if a draft is not available currently, please provide a date in the near future when the draft will be provided to the Board);
b) a description of how the adaptive management approach and mitigation measures outlined in reference i) will be incorporated into the Rehabilitation and Weed Management Plan, including how the post-construction, non-native, invasive species survey and resulting action will overlap with measures outlined in the Rehabilitation and Weed Management Plan; and
c) a description of what mitigation measures will be undertaken if the establishment and/or spread of invasive species is observed along the RoW during post-construction surveys, and the decision-making process for how measures would be implemented.

1.10 RESPONSE

a) A draft of the Rehabilitation and Invasive Species Management Plan (RISMP) (formerly called Rehabilitation and Weed Management Plan) is attached as Appendix 6 to this filing.

b) An adaptive management approach in the Environmental Monitoring Plan allows for recommendations for ongoing improvements to be made to the mitigation measures prescribed in response to knowledge gained through ongoing monitoring and analysis. The actions of the RISMP are triggered as a response to results from the findings of the Invasive Plant Species Surveys, which are part of the Environmental Monitoring Plan. As a result of these surveys, where non-native and invasive species control is required, the RISMP will be implemented in order to determine invasive species treatment options (e.g., manual, mechanical, chemical and biological control). Once treatment options are implemented, monitoring through the Invasive Plant Species Surveys will take place to determine treatment effectiveness.

c) Section 3 of the RISMP "Invasive Species Management" describes in detail the mitigation/control measures Manitoba Hydro will consider if the establishment and/or spread of invasive species is observed along the ROW during post-construction surveys. As described in Chapter 22 Section 22.2.2 of the EIS the Environmental Protection Implementation and Management Teams have the responsibilities of management and implementation of the environmental protection

program including the RISMP. When Project effects are discovered, decisions with respect to invasive species management will take into consideration land ownership, species, location, nature of spread and possible treatment options and may include discussions with local Weed Supervisors and/or Manitoba Agriculture or Sustainable Development departments.

1.11 Wildlife and Vegetation - Outstanding Baseline Surveys

Reference: *A8l183-ll, MMTP Draft Environmental Monitoring Plan, Figure 4-1 Proposed Monitoring Activities Schedule, PDF page 22 of 86*

Preamble: *Reference i) provides a proposed monitoring activities schedule, including outstanding pre-construction surveys.*

The Board requires additional information about when the results of outstanding baseline surveys will be provided, including how Manitoba Hydro's mitigation measures might change as a result of information gained during outstanding surveys.

Request: *Please:*

a) provide a draft schedule outlining when Manitoba Hydro will provide the results of any outstanding baseline surveys for vegetation and wildlife, including those described in reference i), to the Board; and
b) confirm that filings provided according (sic) the schedule in a) will include the following:
b.l) results of surveys conducted;
b.2) a description of any changes to mitigation measures that arise from information gained during surveys; and
b.3) an updated copy of the CEnvPP and CEnvPP maps, if applicable.

1.11 RESPONSE

a) At this point in time Manitoba Hydro intends to submit a report to the NEB outlining the results of all vegetation and wildlife pre-construction surveys by November 15, 2017.

b) Manitoba Hydro confirms that filings will include items requested in b.1, b.2, and b.3.

1.12 Aboriginal Consultation Update

Reference:
i) A8 l 182-8, MMTP Environmental Impact Statement, Chapter 4 First Nation and Metis Engagement Process, PDF page 12 of 193
ii) A81054-1, MMTP Application, Section 5.4 First Nations and Metis Engagement Process, PDF page 51 of 90
iii) National Energy Board, Electricity Filing Manual, Chapter 5 Consultation, PDF page 40 of 122

Preamble: *In reference i) Manitoba Hydro states it first began engaging with First Nations, Metis and Aboriginal organizations in Canada about the Project in August 2013 through its First Nations and Metis Engagement Process (FNEMP). This report covers engagement up to August 2015.*

Reference ii) states that Manitoba Hydro is committed to sharing information with First Nations, Metis and Aboriginal organizations throughout the regulatory, construction and operation phases of the Project.

Reference iii) requires applicants to provide clear, relevant and timely information to potentially affected persons or groups and to continue engaging throughout the regulatory process.

Request: *Please provide:*

a) an update on consultation with First Nations, Metis and Aboriginal organizations since August 2015;
b) a summary of any concerns raised;
c) a description of how Manitoba Hydro has addressed or will continue to address any concerns raised, or an explanations as to why no further action is required to address the concerns; and
d) a description of how Manitoba Hydro plans to engage potentially affected Aboriginal peoples and organizations throughout the provincial and federal regulatory processes, and construction and operational phases of the Project

1.12 RESPONSE

a) The description of engagement activities up to the time of filing Manitoba Hydro's Application in December of 2016 can be found in section 5.4.2 of the Application. Since the time of filing, the following specific engagement activities have occurred:

Manitoba Hydro has been communicating with all those involved in the MMTP First Nations and Metis Engagement Process ("FNMEP") on a variety of topics including the planning of community monitoring meetings and the sharing of process-related information about provincial and federal regulatory review processes, including how to be involved.

b) The following community-specific concerns have been raised since December 2016:

Peguis First Nation ("Peguis") representatives reiterated concerns about sharing the final "Peguis First Nation Land Use and Occupancy Interview Project" on February 9, 2017.

Peguis had communicated concerns about sharing spatial data more broadly. Based on this concern, Manitoba Hydro sent a letter June 30, 2016 to try to better understand and address concerns around this issue and has not filed the final report with the Manitoba Clean Environment Commission ("CEC"). No shape files have been filed as part of any submission.

On March 8, 2017, the MMF submitted their final report outlining concerns based on an MMF Study. Manitoba Hydro intends to file the final report with CEC and will also file this report with the Board if directed to do so. Further, Manitoba Hydro is committed to filing a supplemental report describing how the MMF Study information has influenced the MMTP. Manitoba Hydro is currently reviewing the report and is not able to provide a summary of MMF concerns at this time.

On March 20, 2017, a Black River First Nation representative requested an Environmental Protection Plan meeting, and had questions about the status of the project. Manitoba Hydro will work with Black River First Nation to set-up a meeting to provide an update on the status of the project and to ask if there are outstanding concerns.

c) Sections 5.4.3.I, 5.4.3.ii, 6.1.2 and 6.5.2 of the Application describe how Manitoba Hydro has addressed concerns expressed during the FNMEP and will continue to address concerns. Any new Project specific concerns raised through other forums or discussions with communities will be addressed through the same mechanisms.

d) Section 5.4.1.2 of the Application describes how Manitoba Hydro plans to engage potentially affected Aboriginal peoples and organizations throughout the provincial and federal regulatory processes, and construction and operational phases of the Project.

1.13 Public Consultation Update

Reference:
- *i) AS 1182-6, MMTP Environment Impact Statement, Chapter 3 Public Engagement Process, PDF page 12 of 112*
- *ii) National Energy Board, Electricity Filing Manual, Chapter 5 Consultation, PDF page 40 of 122*

Preamble: *Reference i) states that Manitoba Hydro undertook a Public Engagement Process (PEP) that began in June 2013, two years prior to regulatory filing. Manitoba Hydro indicates that the PEP will continue through the regulatory construction and operational phases of the Project. The report includes information up to May 2015.*

Reference ii) requires proponents to provide clear, relevant and timely information to potentially affected persons or groups and to continue engaging throughout the regulatory process.

Request: *Please provide:*

a) an update on consultation with interested people and organizations since May 2015;
b) a summary of any concerns raised;
c) a description of how Manitoba Hydro has addressed or will continue to address any concerns raised, or an explanation as to why no further action is required to address the concerns; and
d) a description of how Manitoba Hydro plans to engage potentially interested people and organizations throughout the provincial and federal regulatory processes, and construction and operational phases of the Project.

1.13 RESPONSE:

a) Section 5.3 of Manitoba Hydro's Application outlines public engagement activities up to the time of filing the Application in December of 2016. Since the time of filing, Manitoba Hydro has continued to discuss the Project with interested parties. Manitoba Hydro has maintained a Project information line as well as a dedicated email address to readily respond to concerns and questions brought forward. A Project website is also updated as information becomes available. The following activities have also been undertaken regarding stakeholder groups and potentially affected landowners.

- Three email campaigns were sent to over 700 email contacts. These email campaigns were emails sent to subscribers who wished to be kept up to date regarding the Project.
- A letter was sent to landowners who will require an easement on their property if the Project is approved (February 2017). This letter outlined the status of the regulatory review process and encouraged ongoing discussions with a Manitoba Hydro representative regarding process, land access, compensation and surveying.
- A letter was sent to landowners with a Manitoba Hydro meter within one mile of the proposed IPL (February 2017) providing an update on the regulatory process for the Project and encouraging Landowners to sign up for email updates.

- An email was sent to stakeholder groups (February 2017) providing an update on the regulatory process for the Project and encouraging contact with Manitoba Hydro if there was a desire to discuss the Project.
- Meetings were held with Municipal councils (March 2017) to outline the activities being undertaken with their constituents and to outline a community benefit program being developed.

b) No new concerns were raised during the course of the above-referenced activities that have not been outlined in section 5.3.4 of the Application.

c) A description of how Manitoba Hydro has addressed and will continue to address concerns raised during the Public Engagement Process is provided in the Application, sections 5.3.4 and 5.3.5.

d) Manitoba Hydro's plans for ongoing engagement with potentially interested people and organizations is described in the Application, section 5.3.5.

1.14 Public Notification Process

Reference:
i) National Energy Board Electricity Regulations, Subsections 5(c) and (d), PDF page 11 of 23
ii) A81054-12, MMTP Application, Appendix 11, PDF pages 2-3 of 3
iii) A81273-l, Affidavit of Publication and Service – Manitoba Minnesota Transmission Project, PDF page 2 of 17

Preamble: *Reference i) outlines required information for applications for the construction and operation of an international power line that exceeds an operating voltage of50 kV. Section 5(c) of reference i) requires applicants to provide a proof of publication of its notice and 5(d) of reference i) requires applicants to provide a description of any early public notification processes.*

Reference ii) is Manitoba Hydro's Notice of Application and Directions on Procedure.

In reference iii), Manitoba Hydro states that it published reference ii) in the Canada Gazette Part 1, Winnipeg Free Press, and La Liberte, and served it on interconnected Canadian utilities.

Request: *Please provide:*

a) a description of the early public notification process Manitoba Hydro implemented for its Permit Application to the Board; and

b) a description of the methods that Manitoba Hydro used to communicate its Notice of Application and Directions on Procedure, including information about the 30 day comment period to potentially interested stakeholders, landowners and Aboriginal groups.

1.14 RESPONSE

a) Section 2 of the Application provides a concordance table listing the subsections to section 5 of the National Energy Board Electricity Regulations and the corresponding sections of the Application where the requirements of the regulations are addressed. This table identifies that the description of early public notification processes is contained in sections 5.3.2 and 5.4.2.b of the Application. As described in more detail in those sections, Manitoba Hydro provided early public notification of the Project approximately three and a half years prior to filing its Application using a variety of methods. These methods included: news releases, a Project website, stakeholder letters and postcards. As indicated in section 5.4.2.b, early notification letters were also sent to leaders of the fifteen communities and organizations that were originally identified for inclusion in Manitoba Hydro's First Nations and Metis Engagement Process ("FNMEP"). See Appendices 29, 30 and 32 to the Application for copies of these notifications.

b) Manitoba Hydro provided early communication of the NEB comment process to participants in its Public Engagement Process and its First Nations and Metis Engagement Process ("FNMEP") by having the NEB brochure "Information for Proposed Pipeline or Power Line Projects that Do Not Involve a Hearing" available at public forums (See Application sections 5.3.1 and 5.4.2.c.i). While this brochure does not specifically mention the thirty day comment period following a Notice of Application and Directions on Procedure, it contains a statement indicating that, "if you still have project-related views or concerns after the project application has been submitted, you are encouraged to send a letter of comment to the NEB as soon as possible and preferably within 14 days after the application has been filed." As indicated in section 3.3 of the Application, Manitoba Hydro published a Notice of Application and Directions on Procedure ("Notice") in the largest paid general circulation English and French language newspapers in Winnipeg at the time of filing its Application. Manitoba Hydro filed an Affidavit of Publication and Service with the Board on January 12, 2017 evidencing communication of the Notice through publication and service in accordance with NEB requirements. In addition to meeting these requirements specified in the Board's Electricity Filing Manual and its Memorandum of Guidance, Manitoba Hydro made the following communications.

Once Manitoba Hydro's Application was filed with NEB on December 16, 2016, Manitoba Hydro's Project website was updated announcing filing of the Application and included links to the NEB's website as well as to Manitoba Hydro's Application containing the Notice. On December 22nd, Manitoba Hydro distributed emails to 718 parties that had subscribed to Manitoba Hydro's email notification list, advising that Manitoba Hydro had filed its Application with NEB and that there was an opportunity for public comment. The letter included a link to Manitoba Hydro's Application containing the Notice. In addition, on January 6th, 2017, Manitoba Hydro sent letters to the leaders of communities and organizations involved in the FNMEP via email advising them of the filing of Manitoba Hydro's Application with the Board and that the deadline for filing comments was contained in the Notice in Appendix 11 of the Application. The letter provided electronic links to these documents. Accordingly, through the Project website, various publications and service of the Notice, emails and letters, potentially interested stakeholders, landowners and Aboriginal groups were informed of the thirty day comment period.

1.15 Identification of Aboriginal Groups

Reference: *i) A81182-8, MMTP Environmental Impact Statement, Chapter 4 First Nation and Metis Engagement Process, PDF pages 18-19 of 193*
ii) National Energy Board, Electricity Filing Manual, Section 5.2: Designing Project-Specific Consultation Activities, Identifying Aboriginal Groups, PDF page 43 of 122

Preamble: *In reference i), Manitoba Hydro states that it began engaging with 16 First Nations, Metis and Aboriginal Organizations in September 2013. It further states that in July 2015 it provided notification about the Project to two additional First Nations who may have interest in the Project.*

Manitoba Hydro also stated in reference i) that it was prepared to engage with other parties not on the list if it came to the Applicant's attention that others may have an interest in the Project.

Reference ii) outlines the Board's guidance for identifying Aboriginal groups.

The Board, through its own preliminary assessment of publically known or asserted Aboriginal traditional territory information, identifies Aboriginal groups that could be potentially affected by the proposed Project. The Board notes that the following seven Aboriginal groups not mentioned in reference i) have asserted traditional territory in the Project area:

- *Animakee Wa Zhing #37*
- *Anishinaabeg of Naongashiing*
- *Birdtail Sioux First Nation*

• Canupawapka Dakota First Nation
• Northwest Angle No. 33
• Sioux Valley Dakota First Nation
• Waywayseecappo First Nation

Request: Please provide:

a) confirmation that the above groups have been provided with notice of the Project;
b) a summary of concerns raised by the Aboriginal groups listed above; and
c) a description of how Manitoba Hydro has addressed or will address any concerns raised to the extent possible, or an explanation as to why no further action is required to address the concerns; or
d) justification why it was not necessary to carry out consultation activities with respect to the additional groups as noted above.

1.15 RESPONSE

a. The above-referenced First Nations have not been provided with notice of the Project by Manitoba Hydro through its First Nations and Metis Engagement Process ("FNMEP").

b. No concerns regarding the Project have been raised by the above-referenced First Nations.

c. Not applicable.

d. Manitoba Hydro did not include the above-referenced First Nations in its FNMEP as they did not meet the criteria developed by Manitoba Hydro to identify communities and organizations that were potentially impacted by the Project. As indicated in section 5.4.2.a.i of Manitoba Hydro's Application, Manitoba Hydro considered a number of broad factors in determining whom to contact regarding participation in the FNMEP, taking into account that the Project is located on Treaty 1 territory. These criteria were:

- Communities and organizations expressing an interest in the Project;
- Treaty 1 signatories;
- Communities located within 40 km of the Project region (40 km)
- Located within Treaty 1 area, but not a signatory to the numbered treaties; and
- Aboriginal organizations with interests or mandates related to the Project region.

As indicated in section 6.3.1 of Manitoba Hydro's Application, "Project region" is broadly defined to include: "the area of southeastern Manitoba where the Project is

located, from the Dorsey Converter Station near Rosser to the Manitoba-Minnesota border and the area of Glenboro South Station in the R.M. of Cypress".

The seven First Nations noted in this question did not meet these criteria. They have not expressed an interest in the Project directly to Manitoba Hydro, nor has Manitoba Hydro been advised through another party that these First Nations are interested in the Project. They are not signatories to Treaty 1, nor located in the Treaty 1 area. These First Nations are also not located within 40 km of the Project region, which is broadly defined as indicated above.

Manitoba Hydro developed its identification criteria in accordance with guidance from the Board in its Electricity Filing Manual. Section 5.2 indicates that Aboriginal groups potentially affected by the proposed project can be identified by:

- considering the location of Indian reserve lands, Métis settlements, Métis or other Aboriginal populations, and the traditional territory that may be claimed by one or more Aboriginal groups;
- contacting regional Aboriginal organizations or government agencies familiar with local Aboriginal groups; and
- taking into consideration past experience working in the area.

Manitoba Hydro notes that these guidelines necessarily require the use of some discretion by the Project proponent in determining appropriate locational criteria and applying past experience. Manitoba Hydro believes that the criteria developed for the FNMEP, which was based on Manitoba Hydro's recent experience in developing a number of significant transmission and generation projects appropriately applied the guidance provided in the Manual.

The reasonableness of Manitoba Hydro's criteria has also been subject to review. Manitoba Hydro sought input from both provincial and federal government representatives to verify the criteria used to guide FNMEP involvement and the inclusiveness of its engagement program. Early in the planning process (November,

2014) Manitoba Hydro submitted a draft EIS scoping document to Manitoba Conservation and Water Stewardship (now Manitoba Sustainable Development) that was reviewed by both provincial and federal representatives through a Technical Advisory Committee process (See section 4.4.1 of the Application). This scoping document included a description of how communities would be invited to participate in the FNMEP. Neither governments commented on concerns with the proposed criteria or suggested that the additional First Nations noted above be included in the FNMEP. Similarly, none of the above- referenced First Nations provided comments during the public comment period associated with the scoping document.

1.16 Eventual Abandonment of Facilities

Reference:

i) National Energy Board, Electricity Filing Manual, Section 4.4 – Other Required Approvals and Project Schedule, PDF page 37 of 122
ii) A81374-l, Manitoba Metis Federation Comments on Manitoba Minnesota Transmission Line, PDF page 23 of 34
iii) A81188-10, Manitoba Hydro, Stakeholder Group and Landowner Meeting Minutes, PDF page 36 of 123

Preamble:

Reference i) provides guidance that an application to the Board for the construction of an international power line should include a description of when proposed decommissioning and abandonment of the Project might take place.

In reference ii) the Manitoba Metis Federation (MMF) states that there is no description provided in the EIS for decommissioning of temporary infrastructure or facilities related to the construction of the Project.

In reference iii) Manitoba Hydro stated, in response to a question from Keystone Agricultural Producers regarding decommissioning, that the life of the transmission lines will likely be long term and decommissioning is not taken into consideration.

Request:

Please provide:

a) the expected economic life of the Project;
b) the proposed plan to eventually abandon the Project, including a schedule for when such an abandonment might take place;
c) the proposed plan to decommission or abandon the temporary infrastructure or facilities related to the construction of the Project, including a schedule for when such work would be expected to take place; and
d) the estimated cost of abandoning the Project, including, but not limited to:
d.l) the types of expenses likely to be involved;
d.2) any ongoing liabilities and associated costs that would remain following the abandonment; and
d.3) how Manitoba Hydro plans to finance the abandonment costs and any ongoing liabilities that would remain following the abandonment.

1.16 RESPONSE

a) The economic lifespan of the Dorsey IPL is expected to be approximately 80 years.

b) Manitoba Hydro does not envision abandoning the Dorsey IPL. The IPL is currently planned to be an asset of the Corporation in perpetuity as it will provide increased access to additional markets in the United States for future power sale agreements and enhance the reliability of the province's electricity supply in emergency and drought situations.

However, in the event abandonment is required, Manitoba Hydro's plans are described in section 2.14 of the Project Description Chapter of the EIS, Transmission Line Decommissioning (Page 2-65) as follows:

> "Should these transmission lines be decommissioned at some future date, Manitoba Hydro will apply acceptable means for environmentally restoring Project sites and ROWs.
>
> Current methods of transmission line decommissioning entail the dismantling of the structures and salvage or disposal of all steel structure components, as well as removal and salvage of insulators, conductors and ground wires. Decommissioning of ROWs currently involves clean up and remediation to a standard commensurate with local environmental conditions, including the applicable land use and policy in effect at the time of decommissioning".

Manitoba Hydro does not have a schedule for when abandonment might take place.

c) As noted in Section 2.12.9 of the Project Description chapter regarding demobilization/decommissioning of temporary infrastructure (Page 2-61):

> "The final step in clearing and construction is the demobilization of a workforce from an area. Demobilization includes the movement of Manitoba Hydro and contract staff, vehicles and equipment from the job site, as well as the clean-up (and if required rehabilitation) of camps, marshalling yards, borrow sources and access routes. Generally, demobilization is ongoing throughout the clearing and construction phase as different types of equipment are required for specific activities such as

clearing, tower construction and conductor stringing. Construction cleanup will occur throughout clearing and construction. As soon as possible after completion of construction, the sites will be cleaned up and left in standard operating condition. All non-toxic materials will be disposed of using existing, appropriately licensed local facilities. Material supply and waste handling will be subject to conventional Manitoba Hydro codes of practice and relevant provincial and federal legislation. All cleanup and rehabilitation activity will be subject to the requirements of the Environmental Protection Plan."

d.1) In the event that the Dorsey IPL was decommissioned, expenses would relate to dismantling of the structures and salvage/disposal of all steel structure components, as well as removal and salvage of insulators, conductors and ground wires. Station components not required for system reliability would be decommissioned and removed from the existing station sites. Total cost of decommissioning is not available.

d.2) There would be no ongoing liabilities and associated costs that would remain following the abandonment, as the transmission right of way would be reclaimed and restored as close to pre-disturbance condition as practical and in accordance with all applicable legislation.

d.3) Manitoba Hydro would finance the abandonment costs in the same manner as other Corporate capital expenditures (See Application section 7.2.1.a). Given Manitoba Hydro's above-referenced plans, Manitoba Hydro does not anticipate any ongoing liabilities that would remain following the abandonment. Accordingly, no financing is expected to be required.

1.17 Financial Responsibility

Reference: *i) A81182-36, MMTP Environmental Impact Statement, Chapter 21 Accidents, Malfunctions and Unplanned Events*

Preamble: *In reference i) Manitoba Hydro identifies potential accidents, malfunctions, and unplanned events that may occur during Project construction and operation, and assesses their potential effects.*

Request: *In relation to potential accidents, malfunctions, and unplanned events involving the Project, please provide:*

a) information regarding whether the emergency response plan, when created and filed, will contain an estimate of the cost to implement the plan after an incident;

b) examples or estimates of the cost associated with incidents that have occurred or could occur in facilities similar to those proposed in the Application;

c) a demonstration of the financial resources available to Manitoba Hydro to address its financial responsibility in the case of a possible incident. Examples of financial resources include, but are not limited to, insurance that Manitoba Hydro has, or plans to have in place. Examples of incidents include, but are not limited to, damages to persons, property, and the environment resulting from an incident for which Manitoba Hydro is liable; and

d) confirmation of Manitoba Hydro's role as the operator of the Project and as the responsible party for addressing a possible emergency or incident during the lifecycle of the Project, including during construction, operation, and abandonment.

1.17 RESPONSE

a) The emergency response plan will not contain an estimate of cost as all events are varied in scope and response method.

b) The following are examples and estimates of costs associated with incidents that have occurred or could occur in facilities similar to those proposed in the Application;

i. Collapse of a 500kV AC tower would require complete replacement of one tower. The cost estimate for replacement is in the order of $250,000-$500,000.

ii. Accidental release of hazardous materials due to equipment failure which would require clean-up and remediation. The cost estimate is in the order of $2,500 to $10,000.

iii. Total failure of a bank of 500kv current transformers at a station which would result in the complete replacement of the bank. The cost estimate for replacement is in the order of $300,000-500,000.

iv. The failure of other electrical equipment such as circuit breakers, surge arresters, disconnecting switches, etc. The cost estimate for replacement will vary from $5000 to $1M.

v. During the construction phase of the Project, Manitoba Hydro and/or the contractors put in place Builders Risk insurance and Wrap-up Liability/Commercial General Liability (CGL) insurance. The Builders Risk policy insures against all risks of direct physical loss or physical damage to the all material, supplies, equipment and other property which are to be used in or incidental to the fabrication, erection or completion of the Project. The

Wrap-up/ CGL policy covers all sums which Manitoba Hydro is legally obligated to pay as damages with respect to the Project for personal injury or property damage liability. During the operational phase of the Project, Manitoba Hydro self-insures directly or indirectly, through deductibles and other risk financing alternatives, the majority of its transmission property damage exposure. Manitoba Hydro uses Commercial General Liability and Excess Liability insurance to cover all sums which Manitoba Hydro is legally obligated to pay as damages with respect to personal injury or property damage liability resulting from the operation of the Project.

vi. Manitoba Hydro confirms that it is the operator of the proposed Project and the Responsible Party for addressing a possible emergency or incident during the lifecycle of the Project, including during construction, operation, and abandonment. See Section 3.2.c of the Application.

1.18 Definition of Technical Terms and Related Issues

Reference: *A8 l 054-1, MMTP Application:*

i) Section 4.2.1 Engineering Design Details, Project Activities, Federal Authorizations, PDF pages 21-23 of 90

ii) Section 4.3 Impacts on the Bulk Power System, PDF pages 28 and 30 of 90

iii) Section 4.5.2 Alternate Designs, PDF page 40 of 90

Preamble: *In Reference i) Manitoba Hydro states the following:*

1) "Three types of towers will be used: tangent towers, angle towers and dead-end towers. It is estimated that 526 new tangent angle towers will need to be constructed."

2) "In order to construct the Dorsey IPL, modifications will also be required to the terminal facilities of the IPL at Manitoba Hydro's Dorsey Converter Station which contains a 500 kV switchyard and 230 kV switchyard. Modifications within the 500 kV yard include a 500 kV bus extension and bay modifications, and the addition of the following: one 500 kV circuit breaker; 500 kV single-phase current transformers; a 500 kV line termination; and a 500 kV single-phase shunt reactor."

3) "Alterations to the Glenboro IPL will consist of the addition of two series connected 300 MVA (230 kV+ - 40 degrees) phase shifting transformers to the terminal facilities at Glenboro Station. This alteration is required in order to mitigate pre-contingency overloads on the Riel IPL resulting from increased power flows over the Manitoba-U.S. interface once the Dorsey IPL is in service, as identified in Manitoba Hydro's Preliminary Report on Group Facilities Study."

In Reference ii) Manitoba Hydro states the following:

1) "Pursuant to an operating procedure in place between Manitoba Hydro and IESO, the Riel IPL is considered a "Critical Facility" that impacts Ontario system transfer limits."

2) "Manitoba Hydro confirms that, in accordance with the Board's General Order on Reliability, Manitoba Hydro intends to comply with NERC standards applicable to the design, construction and operation of the proposed IPL as specified in Manitoba Regulation 25/2012 as amended from time to time. This includes standards related to Critical Infrastructure Protection."

In Reference iii) Manitoba Hydro states:

> *"Finally, the cost of underground cable is expected to be at least ten times more expensive than a comparable overhead transmission line. Not only is the cable itself expensive, but reactive power compensation stations are required roughly every 25 km to compensate for the high capacitance of the cable."*

The Board requires clarification on a number of terms.

Request: *Please provide the following:*

a) definition of the terms tangent towers, angle tower, dead-end towers, and tangent angle towers.

b) definition of the terms:

b.1) 'Station' – including a discussion of whether this term is a synonym of the terms 'Substation';

b.2) 'Switchyard' and 'yard' – including a discussion of whether these two terms are synonymous; and

b.3) 'Single-phase shunt reactor' – including a succinct description of the functionality of this device and its common usage.

c) definition of the term 'phase shifting transformer' and include:

c. l) a succinct description of the functionality of this device and its common usage;

c.2) the name of the Manitoba-U.S. interface causing overloads on the Riel IPL once the Dorsey IPL is in service;

c.3) a thorough explanation, in plain language, of how the addition of the Dorsey IPL causes overloads on the Riel IPL; and
c.4) a complete explanation of how the proposed phase shifting transformer added to the terminal facilities at Glenboro Station mitigates the overloads on the Riel IPL.

d) definition of the expressions 'Critical Facility' and 'Critical Infrastructure', and the differences between the two terms, and include:

d. l) the impact on the reliability of the power system when a critical facility or a critical infrastructure fails or suffers an unplanned outage;

d.2) the NERC standards that address the terms 'Critical Facility' and 'Critical Infrastructure' including a thorough discussion of the meaning of these terms in NERC standards; and

d.3) a thorough explanation of the implications of labeling the Riel IPL as a 'Critical Facility'.

e) definition of the terms:
e.1) 'Reactive power', and include
1. *a list of NERC standards that are applicable to the Project and address the concept of reactive power; and*
2. *a succinct description of the significance of reactive power to the power system.*

e.2) 'Reactive power compensation', including a succinct explanation, in plain language, when and why reactive power compensation is required.

1.18 RESPONSE

a) Tangent, Angle and Dead-end are terms used to describe the different types of transmission towers within a single transmission line. Figures 2-4 and 2-5 in Chapter 2 of the EIS illustrate typical self-supporting and guyed steel lattice structure configurations. For this Project each type is as described below:

Tangent towers can either be self-supporting or guyed steel lattice structures that are used to support conductors in straight line sections of the line;

Angle towers can either be self-supporting or guyed steel lattice structures used where there is an angle change in line direction. As they are subject to additional longitudinal loads arising from the tension of the conductors in multiple directions they have larger bases and greater structural strength than tangent towers;

Dead-end towers are self-supporting structures typically used at the termination of a line into a station, large angle changes in line direction, and at major crossings like highways and rivers. These towers are subject to loads arising from the unbalanced effect of conductor tension on one side of the structure and are of greater structural size and strength than angle towers.

The statement in the Application "It is estimated that 526 new tangent angle towers will need to be constructed." is an error and should read as follows:
"It is estimated that 526 new tangent **and** angle towers will need to be constructed".

b.l) 'Station' and 'substation' are synonyms. A station is an electrical facility that can include equipment for generating, switching, transforming and distribution of electric energy which is typically bordered by a fence.

b.2) 'Switchyard' and 'yard' are synonyms. A switchyard is a station that either directs or switches electricity at the same voltage level to different lines or pathways, therefore no transformation to different voltage levels occurs at this type of station.

b.3) Shunt reactors are used to eliminate voltage variations to improve overall system stability under different loading conditions. Shunt reactors are common equipment found in most stations.

c.1) A phase-shifting transformer is also known as a phase angle regulating transformer, phase angle regulator, phase shifter, quadrature booster or quad booster. It is a specialized form of a transformer used to control the flow of real power on three-phase transmission networks. It is commonly used to prevent inadvertent power flow from overloading transmission facilities. Several international power lines in Canada use phase-shifting transformers such as Boundary Dam (B10T) in Saskatchewan and Fort Frances (F3M) in Ontario.

c.2) Manitoba Hydro clarifies that there is no Manitoba-U.S. interface causing overloads on the Riel IPL once the Dorsey IPL is in service. The phrase "Manitoba-U.S. interface" refers collectively to the international power lines owned by Manitoba Hydro. This interface currently consists of three 230 kV IPLs (Glenboro IPL, Letellier IPL and Richer IPL) as well as the 500 kV Riel IPL. These lines connect Manitoba to the U.S. transmission grids in North Dakota and Minnesota.

c.3) Manitoba Hydro believes the question follows from the following statement made in the preamble: “This alteration is required in order to mitigate pre-contingency overloads on the Riel IPL resulting from increased power flows over the Manitoba-U.S. interface once the Dorsey IPL is in service, as identified in Manitoba Hydro's Preliminary Report on Group Facilities Study.” As a result of the transmission lines being part of a network of transmission lines owned by several parties, there can be inadvertent flows from North Dakota through Manitoba to Minnesota, for example. If the Dorsey IPL is constructed, the study referenced in the Application indicates the potential for an increase in these inadvertent flows, which could lead to overloading the Riel IPL unless additional measures are taken. Series capacitors are planned to be added to the Great Northern Transmission Line at Warroad in the US to lower the impedance of the Dorsey IPL and more equally share the loading between the two 500 kV lines. In addition, two phase-shifting transformers are planned to be added to the terminal facilities of the Glenboro IPL at Glenboro Station. This device can control the real power flow through the Glenboro IPL which helps to eliminate the effect of inadvertent flow from the US on the Riel IPL.

The Dorsey IPL is designed to lower the loading on the Riel IPL. The Dorsey IPL is constructed in a path roughly parallel to the Riel IPL and series capacitors will be added to lower its impedance by 60%. As a result, there is roughly a 60:40 split in loading between the Riel IPL and Dorsey IPL.

c.4) Power flow across an ac transmission line is roughly proportional to the difference in the phase angle between the sending and receiving end ac voltages, and inversely proportional to the impedance of the transmission line. The proposed phase shifting transformer at Glenboro Station will be rated 300 MVA and will be able to control the powerflow in either the north or south direction by adjusting the phase angle. A control system will be provided that will allow the System Operator to select the desired power flow and direction. The controls will then automatically determine the correct internal phase-shifting transformer tap position to realize the desired power flow. Most of the time it is expected that the power flow through the Glenboro phase shifter will be 0 MW.

This will maximize flow on the 500 kV circuits and will minimize system losses as the power losses on a 500 kV circuit are much lower than on a 230 kV circuit. If congestion is expected when Manitoba Hydro is exporting to the U.S., the Glenboro phase shifter can be controlled to carry 250 MW in the southern direction, for example. This will lower the loading on the 500 kV circuits and prevent congestion from occurring.

d) The phrase ”Critical Facility” is a term used in some of Manitoba Hydro’s operating procedures and interconnection agreements with neighbouring jurisdictions. This term, as defined in those agreements and associated procedures, means any equipment in the Transmission System that, if taken out of service, will have an impact on the firm transfer capability of an interconnection. The firm transfer capability is calculated assuming system intact conditions. After an outage, system adjustments, such as lowering the firm transfer capability of an interconnection, are permitted in order to be ready for the next contingency. The reference in Manitoba Hydro’s Application to “Critical Infrastructure Protection” or “CIP” relates to the name of the set of NERC standards designed to identify and categorize Cyber Assets and Cyber Systems for the application of cyber security measures. Although NERC refers to these standards as Critical Infrastructure Protection Standards, the term “Critical Infrastructure” is not defined. Critical Assets are defined by NERC to mean “Facilities, systems, and equipment which, if destroyed, degraded, or otherwise rendered unavailable, would affect the reliability or operability of the Bulk Electric System.” Some Critical Facilities may also be defined as Critical Assets if they meet Manitoba Hydro’s Critical Asset identification methodology as required by NERC Standard CIP-002-3. Critical Assets are subject to further review to determine if they contain critical Cyber Assets or Cyber Systems.

d.1) There is no immediate impact on reliability following loss of a Critical Facility as Manitoba Hydro’s power system is designed to withstand the loss and not violate the performance criteria defined in the NERC transmission planning standards (eg TPL-002-0). Loss of Critical Infrastructure is assumed to mean loss of a BES Cyber Asset or Cyber System. The impact will depend if it has a low, medium or high impact rating according to CIP-002-5.1a.

d.2) Critical Facility is a term used by Manitoba Hydro and is not defined by NERC. Accordingly, no NERC standards refer to Critical Facilities. The NERC CIP Standards currently in effect in Manitoba are Version 3 of CIP-002 through CIP-011 inclusive. CIP-002-3 uses the term Critical Asset, which is defined in the NERC glossary of terms as: "Facilities, systems, and equipment which, if destroyed, degraded, or otherwise rendered unavailable, would affect the reliability or operability of the Bulk Electric System."

The Riel IPL has been labeled a Critical Asset by virtue of Manitoba Hydro's Critical Asset Methodology, which is based on Attachment 1 of NERC Standard CIP-002-4. The criteria that qualifies it as a Critical Asset is "Transmission facility operating at 500 kV". The implication of this labeling is that Cyber Assets are identified to determine if any are deemed critical (e.g. able to communicate outside an electronic security perimeter). For the case of the Riel IPL, no critical Cyber Assets were identified.

d.3) The implications of the Riel IPL being labeled as a Critical Facility is covered by an operating procedure. Manitoba Hydro's NOP-1102-05 (revision 9) ensures that outages are communicated to the Reliability Coordinator in Ontario (IESO). The IESO's Northwestern System Operating Limits (Version 18) defines the actions to be taken. The main action taken by the IESO when the Riel IPL is out of service is to limit the flow south on the Fort Frances IPL (F3M) to 0 MW.

e.1) Reactive Power is defined in the NERC glossary of terms as: "The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply the reactive losses on transmission facilities. Reactive power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar)."

The main NERC standards, applicable to the Project that address reactive power are: TPL-001-0.1, TPL-002-0b, and TPL-003-0a. These NERC standards require an investigation of the effects of Category A (no contingency), B (loss of a single element) and C disturbances (loss of two or more elements) to ensure voltages remain within applicable limits.

A sufficient supply of reactive power is needed to ensure voltages remain within +/-10% of the nominal rated system voltage following a contingency. If voltages are too high, equipment can be damaged. If voltages are too low, there is risk of voltage instability.

e.2) Reactive power compensation is defined as the management of reactive power to improve the performance of the transmission system. If a contingency analysis has determined an unacceptable post-contingency voltage, then a corrective action plan could be the addition of a reactive compensation device such as a shunt capacitor bank to correct for low voltages or a shunt reactor bank to correct for high voltages. As noted in the preamble, a 500 kV shunt reactor is planned to be added at the Dorsey Converter Station. This shunt reactor helps to maintain voltages within equipment ratings if the Dorsey IPL circuit breakers are opened at Dorsey Converter Station. For the underground cable alternative, shunt reactors would be required every 25 km to ensure voltages remain within limits. These shunt reactors would be required to be located within a small substation, hence the term “reactive power compensation station” was used.

1.19 Reliability Issues

Reference: *A81054-l, MMTP Application:*
i) Section 4.1.2 Detailed Route of Dorsey IPL, PDF pages 18 and 19 of 90
ii) Section 4.5.2 Alternate Designs, PDF page 41 of 90
iii) A81054-l 7, Application, Appendix 17 Plan and Book of References, PDF 6 of 25

Preamble: *In Reference i) Manitoba Hydro states: "A 500 kV high voltage direct current intraprovincial transmission line (Bipole III) is under construction in the RVTC at the time of this Application. As explained in more detail in section 4.2.1.1 of this Application, the existing Riel IPL and future 500kV transmission lines (Dorsey IPL and Bipole III) will be arranged to avoid crossing each other."*

In Reference ii) Manitoba Hydro states: "As described in detail in section 4.2.1 of this Application, the decision to relocate a segment of the Riel IPL, rather than the alternative of constructing two 500 kV line crossover structures, was based primarily on reliability

considerations. A crossover creates the risk of an outage to two IPLs arising from a conductor failure, tower failure or flashover event."

Reference iii) shows the Bipole III crossing over both the Riel IPL and the new Dorsey IPL.

The Board requires further technical information that justifies the necessity of the alteration.

Request: *Please provide:*

a) the rationale for avoiding the crossing of the Riel IPL and the new Dorsey IPL but allowing Bipole III crossing over both the Riel IPL and the new Dorsey IPL;
b) a list of NERC standards addressing the impact on reliability of the crossings between power lines.
c) a reliability analysis, with sufficient depth and breadth, demonstrating that the crossing of the 500k V DC line (Bipole III) over both 500kV AC IPLs, Riel and Dorsey, will have no negative impact on the reliability of the power system;
d) a risk analysis of Bipole III causing a simultaneous outage on both IPLs, Riel and Dorsey, due to a conductor failure, tower failure or a flashover event, including:
d. l) a thorough explanation of the likelihood and consequences of each event; and
d.2) the incremental risks when the crossing involves three power lines;
e) the incremental cost (percent increase) to the Bipole III project of implementing the underground option for both 500kV AC IPLs, Riel and Dorsey;
f) the incremental cost (percent increase) to the Bipole III project of implementing the underground option for Bipole III;
g) a cost-benefit analysis of Manitoba Hydro's proposed option as applied for and the options in (e) and (f) above, including the impact of each option on the maintenance of each line;
h) a thorough explanation of:
h. l) the factors that are considered in order to deem a crossing of the three power lines acceptable from the reliability perspective;
h.2) the impact, if any, on the reliability of the power system when a 500kV DC power line crosses over two 500kV AC power lines; and
i) a list of national or international cases where a 500kV DC power line crosses over two 500kV AC power lines.

1.19 RESPONSE

a) As a preliminary matter, Manitoba Hydro believes it may be helpful to clarify its position regarding the reliability of transmission line crossings. The probability of an event impacting a crossing is so low that international standards set by NERC that are currently in effect do not require an assessment of the associated risks. Nevertheless, based on past experience Manitoba Hydro is cautious about the proximity of high voltage transmission lines in general and conducts additional analysis regarding their proximity, taking into account other relevant factors. During the course of planning both Bipole III and MMTP Manitoba Hydro went beyond what was required by industry standards to determine the most cost effective solutions to manage this low probability event. In the case of MMTP, 500 kV AC crossings have been avoided by swapping a portion of one

IPL for another. In the case of the Bipole III project, higher reliability crossing towers (1 in 500) have been designed to replace the standard 1 in 150 year design towers.

Since 1996, when Manitoba Hydro experienced an extreme wind storm that impacted two DC Bipoles, Manitoba Hydro has considered the vulnerability of having 500 kV DC lines in a common corridor as part of its planning criteria. After this event, Manitoba Hydro performed an assessment of the risks of extreme, but low probability, contingencies impacting the bipoles according to NERC TPL-004-0. This standard leaves it to the discretion of the transmission planner of the facility to take any action based on the assessment. As a result of this assessment Manitoba Hydro concluded that the risk of loss of Bipole I and II was too high to remain unmitigated. Accordingly, Bipole III, constructed on a separate corridor to Bipoles I and II, was approved to be constructed with an in-service date of 2018.

Given that the Riel IPL and Dorsey IPL are both 500 kV lines and could carry substantial power, it was natural for Manitoba Hydro to also consider the risks of building these lines in close proximity when planning MMTP and to consider how the risks compared with loss of Bipoles I and II. The two 500 kV IPLs are important to Manitoba Hydro's ability to supply load in times of drought or during long term DC outages. During the preliminary planning phase of the MMTP routing process, the desire was to have at least a 10 km separation buffer between the Dorsey IPL and Riel IPL in order to limit the loss to one of the two 500 kV AC circuits if tornadoes, for example occurred in the local area. A weather study completed for MMTP included an investigation of the probability of tornadoes impacting two parallel transmission lines with various separation distances. The weather study confirmed that 90% of tornadoes have a path length of 10km or less. The weather study also confirmed that west-east routed transmission lines are less vulnerable than north-south routed lines to extreme weather. As the total length of paralleling increases, the risk of a weather event affecting both lines also increases. Paralleling within the Riel to Vivian Transmission Corridor (RVTC) is expected to be 22.8 km. The weather study estimated the return period to be 1 in 93 years for tornado events impacting 25km of west to east parallel transmission line as compared with 1 in 63

years for a north-south line. This lower risk of 1 in 93 years was deemed acceptable to Manitoba Hydro. Taking into account this lower risk as well as the consideration that Manitoba Hydro staff would have all-weather access to the site for repairs if needed in the event of a contingency and the proximity to Winnipeg for more rapid repair times, Manitoba Hydro eliminated its originally planned buffer zone near the Riel Converter Station in response to feedback from the public during Manitoba Hydro's Public Engagement Program favouring the use of a common corridor. Additional segments parallel to the Riel IPL in the RVTC were added starting in the Round 2 route evaluation process based on public input and based on the evaluation of risk.

For MMTP, Manitoba Hydro was primarily concerned with limiting the distance of common corridor between the two 500 kV IPLs. The portion of parallel line in the RVTC could have been constructed with or without crossovers, as the presence of the crossovers doesn't significantly change the overall vulnerability of the 22.8 km common corridor to weather events that could impact both circuits. The primary rationale for avoiding the crossovers on the Riel IPL was that it cost nothing extra to completely avoid the 1 in 500 year risk of a tower failure due to extreme weather impacting the two lines at the crossing location. The proposed Dorsey IPL route as it approaches the Riel IPL just outside of the Riel substation is perfectly in line with the existing transmission line. The two crossovers of the Dorsey IPL over the Riel IPL could be avoided by simply swapping a portion of the existing Riel IPL within the Riel-Vivian corridor with the Dorsey IPL. The incremental cost of swapping or crossing over were both expected to be around $2.5 million. While the risk associated with these crossovers is considered acceptable by industry standards, it could be completely avoided at no additional cost with the end result being a simpler design.

In contrast, there was no feasible way to avoid Bipole III crossing over the Riel and Dorsey IPLs near the Riel substation. An underground option was considered but it was expected to cost in the range of 15-20 times more than the overhead option ($370,000) and was expected to lower the reliability and availability of the DC line. Further information can be found in Manitoba Hydro's Response to Information Request No. 2 in

that proceeding[4]. Manitoba Hydro has no reliability concerns with the Bipole III line crossing over the Riel and Dorsey IPLs based on Manitoba Hydro's robust design of the crossings. Rather than use standard 1 in 150 year towers for the Bipole III crossing, the highest reliability level of crossing towers (1 in 500 year design) were chosen. Higher reliability towers are approximately 15-30% more expensive than 1 in 150 year design towers.

b) There are no NERC standards that specifically address the reliability of overhead transmission line crossings. However, NERC standards do require the assessment of existing and new transmission facilities against a range of specified criteria. Manitoba Hydro completed its assessment of the transmission facilities required to fulfill the transmission service requests referenced in section 3.1.3 of Manitoba Hydro's Application under both normal and contingency conditions in accordance with NERC Reliability Standards TPL-001-0, TPL-002-0 and TPL-003-0 as per the NERC Standard FAC-002-1, which covers the coordination of plans for new facilities. Manitoba Hydro also complies with NERC TPL-004-0, by performing an annual assessment of system performance following extreme events. TPL-004-0 only requires an assessment of extreme contingencies that would produce more severe system results or impacts. Manitoba Hydro routinely investigates the impact of a double bipole outage contingency as part of the annual NERC TPL assessment. Assessment of loss of Bipole III plus the Dorsey and Riel IPLs has not been performed to date as it is not expected to be as severe as a double bipole outage. TPL-004-0 only requires an evaluation and documentation of the results. Mitigation of impacts through a corrective action plan is not required.

A new TPL standard developed by NERC, though not in effect, is informative regarding the issue of crossovers. The currently effective NERC TPL Standards have been revised and combined into NERC TPL-001-4. Within TPL-001-4, the closest category to loss of all circuits at a crossing location would be loss of all transmission lines on a common right-of-way (extreme event). In this case, note 11 of Table 1 of TPL-001-4 excludes the need to perform a study when the common right-of-way distance is 1 mile or less due to

[4] NEB File No. OF-Fac-IPL-M180-2016-02 01

the low probability of such an event. This effectively excludes the requirement to perform a study on any crossovers. If this contingency were chosen to be analyzed by a Planning Authority, the new NERC standard would only require determination of possible actions if simulations showed the risk of Cascading (i.e cascading outages). As with the current standard, there is no requirement to include these actions as part of a corrective action plan.

Based on the foregoing, Manitoba Hydro has complied with the requirements of the NERC standards in effect in Manitoba with regards to the reliability of overhead line crossings for both MMTP and the Bipole III project.

c) A documented reliability analysis investigating the simultaneous loss of Bipole III and both 500 kV AC IPLs, (Riel and Dorsey) at the crossing location has not been performed to date as NERC standards do not require this analysis to be performed. While, as indicated previously, Manitoba Hydro may do further analyses regarding the proximity of transmission lines to each other of its own accord, a formal analysis of this issue was not considered necessary given that more severe contingency events are routinely investigated as part of Manitoba Hydro's annual NERC TPL assessments and these more severe events do not indicate any risk of Cascading.

The total import level measured over all Manitoba to US IPLs is expected to increase from 775 MW to 1658 MW as a result of the addition of the Dorsey IPL. This total loading is lower but comparable to a fully loaded 2000 MW Bipole in Manitoba. Loss of the Dorsey and Riel IPLs and Bipole III in a single event results in a loss of transmission capacity in Manitoba that is comparable to the amount of transmission capacity loss of two HVDC Bipoles, which has been shown to not result in Cascading[5] in annual NERC TPL assessments. Therefore, there is no impact on the reliability of the power system in this example when the crossing involves three power lines.

[5] Cascading is defined in the NERC glossary of terms to mean: The uncontrolled successive loss of System Elements triggered by an incident at any location. Cascading results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies.

d. l) The table below summarizes the probability and consequence of a tower failure, conductor failure and flashover event.

Event	Probability	Consequence	Risk
DC Tower failure	1 in 500 years (due to icing or extreme wind)	Loss of Bipole III; Riel and Dorsey IPL for a few weeks; Exports will be curtailed for the duration of the outage.	Acceptable
DC Conductor Failure	1 in 500 years (due to icing or extreme wind)	Same as above	Acceptable
Flashover between DC and AC conductor	negligible	Temporary fault. Both the DC line and AC line will automatically reclose for temporary faults. No impact.	Acceptable

Tower failure and conductor failure are typically a result of strong winds (wide-front winds or tornadoes) or excessive ice buildup. The Bipole III line is designed to withstand 1 in 150 year extreme weather events (eg. icing, wind loading). At the crossing location, the Bipole III DC towers are designed to withstand 1 in 500 year extreme weather events. Bipole III tower failures that might occur outside the crossover location will not cascade beyond the Bipole III DC towers at the crossover location and therefore will not impact the Riel and Dorsey IPLs. Other events that could put the tower at risk would be accidents or deliberate acts of sabotage. Manitoba Hydro assumed these events would be rare and did not consider them in the table above.

Clearances between the 500 kV AC and DC lines have been designed by Manitoba Hydro to exceed CSA Standard C22.3 No.1-15 by roughly a 1 metre margin. The minimum clearance is calculated with the upper conductor at its maximum sag position and the lower conductor with no sag (i.e. assumed to form a straight line between its points of

supports). Manitoba Hydro made a conservative assumption that the upper conductor was carrying 3600 A or almost double its normal maximum loading of 2000 A. The CSA vertical clearances ensure the probability of a flashover event due to lightning or switching surges is negligible. The most likely scenario is that a lightning stroke will hit the DC sky wire causing a back flashover on to one of the DC conductors causing a temporary DC pole outage.

d.2) The incremental risk is assumed to be the difference in risk between Bipole III crossing over one 500 kV AC IPL versus crossing over two 500 kV AC IPLs. An analysis of the two scenarios is included in the table below.

Scenario	Probability of outage	Consequence	Risk
DC line crosses over Riel IPL	1 in 500 years (due to icing or extreme wind)	Loss of Bipole III and Riel IPL – loss of transmission capacity equal to 2000 MW plus 775 MW of firm import capability. Exports to US curtailed for duration of outage (few weeks).	Acceptable
DC line crosses over Riel IPL and Dorsey IPL	1 in 500 years (due to icing or extreme wind)	Loss of Bipole III, Riel IPL and Dorsey IPL – loss of transmission capacity equal to 2000 MW plus 1658 MW of firm import capability. Exports curtailed for duration of outage (few weeks).	Acceptable

The incremental risk when the crossing involves three power lines is that an additional 883 MW of firm import capability from the U.S. is not available for the duration of the outage. In either case, Manitoba has access to enough generation and transmission to

ensure that its Manitoba load is served, even at winter peak. Exports to the U.S. would need to be curtailed in either case for the duration of the outage.

In the rare event that one of the Bipole III towers fell over onto the Riel and Dorsey IPL, the newly constructed single tubular steel A-frame dead-end structures on the Riel and Dorsey IPL at the crossover location are designed to limit the extent of damage between the two dead-end structures and it is expected the Riel and Dorsey IPLs could be returned to service within a week or two of such an event.

e) The AC line would be able to use extruded cross-linked polyethelene (XLPE) as compared with the mass-impregnated (MI) paper cable needed for the DC line. 550 kV XLPE AC cables were introduced in 1990. The Riel IPL is rated for 600 kV continuous, which would make utilization of a 550 kV cable challenging. Increasing the operating voltage of a cable reduces the service life. Additional reactive power compensation would be required to ensure the operating voltage of the cable was not exceeded.

Typical transmission costs for the installation of MI DC cable (based on a 300m span) are listed in the following table:

Cable Cost (including 2 spare cables)	$650,000/km x 0.3km x 6 = $1.17M
Civil Work	1.6M/km x 0.3km = $480,000
Tunnel	3.3M/km x 0.3km = $0.99M
Termination and Tie Down Structure	480,000+400,000=$880,000
Arrestors	$500,000
Total Cost	**$4.02M**

The cost of an underground AC cable of comparable capacity to an underground DC cable is roughly double in cost. Therefore, the cable costs, civil works and tunnel costs noted above are doubled for a total cost of $6.7 million. An additional $4.0M in 2017

dollar value (cable, termination and installation) will be required 40 years after the Bipole III in-service date in order to extend the life of the cable to 80 years, which is the typical expected life of an overhead transmission line. Therefore, the incremental cost to the Bipole III project of implementing the underground option for both 500kV AC IPLs, Riel and Dorsey would be **$21.7 million**. This cost does not include the cost to mitigate possible high voltages that could affect the cable life.

The Bipole III project is expected to cost roughly $5 billion. The incremental costs of an underground cable option are less than 0.5%. As a result of adding the underground cable, single pole trip and reclose would not be possible in order to protect the cable from damage. This will impact the reliability and availability of the IPL and is not acceptable to Manitoba Hydro.

f) Please refer to Manitoba Hydro's response to e) above for more details. The cost of underground DC cable is approximately **$6.5 million** ($4.0 million initial cost plus $2.5 million replacement cost after 40 years) or 15-20 times the cost of an overhead crossing.

The Bipole III project is expected to cost roughly $5 billion. The incremental costs of an underground cable option for Bipole III are around 0.1%, however, this simple analysis doesn't consider the impact on schedule. Changing the design of Bipole III to include an underground cable dip will add at least one year to the project to redesign controls and protection, which could add up to 6% or $300 million to the total project costs for additional interest, escalation and design modifications. In addition to the cost risk, an underground cable section on the Bipole III DC line will impact the reliability and availability of the line and as a result is not a viable option for Manitoba Hydro.

g) Manitoba Hydro submitted an economic evaluation for the Dorsey IPL, as part of its preferred development plan, to the Public Utilities Board (PUB) in August 2013. The PUB reviewed Manitoba Hydro's development plan and approved the plan in June 2014. The economic evaluation considered many metrics such as Multiple Account Benefit-

Cost analysis and Net Present Value. The PUB recognized the benefits of the IPL on Page 28 of their report:

> "There are significant benefits with the 750 MW interconnection that go beyond the pure economics of the underlying export contract. Currently, Manitoba is interconnected with the MISO market through 1,950 MW of transmission capacity. An additional 750 MW interconnection provides increased electric reliability to Manitoba through additional capacity for imports in times of drought or infrastructure outages. The increased transmission capacity also opens new potential markets in the United States to Manitoba Hydro."

A formal economic (cost-benefit) analysis comparing the impact of an overhead crossing with an underground crossing of the 500 kV AC lines was not performed during the planning stages as an underground crossing was not preferred by Manitoba Hydro due to the cost and impact on reliability. A rough cost-benefit analysis has been provided below.

The use of underground DC cables as proposed in (f) above would fundamentally change the design of the Bipole III protection scheme and lower the availability and reliability of the DC line. The use of underground (U/G) cables would require:

- the addition of an underground fault detection system, and
- changes to the Bipole III DC line fault recovery sequence.

The fast DC line fault restart is a key reliability benefit for Bipole III. Faults on the overhead DC line are typically temporary and the line can be restored in less than one second via automatic DC line restart. For any fault in the underground section, Bipole III has to be shut down permanently until the fault can be located and repaired.

Similarly, the use of underground AC cables as proposed in (e) would change the protection scheme of the Dorsey and Riel IPLs. Faults on an overhead 500 kV AC line are typically temporary and affect only one phase. Protection is able to detect single phase faults on overhead lines and restore the line in one second using automatic reclosure. If a cable section is added, faults within the cable cannot be easily detected and the line will have to be tripped in all three phases to ensure no cable damage. Restoration

of the line when it is tripped on all three phases can take 90 minutes based on the time it takes for MISO to redispatch generation to allow for the line to be safely re-energized.

Assuming the crossing failure occurs during the summer during system intact conditions with normal or better water conditions, the consequence would be curtailment of about 2800 MW of exports for around three weeks. Assuming the value of energy was $40/MWh, the consequence of the outage could be close to $60 million in lost opportunity. The probability of such an event is one in 500 so the monetary value of this risk is $120,000.

On the other hand, the lost opportunity that occurs during the 90 minute restoration time (when single phase trip and reclose is not available) is approximately $50,000. On average there are one to two faults per year. Assuming one fault puts the monetary value of this risk at $50,000.

The incremental benefits of eliminating the risk of tower failure are negligible ($70,000) given that the reliability benefits of automatic reclosing on the 500 kV AC IPLs are no longer available. The benefit-cost ratio of placing the 500 kV AC lines underground is 0.003 (70,000:22,000,000). In order to be considered as a potential project, the benefit-cost ratio should be greater than 1.

The benefit to cost ratio of placing Bipole III underground was not calculated but is assumed to be also near zero based on the above analysis.

Maintenance costs for an overhead or underground crossing is assumed to be roughly $1000/year and is deemed to not be a major component and was excluded from the benefit to cost analysis.

In Manitoba Hydro’s opinion, the underground cable options don’t have sufficient benefits to make them desirable investments.

h.1) At a crossing of one overhead power line by another, the two lines must be kept at the necessary safe clearances defined by standards (eg. CSA C22.3 No. 1-15). The line with the lower voltage passes under the line with higher voltage as higher voltage lines require larger electrical clearances and are typically designed to meet higher reliability design levels. When two lines are of the same voltage, the line with a higher reliability design generally passes over the one with a lower reliability design. For the Bipole III crossing, the higher reliability design (1 in 500) will pass over the lower reliability designs (1 in 50 for the Riel IPL and 1 in 150 for the Dorsey IPL). In addition, the DC line only has two conductors compared with three conductors for the IPLs, which also lowers the risk of the overhead crossing.

While not required by NERC standards, it is prudent from an engineering perspective to consider whether there is risk of Cascading if both circuits are tripped, especially if the lines are 345 kV or higher in voltage. As outlined previously, this factor was considered by Manitoba Hydro.

h.2) In the present situation, there is no impact on the reliability of the power system when Bipole III (500 kV DC) crosses over the Riel IPL (500 kV AC). The risk of losing both lines due to extreme weather is very low (1 in 500 years) and even if the lines did trip simultaneously, it is Manitoba Hydro's opinion that there is no risk of Cascading. The risk to lost transmission capacity is equivalent to losing roughly 1.5 HVDC bipoles in Manitoba when Bipole III crosses over one 500 kV AC line. When Bipole III crosses over two 500 kV AC lines, the risk increases to be equivalent to losing roughly two HVDC bipoles in Manitoba. A double bipole loss does not result in Cascading.

i) Manitoba Hydro is not aware of a national or international example where a 500 kV DC power line crosses over two 500 kV AC power lines. Some examples of overhead lines crossing other overhead lines have been compiled in Wikipedia (search phrase - Overhead Line Crossing). Manitoba Hydro's existing 500 kV DC power lines cross over 230 kV AC power lines at several locations. There have been no operational or reliability

concerns noted regarding these crossing locations. Both DC lines have been operating near 500 kV since 1985.

1.20 Reconciliation of Two Apparently Conflicting Statements

Reference: *A81054-l, MMTP Application:*
i) Section 4.3.2 lmpact on Transfer Capability, PDF page 29 of 90
ii) Section 4.3.1 Temporary Impact, PDF page 27 of 90

Preamble: *In Reference i) Manitoba Hydro states: "The addition of phase shifters to the Glenboro IPL will impact the transfer capability of the Glenboro IPL, but not that of the Manitoba-U.S. interface. The facility rating of the IPL will decrease from 390 MV A in summer to 300 MVA.*

In Reference ii) Manitoba Hydro states: "Since the Glenboro IPL and Riel IPL form part of the Manitoba-U.S. interface, the proposed schedules for outages to these IPLs will be discussed at the outage coordination meeting approximately one to two years in advance of the planned work."

Request: *Please provide:*

a) a thorough explanation of why the reduction on the Glenboro IPL does not affect the transfer capability of the Manitoba-U.S. interface, given that the Glenboro IPL forms part of the Manitoba-U.S. interface; and
b) confirmation that the term "phase shifters" means "phase shifters transformer"; otherwise, define the term "phase shifters".

1.20 RESPONSE

a) The facility rating of each of the Manitoba-U.S. IPLs is listed in the table below.

IPL	Facility rating (summer 40C)	Limiting Element
Glenboro IPL (G82P)	390 MVA	Transmission line conductor
Letellier IPL (L20D)	478 MVA	Letellier disconnect
Richer IPL (R50M)	230 MVA	Operating limit (US)
Riel IPL (M602F)	1732 MVA	Series capacitor(US)
Dorsey IPL (D604I)	1200 MVA	Iron Range transformer (US)
Total	4030 MVA	

If there was the ability to control the power flow on each IPL perfectly, in theory the total interface could reach a loading level of 4000 MVA. Given the interconnected nature of

the transmission network as well as inadvertent power flow, studies have indicated that the interface is capable of carrying a total of 3058 MW of exports (roughly 75% of the total Facility rating) while meeting the performance requirements of the applicable NERC TPL standard. To achieve this maximum export flow level, the full rating of the Glenboro IPL is not needed. If there are high levels of inadvertent flow leaving North Dakota, for example, the flow on the Glenboro IPL can be very low and even reverse in direction, which can in turn impact the Riel IPL loading. Adding the proposed phase shifters to the terminal facilities at Glenboro Station allows for the Glenboro IPL to be loaded as desired in the south direction. The studies referenced in section 4.3.2 of the Application have confirmed that a maximum rating of 300 MVA is sufficient to meet the overall objective of having the entire interface loaded to 3058 MW when Manitoba exports to the U.S. The 300 MVA rating is also sufficient when Manitoba imports from the U.S. up to 1658 MW. Therefore, the statements, "The addition of phase shifters to the Glenboro IPL will impact the transfer capability of the Glenboro IPL, but not that of the Manitoba-U.S. interface. The facility rating of the IPL will decrease from 390 MVA in summer to 300 MVA." are not conflicting.

b) "Phase shifters" is the common short hand notation for" phase-shifting transformers". A definition for" phase-shifting transformers" is provided in response to NEB Information Request 1.18 c.1).

ALL OF WHICH IS RESPECTFULLY SUBMITTED,

March 25, 2017

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