Manitoba Hydro

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August 21th, 2012

Mr. Terry Sargeant
Clean Environment Commission
305-155 Carlton St.
Winnipeg, MB R3C 3H8

Dear Mr. Sargeant:

RE: Bipole III Transmission Project – Response Package #6

Please find enclosed responses to information requests which were submitted to Manitoba Hydro on August 1st 2012.

We trust the enclosed responds appropriately to all Round One information requests (#324 - #358) sent to Manitoba Hydro on August 1st 2012. Manitoba Hydro's records indicate that all outstanding information requests have been completed and all imposed deadlines have been met.

Should you have any questions or require further clarification of our comments and information requests please do not hesitate to contact me at 360-4394.

Regards,

Shannon Johnson
Manager Licensing and Environmental Assessment Department
820 Taylor Ave (3)
Winnipeg, Manitoba
R3M 3T1

sj/tk

Clean Environment Commission

Bipole III Transmission Project

Package #6

August 21 2012

Manitoba Hydro

Date	August 1 2012
Reference	Vol.1, Exec. Summary, page (i) Vol. 1, S. 222 and 2.2.3., pages 2-2 to 2-5
Source	CEC Information Request #6
Question	CEC/MH-VI-324(2)a

Preamble:

The referenced pages discuss severe weather events that have impacted (or could have impacted) on Bipole I and Bipole II and/or Dorsey Station.

Question:

Since the in-service of these lines and the associated Dorsey Station, have there been any weather related events (or other random events) that have led to the outage of the entire Dorsey Station? For each event, please indicate the cause of the event, the extent of the damage and the duration of the outage.

Response:

No, there has not been a failure of the entire Dorsey Station.

A severe wind event on September 5, 1996 resulted in an outage of both dc transmission lines. Nineteen towers on the dc transmission lines and several wood poles on both electrode lines were destroyed, approximately two miles north of Dorsey Station.

Both lines were out of service from September 5 to September 10th, 1996. Temporary wood pole structures and paralleling valve groups allowed varying amounts of HVdc transmission capacity while repairs were completed. Both lines were fully repaired and back in service at full capacity on October 27th, 1996.

Date	August 1 2012
Reference	Vol.1, Exec. Summary, page (i) Vol. 1, S. 222 and 2.2.3., pages 2-2 to 2-5
Source	CEC Information Request #6
Question	CEC/MH-VI-324(2)b

Preamble:

The referenced pages discuss severe weather events that have impacted (or could have impacted) on Bipole I and Bipole II and/or Dorsey Station.

Question:

What mitigation measures have been put in place at the Dorsey Station that address fire vulnerability? Based on these measures, what is the current likelihood that a fire would lead to a full station outage?

Response:

The Dorsey 230 kV relay building hardening project design specifically addressed fire vulnerability as follows;

- Battery rooms have been relocated and fire separated from the relay room. No high voltage equipment or dry type transformers are in the relay room.
- Battery rooms have been equipped with improved ventilation systems and room designs.
- The fire suppression system has been replaced by a pre-action sprinkler system.
- Cables in trenches have been provided with fire retardant coatings to reduce the potential for ignition and spread of flame along the cables.
- Fire stopping through walls has been improved.
- New HVAC and smoke removal systems have been installed with heating/cooling units in separated room.

- Removal of any combustibles from relay room including no exposed combustible finishes.
- No nearby oil filled transformers or switchgear.

Improvements to the Dorsey site since construction include;

- Installation of an oil spill containment system with a fast drain system designed to remove oil away from critical areas in case of an oil fire.
- Improved fire stopping in cable trenches to limit the spread of oil that may enter a cable trench.
- Improved application of fire retardant coatings on cables to reduce the potential for ignition and spread of flame along cables.
- Oil filled equipment has been equipped with improved deluge systems.
- Technology advancements have allowed replacement of oil filled smoothing reactors with dry type smoothing reactors, eliminating a large volume of oil from the site.
- Improved firefighting equipment on site.
- Improved process and procedures to control high risk activities in critical areas.

Considering the measures that have been taken, the risk of a full station outage due to a fire event has been reduced. A severe weather event is more likely to result in a full station outage.

Date	August 1 2012
Reference	Vol. 1, S. 2.2.2, pages 2-2 to 2-3
Source	CEC Information Request #6
Question	CEC/MH-VI-325

Question:

The referenced pages discuss studies undertaken to determine the likelihood of a catastrophic event impacting Bipoles I & II.

Are the 1 in 17 year probability of an outage due to a tornado and the 1 in 250 year probability of an outage due to wide front winds both equally distributed across all months of the year or is the risk higher in some months? If so, please indicate the relative risks for each of the 12 months of the year.

Response:

The weather statistics adopted in the study are yearly based.

Wind data were gathered from available meteorological databases provided by Environment Canada and the National Climatic Data Center in the United States. The wide front winds could occur anytime of the year and could be widespread.

There are no adequate statistics to confirm the accurate distribution on a monthly basis of tornados, but tornadoes occur more frequently in the summer.

Date	August 1 2012
Reference	Vol. 1, S. 2..2.3, page 2-5 to 2-6 and Figure 2.2.1 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 84 (2010/11 Power Resource Plan).
Source	CEC Information Request #6
Question	CEC/MH-VI-326a

Question:

Manitoba Hydro's 2010/11 Power Resource Plan included an allowance for new export contracts with WPS and MP (page 17) and called for new interconnections and increased import capability (page 18).

How could the design of Bipole III change if the deficit it was being designed to address was 1000 MW in 2017 (growing to 1,500 MW by 2025)?

Response:

Manitoba Hydro's assessment indicates that the 1500 MW shortage of generation compared to forecast load in 2017 is a conservative estimate of the supply deficit, as it assumes 100% supply of the hydraulic and thermal generation, as well as some non-firm import availability. Therefore, the design of Bipole III was not studied for a supply deficit of 1000 MW as such a design would not able to meet the capacity deficit in 2017 of 1500MW assuming the loss of Bipoles I and II. It should be noted that the supply deficit during the 2011/12 winter peak would have been 1600 MW if an event caused a Dorsey outage, considering that Riel is not available to the existing import from the United States.

Date	August 1 2012
Reference	Vol. 1, S. 2..2.3, page 2-5 to 2-6 and Figure 2.2.1 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 84 (2010/11 Power Resource Plan).
Source	CEC Information Request #6
Question	CEC/MH-VI-326b

Preamble: Manitoba Hydro's 2010/11 Power Resource Plan included an allowance for new export contracts with WPS and MP (page 17) and called for new interconnections and increased import capability (page 18).

Question:

How could the design of Bipole III change if the deficit it was being designed to address was 500 MW in 2017 (growing to 1,000 MW by 2025).

Response:

Please see response provided for *CEC/MH-VI-326a*.

Manitoba Hydro's assessment indicates that the 1500 MW shortage of generation compared to load in 2017 is a conservative estimate of the supply deficit, as it assumes 100% supply of the hydraulic and thermal generation, as well as some non-firm import availability. Therefore, a supply deficit of 500 MW in 2017 growing to 1000MW in 2025 was not examined as it was not able to meet the capacity deficit of 1500MW estimated for the loss of Bipoles I and II.

Date	August 1 2012
Reference	Vol. 1, S. 2..2.3, page 2-5 to 2-6 and Figure 2.2.1 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 84 (2010/11 Power Resource Plan).
Source	CEC Information Request #6
Question	CEC/MH-VI-326c

Preamble: Manitoba Hydro's 2010/11 Power Resource Plan included an allowance for new export contracts with WPS and MP (page 17) and called for new interconnections and increased import capability (page 18).

Question:

How would each of these different designs noted in the response to parts (c) and (d)impact:

- The cost of the lines and converter stations?
- The size of the corridor/right of way required for the Bipole III transmission?

Response:

The response below assumes that parts c and d above should read parts a and b.

The Bipole III design rated for 2000MW is required for reliability to address the initial supply deficit of 1500 MW in 2017 and subsequent deficit due to growing load. Consequently, only the 2000 MW design was evaluated due to the other designs (parts a and b) being inadequate to meet the reliability requirement.

Date	August 1 2012
Reference	Vol. 1, S2.3, page 2-9
Source	CEC Information Request #6
Question	CEC/MH-VI-327a

Question:

Please provide the details (e.g., work to be undertaken and costs) for the alternative which involved strengthening the existing HVdc lines and converter stations to withstand higher stresses. By how much was the probability of a major outage reduced? In responding, please address separately failure of the converter station versus the two transmission lines.

Response:

Strengthening of the existing Bipole I & II lines is not a feasible solution. There is no proven line design that will be resistant to tornadoes since no reliable design tools exist to model these extreme events. In addition, significant outage costs are expected for the Bipole I&II line strengthening as these lines are heavily utilized to supply up to 70% of MH load. The separation of lines is the most effective means to reduce the vulnerability.

Strengthening of the Dorsey station is not a feasible solution as it would require rebuilding the entire station. While Manitoba Hydro has undertaken to protect certain parts of the Dorsey station such as the relay building, it is not possible to protect the outdoor equipment spread over a significant area from severe wind, icing, tornado and fire events. When evaluating infrequent, but catastrophic outages, it is usual to consider the duration of the outage and its impact on the MH electrical system. The outage duration is based on the assumed time to procure and replace specialized HVdc equipment, which experience has shown can require up to 3 years.

Establishing another major power injection point, removed from Dorsey, in the south is the only reliable solution. The establishment of an independent Riel station, substantially distant from Dorsey, will help protect reliability of supply in the event of catastrophic loss of Dorsey Station. The probability of losing two converter stations simultaneously is negligible.

Date	August 1 2012
Reference	Vol. 1, S2.3, page 2-9
Source	CEC Information Request #6
Question	CEC/MH-VI-327b

Preamble:

The text on page 2-9 briefly mentions a number of other alternatives that were considered, including strengthening the existing facilities.

Question:

To what level would the probability of an outage at the converter station have to be reduced in order for "strengthening" the station to be considered an acceptable solution from a reliability perspective?

Response:

Please see response provided for *CEC/MH-VI-327a.*

Date	August 1 2012
Reference	Vol. 1, S2.3, page 2-9
Source	CEC Information Request #6
Question	CEC/MH-VI-327c

Preamble: The text on page 2-9 briefly mentions a number of other alternatives that were considered, including strengthening the existing facilities.

Question:

To what level would the probability of a corridor outage (i.e. simultaneous outage of Bipole I and II) have to be reduced in order for "strengthening" of the lines to be considered an acceptable solution from a reliability perspective?

Response:

Please see response *CEC/MH-VI-327a.*

Date	August 1 2012
Reference	Vol. 1, S. 2.3.2, page 2-10
Source	CEC Information Request #6
Question	CEC/MH-VI-328a

Question:

Does the $3.28 B include interest during construction or just the as spent dollars? If the latter, what is the overall in-service cost (including allowances for interest during construction)?

Response:

The $3.28 billion includes interest during construction.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.2, page 2-10
Source	CEC Information Request #6
Question	CEC/MH-VI-328b

Question:

In estimating the cost of Bipole III what assumptions were made regarding the cost inflation for the required equipment, materials and labour?

Response:

Cost of inflation for the required equipment, materials and labour was based upon Manitoba Hydro's projection of Canadian Consumer Price Index.

Date	August 1 2012
Reference	Vol. 1, S 2.3.2, page 2-10
Source	CEC Information Request #6
Question	CEC/MH-VI-329a

Question:

Based on the level of project definition, into what AACE International estimate class does the current cost estimate fall?

Response:

The current cost estimate falls between a Class 4 and a Class 3. This is an adaptation of AACEI's (Association for the Advancement of Cost Engineering International) Recommended Practice No. 17R-97, as definitions of the estimate characteristics are not available for transmission line or converter station construction projects.

Date	August 1 2012
Reference	CEC Information Request #6
Source	CEC Information Request #6
Question	CEC/MH-VI-329b

Question:

Has Manitoba Hydro determined a confidence level and/or range for its project cost estimate? If so, what is it and how was it determined?

Response:

Two different methodologies were used to develop the total project cost estimate for transmission lines and for converter station components, based on the nature of the work. Transmission lines estimates reflect a linear project and relies on standard estimating approaches with cross-checks of recently completed projects. Whereas converter stations are non-standard custom designs and are site specific, hence cost estimates have been developed based on a combination of equipment manufacturers' budgetary prices and other references. The confidence levels or ranges of each estimate are not directly comparable.

The Bipole III Transmission Line, and the Collector Lines cost estimate range is ±35%, using an internal transmission estimate classification system. Estimates are produced based on the best information available as well as reference from recent Manitoba Hydro projects of similar type and industry knowledge.

The Converter Station cost estimate has been developed to a P50 confidence level. A P50 confidence level means there is a 50% chance of budget under-run (or alternatively a 50% chance of budget overrun). The P50 estimate is obtained through a risk-based contingency development process that outputs a range of contingency amounts for different desired levels of confidence in achieving budget under-run.

The above stated estimate range and confidence level assumes current scope of work, projected interest and escalation, and project schedule.

Date	August 1 2012
Reference	Volume 1, S. 2.3.2, page 2-10 – 2-11 Volume 2, Section 8
Source	CEC Information Request #6
Question	CEC/MH-VI-330a

Question:

To what extent are the costs of the various planned or anticipated mitigation measures discussed in Section 8 included in the $3.28 B cost estimate (page 2-10) or the Project NPV used in to calculate the $700 M cost difference between Alternative 1 and Alternative 2 (page 2-11)?

Response:

Estimates of anticipated mitigation measures are included in the project estimate. As the Environmental Protection Plans will be considered draft until final licence conditions and mitigation measures can be incorporated contingency was included for the potential for additional mitigation or unforeseen measures. The project NPV was based on the project total estimate.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.2, page 2-10 to 2-11 Vol. 2, Section 8
Source	CEC Information Request #6
Question	CEC/MH-VI-330b

Preamble:

Section 8 of the EIS identifies a range of potentially unacceptable Environmental and socio-economic impacts due to the project and also identifies various mitigation measures to be undertaken.

Question:

If applicable, please indicate the extent to which these costs are reflected in the Project's base costs versus those considered to be captured as part of any contingency allowance.

Response:

Estimates of anticipated mitigation measures identified have been included in the project's base cost estimate. Contingency was included for the potential for additional mitigation or unforeseen measures.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.2, page 2-10 to 2-11 Vol. 2, Section 8
Source	CEC Information Request #6
Question	CEC/MH-VI-330c

Preamble:

Section 8 of the EIS identifies a range of potentially unacceptable Environmental and socio-economic impacts due to the project and also identifies various mitigation measures to be undertaken.

Question:

Please identify all effects/mitigation measures for which costs have not been included. In each case, explain why and provide the expected costs.

Response:

Costs have been included for all mitigation measures of known effects. Contingency has been included for unforeseen items that may arise.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331a

Question:

Please provide an annual cas flow schedule that sets out the timing of the required expenditures as spent for Alternative 2. In doing so, please show separately each of the following:

- Gas-fired generation capital costs,
- Annual operating cost for the gas-fired generation (excluding fuel),
- Fuel costs for idling and testing,
- New Transmission (to connect to generation) capital costs,
- New gas pipeline (to supply generation) capital costs,
- Gas supply contract costs to secure firm supply (e.g., pipeline reservation fees, etc.),
- Annual fuel costs of generation required due to outages and related MWh generated.

Response:

The table below shows the annual cost in millions 2010$ for each of the requested components. Please also see Manitoba Hydro's response to *CEC/MH-V-154*.

	Base Dollars										
		Capital Costs				Annual Costs					
	Installed Capacity	Capital Cost	Transmission	Gas Storage	Total Capital	Fixed O&M	Gas Reserve Costs	Fuel - Idling & Testing	Fuel - Outages	Total Annual	Grand Total
2011	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0
2015	0	158	0	0	158	0	0	0	0	0	158
2016	0	606	173	0	779	0	0	0	0	0	779
2017	1500	675	168	0	844	0	0	0	0	0	844
2018	1553	104	39	42	186	21	89	0	0	110	297
2019	1606	99	26	0	126	22	89	0	0	111	237
2020	1765	118	32	0	150	22	89	0	0	112	262
2021	1871	77	22	0	99	25	89	0	0	114	213
2022	1924	47	15	0	62	26	89	0	0	116	177
2023	1977	24	7	0	32	27	89	0	0	116	148
2024	1977	2	1	0	3	28	89	0	0	117	120
2025	1977	0	0	0	0	28	89	0	0	117	117
2026	1977	0	0	0	0	28	89	0	0	117	117
2027	1977	0	0	0	0	28	89	0	0	117	117
2028	1977	0	0	0	0	28	89	0	0	117	117
2029	1977	0	0	0	0	28	89	0	0	117	117
2030	1977	0	0	0	0	28	89	0	0	117	117
2031	1977	0	0	0	0	28	89	0	0	117	117
2032	1977	0	0	0	0	28	89	0	0	117	117
2033	1977	0	0	0	0	28	89	0	0	117	117
2034	1977	0	0	0	0	28	89	0	0	117	117
2035	1977	0	0	0	0	28	89	0	0	117	117
2036	1977	0	0	0	0	28	89	0	0	117	117
2037	1977	0	0	0	0	28	89	0	0	117	117
2038	1977	0	0	0	0	28	89	0	0	117	117
2039	1977	0	0	0	0	28	89	0	0	117	117
2040	1977	0	0	0	0	28	89	0	0	117	117
2041	1977	0	0	0	0	28	89	0	0	117	117
2042	1977	0	0	0	0	28	89	0	0	117	117
2043	1977	0	0	0	0	28	89	0	0	117	117
2044	1977	0	0	0	0	28	89	0	0	117	117
2045	1977	0	0	0	0	28	89	0	0	117	117
Total		1912	483	42	2438	752	2505	0	0	3257	5695
NPV	6.10%	1253	312	26	1592	230	784			1014	2605

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Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331b

Question:

What is the Net Present Values (NPV) (2010$) of Alternative 2? As part of the response please provide a copy of the spreadsheet that sets out the annual cost both in as spent and discounted dollars which sum the NPV.

Response:

This response itemizes the costs in millions of dollars included in Manitoba Hydro's response to *CEC/MH-V-154.*

As Spent Dollars												
		Capital Costs					Annual Costs					
	Installed Capacity	Capital Cost	Transmission	Gas Storage	Interest	Total Capital	Fixed O&M	Gas Reserve Costs	Fuel - Idling & Testing	Fuel - Outages	Total Variable	Grand Total
2011	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	172	0	0	2	174	0	0	0	0	0	174
2016	0	672	191	0	38	902	0	0	0	0	0	902
2017	1500	764	191	0	107	1062	0	0	0	0	0	1062
2018	1553	121	46	49	16	231	24	103	0	0	128	359
2019	1606	117	31	0	9	157	26	106	0	0	131	288
2020	1765	143	39	0	16	198	27	108	0	0	135	332
2021	1871	95	27	0	11	133	30	110	0	0	140	273
2022	1924	59	18	0	6	84	33	112	0	0	145	229
2023	1977	31	9	0	4	45	35	115	0	0	149	194
2024	1977	2	1	0	0	3	36	117	0	0	153	157
2025	1977	0	0	0	0	0	37	120	0	0	157	157
2026	1977	0	0	0	0	0	38	122	0	0	160	160
2027	1977	0	0	0	0	0	39	125	0	0	163	163
2028	1977	0	0	0	0	0	39	127	0	0	167	167
2029	1977	0	0	0	0	0	40	130	0	0	170	170
2030	1977	0	0	0	0	0	41	133	0	0	174	174
2031	1977	0	0	0	0	0	42	135	0	0	177	177
2032	1977	0	0	0	0	0	43	138	0	0	181	181
2033	1977	0	0	0	0	0	44	141	0	0	185	185
2034	1977	0	0	0	0	0	45	144	0	0	189	189
2035	1977	0	0	0	0	0	46	147	0	0	193	193
2036	1977	0	0	0	0	0	46	150	0	0	197	197
2037	1977	0	0	0	0	0	47	153	0	0	201	201
2038	1977	0	0	0	0	0	48	157	0	0	205	205
2039	1977	0	0	0	0	0	49	160	0	0	209	209
2040	1977	0	0	0	0	0	51	163	0	0	214	214
2041	1977	0	0	0	0	0	52	167	0	0	218	218
2042	1977	0	0	0	0	0	53	170	0	0	223	223
2043	1977	0	0	0	0	0	54	174	0	0	228	228
2044	1977	0	0	0	0	0	55	177	0	0	232	232
2045	1977	0	0	0	0	0	56	181	0	0	237	237
Sum		2176	552	49	211	2988	1175	3886	0		5061	8049

Present Value Discounted Dollars

		Capital Costs				Annual Costs					
	Installed Capacity	Capital Cost	Transmission	Gas Storage	Total Capital	Fixed O&M	Gas Reserve Costs	Fuel - Idling & Testing	Fuel - Outages	Total Annual	Grand Total
2011	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0
2015	0	118	0	0	118	0	0	0	0	0	118
2016	0	425	121	0	546	0	0	0	0	0	546
2017	1500	446	111	0	557	0	0	0	0	0	557
2018	1553	65	25	26	116	13	56	0	0	69	185
2019	1606	58	15	0	74	13	53	0	0	65	139
2020	1765	65	18	0	83	12	49	0	0	62	145
2021	1871	40	11	0	52	13	47	0	0	60	111
2022	1924	23	7	0	30	13	44	0	0	57	87
2023	1977	11	3	0	15	12	41	0	0	54	68
2024	1977	1	0	0	1	12	39	0	0	51	52
2025	1977	0	0	0	0	11	37	0	0	48	48
2026	1977	0	0	0	0	11	35	0	0	45	45
2027	1977	0	0	0	0	10	33	0	0	43	43
2028	1977	0	0	0	0	10	31	0	0	40	40
2029	1977	0	0	0	0	9	29	0	0	38	38
2030	1977	0	0	0	0	8	27	0	0	36	36
2031	1977	0	0	0	0	8	26	0	0	34	34
2032	1977	0	0	0	0	8	24	0	0	32	32
2033	1977	0	0	0	0	7	23	0	0	30	30
2034	1977	0	0	0	0	7	22	0	0	28	28
2035	1977	0	0	0	0	6	20	0	0	27	27
2036	1977	0	0	0	0	6	19	0	0	25	25
2037	1977	0	0	0	0	6	18	0	0	24	24
2038	1977	0	0	0	0	5	17	0	0	22	22
2039	1977	0	0	0	0	5	16	0	0	21	21
2040	1977	0	0	0	0	5	15	0	0	20	20
2041	1977	0	0	0	0	4	14	0	0	19	19
2042	1977	0	0	0	0	4	13	0	0	18	18
2043	1977	0	0	0	0	4	13	0	0	17	17
2044	1977	0	0	0	0	4	12	0	0	16	16
2045	1977	0	0	0	0	3	11	0	0	15	15
NPV	0	1253	312	26	1592	230	784	0	0	1014	2605

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Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331c

Question:

Please provide a schedule that sets out the deviation of the $700 million (2010$) cost difference between Alternative 1 and 2. Please ensure the NPV for the cost attributed to each project reconciles with the responses to the preceding information requests.

Response:

Please see Manitoba Hydro's response to *CEC/MH-V-154* which addresses the question above. The difference between the present value of Alternative 1 and Alternative 2, provided in *CEC/MH-V-154*, yields the value of $702 million (2010 PV).

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331d

Question:

Please provide the source/basis for the $2.99 B cost estimate for 2000 MW of gas-fired generation.

Response:

Please see Manitoba Hydro's response to *CEC/MH-V-154*. The capital in-service cost for the Alternative 2 option is $2988 M.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331e

Question:

Are there any public sources for the cost of a new gas-fired generation (e.g. the US Energy Information Administration) that would substantiate/support this cost estimate? If so, please provide the source(s) and their associated cost estimates.

Response:

The costs provided in the US Energy Information Administration website (provided below) would be consistent with those used in the cost estimate for Alternative 2. The costs found on the website are generation costs expressed in $/kW of installed capacity.

It should be noted that, in addition to generation costs, there are additional estimated costs for transmission, the total estimated cost would increase with inflation, and estimated in-service costs include interest during construction.

Information from the US Energy Information Administration on the generation cost of natural gas-fired generation may be found at:
http://www.eia.gov/oiaf/beck_plantcosts/pdf/updatedplantcosts.pdf

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331f

Question:

Please explain more fully how the average cost of $181 M per annum to secure firm gas supply was derived?

Response:

The average cost of $181 million per year as referenced in Vol. 1, S. 2.3.3., page 2-11 of the EIS, consists primarily of the cost to reserve pipeline capacity for the life of the natural gas-fired facility, with an additional cost to ensure a firm supply of natural gas in the event that it is called upon, as well as fixed operation and maintenance costs. Of the $181 M/yr, 42 M/yr is attributable to operation and maintenance of the natural gas-fired generation equipment.

The cost to reserve pipeline capacity and to ensure a firm supply of natural gas is based on a cost of $ 0.92/MMBTU (2010$). The cost of $0.92/MMBTU is representative of a long-term average cost for reservation fees. The $0.92/MMBTU is estimated based on $0.85/MMBTU to reserve pipeline capacity for the life of the natural gas-fired facility, and an additional $0.07/MMBTU was estimated to ensure a firm supply of natural gas in the event that it was called upon.

The cost to secure firm gas supply and transportation is estimated to start in 2018 at $103 million per year, and will increase to $181 million per year by 2045, and averages $139M/yr.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331g

Question:

Since the firm gas supply will only be used in contingency situations, would Manitoba Hydro be able to re-sell the pipeline capacity it has reserved to 3rd parties during those periods when not required (even if only on a short-term or recallable basis)? If not, why not?

Response:

If this alternative were to be pursued, Manitoba Hydro would make every effort to minimize the cost of reserving large amounts of pipeline capacity, but it is unlikely any notable amount of the reservation fee could be recovered. As Manitoba Hydro cannot predict when a catastrophic event may occur, it is unlikely that Manitoba Hydro would find a 3rd party that is able to rely on capacity that could be immediately withdrawn for extended periods of time. Therefore, if pipeline capacity were to be re-sold, it would be sold on a daily basis, and would be valued much lower than a long-term firm reservation. Resale values would increase as the pipeline approaches full, but so would the cost to Manitoba Hydro. The potential value of such sales is very uncertain and has not been relied upon.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331h

Question:

If yes (i.e., re-sale of reserved pipeline capacity is possible), was any allowance for the revenue from such re-sale included in the determination of the $181 M annual cost or the $700 M higher cost attributed to Alternative 2.

- If yes, what was the annual value attributed to this resale and how was it determined? (Note: If this is the case, please ensure the response to part shows separately these annual revenues).
- If not, what would be anticipated annual revenues from such capacity resale? Also, please re-do the response to parts (a) and (b) so as to include these revenues.

Response:

As described in Manitoba Hydro's response to *CEC/MH-VI-331g*, the $181 million in average annual cost consisted only of costs to reserve pipeline capacity and to ensure fuel supply together with fixed operating and maintenance costs.

There would be no revenue associated with the reserved pipeline capacity, as described in Manitoba Hydro's response to *CEC/MH-VI-331g*.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331i

Question:

Is the Riel Sectionalization Project required under Alternative 2? If yes, please explain why and whether the scope and cost would be the same as under Alternative 1(see page 3-135 for reference to the Riel Sectionalization Project).

Response:

Riel Sectionalization project is required under all three alternatives. The cost of Riel sectionalization, however, is not included in the cost estimate of any of the alternatives because it is a project that is already approved and is independent of the three reliability alternatives.

The Riel sectionalization project has an estimated ISD of 2014 and protects the delivery of 900MW of import power in the event of a Dorsey station outage, as assumed in all three alternatives. Without the Riel Sectionalization project the import power deliverable is only 600MW with the Dorsey station outage for all three alternatives.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.3., page 2-11
Source	CEC Information Request #6
Question	CEC/MH-VI-331j

Question:

If it is not required or required but with a reduced scope/cost, how does this impact the cost comparison of Alternatives 1 and 2? If applicable, please provide a revised cash flow for Alternative 2 (per part (a)) that includes the cost savings associated with the Riel Sectionalization and update the response provided to parts (b) and (c).

Response:

Riel sectionalization is an independent reliability project that maintains the existing import capability for the outage of the Dorsey Station. Therefore costs of any of the alternatives are not affected.

Please see response provided for *CEC/MH-VI-331i.*

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332a

Question:

Please provide an annual cash flow schedule that sets out the timing of the required expenditures as spent for Alternative 3. In doing so, please show separately the cost associate with the import and generation aspects of the alternative. For the import component please separate out:

- The cost of the new transmission interconnection, and
- The cost of firm power contract, separating out the cost of any assumed purchases.

For the gas generation component, please show each of the following:

- Gas-fired generation capital costs,
- Annual operating cost for the gas-fired generation (excluding fuel),
- Fuel costs for idling and testing,
- New Transmission (to connect to the generation),
- New gas pipeline (to supply generation),
- Gas supply contract to secure firm supply (e.g. pipeline reservation fees, etc.),
- Annual fuel costs of generation required due to outages and related MWh generated.

Response:

Please see Manitoba Hydro's responses provided for *CEC/MH-V-153* and *CEC/MH-V-154*.

The costs associated with Alternative 3 generation were assumed to be equivalent to the costs associated with Alternative 2 gas generation, as all the same generation resources would be required, with the added cost of constructing a new interconnection for import.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332b

Question:

What is the Net Present Values (2010$) of Alternative 3? As part of the response please provide a spreadsheet that sets out the annual cost both in as spent and discounted dollars which sums to the NPV.

Response:

Please see responses provided for *CEC/MH-V-153* and *CEC/MH-V-154.*

The costs associated with Alternative 3 were assumed to be equivalent to the costs associated with Alternative 2, as all the same generation resources would be required, with the added cost of constructing a new interconnection for import.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332c

Question:

Please describe the difference (in terms of scope and planned facilities) between the 1500 MW interconnection assumed in Alternative 3 and the new interconnection facilities include in CEF-10 for 2019 (page 15) and explain the resulting difference in costs (i.e., $1.5 B versus $205M).

Response:

The new interconnection facilities included in CEF-10 for 750 MW, only include the portion of the interconnection that is constructed in Manitoba. Other parties are responsible for facilities on the US side of the border.

Alternative 3 interconnection infrastructure is a 1500 MW interconnection designated for import and therefore Manitoba Hydro assumes it will be responsible for the entire facility to supply Manitoba Hydro in the event of an HVdc failure. The $1.5 B is representative of the in-service cost of the 1500 MW interconnection. The construction costs in the US are higher and line length in the US is much longer than in Manitoba.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332d

Question:

Since power purchases will only be used in contingency situations, would Manitoba Hydro be able to re-sell the firm electricity supply it has contracted for to 3rd parties during those periods when it is not required (even if only on a short-term or recallable basis)? If not, why not?

Response:

The firm electricity supply that Manitoba Hydro would contract for in the Alternative 3 option for reliability does not assume that any power is actually purchased, nor does it assume that Manitoba Hydro would have any rights to sell the reserved capacity.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332e

Question:

If yes (i.e., re-sale of the contracted electricity supply is possible), was any allowance for revenue from such re-sale included in the the determination of the cost of Alternative #3?

- If yes, what was the annual value attributed to this resale and how was it determined? (Note: If this is the case, please ensure the response to part shows separately these annual revenues).
- If not, what would be the anticipated annual revenues from such a resale? Also, please re-do the response to parts (a) and (b) so as to include these revenues.

Response:

As described in Manitoba Hydro's response *CEC/MH-VI-332d,* there would be no energy purchased which could be resold and it is not assumed that Manitoba Hydro would have any rights to sell the reserved capacity.

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332f

Question:

Is the Riel Sectionalization Project required under Alternative 3? If yes, please explain why and whether the scope and cost would be the same as under Alternative 1 (see page 2-135 for reference to Riel Sectionalization Project).

Response:

Please see response provided for *CEC/MH-VI-331i.*

Date	August 1 2012
Reference	Vol. 1, S. 2.3.4, page 2-12 Manitoba Hydro's 2010/11-2011/12 GRA, Appendix 82 (CEF-10), page 15
Source	CEC Information Request #6
Question	CEC/MH-VI-332g

Question:

If it is not required or required but with a reduced scope/cost, how does this impact the cost comparison of Alternatives 1 and 3? Please provide a revised cash flow for Alternative 3 (per part (a)) that includes the cost savings associated with the Riel Sectionalization and update the response provided to part (b).

Response:

Please see response provided for *CEC/MH-VI-331j*

Date	August 1 2012
Reference	Vol. 1, S. 2.4.1, pages 2-15 to 2-17
Source	CEC Information Request #6
Question	CEC/MH-VI-333a

Question:

What is the value of losses on the Manitoba Hydro system (provide both $ value and how it was determined) versus the value of losses used for the cost comparisons in Rudervall *et al* 2000 and Siemens 2008.

Response:

Value of losses for the Manitoba Hydro HVdc system or a comparable ac system were not evaluated for the cost analysis, as the break even distance for the HVdc viability fell well below the total line length of about 1364 km, even without considering the losses.

Both references above do not provide specific information on the value of losses considered in the cost comparisons. However it is clear in both these references that considering the losses in the cost analysis improves the break even distance for HVdc viability, as the losses of the HVdc system are generally lower than the losses of an ac system of comparable capacity. In other words, including the losses in the cost comparison makes the dc scheme even more economic.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.1, pages 2-15 to 2-17
Source	CEC Information Request #6
Question	CEC/MH-VI-333b

Question:

How does the cost of HVdc (including converters) vs. HVac transmission on the Manitoba Hydro system compare with the relative costs as assumed in the above references?

Response:

The relative costs of the ac and HVdc schemes assumed in the references can be considered to compare well with the relative costs of MH HVdc and ac cost estimates, because the economic analysis for MH systems results in break-even distance well within the industry range of 500~800km. See the graph in response *CEC/MH-VI-333d*.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.1, pages 2-15 to 2-17
Source	CEC Information Request #6
Question	CEC/MH-VI-333c

Question:

Based on the responses to parts b) and c), please comment on the applicability of the industry comparisons in these two references to Manitoba Hydro's current circumstances.

Response:

This response assumes parts b) and c) should say Parts a) and b).

The industry comparisons provided in the two references for the ac and HVdc costs are considered applicable to Manitoba Hydro's current circumstance of a point-to-point transmission scheme.

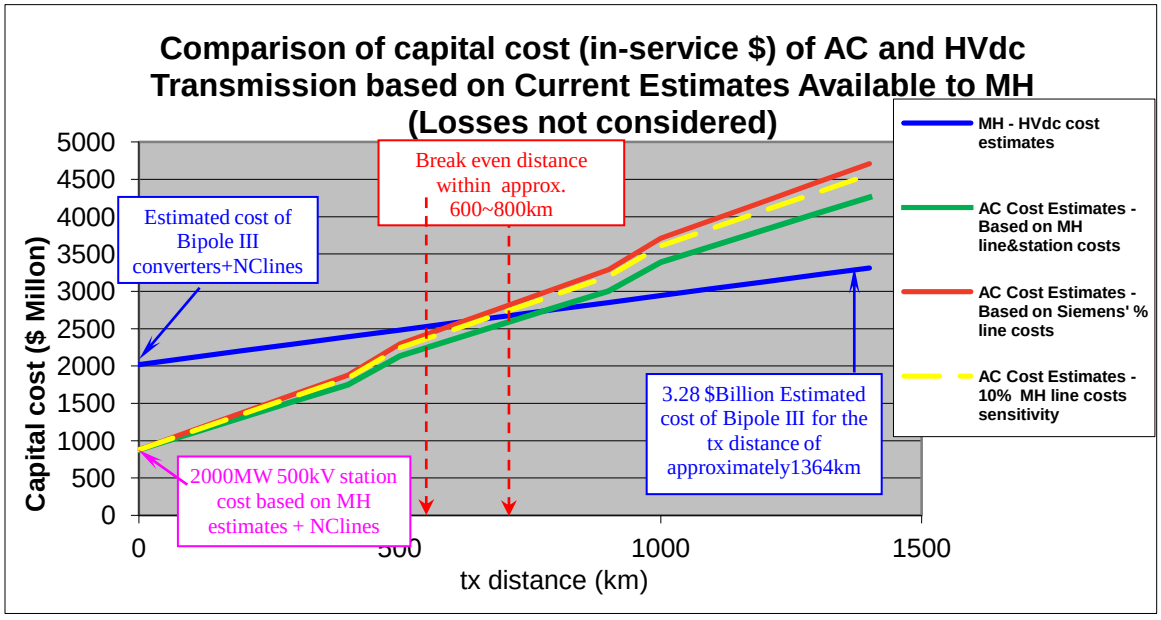
Date	August 1 2012
Reference	Vol. 1, S. 2.4.1, pages 2-15 to 2-17
Source	CEC Information Request #6
Question	CEC/MH-VI-333d

Question:

Please provide any analysis that Manitoba Hydro has prepared that compares the cost of the HVdc vs. HVac options for this project that supports the overall conclusions (page 2-17) that HVdc is less expensive. If not done so as part of this analysis, please present the cost comparison based on a NPV basis (2010$).

Response:

Manitoba Hydro has the following cost comparison of HVdc and ac cost estimates based on the latest information available.



The blue curve shows Manitoba Hydro HVdc costs and reflects the latest estimates of the Bipole III costs. The terminal equipment cost, the northern collector lines and the electrode costs form the cost at zero length. The 500 kV HVdc line cost is added with increasing length to make up the total cost of $3.28B.

The green curve shows the Manitoba Hydro estimated cost of a comparable ac system where the terminal equipment cost is for the ac stations at the sending and receiving ends along with the northern collector line costs. The 500 kV double circuit ac line cost is added with the increasing line length. AC systems also need compensation stations approximately about every 500km. The cost of compensation is added at the 500km and 1000km lengths. The total estimated cost with Manitoba Hydro estimates amount to $4.18B and is approximately $900M more than the cost of HVdc. The break even distance for this estimate lies at a line length of about 800km.

Similar estimates with line cost percentages available from Seimen's (web site) are shown in red. The total cost here is estimated at $4.62B, and is $1.34B more than the cost of HVdc. The break even distance with this estimate is approximately 600km.

Sensitivity to 10% increase in Manitoba Hydro estimated line costs are investigated with the yellow line. The total cost is approximately $4.48B and is $1.20B more than the cost of the HVdc.

This analysis shows that the break even distance lies in the range of 600-800km and that HVdc is significantly economical for the considered transmission distance not consisting losses. The break even distance will favour HVdc further if the losses are considered.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.2
Source	CEC Information Request #6
Question	CEC/MH-VI-334

Question:

BC Hydro has used both dc (since early 1970's) and ac (since late 1960's) underwater transmission facilities to supply Vancouver Island.

- Was this experience considered at all in the Farlinger *et al* report?
- Please reconcile BC Hydro's use of submarine cable with Manitoba Hydro's conclusion that underwater cable is currently not feasible in the Manitoba situation (Table 2.4-1). Specifically what are the differences in circumstances that led to this conclusion?

Response:

The report "Potential Use of Submarine or Underground Cables for Long Distance Electricity Transmission in Manitoba" makes references to Mainland BC to Vancouver Island Submarine Cable system application on page 147. A critical difference in the BC and Manitoba situation is that BC has full accessibility to the cable laying ocean vessels whereas Manitoba is land bound. There are numerous findings in the above referenced report that point out the issues with the use of submarine cables in Manitoba.

Date	August 1 2012
Reference	Vol. 1. S. 2.4.3
Source	CEC Information Request #6
Question	CEC/MH-VI-335a

Question:

Please provide documentation that HVDC underground cable failure rates are high (failure every 3 to 17 years) beyond information provided in Farlinger *et al*. What cable length was this related to?

Response:

Report titled " Potential Use of Submarine or Underground Cables for Long Distance Electricity Transmission in Manitoba" by David Farlinger et al was a result of a concepts study conducted by a working group consisting of experts in the field. The report has many references listed as the sources of information used by the working group. As indicated on page 55 of the above report, the failure rates are derived using the information in the Cigre Brochure 376 (reference 16 of the report). The failure rate of every 3 to 17 years stated on page 58 of the above report is based on the information provided in table 12, 13, and 14 of the report. They are for the Manitoba north-south transmissions schemes which have underground cables lengths as indicated in table 6 of the same report. The failure rates apply to cable lengths of 525 km to 1052 km which represents route lengths of 175 km to 263 km. Please note that the cable length is a multiple of the route length and number of cables needed for the scheme.

Manitoba Hydro therefore considers the above report as a reliable source of information applicable to Manitoba and does not need any further information.

Date	August 1 2012
Reference	Vol. 1. S. 2.4.3
Source	CEC Information Request #6
Question	CEC/MH-VI-335b

Question:

Was underground cable considered over short distances? Please describe the constraints for using underground cable over long and short distances. What are the construction, cost, maintenance and reliability factors? Please provide supporting documentation, including studies, plans and analysis, including calculations performed by Manitoba Hydro to conclude underground cable is not feasible.

Response:

Manitoba Hydro looked at the use of underground cable for some short sections of the Bipole III route and found the cost to be prohibitive (3-6 times that of over head line). Please see response to *CEC/MH-III-064*.

The report by David Farlinger et al, titled "Potential Use of Submarine or Underground Cables for Long Distance Electricity Transmission in Manitoba - A Post Bipole III Concepts Review" has considered many HVdc and ac cable schemes that have a combination of overhead, underground and underwater segments of line. Please see this report for more information regarding construction, cost, maintenance and reliability factors applicable to Manitoba.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.4, pages 2-19 to 2-20 Vol. 1, S. 2.2.2, page 2-3
Source	CEC Information Request #6
Question	CEC/MH-VI-336a

Question:

Please describe the proximity (i.e. degree of physical separation) of the Bipole I and Bipole II lines to each other.

Response:

Bipole I & II transmission lines were constructed on the same right of way with a tower centerline to centerline separation of 65 meters.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.4, pages 2-19 to 2-20 Vol. 1, S. 2.2.2, page 2-3
Source	CEC Information Request #6
Question	CEC/MH-VI-336b

Question:

Would the use of the Interlake corridor for Bipole III require a similar degree of proximity as between Bipole III and the existing Bipole facilities or could a greater degree of physical separation be achieved? If a greater degree of physical separation could be achieved, what is the extent to which this physical separation could be increased for Bipole III?

Response:

Routing Bipole III on the Interlake corridor may maintain a separation of about 20km-30km from the existing Bipole I and II lines for 500 to 600 km of the route in the area west of Lake Winnipeg. However, for portions of this route north and south of Grand Rapids, the separation between Bipole III and the existing DC lines will be less than 10km for an approximate distance of 250km due to physical constraints. In the vicinity of Grand Rapids, Bipole III would have to be on the same right of way as the existing DC lines for a distance of 45km as there simply is nowhere else to route a line in this area.

Because of the close proximity of the Bipole III route to Bipole I and II for such a significant portion of the route, the Interlake corridor route is deemed to be unacceptable as a reliability enhancement.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.4, pages 2-19 to 2-20 Vol. 1, S. 2.2.2, page 2-3
Source	CEC Information Request #6
Question	CEC/MH-VI-336c

Question:

In establishing the various probabilities, did the Teshmont studies (2001 or 2006), assess:

- Only the likelihood of weather events that would impact the entire Interlake corridor and therefore result in loss of all facilities regardless of their location in the corridor, OR
- The likelihood of both weather events that would impact the entire corridor and more localized events that would impact Bipole I and II but not the entire corridor?

Response:

Teshmont 2006 report evaluated the probability of simultaneous failure of the three HVdc bipoles for different routing options of Bipole III: Interlake, West and East corridors in terms of weather events (wind and icing, tornados and windstorms). The spatial distribution of weather hazards were factored into the analysis of the probabilities affecting the entire corridor.

MH undertook another weather risk assessment in the year 2011-12 (Teshmont 2012 report) considering the Bipole III Final Preferred Route. The study incorporated additional weather data to date since the completion of 2006 study, and went further with the reliability analysis to determine the estimated probabilities of occurrence of weather events and the probabilities of failure (i.e., collapse) for single and multiple

lines. The sensitivity of failure probabilities due to changes in separation over short sections of the dc line was also investigated.

Please refer to the response provided for *CEC/MH-II-023*.

Date	August 1 2012
Reference	Vol. 1, S. 2.4.4, pages 2-19 to 2-20 Vol. 1, S. 2.2.2, page 2-3
Source	CEC Information Request #6
Question	CEC/MH-VI-336d

Question:

If the latter, how would the probabilities of the loss of the Interlake corridor facilities set out on page 2-3 be reduced if an Interlake route for Bipole III was designed so as to maximize the physical separation between it and the existing facilities.

Response:

As indicated in the response to *CEC/MH VI-336b* (part b), routing Bipole III along the Interlake corridor is essentially putting Bipole III in close proximity to the existing Bipoles I & II for substantial portions of the route, and on the same right of way for about 45km. Use of Interlake corridor for Bipole III is not good utility practice to ensure the security of electricity supply.

In the 2006 Teshmont report, the general routes selected for study were considered adequate for weather risk assessment purposes, as the specific routing had not been planned in any detail in any one corridor at the time. Even without the considerations of the limitations listed in part b), the routing of Bipole III on the west or east corridors were found to have much superior performance than the use of an Interlake corridor in terms of system reliability.

Please refer to the response provided for *CEC/MH-II-023*.

Date	August 1 2012
Reference	Vol. 1, S. 3, Appendix 3A Vol. 2, S. 10, page 10-5
Source	CEC Information Request #6
Question	CEC/MH-VI-337

Question:

At page 3A-5, Manitoba Hydro states that the consequences of an outage of Bipole I and II through loss of the Interlake corridor or a Dorsey station loss are an "unacceptable" risk to the reliable supply of electricity. At page 10-5, Manitoba Hydro states that system reliability studies have concluded that the likelihood of such events occurring, when combined with severe consequences of prolonged major outages, warrant substantial system improvements.

If the probability of an outage was lower and/or the duration shorter would there be a point at which the "risk" would be deemed to be acceptable? If yes, please indicate what that pint is and how it is determined.

Response:

Manitoba Hydro has not established specific guidelines defining acceptable levels of risk for low probability high consequence events. Similarly, the industry has no established guidelines. However, there is growing industry concern regarding such events.

The North American Electric Reliability Corporation (NERC) is currently enhancing its planning standards with respect to extreme disturbance such as the loss of Bipoles I and II. The existing NERC planning standard for extreme disturbances requires the planner to evaluate the risks and consequences of such disturbances and document the results of the assessment. The new Transmission Planning Standard (TPL-001-2) under development stipulates that if the analysis concludes there is cascading caused by the occurrence of extreme events, an evaluation of possible actions designed to reduce the

likelihood or mitigate the consequences and adverse impacts of the event(s) shall be conducted. However, implementation of actions is left to the discretion of the transmission planner.

In the case of the catastrophic loss of Bipole I & II, Manitoba Hydro has taken the approach of assessing the relative risk related to the simultaneous loss of supply. As described in *CEC/MH-II-023*, Manitoba Hydro has retained consultants to assess the weather related risk to the existing HVdc Bipole I and II schemes and how Bipole III reduces this risk.

Date	August 1 2012
Reference	CEC Information Request #6
Source	CEC Information Request #6
Question	CEC/MH-VI-338

Question:

Has any attempt been made to determine how to minimize HVDC line outage duration due to simultaneous Bipole I and II line failure from severe winds/tornadoes to a period that is significantly less than six to eight weeks referenced in the EIS, such as an inventory of spare parts.

- if yes, indicate the duration of the reduced duration of the transmission outage and its justification
- if not provide an explanation why no determination has been made.

Response:

The estimated six to eight weeks outage duration due to simultaneous Bipole I and II line failure is in consideration of several factors such as the availability of resources, location, available mechanical equipment and inventory of spare materials.

Efforts to date to minimize the duration include the design of specialized tools to allow for restoration to occur using minimal mechanical equipment where access to the failure location is not readily achievable. Manitoba Hydro has also purchased special soft-track equipment to facilitate access to remote sites to complete repairs. Training exercises in the use of these tools is performed annually. Mutual assistance agreements are in place with neighbouring utilities to increase the potential resource pool to complete repairs in the shortest possible time.

It should however be noted that depending on the remoteness of the location, the season and the prevalent weather conditions, this estimate may be conservative.

Date	August 1 2012
Reference	Chapter 3, S. 3.6
Source	CEC Information Request #6
Question	CEC/MH-VI-339

Question:

The selection for the technology for the converter stations was intended to be made in 2011, indicate whether a selection has been made between two competing technologies, conventional Line-Commutated Conversion (LCC) and a newer Voltage-Source Converter (VSC).

● if this selection is not resolved, why not and what are the considerations that impact the decision?

● Do these considerations take into account the recent developments in VSC converter technology and what are the recent developments that have been considered? Please explain

Response:

A final selection between the LCC and VSC technologies has not been made to date.

Manitoba Hydro will evaluate both LCC and VSC technology in the Bipole III tendering process. Manitoba Hydro has decided to take this approach considering both the advantages and risks associated with the new VSC technology, and the power level of Bipole III.

The recent Skagerrak 4 project (a HVDC link between Denmark and Norway with a 715MW valve group size) used the same approach and tenders for both technologies were evaluated.

Manitoba Hydro is considering all available information on VSC technology, including recent developments such as DC breakers.

Date	August 1 2012
Reference	Components Route/Site Selection Process Section 7-1, p. 7-3
Source	CEC Information Request #6
Question	CEC/MH-VI-340a

Hydro states that:
The site for the Riel Converter Station is owned by Manitoba Hydro and was established through the Riel Reliability Initiative Project, which received its Environment Act Licence in April 2009.

Question: a) Please indicate the technical advantages of the Riel site compared to other sites that might have been considered around Winnipeg, including any consideration of sites on the west side of Winnipeg to reduce length.

Response:

Please see response provided for *CEC/MH-VI-305*

Date	August 1 2012
Reference	Components Route/Site Selection Process Section 7-1, p. 7-3
Source	CEC Information Request #6
Question	CEC/MH-VI-340b

Hydro states that:

The site for the Riel Converter Station is owned by Manitoba Hydro and was established through the Riel Reliability Initiative Project, which received its *Environment Act* Licence in April 2009.

Question:

What other locations were considered and why were they rejected? Please provide any studies to support these conclusions

Response:

The Riel Sectionalization Project, which established the Riel 500 kV-230 kV Station received an *Environment Act* Licence in April 2009 and is currently under construction.

Alternate locations for the southern Converter Station were not considered as part of the Bipole III Transmission Project.

The Riel substation site was identified in the 1970s as the preferred location for the next HVdc converter station after Dorsey. The Riel location is optimal in terms of transmission requirements. Also see *CEC/MH-VI-305* for further detail.

Date	August 1 2012
Reference	Components Route/Site Selection Process Section 7-1, p. 7-3
Source	CEC Information Request #6
Question	CEC/MH-VI-340c

Hydro states that:

The site for the Riel Converter Station is owned by Manitoba Hydro and was established through the Riel Reliability Initiative Project, which received its *Environment Act* Licence in April 2009.

Question:

Are there future plans to have a 500Kv ring around the City of Winnipeg? If, so please provide any studies or analyses regarding such a plan.

Response:

While Manitoba Hydro has done some preliminary analysis of an additional 500 kV transmission line between Dorsey and Riel, no plans have been committed to date.

Date	August 1 2012
Reference	Initial Preferred Route S. 7.3.2.1 p. 7-33
Source	CEC Information Request #6
Question	CEC/MH-VI-341

Question:

Hydro states that:

East of the Red River, the route crosses through a more densely populated rural setting that includes rural residences and barn complexes. It move north past the Village of Landmark, east to avoid the community of Dufresne and crosses the Trans Canada Highway before heading north to an existing transmission line right-of-way, where it parallels the Dorsey to Forbes, Minnesota (D605F) 500KV international transmission line west into the Riel Converter Station site.

Please indicate how the costs of this routing, including the risks associated with its proximity to Bipoles I and II near the Dorsey site, compare to alternative sites for the proposed Southern Converter Station site.

Response:

As explained in response *CEC/MH-VI-305*, if the Bipole III southern converter was sited away from the Riel site, then several more transmission lines would have to be extended from the new alternative converter station site to existing load serving stations on the Winnipeg periphery corridor to carry the converter power to load, resulting in further costs and additional new transmission line corridors.

The question presumes that there are risks with the described Bipole III route associated with its proximity to Bipole I and II near the Dorsey site. The risk of the simultaneous loss of Bipole III and the Dorsey Station, which about 40 km away from the Bipole III line, is minimal. The issue here is basically a point location (Dorsey) and a

line (Bipole III) that passes by it some 40 km away. There is much lower probability of a weather event hitting a point and a line as opposed to two lines running in parallel over a large distance.

Date	August 1 2012
Reference	Project Sustainability Assessment S. 10.2, p. 10-5
Source	CEC Information Request #6
Question	CEC/MH-VI-342a

Hydro states that:

The Project will provide substantial economic benefits to Manitobans with the major economic benefit from the construction phase. In total, the entire project construction expenditure is expected to contribute to Manitoba:

- 8,782 person-years of direct and indirect employment
- $482.3 million in labour income
- $688.7 million in GDP
- $352.4 million in tax revenue

Question:

Please indicate whether, in the terminology of the Economic Impact Assessment Technical Report (EIATR) from the Manitoba Bureau of Statistics (September 2011), the quoted benefits are direct, indirect or induced impacts or some combination of these impacts.

Response:

The employment impact estimates are broken down and are referenced as either direct, indirect or induced throughout the EIATR report. However, the labour income, GDP and tax revenue impact estimates are a combination of direct, indirect and induced impacts and are not broken down.

Date	August 1 2012
Reference	Project Sustainability Assessment S. 10.2, p. 10-5
Source	CEC Information Request #6
Question	CEC/MH-VI-342b

Hydro states that:

The Project will provide substantial economic benefits to Manitobans with the major economic benefit from the construction phase. In total, the entire project construction expenditure is expected to contribute to Manitoba:

- 8,782 person-years of direct and indirect employment
- $482.3 million in labour income
- $688.7 million in GDP
- $352.4 million in tax revenue

Question:

Please indicate where the following views of the EIATR (p.3) are reflected in the Hydro environmental statement:

economic impact analysis .... only considers the impact of project expenditures. It does not consider the opportunity cost of labour and capital in the project nor does it consider the revenue generated by the project. By itself, it cannot measure the profitability of the project. Thus, the results of this study should be treated as general estimates and never as absolutes

Response:

The EIATR is a technical report developed in support of Manitoba Hydro's Environmental Impact Statement filed with Manitoba Conservation and Water Stewardship related to the Bipole III Transmission Project. The reference from page 3 of the EIATR was

included to highlight the standard limitations of economic impact analysis methodology for project evaluation.

Date	August 1 2012
Reference	Project Sustainability Assessment S. 10.2, p. 10-5
Source	CEC Information Request #6
Question	CEC/MH-VI-342c

Question:

Hydro states that:

The Project will provide substantial economic benefits to Manitobans with the major economic benefit from the construction phase. In total, the entire project construction expenditure is expected to contribute to Manitoba:

- 8,782 person-years of direct and indirect employment
- $482.3 million in labour income
- $688.7 million in GDP
- $352.4 million in tax revenue

Does Manitoba Hydro agree with the views expressed in question b? If not, why not?

Response:

Yes. The views reflect standard limitations of economic impact analysis methodology.

Date	August 1 2012
Reference	Project Sustainability Assessment S. 10.2, p. 10-5
Source	CEC Information Request #6
Question	CEC/MH-VI-342d

Hydro states that:

The Project will provide substantial economic benefits to Manitobans with the major economic benefit from the construction phase. In total, the entire project construction expenditure is expected to contribute to Manitoba:

- 8,782 person-years of direct and indirect employment
- $482.3 million in labour income
- $688.7 million in GDP
- $352.4 million in tax revenue

Question:

Please indicate where the views of the EIATR (pp.21-23) that it is very difficult to estimate the economic impact on Northern Manitoba and on Northern Manitoba Aboriginal residents are reflected in the Hydro environmental impact statement.

Response:

The EIATR is a technical report developed in support of Manitoba Hydro's Environmental Impact Statement filed with Manitoba Conservation and Water Stewardship related to the Bipole III Transmission Project. The views in that report are the views of Manitoba Hydro.

Date	August 1 2012
Reference	Air Quality S. 6.2.2, 8.2.2.1
Source	CEC Information Request #6
Question	CEC/MH-VI-343a

MH states that air quality is an important environmental component that requires protection and monitoring to maintain the current level of quality enjoyed in Manitoba. Potential effects are identified as the result of vehicle emissions, burning, clearing and dust generation.

Question:

Please provide baseline air quality data metrics for nitrogen oxides (NOx), volatile organic compounds (VOCs), particulate matter (PM10 and PM2.5), ozone (O3) and other air quality parameters that may be impacted by the project.

Response:

Manitoba Conservation has operated and maintained an ambient air quality monitoring program for specific locations within the province since 1968. The Province's ambient air quality program monitors air for carbon monoxide (CO), particulate matter (PM_{10}), nitrogen dioxide (NO_2), nitrogen oxides (NO_X), ground-level ozone (O_3) and fine particulate matter ($PM_{2.5}$). Manitoba Conservation issues annual reports for Manitoba's monitored ambient air quality with the most recent report issued covering the period 2003 to 2005. Manitoba Conservation air quality monitoring program consists of dedicated monitors in permanent locations and relate to either General/Urban Air Quality or Industrial (source specific) monitoring.

The Project components for Bipole III are located across a large area stretching from the boreal forest region of northern Manitoba to the rural agricultural areas of southern Manitoba. Manitoba's monitoring network consists of only urban centres, including

Winnipeg, Brandon, Flin Flon and Thompson. There are no ambient air quality monitors in remote and/or rural locations in the province.

In addition to the Province's network of air quality monitoring stations, a few additional stations have been established specific to companies with operations in Manitoba. Environment Canada operates an air quality monitoring station in Flin Flon, where data is collected on sulphur dioxide, carbon monoxide, nitrous oxide, ozone, particulate matter and volatile organic compounds. The mining company Vale also conducts regular monitoring of sulphur dioxide at nine sites in Thompson.

Manitoba generally enjoys excellent air quality which is comparable to or better than air quality in other parts of Canada. Air quality in Manitoba is rated by Environment Canada as "generally good" (Krawchuk and Snitowski 2008). Air quality concerns in Manitoba tend to be local in nature, related to presence of odours, noise and other pollutants. The main source of these pollutants are industrial and agricultural operations, and vehicle emissions. In northern Manitoba, emissions from metallurgic smelters in Flin Flon and Thompson, as well as smoke from fires, tend to be the primary sources of air pollution. The status of these two smelters as a source of air pollution have changed, or is changing, as noted below.

The Province of Manitoba has adopted National Ambient Air Quality objectives for those pollutants for which objectives have been established (i.e., sulphur dioxide, suspended particulate matter, carbon monoxide, ozone and nitrogen dioxide). Air Quality Guidelines have been developed and adopted for other specific pollutants and guidelines (Krawchuk and Snitowski 2008). The guidelines have three levels: the maximum tolerable level (MTL), the maximum acceptable level (MAL) and the maximum desirable level (MDL). A listing of "Ambient Air Criteria" currently endorsed by Manitoba Conservation and Water Stewardship can be found at the following Provincial government website: http://www.gov.mb.ca/conservation/pollutionprevention/airquality/aq-criteria/ambientair_e.html.

A summary of results of annual air pollutant concentration levels at specific monitored sites with comparison to Manitoba Air Quality criteria, where applicable criteria exist, are found in the latest available annual report (Krawchuk and Snitowski 2008). Air quality is represented by an Air Quality Index (AQI) as a measure of overall air quality based on a number of potential contaminants which provides a general understanding of air quality.

According to the last Manitoba Conservation Provincial Sustainability Report for Manitoba (2009), an hourly AQI for Winnipeg has been calculated since 1987 and for Brandon and Flin Flon since 1997. Air quality in Winnipeg is relatively unchanged since data has been collected and has been good for over 95% of the time in recent years. Brandon and Flin Flon air quality has also continued to be good, 85% or more of the time over the period data has been collected (Manitoba Conservation 2009). The overall trend for air quality in Winnipeg, Brandon and Flin Flon is deemed to be stable.

The lack of available air quality data for remote and rural areas across Manitoba in the vicinity of the Project's local Study Area and sites is a limitation for assessing what is predominantly a greenfield development. In order to provide some context with respect to air quality parameters potentially affected within the Project Study Area, a discussion of air quality is presented for the closest regional monitoring locations at Winnipeg, Flin Flon and Thompson.

Winnipeg's Air Quality Index for the period 2003 to 2005 was derived from air quality data at two stations located in a residential area and a downtown area of Winnipeg and is designed to describe the general air quality of air in urban centres, not the condition of air downwind from a specific source of emissions. In 2004 and 2005 for the downtown area, there were eight hours and 22 hours respectively where the Air Quality was Poor with no Very Poor hours, while in 2003 there were no Poor or Very Poor hours. Reported results for specific pollutants are noted from Krawchuk and Snitowski (2008). The maximum 1-hour and 8-hour concentrations of carbon monoxide in the downtown area have not exceeded MAL since 1978. The average levels of carbon monoxide were lower in the residential area and there were no exceedances of Provincial Criteria in any year. The 1-hour MAL for ground level ozone at the downtown station has not been exceeded since 1990 and has not been exceeded in the residential area since 1989.

Monitoring of inhalable particulates (PM_{10}, $PM_{2.5}$) indicated concentration spikes for both parameters in November 2005 which was due to smoke from a buidling fire two blocks away from the monitoring location. None of the daily 24-hr averages for $PM_{2.5}$ in 2003, 2004 and 2005 exceeded a new Canada Wide Standard (CWS) set for this parameter at the residential site. Manitoba has no Air Quality Objectives or Guidelines for nitrogen oxides or for VOCs.

Sulphur dioxide (SO_2) has been a common air pollutant in Manitoba and in portions of the Project Study Area. It reacts with water vapour to form sulphuric acid. The resulting acid precipitation can occur long distances from where the sulphur dioxide has been emitted. Up until June 2010, sulphur dioxide emissions were monitored at five locations near the Hudson Bay Mining and Smelting Co. Limited (HMB&S) zinc and copper smelter in Flin Flon. As of June 2010, the smelter operation at Flin Flon has been closed. For the last complete reporting year (2009), HBM&S reported that its emissions for sulphur dioxide were 144 kilotonnes (below the regulated limit of 220). This emission level was within the 2008 federal pollution prevention target for SO_2.

Monitoring locations also exist near the VALE (INCO) Limited nickel smelter in Thompson. For 2005, the last reporting year where data was available on air quality in Thompson, SO_2 emissions were 180 kilotonnes (down from 192 kilotonnes the previous year). In the mid-1990s, these two smelters, both within the Boreal Shield ecozone, accounted for over 95% of the human-caused emissions of sulphur dioxide in Manitoba (Manitoba Environment 1997). The emissions have continually decreased over the years with better control of sulphur dioxide from the metallurgic smelters. Precipitation has remained at acceptable levels and not within the range usually associated with human-caused acid rain. Acid rain is not a problem within the province as acidic precipitation is not generally elevated and most of the soils and surface waters have a buffering capacity to neutralize such deposition. However, Manitoba is continuing its overall efforts to reduce SO_2 emissions. VALE subsequently announced in December 2010 that it was closing down its smelter operations in Thompson beginning in 2012.

Existing air quality in Manitoba is considered to be good in general (Krawchuk and Snitowski 2008) based on locations where data has been collected. There is a lack of

heavy industrial development within the Project local Study Area and sites and few if any substantive emission sources in the vicinity of the Project, particularly now with the winding down of two metallurgic smelters in Flin Flon and Thompson. Air quality for the Project local study area and sites is expected to be primarily influenced by long-range transport of airborne pollutants. The Project's local Study Area and sites (i.e., transmission line rights-of-way and converter station sites and associated facilities) are consistent with more remote, rural lands and largely non-industrialized land, where air quality is considered typically to be of good quality.

References:

Krawchuk, B.P. and A. Snitowski. 2008. Manitoba Ambient Air Quality: Annual Reports for 2003, 2004 and 2005. Report No. 2008-1 (online). Available from http://www.gov.mb.ca/conservation/pollutionprevention/airquality/pdf/2003_05_ambient_air_quality_annual_report.pdf.

Manitoba's Ambient Air Quality Guidelines. Objectives and Guidelines for Various Air Pollutants: Ambient Air Quality Criteria. Accessed at: www.gov.mb.ca/conservation/pollutionprevention/airquality/aq-criteria/ambientair_e.html. Updated July 2005).

Manitoba Conservation. 1997. State of the Environment. Moving Towards Sustainable Development Reporting. Department Annual Reports.

Manitoba Conservation. 2009. Provincial 2009 Sustainability Report for Manitoba. Department Annual Reports.

Date	August 1 2012
Reference	Air Quality S. 6.2.2, 8.2.2.1
Source	CEC Information Request #6
Question	CEC/MH-VI-343b

MH states that air quality is an important environmental component that requires protection and monitoring to maintain the current level of quality enjoyed in Manitoba. Potential effects are identified as the result of vehicle emissions, burning, clearing and dust generation.

Question:

Please quantify the expected changes in air quality parameters as a result of (i) project construction and (ii) project operation.

Response:

The approach to considering potential effects of the Project on local air quality consisted of a baseline description of the air environment (please see response to *CEC/MH-VI-343a)*, identification of potential effects related to Project construction and operation activities on local air quality, and an analysis of any potential changes to local air quality. This approach was based largely on the use of available information and review of previous experience with construction and operation practices involving similar transmission facilities. A qualitative approach was utilized as there is an absence of regional ambient air quality data (as discussed in *CEC/MH-VI-343a*) to be able to quantify changes in air quality parameters resulting from project construction and operation.

In terms of air quality, data from the closest regional monitoring locations in Thompson and Winnipeg were accessed. Potential air pollutants arising from construction and operation activities can include sulphur dioxide (SO_2), carbon monoxide (CO), nitrogen

oxides (NO_X), volatile organic compounds (VOCs), ozone (O_3), and total suspended particulate matter (PM, PM_{10}, $PM_{2.5}$). A review of air quality monitoring data collected from these two centres for the last available reporting period (2003-2005 inclusively) indicated that surrounding air quality is good for the most part (see response to *CEC/MH-VI-343a*). Recent reported events associated with the closing and/or winding down of metallurgic smelters in both Flin Flon and Thompson will likely serve to improve local air quality in and around these areas.

Construction for Bipole III will involve the use of heavy machinery and construction activities with the potential to generate temporary, localized changes to air quality. Emissions during Project construction will mainly be associated with exhaust from diesel and gasoline engines (construction equipment), land clearing for the transmission line rights-of-way and sites, ground excavation, drilling and blasting, earth moving operations and construction of the converter stations as well as supporting infrastructure. Release of pollutants during operation of the Bipole III Project can include trace amounts of ozone which can be produced by chemical reactions in periods of high humidity (i.e., air surrounding a conductor becomes electrically ionized [charged] producing a corona effect).

The nature of emissions from construction activities associated with the transmission line components of Bipole III is such that sources will be mobile or transient within the construction zones. For the converter station and associated facilities sites, emission sources from construction will be longer term, but typically variable and intermittent, as not all construction equipment will be in operation simultaneously. Potential effects on air quality are discussed for the transmission lines and converter stations in turn as noted below.

<u>Bipole III Transmission Lines</u>:

For the Bipole III transmission lines, potential effects on air quality are expected to result from clearing, burning, dust generation and vehicle emissions. There will be a temporary increase in vehicular and equipment traffic during clearing and construction activities resulting in potentially higher vehicle (i.e., engine exhaust and hydrocarbon

vapours) and dust emissions affecting local air quality. To the extent that vehicle emissions will occur as a result of highway/road transport of equipment, materials and personnel, emission levels associated with construction are expected to have only a very small effect on local air quality as the concentration of vehicles and equipment will be localized to specific areas for limited amounts of time. Winter clearing and construction activities will further minimize potential dust impacts. The burning of slash from clearing activities is expected to take place in the winter (i.e., under suitable weather/wind conditions) and in accordance with relevant permits. The main air pollutants from wood smoke can include: carbon monoxide (CO), particulate matter (PM_{10}, $PM_{2.5}$), VOCs, and nitrogen oxides (NO_x). As the air quality in Manitoba is considered good in general and Bipole III construction activities are mostly located away from urban areas, there will be limited effects on air quality. With adherence to proper mitigation measures (i.e., proper maintenance of vehicles, restricting idling, use of low-sulphur diesel fuels), potential effects on local air quality are expected to be inconsequential and will not likely be an issue for workers or the general public.

Ongoing operation and maintenance activities are unlikely to affect local air quality, as inspection and maintenance patrols of the transmission line rights-of-way, including structures and hardware, are typically undertaken two or three times a year by fixed wing aircraft or helicopter. Ground patrols are typically conducted once per year. Non-scheduled patrols or maintenance may also be conducted by ground or air should unexpected repairs to the lines be required. Potential effects will be short-term and localized and are not expected to be a concern for local air quality.

There is the potential for release of hazardous materials into the air as a result of accidental spills of solvent, fuels, etc. during construction or operation activities. With adherence to proper mitigation measures (i.e., emergency response preparedness, proper spill response equipment, dedicated storage areas), potential effects on local air quality would be short-term and localized.

Converter Stations and Associated Facilities:

For the Keewatinoow and Riel converter station sites and associated facilities, potential effects on air quality are expected to result from clearing, dust generation and vehicle emissions. There will be a temporary increase in vehicular and equipment traffic during clearing and construction activities resulting in potentially higher vehicle (i.e., engine exhaust and hydrocarbon vapours) and dust emissions affecting local air quality. The concentration of vehicles and equipment will be localized to specific sites for limited amounts of time. Dust emissions will vary during the construction period and will be influenced by the level of construction activity, specific operations and local weather conditions. The nature of construction involves a series of different activities and operations, each with its own associated dust emissions.

As the air quality in Manitoba is considered good in general and converter station construction activities are mostly located away from or on the fringe of urban areas, there will be limited effects on air quality. Given that Project components involve relatively small footprints/sites, construction effects on air quality from the converter stations and associated facilities are not expected to be an issue in a regional context. With adherence to proper mitigation measures (i.e., application of dust suppressant [watering]) for nuisance or visibility issues, proper maintenance of vehicles, restricting idling, use of low-sulphur diesel fuels), potential effects on local air quality while likely present are expected to be minimal and incremental in nature for surrounding areas. It is unlikely that emissions will be detectable beyond the local Project Study Area (i.e., sites).

Air emissions associated with the operation of the converter stations and associated facilities are expected to be minor in nature and are associated with activities such as operation of generators and other equipment, and transport of operators by vehicles to the converter station sites. These effects are considered to be small, localized and continuous in nature. It is expected that 42 persons will be on-site at the Keewatinoow converter station and another 45 persons on-site at Riel once operational, the majority of which would occur during the day. The volume of traffic resulting from operations (e.g., commuting) is considered minor. In general, impacts to air quality associated with

converter station operations will be minimal and managed by adherence to applicable regulations, guidelines and standard codes of practice. This includes maintaining emergency preparedness plans, maintaining vehicles and other equipment in good working order, compliance with federal emissions and efficiency standards, and control of emissions from dust, combustion gases by posted speed limits, use of dust control and implementation of a no idling policy.

Manitoba Hydro has standard procedures in place which will minimize potential effects or air quality from converter station sites and associated facilities from ongoing operation and maintenance activities. These include protocols to address potential effects on air quality from the occurrence of contingency events (e.g., transformer fire). Both the Keewatinoow and Riel converter stations will be designed and operated in accordance with Manitoba Hydro's Fire Manual that involves the use of proper fire suppression measures (i.e., deluge water, reservoir system).

As stated in section 8.2.2.5 of the Bipole III EIS, the effects of the Project on air quality are expected to be negative in direction, small in magnitude, limited to the Local Study Area, short term in duration for construction, medium term for Operations, and overall not significant.

Date	August 1 2012
Reference	Baseline Human Health p. -6-210
Source	CEC Information Request #6
Question	CEC/MH-VI-344a

Question:

MH states that a summary of infant mortality and life expectancy in various regions of the province provide an indicator of overall health in the project study area. Please provide other relevant baseline health indices including cancer, heart and respiratory disease rates, and hospital admissions.

Response:

For the Bipole III Transmission Project, there is no direct pathway of effect between the Project and health indices such as cancer, heart and respiratory disease rates and hospital admissions related to such diseases. As such, baseline information related to these diseases was not collected.

Date	August 1 2012
Reference	Baseline Human Health p. -6-210
Source	CEC Information Request #6
Question	CEC/MH-VI-344b

Question:

Please identify major health determinants in the study area including socio-economic status, traditional foods and overall diet, exercise, alcohol and drug abuse and other health determinants as listed in Manitoba Community Health Assessment Guidelines (2009).

Response:

The Manitoba Community Health Assessment Guidelines (2009) is a document prepared for Manitoba health authorities to support these health authorities in defining the health needs of their populations. This document was prepared specifically for Manitoba health authorities. As reviewed in response to *CEC/MH-VI-347b*, in the case of the Bipole III Project there is no direct pathway of effect between known Project effects and human health indices such as cancer, heart and respiratory disease rates and hospital admissions related to such diseases.

The Bipole EIS was specifically informed by the Scoping Document and considered workplace health and safety and human health and well being pursuant to direction provided therein. The following was considered in the EIS:

- Human health was described in Chapter 6 (baseline), section 6.3.6.3
- Human health was considered as a VEC in Chapter 8 where there was a pathway of effect (i.e., issues related to noise, vibration, dusk, EMFs and herbicides as considered in Section 8.3.5).

- Community Services were considered as a VEC in Chapter 8 - this included consideration of potential effects on local community health and emergency response services.

Date	August 1 2012
Reference	Economy S. 8.3.3., 10.2, p10.5
Source	CEC Information Request #6
Question	CEC/MH-VI-345a

Question:

MH states direct employment opportunities for new employees will be generated during the construction and operation phases. It provides some additional detail relating to employment and income at a provincial level later in the filing.

Please provide projected total direct and indirect employment and income opportunities (using current socio-economic multipliers) associated with the project.

Response:

Economic impact multipliers for Manitoba during the construction phase of the project are described on Page 7 of the Economic Impact Analysis Technical Report.

Date	August 1 2012
Reference	Economy S. 8.3.3., 10.2, p10.5
Source	CEC Information Request #6
Question	CEC/MH-VI-345b

MH states direct employment opportunities for new employees will be generated during the construction and operation phases. It provides some additional detail relating to employment and income at a provincial level later in the filing.

Question:

Please provide projected population impacts on local communities and impacts on community services such as housing, schools and health care facilities.

Response:

HVdc Transmission Line and ac Collector Lines: As stated in Section 8.3.3.3 pg. 8-288, operation phase employment generally involve (a) regular line maintenance by Manitoba Hydro and contractor staff; and (b) limited short-term contracts for brush clearing to maintain the transmission line right-of-way. The latter could periodically provide opportunities for employment opportunities to local communities. There will be no associated population growth in local communities with operation and maintenance of the transmission lines; and therefore no effects on local community services.

Keewatinoow Converter Station: The socio-economic supplemental material submitted July 31, 2012, Tab 3.2 provides projected population growth in Gillam in relation to the Keewatinoow Converter Station and Tab 3.4 provides additional information regarding effects assessment on community services (operation phase) related to the Keewatinoow Converter Station. The supplemental material includes effects on housing, schools and health care facilities from a projected population growth of 110 to 140 people due to the operation of the Keewatinoow Converter Station.

Riel Converter Station and Associated Facilities: As noted in Section 8.3.3.3 on pg. 8-293, the Riel Converter Station will employ 45 operation and maintenance staff. Given the proximity of the station to the City of Winnipeg, there is no projected population growth on the City associated with the Riel station; therefore no effects on community services.

Date	August 1 2012
Reference	Human Safety and Human Health S 8.3.5.2 pp 8-316 to 8-3342
Source	CEC Information Request #6
Question	CEC/MH-VI-346a

Question:

A large project such as this will result in both positive and negative socioeconomic impacts that may affect overall community health status. MH identifies potential sources of effects on human health (EMF, dust, herbicides) but concludes there will be no significant impact. EMF was assessed in some detail but other sources of effects on human health were only qualitatively addressed or not addressed at all. Accidents and malfunctions (Section 8.4) are generic representations that do not include impact or risk assessment of such. Worst case scenarios (e.g. chemical spills, fires, explosions) should be identified and assessed within the HHRA. "The purpose of a community health assessment is to collect, analyze and present Information so that the health of the population can be understood and improved and to provide evidence to inform health service planning. It provides baseline information about the health status of community residents, tracks health outcomes over time, and helps to identify opportunities for disease prevention, health promotion and health protection". Manitoba CHA guidelines are available "Community Health Assessment Guidelines", 2009. Manitoba Health and Healthy Living, 41pp.

Please provide a community health assessment to identify impacts of the project on locally affected communities and residents.

Response:

Please see responses provided for *CEC/MH-VI-334a, CEC/MH-VI-334b* and *CEC/MH-II-020b.*

Date	August 1 2012
Reference	Human Safety and Human Health S 8.3.5.2 pp 8-316 to 8-3342
Source	CEC Information Request #6
Question	CEC/MH-VI-346b

Question:

A large project such as this will result in both positive and negative socioeconomic impacts that may affect overall community health status. MH identifies potential sources of effects on human health (EMF, dust, herbicides) but concludes there will be no significant impact. EMF was assessed in some detail but other sources of effects on human health were only qualitatively addressed or not addressed at all. Accidents and malfunctions (Section 8.4) are generic representations that do not include impact or risk assessment of such. Worst case scenarios (e.g. chemical spills, fires, explosions) should be identified and assessed within the HHRA. "The purpose of a community health assessment is to collect, analyze and present Information so that the health of the population can be understood and improved and to provide evidence to inform health service planning. It provides baseline information about the health status of community residents, tracks health outcomes over time, and helps to identify opportunities for disease prevention, health promotion and health protection". Manitoba CHA guidelines are available "Community Health Assessment Guidelines", 2009. Manitoba Health and Healthy Living, 41pp.

Please provide a human health risk assessment (HHRA) that identifies and assesses sources of health risks other than EMF (which has been addressed in the EIS). Examples include air emissions during construction and operations, dust, herbicides, chemical spills, contamination of country foods, hazardous wastes, drinking water quality. The scope of the human health assessment should address the following potential exposure

pathways related to human health as stated in Health Canada 2010. "A Primer on Scientific Risk Assessment at Health Canada":

- Air Quality Effects
- Contamination of country foods (fish, wild game, garden produce, berries etc.)
- Drinking and Recreational Water Quality
- Electric and Magnetic Fields Effects
- Noise Effects
- Human Health Risk Assessment (HHRA) and Risk Management
- Air, Water and Soil Quality Guidelines/Standards Used in HHRAs
- Toxicology (multimedia – air, water, soil)
- First Nations and Inuit Health

The scope of the HHRA (Item 6) should follow the standard risk assessment paradigm and include: (i) problem formulation (identification of hazards, receptors and exposure pathways, (ii) exposure management, (iii) toxicity (hazard) assessment, and (iv) risk characterization and risk management/mitigation. Health Canada advises that consideration be given to potential effects on human health for all phases of a proposed project (i.e. construction, operation, modification, decommissioning and abandonment), and that baseline data, predicted project values, and cumulative effects be considered, as appropriate. Health Canada suggests that all information relevant to human health be documented in one section of the environmental assessment, and that all relevant assumptions, reference values, models, equations and reference citations be clearly stated. Note: Health Canada's role is advisory only. The responsible authority (or the provincial/territorial authority) determines how the advice provided by Health Canada will be used in the environmental assessment process, and the responsible authority (or provincial/territorial authority) makes all decisions related to the environmental assessment of the project. In areas of jurisdictional overlap, it is the responsible authority's (or the provincial/territorial authority's) responsibility to determine whether Health Canada's advice is applicable.

Response:

The justification for undertaking a human health risk assessment is under conditions of real risk of emissions or the release of contaminants of concern to potential human receptors under an existing pathway(s) for human exposure to said contaminants of concern (Health Canada, 2010: Useful Information for Environmental Assessments).

In the case of the Bipole III Transmission Project, the exposure pathways would be through the release of hazardous materials and/or spills into water or soil, effects on drinking or recreational water quality, noise and contamination of country foods through spills or release of hazardous materials. The majority of these are contingency events and are not expected to occur and as such a human risk assessment is not required. Those which are not contingency events have been addressed in the Chapter 8 of the Bipole III EIS e.g. noise and EMF.

When undertaking the construction, operation and decommissioning of a project such as the Bipole III Transmission Project, Manitoba Hydro must adhere to standards, guidelines and legislative requirements that link to the above exposure pathways. This information is contained in the following documents:

- Attachment 11-1 to Chapter 11, Environmental Protection, Follow-Up and Monitoring. As stated in Section 11.2.1:

> "Manitoba Hydro's Environmental Protection Program provides the framework for the delivery, management and monitoring of environmental and socio-economic protection measures that satisfy corporate policies and commitments, regulatory requirements, environmental protection guidelines and best practices, and input from stakeholders and the Aboriginal community. The Program describes how Manitoba Hydro is organized and functions to deliver timely, effective, and comprehensive solutions and mitigation measures to address potential environmental effects. Roles and responsibilities for Manitoba Hydro employees and contractors are defined, and management, communication and reporting structures are outlined. The Environmental

Protection Program includes the what, where and how aspects of protecting the environment during the pre-construction, construction, operation and decommissioning of the Project."

- In the case of spills of hazardous materials, Section 3.7.4, Table 34 identifies the management of hazardous materials, including adherence to provincial legislation (provided in Appendix C) and Manitoba Hydro's policies (Appendix E); and Section 3.7.2, Table 32 addresses emergency response measures. Similarly, the safe use, handling, storage and disposal of petroleum products is covered under Section 3.7.5, Table 35.

- In the case of noise (e.g., blasting), Section 3.4.1, Table 2 identifies the management of blasting in both urban and remote northern areas.

- Section 3.7.6 includes general environmental protection measures pertaining to Safety and Health (see Table 36); Section 3.7.7 includes measures related to soil contamination (Table 37); and Section 3.5.6 includes measures related to potable water and wells.

- Project Description, Chapter 3 includes information related to camp construction, adherence to legislation, standards and policies relating to spills etc. and includes a commitment to environmental protection (reiterated in Attachment 11-1). Given the above measures that are already in place, and applicable provincial legislation there is no requirement to undertake a human health risk assessment for this Project.

See also *CEC/MH-II-020b*.

Date	August 1 2012
Reference	Human Safety and Human Health S 8.3.5.2 pp 8-316 to 8-3342
Source	CEC Information Request #6
Question	CEC/MH-VI-346c

Question:

The scope of the human health assessment should address the following potential exposure pathways related to human health as stated in Health Canada 2010. "A Primer on Scientific Risk Assessment at Health Canada":

- Air Quality Effects
- Contamination of country foods (fish, wild game, garden produce, berries etc.)
- Drinking and Recreational Water Quality
- Electric and Magnetic Fields Effects
- Noise Effects
- Human Health Risk Assessment (HHRA) and Risk Management
- Air, Water and Soil Quality Guidelines/Standards Used in HHRAs
- Toxicology (multimedia – air, water, soil)
- First Nations and Inuit Health

The scope of the HHRA (Item 6) should follow the standard risk assessment paradigm and include: (i) problem formulation (identification of hazards, receptors and exposure pathways, (ii) exposure management, (iii) toxicity (hazard) assessment, and (iv) risk characterization and risk management/mitigation.

Health Canada advises that consideration be given to potential effects on human health for all phases of a proposed project (i.e. construction, operation, modification, decommissioning and abandonment), and that baseline data, predicted project values, and cumulative effects be considered, as appropriate. Health Canada suggests that all

information relevant to human health be documented in one section of the environmental assessment, and that all relevant assumptions, reference values, models, equations and reference citations be clearly stated.

Note: Health Canada's role is advisory only. The responsible authority (or the provincial/territorial authority) determines how the advice provided by Health Canada will be used in the environmental assessment process, and the responsible authority (or provincial/territorial authority) makes all decisions related to the environmental assessment of the project. In areas of jurisdictional overlap, it is the responsible authority's (or the provincial/territorial authority's) responsibility to determine whether Health Canada's advice is applicable.

c) Given that the accidents and malfunction (Section 8.4) are generic representations that do not include impact of risk assessment of such, please identify and assess worst case scenarios (eg. Chemical spills, fires, explosions) within the HHRA.

Response:

CEC/MH-II-020i provides a response on the question of accidents and malfunctions in terms of worst case scenarios.

In addition, Section 8.4 on accidents and malfunctions directs the reader to the draft Bipole III Environmental Protection Plan (Attachment 11-1) in general, as well as specific sections related to spills, hazardous materials, emergency preparedness and response and fire/explosions. Adherence to legislative requirements, standards and Manitoba Hydro policies is required. See also *CEC/MH-VI-344b*.

Date	August 1 2012
Reference	Section 9 Cumulative Effects
Source	CEC Information Request #6
Question	CEC/MH-VI-347a

The cumulative effects assessment (Section 9.0) is very vague, generic and qualitative, with only checklists identifying potential cumulative effects between known and announced projects. The conclusion (.... a small magnitude, medium-term cumulative effect is expected....) is not defensible on the basis of the CEA.

The Socio-Economic Assessment (Section 9.3.3) utilizes red squares in Table 9.3.2 to Represent "potentially non-negligible negative cumulative effects" on personal, and community life. Again this is a qualitative assessment that could benefit substantially form a community health assessment with the objective of identifying and mitigating potential adverse social effects, while specifically identifying community socio-economic and health benefits and opportunities for local residents.

Monitoring plans (Section 9.0) could benefit by adding human community health monitoring that would not necessarily be cost prohibitive (eg selected blood and urine monitoring within communities as was done in Flin Flon as the mine and smelter operation was being decommissioned).

Question:

Please provide a quantitative CEA that realistically addresses the cumulative impacts of this project (i.e. not simply assuming that all biophysical and socioeconomic impacts of this project are "not significant"), in combination with other announced industrial projects, in a quantitative manner, to the extent possible.

Response:

The environmental assessment did not "simply assume" that effects of the Project are "not significant".

The cumulative effects assessment for the Bipole III Transmission Project reflected the outcome of extensive analysis that started with a route and site selection process appropriate for a transmission project environmental assessment, involving a variety of route options over a large Project Study Area, and with an objective to avoid adverse effects where feasible through selection of a preferred route. Following selection of a preferred route and other Project sites as described in Chapter 7, valued environmental components (VECs) relevant to the remaining expected effects of the Project were identified and an environmental assessment of expected Project effects on these VECs was carried out in Chapter 8. This effects assessment for each VEC was conducted by Project component during construction and operation, taking into consideration the likely effects of the Project on each VEC in the context of other past and existing projects having effects on that VEC. Chapter 9 then provided a high level screening to identify any VECs having potentially non-negligible cumulative effects beyond those already assessed in Chapter 8, and provided further cumulative effects assessment analysis of each VEC so identified.

In order to respond to this question, the above assessment process is reviewed in more detail below.

As set out in Chapter 4 (Assessment Approach), environmental assessment of the Bipole III Transmission Project followed an SSEA process that involved a phased approach using increasing levels of study area refinement leading to the selection of a preferred route and other Project component sites that balanced physical, biological, socio-economic, technical (engineering) and cost perspectives with input from ongoing environmental assessment and consultation with a variety of stakeholders in route and site selection for the proposed Project. The following primary tasks were undertaken in support of this process (and described in further detail in Chapter 4):

- Scoping of Project description and Project phases;

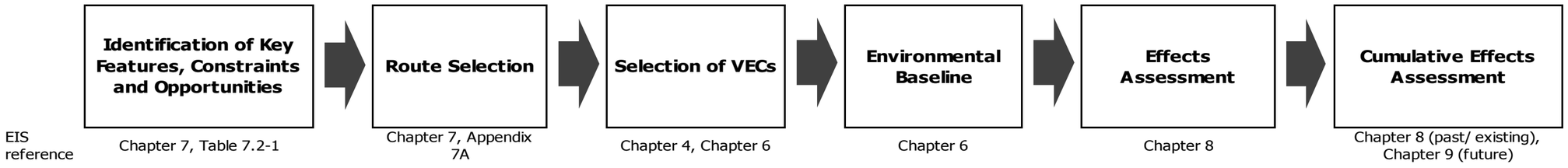
- Study area delineation and characterization;
- Consultation;
- Route and site selection;
- Selection of valued environmental components;
- Data gathering (biophysical and socio-economic);
- Identification and assessment of environmental effects;
- Development of mitigation measures; and
- Significance evaluation.

As the SSEA moved in an iterative manner towards selection of a preferred final route for the HVdc transmission line and final sites for other Project components, specific biophysical and socio-economic environmental components that could still be impacted by the Project were identified as important or valued by members of the proponent's technical team, and/or by the public, by ATK studies and by other elements of the SSEA process. The identified Valued Environmental Components (VECs) facilitated assessment of the interactions between the specific valued components in the environment and the Project Components defined by the preferred final route and sites.

Both adverse effects and potential beneficial effects of the Project were assessed on VECs in Chapter 8. Environmental effects were expressed quantitatively to the extent possible. Where quantification was not possible, qualitative methods were used to estimate and compare effects systematically. Where insufficient data were available to support a high level of certainty, the constraints on the conclusion were so noted. As described in Chapter 4 (Assessment Approach) the effects Assessment in Chapter 8 considered the residual adverse effects after mitigation of the Project on VECs and a significance determination was made considering the criteria set out in the Bipole III Scoping Document. As noted in Chapter 4, VECs with residual adverse effects after mitigation were then considered further in Chapter 9 (Cumulative Effects).

Figure 1 below illustrates the SSEA process as described and indicates for each biophysical and socio-economic subcomponent the number of VECs considered at each stage of the assessment process.

Bipole III Transmission Line Project
VEC Selection and Application within Site Selection Environmental Assessment process



With regard to the cumulative effects assessment, Tables 1 through 5 provided as Attachment 1 to this response review in detail the screening process described in Chapter 9 of the EIS. This process flows out of and is consistent with the SSEA process described above (and detailed in Chapter 4), and is appropriate to the type of transmission project being undertaken, i.e., a linear development as examined in a large Project Study Area where the assessment seeks to avoid significant adverse effects at the outset through the routing and site selection process.

Of the 46 Biophysical VEC and 21 Socio-economic VECs considered in the Effects Assessment (Chapter 8) that took into account effects on each VEC of other past and existing projects:

- 44 biophysical VECs were assessed in Chapter 8 to have "not significant" residual adverse effects that are considered further in Chapter 9[1]; and
- 20 socio-economic VECs were assessed in Chapter 8 to have "not significant" residual adverse effects that are considered further in Chapter 9.[2]

The remaining 44 biophysical and 20 socio-economic VECs considered in Chapter 9 are screened further in that chapter to determine which, if any, VECs require additional cumulative effects assessment with regard to Project effects in combination with the effects of other projects (specifically including other future and prospective future projects not considered in the Chapter 8 assessment). The Chapter 9 screening is based on the geographic extent of the residual adverse effect of the Project on the VEC, as well as the expected magnitude of the effect, as provided in the Chapter 8 effects assessment. The screening process in Chapter 9 is described in greater detailed below. This screening results in additional cumulative effects assessment in Chapter 9 on 1 biophysical VEC (Boreal Woodland Caribou) and 2 socio-economic VECs (Community Services, Travel and Transportation and Public Safety).

[1] Two biophysical VECs are not considered further in the Chapter 8 assessment due to determination of negligible effects from the Project on the VEC: Groundwater Quality and Dakota Skipper.
[2] One socio-economic VEC has positive effects and is not considered further: Economic Opportunities.

Screening of Biophysical VECs in Cumulative Effects Assessment

The screening of biophysical VECs considered in Chapter 9 (Cumulative Effects Assessment) indicates as follows:

- Section 9.3.2 noted that residual adverse effects of the Project for certain biophysical VECs were effectively limited to the immediate rights-of-way and footprint area of the Project and as such the only real prospect of a related cumulative biophysical effect beyond that assessed in Chapter 8 would occur where there is a further development on or adjacent to the rights-of-way for the HVdc transmission line, the 230 kV ac northern collector lines, the northern converter station or ground electrode site and line. Overall, Section 9.3.2 concludes that non-negligible cumulative adverse effects are not expected for these biophysical VECs due to the site specific effects and general low magnitude of effects of the Project as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on in Attachment 1 with added information on the relevant VECs.
- Section 9.3.2.1 noted that residual adverse effects of the Project for certain biophysical VECs were effectively geographically limited to the Local Study Area. Overall, Section 9.3.2.1 concludes that non-negligible cumulative adverse effects are not expected for these biophysical VECs due to the limited geographic extent of Project effects and general low magnitude of Project effects as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on in Attachment 1 with added information on the relevant VECs.
- Section 9.3.2.2 of Chapter 9 (Cumulative Effects Assessment) focused consideration on the potential non-negligible cumulative adverse effects on Boreal Woodland Caribou (Wabowden, Reed Lake and Bog Ranges) due to potential for existing and past project and human activities, as well as other resource development to act cumulatively with the Project on this VEC. The high level screening analysis supporting this conclusion is elaborated on in Attachment 1 with added information on the relevant VECs.

The 44 biophysical VECs considered in Chapter 9 are screened further in that chapter based on the geographic extent of the residual adverse effect of the Project on the VEC, as well as the expected magnitude and duration of the effect, as provided in the Chapter 8 effects assessment.

- Of the 44 biophysical VECs assessed in Chapter 8 to have "not significant" residual adverse effects, seven have effects that extend only to the Project Site/Footprint geographic area and are considered not to have cumulative adverse effects beyond those assessed in Chapter 8.[3]
- Of the 37 biophysical VECs considered further in the screening process, 35 are considered to have effects that extend only to the Project Site/Footprint and/or Local Study Area (primarily related to the HVdc line component):
    - 28 of these remaining VECs have effects of the Project (all components and phases, as assessed in Chapter 8) that are also small in magnitude, which when considered with the limited geographic extent further reduces the potential for cumulative effects with other Projects beyond effects assessed in Chapter 8.
    - Six of these remaining VECs have effects of the Project that are small or negligible in magnitude during operation, and moderate magnitude but short term duration during construction; effects of future projects identified in Table 9.3-1 are not expected to overlap with effects of the Project in these VECs.
    - One VEC (American marten) with Local Study Area geographic extent has moderate magnitude effects of medium term duration. No prospect was identified of a related non-negligible cumulative biophysical effect of this VEC beyond that assessed in Chapter 8.
- Of the two remaining biophysical VECs considered further in the screening process, Boreal Woodland Caribou is the only VEC with residual adverse effects that are Project Study Area in geographic extent and considered in Table 9-3.2 to

[3] VECs with only Project Site specific effects are: Soil Productivity, Terrain Stability, Aquifer Productivity, Plant Species and Communities of Conservation Concern, Native Grasslands/ Prairie areas; Beaver and Wood Frog.

have potential non-negligible cumulative adverse effects for the Wabowden, Reed Lake and Bog ranges related to the HVdc Transmission component during construction and operation. Climate is the other VEC with residual adverse effects that are Project Study Area in geographic extent; however, these effects as assessed in Chapter 8 are small in magnitude during construction and operation.

A further, updated assessment of Project effects on Caribou was provided as Supplemental Material – Caribou (filed with CEC and MCWS August 8, 2012). This supplemental material includes a summary of current available information on cumulative effects related to Caribou due to this ongoing work. Specifically, this includes updates to baseline and other information and further refinements to the caribou effects assessment. This supplemental material does not change the conclusions regarding significance assessment related to biophysical VECs included in Chapters 8 and 9 of the Bipole III EIS.

Screening of Socio-economic VECs in Cumulative Effects Assessment

The screening of Socio-economic VECs in Chapter 9 (Cumulative Effects Assessment) indicates as follows:

- Section 9.3.3 notes that residual adverse effects of the Project on certain socio-economic VECs were effectively limited to the immediate right of way and footprint area of the Project (Project Site/Footprint) or to the broader Local Study Area, and as such the only real prospect of a related cumulative socio-economic effect beyond that assessed in Chapter 8 would occur where there is a further development on or adjacent to the rights-of-way or in the Local Study Area.
- Overall, Section 9.3.3 concludes that non-negligible cumulative adverse effects are not expected for these socio-economic VECs due to the site specific effects and general low magnitude of effects of the Project as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on in Attachment 1 with added information on the relevant VECs.

- VECs with effects in the broader Project Study Area were the focus of discussion provided in Section 9.3.3.1. This discussion focused on Construction Phase non-negligible adverse cumulative effects in the Project Study Area related to Services and Personal, Family and Community Life due to influx of workers in the Gillam area during construction of Keewatinoow. The high level screening analysis supporting this conclusion is elaborated on in Attachment 1 with added information on the relevant VECs.

The 20 socio-economic VECs considered in Chapter 9 were screened further in that chapter based on the geographic extent of the residual adverse effect of the Project on the VEC, as well as the expected magnitude and duration of the effect, as provided in the Chapter 8 effects assessment.

- Of the 20 socio-economic VECs assessed in Chapter 8 to have "not significant" residual adverse effects, five have effects that extend only to the Project Site/Footprint geographic area and are considered not to have cumulative adverse effects beyond those assessed in Chapter 8.[4]
- Of the 15 socio-economic VECs considered further in the screening process, 11 have effects that extend only to the Project Site/Footprint and/or Local Study Area.
- Of the 11 VECs with Local Study Area residual adverse effects, eight have effects that are small in magnitude, which when considered with the geographic extent further reduces the potential for cumulative effects with other Projects beyond effects assessed in Chapter 8. The three remaining VECs with Local Study Area effects have moderate magnitude effects[5].
- There are four VECs with residual adverse effects that are Project Study Area in geographic extent. Of these, the following are considered in Table 9-3.2 to have potential non-negligible cumulative adverse effects related to the Keewatinoow

[4] VECs with Project Site/Footprint effects are: Private Forest Lands; Infrastructure; Agricultural Land Use/ Productivity; Mining/ Aggregates; Heritage Resources.
[5] VECs with Local Study Area effects of moderate magnitude and short to medium term duration are: Designated Protected Areas and PAI (during construction); Domestic Resource Use (during construction) and Aesthetics (during operation).

Converter Station during construction: Community Services, Travel and Transportation and Public Safety.

The assessment provided Chapter 9 was based on the information available at that time. Since the Bipole EIS was filed, the Keeyask Generation Project EIS has been submitted for regulatory review (July 6, 2012). Attachment 2 to this response provides further updated socio-economic information consistent with the latest information, analysis and proposed mitigation included in the Keeyask Generation Project EIS, and specifically includes an updated cumulative effects workforce estimate table and brief explanatory text.

The additional information included Attachment 1 and Attachment 2 to this response does not change any conclusions regarding significance assessments related to socio-economic VECs included in Chapters 8 and 9 of the EIS.

ATTACHMENT 1 – OVERVIEW OF CHAPTER 9 SCREENING PROCESS

Biophysical – VECs with Site Specific Residual Effects

Section 9.3.2 of Chapter 9 (Cumulative Effects Assessment) noted that residual adverse effects of the Project for certain biophysical VECs were effectively limited to the immediate rights-of-way and footprint area of the Project and as such the only real prospect of a related cumulative biophysical effect beyond that assessed in Chapter 8 would occur where there is a further development on or adjacent to the rights-of-way for the HVdc transmission line, the 230 kV ac northern collector lines, the northern converter station or ground electrode site and line. Overall, Section 9.3.2 concludes that non-negligible cumulative adverse effects are not expected for these biophysical VECs due to the site specific effects and general low magnitude of effects of the Project as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on below with added information on the relevant VECs.

For each biophysical sub-component, Table 9.3-1 in Chapter 9 (as corrected in *CEC/MH-VI-226*) identifies past, existing and future projects having potential coincidence of effects with Project effects.

Table 1 below indicates Project biophysical VECs that have residual adverse effects that are expected to be Project Site/ Footprint in geographic extent, and as such Project effects on these VECs are not expected to overlap with effects from other projects or human activities unless they occur within or adjacent to the right of way/ footprint. For the following biophysical VECs as listed in Table 1, cumulative adverse effects beyond those assessed in Chapter 8 are ether expected not to occur or to be negligible:

- *Soils and Terrain* (soil productivity, terrain stability)
- *Groundwater* (aquifer productivity)
- *Aquatic environment* (surface water quality, fish habitat related to Keewatinoow Converter Station).

- *Terrestrial Ecosystems and Vegetation* (plant species and communities of conservation concern; native grasslands/ prairie areas)

- *Mammals and Habitats* (effects primarily related to construction and operation of the Keewatinoow Converter Station, borrow sites and ground electrode and line as they relate to American Marten, Beaver, Wolverine, Moose).

- *Amphibians & Reptiles* (effects related to construction and operation of the Keewatinoow Converter Station, borrow sites and ground electrode and line as they relate to Wood frog and Northern Leopard Frog, and HVdc Transmission Line as they related to Wood Frog).

For the above VECs cumulative effects related to any past or existing projects are considered as part of the existing environmental baseline and considered as part of the effects assessment in Chapter 8.

The magnitude of effects as assessed in Chapter 8 for most of these VECs in Table 1 is small (which, in addition to the limited geographic extent, further reduces the potential for any cumulative effect with other projects). Only the following of these biophysical VECs were assessed to have moderate or large magnitude effects from the Project in the context of other past and existing projects:

- *Soil Productivity* (moderate effects during construction due to loss of soil structure from compaction and rutting of heavy equipment in organic soil within the right of way of the HVdc Transmission line and northern Ground Electrode and line).

- *Terrain Stability* (moderate effects due to mass wasting and permafrost thaw following disturbance during construction within the right of way of the HVdc Transmission line and Ground Electrodes and lines).

- *Surface Water and Fish Habitat* (large effects during construction of the Keewatinoow Converter Station due to infilling of an unnamed non-fish bearing tributary and some loss of riparian vegetation).

- *American Marten* (due to specific habitat preferences for mature conifer forests, moderate effects during construction and operation of the Keewatinoow Converter Station due to functional habitat loss, and sensory disturbance; however, less than 0.1km^2 of the total 436.7 km^2 of American marten habitat in the Local Study Area will be removed for the Keewatinoow converter station).

In summary, focusing on the above Table 1 VECs having moderate or large site specific effects from the Project, the Chapter 9 screening of future and prospective future projects did not identify any prospect of a related non-negligible cumulative biophysical effect beyond that assessed in Chapter 8.

Table 1 – Biophysical VECs with Site Specific Residual Adverse Effects

VEC adversely affected by the Project	**Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)**	***Determination of Significance (Chapter 8)***
SOILS AND TERRAIN		
Soil productivity [*HVdc Transmission & ac collector*] [*Ground Electrodes & Lines*] [*Keewatinoow Converter Station & Area]*	• Loss of soil structure from compaction and rutting of heavy equipment in organic soil due to construction of HVdc Transmission line. • Loss of soil structure from compaction and rutting of heavy equipment in organic soil due to construction of Ground Electrodes and Lines (northern electrode site) • Topsoil removal and subsurface soil excavation and removal and increased water erosion potential and soil landscape alteration from borrow pit excavation due to construction in Keewatinow Station and Area.	***Construction – HVdc line & Ground Electrode and Lines (northern)*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Overall – Not Significant ***Construction*– Keewatinoow Station & Area** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Long Term Overall – Not Significant
Terrain Stability [*HVdc Transmission & ac collector*] [*Keewatinoow Converter Station & Area*]	• Potential effects related to loss of terrain stability due to mass wasting and permafrost thaw following disturbance due to construction of HVdc transmission line. • Potential effects on borrow pit slope stability due to construction in Keewatinoow site and area.	***Construction*** Direction – Negative Magnitude – Moderate (Small for Keewatinoow Station & Area) ***Geographic Extent – Project Site/ Footprint*** Duration – Long Term Overall – Not Significant

VEC adversely affected by the Project	**Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)**	***Determination of Significance (Chapter 8)***
[*Ground Electrodes & Lines*]	• Effects related to potential loss of terrain stability due to permafrost thaw following disturbance from construction at the northern electrode site.	
GROUNDWATER		
Aquifer Productivity [*Keewatinoow Converter Station*]	• Effects due to groundwater withdrawal due to construction and operation of the Keewatinoow converter station.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term Overall – Not Significant
AQUATIC ENVIRONMENT		
Surface Water Quality & Fish Habitat [*Keewatinoow Converter Station*]	• Effects due to infill, loss of riparian vegetation, stream bank alteration and increase in TSS Construction related to construction of Keewatinoow converter station.	***Construction*** Direction – Negative Magnitude –Large ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term Overall – Not Significant
TERRESTRIAL ECOSYSTEMS AND VEGETATION		
Plant species & communities of conservation concern [*Keewatinoow Converter Station (construction power station)*]	• Effects related to potential loss of plants from one species (snow willow) of conservation concern and ranked S3 (uncommon) by the MBCDC due to construction of Keewatinoow converter station.	***Construction*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Long Term Overall – Not Significant
Native grasslands/ prairie areas [*HVdc Transmission line*]	• Effects related to removal of trees that may occur in dry upland prairie areas due to construction of the HVdc transmission line.	***Construction*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term Overall – Not Significant
MAMMALS AND HABITAT		
American Marten [*Keewatinoow*	• Effects related to functional habitat loss, sensory disturbance, fragmentation and overharvesting due to construction of Keewatinoow Converter Station.	***Construction & Operation*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Project Site/***

VEC adversely affected by the Project	**Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)**	***Determination of Significance (Chapter 8)***
Converter Station]		***Footprint*** Duration – Medium Term (Op) Overall – Not Significant
Beaver [*HVdc Transmission line and ac collector Lines, Site Access Roads*] [*Keewatinoow Converter Station*]	• Effects related to decreased population, sensory disturbance and overharvest due to construction and operation of the HVdc Transmission line, ac collector lines and site access roads. • Effects related to functional habitat loss, sensory disturbance and a small increase in trapping due to construction and operation of Keewatinoow converter station.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term (Op) Overall – Not Significant
Wolverine [*Keewatinoow Converter Station*; *Borrow & Excavation Sites and Ground Electrodes and Lines*]	• Effects related to functional habitat loss, sensory disturbance, and harvesting due to construction of the Keewatinoow Converter Station, borrow pit and excavation sites. • Effects related to functional habitat loss, sensory disturbance, and harvesting due to operation of the Keewatinoow Converter Station. • Effects related to sensory disturbance due to construction of the ground electrodes and lines.	***Construction (All) & Operation (Station Only)*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term (Op) Overall – Not Significant
Moose [*Keewatinoow Converter station* [*Borrow Sites, Ground Electrode & Line*]	• Effects related to functional habitat loss, sensory disturbance, overharvest & predation due to construction of Keewatinoow Converter Station. • Effects related to functional habitat loss, sensory disturbance, overharvest & predation due to operation of Keewatinoow Converter Station. • Effects related to functional habitat loss, sensory disturbance, overharvest & predation due to Borrow & Sites and construction of Ground Electrode & Lines.	***Construction (All) & Operation (Station Only)*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term (Op) Overall – Not Significant
AMPHIBIANS AND REPTILES		
Wood Frog [*HVdc Transmission Line and ac collector lines*; *Keewatinoow Converter Station*; *Borrow*	• Effects related to fragmentation of sensitive area; habitat alteration/ disturbance; mortality and vehicle related effects associated with increased use of seasonal access trails and ROWs due to construction and operation of the HVdc Transmission line and ac collector lines, Keewatinoow converter station, borrow areas and	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term (Op) Overall – Not Significant

VEC adversely affected by the Project	Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)	*Determination of Significance (Chapter 8)*
Areas; and *Ground Electrode and Line*]	ground electrodes and lines.	
Northern Leopard Frog [*Keewatinoow Converter Station*; B*orrow Areas*]; *Ground Electrode and Line*]	• Effects related to fragmentation of sensitive area; habitat alteration/ disturbance; mortality and vehicle related effects associated with increased use of seasonal access trails and ROWs due to construction and operation of the Keewatinoow Converter Station; Borrow Areas; Ground Electrode and line.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Site/ Footprint*** Duration – Medium Term (Op) Overall Not Significant

Biophysical – VECs with Local Study Area Residual Effects – Primarily related to Presence of HVdc Transmission line

Section 9.3.2.1 of Chapter 9 (Cumulative Effects Assessment) noted that residual adverse effects of the Project for certain biophysical VECs were effectively geographically limited to the Local Study Area. Such effects primarily relate to alteration/ disturbance and associated loss or fragmentation of suitable habitat from clearing and maintenance of the HVdc transmission line right-of-way and tower installation. In the event of increased use of seasonal access trails and rights of way during the life of the Project and for a period of time following decommissioning, mortality and vehicle related effects could increase in the Local Study Area until access is limited by successional growth. Overall, Section 9.3.2.1 concludes that non-negligible cumulative adverse effects are not expected for these biophysical VECs due to the limited geographic extent of Project effects and general low magnitude of Project effects as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on below with added information on the relevant VECs.

For each biophysical sub-component, Table 9.3-1 in Chapter 9 (as corrected in CEC/MH-VI-226) identifies past, existing and future projects having potential coincidence of effects with Project effects.

Table 2 below indicates Project biophysical VECs that have residual adverse effects that are expected to be Local Study Area in geographic extent based on the assessment in Chapter 8. The following biophysical VECs as listed in Table 2 are potentially adversely affected within the geographic extent of the Local Study Area by the HVdc transmission line, ac collector lines, and (in some instances) site access roads include the following (in a few instances these VECs may also be affected by the converter station and ground electrode Project components):

- *Air Quality and Climate* – effects on Air Quality due to local emissions during construction and operation phases of the HVdc transmission line primarily (plus other Components).

- *Aquatic Environment* – effects on Surface Water Quality and Fish Habitat during construction and operation phases of the HVdc transmission line primarily (also Northern Ground Electrode, Borrow Areas, Excavated Material Placement Areas).

- *Mammals and Habitat* – effects on Coastal and Barren Ground Caribou, American Marten, Wolverine, Moose and Elk primarily due to the HVdc Transmission line and ac Collector lines and Site Access Roads during both construction and operation phases of the Project.

- *Birds and Habitat* – effects on Waterfowl and Waterbirds, Colonial Waterbirds, Birds of Prey Upland Game birds, Woodpeckers, and Songbirds and other birds due primarily to the HVdc Transmission Line and ac collector lines, ground electrodes and lines in vicinity of the HVdc transmission line and the Keewatinoow Converter Station during both construction and operation phases of the project.

- *Amphibians and Reptiles* - effects on Plains Spadefoot, Northern Leopard Frog, Red-sided Garter Snake, and Northern Prairie Skink related to the HVdc Transmission line and ac collector lines and expected to occur over the construction and operation phases of the Project.

- *Terrestrial Invertebrates* – effects on Ottoe and Uncas Skipper related to the HVdc Transmission line and ac collector lines and expected to occur over the construction and operation phases of the Project.

The magnitude of effects as assessed in Chapter 8 for the following of these VECs in Table 2 is small (which, in addition to the limited geographic extent, further reduces the potential for any cumulative effect with other projects beyond the effects as assessed in Chapter 8):

- Air Quality and Climate: Air Quality.
- Aquatic Environment: Surface Water Quality; Fish Habitat.
- Mammals and Habitat: Coastal and Barren Ground Caribou; Wolverine; Moose; Elk.
- Birds and Habitat: Waterfowl and Waterbirds; Colonial Waterbirds; Birds of Prey; Upland Gamebirds; Woodpeckers; Songbirds.
- Amphibians and Reptiles: Plains Spadefoot (during operation); Red-sided Garter Snake (during operation); Northern Prairie Skink (during operation).
- Terrestrial Invertebrates: Ottoe and Uncas Skipper (during operation).

The following of the Table 2 biophysical VECs were assessed in Chapter 8, in the context of other past and existing projects, to have moderate residual adverse effects from the Project during construction (but only small adverse effects during operation). Effects on these VECs are determined to be short-term in duration and relate primarily to construction activities. Effects of future projects as identified in Table 9.3-1 are not expected to overlap with effects of the Project on these VECs:

- *Plains Spadefoot* – moderate magnitude effects during construction (short term duration).
- *Northern Leopard Frog* – moderate magnitude effects during construction (short term duration).

- *Red-sided Garter Snake* – moderate magnitude effects during construction (short term duration).
- *Northern Prairie Skink* – moderate magnitude effects during construction (short term duration).
- *Ottoe and Uncas Skippers* - moderate magnitude effects during construction (short term duration).

The American Marten VEC has moderate magnitude effects related to displacement, functional habitat loss, fragmentation, sensory disturbance, trapping and overharvest which are expected to be of medium term duration (i.e., over construction and operation phases of Project). As noted in Chapter 8, American Marten habitat occurs along the HVdc transmission line right of way. The species specifically prefers mature conifer forest and may experience effects due to habitat removal during the life of the Project that are of greater magnitude than those experienced by other species with more general habitat requirements. Negative effects of the Project on core coniferous marten habitat and populations were primarily mitigated during the planning and routing process:

- 2.2km^2 of the total 436.7 km^2 of marten habitat in the Local Study Area will be removed for the ac Collector Lines.
- The HVdc transmission ROW will intersect 92.9 km^2 of marten habitat in the Local Study Area.
- The Henday-Longspruce ROW will intersect 1.6 km^2 of marten habitat.

In summary, focusing on the above Table 2 VECs having moderate magnitude effects from the Project with a Local Study Area geographic extent, the Chapter 9 screening of future and prospective future projects did not identify any prospect of a related non-negligible cumulative biophysical effect beyond that assessed in Chapter 8.

388 **Table 2 - Biophysical VECs with Local Study Area Residual Adverse Effects**

VEC adversely affected by the Project	**Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)**	***Determination of Significance (Chapter 8)***
AIR QUALITY AND CLIMATE		
Air quality [*HVdc Transmission primarily; plus other Components*]	• Local emissions from construction as well as operation and maintenance activities primarily in relation to the HVdc transmission line (plus other Components).	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
AQUATIC ENVIRONMENT		
Surface Water Quality and Fish Habitat [HVdc Transmission Line & ac collector lines (incl construction access trails)] [Northern Ground Electrode] [Borrow Areas, Excavated Material Placement Areas]	• Loss of riparian vegetation, stream bank damage and increase in TSS related to construction and operation of the HVdc transmission line and ac collector lines (including construction access trails) • Loss of riparian vegetation, stream bank damage and increase in TSS due to construction and operation related to construction and operation of the Northern Ground Electrode and Lines. • Loss of riparian vegetation, stream bank damage and increase in TSS due to construction and operation during construction related to borrow pit excavation areas and excavated material placement areas.	***Construction*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
MAMMALS AND HABITAT		
Coastal and Barren Ground Caribou [*HVdc Transmission Line and ac Collector lines and Keewatinoow Area*]	• Overharvesting due to construction and operation of the HVdc transmission line and ac Collector lines and Keewatinoow.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term (Op) Overall – Not Significant
American Marten [*HVdc Transmission line and ac Collector Lines, Site Access Roads*]	• Displacement, functional habitat loss, fragmentation, sensory disturbance, trapping and overharvesting due to construction and operation of the HVdc transmission line and ac collector lines and site access roads.	***Construction & Operation*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Local Study Area*** Duration – Medium Term (Op) Overall – Not Significant
Wolverine [*HVdc Transmission Line and ac Collector Lines, Site Access Roads*]	• Sensory disturbance due to construction and operation of the HVdc transmission line and ac collector lines and site access roads.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term (Op) Overall – Not Significant

VEC adversely affected by the Project	Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)	***Determination of Significance (Chapter 8)***
Moose [*HVdc Transmission Line and ac Collector Lines, Site Access Roads*]	• Overharvest, sensory disturbance, functional habitat loss, predation, parasites and disease due to construction and operation of the HVdc transmission line and ac collector lines and site access roads.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term (Op) Overall – Not Significant
Elk [*HVdc Transmission Line and ac Collector Lines*]	• Overharvest, sensory disturbance, functional habitat loss, predation, parasites/ disease and fragmentation due to construction and operation of the HVdc transmission line and ac collector lines.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term (Op) Overall – Not Significant
BIRDS AND HABITAT		
Waterfowl & water birds (mallard[6], sandhill crane & yellow rail[7]) [*HVdc Transmission Line and ac Collector Lines; Ground Electrodes and Liens in vicinity of HVdc line*] [*Keewatinoow Converter Station and Area; Borrow Areas, excavated Material Placement Areas*] [*Riel Converter Station*]	• Habitat loss primarily at tower footprints, and habitat alteration in the ROWs; fragmentation effects in sensitive areas including habitat avoidance near the ROWs from sensory disturbances associated with human or mechanical activity; some potential mortalities from increased hunting, predation and/or bird-wire collisions due to construction and operation of the HVdc Transmission line and ac collector lines, ground electrodes and lines in vicinity of HVdc line. • Habitat loss/ alteration at footprints, habitat avoidance near infrastructure from sensory disturbances associated with human or mechanical activity; some mortalities from increased hunting, predation, and/or bird-wire collisions due to construction and operation of the Keewatinoow converter station, borrow areas and excavated material placement areas. • Habitat avoidance from sensory disturbances associated with human or mechanical activities due to the construction of the Riel converter station.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
Colonial waterbirds (Great Blue Heron & Least Bittern) [*HVdc Transmission Line and ac Collector Lines; Ground*	• Habitat loss primarily at tower footprints and habitat alternation in the ROWs; fragmentation effects in sensitive areas including habitat avoidance near the ROWs from sensory disturbances associated with human or mechanical activity, some potential mortalities from increased predation or bird-wire collisions due to construction and	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant

[6] Only Mallard in Riel site area.
[7] No Yellow Rail in the Keewatinoow site area.

VEC adversely affected by the Project	Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)	*Determination of Significance (Chapter 8)*
Electrodes and Liens in vicinity of HVdc line]	operation of the HVdc Transmission line and ac collector lines and ground electrodes and Lines in vicinity of HVdc line.	
Birds of Prey (bald eagle[8], ferruginous hawk, borrowing owl, short-eared owl) [*HVdc Transmission Line and ac Collector Lines; Ground Electrodes and Liens in vicinity of HVdc line*] [*Keewatinoow Converter Station and Area*]	• in the ROWs, including increased nesting habitat, perches and foraging opportunities; fragmentation effects in sensitive areas including habitat avoidance near the ROWs from sensory disturbances associated with human or mechanical activity; some potential mortalities from vehicle collisions due to construction and operation of the HVdc Transmission line – and ac collector lines; ground electrodes and Lines in vicinity of HVdc line and Keewtinoow Converter station.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
Upland game birds (sharp-tailed grouse[9] & ruffled grouse) [*HVdc Transmission Line and ac Collector Lines; Ground Electrodes and Liens in vicinity of HVdc line*] [*Keewatinoow converter station and area; Borrow areas*]	• Habitat loss primarily at tower footprints and habitat alteration in the ROWs; fragmentation effects in sensitive areas including habitat avoidance and disruption of daily movements near the ROWs from sensory disturbances associated with human or mechanical activity; some potential mortalities from increased hunting vehicle collisions and bird-wire collisions due to construction and operation of the HVdc transmission line • For sharp tailed grouse Habitat loss primarily at tower footprints and habitat alteration in the ROWs; fragmentation effects in sensitive areas including habitat avoidance and disruption of daily movements near the ROWs from sensory disturbances associated with human or mechanical activity; some potential mortalities from increased hunting vehicle collisions and bird-wire collisions due to construction and operation of Keewatinoow converter station and borrow areas.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
Woodpeckers (pileated woodpecker & red-headed woodpecker) [*HVdc Transmission Line and ac Collector Lines; Ground Electrodes and Liens*	• Habitat loss and habitat alteration in the ROWs; fragmentation effects in sensitive areas including habitat avoidance near the RWOs from sensory disturbances associated with human or mechanical activity; some potential mortalities from vehicle collisions due to construction and operation of the HVdc Transmission line and ac collector lines and the ground electrodes and Lines in	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant

[8] Only bald eagle in Keewatinoow site area.
[9] Only sharp-tailed grouse in Keewatinoow site area.

VEC adversely affected by the Project	Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)	*Determination of Significance (Chapter 8)*
in vicinity of HVdc line]	vicinity of HVdc line.	
Songbirds & other birds (Common nighthawk, whip-poor-will, olive flycatcher, loggerhead shrike, sprague's pipit, golden winged warbler, Canada warbler, rusty blackbird) [*HVdc Transmission Line and ac Collector Lines; Ground Electrodes and Liens in vicinity of HVdc line*]	• Habitat loss primarily at tower footprints and habitat alteration in the ROWs; fragmentation effects in sensitive areas including habitat avoidance near the ROWs from sensory disturbances associated with human or mechanical activity; some potential mortalities from vehicle collisions due to construction and operation of the HVdc Transmission line and ac collector lines, ground electrodes and Lines in vicinity of HVdc line.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
Songbirds & other birds (common nighthawk, olive sided flycatcher, rusty blackbird) [*Keewatinoow Converter Station and Area*]	• Habitat loss at footprints; habitat avoidance near infrastructure from sensory disturbances associated with human or mechanical activity due to construction and operation of Keewatinoow Converter station and area.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
AMPHIBIANS AND REPTILES		
Plains Spadefoot [HVdc Transmission Line and ac Collector Lines]	• Fragmentation of sensitive area; habitat alteration/ disturbance; mortality and vehicle related effects associated with increased use of seasonal access trails and ROWs due to construction and operation of HVdc Transmission line and ac collector lines.	***Construction*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
Northern Leopard Frog [*HVdc Transmission line and ac Collector Lines*]	• Fragmentation of sensitive area; habitat alteration/ disturbance; mortality and vehicle-related effects associated with increased use of seasonal access trails and ROWs due to construction and operation of HVdc Transmission line and ac collector lines.	***Construction & Operation*** Direction – Negative Magnitude – Moderate (construction) & small (Op) ***Geographic Extent – Local Study Area***

VEC adversely affected by the Project	Residual Adverse Effects of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)	*Determination of Significance (Chapter 8)*
		Duration – Medium Term (Op) Overall – Not Significant
Red-sided Garter Snake [*HVdc Transmission Line and ac Collector Lines*]	• Habitat alteration/ disturbance; fragmentation of sensitive areas; mortality and vehicle-related effects associated with increased use of seasonal access trails and the ROW; creation of movement corridors along the ROW due to construction and operation of HVdc Transmission line and ac collector lines.	***Construction*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration –Medium term Overall – Not Significant
Northern Prairie Skink [*HVdc Transmission Line and ac Collector Lines*]	• Habitat alteration/ disturbance in sensitive areas; alteration –disturbance of suitable habitat (risk of invasive plant species encroachment) due to construction and operation of HVdc Transmission line and ac collector lines.	***Construction*** Direction – Negative Magnitude – Moderate ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration –Medium Term Overall – Not Significant
TERRESTRIAL INVERTEBRATES		
Ottoe and Uncas Skipper [*HVdc Transmission Line and ac Collector Lines*]	• Residual effects on the Ottoe and Uncas skippers include habitat alteration and disturbance as a result of right-of-way construction, including at tower footprints due to construction and operation of HVdc Transmission line – and ac collector lines.	***Construction*** Direction – Negative Magnitude - Moderate ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude - Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant

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Biophysical - VECs with Project Study Area Residual Effects

Section 9.3.2.2 of Chapter 9 (Cumulative Effects Assessment) focused consideration on the potential non-negligible cumulative adverse effects of the Project on Boreal Woodland Caribou (Wabowden, Reed Lake and Bog Ranges) due to potential for existing and past project and human activities, as well as other future resource development, to act cumulatively with the Project effects on this VEC. Climate is the only other biophysical VEC assessed in Chapter 8 with Project effects that have a geographic extent to the Project Study Area. The high level screening analysis of these VECs as provided in Chapter 9 is elaborated on below with added information in the relevant VECs.

Table 3 below reviews the potential coincidence of effects on these biophysical VECs with other projects identified in Table 9.3-1 in Chapter 9 (as corrected in *CEC/MH-VI-226*).

Table 3 shows that Project adverse effects on Climate are expected to be small in magnitude during construction and operation, and that there are no expected non-negligible cumulative adverse effects on this VEC due to coincidence of Project effects with the effects of the other past/existing and future projects and activities considered.

Table 3 shows that the Project HVdc line effects on Boreal Woodland Caribou during construction and operation as assessed in Chapter 8 (in the context of past/existing projects) are expected to have potential non-negligible cumulative effects with the identified other future and prospective future projects. Section 9.3.2.2 accordingly assesses these potential cumulative effects of the Project on this VEC during construction and operation.

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VEC adversely affected by the Project	**Residual Adverse Effect of the Bipole III Project (as assessed in Chapter 8 of EIS which considers effects of past and existing projects on each VEC)**	***Determination of Significance (Chapter 8)***	***Potential Non-Negligible cumulative effects***
AIR QUALITY AND CLIMATE			
Climate [*HVdc Transmission primarily; plus other Components*]	• GHG Emissions (building materials manufacture, land use change and other factors) due primarily to construction and operation of HVdc transmission line (plus other Components).	***Construction& Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Short to Medium Term Overall – Not Significant	No expected non-negligible cumulative effects.
MAMMALS AND HABITAT			
Boreal Woodland Caribou (Wabowden, Reed Lake and Bog Ranges) [*HVdc Transmission line*]	• Sensory disturbance, avoidance and displacement, hunting, poaching and predation due to construction and operation of the HVdc transmission line.	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Medium – Term (Op) Overall – Not Significant (Uncertainty Noted – require adaptive management[10])	Cumulative effects of past / existing projects are considered in Chapter 8. Potential non-negligible cumulative effects related to the following future projects: Keeyask Generation/ Transmission; Conawapa Generation Station; future forestry operations [Tolko & Louisiana Pacific]; and future mineral licence area exploration, mineral lease, mining claims and quarry lease developments.

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[10] Uncertainty noted (with requirement for monitoring and adaptive management) specifically regarding potential residual effects on Caribou in the Wabowden range; monitoring required in all three ranges with the potential for adaptive management if required.

Socio-Economic – VECs with Site Specific Residual Effects [Project Site/ Footprint and Local Study Area]

Section 9.3.3 of Chapter 9 (Cumulative Effects Assessment) notes that residual adverse effects of the Project for certain socio-economic VECs were effectively limited to the immediate right of way and footprint area of the Project (Project Site/Footprint) or to the broader Local Study Area, and as such the only real prospect of a related cumulative socio-economic effect beyond that assessed in Chapter 8 would occur where there is a further development on or adjacent to the rights-of-way or in the Local Study Area. Overall, Section 9.3.3 concludes that non-negligible cumulative adverse effects are not expected for these socio-economic VECs due to the site specific effects and general low magnitude of effects of the Project as assessed in Chapter 8. The high level screening analysis supporting this conclusion is elaborated on below with added information in the relevant VECs.

For each socio-economic sub-component, Table 9.3-2 in chapter 9 (as corrected in *CEC/MH-VI-226*) identifies past/ existing and future projects having potential coincidence of effects with Project effects.

Table 4 below indicates Project socio-economic VECs that have residual adverse effects that are expected to be Project Site/ Footprint in geographic extent, and as such Project effects on these VECs are not expected to overlap with effects from other projects or human activities unless they occur within or adjacent to the ROW/Footprint. For the following socio-economic VECs as listed in Table 4, cumulative adverse effects beyond those assessed in Chapter 8 are either expected not to occur or to be negligible.

- *Land Tenure and Residential Development* – Project effects due to construction of the HVdc Transmission Line and the operation of the Riel Ground Electrode and line.

- *Private Forestlands* – Project effects due to construction and operation of the HVdc Transmission line and Riel Ground Electrode.

- *Aboriginal Lands [Reserve Lands and TLE]* – Project effects during construction and operation of the HVdc Transmission line.
- *Infrastructure* - Project effects during construction and operation of the HVdc Transmission Line and Keewatinoow Converter Station and associated facilities.
- *Agricultural Land Use/ Productivity* – Project effects during construction and operation of the HVdc transmission line and Riel Ground Electrode and Line.
- *Mining/ Aggregates* – Project effects during construction and operation of the HVdc Transmission line.
- *Public Safety* – Project effects during the construction and operation of the HVdc Transmission line and Riel Converter Station.
- *Heritage* – Project effects during construction and operation of the HVdc Transmission line and Keewatinoow Converter Station and associated facilities.

For the above VECs, cumulative effects related to past/ existing projects are considered as part of the existing environmental baseline and considered as part of the effects assessment in Chapter 8. The magnitude of effects as assessed in Chapter 8 for all of these VECs (except for effects on *Private Forest Lands* which are moderate in magnitude) is small (which in addition to the limited geographic extent, further reduces the potential for any cumulative effects with other projects).

The remaining VECs addressed in Table 4 below relate to effects that in some cases may extend beyond the Project Site/Footprint and into the Local Study Area. Project Site specific or Local Study Area residual adverse effects may include effects due to physical presence of the HVdc Transmission Line, habitat alteration and fragmentation from creation of the right-of-way, improved access to new areas for hunters and predators, bird line-strikes, noise and potential disturbance from lines, maintenance vehicles and equipment. These residual effects have the potential to combine with similar effects from other projects and activities in the area including activities associated with forestry, mineral exploration, and other Manitoba Hydro developments as previously discussed in relation to construction activities.

Many of the VECs with Local Study Area effects also have residual adverse effects that are small in magnitude, reducing potential for non-negligible cumulative adverse effects. VECs with Local Study Area geographic extent and potential moderate residual adverse effects include the following:

- Effects *on Designated Protected Areas and PAI* due to construction of the HVdc Transmission line – these effects are short term in duration. As indicated in Chapter 8, the final preferred route does not cross through any designated protected areas and crosses through one ASI (ASI 114 Stephens Lake) under the Protected Areas Initiative. During construction an EnvPP will manage work in proximity to designated protected areas and in lands under consideration for PAI. For areas under consideration for PAI, Manitoba Hydro has maximized the portion of the route that follows existing linear facilities. As such, and given the short duration of these Project effects, non-negligible cumulative adverse effects with other projects are not expected.

- Effects on *Domestic Resource Use* due to construction and operation of the HVdc Transmission Line and Keewatinoow Converter Station and associated facilities – these Project effects on domestic resource use are described as Project Site/Footprint/Local Study Area geographic extent, small to moderate in magnitude and short to medium term in duration (occurring during construction and operation phases of the Project). Existing project effects on Domestic Resource Use were considered as part of the existing baseline and informed the effects assessment in Chapter 8.

Residual adverse effects of the Project on *Aesthetics* extending to the Local Study Area were moderate in magnitude and medium term in duration due to the physical presence of the Keewatinoow Converter Station and Associated facilities during operation.

In summary, focusing on Table 4, VECs having moderate magnitude effects from the Project with a Site Specific or Local Study Area geographic extent, the Chapter 9 screening of future and prospective future projects did not identify any prospect of a related non-negligible cumulative socio-economic effect beyond that assessed in Ch.8.

498 **Table 4 – Socio-Economic VECs with Site Specific & Local Study Area Residual**

499 **Adverse Effects**

VEC adversely affected by the Project	Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)	*Determination of Significance (Chapter 8)*
LAND USE		
Land Tenure & Residential Development [*HVdc Transmission line*]	• Possible loss of one residence within 75 m of the ROW through purchase due to construction of the HVdc Transmission line (construction) • Effects due to physical presence of the HVdc line (operation)	**Construction (HVdc line)** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short Term Overall – Not Significant **Operations (HVdc line)** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration – Medium-Term Overall – Not Significant
[*Riel Ground Electrode & Line*]	• Loss of two residences through purchase due to construction of the Riel Ground Electrode and Line (construction) • Effects due to physical presence of the Riel ground electrode and line (operation)	**Construction (Riel)** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration – Short Term Overall – Not Significant **Operations (Riel)** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Medium-Term Overall – Not Significant
Private Forest Lands [*HVdc Transmission line and Riel Ground Electrode*]	• Effects due to loss of private woodlots/ shelter belts due to of the HVdc line and construction and operation of the Riel Ground Electrode. (construction and operation)	**Construction & Operation** Direction – Negative Magnitude –Moderate ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant

VEC adversely affected by the Project	**Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)**	***Determination of Significance (Chapter 8)***
Aboriginal lands - Reserve Lands and TLE. [*HVdc Transmission line]* *[Keewatinoow Converter Station & Associated Facilities*]	• Effects due to physical presence of the HVdc transmission line; and increased access due to the HVdc transmission line. (construction and operation) • Effects due to physical presence of facilities and increased access. (construction and operation)	**<u>Construction & Operation (HVdc Line)</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant **<u>Construction & Operation (Keewatinoow)</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Designated Protected Areas and PAI [*HVdc Transmission Line*]	• Effects to Areas of Special Interest related to impairment or loss of unique terrain and soil features due to construction of HVdc transmission line. (construction) Effects due to physical presence of the HVdc transmission line and effects related increased access due to the HVdc transmission line. (operation)	**<u>Construction</u>** Direction – Negative Magnitude –Moderate ***Geographic Extent – Local Study Area*** Duration – Short Overall – Not Significant **<u>Operation</u>** Direction – Negative Magnitude – Small ***Geographic Extent – Local Study Area*** Duration –Medium Term Overall – Not Significant
Infrastructure [*HVdc Transmission Line & Keewatinoow Converter Station & Associated Facilities*]	• Effects due to physical presence of the HVdc transmission line facilities (construction and operation) • Effects due to physical presence of the Keewatinoow Converter Station and associated facilities (construction and operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant
Agricultural Land Use/ productivity [*HVdc Transmission Line & Riel Ground Electrode and Line*]	• Effects related to loss of agricultural productivity due to construction and operation of the HVdc Transmission line. (construction and operation) • Effects related to loss of agricultural productivity due to the construction and operation of the Riel Ground Electrode. (construction and operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant

VEC adversely affected by the Project	Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)	*Determination of Significance (Chapter 8)*
RESOURCE USE		
Commercial Forestry [*HVdc Transmission Line*]	• Effects related to loss of productive forestlands due to construction and operation of the HVdc Transmission line. (construction and operation)	**Construction & Operation** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Commercial Fishing [*HVdc Transmission Line*]	• Effects related to the physical presence of the line, habitat degradation and increased access due to construction and operation of the HVdc transmission line. (construction and operation)	**Construction & Operation** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Mining/ Aggregates [*HVdc Transmission Line*]	• Interference with exploration due to construction and operation of the HVdc Transmission line and operation effects due to physical presence of the line. (construction and operation)	**Construction & Operation** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant
Trapping [*HVdc Transmission Line & Keewatinoow Converter Station & Associated Facilities*]	• Temporary displacement of wildlife and increased access due to construction and operation of the HVdc transmission line. (construction and operation) • Temporary displacement of wildlife and increased access due to construction and operation of the Keewatinoow Converter Station and associated facilities. (construction and operation)	**Construction & Operation** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Recreation & Tourism [*HVdc Transmission Line & Keewatinoow Converter Station & Associated Facilities*]	• Habitat loss/degradation due to construction and operation of the HVdc transmission line and the Keewatinoow Converter Station and associated facilities. (construction and operation) • Temporary displacement of wildlife and increased access due to construction and operation of the HVdc transmission line and Keewatinoow Converter Station and associated facilities. (construction and operation) • Effects due to physical presence of the HVdc transmission line. (operation) • Increased access related to the HVdc transmission line and the Keewatinoow Converter Station and associated facilities (operation)	**Construction & Operation** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant

VEC adversely affected by the Project	**Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)**	***Determination of Significance (Chapter 8)***
Wild Rice Harvesting [*HVdc Transmission Line*]	• Effects due to the physical presence of the HVdc transmission line and increased access associated with the line. (construction and operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Domestic Resource Use [*HVdc Transmission Line & Keewatinoow Converter Station & Associated Facilities*]	• Effects due to loss of plants, temporary displacement of wildlife, habitat loss/degradation due to construction of the HVdc transmission line and Keewatinoow Converter Station and associated facilities. (construction) • Effects during due to physical presence of the HVdc transmission line; and increased access due to the HVdc transmission line and the Keewatinoow Converter Station and associated facilities. (operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small/Moderate ***Geographic Extent – Project Site/Footprint/Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
PERSONAL, FAMILY AND COMMUNITY LIFE		
Public Safety [HVdc Transmission Line and Riel Converter Station]	• Effects due to site risks associated with the construction of the HVdc transmission line and the Riel converter station and associated facilities. (construction) • Effects due to ROW dangers associated with the presence of high voltage lines. (operation) • Effects due to risks of high voltage lines at site. (construction and operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short to Medium Term Overall – Not Significant
Human Health [HVdc transmission line; Keewatinoow Converter Station & Associated Facilities]	• Effects related to noise vibration, dust and other disturbances during construction and operations of the HVdc transmission line, and the Keewatinoow and Riel converter stations and associated facilities. (construction and operation)	**<u>Construction & Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration – Short to Medium Term Overall – Not Significant
Aesthetics [HVdc Transmission line and Riel Converter station and associated facilities]	• Effects due to the physical presence of the HVdc transmission line and Keewatinoow and Riel converter stations and associated facilities. (operation)	***<u>Operation – HVdc TLine and Riel</u>*** Direction – Negative Magnitude –Small ***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant ***<u>Operation – Keewatinoow</u>*** Direction – Negative Magnitude –Moderate

VEC adversely affected by the Project	Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)	*Determination of Significance (Chapter 8)*
[Keewatinoow Converter Station & Associated facilities]		***Geographic Extent – Local Study Area*** Duration – Medium Term Overall – Not Significant
CULTURE & HERITAGE		
Heritage Resources [HVdc transmission line; Keewatinoow Converter Station & Associated Facilities]	• Potential discovery of unknown heritage resources related to construction and operation HVdc transmission line and the Keewatinoow converter station and associated facilities. (construction and operations)	**<u>Construction</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration – Short Term Overall – Not Significant **<u>Operation</u>** Direction – Negative Magnitude –Small ***Geographic Extent – Project Site/Footprint*** Duration –Medium Term Overall – Not Significant

500 ***Socio-Economic - VECs with Project Study Area Residual Effects***

501 Section 9.3.3.1 of Chapter 9 (Cumulative Effects Assessment) considers construction
502 phase non-negligible adverse cumulative effects of the Project for certain socio-
503 economic VECs in the Project Study Area and focuses on the potential non-negligible
504 cumulative adverse effects on Services and Personal, Family and Community Life
505 environmental sub-components due to potential for existing and past project and human
506 activities, as well as other future resource development activities to act cumulatively
507 with the Project on the relevant VECs. Table 5 below reviews the potential coincidence
508 of effects on these socio-economic VECs with other projects identified in Table 9.3-2 in
509 Chapter 9 (as corrected in CEC/MH-VI-226), and identifies certain VECs with potential
510 non-negligible cumulative effects from the Project in combination with specific other
511 projects examined. The high level screening analysis supporting this conclusion is
512 elaborated on below with added information in the relevant VECs.

513 The following socio-economic VECs examined in Table 5 are assessed in Chapter 8 to
514 have only small magnitude effects from the Project (Table 5 in each instance identifies

the potential other projects that may have effects that overlap with effects of the Project):

- *Community Services* - effects of the HVdc line and Riel Converter Station and associated facilities during construction and operation, and Keewatinoow Converter Station and associated facilities during operation.
- *Travel & Transportation* - effects of the HVdc line and Riel Converter Station during construction and operation, and Keewatinoow Converter Station and associated facilities during operation.
- *Public Safety* - effects of the Keewatinoow Converter Station and associated facilities during operation.
- *Culture* - effects of the HVdc line and Keewatinoow Converter Station and associated facilities during construction and operation.

The above small magnitude effects of the Project as assessed in Chapter 8 are not expected to have potential non-negligible cumulative effects with other projects and activities beyond those effects assessed in Chapter 8.

As noted in Chapter 8, the construction of the Keewatinoow Converter Station and associated facilities are expected to have moderate residual adverse effects on Community Services, Travel and Transportation, and Public Safety VECs that extend into the Project Study Area near this activity due to the influx of workers, interactions between visiting workers and residents of the Gillam area and consequent increased stress on community services (emergency, health and social) in the Gillam area. Residual adverse effects of the Project on these VECs during construction of the Keewatinoow Converter Station and associated facilities arise primarily due to safety issues related to worker interaction with the community of Gillam and have the potential to interact cumulatively with the residual effects of other projects and human activities planned to be undertaken in the area during the same timeframe. Section 9.3.3.1 accordingly assesses these potential cumulative effects of the Project during construction.

543 **Table 5 - Socio-Economic VECs with Project Study Area Residual Adverse**
544 **Effects**

VEC adversely affected by the Project	Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)	***Determination of Significance (Chapter 8)***	***Potential Non-Negligible cumulative effects***
SERVICES			
Community Services [HVdc transmission line and Riel Converter station and associated facilities]	• Effects due to increased stress on community services during the construction and operation of the HVdc transmission line. (construction and operation) • Effects due to increased stress on community services during the construction and operation of the Riel station and associated facilities. (construction and operation)	***Construction & Operation*** Direction – Negative Magnitude –Small ***Geographic Extent – Project Study Area*** Duration – Short to Medium Term Overall – Not Significant	None (except for potential overlaps of northern transmission line with Kettle Generating station; Keeyask Generation/ transmission and Conawapa Generating Station).
Community Services [*Keewatinoow Converter Station and associated facilities*]	• Effects due to increased stress on community services during the construction and operation of the Keewatinoow converter station. (construction and operation)	***Construction:*** Direction – Negative Magnitude –Moderate ***Geographic Extent – Project Study Area*** Duration – Short Term Overall – Potentially Significant Frequency – Infrequent Reversibility – Reversible Overall – Not Significant ***Operation:*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Medium-Term Overall – Not Significant	Potential overlaps with Kettle Generating station; Keeyask Generation/ transmission; and Conawapa Generating Station
Travel & Transportation [*HVdc transmission line and Riel converter station*]	• Effects due to increased stress on transportation services during the construction and operations of the HVdc transmission line and the Riel converter station and associated facilities. (construction and operations)	***Construction & Operation*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Short to Medium-Term Overall – Not Significant	None (except for potential overlaps of northern transmission line with Kettle Generating station; Keeyask Generation/ transmission and Conawapa Generating Station).

VEC adversely affected by the Project	**Residual Adverse Effect (as assessed in Chapter 8 of EIS and considering past and existing projects)**	***Determination of Significance (Chapter 8)***	***Potential Non-Negligible cumulative effects***
Travel & Transportation [*Keewatinoow Converter Station and associated facilities*]	• Effects due to increased stress on transportation services during the construction and operations of the Keewatinoow converter station and associated facilities. (construction and operations)	***Construction:*** Direction – Negative Magnitude –Moderate ***Geographic Extent – Project Study Area*** Duration – Short Term Overall – Potentially Significant Frequency – Infrequent Reversibility – Reversible Overall – Not Significant ***Operation:*** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Medium-Term Overall – Not Significant	Potential overlaps with Kettle Generating station; Keeyask Generation/ transmission; and Conawapa Generating Station
PERSONAL, FAMILY AND COMMUNITY LIFE			
Public Safety [*Keewatinoow Converter station and associated facilities*]	• Effects related to worker interaction with local communities during construction and operations. (construction and operation) • Effects related to construction site risks. (construction) • Effects related to risks of high voltage power at site during operations (operation)	**Construction:** Direction – Negative Magnitude –Moderate ***Geographic Extent – Project Study Area*** Duration – Short to Medium-Term Overall – Potentially Significant Frequency – Infrequent Reversibility – Reversible Overall – Not Significant **Operation:** Direction – Negative Magnitude – Small ***Geographic Extent – Project Study Area*** Duration – Medium-Term Overall – Not Significant	Potential overlaps with Kettle Generating station; Keewatinoow wastewater management; Keeyask Generation/ transmission; and Conawapa Generating Station
CULTURE & HERITAGE			
Culture [*HVdc Transmission Line & Keewatinoow Converter Station and Associated Facilities*]	• Effects due to impairment of Aboriginal culture during construction and operations of the HVdc transmission line and the Keewatinoow converter station and associated facilities. (construction and operation)	**Construction** Direction – Negative Magnitude –Small ***Geographic Extent – Project Study Area*** Duration – Short Term Overall – Not Significant ***Operation*** Direction – Negative Magnitude –Small ***Geographic Extent – Project Study Area*** Duration – Medium Term Overall – Not Significant	No potentially non-negligible cumulative adverse effects.

ATTACHMENT 2 – UPDATED CUMULATIVE EFFECTS WORKFORCE ESTIMATE

Since the Bipole III EIS was filed December 1, 2011, the Keeyask Generation Project EIS has been submitted for regulatory review (July 6, 2012). Provided below is updated information consistent with the latest information, analysis and proposed mitigation included in the Keeyask Generation Project EIS, including an updated cumulative effects workforce estimate table and brief explanatory text.

Figure 1 summarizes the currently anticipated timing of construction of future projects in the vicinity of Gillam, including employment estimates. Figure 1 replaces Figure 9.3-1 on pg. 9-27 of the Bipole III EIS.

The following is additional text to pages 9-24 through 9-26:

> As indicated in the Bipole III EIS, pg. 9-24, construction of several of the future projects and activities will overlap with the Bipole III Project's construction period. As evidenced in Figure 1, these projects include KIP, Keeyask transmission, the Keeyask GS, the Kettle upgrade and Gillam redevelopment in terms of overlap with the Keewatinoow Converter Station and Section N1 of the Bipole III Project. Of particular concern is the overlap between 2014 and 2017 when construction of Keewatinoow will overlap with the Keeyask GS. For example, between Q3 2014 and Q4 2015, there will be an approximate quarterly average workforce for Keewatinoow between 300 and 550 at the time when the Keeyask GS will have an approximate quarterly average workforce between 300 and 480.

Tab 3.5 of the Socio-Economic Supplemental Material (July 31, 2012) provides further detail on mitigation measures focused on addressing worker interaction related to the Bipole III EIS, which are consistent with the Keeyask GS, thereby inherently addressing cumulative effects of these two major Manitoba Hydro projects. Overall coordination and discussion across all Manitoba Hydro projects in the vicinity of Gillam will be put in place prior to construction of the Bipole III Project to address worker interaction issues (including cumulative effects)

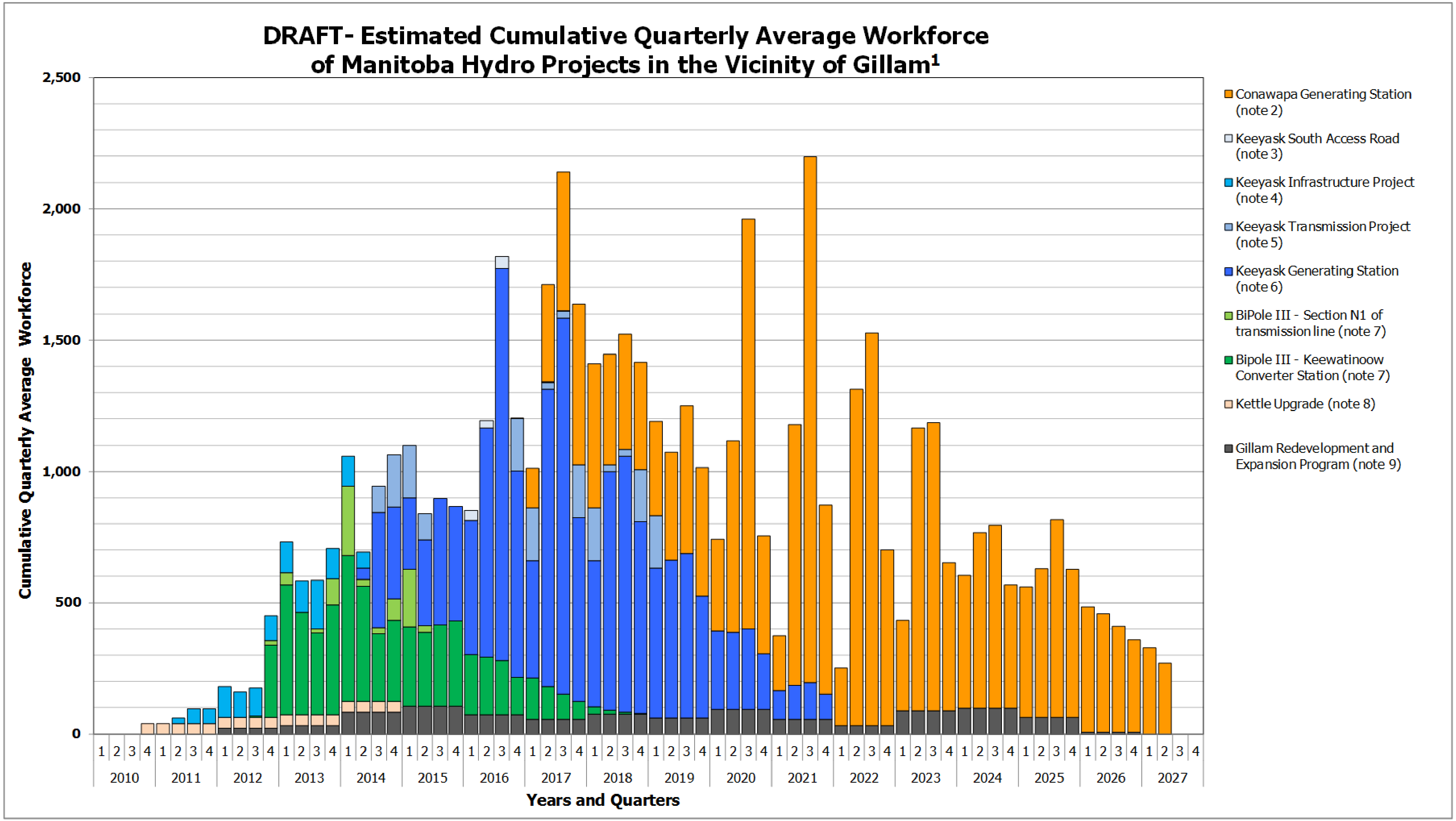

Figure 1: Estimated Cumulative Quarterly Average Workforce of Manitoba Hydro Projects in the Vicinity of Gillam

Note 1 The estimates are quarterly average workforce requirements (averages within each quarter based on monthly information) based on information available at the time of compilation and are subject to change. In some instances the level of detail for the estimates vary and the footnotes below provide further details where necessary. Unless otherwise noted: the above information represents a forecast only, based on current regulations, present project plans, and experience with similar projects; contractors will determine specific job requirements when the project is being built; actual employment requirements will vary from the forecast presented. Unless otherwise noted: the above information indicates contractor site presonnel (including supervisory and management positions); it also includes Manitoba Hydro site staff. The above forecasts do not include Manitoba Hydro Winnipeg office staff, or workforce for the construction of Substations and Transmission Lines.

577

Note 2: Conawapa Generating Station

Located approximately 90 kms from Gillam via PR 290 and PR 280.

- The above forecasts are based on KGS Acres and Manitoba Hydro's forecast of workforce and a construction schedule of May 2023 first unit in-service date, and was shifted to the current first unit in-service date of May 2025.
- The above information represents a forecast only, based on current regulations, present project plans, and experience with similar projects; contractors will determine specific job requirements when the project is being built; actual employment requirements will vary from the forecast presented. Unless otherwise noted: the above information indicates contractor site presonnel (including supervisory and management positions); it also includes Manitoba Hydro site staff. The above forecasts do not include Manitoba Hydro Winnipeg office staff, or workforce for the construction of Substations, Converter Station or Transmission Lines.

Note 3: Keeyask South Access Road

Located approximately 15-20 kms from Gillam from southern most point of road.

- The above forecasts are based on KGS Acres and Manitoba Hydro's forecast of workforce and a construction schedule of November 2019 first unit in-service date.
- The Keeyask Generating Station Project is expected to commence in June 2014.

Note 4: Keeyask Infrastructure Project

Located approximately 115 kms from junction of PR 280.

- The above forecasts are based on KGS Acres and Manitoba Hydro's forecast of workforce and a construction schedule of November 2019 first unit in-service date.
- The Keeyask Infrastructure Project is expected to be completed by May 2014.

Note 5: Keeyask Transmission Project

Includes the Construction Power Station, switching station, Generation Outlet Transmission (GOT) lines and KN36 Tap.
Located approximately 2 kms from Gillam from the nearest point of GOT line.

Note 6: Keeyask Generating Station

Located approximately 130 kms to Gillam via Keeyask North Access Road and PR 280.

- The above forecasts are based on KGS Acres and Manitoba Hydro's forecast of workforce and a construction schedule of November 2019 first unit in-service date.
- The Keeyask Generating Station project is expected to commence in June 2014.
- The above forecast does not include the workforce for the South Access Road (SAR); SAR estimates are provided separately in the figure.

Note 7: Bipole III Project

Keewatinoow Converter Station and supporting infrastructure includes construction power line, construction power station, AC collector lines, northern electrode line, Henday switchyard expansion, Longspruce switchyard upgrade, and Keewatinoow Converter Station.

The following notes apply to Bipole III Transmission Line N1 clearing and construction, Keewatinoow construction power line, Keewatinoow AC collector lines and the northern electrode line.

- Located approximately 30 kms from Gillam at its nearest point.
- Projections are extrapolated from Wuskwatim Transmission Line figures.
- Projections based on a December 2012 construction start date.
- Projections are assumptions only; each contractor will staff and schedule his/her section of the work as per their own preferences.
- Breakdown is derived from Wuskwatim-Herblet actuals and then applied as a percentage to Bipole III projected figures
- Estimate includes contractor workers and contractor supervisory positions and Manitoba Hydro workers and Manitoba Hydro supervisory positions.

The following notes apply to Henday switchyard expansion, Long Spruce switchyard upgrades, and the Keewatinoow construction power station

- Estimate includes contractor workers and contractor supervisory positions and Manitoba Hydro workers and Manitoba Hydro supervisory positions.

Keewatinoow Converter Station

Located approximately 90 kms from Gillam Via PR 290 and 280

- The above forecasts are based on Manitoba Hydro's forecast of workforce and a construction schedule based on an October 2017 BP III in-service date.

Note 8: Kettle Upgrade

Located approximately 5 kms from Gillam by road.

- Assumes peak quarterly workforce of 40 workers.

Note 9: Gillam Redevelopment and Expansion Program

Development occuring in Gillam.

578 - Estimated number of workers required per year. Assumes quarterly peak workforce is equal to number of workers required per year.

Date	August 1 2012
Reference	Section 9 Cumulative Effects
Source	CEC Information Request #6
Question	CEC/MH-VI-347b

The cumulative effects assessment (Section 9.0) is very vague, generic and qualitative, with only checklists identifying potential cumulative effects between known and announced projects. The conclusion (.... a small magnitude, medium-term cumulative effect is expected....) is not defensible on the basis of the CEA. The Socio-Economic Assessment (Section 9.3.3) utilizes red squares in Table 9.3.2 to Represent "potentially non-negligible negative cumulative effects" on personal, and community life. Again this is a qualitative assessment that could benefit substantially form a community health assessment with the objective of identifying and mitigating potential adverse social effects, while specifically identifying community socio-economic and health benefits and opportunities for local residents. Monitoring plans (Section 9.0) could benefit by adding human community health monitoring that would not necessarily be cost prohibitive (eg selected blood and urine monitoring within communities as was done in Flin Flon as the mine and smelter operation was being decommissioned).

Question:

Please supplement the Socio-economic Assessment (Section 9.3.3) by utilizing a community health assessment with the objective of identifying and mitigating potential adverse social effects, while specifically identifying community socioeconomic and health benefits and opportunities for local residents.

Response:

As indicated in *CEC/MH-VI-344b* and *CEC/MH-VI-346a*, the responsibility for undertaking a community health assessment rests with the provincial health authorities. In the case of the Bipole III Project, there is no direct pathway of effect between known Project effects and human health indices such as cancer, heart and respiratory disease rates

and hospital admissions related to such diseases. As such a community health assessment is not necessary and will not be undertaken for this project. Please see the response to *CEC/MH-VI-344b* for an outline of human health issues addressed in the EIS for the Bipole III Project.

Date	August 1 2012
Reference	Section 9 Cumulative Effects
Source	CEC Information Request #6
Question	CEC/MH-VI-347c

The cumulative effects assessment (Section 9.0) is very vague, generic and qualitative, with only checklists identifying potential cumulative effects between known and announced projects. The conclusion (.... a small magnitude, medium-term cumulative effect is expected....) is not defensible on the basis of the CEA. The Socio-Economic Assessment (Section 9.3.3) utilizes red squares in Table 9.3.2 to Represent "potentially non-negligible negative cumulative effects" on personal, and community life. Again this is a qualitative assessment that could benefit substantially form a community health assessment with the objective of identifying and mitigating potential adverse social effects, while specifically identifying community socio-economic and health benefits and opportunities for local residents. Monitoring plans (Section 9.0) could benefit by adding human community health monitoring that would not necessarily be cost prohibitive (eg selected blood and urine monitoring within communities as was done in Flin Flon as the mine and smelter operation was being decommissioned).

Question:

Please comment on the suggestions that: Monitoring plans (S. 9.0) could benefit by adding human community health monitoring that would not necessarily be cost prohibitive per example above.

Response:

Human community health monitoring programs may be appropriate where there is a direct pathway of a measureable effect between the Project and human community health indices to support such activity. Monitoring implementation costs are also a factor in this consideration. In the case of the Bipole III Project, there is no reasonable

basis to design or support adding human community health monitoring (see response to *CEC/MH-VI-347b*).

Date	August 1 2012
Reference	Project Alternatives S. 2.3.3
Source	CEC Information Request #6
Question	CEC/MH-VI-348

Question:

MH rejected Alternative 2 –Building Natural Gas-Fired Generators in Southern Manitoba

Please comment on the suggestion that: The gas-fired power plant option should be re-examined in a benefit-cost scenario that considers the much lower current and projected natural gas prices as well as the potentially reduced overall project footprint and associated environmental impacts.

Response:

There are no costs associated with the purchase of gas included in Alternatives 2 or 3, therefore natural gas prices have no impact on the costs of these alternatives.

As the gas-fired power plant was rejected, no environmental assessment was conducted to understand the potential environmental impacts associated with such an alternative.

Please see related responses to *CEC/MH-VI-331a, and CEC/MH-V-154.*

Date	August 1 2012
Reference	Environmental Protection Plan Appendix 11-1, Chapter 8, Various Tech rpts.
Source	CEC Information Request #6
Question	CEC/MH-VI-349

There is a lack of clear concordance among the inspection an monitoring sections in the technical reports, Chapter 8, and the draft EPP. Some suggestions for inspection and monitoring in the technical reports are not picked up in the EIS, e.g. effluent monitoring is raised in the Aquatic report S. 6.3 but is not addressed in Chapter 8 section 8.2.4.6.

Question:

Please explain the lack of agreement among the inspection and monitoring sections in the technical reports, Chapter 8 and the draft EPP.

Response:

All monitoring activities will be designed in accordance with the requirements of the *Environment Act*. Any suggestions for monitoring contained in the technical reports are suggested mitigation measures and will need to be discussed with the regulator, prior to the monitoring plan being formally submitted and accepted.

Date	August 1 2012
Reference	Attachment 11-1, Appendix H
Source	CEC Information Request #6
Question	CEC/MH-VI-350

While the EIS includes a preliminary Biophysical Environment Effects Monitoring Framework (Appendix H), there is no corollary plan for Socio-economic Effects or Heritage Resources. This is an important gap given the differences in VECs and residual effects among environmental, socio-economic and heritage resources.

Question:

Please describe the fundamental components of the preliminary monitoring plans (which are referenced in section 8.3.1.5) for socio-economic and heritage impacts.

Response:

Section 11.3.4.4 in Chapter 11 discusses socio-economic monitoring for the project. The socio-economic monitoring plan is currently under development. Monitoring key components of the socio-economic environment will be undertaken during the construction and operation and maintenance phases of the project. Similar to other projects undertaken by Manitoba Hydro, socio-economic monitoring plans will be developed and submitted to the regulator in advance of all project phases, and results from the socio-economic monitoring program will be reported to regulatory authorities. Two streams of socio-economic monitoring will be undertaken for the project – social monitoring and economic monitoring. The purposes of the socio-economic monitoring program for the Project will be to:

- Confirm effects predictions documented in the Environmental Impact Statement;
- Monitor the effectiveness of mitigation measures;
- Identify unanticipated effects; and

- Identify other actions necessary to mitigate adverse effects or enhance positive effects.

The fundamental components of socio-economic monitoring will include:

1) Economic monitoring:

- Employment/workforce: Tracking project employment outcomes (e.g., total hires)
- Business opportunities: Monitoring project business outcomes (e.g., total value of contracts)
- Income: Tracking project income levels of workers and direct taxes paid

2) Social monitoring

- Infrastructure and services: Monitoring in key areas (e.g., Gillam) the demands placed on existing infrastructure and services (e.g., hospitals, RCMP)
- Transportation safety: Monitoring key roadways (e.g., PR 280) for traffic volumes and accidents

The following are the fundamental components of monitoring heritage resources.

1) Site Avoidance

Avoidance is the preferred process. The route selection process attempted to avoid known (registered) heritage resources.

2) Environmental Protection Plan (EPP)

As part of the EPP, a protocol and set of guidelines for monitoring, managing and protecting heritage resources will be established.

A stand-alone Heritage Resources Protection Plan (HRPP) has been drafted for the Keewatinoow Converter Station near Conawapa. This plan follows the *Manitoba Heritage Resources Act* (1986) Policy Concerning the Reporting, Exhumation and Reburial of Found Human Remains (1987) and direction by the Fox Lake Cree Nation (FLCN) Elders who participated in on-site evaluation and guidance.

3) On-site Monitoring

Occasionally heritage resources are exposed during construction and related activities. The EPP will contain specific instruction as to the identification and monitoring of previously unknown heritage resources. Manitoba's *Heritage Resources Act* (*The Act*) is the legislation that governs heritage resources and the Historic Resources Branch manages *The Act*. The guidelines for on-site monitoring will be developed to ensure that legislation and instruction are followed.

Locations that were identified as Environmentally Sensitive Sites (ESS) for heritage resources, which were considered high priority and which were not possible to access during the assessment period, will be monitored on a case-by-case basis.

Date	August 1 2012
Reference	Chapter 11,section 11.3.4.2, Attachment 11-1, section 6 and Appendix H, section 4
Source	CEC Information Request #6
Question	CEC/MH-VI-351

There are several indications that regulators, Aboriginal communities and groups, and other interested parties will be involved in follow-up activities (especially monitoring) (e.g. Chapter 11,section 11.3.4.2, Attachment 11-1, section 6 and Appendix H, section 4) but the extent of the involvement is unclear.

Question:

Please provide a specific community involvement plan, or at the very least a detailed framework for a plan.

Response:

Manitoba Hydro is offering to meet with communities to review the Draft Environmental Protection Plan for the Bipole III Transmission Project. The intent of these meetings is to review with communities the mitigation and monitoring plans Manitoba Hydro intends to put into place, and to discuss with communities the specific mitigation and monitoring activities that relate to the concerns raised by communities. As the project proceeds, there will be on-going communication by Manitoba Hydro with communities where construction activities are occurring to ensure that any issues/concerns that may arise are addressed in a timely fashion.

Date	August 1 2012
Reference	Chapter 11, S. 11.3 and Attachment 11-1, section 6
Source	CEC Information Request #6
Question	CEC/MH-VI-352a

Consistent with the continuous improvement purpose of MH's environmental policies and EMS, the EPP (Chapter 11, S. 11.3 and Attachment 11-1, section 6) establishes a process for updating and reviewing the plan. The process sets out several important sources of information for the review but does not explicitly state that monitoring and auditing results will feed into the process

Question:

Please elaborate on how monitoring and auditing results will have an effect on the EPP.

Response:

Monitoring of the EPP will be an ongoing process throughout construction of the project. Any issues/concerns found through that process will be communicated in a timely fashion to ensure that they are addressed quickly and effectively. This would include any instances where there may be a requirement to alter or change an aspect in the EPP. If that were to occur MH would be in direct contact with the Provincial regulatory body and/or the associated department or Regional Director to ensure that all parties are aware and agree that an alteration or change is necessary. All aspects of that type of situation will be documented and reported in the annual monitoring report as per the *Environment Act* Licence.

Date	August 1 2012
Reference	Chapter 11, S. 11.3 and Attachment 11-1, section 6
Source	CEC Information Request #6
Question	CEC/MH-VI-352b

Question:

Consistent with the continuous improvement purpose of MH's environmental policies and EMS, the EPP (Chapter 11, S. 11.3 and Attachment 11-1, section 6) establishes a process for updating and reviewing the plan. The process sets out several important sources of information for the review but does not explicitly state that monitoring and auditing results will feed into the process.

Will monitoring and auditing results have an effect on MB's broader Environmental Protection Program and, if so, by what mechanisms?

Response:

Monitoring and auditing results will be shared within Manitoba Hydro through ongoing communications between many departments and senior personnel. Section 11.2.1 in EIS Chapter 11 indicates the organizational structure to be used for the implementation of the Bipole III environmental protection program as indicated in Section 11.2.2 of EIS Chapter 11. The structure ensures essential feedback on the performance of the environmental protection program and appropriate response to any environmental protection issues should they arise.

Date	August 1 2012
Reference	Chapter 10
Source	CEC Information Request #6
Question	CEC/MH-VI-353

Question:

Preamble: Evaluating the sustainability of a project, or the overall net contribution to sustainable development, involves trade-offs within and between environmental, economic, human health and social well-being. While the impact statement specifies that, in the proponent's opinion, the project impact on each VEC should be assessed as "not significant", nonetheless, there are negative, positive and neutral implications.

Please provide a discussion that demonstrates the trade-offs considered amongst environmental, economic, human health and social well-being components that allow MH to achieve environmentally sound and sustainable economic development in respect to this proposed development.

Response:

Chapter 7 of the Environmental Impact Statement is dedicated to discussion of the route selection process and articulates the trade-offs considered in the selection of the preferred route that allows Manitoba Hydro to achieve environmentally sound and sustainable economic development with respect to the proposed development.

Overall, the goal of the site selection process for the project was to balance environmental, economic and social considerations in identifying alternative routes and ultimately selecting the preferred route. Through the process, alternate routes were selected to avoid valued and sensitive areas such as national parks, ecological reserves, provincial wilderness parks, provincial protected areas and critical habitat for species at risk. Technical feasibility and cost effectiveness were also considered. A total of 28

factors, including ATK, were used to evaluate the alternative route segments and to select the preferred route in five general categories: biophysical, socio-economic, land use, technical and stakeholder input. Please also see response *CEC/MH-II-024*.

Date	August 1 2012
Reference	Chapter 4
Source	CEC Information Request #6
Question	CEC/MH-VI-354

Preamble:

The determination of significance often includes sustainable development (or sustainability) as one evaluative criterion. The methodology employed in this impact statement considers eight criteria, as specified in the scoping document (ecological value; societal value; nature of the effect; magnitude of the effect; geographic extent of the effect; frequency of the effect; duration of the effect; and reversibility of the effect); however this methodology does not explicitly identify sustainability, nor does it capture all four elements which inform the typical headings in Manitoba Hydro's sustainable development "guidelines" (economy, environment, human health and social well-being) (see Table 10.2-1).

Question:

a) Please explain how the determination of significance addresses best practice, as required in the scoping documents, with specific consideration to sustainability objectives.

b) Please provide a rationale as to why sustainable development was not explicitly considered in the determination of significance.

Response:

(a) and (b)

As reviewed in Chapter 4 (Assessment Approach), the determination of significance was undertaken in accordance with the EIS Scoping Document and prior experience in SSEA

studies for transmission facilities and considered applicable legislation, guidelines, standards etc. In this manner, the approach addressed best practice for the environmental assessment of the significance of adverse effects of the Project on VECs.

The EIS Scoping Document specified the criteria to be considered to determine the significance of residual environmental effects of the Project on a VEC. The criteria are defined on pages 4-32 and 4-33 of the EIS and are as follows: direction or nature of effect; magnitude; geographic extent; duration; frequency; reversibility; ecological importance and societal importance. The EIS Scoping Document did not specify sustainability objectives as one of the criterion to determine significance of residual adverse effects on a VEC. Accordingly, sustainable development was not explicitly considered in the determination of significance.

However, the significance determination criteria as adopted do implicitly assess the impact of the Project on the sustainability of each VEC. i.e., "magnitude" addresses whether effects on a VEC exceed established thresholds of acceptable change, "ecological importance" addresses the ecological context of a biophysical VEC (including sensitivity to disturbance) and "societal importance" addresses the context of a socio-economic VEC (including sensitivity to disturbance and values placed on specific VECs).

In addition, the Scoping Document specified that the EIS should examine

> "…how Manitoba Hydro's corporate environmental and sustainable development policies are incorporated into the planning, design, construction, operation and maintenance, and eventual decommissioning of the proposed Project. Sustainability indicators will be identified, described, and assessed, and incorporated in to the follow-up program. The EIS will also discuss how Manitoba's Principles and Guidelines of Sustainable Development, as scheduled under *The Sustainable Development Act*, have been or will be met".

A separate chapter (Chapter 10) was included in the EIS to address the above.

Date	August 1 2012
Reference	Chapter 10
Source	CEC Information Request #6
Question	CEC/MH-VI-355

Question:

The Impact Statement identifies Manitoba Hydro's thirteen guiding principles for all operations. Table 10.2-1 describes each principle (drawing from Schedule A of the Sustainable Development Act (C.C.S.M. c. S270)), explains how it is incorporated into the design of the proposed development, and identifies potential indicators. The indicators identify specific target areas, but do not give information on potential thresholds or targets important for understanding the project's sustainability. This group of questions, then, focuses on the thresholds and/or targets for the sustainability indicators and on table 10.2-1. For clarity, we divide this group of questions by each Sustainable Development Principle. Where appropriate, we identify relevant table heading (ie. Comment or Indicator). When considering the indicator questions, our goal is to understand the quantity Manitoba Hydro equate with "success".

Question:

As noted in Chapter 10, Section 10.2, the sustainability indicators provided in the chapter were examples and not intended to be exhaustive. Indicators, including any applicable targets, are currently in development and will be finalized prior to construction. For some indicators, corporate targets will be used to measure performance as noted below. For other indicators, project specific targets will be developed (e.g., salvageable timber). Furthermore, some indicators will only be tracked and will be used to inform adaptive management measures for the project.

a) Please explain how Manitoba Hydro proposes to assess whether on-going (e.g. construction, operation, decommissioning) economic decisions

adequately reflect environmental, human health and social effects. (Comment)

Manitoba Hydro's environmental management system (EMS) works alongside other corporate systems to support the integration of economic, environmental, and other considerations into various decision-making processes. The EMS applies to all assets, infrastructure, business processes, support and customer services occurring in Manitoba that relate directly to the generation, transmission, and distribution of energy in Manitoba. The purpose of this system is to help Manitoba Hydro identify those types of activities that have the potential to result in environmental impacts, set goals to manage them, implement plans to meet those goals, evaluate performance, and make continual improvements to the system. As one example of this, operating units engage in annual management review exercises with the intention of identifying changing circumstances, legislation, stakeholder interests and potential impacts. The results of these reviews are incorporated into risk management and planning activities in the various operating units.

b) Please identify the specific components of the Environmental Protection Plan that will be used to inform economic decisions. (Indicator) Stewardship. The impact statement (p. 10-5) identifies describes stewardship within the context of the economy, the environment, human health and social well-being.

The question appears to inadvertently reference the principle of stewardship in association with the Environmental Protection Plan Indicators. In Table 10.2-1, the EPP indicators pertain to the principle of "integration of environmental and economic decisions" on page 10-4, while the examples of indicators for the principle of Stewardship are found on page 10-5.

c) Please provide your view on whether the commentary for this principle focuses on the issues of economy, human health and social well being to the exclusion of the environment, Does Manitoba Hydro agree that the interpretation of this principle should extend to the environment? (Comment)

Manitoba Hydro agrees that the interpretation of the Stewardship principle extends to the environment.

d) Although the stewardship principle encompasses four elements (economy, environment, human health and social well-being) all indicators listed under this topic are economic in nature. Please identify the indicators through which the project's overall contribution to human health, the environment and social wellbeing will be evaluated. (Indicator)

In addition to the indicators noted in the table, the following indicators are also being considered:

- Rates of worker retention, including average duration of employment and rates of turnover
- Number of workers who have received cross cultural training programs
- Human health and safety – Accident frequency - The number of lost time injuries that occurred in a specified period of time.

e) Please identify Manitoba Hydro's specific targets with respect to the percent of goods and services purchased from Manitoba, Local business/suppliers and Aboriginal business/suppliers. (Indicator)

Procurement Policies are in place that provide preference to Manitoba, Northern Manitoba and Northern Aboriginal businesses. Due to the varying type and volume of goods and services procured from year to year and Manitoba Hydro's open tendering practice, no specific targets exist.

Manitoba Hydro strives to maximize procurement within these preferential groups subject to the overriding principle that the quality of goods, attainment of schedules, and achievement of acceptable costs will be the primary factors considered in all preferential purchase decisions. Through an open tendering practice, Manitoba Hydro identifies within tender documents and would apply a preference for Manitoba, Northern Manitoba and Northern Aboriginal vendors. Manitoba Hydro does not have control over

the bid submission of the vendors and therefore evaluates preferential procurement policies on a contract by contract basis.

Furthermore, in the case of both the transmission line and the converter stations, the percentage of Manitoba, Northern Manitoba and/or Northern Aboriginal content may be lower than it would be for other projects because of the nature of the goods and services are highly technical, have limited or no Manitoba supply options, and/or lacking economic competitiveness.

f) Please identify Manitoba Hydro's specific target with respect to the percent of the project workforce that will be Aboriginal. (Indicator)

This indicator will be tracked annually and will not have a target. However, Manitoba Hydro has mechanisms in place to hire locally in the vicinity of its projects. Clearing and construction of the transmission lines will be subject to a collective agreement (the Transmission Line Agreement) which will allow Manitoba Hydro to include hiring preferences in the tender specifications. Through the contracting process, Manitoba Hydro expects the Contractor to actively promote the participation of Manitoba business, Northern Manitoba business and Northern Manitoba Aboriginal business for the Project. In addition, the Contractor in selecting persons (other than supervisory personnel) to be employed on the Project who meet the Contractor's requirements in training, experience and other qualifications for the work to be performed, shall give preference to Aboriginal and local residents.

For Keewatinoow Converter Station construction, employment opportunities will generally be based on the hiring preferences defined in the Burntwood Nelson Agreement (BNA). The BNA includes a preference for hiring Northern Aboriginal employees.

For operation and maintenance of the HVdc line and associated collector lines, as stated in response *CEC-VI-243*, hiring of new positions will follow Manitoba Hydro's hiring practices. Manitoba Hydro strives to create a workforce that reflects the diversity of the population served.

g) Recognizing that the goal of all workplaces is for zero accidents, nonetheless, what target has Hydro set with respect to accident frequency as a means of evaluating the project with respect to sustainable development. (Indicator) Integrated Decision-making and planning

The corporate targets (as established in Manitoba Hydro's Corporate Strategic Plan) will be adopted for this indicator. For accident frequency the target in the CSP is less than .8 accidents per 200 000 hours worked. The Corporate Strategic Plan is available on the Manitoba Hydro website at http://www.hydro.mb.ca/corporate/csp/index.shtml.

h) Please explain the systems in place to ensure integrated decision-making across departments responsible for power supply (northern generation, new construction) and transmission.(Indicator)

Manitoba Hydro ensures integrated decision-making across all of its business units through the business planning processes in place at Manitoba Hydro.

Shared responsibility and understanding

i) Please identify targets for the number of inspectors on-site during construction, the number of training sessions for contractors and the number of community members involved in the EPP to illustrate sustainable development (Indicator)

This indicator will be tracked annually and will not have a target. The number of inspectors and training sessions are contingent upon the geographic area of work, type of work as well as size of workforce. The environmental protection program has been reviewed with communities in the vicinity of the Bipole facilities, and the construction phase EPP will be reviewed with directly affected communities to discuss measures to mitigate adverse project effects as well as project monitoring.

Efficient use of resources

j) Please identify the target volume of recycled material used in project construction (Indicator)

Objectives for this indicator are under development and will include comparison with MH experience in past projects (ex. Wuskwatim GS construction). This will need to be informed by site specific design and planning.

k) Please identify the target volume of wood made available to the community through ROW clearing. (Indicator)

Manitoba Hydro will salvage as much merchantable timber cleared from the Project footprint as is financially and logistically practical on Crown lands. With respect to private land wood, utilization will be left to the discretion of the landowner. Within most of the Project Local Study Area the Forest Management License and quota holders have first right of refusal to all merchantable timber, species specific to their respective agreements. Timber not bound by such agreements or rejected by the agreement holders can be made available to local communities (conditional on permission from Manitoba Conservation and Water Stewardship). The demand for timber for domestic use may vary widely between communities and will be explored locally by Manitoba Hydro in advance of clearing.

Given the above and the fluctuating demand for forestry products it is difficult for Manitoba Hydro to predict with any certainty the volume of wood that will be salvaged or what the demand may be within communities in proximity to the Project footprint.

Prevention, Rehabilitation and reclamation

l) Please identify the percent of land area used in decommissioned components (e.g. burrow areas) that will be reclaimed in the project (Indicator)

Manitoba Hydro plans to decommission lands for borrow areas (developed for the project), construction sites and Project components that are no longer required.

Waste minimization and substitution

m) Please identify the ratio of waste to diversion anticipated during construction (Indicator)

Please see response to j) above. There is not a project target ratio for waste diversion but performance will be tracked and informed by experience from past projects.

Public participation & Access to information

n) Notification is one indicator of an effective public participation program. Please identify addition indicators (e.g. attendance at annual review events) useful for assessing this principle. (Indicator)

One other indicator, as noted in the table, is the number of locations where project information is made available to the public. Indicators for this principle are currently in development.

Research and innovation

o) Please quantify the threshold associated with public complaints considered unsustainable. (Indicator)

This indicator will be tracked annually.

Global responsibility

p) Please identify the threshold for GHG fleet vehicle emissions considered unsustainable. (Indicator)

The Global Responsibility indicator provided in Table 10.2-1 should read "Amount of atmospheric emissions of GHGs from Project". The inclusion of the phrase "vehicle fleet" at the end of the indicator was an error. While emissions associated with vehicles and other equipment were a component of the life cycle greenhouse gas analysis, their contribution was a very modest portion of the total GHG emissions estimate. Fleet vehicle emissions, in and of themselves, would not be a meaningful indicator of global responsibility for this project. Details of the life cycle greenhouse gas emissions associated with the Project are provided in response to question (q) below.

q) GHG emissions associated with this project go beyond fleet vehicles. Please explain the total GHG emission balance targeted for the project. (Indicator)

As described in the EIS (Chapter 8.2.2.4 - *Environmental Effects Assessment and Mitigation*, a life cycle assessment (LCA) was used to estimate the greenhouse gas (GHG) emissions resulting from the construction, land use change, operation, and decommissioning of the Project. The EIS considered all of the significant contributing GHG factors throughout the life of the project. For example, the construction analysis phase includes all GHG emissions due to construction activities, equipment operation and includes the GHG emissions from raw material extraction, production and transportation associated with components such as the steel towers and aluminum conductors.

Manitoba Hydro contracted the Pembina Institute to prepare the quantitative GHG assessment (i.e. the Bipole III Greenhouse Gas Lifecycle Assessment Technical Report).

The project is estimated to generate 923,273 tonnes CO2 equivalent where the construction of the transmission line accounts for 760,989 CO2eq tonnes and the converter stations 162,284 tonnes CO2eq. Figure 8.2-1 in the EIS summarizes the results of the GHG analysis by life cycle stage.

Date	August 1 2012
Reference	Appendix A1/*CEC/MH-III_120*
Source	CEC Information Request #6
Question	CEC/MH-VI-356

Preamble:

The scoping document requires Manitoba Hydro to provide a list of all applicable legislation, regulation, policies and guidelines from relevant jurisdictions, including federal and provincial statues and regulations and municipal by-laws, agreements and other regulatory and policy structures (p.3). Appendix A lists only lists only federal and provincial statues and regulations. *CEC/MH-III-120* Asks Hydro to clarify if there are/will be situations that don't comply with local regulations.

Question:

(a) Please list the outstanding municipal by-laws, agreements or other regulatory instruments applicable to the project.

(b) Please identify the specific permits, land leases, water licenses, navigable water licenses, and other authorizations required for the project (Appendix A-1). To facilitate this response, we suggest adding two additional columns to the table provided in Appendix A-1

Response:

a) Efforts were made to review the by-laws of rural municipalities, cities, towns and villages through which, or near which, Bipole III is to be constructed. The by-laws of 18 of these entities were accessible on-line and were reviewed. No provisions were found that were considered a concern to Bipole III, taking into account that it is to be constructed and operated by a Crown utility which is exempt from some provisions in some by-laws. The by-laws of a remaining 36 entities were not accessible on-line and

thus were not reviewed, although, as noted below, Manitoba Hydro has had meetings with representatives of affected municipalities and planning districts. As part of the Bipole III consultation process, Manitoba Hydro met with municipalities and planning districts which may be affected by the Bipole transmission line route. Through this process Manitoba Hydro was provided with development plans, which assisted in the routing process. Prior to construction Manitoba Hydro anticipates meeting with municipalities along the Bipole III route to ensure that construction activities are not in conflict with any applicable local by-laws.

b) Appendix A1 to Chapter 1 of the EIS lists out the applicable provincial and federal legislation that may be applicable to the Bipole III Transmission Project. Included is the column indicating what actions are required to address the requirement of the legislation or regulation. Given that specific sections of the Act are listed with the name of the Act no further columns will be added to the appendix.

Date	August 1 2012
Reference	Chapter 3, Section 3.4.7
Source	CEC Information Request #6
Question	CEC/MH-VI-357

Question:

The Community Development Initiative (CDI) is designed "to provide real and directed benefits to communities in the vicinity of Bipole III" Section 3.4.7 identifies five potential theme areas to which this initiative is envisioned to apply. CEC IRs 94 through 96 inquire about community and group eligibility. However, the documentation does not address the process for adjudicating application and allocation funding through this initiative.

Please explain the adjudication process and fund allocation formula used to for the CDI.

Response:

There will be no adjudication process for the Community Development Initiative ("CDI"). A community's eligibility for CDI funds will be determined based on the eligibility criteria as described in the EIS. Estimated annual payments for eligible communities will be based on a community's proximity to the Bipole III facilities, or the distance of a RMA or RM traversed by the Bipole III facilities, and the community's population.

Date	August 1 2012
Reference	Appendix 11-1, also Chapter 4
Source	CEC Information Request #6
Question	CEC/MH-VI-358a

Question:

Preamble: This set of questions focuses on the Environmental Protection Plan as a whole. The next set focuses specifically on the Environmental Protection Information Management System (EPIMS). The EIS notes, on several occasions, that the Environmental Protection Plans (EPP) will be updated as necessary. However, "as necessary" is vague, and it unclear what thresholds exist for an actual update to the EPP. This group of questions builds on the CEC IR 2 b, which asks about what the process is (or what transpires) should monitoring indicate a problem that requires mitigation, and *CEC/MH-II-002j* which seeks information about the track record of Manitoba Conservation in monitoring.

Request:

(a) Can MB Hydro give example(s) of an update to the Environmental Protection Plan for the Wuskwatim Project stemming from that project's monitoring program?

Response:

By way of example, during the annual monitoring in 2010 a heron rookery was identified in proximity to the Wuskwatim Transmission Project, the specialist identified the need for bird diverters to be installed on adjacent transmission line spans. Diverters were installed and the site was added to the monitoring program to determine mitigation effectiveness.

Date	August 1 2012
Reference	Appendix 11-1, also Chapter 4
Source	CEC Information Request #6
Question	CEC/MH-VI-358b

Question:

This set of questions focuses on the Environmental Protection Plan as a whole. The next set focuses specifically on the Environmental Protection Information Management System (EPIMS). The EIS notes, on several occasions, that the Environmental Protection Plans (EPP) will be updated as necessary. However, "as necessary" is vague, and it unclear what thresholds exist for an actual update to the EPP. This group of questions builds on the CEC IR 2 b, which asks about what the process is (or what transpires) should monitoring indicate a problem that requires mitigation, and *CEC/MH-II-002j* which seeks information about the track record of Manitoba Conservation in monitoring.

Request:

b) In MB Hydro's expert opinion, what is the best estimate of the number of Environmental Inspectors that will be necessary for this project (Section 2.4 p17)?

Response:

Each construction section will have one environmental inspector and one environmental monitor assigned to the section during the course of construction. Additionally, the construction inspectors will be trained to be able to undertake the duties of the environmental inspector in those instances where the environmental inspector is not on site (i.e., time off). It is anticipated that there will be three sections being cleared concurrently.